Port of Umm Qasr Yard 5 Terminal Development
Environmental and Social Impact Assessment

Scoping Report

On Behalf of:
Basra Multipurpose Terminal

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List of Abbreviations and Acronyms

Abbreviation/Acronym	Description
AOI	Area of Influence
AXO	Abandoned explosive ordnance
BCE	Before Common Era
b/d	Barrels per day
Becquerel/l	Radionuclide per litre
bgl	Below ground level
BMT	Basra Multipurpose Terminal
BOD	Biological Oxygen Demand
BOT	Build Operate Transfer
BSI	British Standards Institute
BTEX	Benzene, toluene, ethylbenzene and xylene
BWh	Desert climate (as per Koppen climate classification)
CCTV	Closed-circuit television
CE	Common Era
CFCs	Chlorofluorocarbons
CFS	Container freight stage
CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm	Centimetres
CMR	Cluster munition remnants
CO	Carbon monoxide
COD	Chemical Oxygen Demand

Abbreviation/Acronym	Description
CO_2	Carbon dioxide
CPA	Coalition Provisional Authority
CPT	Cone Penetration Tests
CSO	Central Statistics Office
dBa	A-weighted decibels
DEP	Diethyl phthalate
DMP	Dimethyl phthalate
DU	Depleted Uranium
DWT	Deadweight tonnage
EAME	Earth & Marine Environmental Consultants
ECH	Empty Container Handler
EPIC	Environment Protection and Improvement Council
EHS	Environmental, Health, and Safety
EBA	Endemic Bird Area
ESG	Environmental, social and corporate governance
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Monitoring Plan
ESMS	Environmental and Social Management System
EU	European Union
FAO	Food and Agriculture Organization
FCO	Foreign and Commonwealth Office
FGM	Female Genital Mutilation
FIDIC	International Federation of Consulting Engineers
FPIC	Free, prior, and informed consent
GCPI	General Company for Ports of Iraq
GDMA	General Directorate of Mine Action

Abbreviation/Acronym	Description
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GIIP	Good International Industry Practice
GIS	Geographic information system
GoI	Government of Iraq
GW	Gigawatt
Ha	Hectares
HFC	Hydrofluorocarbons
HGVs	Heavy Goods Vehicles
H_2S	Hydrogen sulphide
IBA	Important Bird Area
IAQM	Institute of Air Quality Management
ICOMOS	International Council on Monuments and Sites
ICP	informed consultation and participation
IDPs	Internally Displaced Persons
IFC	International Finance Corporation
ILO	International Labour Organisation
IMF	International Monetary Fund
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IKMAA	Iraqi Kurdistan Mine Action Agency
IRC	Iraqi Railway Company
ISO	International Organization for Standardization
ISPS	International Ship and Port Facility Security
IUCN	International Union for Conservation of Nature
IS	Islamic State

Abbreviation/Acronym	Description
IT	Information Technology
ITSAM	Integrated Transport System in the Arab Mashreq
JICA	Japanese International Cooperation Agency
KBA	Key Biodiversity Area
kWh	kilowatt-hours
km	Kilometre
Km/hour	Kilometres per hour
Km^2	Square kilometre
KRG	Kurdistan Regional Government
KRI	Kurdistan Region of Iraq
KZP	Khor Al-Zubair Port
LNG	Liquefied Natural Gas
LPG	Liquefied petroleum gas
m	Metres
m^2	Square metres
m^3	Cubic metres
MCM	Million cubic metres
MENA	Middle East and North African
mg/l	Milligram per litre
mg/m^3	Milligram per cubic metre
mg/m2/day	Milligram per cubic metre per day
MHC	Mobile Harbour Crane
ml	Millilitre
MOD	Main Outfall Drain
MoCH	Ministry of Construction and Housing
MoE	Ministry of Environment

Abbreviation/Acronym	Description
MoHE	Ministry of Health and Environment
MoLSA	Ministry of Labour and Social Affairs
MoP	Ministry of Planning
MoT	Ministry of Transportation
MoWR	Ministry of Water Resources
mph	Miles per hour
MSW	Municipal Solid Waste
m/s^2	Metres per second squared
NBSAP	National Biodiversity Strategy and Action Plan
NCCI	NGO Coordination Committee for Iraq
NDP	National Development Plan
NESAP	National Environment Strategy and Action Plan
NOx	Oxides of nitrogen
NSRs	Noise Sensitive Receptors
NTS	Non-Technical Summary
NTU	Nephelometric Turbidity Units
NO_2	Nitrogen dioxide
N_2O	Nitrous oxide
OPEC	Organization of the Petroleum Exporting Countries
O_3	Ozone
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCTC	Pure car/truck carrier
PCUs	Passenger car units
PCUs/hour	passenger car units per hour
PDS	Public Distribution System

Abbreviation/Acronym	Description
PFCs	Perfluorocarbons
$PM_{2.5}$	Particulate matter that have a diameter of less than 2.5 micrometers
PM_{10}	Particulate matter that have a diameter of less than 10 micrometers
POPs	Persistent Organic Pollutants
ppm	Parts per million
PS	Performance Standard
RERDs	Real Estate Registration Departments
RoRo	Roll-on/Roll-off
RS	Reach Stacker
RTG	Rubber Tyre Gantry
SBAH	Iraq State Board of Antiquities and Heritage
SBSTTA	Subsidiary Body on Scientific and Technological Advice
SEP	Stakeholder Engagement Plan
SF	Sustainability Framework
SF_6	Sulphur hexafluoride
SHAs	Suspected hazardous areas
SIA	Social Impact Assessment
SOx	Oxides of sulphur
SO_2	Sulphur dioxide
STS	Ship-to-Shore
Tcf	Trillion cubic feet
TCU	True Colour Unit
TEU	Twenty-foot equivalent unit
TIL	Terminal Investment Ltd

Abbreviation/Acronym	Description
TIS	Traffic Impact Study
TSCs	Technical Service Contracts
TSP	Total Suspended Particle
TTUs	Tractor Trailer Units
UK	United Kingdom
UN	United Nations
UNCAC	UN Convention Against Corruption
UNCCD	UN Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNFCCC	United Nations Framework Convention on Climate Change
UPS	Uninterruptible power supply
UQP	Umm Qasr Port
USA	United States of America
UXO	Unexploded ordnance
VBIED	Vehicle-Borne Improvised Explosive Devices
VOCs	Volatile Organic Compounds
WBG	World Bank Group
WebTAG	Web Transport Analysis Guidance
WHO	World Health Organization
WHSs	World Heritage Sites
WSSD	World Summit on Sustainable Development

Abbreviation/Acronym	Description
WTPS	Waterway Trading & Petroleum Services
ZTV	Zone of Theoretical Visibility
$	US Dollars
ºC	degrees Celsius
µg/m^3	Microgram per cubic metre
ºF	Degrees Fahrenheit

1 Introduction

This document presents the Port of Umm Qasr Yard 5 Terminal Development ("the Project") Environmental and Social Impact Assessment (ESIA) Scoping Report.

This document has been prepared by Earth & Marine Environmental Consultants Ltd (EAME) on behalf of the client, Basra Multipurpose Terminal (BMT).

1.1 Project Background

The Republic of Iraq is located in Western Asia, bordered by Turkey, Iran, Kuwait, Saudi Arabia, Jordan and Syria. Iraq's modern borders were mostly demarcated in 1920 by the League of Nations when the Ottoman Empire was divided by the Treaty of Sèvres. Iraq was placed under the authority of the United Kingdom as the British Mandate of Mesopotamia. A monarchy was established in 1921 and the Kingdom of Iraq gained independence from the British in 1932. In 1958, the monarchy was overthrown, and the Iraqi Republic created. Iraq was controlled by the Arab Socialist Ba'ath Party from 1968 until 2003 when the Party was removed from power following an invasion lead by the United States.

Iraq comprises 19 governorates, of which four, Erbil, Dohuk, Sulaimani and Halabja are located within the Kurdistan Region of Iraq (KRI). KRI holds autonomous status as per the Iraqi Constitution.

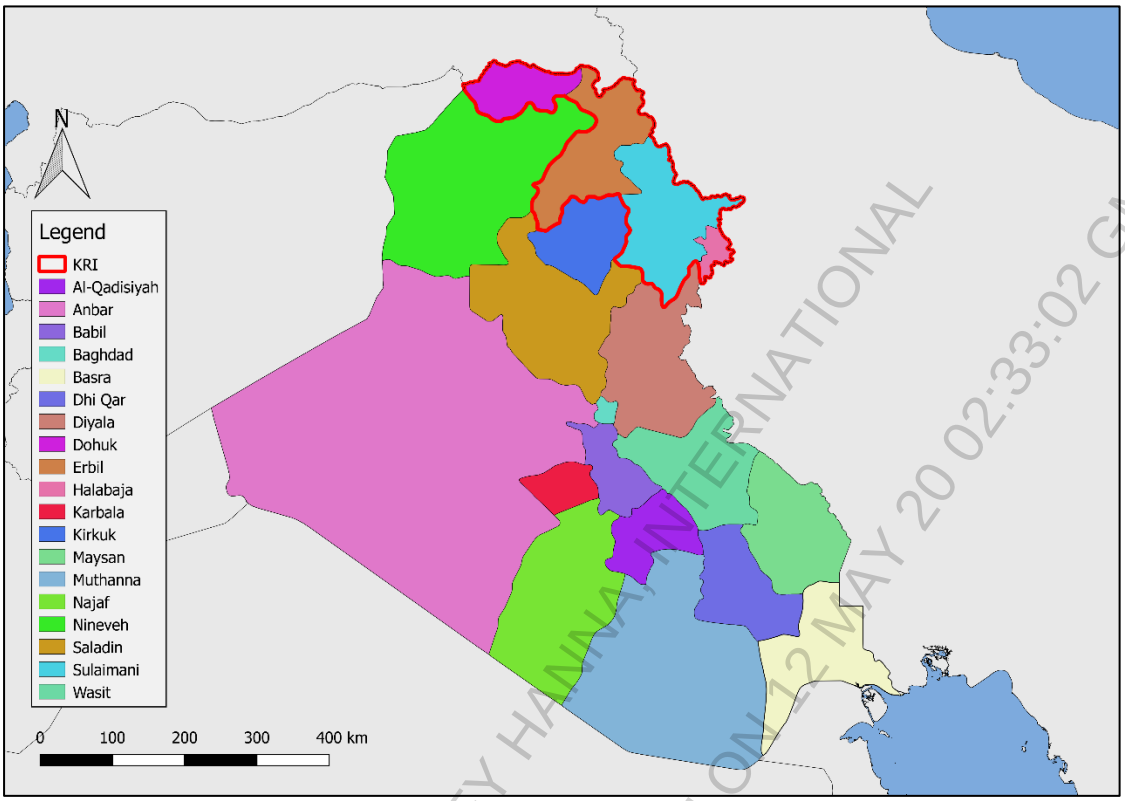

Figure 1.1: Iraq and its 19 Governorates

Iraq is rich in natural resources, including mineral and fossil fuels reserves and agricultural land and water. However, the deleterious impacts of Iraq's recent modern history have stifled the country's economic development including within the port sector. At present, calling cargo ships suffer from inefficient cargo handling services due to lack of investment and constraints caused by decades of conflict. In order for Iraq to be rehabilitated effectively, the port sector needs to be more effective and efficient in receiving and processing vessels as well as invest in more capacity.

Iraq's large annual population growth has placed significant demands on the requirement for additional food imports, which Iraq is highly dependent upon (exacerbated during the brief period of Islamic State (IS) activities which affected around 40% of Iraq's agricultural land). This import demand is placing further stress on existing port infrastructure. In addition, this stress is likely to be exacerbated by the influx of refugees and Internally Displaced Persons resulting from the ongoing humanitarian crisis in the region and notably the disintegration of Syria and IS activities.

In 2013, the Government of Iraq (GoI) produced its National Development Plan (NDP) 2013-2017 (Ministry of Planning, 2013) to provide a framework for Iraq's development goals. The vision for the port sector is to expand the capacity of Iraq's ports, and improve the port

facilities and cargo handling productivity. Accordingly, policy priorities for the GoI include improving and developing the port sector infrastructure.

As such, GoI are proceeding with this Project to develop Yard 5 at Umm Qasr Port (UQP), Iraq's only deep-water port, located within the Governorate of Basra. The Project will be part-funded by international investment banks.

1.1.1 Project Objectives

The overall objective of the Project is to develop Yard 5, in accordance with the NDP (Ministry of Planning, 2013), into a flexible and efficient terminal cargo, operating to international standards, handling container and Roll-on/Roll-off (RoRo) cargo. Specific Project objectives are to:

- Develop an international standard container and general cargo terminal which will assist with the current needs and future development of the country;
- Provide a berth structure designed for container handling equipment which will increase the capacity of UQP;
- Increase the efficiency of UQP, thereby, reduce vessel queuing times and traffic congestion; and
- Operate Yard 5 to international standards.

1.1.2 Summary of the Project

The Project will be delivered using a phased approach. Phase I will comprise the main construction works with Phase II relating to the development of additional infrastructure.

Finance for Phase I only is currently being sought. Accordingly, this Scoping Report and the ESIA are applicable to the Phase I works only.

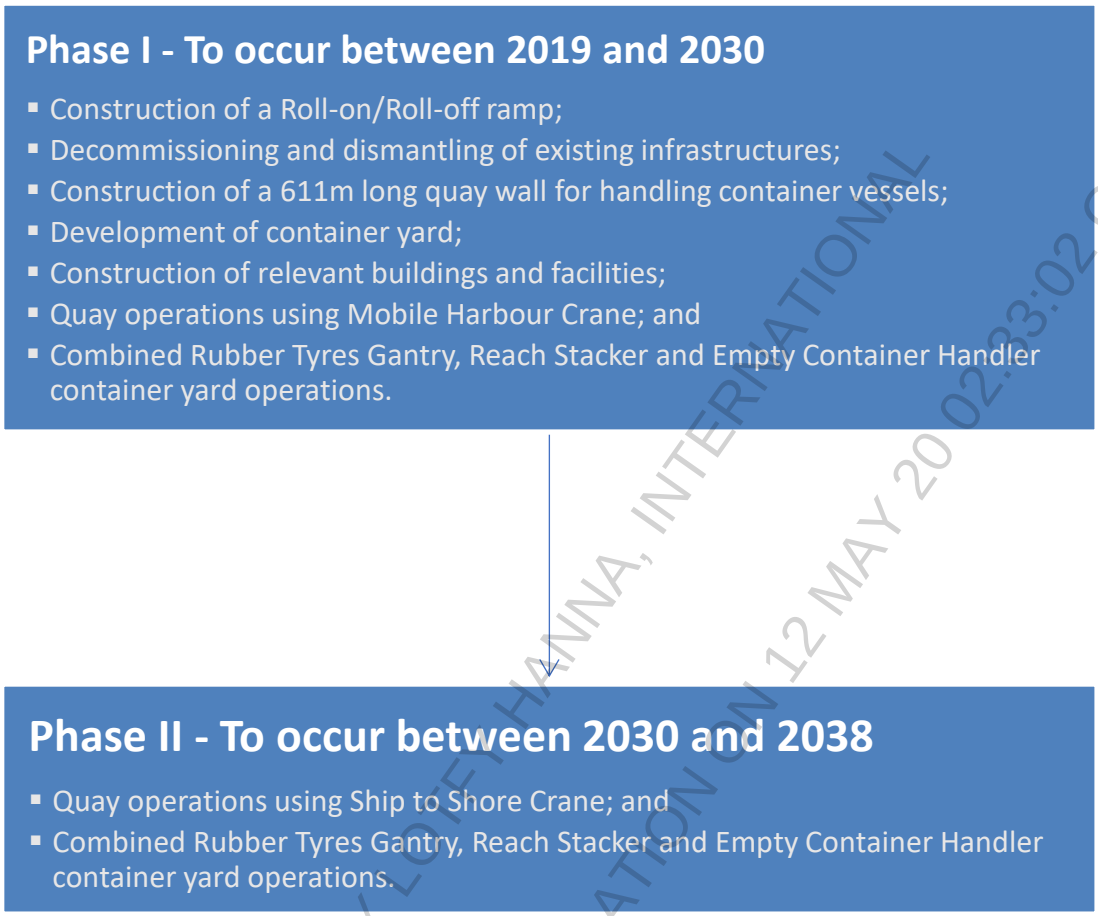

Figure 1.2: Summary of the Project Phasing

1.1.3 Project Location

The location of Project area is shown in **Figure 1.3**.

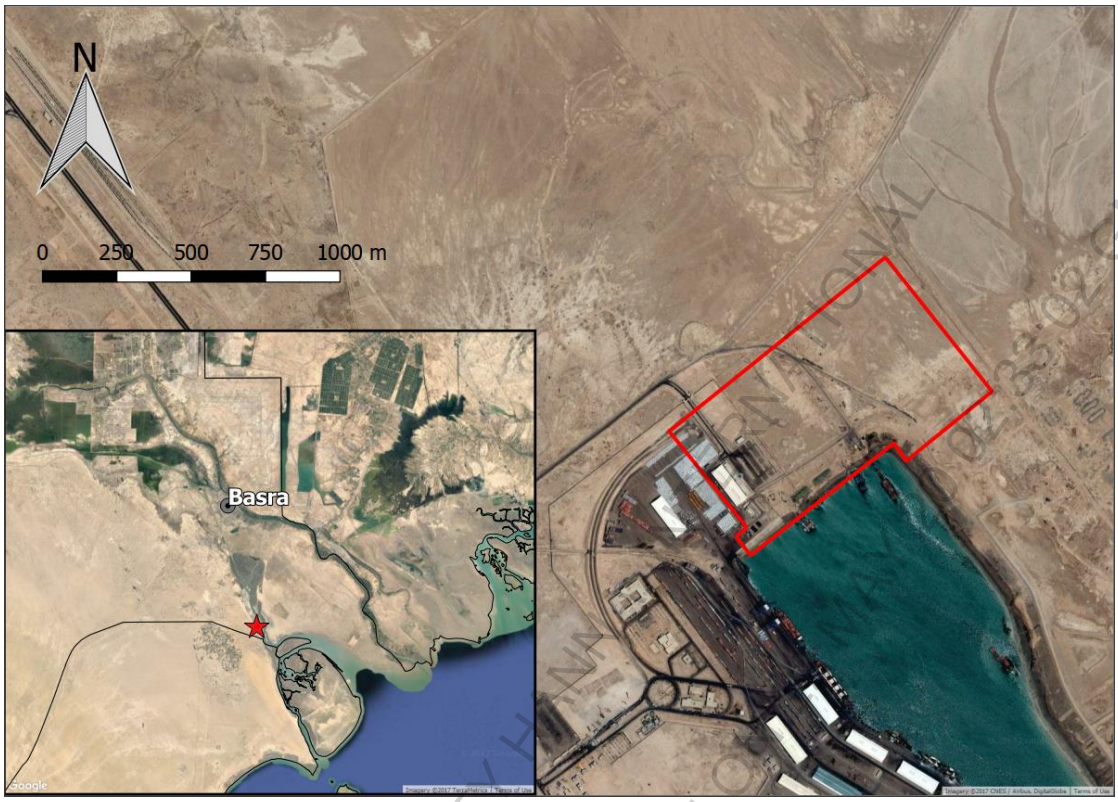

Figure 1.3: Project Location

1.1.4 Project Structure, Responsibilities and Finance

BMT is an Iraqi port operations company which currently holds the concession for Yard 5 at UQP and also operates Yard 3 (including berths 14 and 15). It is the intention that the existing container operations at Yard 3 are transferred to Yard 5 upon completion and that Yard 3 will specialise in handling general cargo.

BMT is a subsidiary of Aloreen Investment Limited Company, an-Iraqi registered company comprising three shareholders – Terminal Investment Limited Group (TIL Group) (50%), Misnak International DWC (25%) and Rayanat Aloud (25%).

BMT will undertake full contract responsibility, including design, contract, process, performance and operating risk for the entire Project. BMT will be the Project borrower and will receive funding from international investment banks. The funding will be arranged by BMT.

1.2 Environmental and Social Impact Assessment

The Project is subject to environment impact assessment under the requirements of Law No. 27 of 2009 for the Protection and Improvement of Environment.

As the Project will may be partially funded by an International Bank, BMT has determined that the Project should be assessed in accordance with the IFC Social and Environmental Performance Standards (PS) and the IFC Environmental, Health and Safety (EHS) Guidelines. In accordance with these standards and guidelines, an ESIA will be required for the Project.

EAME has been commissioned by BMT to undertake the ESIA for Phase I of the Project.

1.2.1 Purpose of Scoping Report

The scoping process is the first phase of the ESIA process and aims to identify significant issues and determine the scope of the subsequent impact assessment phase.

The following activities have been undertaken during the scoping phase:

- Identification of available data, data gaps, and how data gaps will be addressed during the next stage of the ESIA;
- Initial identification of the study area and Area of Influence (AOI);
- Project area reconnaissance;
- Definition of the baseline environmental and social conditions in the study area;
- Definition of the Project, to the extent possible;
- Initial review of Project alternatives;
- Identification of the key potential environmental and social impacts and key Projects risk and opportunities;
- Identification of the methodology for the detailed impact assessment in the next stage of the ESIA; and
- Identification of the way forward for the next stage of the ESIA.

The purpose of this Scoping Report is to set the findings of the scoping phase of the ESIA and the proposed methodology for detailed studies identified as necessary in the ESIA. As such, the ESIA can focus its efforts on those issues considered to be most important in terms of data

collections, engaging stakeholders and identifying impacts and thus forms the basis for completion of the detailed impact assessments during the next stage of the ESIA.

This Scoping Report will be circulated to the International Lenders and other interested parties. An abbreviated Scoping Report will be issued to relevant stakeholders in Arabic.

1.2.2 Project Stakeholders

For the purposes of this ESIA, a stakeholder is defined as:

"persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses." (IFC, 2007)

The expected stakeholder groups that the ESIA will seek to connect with are outlined in **Figure 1.4**. These are based on the present state of knowledge about the Project and the stakeholder communities in Iraq. The list may be modified in the light of ongoing engagement activities.

Figure 1.4: Stakeholder groups

1.3 Structure of Scoping Report

This Scoping Report is structured as follows:

Table 1.1: Structure of the Scoping Report

Section	Description
Section 1	**Introduction** Provides a background to the proposed Project, Project operators, need for the Project and the Structure of the Scoping Report.
Section 2	**Project Description** Describes the proposed Project and its components.
Section 3	**Initial Alternatives Assessment** Provides an initial review of the alternatives considered for the Project.

Table 1.1: Structure of the Scoping Report	
Section	**Description**
Section 4	**Policy, Legislative and Institutional Framework** Describes the legal and regulatory framework for the ESIA, including relevant international conventions and BMT policies.
Section 5	**Approach to ESIA** Describes the overarching requirements for ESIA, including the steps required to fulfil Iraqi legislation and IFC requirements.
Section 6 – 22	**Baseline Conditions and Approach to ESIA per Topic** Describes the existing biophysical and socio-economic environment that could be affected by the Project and provides a summary of potential issues per topic, key outstanding data requirements, and outlines the proposed methodology for the ESIA of that topic, including any interdependencies.
Section 22	**Summary of Topics Scoped into the ESIA** Summary table of the potential issues and topics scoped in the ESIA.
Section 23	**Other Projects in the Project Area** Details of other projects in the Project area
Section 24	**Stakeholder Engagement** Describes the proposed approach to stakeholder engagement and reports on consultation undertaken to date.
Section 25	**Draft Structure of ESIA Report and Environmental and Social Management Plan (ESMP)** Sets out the draft template for the ESIA report and requirements and a draft structure for the ESMP.
Section 26	**References**

2 Project Description

2.1 Regional Context

The port sector been recognised by the GoI as an important sector which requires investment. The NDP 2013- 2017 (Ministry of Planning, 2013) states the need to boost efficiency and performance of existing facilities well as developing new facilities.

It is recognised that there are several challenges to the port sector, including:

- Need to deepen, excavate and equip navigational channels into the ports;
- Remove all shipwrecks from the navigational corridors;
- Deficit of naval units, specialised port equipment, cargo-handling equipment and obsolescence of the current stock;
- Lack of government investment; and
- Unskilled and unmotivated management and workforce (Ministry of Planning, 2013).

2.2 Current Situation

2.2.1 Existing Ports in Iraq

The General Company for Ports of Iraq (GCPI) is a government agency part of the Ministry of Transportation. GCPI manages all of Iraq's ports, comprising four commercial ports and two oil export platforms, as well as undertaking maintenance and upkeep of the navigational channels.

Iraq covers any area of 434,320km^2 with a coastline of only 58km. Basra is the only Governorate with a coastline and is, therefore, a vital link to develop the land bridge between the Mediterranean Sea and the Arabian Gulf. Four commercial ports, UQP, Khor Al-Zubair Port (KZP), Abu Flous and Al Maqil, with an estimated total capacity of 16,560,000 tonnes (JICA, 2015), are located in the Governorate. Fao Port, historically an important port, is no longer commercially active and is only used by local fishermen. Grand Fao Port is reported to be one of the biggest port developments in the Middle East, however, development is yet to fully proceed and appears to have stalled.

UQP and KZP are located on the Khor Al-Zubair, whilst Abu Flous and Al Maqil are sited on the Shatt Al-Arab Waterway. Iraq also has two oil export platforms, Al-Basra Oil Terminal and Khor Al-Amaya Oil Terminal, positioned in the Arabian Gulf.

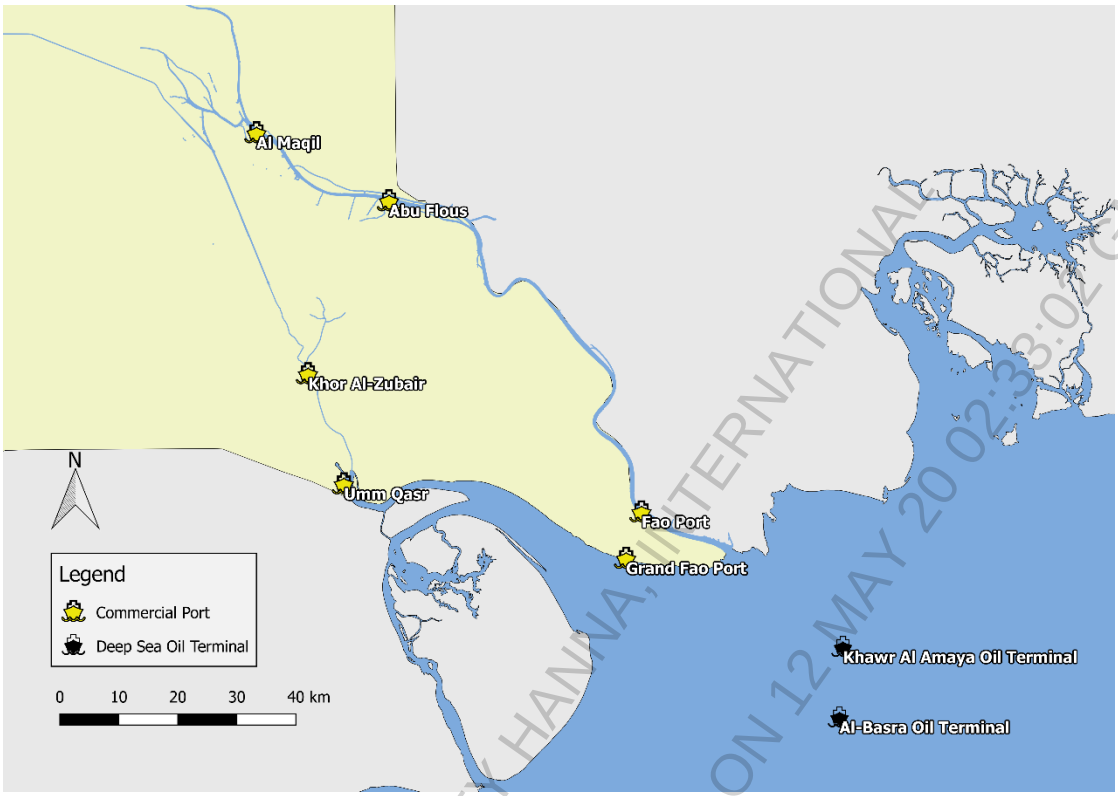

Figure 2.1: Location of Iraq's commercial ports and oil export platforms

Umm Qasr Port

UQP is Iraq's only deep-water port and the only port that has the capability of accommodating ships with Deadweight Tonnage (DWT) of 50,000 tonnes. The port was established by a consortium of companies from West Germany, Sweden, and Lebanon, with Iraqi Republic Railways services connecting it to Basra and Baghdad. The Port opened 1967. Although its development was interrupted by the Iran-Iraq War of 1980 to 1988, UQP eventually became the leading port of Iraq, handling general cargo, containers, grain, vegetable oil and sugar.

The port complex has 21 berths with a total length of 5km. The Port comprises two operational areas, the "Old Port" (Berths 1 – 9) and the northern area referred to as the "New Port" (Berths 12 - 21). The Old Port contains nine berths used for general cargo, containers and grain unloading. The newer northern port comprises 10 berths, also used for general cargo, containers and with one berth equipped for RoRo vehicles.

Berths 10 and 11, located between the southern and the northern areas are outside of the port's original perimeter fences and do not fall within GCPI jurisdiction, however, they are owned and administered by the Ministries of Trade (Grain Board) and Industry respectively, for the import of grain and sugar and have dedicated land access and storage facilities.

Table 2.1: Berthing Arrangements at Umm Qasr Port (Old Port - Southern Area)					
Berth No.	**Designed Usage**	**Current Usage**	**Current Water Depth (m CD)**	**Length x Width (m)**	**Construction Year**
1	Grain Unloading	Used by Iraqi Navy	-11.0	285x25	1974
2	General Cargo	Food Products. Grain evacuator present, however, no silo exists nearby	-11.0	200x25	1979
3	General Cargo		-10.0	200x25	1979
4	General Cargo	General Cargo. Operated and managed by GCPI and CMA-CGM.	-10.0	200x25	1979
5	Containers	Containers. 100,00m^2 container yard behind. Operated and managed by GCPI and Gazal.	-9.0	200x25	1977
6	General Cargo	General Cargo	-9.0	185x25	1967
7	General Cargo	General Cargo	-9.0	185x25	1967
8	General Cargo	General Cargo. Operated and managed by GCPI and Gulftainer. 75,000m^2 container yard behind berth.	-8.0	185x25	1967
9	General Cargo	General Cargo. Formerly used by a generator-powership.	-6.0	168x25	1974
10	Grain silos	Grain. Operated by the Ministry of Trade. Dolphin Pier.	-6~7	280x30	1977
11	Sugar	Vegetable Oils. Operated by the Ministry of Trade.	-6.0	190x25	1977

Table 2.2: Berthing Arrangements at Umm Qasr Port (Old Port - Northern Area)					
Berth No.	**Designed Usage**	**Current Usage**	**Current Water Depth (m CD)**	**Length x Width (m)**	**Construction Year**
11a and 11 b		General Cargo. Managed and operated by GCPI and Gulftainer. Container yard of 250,000m2 behind.		375x25	-
12	General Cargo	General Cargo	-9~10	188x25	1979-1984
13	General Cargo	General Cargo	-9~10	200x25	1979-1984
14	General Cargo	General Cargo. Operated and managed by GCPI and Aloreen. Container yard areas present.	-9~10	200x25	1979-1984
15	General Cargo		-9~10	200x25	1979-1984
16	General Cargo	General Cargo	-9~10	240x25	1979-1984
17	General Cargo	General Cargo	-9~10	200x25	1979-1984
18	General Cargo	General Cargo	-10.0	200x25	1979-1984
19	General Cargo	General Cargo	-11.0	210x25	1979-1984
20	Containers	Containers. 116,000m^2 container yard behind.	-11.0	180x25	1979-1984
21	Ro/Ro	Passenger and Ro/Ro Ships	-11.0	200x25	1979-1984
22 - 24	**Project Area – to be developed**				
25 - 26	Basra Gateway Terminal – to be developed				

Table 2.2: Berthing Arrangements at Umm Qasr Port (Old Port - Northern Area)					
Berth No.	**Designed Usage**	**Current Usage**	**Current Water Depth (m CD)**	**Length x Width (m)**	**Construction Year**
27	Basra Gateway Terminal				2016

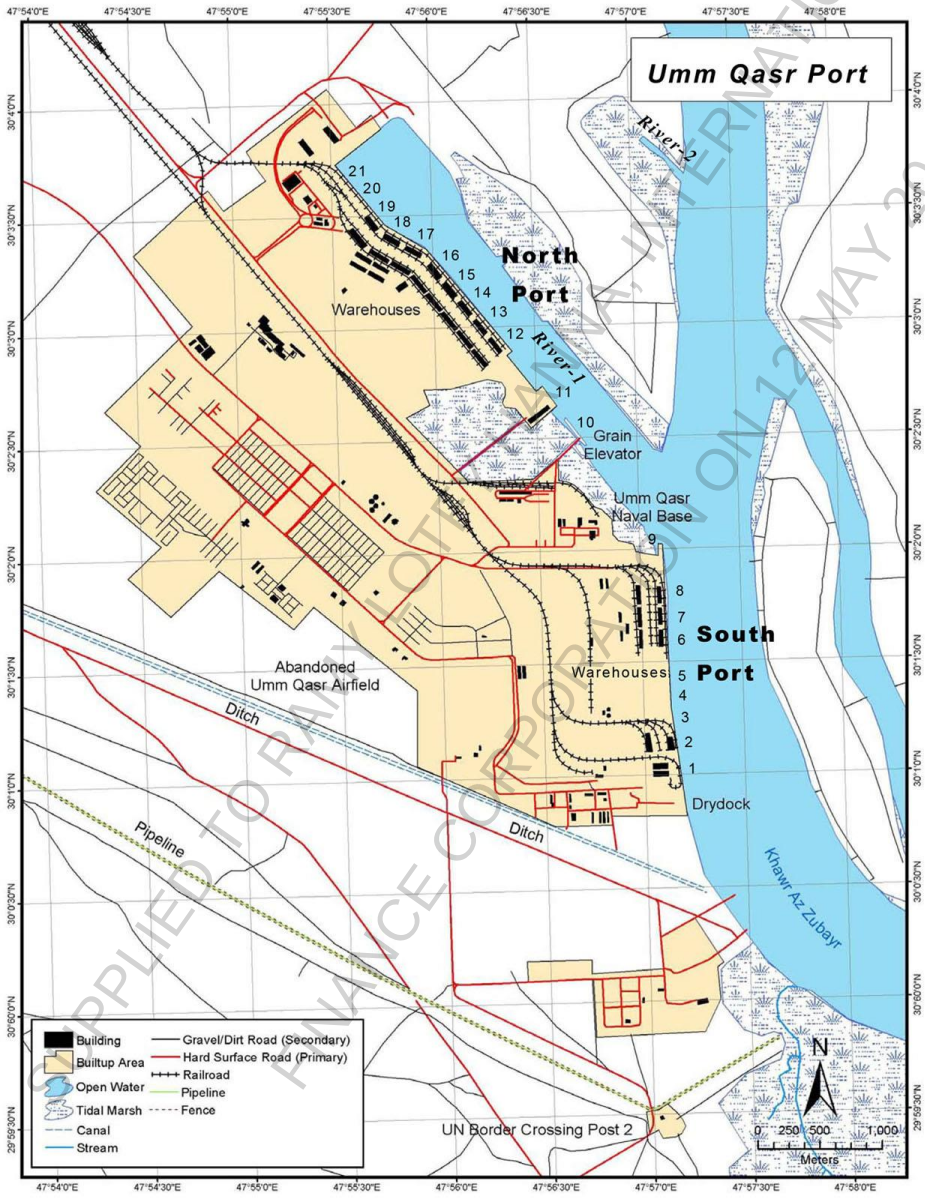

Figure 2.2: Layout of Umm Qasr Port (JBIC, 2006)

There is also ample warehousing and storage capacity at the Port, with approximately 177,000m^2 of covered warehouse facilities, and 800,000m^2 of open storage space. The warehousing facilities, which are in relatively good condition and accessible by road and rail (non-operational), have had little maintenance over the years and are in need of weatherproofing and rodent control.

The current attempts at development at UQP focus on the existing port area, however, to cope with the demand, it is likely that GCPI will look to develop other areas including unexploited land outside of the existing port.

Khor Al-Zubair Port

KZP is situated upstream of UQP on the western banks of the Khor Al-Zubair. The Port was constructed between 1975 and 1980, operating as a free trade zone and industrial port supporting the industrial developments in Basra. The Port covers an approximate area of 400 ha and includes twelve berths giving approximately 3,000m of quay. The Port has road and rail (inactive) links to Basra and road links across the Kuwaiti border and there is also a good road link to the UQP.

The Port was designed to handle general cargo and specialised bulk materials such as fertilizer, phosphate, petrochemical and iron (scrap) exports together with iron ore imports. The Port's facilities extend beyond the quay side to include cranes and warehouses. Bulk handling facilities include conveyors and ship-loaders for fertilizer exports and ship unloaders for iron ore imports. The iron ore handling facilities comprise open stockyards located within the port complex, equipped with belt conveyors, stackers and bucket wheel stacker/reclaimers.

The Port also plays a role as an industrial port, as originally designed, to support industries located in the vicinity of the Port such as the nearby fertiliser plant and steel works.

Al Maqil Port

Al Maqil Port is located on the Shatt Al-Arab Waterway, to the north of Basra City Centre. The Port has a combined wharf length of 2,000m across a total of 15 berths, of which 11 are understood to be operational. The main commodity handed at Al Maqil Port is cement, however, Berths 13 and 14 are to be used as a container terminal by NAWAH Port Management. The goal of Al Maqil Port is to achieve 3.6 million tonnes per year by 2017, however, taking into consideration that only small vessels can call at the Port due to shallow approach depths, this figure is likely to be unachievable (JICA, 2015).

Abu Fluos Port

Abu Fluos Port, constructed in the mid-1970s, is also located on the Shatt Al-Arab Waterway, approximately 18km downstream of Basra City Centre. Generally, Abu Fluos Port is a small port for feeder vessels and dhows, however, it possesses a fertiliser wharf and three new jetties which handle the import of cars, agricultural products, construction materials and electrical goods. However, all berths require some form of rehabilitation. The Port has road links to Basra City and is surrounded by underused land which has the potential to attract industry and commercial activities.

Al Maqil and Abu Fluos Ports are currently called at by smaller-sized vessels due to the shallow draft of Shatt Al-Arab Waterway, in large part due to the lack of dredging agreement between Iraq and Iran, whose border is located within the watercourse.

Fao Port

Fao Port is a small port located on the Fao Peninsula near to where the Shatt Al-Arab Waterway discharges into the Arabian Gulf. The Port's development stated in 1950 and was used to export oil. Fao Port was heavily used up until it was badly damaged in the Iran-Iraq war (1980 – 1988). The approach is blocked by shipwrecks and thus the Port is only capable of handling smaller vessels, mainly local fishing vessels and is not currently commercially viable.

Grand Fao Port

In April 2012, the foundation stone for the Grand Fao Port project was laid. The project has an estimated cost of €4.6 billion ($6.1 billion), and the Port's annual handling capacity is predicted to be around 99 million tonnes. This would make it one of the largest ports in the Arabian Gulf region. The new port will be designed in order to move about 36 million tonnes of containerized freight (4 million of Twenty-foot Equivalent Unit (TEU)) and about 22 million tonnes of dry bulk by 2028, to be increased respectively to 7.5 million of TEU and 33 million of tonnes respectively by 2038. The Port will be protected by rubble mound breakwaters approximately 15km long.

The project includes 2,000,000m^2 of yard for terminal container stacking, 600,000m^2 for dry bulk yards and 1,000,000m^2 of land yard for buildings and warehouses 200,000m^3 of silos for wheat. A double lane road (2,000 - 3,000 commercial vehicles during peak hours) and a double track railway (80 - 90 couples of train/day) will connect the new port to the existing transport network.

As yet, only the breakwaters have been completed and no other developments have taken place.

2.2.2 Issues facing the Port Sector

In summary, the Iraqi port sector suffers from several deficiencies including:

- Low berth occupancy ratio including container berths not being used as designed;
- Shortage of container yard space due to long dwelling time of imported containers;
- Lack of Rubber Tyred Gantry (RTG) systems and shortage of container yard space;
- Long waiting queue of trucks for entering port, loading cargo and clearing the departure gate (poorly developed road infrastructure);
- Lack of electronic means for data processing port operations;
- Low productivity of break bulk cargo operations. Discharging of sugar, wheat, rice is brought about by direct loading onto trucks on a wharf rather than storage and distribution later;
- Lack of bulk loading and unloading facilities;
- High port fees and charges inconsistent with the quality and quantity of service provided;
- Lengthy procedures for customs documentation, inspection and clearance – no electronic system has been introduced; and
- Competition between private terminals is not encouraged due to the pricing policy of GCPI (Ministry of Planning, 2013) (JICA, 2015).

2.2.3 Project Requirements/Demands

According to the NDP (Ministry of Planning, 2013), the Iraq's commercial ports are not working to capacity due to poor management and operational processes, and obsolete and poor maintenance of port and cargo-handling equipment. There is a large shortfall between the design capacity of the Iraqi port sector – approximately 15 million tonnes per year – and Iraqi projected import/export demand, estimated to be 53 million tonnes in 2018. As such, there is a need to develop, expand and modernise the Iraqi port sector.

2.3 Overview of Works Proposed

The overall Project will be delivered in three phases, with Phase I comprising the main construction works and subsequent phases being associated with operational expansion.

The ESIA will cover the Phase I works only; though the cumulative impacts of the potential implementation of all stages will be considered within the ESIA.

Table 2.3: Project Phasing

Phase	Proposed Works
Phase I	▪ Construction of a RoRo ramp. ▪ Decommissioning and dismantling of existing infrastructures. ▪ Construction of 611m quay wall for handling container vessels. ▪ Development of container yard. ▪ Construction of relevant buildings and facilities. ▪ Quay operations using Mobile Harbour Crane (MHC). ▪ Combined RTG, Reach Stacker (RS) and Empty Container Handler (ECH) container yard operations.
Phase II	▪ Quay operations using Ship-to-Shore (STS) Crane. ▪ Combined RTG, RS and ECH container yard operations.

The proposed phasing development of Yard 5 will mandate the development of the yard services in a similar and continuous approach.

It is understood that GCPI would like BMT to develop the RoRo ramp as a priority, therefore, the RoRo ramp and quay wall will be developed together.

2.4 Project Responsibilities

BMT is undertaking full contractual responsibility for the design, construction, operational and maintenance of the Project. BMT also have responsibility for the initial dredging the area of the quay wall and 50m beyond to create a suitable depth berth pocket.

It is the responsibility of GCPI to:

- Hand over the rights of use of the land required for the Project to BMT during the construction phase. This includes obtaining necessary wayleaves or easements, and providing BMT with access rights for installing and maintaining infrastructure equipment across all private land;
- Undertake a supervisory role during the operation phase;
- Construct the access road to the Project area; and

- Undertake maintenance dredging of existing dredged areas and approach channels as well as the berth pocket.

2.5 Proposed Project Components

The container storage area and RoRo storage areas are located adjacent to the berths to minimise the travel distance of terminal equipment. The terminal entrance, utilities area, Customs area, truck parking and terminal exit are located at the rear of the terminal, adjacent to the external road. The administration area is located on the side of the terminal, with separate access to the external road network. The container freight stage (CFS) area is located on the side of the terminal, close to the container storage yard to minimise the travel distances.

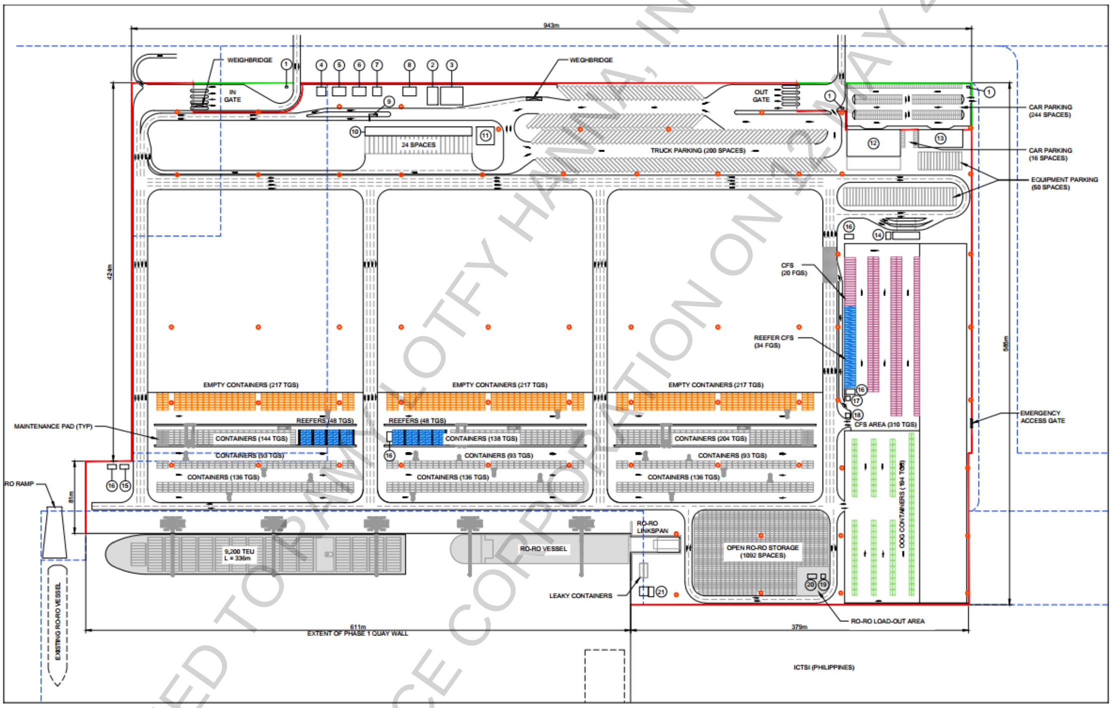

Figure 2.3: Indicative layout of Phase I (from drawing no. DU153-RHD-01-02-DR-C-0001, October 2016)

Phase II comprising an extension of the container yard due to anticipated increased container volumes.

2.5.1 Berth

The quay at Yard 5 will be developed to a length of 611m which will provide two notional berths with a length of around 305m each. The berths will be shared between container and RoRo vessels (although the majority of vessels are expected to be container vessels).

2.5.2 Container Handling

Operations will initially be carried by a combination of two existing RTG cranes transferred from Yard 3 plus several RSs and ECHs. Containers will be transferred between the quayside, storage yard and CFS area using terminal Tractor Trailer Units (TTUs).

2.5.3 RoRo Handling

It is envisaged that much of the RoRo cargo, predominantly imported cars, will be unloaded from vessels by driving from the stern ramp of the vessel onto a floating linkspan attached to the shore. Any RoRo vessels fitted with side rams or stern quarter ramps may provide an alternative or additional method of unloading RoRo cargo.

RoRo cargo will drive from the RoRo vessel to the adjacent RoRo storage area where the cars and other vehicles will be block parked in long rows.

2.5.4 CFS Area

A CFS area will be provided within the terminal to allow for unpacking of import containers and loading of the contents into consignee trucks.

2.5.5 Customs Inspections

Customs inspection will be undertaken at a dedicated area adjacent to the terminal exit. The inspection process will be sub-divided into two main processes: x-ray scanning and physical inspection. Customs inspection is not directly linked to quayside operations; however, it does require immediate external truck connectivity with the import stacking areas of the container yard and may be consider as part of the out-gate process.

All full import containers must be x-rayed before being permitted to depart the terminal. BMT have stated that approximately 65% of x-rayed contained are then physically inspected by Customs, therefore, 54 physical inspection points will be constructed. The inspection area will also include 200 truck parking spaces with a small drivers' amenities facility.

2.5.6 In/Out Gates

In and out gates are required to restrict and regulate the flow of traffic into the terminal. The entrance and exit are located to best suit the internal traffic circulation within the terminal, whilst also providing an efficient connection to the port road network.

The activities required at the in and out gates is expected to include:

- Checking of vehicles and personnel entering/departing the port;

- Any security inspections required;
- Any specific custom checking requirements;
- Arrival / departure procedures for vessel crews and passengers;
- Recording vehicle entry into port;
- Weighbridges - if required; and
- Directing drivers to the appropriate parts of the terminal.

Eight vehicle entry / exit lanes (four in each direction) are proposed. One lane in each direction should be suitable for oversized loads. A high-level canopy is envisaged over the full width of each entrance gate complex (excluding the oversized load lanes) to shield the area from adverse weather conditions. The canopy will also serve to carry cameras and other systems for security and vehicle registrations. Lifting arm barriers (fitted with "skirts") are to be installed at the exit of each lane.

2.5.7 Security Booth

A security booth will be provided at the in-gate, out-gate, and at the entrance to the operations building carpark. The security booth will provide an air-conditioned shelter for the on-duty security guards.

2.5.8 Customs Inspection Shed

When physical inspection of containers and cargo is required, it will be carried out at the Customs Inspection Shed. It is envisaged that the building will be a simple steel portal frame shed with open back and sides to protect the cargo from the elements when it is unpacked from the containers.

2.5.9 Customs Office and Driver's Amenities Building

Activities within the Customs Inspection Area will be managed and controlled from the Customs Office. The Customs Office will provide facilities for Customs staff and also include the control centre for the x-ray scanning machine.

The Customs Inspection Area, including the 200-space truck parking area, will include some amenities for visiting truck drivers. It is envisaged that the amenities will include toilets, canteen, and a kitchen. The drivers' amenities will be incorporated into the Customs Office, although the entrance will be located on the opposite side of the building.

2.5.10 Workshop

Cargo handling equipment used in Yard 5 will be maintained and repaired at a workshop within the terminal. The workshop will include around 15 to 20 separate maintenance bays and various activities (e.g. mechanical servicing, tyre changing, painting, welding, etc).

Surrounding the maintenance bays will be several supporting facilities including offices for maintenance personnel, meeting/training room, document storage/filing, and spare parts storage.

It is assumed that RTG's will not be maintained and repaired at the workshop. Instead they will be maintained 'in-situ' at the ends of the containers stacks.

2.5.11 Operations and Staff Amenities Buildings

Administrative functions for Yard 5 will be carried out from BMT's main administration building in Yard 3.

Co-ordination of operational activities for Yard 5 will be carried out from the operations and staff amenities building located in Yard 5. It is envisaged that the building will provide the following functions:

- Ground floor:
  - Reception and waiting area
  - ISPS compliant staff entrance (including turnstiles, security, baggage x-ray)
  - Staff lockers and changing room (650 lockers and changing area for maximum 150 personnel)
  - Staff toilets and showers (maximum 150 personnel per shift)
  - Briefing room (maximum 150 personnel per shift)
  - Dispatch office
  - Medical clinic
  - Prayer room (40 worshipers)
  - Back-up generator for IT system UPS (outside)
- First Floor:

- Offices for duty manager and supervisors
- Offices for security manager and CCTV monitoring
- Meeting room
- Canteen (maximum 150 personnel per shift)
- Kitchen and stores
- IT and server room

2.5.12 Quayside Amenities, CFS Drivers Amenities, RoRo Amenities

Amenities buildings are provided throughout the terminal for use by both terminal staff and visiting truck drivers. It is envisaged that the amenities will include toilets and an area for eating during breaks.

2.5.13 CFS Office and RoRo Office

A small office will be provided in the CFS area and the RoRo area to co-ordinate the delivery and collection of cargoes. It is envisaged that the offices will include office space for the supervisor, service windows at eye level of truck driver and a troubleshooting office.

2.5.14 Standby Electrical Generator Facilities

To ensure security of electrical supplies, it is envisaged that individual dedicated standby diesel powered electrical generating facilities will be provided adjacent to the main intake substation.

Appropriate bulk diesel storage tank facilities will be provided at a suitable adjacent location to the generator facilities and that day tanks will be provided within the power generator house for up to 8 hours continuous full-load running of the generators sets.

The standby generating facilities will be operated, controlled and maintained by BMT. A dedicated standby generator power house will be constructed to house and incorporate single or multiple units of diesel generators of the desired capacity as appropriate to the essential services electrical capacity requirements and security of supply demands of that facility. It will incorporate all generator control and electrical switchgear including interlocks to enable the system to be connected to the terminal electrical network without back feeding onto the incoming supply network.

2.6 Construction

Details of the construction phase are currently being developed as part of the detailed design. However, the information within this section provides an indication of the anticipated construction, responsibilities, activities and requirements.

2.6.1 Responsibilities

A Construction Contractor will be employed for the delivery of the construction phase.

The Contractors obligations will be commensurate with the contract agreement between GCPI and BMT, and in accordance with the International National Federation of Consulting Engineers (FIDIC) conditions of contract for Plant Design and Build (yellow book), as recommended by FIDIC for the provision of electrical and/or mechanical plant, and for the design and execution of building or engineering works.

2.6.2 Safety and Security

Consideration of safety will be made in the design, layout, installation and operation of all equipment. Each system will be designed in accordance with the appropriate international codes, and appropriate emergency trips and relief systems will be installed to ensure the safety of plant personnel and protection of plant equipment.

2.6.3 Indicative Programme

Currently Phase I are envisaged to begin in Q2 2018. It is anticipated that construction will take 22 months.

2.6.4 Procurement Strategy

All materials and equipment used in the Project will be manufactured, or assembled in quality certified facilities. All products used will comply with relevant international standards such EN BS, IFC Performance Standards, and corporate sustainable procurement and shipping policy.

2.6.5 Construction Labour Force

Construction personnel will be sourced both internationally and from the local population. Details of the construction workforce – number of local and international employees – is yet to be determined. International employees are likely to mainly hold managerial roles.

A temporary camp will be set up within the Project site boundary for the workers during construction.

2.6.6 Construction Activities

Detailed construction activities are not currently available; however, it is anticipated that the following broad activities will take place:

- **Stage 1:** Preparatory Earthworks and Soil Improvements, Dredging, and Quay Wall Design and Construction;
- **Stage 2:** Remaining Construction Works; and
- **Stage 3:** Commissioning and Demobilisation.

2.6.7 Transportation

Workers

Most of the construction workers will be local, whilst any international workers will be accommodated in the existing BMT accommodation camp located within UQP.

Construction Vehicles

All imported goods will be shipped to UQP before being transported to the Project Area by road.

2.6.8 Construction Raw Materials

Construction raw materials will be influenced by the process design, and as such are not currently available. Once the process design has been confirmed, details of the raw materials required will be confirmed. However, it can be assumed as a minimum, raw materials will include: concrete; power supply; construction aggregate; dredged material to be re-used on-site and road materials. Fuel and oils will also be used by plant operating on-site.

2.6.9 Construction Waste

During construction, the major waste stream will be the disposal of unsuitable dredged material. The disposal location for this material is yet to be confirmed. Other wastes will comprise general domestic waste including sanitary and food waste, office waste, organic material, small volumes of wastes arising from mobile plant, chiefly waste lubricating oil, and packing materials (e.g. crates). The nature and volumes of these wastes will be identified and assessed in the ESIA.

2.6.10 Construction Emissions

The main emissions during construction will be:

- Noise: from construction activities and movement of construction vehicles;
- Air Emissions: exhaust emissions from onsite plant and construction traffic; dust and particulate matter may be generated by dust-raising activities on-site and the movement of heavy goods vehicles (HGVs) on local roads; and
- Light: from lighting towers, temporary offices/accommodation and construction plant.

2.7 Operation

2.7.1 Responsibilities

Once the terminal and supporting infrastructure has been constructed, tested and commissioned, BMT will operate and maintain the terminal. BMT will have a 25-year concession and if the concession is not renewed, the terminal will be owned by GCPI.

2.7.2 Operations Labour Force

The terminal will be operated on a 24 hour, 7 days a week basis. The number of operational staff is approximately 500. As per the concession agreement, 50% of all employees (skilled and unskilled) will be Iraqi, in addition, wherever possible, the Project will seek to maximise local job creation and provide adequate training to support local staff in the discharge of these jobs. At present, approximately 85% of staff employed at Yard 3 are Iraqi.

2.7.3 Safety and Security

During the operation of the Project, there will be a security fence and security presence with a secure check point verifying all personnel and transport access/exit and perimeter/compound surveillance.

Further security measures will be developed to ensure that a safe and secure environmental for all personnel and/or visitors during the construction and operational phases.

2.7.4 Raw Materials

The following raw materials are anticipated for the operation of Yard 5:

- Diesel for standby generators;

- Fuel for Heavy Goods Vehicles (HGVs); and
- Oil (various viscosity) for plant and equipment.

2.7.5 Site Drainage

The preferred option is one based on a free fall system with Primary and Secondary storm drainage piping designed with gradient of 1 - 2%. The Primary piping will run parallel to the quay wall under the apron road and will collect water from the apron and quay areas while Secondary piping will come from the far-most landside and discharge to the Primary network. Storm water surface collection will happen through gullies connected to the Primary or Secondary networks. Drainage gullies should be located outside heavily loaded areas and designed for easy jetting-out in the event of blockage by sand, soil, dust or foreign materials. The Primary network will finally discharge to the sea through a set of oil-water separators and outfalls.

2.7.6 Operation Wastes

The Project Operators will apply the waste hierarchy of reduce, re-use, recycle/recover and disposal. Whilst this will go some way to reducing the volumes of wastes produced, there will still be various waste streams produced which will require treatment and/or disposal. Collection, transport, handling and disposal of all operational wastes will be discussed in more detail in the impact assessment when further details on the project are available, however the following wastes and their treatment and/or disposal is anticipated as summarised in **Table 2.4**.

Table 2.4: Waste Management

Waste Stream	Potential Treatment and Disposal Method
General waste	All rubbish, scrap or replaced materials and equipment shall be stored in dedicated waste management bins on site prior to removal by a licenced carrier to a licenced landfill.
Domestic effluent	Domestic effluent will be discharged to sewer chambers/manholes that will be routed and discharged to holding tank(s). The sewerage holding tank(s) will be placed away from occupied buildings and facilities. The holding tank(s) will be provided with dedicated access route(s) to allow emptying the tank(s) periodically without interference to the terminal operations or causing nausea to the workforce. Provision for future connection to a municipality sewer network will be provided within the design of the pipe network and holding tank(s).

Table 2.4: Waste Management	
Waste Stream	**Potential Treatment and Disposal Method**
Stormwater	The storm water drainage system for the terminal will be based on a free fall system with Primary and Secondary storm drainage piping designed with gradient of 1 - 2%. The Primary piping will run parallel to the quay wall under the apron road and will collect water from the apron and quay areas while Secondary piping will come from the far-most landside and discharge to the Primary network. Storm water surface collection will happen through gullies connected to the Primary or Secondary networks. Drainage gullies should be located outside heavily loaded areas and designed for easy jetting-out in the event of blockage by sand, soil, dust or foreign materials. The Primary network will finally discharge to the sea through a set of oil-water separators and outfalls.
Hazardous waste	It is anticipated that small amounts of hazardous waste will be generated in the form of fuel oil residues, cleaning solvents and sludge from the AST. All used oil will be collected and removed from site and delivered to an approved recycling agent. Finally, all workshop-related wastes will be collected and removed from the Project site to government approved disposal sites.

2.7.7 Emissions

The main emission from the Yard 5 during operation will be noise and air emissions from vessels.

2.7.8 Planned Inspection and Maintenance Programme

A planned inspection programme will be prepared which shall aim to assess the general overall condition of a structure and determining the level of maintenance or repair activities that may be required. This inspection programme will be a long-term continuous activity and will be carried out at regular intervals in order to check the general condition of all components, including general wear and tear, component failure and incidental damage.

2.8 Decommissioning

The projected design life is estimated to extend beyond the 50-year operational period.

Ultimate responsibility for decommissioning will reside with GCPI. A site closure and restoration plan should be developed prior to initiation of decommissioning activities. All infrastructure should be dismantled and removed (where required by GCPI at the time of

hand-over). Machinery, steel and dismantled materials would be recycled where possible and disposed of at licensed disposal sites.

3 Initial Alternatives Assessment

3.1 Introduction

The analysis of alternatives helps identify the most appropriate method of developing a project and can help identify the option(s) with the least environmental impacts. As part of the scoping phase, an initial analysis of Project alternatives has been undertaken.

3.2 Types of Alternatives

Alternatives include consideration of different means to meet the purpose and requirements of the Project activities, and may include alternatives to:

a) the site location - alternative locations;

b) the type of activity to be undertaken – this requires a change in the nature of the proposed activity; this includes the 'do nothing' option i.e. the option of not implementing the activity;

c) the design or layout of the activity – this considers different spatial configurations of an activity on a particular site; and

d) the process and operational aspects of the activity - also referred to as technological or equipment alternatives; the purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process.

Whilst several project decisions are best made through an evaluation of the relative merit of alternatives, economic and other factors, such as local conditions, topography, land tenure etc., will dictate or limit alternatives that can be considered.

3.3 Alternative Site Locations

The specific site location was dictated by GCPI and BMT have had no influence on the location of the proposed Project. However, the Project layout has been considered to reduce travel distances, for example, the container storage area and RoRo storage areas are located adjacent to the berths, whilst, administrative area will be situated away from the main operational activities. It is understood that there is no further development land available within the Umm Qasr commercial basin.

3.4 Alternative Routes to Site

All goods will be imported into UQP via ship, by road transport from Safwan or by air freight into Basra International Airport. These are the shortest routes available, with the preference being for shipping as the most efficient. This aids the construction programme, and reduces the carbon footprint of the Project. Use of ship borne supply routes will also ease the known regional road congestion/degradation and reduce any adverse impacts on local commerce.

No rail served routes are available in Iraq at the present time.

3.5 Alternative Technologies and Processes

If the overall economic objective is to have efficient import and management of goods, then a well-designed efficient port based operation is far superior to road, rail or air freight, which cannot move goods in the same volumes and rate as port facilities.

Alternative operational plant was considered; however, it was deemed that due frequent outages of the public electricity network, electrical equipment and/or automated terminals were dismissed as an option. However, it should be noted that the operational activities are the same, whatever the technology used.

3.6 Do Nothing Option

The do-nothing option is the option of not implementing the activity or executing the proposed development. Assuming that the proposed Project is not developed, Iraq would face a shortfall in import/export capacity, worsening over time.

The Project provides an opportunity to address the shortfall in capacity and may provide a catalyst to stimulate additional modernisation and efficiency improvements in the rest of the Iraqi port sector.

Furthermore, bulk freight of goods by ship, is environmentally preferential to air freight, road and rail freight as it is more fuel efficient per tonne and less disruptive.

4 Policy, Legal and Institutional Framework

4.1 Introduction

This section sets out the policy, legal and institutional framework relevant to the Project, covering national and IFC requirements, as well as relevant BMT policies.

The ESIA for the Project will be undertake in accordance with Law No. 27 of 2009, as well as applicable regional and federal environmental, social and pollution control laws.

The ESIA of the Project will also be aligned with the investment bank requirements which are likely to include the IFC Social and Environmental Performance Standards and the World Bank group EHS Guidelines.

4.2 BMT Policies

The following BMT policies are relevant to this Project:

- Health, Safety and Environment Plan for Yard 5 Construction Project (REF: AL-PR-HSE-PL-001, Revision Number 00, Date, 23th September 2017);
- Occupational Health & Safety and Environmental Policy Manual (REF: QM-MA-03, 27th October 2016);
- Occupational Health & Safety – Environmental Management System Manual (REF: QM-M-02, 24th October 2016);
- Quality, Health, Safety, Security and Environmental Policy Statement (REF: QM-PO-01, Revision 01, 25th October 2016);
- Business Ethics and Code of Conduct Procedure (REF: QM-PR-02, Revision 01, 10th July 2017;
- Project Quality Plan for Yard 5 Construction Project (REF: AL-PR-QM-PL-001, Revision 00, 26th October 2017);
- Human Resource Policy Manual (REF: HR-MA-01, 21st October 2016); and
- Sustainable Procurement Plan (REF: PR-PL-01, Revision 00, 25th October 2017).

These will be reviewed in detail during the ESIA, and will essentially guide the development of the detailed design, procurement processes and construction and operation phases.

4.3 Iraqi Regulatory Framework

4.3.1 Overview

The GoI is defined under its Constitution as an Islamic, democratic, federal parliamentary republic. The federal government is composed of the executive, legislative and judicial branches as well as numerous independent commissions. The executive authority in Iraq belongs to the Presidency Council and the Council of Ministers; the legislative branch of the Iraqi government consists of the elected Council of Representatives and a Federal Council.

Each governorate is divided into local and municipal governments.

4.3.2 Institutional Framework

The GoI operates from Baghdad. The executive branch is composed of the President, who is the head of state, and the Council of Ministers. The Council of Minsters is composed of the Prime Minister as head of the government and his cabinet.

The Iraqi cabinet consists of the following ministries and departments:

- Ministry of Agriculture
- Ministry of Communications
- Ministry of Construction, Housing and Public Municipalities
- Ministry of Culture, Tourism and Antiquities
- Ministry of Defence
- Ministry of Displacement and Migration
- Ministry of Education
- Ministry of Electricity
- Ministry of Finance
- Ministry of Health and Environment
- Ministry of High Education and Scientific Research
- Ministry of Industry and Minerals

- Ministry of Interior
- Ministry of Justice
- Ministry of Labour and Social Affairs
- Ministry of Oil
- Ministry of Planning
- Ministry of Trade
- Ministry of Transportation
- Ministry of Water Resources
- Ministry of Youth and Sports

The port sector in Iraq is under the jurisdiction of the General Company Ports of Iraq (GCPI) within the Ministry of Transportation.

Law No. 27 of 2009 for Protection and Improvement of Environment established the Ministry of Environment (now known as the Ministry of Health and Environment (MoHE). The MoHE regulates all environmental matters in Iraq.

Ministry of Transportation

Established in 1921, the Ministry of Transportation (MoT) is the competent agency for port administration.

Iraqi Ports Authority

The administration of all port operations is under the direction of the Iraq Ports Authority (IPA), based in Basra.

General Company for Ports of Iraq

GCPI is a state-owned company under the jurisdiction of the Ministry of Transport established under the Law on State-owned Companies (Law No.22 of 1997) and manages ports based on the Law of Ports and Harbours. GCPI manages and operates Iraq's ports in accordance with these regulations. GCPI is also concerned with navigation in Iraqi territorial waters and carries out maintenance and dredging activities of the channels. GCPI owns the land on which the Project will be built and GCPI has the authority to manage, operate and develop it.

Ministry of Health and Environment

The MoHE is the highest institutional authority for the environment within Iraq. The MoHE was initially established as the Ministry of Environment (MoE) in August 2003 under Order No. 44 on the Establishment of the MoE set forth by the Coalition Provisional Authority (CPA), and then re-established under the 2008 Environmental Law (Law No. 37 of 2008 on the Creation of MoE). The principal responsibilities of the MoE include protecting and conserving Iraq's environment, developing environmental policies and programmes, and promulgating and enforcing environmental standards. The Ministries of Health and Environment were merged in August 2015.

The MoE developed and published the Law No. 27 of 2009 on Protection and Improvement of the Environment, which establishes the environmental framework currently in place in Iraq. Law No. 27 also established a national Environment Protection and Improvement Council (EPIC) and its provincial branches. The activities of provincial EPICs are reviewed by the national EPIC, which in turn reports to the MoHE with advice on any proposed environmental matters and projects related to protecting and improving the environment in Iraq.

Ministry of Water Resources

The Ministry of Water Resources (MoWR) was established under Law No. 50 of 2008 on the Establishment of the MoWR. The principle responsibilities of the MoWR include managing surface water and groundwater resources for optimum usage, and protecting surface water and groundwater from pollution.

4.3.3 Tribal System

At least three-quarters of the Iraqi population are thought to be members of one of the country's many tribes. The main issues under tribal influence include resolution of social disputes and negotiation of ownership conflicts. Although tribal systems are not part of the formalised law and may even conflict with the formalised law in some cases, they form an important source of regulation, especially at a local level.

4.4 Iraqi Policies, Regulation and Legislation

4.4.1 Constitution

The Iraqi Constitution was first enacted in 1921 and has been revised and updated several times since. The current Constitution, which was updated and approved on 15th October 2005, regulates a wide range of individual or juridical duties from the administrative demarcation of central and regional governments to civil codes like land expropriation.

In accordance with Article 112 of the Constitution, Iraq has become a federal state which is composed of central government and regional autonomous governments.

According to Article 107 of the Constitution, the federal government has the exclusive authorities on the establishment of the following policies or administration;

- Foreign policy and diplomatic representation;
- National security policy including establishment and management of armed forces;
- Fiscal and customs policy;
- Policy of broadcasting and postal system;
- Drawing-up of investment budget bill; and
- Planning policies relating to water sources flowing from the rivers originated from other countries outside Iraq.

According to Article 114 of the Constitution, antiquities, archaeological sites and cultural assets are considered as national property under the jurisdiction of the federal authorities. Article 23 stipulates that an owner shall have the right to benefit, exploit and dispose of private property within the limits of the constitution and that expropriation is not permissible except for the purpose of public benefit in return for just compensation.

4.4.2 National Policies

National Development Plan 2010 - 2014

The NDP stipulated the following nine targets:

1) to boost Gross Domestic Product (GDP) growth up to 9.38% over the planned period;
2) to create 3.0 to 4.5million jobs;
3) to diversify the Iraqi economy (especially, agriculture, industry, tourism, etc.);
4) to strengthen the roles of foreign and local private enterprises;
5) to upgrade the productivity by introducing the principle of competition;
6) to reduce the poverty rate by 30% from 2007 levels focusing on comprehensive rural development and creation of job opportunities;

7) to establish a fair distribution of infrastructure services and public services (water and sanitation, health, education, etc.);

8) to establish sustainable development that balances economic, social and environmental considerations; and

9) to strengthen the role of local government in developing their provinces.

In order to achieve the aims, the following six fields were focused on:

1) Crude oil extraction, as it guarantees sustainable financial resources;

2) Electricity, as one of the central activities relied upon by all production and life activities,

3) Agriculture, as it guarantees food security, reduction of food imports and creation of vast numbers of jobs, which can reduce unemployment in rural areas and alleviate poverty,

4) Social development services focused on water and sanitation, education, health, culture, youth and sports, and housing,

5) Transportation, as it is an important sector that supports the flow of economic activities and increases efficiency, and

6) Conversion industries, as Iraq possesses capabilities in terms of natural and human resources, that guarantee it a comparative advantage in many industrial activities such as petrochemical, chemical, fertilizer, cement, and food industries, which also constitute a crucial starting point for diversifying the national economy.

The NDP believes that Iraq's ports can meet the nation's import and export needs and are able to compete with other ports. The following objectives were stated regarding the port sector:

- Increase the capacity of existing ports and shipping lanes;
- Utilize the available unused capacities of existing ports, which total about 3 million tonnes, and reduce reliance on the ports of neighbouring and nearby countries for Iraq's foreign trade by increasing capacity of current Iraq Ports;
- Transit to constructing major ports capable of receiving the largest ships, reduce transport costs to make Iraqi ports competitive and equip one of them with the requirements necessary to act as a dry port service; and

- Strengthen the private sector's role in implementing, operating and providing port services.

This included developing UQP from 22 to 41 berths, a capacity of 7,500,000 to 14,000,000 tonnes per year and removing 10 shipwrecks from the vicinity of UQP.

National Development Plan 2013 - 2017

The "Iraq: National Development Plan 2013 - 2017, January 2013, Iraq Ministry of Planning" vision in relation to environmental sustainability is a: "*green Iraqi economy based on localizing environmental policies as an integral and inseparable part of overall economic policies attaining sustainable growth*."

The Plan sets out the following goals:

- Goal One: Protecting and improving air quality
- Goal Two: Protecting and improving water quality
- Goal Three: Limiting land deterioration and fighting desertification
- Goal Four: Preserving the Sea and Coastal Environment
- Goal Five: Preservation and Sustainable Use of Biological Diversity
- Goal Six: Developing and improving a system for waste management
- Goal Seven: Limiting Oil Pollution
- Goal Eight: Limiting Radiation Pollution
- Goal Nine: Integrated Management of Hazardous Chemical Materials
- Goal Ten: Developing the Institutional and Legal Framework for the Environment Sector
- Goal Eleven: The Private Sector as a Sustainable and Active Partner in the Environmental Field

The following challenges were identified to achieving sustainable development objectives:

- Sustainable development has not been given advanced priority in developmental decisions;

- Continued imbalance of the relationship between resources and the population, and expansion of urbanisation;
- Growth of the fiscal gaps between the amount of allocations set aside for the environment in the public federal budget and that required to protect and improve the environment;
- Failure to keep pace with capacity building programs in the environmental field and the requirements of protecting and improving the environment;
- Weak enforcement of environmental legislation;
- Limited use of environmentally-friendly technology;
- Limited scope of the environmental dimension of basic and higher education;
- Policies and directives, resulting in low environmental awareness;
- Weak response to international environmental standards, including those conventions to which Iraq is a signatory;
- Absence of a comprehensive national strategy for sustainable development; and
- Lack of involvement of private sectors in environmental management.

With regards to the Port Sector, pertinent information is summarised below:

- Capacity of Iraqi's port needs to be expanded urgently;
- Iraqi ports are under severe competition with neighbouring ports. It is important to improve port facilities, cargo handling productivity and capacity, so that Iraqi ports can attract ships to call;
- Depth of approach channels is limited from 7.5m to 12m and the maximum size of a calling vessel is very much limited.
- Port management system in Iraq is far behind in modern information technology. It is urgent to modernize port operations and computerize port documentation;
- Many wrecks still remain in navigation channel on the Shatt Al Arab waterway and are a big nuisance to ships' smooth entry and departure; and
- Problems of Iraqi ports are insufficient navigation aids, lack of modern cranes and cargo handling equipment, old fashioned port facilities and deterioration.

The NDP estimates that cargo throughput of Iraqi ports will increase from 15 million tonnes in 2012 to 53 million tonnes in 2018.

A Port and Channel Development Plan was provided which included the following measures:

- Total capacity of Iraqi ports is estimated at about 16.65 million tonnes with a total of 46 berths in four ports, i.e. 22 berths in UQP, 12 berths in KZP, three berths in Abu Fluos Port, nine berths in Al Maqil Port. It is planned to develop an additional 19 berths in UQP, 13 berths in KZP, and five berths in Al Maqil Port by the year 2017. Total capacity of cargo throughput will be increased to 29 million tonnes with a total of 83 berths;
- To deepen approach channels, maintain the design depth of channels, install navigation aids and vessel traffic control system;
- To facilitate removal of wrecks, removal target is three wrecks each from 2013 - 2015 and four wrecks each from 2016 - 2017;
- To procure dredgers, tug boats, signal ships, mooring boats, passenger boats, and other work vessels;
- To introduce electronic documentation and port management system;
- To provide marine services for oil platform, Liquefied Petroleum Gas (LPG) terminal in KZP;
- To modernize and install enough cargo handling equipment;
- To encourage private participation in the development of Fao Grand Port, UQP and KZP, by means of Build Operate Transfer (BOT), operation concession, or other forms of private investment. Development target of UQP is 13 multipurpose terminals with a capacity of 3.75 million tonnes and four container terminals with a capacity of 2 million TEUs. Target of KZP is 13 multi-purpose terminals with a capacity of 4.25 million tonnes. It is planned to use the Al-Muamer Terminal at Fao with a capacity of 100,000 tonnes, to develop Al Maqil Port and Abu Fluos Port with participation of private sectors; and
- To reduce port tariff in order to make Iraqi ports more competitive.

Iraqi National Transport Master Plan

The Transport Master Plan (2005) aims at proposing an integrated inter-modal transportation system to contribute to the socioeconomic development of Iraq and focuses on the following features:

- the role of the Iraqi transport system in opening Iraq to the international markets; and
- the introduction of proper infrastructure and inter-modal facilities into the Iraqi transport system in order to equip the backbone of the future "Dry Channel" (from the Indian Ocean to the Mediterranean Sea).

The basic concept of this Transport Master Plan is adopted in NDP 2010-2014 and NDP 2013-2017. EAME understands that Stage 2 of the Transport Master Plan has been commissioned, however, this is not yet publicly available.

National Environmental Strategy and Action Plan, 2012

Published by the MoE, the National Environmental Strategy and Action Plan (NESAP), outlined ten strategic objectives for 2013 – 2017 to protect air and water quality, the marine and coastal environment, biological diversity, handling and manging hazardous wastes, reduction of pollution ad radioactive contamination, and developing an institutional and legal framework for the environmental sector.

National Biodiversity Strategy and Action Plan

Iraq has developed its first National Biodiversity Strategy and Action Plan (NBSAP) for the period (2015-2020), to overcome the main problems that the biodiversity in Iraq is facing, and to comply to one of its obligations towards the Convention on Biological Diversity. The National Targets, that have been included in the NBSAP, have been linked to the Global Strategy on Biodiversity 2011-2020 and its Aichi Targets.

The first two sections of the Strategy include background information about biodiversity, stakeholders and the legal framework in Iraq. The main body of the strategy starts from the third section, it includes the vision of the strategy and the national targets and action plan which is divided into focal areas, in addition to the implementation part of NBSAP and the elements for measuring the success.

4.4.3 Development Plans

Iraq Port Study, UNDP Iraq Country Office, 2006

This study identified the issues and constraints relating to the Iraqi port sector and proposed a restoration programme.

Study for the Project of the Vitalization of Global Environment and Plant (Urgent Rehabilitation Project for Southern Iraqi Ports), 2006

This is a feasibility study on the rehabilitation of ports with the technical assistance of the Japanese government. The study examined the economic evaluation of a project package that includes the following programs:

- dredging of waterways and basin;
- removal of 15 sunken ships;
- repair of damaged facilities (fender, pavement of yards, sheds and buildings); and
- cargo handling equipment and marine equipment, and navigation aids (27 units).

Port Sector Rehabilitation Project in the Republic of Iraq, JBIC, 2006

The project study consisted of the following three components:

1) to identify bottle necks to be settled urgently at UQP and KZP;
2) to propose measures for rehabilitation and staged implementation plan; and
3) to prepare the implementation plan of the rehabilitation project Phase I and the preparation of Phase II.

Feasibility Study of the Fao Grand Port, CIITI, 2008

The study developed the concept of a new offshore port, which was proposed in Iraq Transport Master Plan into a concrete plan, and examined the feasibility of Fao Grand Port. The study also assessed potential locations based on construction cost, security, siltation, influence on the offshore oil facilities, safety, manoeuvrability, dredging cost, connection to the land transport system and impact on environment.

Iraq Port Sector Rehabilitation Project Phase I, JICA, 2011

This study is intended to examine further the rehabilitation project of ports in southern Iraq following the Phase II project. The study identified the project components of the rehabilitation of KZP, evaluated the development potential of UQP and KZP and examined the functional allotment between the two ports to cope with short-term cargo traffic demands by settling the existing problems. The study also intended to propose development concepts of the two ports and the functional allotment between the two ports from the long-term viewpoint.

Information Collection Survey for Iraq Port Sector Development, JICA, 2012

This survey was intended to collect information and data needed for the preparation of the implementation program of Phase II of the Iraqi Port Sector Rehabilitation Project. The survey covers not only UQP and KZP but also Al Maqil and Abu Flous Ports. The survey proposed an urgent implementation of the rehabilitation of KZP, dredging of waterways between UQP and KZP and the installation of navigation aids and cargo handling equipment.

Implementation Program for Port Sector Rehabilitation Project Phase II, JICA, 2013

The project includes the construction of a new 300m long additional wharf, rehabilitation of the existing wharves, dredging of basin, cargo handling equipment, and dredging of waterways between UQP and KZP.

Master Plan Study for Port Sector in the Republic of Iraq, JICA, 2015

To cope with the anticipated increase of cargo, Iraqi ports need further development and improvement of port facilities. The Ministry of Transportation and JICA agreed to support the GCPI to prepare a master plan for Iraqi port sector.

This study included the following activities:

- Review of the existing studies and analysis of the port sector;
- Determination the National Port Sector Development/Administrative Strategy (target year 2035);
- Formulation of the National Port Master Development/Administration Plan for Main Ports and Waterways (target year 2035);
- Formulation of Short Term Development Plan for UQP and KZP (target year 2025);
- Formulation of Short Term Action Plan - to Improve Port Administration / Management and Operation (target year 2025); and
- Technology transfer of preparation of development strategy, long and short-term development plans.

The proposed masterplan for UQP is presented in **Figure 4.1**.

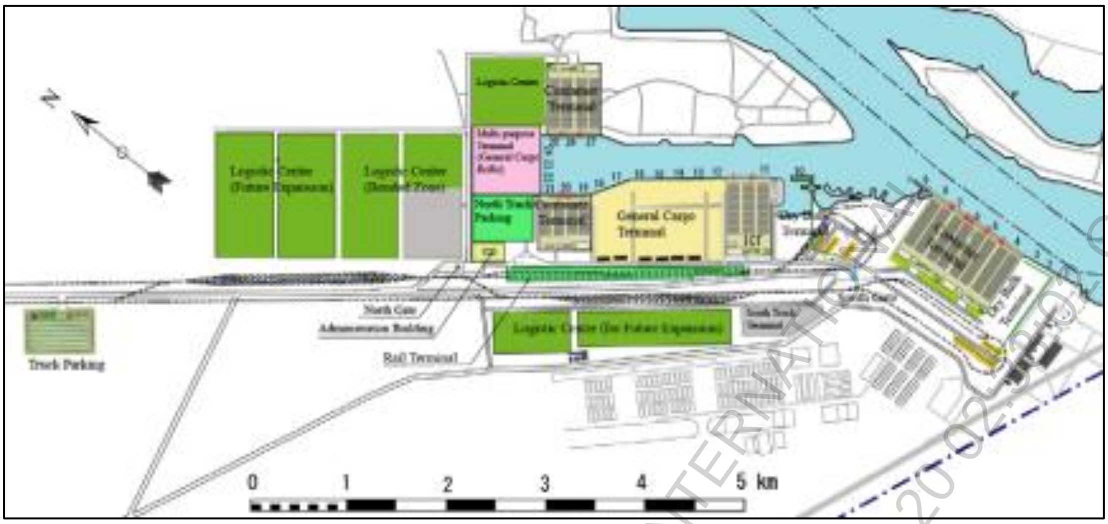

Figure 4.1: Proposed Master Plan for UQP

4.4.4 Environmental and Social Legislation

Table 4.1 summarises relevant environmental and social laws applicable to the Project. It has not been possible to obtain all copies of these Laws, either in English and Arabic and therefore further clarification will be sought via the GoI and the Ministries during the ESIA.

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Environmental Administration and EIA				
Law No.27	2009	Protection and Improvement of the Environment	This Law is the primary environmental legislation in Iraq. Establishes the need for an EIA. It aims to improve and protect the environment by addressing damages and protecting public health and natural resources. The Law establishes a Council for the protection and improvement of the environment referring to the Ministry of Environment and cooperating with other Ministries. Replaces and repeals the Law No. 3 of 1997, Environmental Protection and Improvement Law. *Please note that the Ministry of the Environment has merged with the Ministry of Health*	MoHE will regulate the Project EIA
Law No.37	2008	The Law establishing the Ministry of Environment	This Law establishes the Iraqi Ministry of Environment and outlines its mandate to protect and conserve the environment, as well as protect the residents of Iraq from environmental pollutants and environmental risks to human health. Other duties include the development of environmental policies and programs, as well as the creation and enforcement of environmental standards.	N/A
Iraqi Constitution	2005	Iraqi Constitution	Environmental administration shall be shared between central and regional governments.	All

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Law No. 3	1997	Protection and Improvement of the Iraqi Environment	Repealed by Law No. 27 of 2009, although its regulations and directives remain binding as long as they do not contradict the provisions in Law No. 27 of 2009, or until they are replaced or repealed by other laws.	N/A
Environmental Law				
Resolution No. 1	2015	Rules of Procedure of the Department of Environmental Police	This Resolution aims at regulating the Environmental Police Department.	All
Instruction No.2	2014	Environmental Protection from Municipal waste	Aims to protect the urban environment with proper management of waste from domestic, commercial and professional activities.	Waste management
Instruction No.3	2011	Environmental Determinants for the Establishment of Projects and Monitor the Implementation of Safety	This lists a wide range of potentially polluting industries and activities into three classes (A, B & C) and sets out how far certain industrial activities in each class can be located from municipal and urban areas (creating buffer zones in effect).	General Project
Law No.29	2009	Regulation of Landfills	Details waste management procedures.	Waste management
Law No. 50	2008	Water Resources Law	Establishment of the Ministry of Water Resources who shall develop ground and surface water resources and determines water sources and uses.	Water resources

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Law No.35	2002	Law on Public Roads	This law details procedures and practices to be followed on resettlement and acquisition of land and property relating to road construction and rehabilitation. (Annex 3) Part III of the road law covers land acquisition and compensation procedures for the public roads construction.	Land acquisition (in relation to any new access roads)
Law No. 27	1995	Law Concerning Ports	This law regulates navigation and port safety, the prevention of water pollution, the operation of importation and exportation agents, and the registration of ships.	Water quality
Law No.12	1995	Maintenance of networks of irrigation and drainage	Provides for the management and maintenance of irrigation and drainage networks and defines the duty of famer in relation with the management and exploitation of agricultural land and the use of water.	Water
-	1990	Environmental Criteria for Industrial, Agricultural and Public Service Projects	Establishes environmental criteria with respect to the location and environmental requirements	General Project
Law No.6	1962	Irrigation Law	State bears responsibility for monitoring, operating and protecting lakes and rivers as well as improving natural and man-made waterways which are construction to store, distribute and discharge water. Law also sets out penalties who pollute water sources.	Water quality
Pollution Control				

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Law No. 41	2015	Noise Protection and Control	This law repeals Law No 21 of Noise Prevention, regulates methodological issues in noise control, sets limits for exposure times to continuous noise between 80 and 115 dBA, and determines daytime and night-time standards for outdoor noise exposure.	Noise and vibration
Instruction No.3	2015	Hazardous Waste Management	Details the requirements for management of hazardous waste. EIA required for the treatment site. Annual report on activities and air quality data required to be submitted to the Ministry of Environment.	Waste Management
Law No. 45	2015	Accession by the Republic of Iraq to the Stockholm Convention on Persistent Organic Pollutants	Iraq signing up to the Stockholm Convention	Pollution Control
Instruction No. 2	2014	Environmental Protection from Municipal Waste	Aim at protecting the urban environment with a proper management of wastes, such as solid materials, recyclable and non-recyclable derived from domestic, commercial and professional activities.	Waste Management
Directive No .3	2012	National Limitations on Emission in Activities and work	Aims to regulate the emission of air pollutants at their sources and organise environmental work among all parties concerned with the environment.	Air quality
Law No.29	2009	Regulates the region for the collecting of debris to landfills	Generators of construction, demolition, or excavation wastes are responsible for disposing the wastes at temporary debris accumulation sites specified by the municipality. Replaces Regulation No.67 of 1986 and increases the fine for	Waste Management

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
			dumping debris on public roads or causing accumulation of debris in places other than dedicated landfills.	
Law No.3	2009	Iraq signing up to Basel Convention	Iraq signing up to Basel Convention	Waste Management
Law No.7	2008	Climate Change Convention and Kyoto protocol	Implements the Climate Change convention.	Air quality
Law No.42	2007	Vienna convention and Montreal protocol to protect the Ozone layer	Implements the Vienna Convention and Montreal protocol	Air Quality
Law No.2	2001	Preservation of Water Resources	Regulates the utilisation of water for other purposes other than domestic use.	Water
Specification 417	2001	Drinking Water Standards	Drinking Water Standards	Water quality
Law No.27	1999	General Authority for Water and Sewage Law	This law instructs the local authorities in charge of processing drinking and raw water and the discharge of sewage and rainwater in all parts of Iraq beyond the boundaries of the municipality of Baghdad.	Water
Instruction No.1	1998	Iraqi Ports and Harbours	Addresses the need for the aquatic environmental and fight against pollution. Instruction regulate pollution caused by anchoring vessels.	Water

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Instruction No.2	1993	Noise emitted from sound equipment	Determines acceptable noise levels	Noise and vibration
Directive No.4	1993	Occupational health, protection of workers against vibration	Established work place procedures designed to minimise vibration and any harmful effects. Stipulates maximum total daily limits for exposure to vibration	Noise and vibration
Instruction No.4	1989	Safe Storage and Handling of Chemicals	Requirements for safe storage and handling of chemicals	Health and Safety, Waste Management
Law No. 59	1987	Use of Beaches (amended)	Aims to regulate the utilisation of the beaches of the Tigris and Euphrates rivers, as well as other main rivers and their streams, lakes and reservoirs. This law also aims to prevent pollution, irrespective of issues such as rights to ownership and rights to disposal. It is forbidden to construct buildings or projects on any land included in the provisions of this law without the consent of the Ministry of Agriculture and the Ministry of Irrigation.	All
Law No.89	1981	Public Health Act	Sets out specifications for the burial of waste. Also provides protection for workers from sources of vibration. Chapter V details drinking water issues.	Waste management / Noise and vibration / Water quality
-	1979	National Clean Air Act	Local air quality standard	Air quality

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Regulation No.25	1967	Law on preservation of rivers and other water source public waters from pollution	Protection of rivers and public water bodies from contamination	Water quality
Law No.21	1966	Law on noise prevention	Prevention of excessive noise in public places.	Noise and vibration
Instruction No.1	-	Wastewater Discharge Quality Requirements	Wastewater discharge concentration limits. Related to Regulation No. 25 of 1967.	Water quality
Protection of Biological Environment				
Law No. 74	2010	Prohibition of Importation of Plants to Iraq	Prohibits the import of all plants.	Biodiversity
Law No. 17	2010	Law on the protection of wild animals	Law aims to protect wild animals and to organize the hunting grounds by regulating hunting licences and determining animal species that could be hunted. Repeals Law No.21 of 1979.	Biodiversity
Law No.30	2009	Law on forests and woodlands (also referred to as the Forests and Orchards Law)	Aims to prevent logging in order to protect waterways and springs. It attempts to create a balance between protecting the environment and green spaces on the one hand and water resources on the other for being decisive to protect the ecosystem. Repeals Forest Law No.75 of 1955.	Biodiversity

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Law No.31	2008	Law on joining the convention of biological diversity	Law implementing the convention of Biological diversity	Biodiversity
Law No.7	2007	Law on ratification of convention on wetlands of international importance especially as waterfowl habitats (Ramsar Convention)	Law implementing the Ramsar convention	Biodiversity
Decision No.1	1991	Chief of the Environmental Protection Board Concerning the Cutting of Trees	Prohibits the cutting of trees from natural forests, pavements, areas with young trees and green belts.	Biodiversity
Resolution 463	1989	Law on Deer Hunting	Forbidden to hunt deer across all of Iraq.	Biodiversity, for information only
Law No.61	1985	Amendment on Wild Animals Diseases Law No. 68 of 1936	This Law amends article 36 of Law No. 68 of 1936. Concerns the offences and penalties in case of hiding the presence of a disease to the authority or in case of disrespect of a quarantine period or in case of any other violation of the provisions of the Law.	Biodiversity
Law No.2	1983	Natural Pastures Act	This Law aims to manage and develop the pasture by identifying the areas of rough grazing, planning the grazing according to scientific bases, protecting the natural vegetation, conserving water resources and organizing their use, and conducting studies and researches for the protection of rough grazing. The	Biodiversity

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
			provisions of this Law concern the state-owned properties allocated for pasture and exclude cultivated lands and other particular cases.	
Law No.10 of 1981, amending Law No.48 of 1976	1981	Regulating the Exploitation and Protection of Aquatic Life	Regulates fishing and aquaculture.	Biodiversity, Water Quality
Law No.48	1976	Fishing, Use and Protection of Aquatic Life	Basic Law regulating fishing and aquaculture. Article 1 prohibits the use of mass destruction methods such as chemicals, explosives, or electrical energy, the use of gear which may harm eggs or fry, the pollution of waters in such way as to harm aquatic life.	Biodiversity
Law No.106	1965	Rangelands and their Protection) also referred to as Pasture Protection Act)	Measures to organise grazing and to improve ranges outside the areas irrigated by rivers, prohibit tree or shrub cutting or hay making for commercial or agricultural purposes without a licence	Biodiversity, social, land use
Penal Code No.111	1965	-	Criminalises acts which harm public health and the environment.	All
Law No.57	1938	Hunting Law	Bans the practice of hunting without a licence	Biodiversity
Law No.68	1936	Wild Animal Diseases Law	This Law prescribes some measures to prevent from and to fight against animal diseases.	Biodiversity
Social Aspects				

Table 4.1: Summary of Relevant Iraqi Environmental and Social Legislation				
Legislation	**Year**	**Name**	**Comments**	**Relevant Topic(s)**
Law No.37	2015	Labour Law	Protection of works rights	Social – labour
Law No.12	2008	Law on ratification of convention on protection of the world cultural and natural heritage	World cultural and heritage sites	Cultural heritage
Law No.8	2006	Ministry of Labour and Social Affairs	Minimum limit of wages, promotes health and safety	Social – labour
Law No.55	2002	Law on antiquities and heritage	National heritage law	Cultural heritage
Law No. 71	1987	Labour Code	The Labour Code guarantees the right to work, under equal conditions and with equal opportunity, to all citizens who are able to work, without any discrimination on the basis of sex, race, language or religion.	Social - labour
Law No.12	1981	The Republic of Iraq's Acquisition Law	Simplifies process for land acquisition	Social – land acquisition
Law No.64	1965	Cities land use	-	Social – land use

4.4.5 Environmental Impact Assessment Legislation

Project Categorisation

With respect to the categorisation of the environmental impacts of a development, the Environmental Criteria for Industrial, Agricultural and Public Services Projects (1990) and Instruction No. 3 of 2011 on the Environmental Determinants for the Establishment of Projects and Monitoring the Safety of their Implementation list a wide range of industries and activities into three categories (A, B or C) according to their environmental effects.

- Environment Polluting Activities Category (A) – This category is for intensive environmentally polluting activities, including major agricultural or industrial projects that could result in significant impacts on environment quality over large areas. Such activities should be located away from villages, towns, cities, etc., including areas of cities, districts, sub-districts and villages, etc. nominated for development under a rural settlement plan. Suitable pollution controls/ abatement equipment should be provided to protect the environment.

- Environment Polluting Activities Category (B) – This category relates to those activities which have less potential to result in pollution than those in Category (A). Such activities include industrial, agricultural, or other activities which can result in site contamination which can be controlled. Such activities can therefore be established within city boundaries and within the development plots allocated for them, provided that pollution control equipment/treatment units are installed in accordance with relevant national regulations and instructions.

- Environment Polluting Activities Category (C) – This category relates to activities which cause minor levels of pollution that can be treated i.e. industrial factories that do not result in significant contamination, and small-scale agriculture and residential complexes, hotels, and hospitals, which generate pollution with mainly organic content that can be treated easily using pollution control equipment/treatment units. Such activities can thus be established within and outside of city borders, without any limitation, in accordance with these instructions. This also allows farm owners to set up environmentally non-polluting industries within their farms.

In cases where it is not possible to control all pollution (for example odour), the activity should be located outside of the city boundaries, and in accordance with the determinants for that activity as detailed in these instructions.

The Project is considered as a **Type B** within this directive because of some of its components may have the potential for major negative environmental effects.

The regulations then go on to list various activities, establishing the environmental classification category for that activity, and the various site location restrictions and environmental requirements. However, port facilities are not listed.

Law No.27 of 2009 for Protection and Improvement of Environment

Law No. 27 for Protection and Improvement of Environment was enacted in December 2009, is the most recent comprehensive environmental law in Iraq and addresses the following major regulations:

- The establishment of the Environmental Protection Council / Office which oversees the implementation of environmental protection across the country;
- The environmental protection provisions such as importance of conducting EIA for projects that may impact the environment; and
- The need for facilities to operate efficiently and to monitor environmental impact from polluting sources.

Article 10 specified that an EIA required as part of the technical and feasibility study for all projects undertaken in Iraq and sets out the following minimum requirements for an ESIA:

- Estimation of the positive and negative impacts of the project on the surrounding environment;
- Mitigation measures to avoid and treat the causes of the pollution to comply with national and regional regulations;
- Estimation of incidental and probable incident cases of pollution and their precautionary measures to avoid them;
- Possible alternatives to utilize technology with lower environmental burden and more energy saving;
- 3R (Reduce, Reuse and Recycle) of solid wastes;
- Pollution control for air, land protection, ecological protection and hazardous waste management; and
- Estimate the costs of environmental damage caused by a project, relative to any environmental advantage that the project may produce.

Table 4.2: Major Principles and Rules of Law No.27 of 2009

Chapter	Article
Chapter 1 – Objectives and Definitions	Article 1: The law aims for the protection and improvement of the environment by eliminating and treating existing or potential damage, in order to preserve the general health, environmental resources, biodiversity and cultural and natural heritage in cooperation with the concerned parties in a way that guarantees sustainable development and achieving international and regional cooperation in this regard
Chapter 4 – Regulations for Environmental Protection	Article 9: Entities whose activities may result in pollution are responsible for the following: ▪ Providing means and systems for the treatment of pollution employing environmentally friendly technology, ensuring its efficiency in dealing with the damage when it happens, and notifying the MoHE. ▪ Providing measuring and control devices for the pollutants as per their nature, and documenting the measuring results in a log for this purpose so the Ministry (i.e. MoHE) can obtain it. In case such devices are not available, the MoHE may conduct measures using its own devices available at the consulting labs and firms which it authorises, and which are controlled and audited by the MoHE.
	Article 11: Any entity with activities that affect the environment will be prohibited from working without obtaining an approval from the MoHE.
	Article 14: ▪ Discharging any liquid waste from domestic, industrial or services, or agricultural sources to water resources, including groundwater, surface water, and marine water, unless after the necessary treatment which ensures compliance to the specified standard in the national environmental legislation and international agreements. ▪ Connecting domestic or factory sewers to a rainwater drainage network. ▪ Discharging solid waste, animal excretions, or part of it, to water bodies. ▪ Discharging oily waste, fuel residue, or balance water to surface water, groundwater, or marine water, whether from stationary or mobile sources or from leakage during loading operations.
	Article 15: The following are prohibited: ▪ Gas, smoke, fumes, or particles emissions from the production process or incinerating fuel into the air, except after the necessary treatment that ensures compliance with the national environmental legislation.

Table 4.2: Major Principles and Rules of Law No.27 of 2009	
Chapter	**Article**
	▪ Using motors or vehicles that have exhaust emissions at a higher level than the level allowed in the national environmental legislation. ▪ Burning solid waste, except in locations that are specified by the relevant entities according to an environmentally safe procedure.
	Article 16 It is prohibited to exceed the permissible noise limits while operating equipment, machinery, and volume enhancers for all activities, provided that the noise intensity rate in an area is within the limits allowed by the instructions of the MoHE.
	Article 17: The following are prohibited: ▪ Any activity that leads directly or indirectly to soil damage, deterioration, or pollution in a manner that affects its production capability, the food chain, or the aesthetics, except according to existing applied legislation. ▪ Any activity that might damage plantations in any area or lead to desertification or destruction of the natural environment, except after approval by the relevant entity. ▪ Destruction or damage to natural and cultural heritage features mentioned in the log of the MoHE for this purpose with other relevant entities. ▪ Disposing of solid wastes, except in areas specified for this purpose.
	Article 18: The following are prohibited: ▪ Damaging biodiversity in its whole.
	Article 20: The following are prohibited: Transporting, transferring, admitting, burning, sinking, storing or disposing of hazardous or radioactive waste, except in an environmentally friendly manner and with official approval according to the regulations issued by the MoHE in cooperation with the relevant entities. Producing, transferring, transporting, importing or storing hazardous material, except after taking the necessary precautions stated in the regulations, instructions, and laws as to not cause any environmental damage, and the owner of the facility or activity should notify the MoHE of any discharge that happens due to force majeure, and applying the necessary measures to avoid the damage resulting from it. Practising any activity for hazardous waste treatment except after obtaining an authorisation from the relevant entities, following instruction from the MoHE.

Table 4.2: Major Principles and Rules of Law No.27 of 2009	
Chapter	**Article**
	Disposal of the waste should be done according to the terms and conditions specified for this reason, which guarantees no harm or damage to the environment.
	Article 21: Relevant entities for the extraction of oil and natural gas should do the following: Take the necessary measures to control the damage and hazards that result from the exploration for oil and gas, and taking the necessary precautions to protect the earth, air, surface water and groundwater from pollution.
	Article 22: Activities that affect the environment are controlled by the environmental control teams, and the responsible entity should offer full cooperation and provide the needed facilities for the environmental control teams, including entry to the work site
	Article 23: The owner of an activity or the person responsible for a facility under environmental control needs to own a record of the environmental impact according to instructions issued by the Minister of Environment, where he specified the record model and the data that should be logged. Environmental control teams follow up on the record.

Please note that there are no Iraqi laws or regulations which stipulate an ESIA must be submitted at the planning stage. There is also no legislation related to dredging or disposal of dredgings, however, consultation with the MoHE is requested prior to the commencement of any disposal.

4.5 National Environmental Standards

The following environmental standards exist in Iraq; these are included for reference.

4.5.1 Water Quality Standards

Regulation No.25 of 1967 regulates the national water quality standards as shown in **Table 4.3**.

Table 4.3: National Water Quality Standards

Parameter	Unit	Water body			
		A-1	A-2	A-3	A-4
colour	-	normal	normal	normal	normal
temperature	°C	-	-	-	-
SS	mg/L	-	-	-	-
pH	-	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	-
DO	mg/L	> 5	> 5	> 5	-
BOD_5	mg/L	> 5	> 3	> 3	-
COD (Cr_2O_7 method)	mg/L	0.02	-	-	-
cyanide (CN^-)	mg/L	0.02	0.02	0.02	0.02
fluoride (F^-)	mg/L	0.2	0.2	0.2	0.2
free chlorine	mg/L	trace	trace	trace	trace
chloride (Cl^-)	mg/L	200	200	200	200
phenol	mg/L	0.005	0.005	0.005	0.005
sulphate (SO_4^{2-})	mg/L	200	200	200	200
nitrate (NO_3^-)	mg/L	15	15	15	50
phosphate (PO_4^-)	mg/L	0.4	0.4	0.4	0.4
ammonium (NH_4^+)	mg/L	1	1	1	1
DDT	mg/L	nil	nil	nil	nil
lead	mg/L	0.05	0.05	0.05	0.05
arsenic	mg/L	0.05	0.05	0.05	0.05
copper	mg/L	0.05	0.05	0.05	0.05
nickel	mg/L	0.1	0.1	0.1	0.1
selenium	mg/L	0.01	0.01	0.01	0.01
mercury	mg/L	0.001	0.001	0.001	0.001
cadmium	mg/L	0.005	0.005	0.005	0.005
zinc	mg/L	0.5	0.5	0.5	0.5

Table 4.3: National Water Quality Standards					
Parameter	**Unit**	**Water body**			
		A-1	**A-2**	**A-3**	**A-4**
chromium	mg/L	0.05	0.05	0.05	0.05
aluminium	mg/L	0.1	0.1	0.1	-
barium	mg/L	1.0	1.0	1.0	1.0
boron	mg/L	1.0	1.0	1.0	1.0
cobalt	mg/L	0.05	0.05	0.05	0.05
iron	mg/L	0.3	0.3	0.3	0.5
manganese	mg/L	0.1	0.1	0.1	0.1
silver	mg/L	0.01	0.01	0.01	0.01
Category of water body A-1: Rivers, their tributaries; A-2: Streams, water courses; A-3: Lakes, ponds; A-4: Springs, wells and groundwater					

4.5.2 Discharge Standards

Regulation No. 25 of 1967 is composed of 19 Articles and relates to the protection of rivers and public water bodies from contamination. The public water bodies to which the regulations apply (Article 2), include:

- All rivers in Iraq and their tributaries.
- Streams, canals and all their branches.
- Drainage channels and its branches.
- Lakes, marshes, ponds and swamps.
- Springs, wells and other groundwater.
- Ponds and other pools of water.

Article 3 states that no wastewater discharges should be discharged into public waters unless permitted by the Health Authority.

Article 5 states that the Health Authority will determine the volume and the quality of wastewater which may be discharged into a public water body, and will establish discharge consent limits for the wastewater discharge.

The standard consent limits for the discharge of wastewater into public water bodies are detailed Article 7:

- If oxygen uptake is exceeded, suspended solids or floating rates are to be determined by the health authority's instructions, but at all times should not exceed the upper limit of 60 ppm.
- The discharge must not contain hydrogen sulphide, toxic substances, harmful amounts of bacteria or harmful substances which may produce toxic substances when they interact with chemical agents that may be present in public water.
- The wastewater must not have a hydrogen ion concentration (pH) of less than 6 or more than 10.
- The temperature must not affect the receiving water.
- Any other wastewater discharge parameters may be decided by the Health Authority.

The disposal of carcasses, secretions or faeces, solid and liquid waste of any kind, or any other harmful substance, into any public waterway or on beaches is not permitted (Article 10). Article 11 prohibits the washing of animals, leather, wool, intestine and contaminated clothing, and any material that may result in harm to public health, in public waters, and prohibits the defecation and urination in such waters or on the shores.

Article 15 contains details of the penalties for breaching these regulations.

Wastewater Discharge Quality Requirements (Instruction No. 1)

This Instruction provides discharge concentration limits for several substances contained in wastewater, in accordance with the provisions of Article (16) of Regulation 25 on the Maintenance of Rivers and Public Water from Contamination, 1967.

Table 4.4: Discharge Consent Limits for Wastewater

Analyte	Limit
Lead	0.1
Arsenic	0.05
Copper	0.1
Nickel	0.1

Table 4.4: Discharge Consent Limits for Wastewater	
Analyte	**Limit**
Selenium	0.05
Mercury	0.005
Cadmium	0.1
Zinc (divalent)	5.0
Chromium	0.1
Cyanides	0.1
Hydrogen Sulphide	0.5
Carbon disulphide	1.0
Crude oil and its derivatives dissolved Hydrocarbons	0.1
Free chlorine	Trace
Sulphide	0.5
Carbon tetrachloride	5.0 (0.5?)
D.D.T.	0.2
Dinitronaphthalene	2.0
Cholorobenzene	2.0
Trinitrototoluene	0.5
Dinitrobenzene	0.5
Tetranitromethane	0.5
Fluorides	1.0

EAME understands that these consents have been expressed as a ratio (percentage) rather than an absolute concentration or maximum permissible concentration and this is the maximum percentage that each parameter is allowed to be present in wastewater discharges to natural waters.

Exceedence of these discharge consents is a direct breach of the provisions detailed of paragraph (2) of Article VII of the Maintenance System of Rivers and Public Water, 1967.

It is understood that these values may have been updated with new determinants that appear to be more stringent through the introduction of The New Determinants for the Prevention of Pollution of Rivers No. (25), 1967.

The New Determinands for the Prevention of Pollution of Rivers (No. 25, 1967)

These instructions provide physical, chemical and biological guidelines for water quality and wastewater discharges. The regulation defines Water Resources as:

- rivers and its tributaries and branches;
- streams, waterways, canals and branches of;
- lakes and ponds and other pools of water; and
- springs, wells and groundwater.

The regulations apply to wastewater from cities, industry, agriculture and other activities including:

- wastewater discharged to a public water source;
- wastewater discharged to public sewers;
- wastewater discharged to the sewage treatment works; and
- wastewater discharged to the marshes.

The regulations define discharge limits for discharges to both natural waters (water resources) and sewers (which generally have a higher permissible discharge limit).

Table 4.5: Discharge Consent Parameters

Pollutants	Limits For Discharge to Water Resources	Limits For Discharge to Public Sewers
Colour	-	-
Temperature	Less than 35°C	45°C
Suspended solid	60	750
pH	6 - 9.5	6 – 9.5
Dissolved Oxygen	-	-
BOD	Less than 40	1,000

Table 4.5: Discharge Consent Parameters		
Pollutants	**Limits For Discharge to Water Resources**	**Limits For Discharge to Public Sewers**
COD (Cr_2O_7 method)	Less than 100	-
Cyanide (CN-)	0.05	0.5
Fluoride (F-)	5.0	10
Free Chlorine (Cl_2)	Trace	100
Chloride (Cl-)	A. If the ratio of the amount of water discharged to the amount of source water is 1000:1 or less, the chloride concentration of the discharge is permitted at 1% of the concentration of the natural source before discharge. B. If the ratio of the amount of water discharged to the amount of source water is more than 1000:1 the wastewater discharge must not exceed a chloride concentration of greater than 600 mg/litre. C. If the concentration of fluoride in the source water is less than 200 mg/l then the permitted discharge limit must be established on a case by case basis.	600
Phenol	0.01 – 0.05	5 - 10
Sulphate (SO_4=)	A - if the ratio of the amount of water discharged to the amount of source water is 1000:1 or less, the sulphate concentration of the discharge is permitted at 1% of the concentration of the natural source before discharge. B - If the percentage of the amount of wastewater discharged to the amount of source water is more than 1000:1, the wastewater discharge must not exceed a sulphate concentration of greater than 400mg/l. C - if the concentration of sulphate in the source water is less than 200mg/l then the permitted discharge limit must be established on a case by case basis.	300
Nitrate (NO_3-)	50	-

Table 4.5: Discharge Consent Parameters

Pollutants	Limits For Discharge to Water Resources	Limits For Discharge to Public Sewers
Phosphate (PO_4^{3-})	3	-
Ammonium (NH_4+)	-	-
DDT	Nil	-
Lead (Pb)	0.1	0.1
Arsenic (As)	0.05	0.05
Copper (Cu)	0.2	-
Nickel (Ni)	0.2	0.1
Selenium (Se)	0.05	-
Mercury (Hg)	0.005	0.001
Cadmium (Cd)	0.01	0.1
Zinc (Zn)	2.0	0.1
Chromium (Cr)	0.1	0.1
Aluminium (Al)	5.0	20
Barium (Ba)	4.0	0.1
Boron (B)	1.0	1.0
Cobalt (Co)	0.5	0.5
Iron (Fe)	2.0	15
Manganese (Mn)	0.5	-
Silver (Ag)	0.05	0.1

Table 4.5: Discharge Consent Parameters		
Pollutants	**Limits For Discharge to Water Resources**	**Limits For Discharge to Public Sewers**
Total Hydrocarbons and Derivatives	Allows the discharge of total hydrocarbons to water sources and A -1 and A -2 according to the concentrations and limitations set forth in the tables below; the concentration of hydrocarbons must be measured discharging to the water source. Hydrocarbons shall not be discharged to water sources A3 and A4. For a river in continuous flow 10 mg/l according to the ratio of the amount of wastewater discharged to the amount of the water source should not be less than 1000:1. For a river in continuous flow 5 mg/l and in accordance the ratio of the amount of wastewater discharged to the amount of the water source should be 500:1 or less. For a river in a continuous flow 3 mg/l and in accordance with the ratio of the amount of wastewater discharged to the amount of the water source should be 300:1 or less.	-
Sulphide (S=)	Nil	3.0
Ammonia (NH_3)	Nil	10
Ammonia Gas (Free NH3)	Nil	6.0
Sulphur dioxide SO_2	Nil	7.0
Calcium carbide CaC	Nil	Not allowed
Organic solvents	Nil	Not allowed
Benzene	Nil	0.5
Chlorobenzene	Nil	0.1
TNT	Nil	0.5
Bromine (Br_2)	Nil	1 – 3

EAME understands the references to A1, A2, A3 and A4 to refer to water quality classifications for natural water bodies as determined by the Iraq Authorities. The values presented **Table 4.6** are believed to be the environmental quality standards which must not be exceeded by industrial wastewater discharges.

Table 4.6: Physical, chemical and biological determinants for public water bodies to classify them into Grades A1 – A4

A-4	A-3	A-2	A-1	Material	
normal	normal	normal	normal	Colour	1
-	-	-	-	Heat	2
	-	-	-	Suspended solids	3
	6.5-8.5	6.5-8.5	6.5-8.5	Hydrogen ion concentration	4
-	More than 5	More than 5	More than 5	Dissolved oxygen	5
	Less than 3	Less than 3	Less than 5	B.O.D.5	6
-	-	-	-	CO.D.CR207	7
0.02	0.02	0.02	0.02	Cyanide	8
0.2 or more depending on the concentration in the natural source				Fluorine	9
Trace	Trace	Trace	Trace	Free Chlorine	10
200 Or more depending on the natural source	200 Or more depending on the natural source	200 Or more depending on the natural source	200 Or more depending on the natural source	Chlorides	11
0.005	0.005	0.005	0.005	Phenol	12
200 Or more depending on the natural source	200 Or more depending on the natural source	200 Or more depending on the natural source	200 Or more depending on the natural source	Sulphate	13
50	15	15	15	Nitrate	14

Table 4.6: Physical, chemical and biological determinants for public water bodies to classify them into Grades A1 – A4

A-4	A-3	A-2	A-1	Material	
0.4	0.1	0.4	0.4	Phosphate	15
-	1.0	1.0	1.0	Ammonium	16
zero	zero	zero	zero	Pesticide DDT	17
0.05	0.05	0.05	0.05	Lead	18
0.05	0.05	0.05	0.05	Arsenic	19
0.01	0.05	0.05	0.05	Copper	20
0.1	0.1	0.1	0.1	Nickel	21
0.01	0.01	0.01	0.01	Selenium	22
0.001	0.001	0.001	0.001	Mercury	23
0.005	0.005	0.005	0.005	Cadmium	24
0.1	0.5	0.5	0.5	Zinc	25
0.05	0.05	0.05	0.05	Chromium	26
-	0.5	0.1	0.1	Aluminium	27
1.0	1.0	1.0	1.0	Barium	28
1.0	1.0	1.0	1.0	Boron	29
0.05	0.05	0.05	0.05	Cobalt	30
0.3	0.3	0.3	0.3	Iron	31
0.1	0.1	0.1	0.1	Manganese	32
0.01	0.01	0.01	0.01	Silver	33
-	-	-	-	Total hydrocarbons and their derivatives	34
-	-	-	-	Sulphide	35
-	-	-	-	Ammonia	36
-	-	-	-	Ammonia gas	37
-	-	-	-	Sulphur dioxide	38

Table 4.6: Physical, chemical and biological determinants for public water bodies to classify them into Grades A1 – A4					
A-4	**A-3**	**A-2**	**A-1**	**Material**	
-	-	-	-	Alcohol-oil	39
-	-	-	-	Calcium carbide	40
-	-	-	-	Organic solvents	41
-	-	-	-	Petrol	42
-	-	-	-	Chlorobenzene	43
-	-	-	-	TNT	44
-	-	-	-	Bromine	45
Note: The allowable concentration can be increased in certain special cases based on the impact of the discharge to the water source. Concentration in mg/l unless otherwise indicated.					

4.5.3 Drinking Water Standards

The Iraqi Drinking Water Standard (IQS 417/2001), published by the Ministry of Planning, provides the standards for drinking water quality:

Table 4.7: National Drinking Water Standards		
Parameter	**Unit**	**Standard**
Colour	TCU	10
Turbidity	NTU	5
Taste	-	Accepted
Smell	-	Accepted
pH	-	6.5 – 8.5
Arsenic	mg/L	0.01
Cadmium	mg/L	0.003
Chromium	mg/L	0.05
Cyanide	mg/L	0.02

Table 4.7: National Drinking Water Standards		
Parameter	**Unit**	**Standard**
Fluoride	mg/L	1.0
Lead	mg/L	0.01
Mercury	mg/L	0.001
Nitrate (NO_3)	mg/L	50
Nitrite (NO_2)	mg/L	3
Selenium	mg/L	0.01
Aluminium	mg/L	0.2
Chloride	mg/L	250
Copper	mg/L	1.0
Total Hardness (as $CaCO_3$)	mg/L	500
Iron	mg/L	0.3
Manganese	mg/L	0.1
Sodium	mg/L	200
Total Dissolved Solids	mg/L	1,000
Sulphate (SO_4)	mg/L	250
Zinc	mg/L	3.0
Calcium	mg/L	50
Magnesium	mg/L	50
Barium	mg/L	0.7
Nickel	mg/L	0.02
Dissolved Hydrocarbons	mg/L	0.01
Carbon-chloroform Extracted	mg/L	0.3
Industrial Detergents	mg/L	0.3
Phenol Compounds	mg/L	0.002
Coliform (100 ml after 24 hours at 35°C)	ml	<1.1

Table 4.7: National Drinking Water Standards		
Parameter	**Unit**	**Standard**
E. coli (100 ml after 24 hours at 44°C)	ml	<1.01
Escherichia coli (250 ml after 24 hours at 35°C)	ml	0
Plate count (1 ml after 24 hours at 35°C)	ml	0
Organic chloro (chlorinated)	mg/L	0.7
Organic Phosphorous	mg/L	0.000005
Pesticides Polychlorinated Bi-phenols (PCBs)	mg/L	0.001
Total Alpha radiation	Becquerel/L	0.1
Total Beta radiation	Becquerel/L	1

4.5.4 Noise Limits

Law No. 21 of 1966 for Noise Prevention aims to prevent excessive noise in public places. This was repealed by Law No. 41 of 2015 on Noise Protection and Control. Law No. 41 regulates methodological issues in noise control, sets limits for exposure times to continuous noise and determines daytime and night time standards for outdoor noise exposure:

Table 4.8: Noise Limits (Law No. 41 of 2015)		
Area	**Daytime (09:00 – 19:00)**	**Night time (19:00 – 07:00)**
Quiet areas (hospitals, retirement homes, etc.)	50 dBA	40 dBA
Urban residential	60 dBA	50 dBA
Suburban residential	55 dBA	45 dBA
Rural area	55 dBA	40 dBA
Educational	55 dBA	45 dBA
Industrial area	70 dBA	60 dBA
Commercial, administrative	65 dBA	60 dBA

Table 4.8: Noise Limits (Law No. 41 of 2015)		
Area	**Daytime (09:00 – 19:00)**	**Night time (19:00 – 07:00)**
Airport, railway stations, harbours	70 dBA	60 dBA
Parks	60 dBA	50 dBA
Mixed residential and commercial	60 dBA	50 dBA
Mixed residential and industrial	60 dBA	40 dBA

4.5.5 Vibration Limits

Directive No.4 of 1993 Occupational Health, Protection of Workers against Vibration requires that all employees, who would be exposed to vibration, undertake a medical check to ensure they are fit to work in such an environment. Maximum exposure limits are provided, as shown in **Table 4.9**.

Table 4.9: National Maximum Exposure Limits	
Daily exposure periods to vibration (hours)	**Maximum vibration exposure allowance (m/s^2)**
4-8	4/2
2-4	6/2
1-2	8/2
<1	12/2

4.5.6 Ambient Air Quality

Local air quality standards are defined by the Iraqi National Clean Air Act 1979. This act establishes long term, medium and short term ambient quality standards across a range of pollutant parameter.

Typically, air quality objectives are medium-term policy based targets set by the GoI which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the agreed WHO guideline limits, whereas others involve a margin of tolerance based on local industry activity i.e. allow a limited number of permitted exceedances

of the standard over a given period. No stated exceedances are provided with the Iraqi standards.

These ambient standards are provided within **Table 4.10**.

Table 4.10: National Air Quality Standards (National Clean Act 1979)

Pollutant	Period	Ambient Air Standard (ppm)	Ambient Air Standard (µg/m^3)
Sulphur Dioxide	1 hour 24 hours 1 year	0.1 0.04 0.018	None Stated
Carbon Monoxide	8 hrs 1 hr	10 35	None Stated
Nitrogen Dioxide	1 hr 24 hrs	0.05 0.04	None Stated
Ozone	1 hour	0.06	None Stated
PM10	24 hours	None Stated	150
PM2.5	24 hours 1 year	None Stated	65 15
Total Suspended Particulate	24 hours 1 year	None Stated	350 150
Dust	30 days	None Stated	10 tonne/km^2/month (residential) 20 tonne/km^2/month (Industrial)
Hydrocarbon	3 hours	0.24	160
Lead	24 hours 3 months 1 year	None Stated	2 1.5 1
Benzene	1 year	None Stated	0.003 (mg/m^3)
Dioxin	1 year	None Stated	0.6 (Bg/m^3)

The Ministry of Oil has issued guidelines to the International Oil Companies with respect to air quality standards. These are outlined within **Table 4.11.**

Table 4.11: Ministry of Oil - Air Quality Standards

Pollutant	Averaging Period	Ministry of Oil Guidelines
CO	8-hour	35 ppm
	1-hour	9 ppm
SO_2	10-minute	-
	1-hour	0.1 ppm
	24-hour	0.04 ppm (105 µg/m^3)*
	1-year	0.018 ppm
NO_2	1-hour	-
	24-hour	0.05 ppm
	1 year	0.04 ppm
O_3	1-hour	0.06 ppm
	8-hour	0.075 ppm (147 µg/m^3)*
PM_{10}	24-hour	150 µg/m^3
	- year	-
$PM_{2.5}$	24-hour	35 µg/m^3
	1-year	15 µg/m^3
TSP	24-hour	350 µg/m^3
	1-year	150 µg/m^3
Falling dust	30 days	10 tonne/km^2/month residential zone
	30 days	20 tonne/km^2/month industrial zone
Hydrocarbons	3-hour	0.24 ppm
Lead	24-hour	2 µg/m^3
	3-months	1.5 µg/m^3
Benzene	1-year	0.003 mg/m^3

Table 4.11: Ministry of Oil - Air Quality Standards		
Pollutant	**Averaging Period**	**Ministry of Oil Guidelines**
Dioxin	1-year	0.6 pg/m^3
Notes: * Converted when required for comparison between ppm/ppb and µg/m^3 (or mg/m^3) at 25°C assuming ppm/ppb stated by volume.		

An unnamed draft Instruction of Ambient Air Pollution, issued by the MoHE, provides limits for Iraqi ambient air quality:

Table 4.12: National Ambient Air Quality Standards (Unpublished Instruction)		
Parameter	**Averaging Period**	**Standard**
Carbon Monoxide	1-hour	35 ppm (40,250 µg/m^3)
	8-hour	9 ppm (11,500 µg/m^3)
Nitrogen Oxides (as nitrogen dioxide)	1-hour	-
	24-hour	0.05 ppm (94 µg/m^3)
	Annual	0.04 ppm (75.2 µg/m^3)
Particulate Matter (PM10)	24-hour *1	150 µg/m^3
	Annual	-
Particulate Matter (PM2.5)	24-hour *2	35 µg/m^3
	Annual	15 µg/m^3
Sulphur Dioxide	1-hour *3	0.1 ppm (262 µg/m^3)
	24-hour *4	0.04 ppm (47.2 µg/m^3)
	Annual	0.018 ppm (47.2 µg/m^3)
Benzene	Annual	0.003 mg/m^3 (3 µg/m^3)
Photochemical Oxidants as Ozone	1-hour *5	0.06 ppm (118 µg/m^3)
	8-hour	0.075 (147 µg/m^3)
Notes *1 The average 90th Percentile 24-hour concentration must not exceed 340µg/m^3 *2 The average 90th Percentile 24-hour concentration must not exceed 35µg/m^3		

Table 4.12: National Ambient Air Quality Standards (Unpublished Instruction)		
Parameter	**Averaging Period**	**Standard**
*3 Maximum concentration not to be exceeded more than 10 times per year *4 Recommended concentration to avoid odour nuisance, hence this value is less than the 24-hour guideline that incorporates a protection (safety) factor of 100 *5 Maximum concentration not to be exceeded more than twice per month		

4.5.7 Stationary Source Emissions

Directive No. 3 of 2012 on the National Limitations on Emissions in activities and Work provides details of the national standards regarding stationary source emissions:

Table 4.13: National Standards for Emissions from Stationary Sources		
Parameter	**Source of Emissions**	**Standard (mg/Nm^3)**
Smoke and visible pollutants *1	Combustion Sources *2	250
	Other Sources	0
Opaque Pollutants	All sources	20%
Carbon Monoxide	Combustion Sources *2 – Existing	500
	Combustion Sources *2 – New	250
	Other Sources	500
Nitrogen Oxides (as nitrogen dioxide)	Fuel Combustion Units (Furnaces) – gas fuel	240
	Fuel Combustion Units (Furnaces) – liquid fuel	500
	Turbine Units – gas fuel	70
	Turbine Units – liquid fuel	150
Sulphur Dioxide	Fuel Combustion Units – gas fuel	500
	Fuel Combustion Units – liquid fuel	500
	Turbine Units – gas fuel	500

Table 4.13: National Standards for Emissions from Stationary Sources		
Parameter	**Source of Emissions**	**Standard (mg/Nm^3)**
	Turbine Units – liquid fuel	500
	Other Sources	1,000
Hydrogen Sulphide	All Sources	5
Total Suspended Particles	Combustion Sources *2	250
	Other Sources	150
Total Volatile Organic Compounds (as total organic carbons)	All Sources	20
Benzene	All Sources	5
*1 The limit on smoke and visible pollutants does not apply to emission of steam or during the reasonable period for cold start-up or shutdown. *2 Combustion source include furnaces, incinerators, and boilers in oil and petrochemical industries, power generating stations, etc		

4.5.8 Car Exhaust Emissions

Directive No.3 of 2012 on the National Limitation on Emissions in Activities and Work also provides emissions limits for car exhausts:

Table 4.14: National Standards for Emissions from Car Engines			
Type Fuel	**Pollutants*1**	**Old Cars*2**	**New Cars*3**
Gasoline	Hydrocarbons	900 ppm	600 ppm
	Carbon Monoxide	4.5% of volume	2.5 % of volume
Diesel	Opacity	30%	
*1 Concentrations for any substance listed in Column 1 shall be measured using the method adopted by the US EPA or an equivalent reference measurement method. *2 Cars that have been produced or imported and are still being driven on the roads within the boundaries of the Republic of Iraq. *3 Cars ready for production or which have already been produced that have not yet been driven on the roads, or cars that have already been driven on the roads but have been renovated by making changes to their engines or transmissions.			

4.6 International Conventions

The international conventions to which Iraq is a signatory, and their relevance to the Project, are listed in **Table 4.15**.

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
Universal Declaration of Human Rights (UN General Assembly, 1948)	1948	-	-	The universal declaration of human rights sets out fundamental human rights to be universally protected. The Declaration consists of thirty articles which have been elaborated in subsequent international treaties, economic transfers, regional human rights instruments, national constitutions, and other laws. This is relevant to labour and supply chains; as well as access to water.	Social, Labour issues
International Covenant on Civil and Political Rights	1976	1971	-	This is intended to protect the right to life, freedom of religion, freedom of speech, freedom of assembly etc. This is relevant to labour and supply chains; as well as access to water.	Social
International Covenant for Economic Social and Cultural Rights	1969	1971	Law 193	Objective is to provide labour rights, the right to health, the right to education and the right for an adequate standard of living. This is relevant to labour and supply chains; as well as access to water.	Social
International Convention on the Elimination of All Forms of Racial Discrimination	1969	1970	-	Prohibits racial discrimination. This is relevant to labour and supply chains; as well as access to water.	Social

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
Convention on the Elimination of All Forms of Discrimination against Women	-	1986	-	Prohibits discrimination against women and gives women the equal right to access, and equal opportunities in political and public life – including voting, standing for political office, in education, healthcare, and employment. This is relevant to labour and supply chains; as well as access to water.	Social
Iraq has ratified 7 out of the 8 ILO Core Conventions	Various	Various	-	The ILOs ratified include: ▪ ILO C029 - Forced Labour Convention, 1930 & ILO C105 - Abolition of Forced Labour Convention, 1957. ▪ ILO C098 - Right to Organise and Collective Bargaining Convention, 1949. ▪ ILO C100 - Equal Remuneration Convention, 1951. ▪ ILO C111 - Discrimination (Employment and Occupation) Convention, 1958. ▪ ILO C138 - Minimum Age Convention, 1973 & ILO C182 - Worst Forms of Child Labour Convention, 1999.	Social, Labour issues
RAMSAR Convention for the wetlands	1971	2007	Law 7	Intergovernmental treaty providing the framework for national action and international cooperation for the conservation and sustainable use of wetlands and their resources.	Biodiversity

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
Vienna convention and Montreal protocol to protect the Ozone layer	1985	2007	Law 42	International treaty brought into force globally designed to protect the ozone layer by phasing out the production of CFC's, HFC's, HFCFC's, Halons, etc. that are responsible for global ozone depletion. Iraq was listed under Article 5 as a developing country. Relevant to the types of equipment proposed for the Project.	Air quality
Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	1970	1973	Law 11	Treaty dedicated to fight against illicit trafficking of cultural property.	Cultural heritage and archaeology
International Plant Protection Convention	1952	1954	Law 7	International plan health agreement which aims to protect cultivated and wild plants by preventing the introduction and spread of pests.	Biodiversity
Climate Change Convention and Kyoto protocol to the UN Framework Convention on	1992	2008	Law 7	Negotiated at the UNCED, the treaty objective is to stabilize anthropogenically induced greenhouse gas (GHG) concentrations in atmosphere at a level that is suggested would not undermine the global climate system. UNCCC convention, established Kyoto protocol aiming at an 18% reduction in GHG emissions by 2020, including: Carbon dioxide (CO_2);	Air quality

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
Climate Change (UNFCCC)				Methane (CH_4); Nitrous oxide (N_2O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride (SF_6). Iraq assessed to the UNCCC convention, Kyoto protocol in 2009 as a developing (non-annexe 1 county) without binding targets during the commitment period 2013 to 2020. This is relevant in relation to air emissions arising from project activities.	
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972	1977	Law No 137	Each State Party to this Convention should do all it can to ensure the identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage situated on its territory.	Cultural heritage
UNESCO Convention for the safeguarding of the intangible cultural heritage	2003	2008	Law 12	Intangible cultural heritage, a mainspring of cultural diversity and a positive step towards sustainable development. Found in forms such as oral traditions, performing arts, social practices, rituals, festive events, knowledge and practices concerning nature and the universe, and traditional craftsmanship knowledge and techniques. This definition also comprises the instruments, goods, objects of art and cultural spaces inherent to intangible cultural heritage.	Cultural heritage

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
				Cultural heritage will be avoided wherever possible; however, the potential to affect unknown archaeology and cultural heritage will be assessed and a chance finds policy will be prepared for any works proposed.	
UN ESCWA - agreement on International Roads in the Arab Mashreq	2002	2008		Development of an Integrated Transport System in the Arab Mashreq (ITSAM) complete with integration of transport conventions for road, rail, maritime and air in support of regional socioeconomic integration and development. The M40 international road network linking Iraq, Jordan and Palestine planned for priority implementation. The transport routes to the site, including logistics from port to site(s) will be assessed as part of the ESIA and, where required, traffic management measures proposed.	Traffic and transport
UN Convention Against Corruption (UNCAC)	2005	2008		Comprehensive anti-corruption convention, covering a spectrum of corruption offences, including domestic and foreign bribery, embezzlement, trading in influence and money laundering. The UNCAC provisions obligate State Parties to take a number of public and private anti-corruption measures. Countries are required to undertake measures to support the tracing, freezing, seizure and confiscation of corrupt assets, establishing a wide range of criminal offences, including basic forms of corruption (like bribery and embezzlement), trading in influence and the concealment and	Social – labour

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
				laundering of the proceeds of corruption. The UNCAC offences deal with public and private-sector corruption. Project to be subject to the BMT Business Ethics and Code of Practice Procedure.	
Convention on Biological Diversity	1994	2008	Law 31	Biological diversity underpins ecosystem functioning and the provision of ecosystem services essential for human well-being. It provides for food security, human health, the provision of clean air and water; it contributes to local livelihoods, and economic development, and is essential in the progress towards poverty reduction. The Convention on Biological Diversity aim is to take effective action to halt biodiversity loss, minimise pressures on biodiversity, restore ecosystems, ensuring biological resources are sustainably used based on sound scientific evidence and the precautionary approach, to ensure by 2020 ecosystems are resilient and continue to provide essential services. The potential for the project to affect biodiversity will be assessed.	Biodiversity
Basel Convention, on Transboundary Hazardous Waste Movements	1992	2008	Law 3	Convention applies to the control of transboundary movements of hazardous wastes and their disposal. The scope of application covers a broad spectrum of wastes identified as hazardous, defined by origin, composition and characteristics, also other wastes comprising domestic waste and incinerator ash. The conventions aim is to reduce hazardous waste	Waste

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
				generation, restrict transboundary waste movements whilst promoting sustainable management of wastes The types and nature of the wastes will be assessed as part of the ESIA, and mitigation measures will be identified for the management of waste streams.	
UN Convention to Combat Desertification (UNCCD)	1994	2009	Law No. 7	The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007, Parties to the Convention further specified their goals: *"to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability".* The potential for the project to affect land use and contribute to desertification will be assessed as part of the ESIA.	Land use
Convention of International Trade of Endangered Species (CITES)		2012	Law No. 29	CITES is a multilateral treaty to protect endangered plants and animals. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 35,000 species of animals and plants.	Biodiversity

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
Cartagena Protocol on Biosafety		2013	Law No. 47	The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement on biosafety as a supplement to the Convention on Biological Diversity effective since 2003. The Biosafety Protocol seeks to protect biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology.	Biodiversity
Agreement on the Conservation of African-Eurasian Migratory Waterbirds		2014	Law No. 144	The Agreement on the Conservation of African-Eurasian Migratory Waterbirds, or African-Eurasian Waterbird Agreement (AEWA) is an independent international treaty developed under the auspices of the United Nations Environment Programme's Convention on Migratory Species. It was founded to coordinate efforts to conserve bird species migrating between European and African nations, and its current scope stretches from the Arctic to South Africa, encompassing the Canadian archipelago and the Middle East as well as Europe and Africa.	Biodiversity
The Convention on the Conservation of Migratory Species of Wild Animals		2014	Law No. 114	The Convention on the Conservation of Migratory Species of Wild Animals - or the Bonn Convention - aims to conserve terrestrial, marine and avian migratory species throughout their range.	Biodiversity
International Treaty on Plant Genetic	2014	2014	Law No. 47	The International Treaty on Plant Genetic Resources for Food and Agriculture is a comprehensive international agreement in harmony with the Convention on Biological Diversity, which aims at guaranteeing food security	Biodiversity and social

Table 4.15: Summary of Relevant Environmental and Social International and Social International Conventions					
Convention	**Signed or Ratified**	**Accession Date**	**Applying Legislation**	**Description/Relevant to the Project**	**Relevant Topic(s)**
Resources for Food and Agriculture				through the conservation, exchange and sustainable use of the world's plant genetic resources for food and agriculture, as well as the fair and equitable benefit sharing arising from its use.	
Convention on the Prohibition of the use, Stockpiling, Production and Transfer of Anti-Personnel Mines		2007		The Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, known informally as the Ottawa Treaty, aims at eliminating the use of anti-personnel landmines.	Social
Stockholm Convention on Persistent Organic Pollutants	2016	2015	Law No. 45	The Convention aims to eliminate or restrict the production and use of persistent organic pollutant (POPs). POPs are toxic chemicals which can adversely affect human health and the environment. Other protocol obligations include the application of best available technology and best environmental practices to limit air emissions. Relevant to the types of equipment proposed for the Project.	Biodiversity
Paris Agreement under the United Nations Framework Convention on Climate Change	2016	-	-	Agreement within the UNFCCC dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020. *As yet, not ratified or entered into force.*	Air quality, climate change

4.7 Permitting Requirements

Additionally, in terms of redevelopment projects, an Environmental Compliance Certificate is required. In order to obtain such a certificate, an EIA must be produced for the development proposals, which must be submitted to the MoHE. This legislation should ensure that there is pre-project environmental evaluation of major projects before they commence and provides opportunities for environmental management and protection systems to be incorporated into new developments at the design stage.

It should be noted that the there are no regulations related to dredging and dumping activities.

4.8 Investment Bank Requirements

The Project is to be part-funded by investment banks who will have procedures in place to understand and manage the environmental, social, and corporate governance (ESG) risks of a Project such as this. The International Finance Corporation's (IFC) ESG policies, guidelines, and tools are widely adopted as market standards and embedded in operational policies by corporations, investors, financial intermediaries, stock exchanges, regulators, and countries.

Investment Banks use the IFC Performance Standards (PSs) to benchmark the Project and assess the Project against. The PSs define a developer's role and responsibility for managing the project and the requirements for receiving and retaining investment support. IFC PSs establish standards that the party responsible for implementing and operating a project is to meet throughout the life of an investment by IFC or other relevant financial institution. These are as follows:

- PS1: Assessment and Management of Environmental and Social Risks and Impacts
- PS2: Labor and working Conditions
- PS3: Resource efficiency and Pollution Prevention
- PS4: Community Health, Safety, and Security
- PS5: Land Acquisition and Involuntary Resettlement
- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS7: Indigenous Peoples
- PS8: Cultural Heritage

In addition to the IFC standards, the following guidance is relevant:

- Guidance Notes on Performance Standards - companion documents to the Performance Standards providing guidance in meeting the standards.

WBG Environmental, Health and Safety Guidelines - the WBG Environmental, Health and Safety Guidelines (the 'EHS Guidelines') are technical reference documents with general and industry-specific examples of good industry practice.

Please note that depending on the investment bank(s) who will fund this Project, other risk management frameworks may be applicable such as the Equator Principles or OECD Common Approaches.

4.8.1 IFC Performance Standards

The IFC's Environmental and Social PSs define IFC clients' responsibilities for managing their environmental and social risks. They came into force in July 2006 and were revised and updated in January 2012. These performance standards and guidelines are frequently used as a benchmark for good international industry practice.

A description of the relevant of the IFC PSs to this project are set out in **Table 4.16**.

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
PS1: Assessment and Management of Environmental and Social Risks and Impacts	The standard promotes an effective Environmental and Social Management System (ESMS) i.e. a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders. This ESMS should be appropriate to the nature and scale of the project and promote sound and sustainable environmental and social performance, which can lead to improved financial, social, and environmental outcomes. Business should respect human rights, which means to avoid infringing on the human rights of others and address adverse human rights impacts business may cause or contribute to. *Objectives* ▪ To identify and evaluate environmental and social risks and impacts of the project. ▪ To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. ▪ To promote improved environmental and social performance of clients through the effective use of management systems. ▪ To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.	The Project may potentially be identified as a Category A and an ESIA is required, in line with this Performance Standard.	All topics

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	▪ To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated. *Requirements* ▪ Social and environmental assessment; ▪ ESMS incorporating: Policy; Identification of risks and impacts; Management programs (action plan); Organizational capacity and competence; Emergency preparedness and response; Stakeholder engagement (Disclosure, consultation, grievance mechanism); Monitoring and review.		
PS2: Labor and working Conditions	The pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. A sound worker-management relationship is a key ingredient in the sustainability of a company. *Objectives* ▪ To promote the fair treatment, non-discrimination, and equal opportunity of workers. ▪ To establish, maintain, and improve the worker-management relationship. ▪ To promote compliance with national employment and labor laws.	This Performance Standard is applicable to the construction and operation phases of the Project, when suppliers and nationals may be employed. In particular, the prevailing in country situation includes issues associated with: enforcement of labour laws, high levels of unemployment, low wages, discrimination and child labour. An assessment of labour issues will therefore be undertaken as part of the ESIA.	Social, Labour issues, Human rights

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	▪ To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. ▪ To promote safe and healthy working conditions, and the health of workers. ▪ To avoid the use of forced labor. *Requirements* ▪ Working conditions and management of worker relationship (Human resources policy, working relationship, working conditions and terms of employment, workers' organisations, non-discrimination and equal opportunity, retrenchment and grievance mechanism); ▪ Protecting the work force (child labor, forced labor); ▪ Occupational health and safety; ▪ Workers engaged by Third Parties; and ▪ Supply chain.		
PS3: Resource Efficiency and Pollution Prevention	Project approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. It also promotes the ability of private sector companies to adopt such technologies and practices as far as their use is feasible in the context of the project that relies on commercially available skills and resources.	The Project may give rise to pollution through working near water during construction and general construction and operation wastes.	Water, Air, Noise

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	Objectives ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. ▪ To promote more sustainable use of resources, including energy and water. ▪ To reduce project-related GHG emissions. *Requirements* ▪ General requirements (pollution prevention, resources conservation and energy efficiency, waste, hazardous materials, emergency preparedness and response, technical guidance); ▪ Ambient considerations; ▪ Greenhouse gas emissions; and ▪ Pesticide use and management.		
PS4: Community Health, Safety, and Security	Addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety and security that may arise from project related activities, with particular attention to vulnerable groups. *Objectives*	The Project may give rise to adverse impacts on community health, safety and security during construction, for example, due to the movement of construction vehicles. During operation, the Project is likely to result in a positive impact due to	Social

Table 4.16: IFC Performance Standards Relevant to the Project

Performance Standard	Summary Description	Relevance to the Project	Relevant Topic(s)
	▪ To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. ▪ To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities. *Requirements* ▪ Community health and safety requirements (general requirements, infrastructure and equipment design and safety, hazardous materials management and safety, ecosystem services, community exposure to disease, emergency preparedness and response); and Security personnel requirements.	job creation resulting in improved living standards.	
PS5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood 1) as a result of project-related land acquisition and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement. This occurs in cases of (i) lawful expropriation or temporary or permanent restrictions on land use and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail. To help avoid expropriation and eliminate the need to use governmental authority to enforce	The Project area is owned by GCPI.	Social

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	relocation, clients are encouraged to use negotiated settlements meeting the requirements of this Performance Standard, even if they have the legal means to acquire land without the seller's consent. *Objectives* ▪ To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs. ▪ To avoid forced eviction. ▪ To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. ▪ To improve, or restore, the livelihoods and standards of living of displaced persons. ▪ To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites. *Requirements*		

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	▪ General requirements (project design, compensation and benefits for displaced persons, community engagement, grievance mechanism, resettlement and livelihood restoration planning and implementation ▪ Displacement (physical displacement, economic displacement); and ▪ Private sector responsibilities under government-managed resettlement.		
PS6: Biodiversity Conservation and Sustainable Management of Living Resources	Protecting and conserving biodiversity, managing ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. This performance addresses how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project's lifecycle. This standard applies to projects in all habitats, whether or not those habitats have been previously disturbed and whether or not they are legally protected. *Objectives* ▪ To protect and conserve biodiversity. ▪ To maintain the benefits from ecosystem services. ▪ To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities. *Requirements*	The Project is located adjacent to ecologically diverse Khor Al-Zubair. The Project may also result in an impact of ecosystem services. This will be investigated further in the ESIA.	Biodiversity

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	▪ Protection and conservation of biodiversity (habitat, modified habitat, natural habitat, critical habitat, legally protected and internationally recognised areas, invasive alien species) ▪ Management of ecosystem services ▪ Sustainable management of living natural resources ▪ Supply chain		
PS7: Indigenous Peoples	Indigenous peoples are identified as social groups with identities that are distinct from mainstream groups in national societies. They are often among the most marginalized and vulnerable segments of the population. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. Indigenous peoples may play a role in sustainable development by promoting and managing activities and enterprises as partners in development. *Objectives* ▪ To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.	This performance standard is potentially applicable; specific details of the presence of indigenous peoples in the project areas is currently unknown and will be established through the social surveys in the next stage.	Social

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	▪ To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. ▪ To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. ▪ To establish and maintain an ongoing relationship based on informed consultation and participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. ▪ To ensure the free, prior, and informed consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. ▪ To respect and preserve the culture, knowledge, and practices of Indigenous Peoples. *Requirements* ▪ General requirements (avoidance of adverse impacts, participation and consent) ▪ Circumstances requiring free, prior, and informed, consent (impacts on land and natural resources subject to traditional ownership or under customary use, Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use, Critical Cultural Heritage)		

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	▪ Mitigation and Development Benefits ▪ Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues		
PS8: Cultural Heritage	This standard aims to ensure that clients protect cultural heritage in the course of their project activities consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. Its applicability is established during the social and environmental risk and impacts identification process. The requirements of this standard apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. They also apply to tangible, unique natural features and intangible features. *Objectives* ▪ To protect cultural heritage from the adverse impacts of project activities and support its preservation. ▪ To promote the equitable sharing of benefits from the use of cultural heritage. *Requirements* ▪ Protection of cultural heritage in project design and execution (chance find procedures, consultation, community access, removal of replicable cultural	This PS is potentially applicable; no known archaeology is located within the site footprint, however, unknown archaeology or intangible or community heritage features may be presently; presence of such features will be established through the social surveys.	Cultural heritage

Table 4.16: IFC Performance Standards Relevant to the Project			
Performance Standard	**Summary Description**	**Relevance to the Project**	**Relevant Topic(s)**
	heritage, removal of non-replicable cultural heritage, critical cultural heritage); and ▪ Project's use of cultural heritage		

4.8.2 World Bank Group Environmental, Health and Safety (EHS) Guidelines

The WBG's EHS Guidelines are technical reference documents on cross-cutting environmental, health, and safety issues applicable to all industry sectors. They cover general and industry-specific examples of Good International Industry Practice (GIIP).

The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC and are generally considered to be achievable in new facilities at reasonable costs by existing technology.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

The EHS guidelines relevant to this project are set out in **Table 4.17**.

Table 4.17: EHS Guidelines Relevant to the Project

EHS Guideline	Description/relevance to the project	Relevant topic(s)
Sector specific guidelines – Environmental, Health, and Safety Guidelines for Ports, Harbours, and Terminals, 2017	These provide general guideline on the EHS issues associated with port and terminal construction and operation.	All
General EHS Guidelines – Environmental: Wastewater and Ambient Water Quality, 2007	Applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or stormwater to the environment	Wastewater
General EHS Guidelines – Environmental: Hazard Materials Management	Applies to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics	Water, biodiversity, social
General EHS Guidelines – Environmental: Air Emissions and Ambient Air Quality, 2007	These include the WHO Air Quality Guidelines, and set out an approach for assessing ambient air quality impacts of 'significant' sources of emissions to air	Air quality

Table 4.17: EHS Guidelines Relevant to the Project		
EHS Guideline	**Description/relevance to the project**	**Relevant topic(s)**
General EHS Guidelines – Environmental: Noise, 2007	Sets noise level guidelines for residential and industrial areas. These values are in line with the WHO guidance	Noise
General EHS Guidelines – Environmental: Waste Management, 2007	**T**hese provide general guidelines for waste management	Waste
General EHS Guidelines – Occupation Health and Safety (Chapter 2), Community Health and Safety (Chapter 3), and Construction and Decommissioning (Chapter 4)	These provide general guidelines for health and safety and construction and decommissioning.	Social, waste management

5 Approach to ESIA

5.1 Introduction

The ESIA is a process and management technique which allows consideration of the likely environmental and social impacts of a development prior to it proceeding. This provides an opportunity to ensure that the design is optimised in an integrated manner, minimising negative environmental and social impacts and maximising positive impacts.

The ESIA will be undertaken in accordance with the applicable requirements of:

- Iraq EIA legislation and policy;
- IFC Performance Standards on Environmental and Social Sustainability (2012);
- IFC Environmental, Health, and Safety Guidelines (2007);
- BMT internal policies and standards; and
- GIIP.

5.2 Iraqi ESIA Process

As identified in Section 4.4.5, the legislation implementing EIA in Iraq is Law No. 27 of 2009, Protection and Improvement of the Environment. Whilst this piece of legislation sets out the requirement for EIA, there are no general guidelines on the EIA process.

Whilst environmental protection is espoused in several legislative instruments, the expectation of social impact assessment is not yet enshrined in federal and national legislation.

The national ESIA process is shown schematically in **Figure 5.1**:

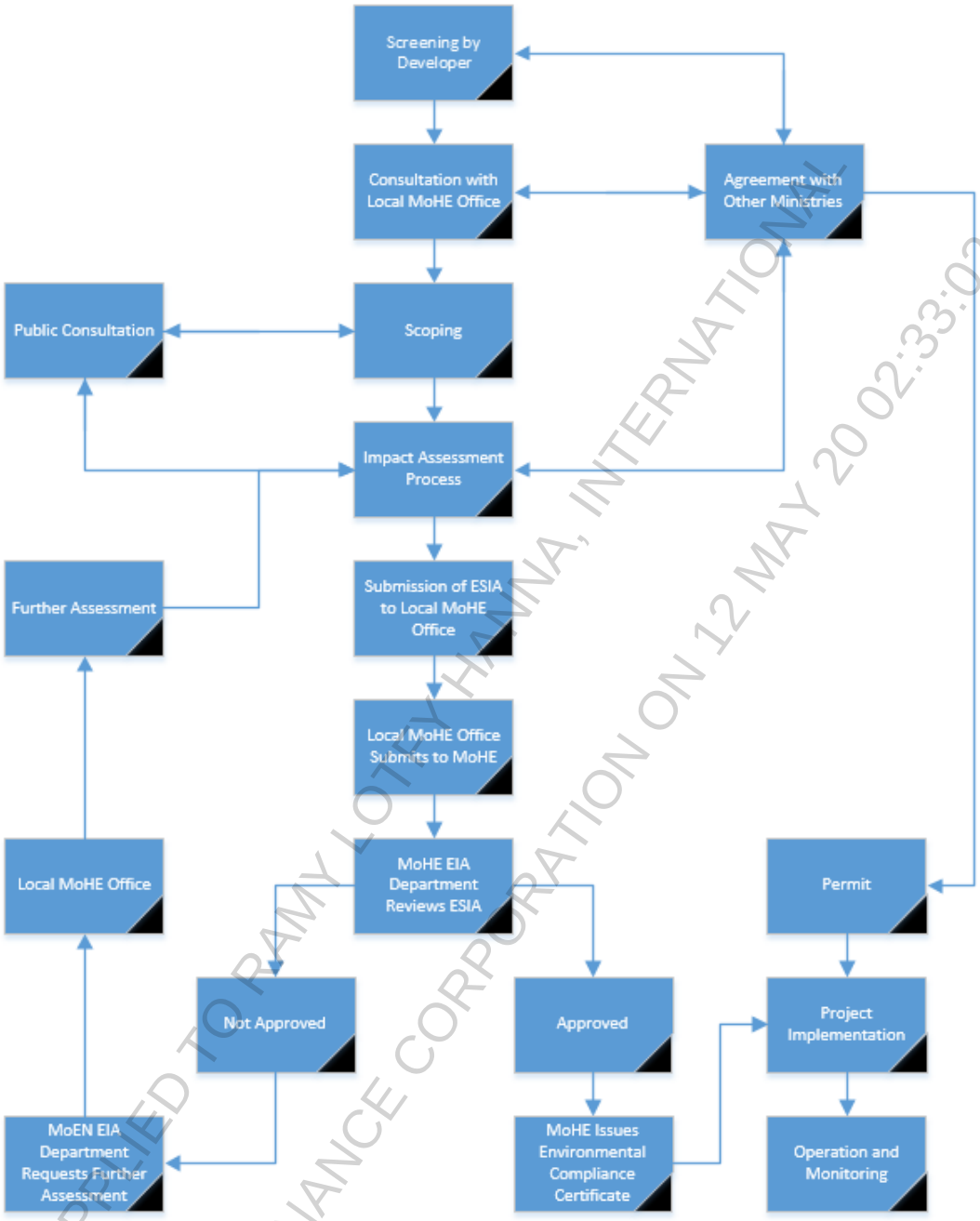

Figure 5.1: Iraqi EIA process

5.3 Proposed ESIA Approach for this Project

Taking into account the Iraqi as well as the GIIP ESIA requirements and processes, the approach and key stages to the ESIA for this Project are shown in **Figure 5.2**.

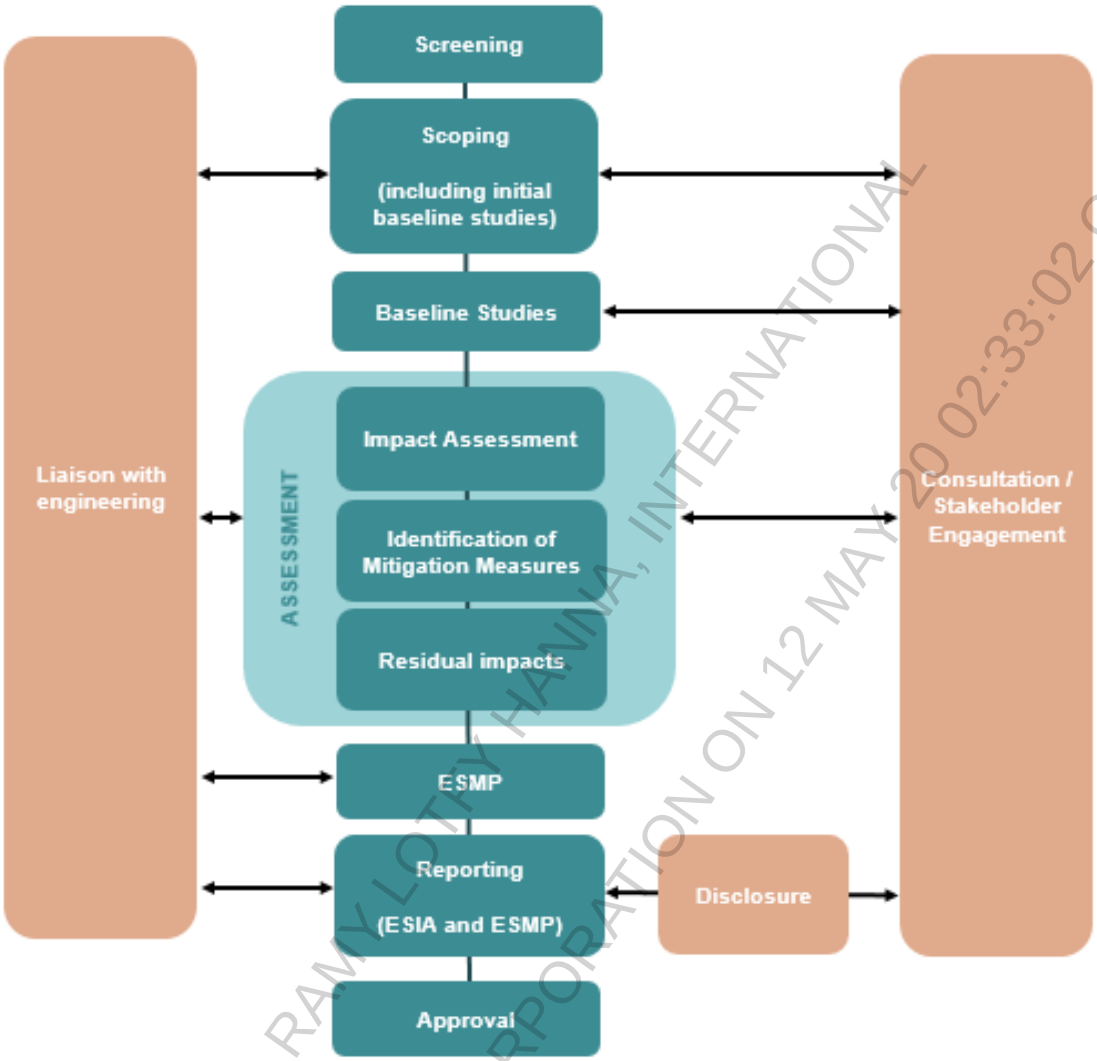

Figure 5.2: ESIA approach for this Project

The key stages of this Project's ESIA process cover the following, and each stage is discussed in more detail in the following sections:

- Screening;
- Scoping phase;
- Stakeholder engagement;
- Establishment of baseline conditions;
- Impact assessment and identification of mitigation measures;

- Cumulative impact assessment;
- Transboundary impacts;
- Consideration of ecosystem services;
- Environmental and social management plan; and
- Reporting and disclosure.

5.3.1 Screening

The Project will be screened by the Investment Bank and EAME believes that potentially the Project may be classed as Category A.

5.3.2 Scope of the ESIA

Technical Scope

The technical scope refers to the range of topics to be addressed in the ESIA.

Temporal Scope

The temporal scope of the ESIA will include consideration of effects arising from the construction, operation and decommissioning of the Project.

Area of Influence (Spatial Scope)

The spatial extent or Area of Influence (AOI) of the ESIA is described by the geographical area potentially affected by the Project. The following definition provided by the IFC (PS1) has been used to determine the AOI:

The area likely to be affected by:

- the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;
- impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or
- indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable[1].

- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

This has been determined on a topic by topic basis, as set out in Sections 7 to 21. The AOI does not include potential impacts that would occur without the Project or independently of the Project.

5.3.3 Scoping Phase

The aim of scoping is to identify potential impacts on environmental and social receptors arising from Project activities that will need to be further considered in the impact assessment and to determine how such an assessment will be undertaken. The primary output of scoping is the preparation of a Scoping Report (this report), setting out potential impacts that will be considered in the ESIA as well as those scoped out (with reasons why). For those impacts scoped in, the method and approach proposed to predict and evaluate their significance is also be presented.

Sources of Information

Information for the scoping phase of the ESIA was collected by:

- Desk based study through online research;

- Desk based study through information/data received through BMT;

- A review of relevant legislation, policies and plans; and

- A reconnaissance of the Project area and land use mapping by two international environmental and social specialists and one in-country personnel in October 2017.

The information collected through the site visits and consultation undertaken was as follows:

- Scoping study field notes, photographs and videos;

[1] IFC recognises that the Project developer may not own these facilities, however that the developer may have some commercial leverage on the operators of such facilities. Where such leverage allows, undertakings should be secured from these operators to operate their facilities consistent with the applicable PSs. In addition, the PS requires that the developer should identify its own actions, if any that will support or supplement the actions of the associated facilities.

- Land use mapping undertaken during the site reconnaissance;
- Technical data and plans;
- Relevant laws and decrees;
- Published government reports;
- Published scientific literature and reports; and
- Visit to the relevant Ministries and organisations to request high level meetings with Ministries.

Scoping baseline conditions have been determined mainly from desk based study through online research; information/data received through BMT; review of relevant legislation, policies and plans; and land-use mapping and site reconnaissance undertaken by EAME.

There are several limitations in relation to the availability and quality of baseline data:

- Whilst there is no shortage of data on the Iraq macroeconomy, particularly surrounding the oil and gas sector, data is often inconsistent;
- Three decades of internal and external conflict has made data gathering difficult and, in the field, often dangerous;
- The transition to a modern market economy has led to large data gaps as definitions and collection methods change; and
- The Iraqi government has attempted to conceal unfavourable data to show its policies in the best possible light. Furthermore, large-scale smuggling across its borders and the operation of a largely cash (no written or recorded transactions) economy distorts international trade and investment data for the region.

Due to the recent and current conflicts, Iraq has challenges in the issue of managing national and regional statistical studies and gathering data in general.

5.3.4 Stakeholder Engagement

Stakeholder engagement will be incorporated at all stages of the ESIA process. The objective of this engagement is to ensure that legislative requirements are met; sources of information and expertise are identified; stakeholder concerns and expectations are registered and addressed; and Affected Communities have the opportunity to discuss Project risks and

impacts, and proposed mitigation and monitoring measures. A SEP has been prepared for the Project. This is a live document that will be updated throughout the ESIA and Project phases.

5.3.5 Establishment of Baseline Conditions

Baseline data will be collected to characterise the existing environmental and social receptors and conditions in the AOI, and trends in such conditions including the situation that would prevail in the absence of the Project.

Baseline data determination largely comprises:

- review of existing published sources; and other available secondary information, including those held by government agencies, non-governmental organisations (NGOs), research agencies;
- site reconnaissance and land use mapping;
- engagement with key stakeholders; and
- analysis and interpretation of data.

The requirement for field surveys is outlined, where relevant, under each topic scope.

5.3.6 Impact Assessment and Identification of Mitigation Measures

The purpose of impact assessment is to identify and evaluate the likely significance of the potential impacts on identified receptors and resources according to defined assessment criteria, to develop and describe measures that will be taken to avoid, minimize, reduce or compensate for any potential adverse environmental effects, and to report the significance of the residual impacts that remain following mitigation. Further information is provided in Section 5.4.

5.3.7 Cumulative Impact Assessment

IFC PS1: Social and Environmental Assessment and its Guidance Note (IFC, 2012) define cumulative impacts those impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. This guidance will be applied during the assessment of cumulative impacts.

5.3.8 Transboundary Impacts

Transboundary impacts are defined by the IFC PS1 as impacts that extend to multiple countries, but are not global in nature. In this case of this project, consideration will be given to water resources and pollution in transboundary rivers.

5.3.9 Consideration of Ecosystem Services

The IFC PS6 defines ecosystem services the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types:

- Provisioning services: The extent and frequency that the land unit provides consumable goods (e.g. food, freshwater; timber, fibre, medicinal plants);
- Regulating services: The extent to which the land unit provides regulating services such as flood attenuation, water purification, storage, climate regulation, carbon sequestration;
- Cultural services: The extent to which the land unit provides cultural services (e.g. tourism attraction, spiritual attraction, aesthetic value), and;
- Supporting services: The extent to which the land unit provides supporting ecological services, either positive (e.g. migration corridor, refuge area, primary production, pollination, pest control, nutrient cycling, soil formation), or negative (e.g. disease sources, pest outbreaks).

An overview of potential ecosystem services that may be impacted by the Project will be undertaken by the relevant topic specialists in the ESIA.

5.3.10 Environmental and Social Management Plan

An ESMP will be prepared, based on the findings in the ESIA. The ESMP will consist of a set of management, mitigation and monitoring measures to be taken during Project construction, operation and maintenance to manage key potential environmental and social impacts identified in the ESIA.

5.3.11 Reporting and Disclosure

The outputs of the above tasks will be drawn together into an ESIA Report and accompanying Non-Technical Summary (NTS) for both IFC and MoHE approval. Comments received on the ESIA Report from the investment bank and MoHE's review and stakeholder comments will be addressed and detailed in a Final ESIA Report.

5.4 Assessment Methodology

The purpose of impact assessment is to identify and evaluate the likely significance of the potential impacts on identified receptors and resources according to defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise, reduce or compensate for any potential adverse environmental effects, and to report the significance of the residual impacts that remain following mitigation.

5.4.1 Overarching Impact Assessment Methodology

An environmental or social impact, in accordance with the definition provided in IFC PS1 is: any change, potential or actual, to (i) the physical, natural, or cultural environment, and (ii) impacts on surrounding community and workers, resulting from the business activity to be supported.

An effect results from the consequences of change (or impact) acting on the resources and receptors of particular value or sensitivity. The ESIA will identify all environmental effects that are considered to be significant. This will include consideration of:

- **Direct effects** – an effect that arises directly from activities that form an integral part of the Project (e.g. new infrastructure) and is within the control of the developer;
- **Indirect effects** – an effect that arises from activities not explicitly forming part of the Project but as a "knock on effect" of it, that may not be within the control of the developer (e.g. changes to water availability due to increased influx of people);
- **Transboundary effects** – impacts that extend to multiple countries, but are not global in nature; and
- **Cumulative effects** – as identified in Section 5.3.7.

The term resources or receptors will be used to describe features of the environment such as water resources, habitats and species which are valued by society for their intrinsic worth and/or their social or economic contribution; and social groups such as individuals and communities that may be affected by the Project.

The impact assessment process will comprise the following main steps:

- Identification of the potential impacts of the Project on receptors, taking into account incorporate environmental and social measures;
- Evaluation of the significance of the effect;

- Development of mitigation measures;
- Where necessary, prediction of the significance of residual effects; and
- Consideration of transboundary and cumulative impacts.

An overarching framework for the impact assessment of environmental and social topics, based on these steps, is provided in the remainder of this section. The details of the methodology will however be developed for each topic base on: professional judgement; comparison with topic-specific regulations or standards; comparison with experience on other similar projects and consultation with stakeholders.

5.4.2 Identification of Potential Impacts

Impacts can be defined as a physical or measurable change in the environment which results from the Project. Impacts can be defined as positive or negative.

5.4.3 Evaluating the Significance of Environmental Effects

The ESIA will identify all environmental effects that are considered to be significant. Although there is no statutory definition of what constitutes a significant effect, for the purposes of the Project, a significant effect will be determined as an effect which either in isolation or in combination with others should be taken into account in the decision-making process.

The approach that will be adopted to determine whether the effects on receptors are significant will be to apply a topic-specific significance evaluation methodology. For some of the topics that will be assessed in the ESIA there is published guidance about significance evaluation. Where such guidance exists, it will be used to inform the development of the significance evaluation methodologies that are used in the ESIA. For other topics, it necessary to develop appropriate methodologies based on professional judgement.

As a general guide, significant effects will be determined by consideration of the following:

- Importance and Sensitivity of the resource or receptor (rated as very high, high, medium and low) by considering the importance of the receiving environment (international, national, regional, district and local), rarity of the receiving environment, benefits or services provided by the environmental resource and perception of the resource or receptor); **Table 5.1** provides an example of categories of importance and/or sensitivity; and

- Severity of the impact, measured by the importance of the consequences of change (high medium, low, negligible) by considering inter alia magnitude, duration, intensity, likelihood, frequency and reversibility of the change.

Table 5.1: Example for Determining Receptor Importance and/or Sensitivity

Importance/ Sensitivity of Receptor	Example of Importance of Receptors	Example of Sensitivity of Receptors
Very High	An attribute with a high quality and rarity on an international, regional or national scale with little or no potential for substitution	Sensitive area or receptor with little resilience to imposed stresses
High	An attribute with a high quality and rarity on a local scale with little or no potential for local substitution, or with a medium quality or rarity on a regional or national scale with limited potential for substitution.	
Medium	An attribute with a medium quality and rarity on a local scale with limited potential for substitution, or an attribute of low quality and rarity on a regional or national scale	The receiving environment or receptor has a moderate natural resilience to imposed stresses
Low	An attribute of low quality and rarity on a local scale with potential for substitution locally	The receiving environment or receptor has a high natural resilience to imposed stresses

The significance of an effect will be determined by consideration of the importance/sensitivity of the receptor in combination with the severity of the impact. **Table 5.2** demonstrates how these parameters are considered in the assessment of significance.

Table 5.2: Determination of Significance of the Environmental Effect

		Severity of Impact			
Importance/Sensitivity of Receptor		**High**	**Medium**	**Low**	**Negligible**
	Very High	Major	Major	Moderate	Minor
	High	Major	Moderate	Minor	Negligible
	Medium	Moderate	Minor	Minor	Negligible
	Low	Minor	Minor	Negligible	Negligible

Predicted significance of environmental effect will be classified according to whether they are considered to be **Major, Moderate, Minor** or **Negligible**; and **Beneficial, Adverse** or **Neutral**. Significance criteria will be specific to each environmental and social topic and will be defined in the impact assessment using a combination of environmental standards, guidance and professional judgement.

5.4.4 Evaluation the Significance of Social Effects

The evaluation of social impacts will differ from the evaluation of environmental impacts. Scoping, research and stakeholder engagement will provide a social baseline from which to establish the potential social effects of the Project, as well as for all feasible and/or realistic project alternatives, including the "no change" alternative. Vulnerable groups will be paid particular attention. As such, the evaluation of the significance of the social impacts will rely upon a risk assessment matrix which provides potentially significant impact assessment with regards to:

- The nature of the impact (including the status which may be positive, negative or neutral);
- The extent and duration of the impact;
- The probability of the impact occurring;
- The degree to which the impact can be reversed;

- The degree to which the impact may cause irreplaceable loss of resources; and
- The degree to which the impact can be mitigated.

5.4.5 Incorporated Environmental and Social Measures

Incorporated environmental and social measures, and industry proactive mitigation/management, are those measures that have been incorporated into the design of the Project. These may include:

- Design changes undertaken to remove or minimise effects; and
- Good operational practice or construction.

The impact assessment will be undertaken assuming that the above are applied as an integral element of the Project design; and these measures will be set out clearly within the ESMP.

5.4.6 Mitigation Measures

Additional measures will be committed to if, as a result of the ESIA, mitigation is required. Mitigation will be identified in accordance with a hierarchy of options in accordance with GIIP including that advocated by the IFC.

- Avoid - making changes to the project's design or location to avoid adverse effects on an environmental feature.
- Minimise - reduction of adverse effects through sensitive environmental treatments/design.
- Restore - measures taken during or after construction to repair/reinstate and return a site to the situation prior to occurrence of impacts.
- Compensate/offset - where avoidance or reduction measures are not available, it may be appropriate to provide compensatory/offsetting measures. It should be noted that compensatory measures do not eliminate the original adverse effect, they merely seek to offset it with a comparable positive one.
- Improvement measures - projects can have positive effects as well as negative ones, and the project preparation stage presents an opportunity to enhance these positive features through innovative design.

5.4.7 Identification of Residual Impacts

Residual impacts are those that remain following the implementation of the proposed mitigation. These will be identified for each of the specialist topics by reviewing the predicted impacts against the mitigation measure proposed and then identifying any residual impact. Residual impacts will be defined based on the same process applied to the evaluation of impacts.

The various technical subject areas that will be addressed in the ESIA are discussed in the subsequent chapters of this Scoping Report.

6 Geology and Soils

6.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to geology and soils. It also sets out the methodology and approach to the ESIA for this topic.

6.2 Baseline Conditions

6.2.1 Regional Setting

The Project area is located in the Mesopotamian Plain and is covered by the Quaternary fluvial sediments. This area, which occupies central and southern Iraq, is a flat terrain in general with gentle slope from northwest to southeast towards the Arabian Gulf. Geomorphological features related to recent fluvial accumulations such as natural levees, river terraces, alluvial fans, flood plains etc., are very common on the surface, whereas significant features of tectonic origin are almost absent.

The Mesopotamian Plain contains several subsurface structures including faults, folds and diapiric (intrusive) structures that are entirely concealed beneath the Quaternary deposits.

Surface folds are almost absent in the Mesopotamia Plain. The northwest – southeast trending Tikrit and Samarra folds are the only exception, though they are hardly recognized on surface because of the Quaternary cover. Due to the continuous growth, the Quaternary sediments are uplifted along these structures with about 10 to 15m of relief in comparison with the surrounding land. Consequently, local drainage divide lines are developed along the crests of these structures. Subsurface folds and structural noses are rather common structures within the Mesopotamia Plain. They are hidden beneath Quaternary cover, usually with northwest – southeast trend in the central and eastern parts, following the general trend of the Zagros Fold – Thrust Belt, but deviate largely in the extreme southern part where the folds are north - south trending.

The folds of the Mesopotamia Plain are of three genetic types: The first is the fault-related folds that have developed above an initial fault bounded structural troughs (grabens or half grabens) because of structural inversion phenomenon. Consequently, the geometry and the trend of such folds match the underlying initial structural trough. Tikrit and Samarra are examples of this type. The second type is simple buckle folds, which formed as a result of the regional compression that was generated by the Arabian – Eurasian (Iranian) Plates collision. Such folds are northwest – southeast trending following the regional trend by the Zagros Fold – Thrust Belt. The third type is limited to the extreme southern part of the Mesopotamia Plain.

These folds are north-south trending, following the old inherited fractures of the north-south Arabian trend, which is best developed in the northern part of the Arabian Gulf region. The folds are usually long, broad and with low amplitudes (such as Zubair and Rumaila structures), and are thought to be related to movement of salt substratum. The presence of the Late Precambrian – Early Cambrian Hormuz Salt and its active movement in the northern parts of the gulf region, in general, and in this part of the Mesopotamia Plain, in particular, is the reason behind the development of these folds. The diapiric salt structures beneath the folds in Iraq have pierced the overlying sedimentary sequence to different stratigraphic levels, but have reached the surface only in one locality, to the south of Basra City, known as Jabel Sanam. It is a circular dome about 4km in diameter and more than 100m high. Igneous rock blocks and fragments have been reported in the core, and are surrounded by Miocene – Pliocene sedimentary rock units dipping towards the peripheries.

The igneous rocks were classified as dolerite and of Infra-cambrian age. Similar to other igneous rock fragments that have been reported in southwest Iran salt structures, it is believed that these rocks were stripped off the basement and brought to the surface by the upward movement of the salt. Recent tectonic activities within the Mesopotamia Plain are well reflected on the present day geomorphological landforms.

It is important to mention that almost all of the mentioned tectonic divisions of Iraq have considered the present day "Mesopotamia Plain" as the entire Mesopotamian basin (or zone). This consideration has caused confusion and uncertainties to the true structural nature of the basin. Actually, the Mesopotamia Foredeep (Basin) is much larger and laterally extensive than that of the Mesopotamian Zone or Mesopotamia Plain, which forms only a part of the basin. The present-day Mesopotamia Foredeep (Basin) extends from northeast Syria to the Straits of Hormuz. It consists of two domains, the first is a terrestrial one that covers parts of northeast Syria, Iraq, parts of Kuwait and the coastal plains of Iran, and the second is marine, represented by the Arabian Gulf Basin.

The Mesopotamia Plain is a subsiding basin with a northwest-southeast trend and of oval shape. The maximum subsidence, as expressed by means of contour lines, is 250km, being measured on the top of the Fatha Formation (Middle Miocene), it forms an elongated oval shape, trending northwest to southeast which extends from east of Al-Khalis, for about 30km, to 10km west of Badra. The basin is asymmetrical, with a very steep eastern rim as compared to the western side. This asymmetry is typical of foreland basins, formed because of plate collision, manifesting the shape of the subsiding foreland basin in front of the rising Zagros Mountain. Such asymmetry also indicates tectonic tilting of the basin (Fouad & Sissakian, 2011).

6.2.2 Stratigraphy

The Mesopotamia Plain is covered entirely by Quaternary sediments; no pre-Quaternary rocks are exposed. The estimated the depth of the basement to be between 8km in the west and 14km in the eastern part of the area (Compagnie General de Geophysique, Unpublished). The area contains almost a complete sedimentary succession without significant breaks.

The complete thickness of the Paleozoic sequence is not penetrated in any borehole in Iraq. Only a very few wells in the Mesopotamia Plain have reached the upper most part of the Paleozoic sequence. However, the thickness of the Paleozoic sequence is estimated to be around 5km. From correlations with other parts of Iraq, as well as in most of Arabia, it is believed that the Paleozoic sequence is dominated by siliciclastic sediments deposited in a shallow epicontinental sea.

The Mesozoic sequence is composed of an almost complete sedimentary succession without significant breaks. The average thickness of the sequence is about 5km. The sequence usually consists of neretic and lagoonal evaporites, shales and carbonates that grade up into an alternation of carbonates and sandstones of shallow marine nature.

The Cenozoic sequence usually consists of Paleogene open marine carbonates that grades up into Neogene lagoonal and restricted marine evaporite facies, followed by molasses type deltaic and continental clastics (Fouad, 2010). The average thickness of the sequence is highly variable in different parts of Iraq.

The Quaternary sediments exhibit an exceptional development in the Mesopotamia Plain. They consist of gravels, sands, silts and clays that are mainly related to the cyclic fluvial sediments of the Tigris and Euphrates Rivers, and their tributaries. These sediments form extensive flood plains with a complex network of natural levees channels and terraces. The Quaternary sediments of the Mesopotamia Plain exhibit progressive thickening from north-west to south-east. They reach their maximum thickness of about 180m near Basra City.

6.2.3 Local Setting

The Khor Al-Zubair area is one of the largest tidal mud flats in the north-western Arabian Gulf. These estuarine and marine deposits form the extreme south-eastern boundary of the larger Mesopotamian Plain. The Plain is a vast lowland area with clearly defined physiographic and structural boundaries and an imperceptible gradient from northwest to the southeast towards to the Arabian Gulf. The Plain is considered to be a huge aggradational geomorphologic unit; where the fluvial, lacustrine and Aeolian landforms prevail, however, estuarine and marine units are also present (Yacoub, 2011).

The structural setting of the Khor Al-Zubair is the result of the formation of a fault structure which represented an extension of the ancient Euphrates river course (Al-Mosawi, 1991). The uplift of the adjacent areas around the Khor Al-Zubair and the subsidence of others led to the propagation of the sea level and disconnection from the River Euphrates. Subsequently, the Khor Al-Zubair become an elongated marine lagoon (Wasil, 2003). However, since 1983, the Khor Al-Zubair has been connected to the Shatt Al-Basra Canal, converting it from a marine lagoon into an estuary. There is a tidal gate (known as the Karla or K22 Tidal Regulator) where the Shatt Al-Basra Canal and Khor Al-Zubair meet, however, it is not known if this is operational as it was under long-term repair.

The sediments of the tidal flats/alluvium comprise an upper layer which is approximately 6 - 8m thick, sequentially underlain by the Hammar Formation and the Dibdibba Formation. A simplified geological cross section of the province is outlined in ***Figure 6.1:*** Simplified *Geological Cross Section of Basra Governorate* **Figure 6.1** and **Figure 6.2**:

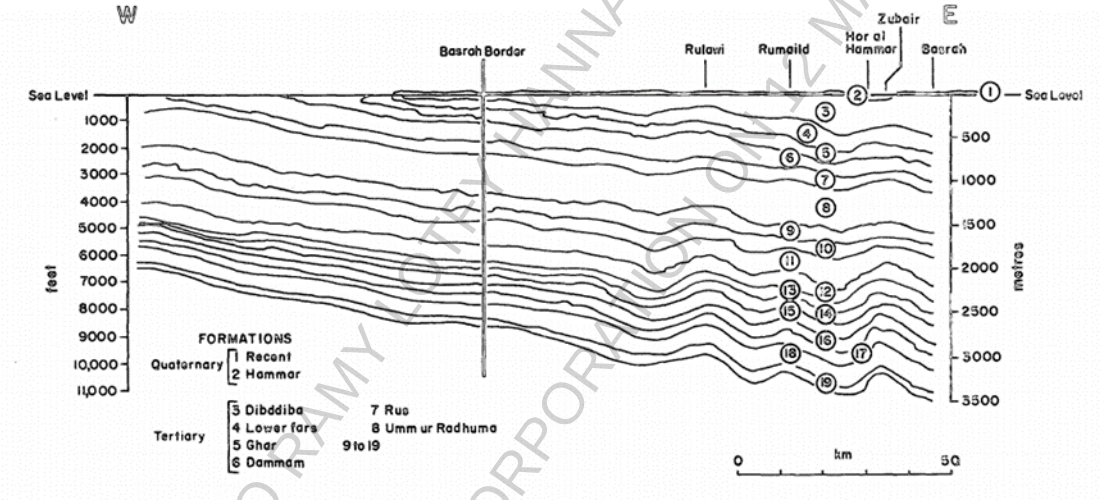

Figure 6.1: Simplified Geological Cross Section of Basra Governorate (Al-Naqib, 1967)

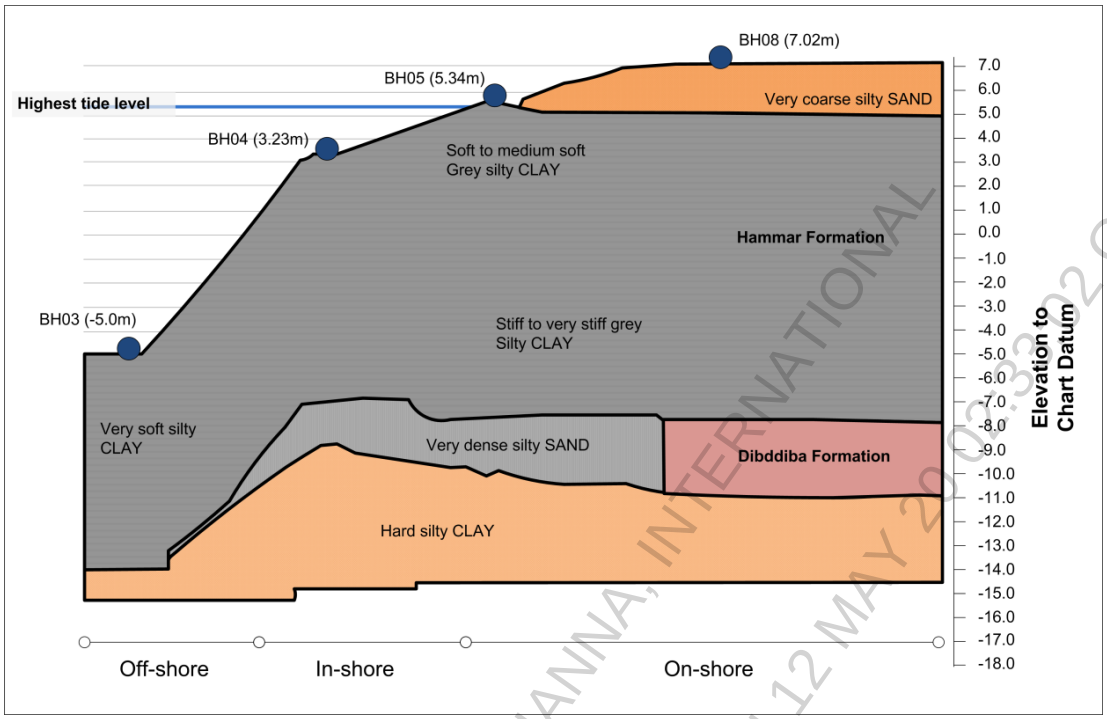

Figure 6.2: Strata of the Western Bank of the Khor Al-Zubair (Muttashar, 2010)

Tidal Flat/Alluvium

The general area surrounding the Project site is overlain by recent estuarine and marine alluvium which predominantly comprises clay and silt with some sand and pebbles (The Iraq Foundation, 2003). The clay and silt fractions predominant and the deposits are commonly lenticular, poorly indurated and nearly flat lying. The upper 1m of the alluvium contains abundant salt and gypsum crystals (Al-Naqib, 1967) which may have a significant impact on the geotechnical properties of the soils.

It should also be noted that Aeolian (wind)-derived sediments are also likely to contribute to the overall depositional environment as the *Shamal* winds blow sediment particles across Iraq towards the Arabian Gulf.

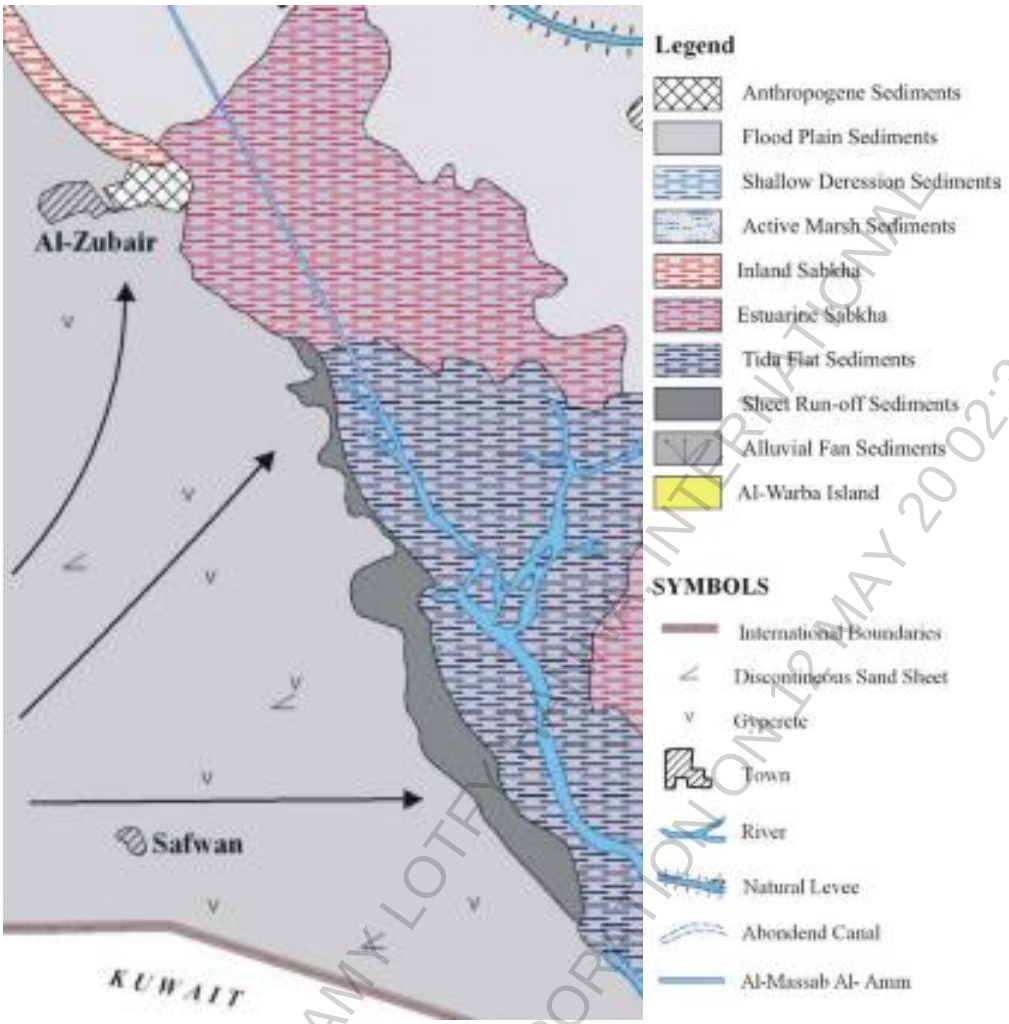

Figure 6.3: Superficial Deposits of the extreme south-eastern section of the Mesopotamia Plain (Yacoub, 1994)

The Exploratory Soil Map of Iraq (Buringh, 1957) highlights the Project area as 'Coastal flats' (code 15).

Table 6.1: Details of Coastal Flats (Code 15)	
Soil mapping unit	Coastal Flats
Main great soil group	Arid-alluvial-Solonchak soils and Solonetz soils
Minor great soil group(s)	-
Land form	Level with creeks
Parent material	Marine silt loam to heavy clay

Table 6.1: Details of Coastal Flats (Code 15)	
Soil depth	Deep, very high groundwater table. Submerged.
Soil erosion	No
Soil salinity	Moderately to strongly saline and alkali
(Buringh, 1960)	

Hammar Formation

The Hammar Formation (also known as Mesopotamian Plain Alluvium) is from the Pleistocene Age (Aqraqi & Evans, 1994) and predominantly comprises lacustrine deposits (silts and clays) which have been deposited in a uniform and consistent manner (Muttashar, 2010).

The Hammar Formation is approximately 6 – 8m thick and consists of two units:

- Clay grey with thin washes of shells; and
- Sand, coarse and very coarse, poorly graded, rarely cemented and some silt; some of the sand is windblown.

The Hammar Formation overlies the Dibdibba Formation; the contact of which is unconformable (Muttashar, 2010).

Dibdibba Formation

Dibddiba Formation is the result of a giant, triangular-shaped alluvial fan of the Wadi ar Rimah-Wadi al Batin drainage system which is the longest ephemeral watercourse in Arabia, draining most of the northern Arabian Shield. The fan extends over parts of Saudi Arabia, over most of Kuwait and south-east Iraq, where it has deflected the course of the Euphrates causing the formation of the Haur Al-Hammer Lake. The Formation was formed by sheet floods during the Pleistocene with sandy horizons representing periods of reduced precipitation (Edgell , 2006).

The Dibdibba Formation comprises '*mainly sand and gravel of igneous rocks, including pink granite, various liver-coloured and slate-grey intrusive, dolerites, etc., and white quartz pebbles. Not infrequently the rock is cemented to a hard grit*' (Macfadyen, 1938). The formation is between 30 – 260m thick (Krasny , 1982), however, wells from the Zubair oil field indicate that it is up to 354m thick. The aforementioned hard grit is likely to be due to gypsum acting as a cementing agent between soil particles.

The formation has been divided up into four units (Elliott, et al., 1954):

- Sandstone and grit;
- Grey and pink Lower Sandstone followed by limestones;
- Conglomerate with pebbles of limestones, chert, and igneous rocks (porphyries) in a calcareous matrix; and
- Green sand and soft green marly sands.

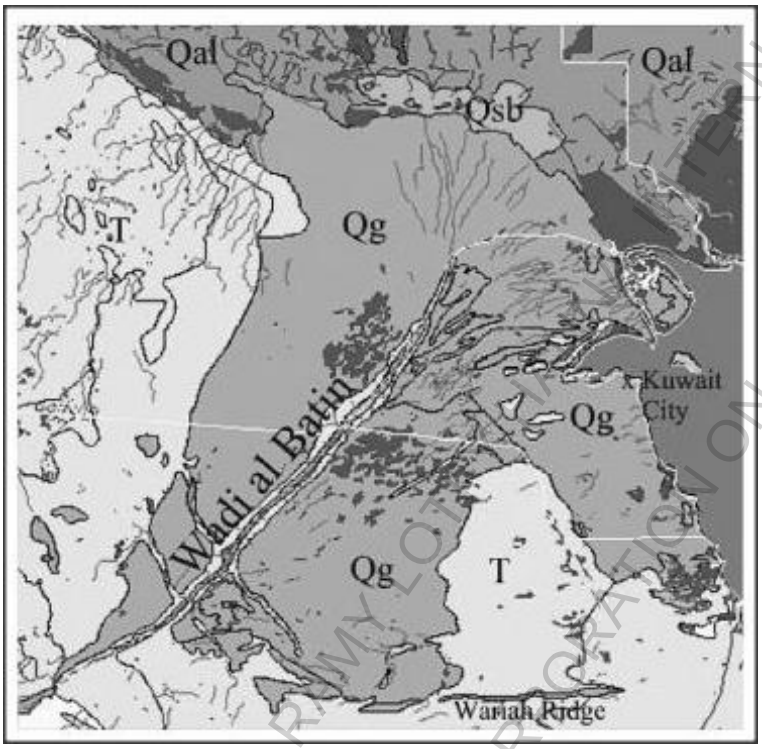

Figure 6.4: Dibdibba alluvial fan with its gravels marked by the symbol Qg (Jassim & Goff, 2006)

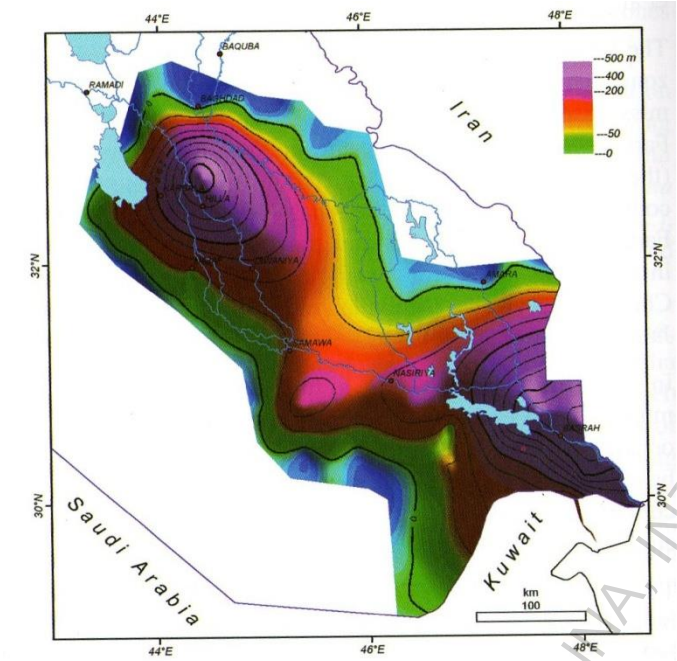

Figure 6.5*:* Thickness of the Dibdibba Formation (Al-Jiburi & Al-Basrawi, 2009)

Coarse sand outcrops of the Dibddiba Formation have been noted on the western bank of the Khor Al-Zubair (Al-Jiburi & Al-Basrawi, 2009).

Photograph 6-1: Dibddiba Formation outcropping close to the western bank of the Khor Al-Zubair

Underlying the Dibdibba Formation is the Upper Fars Formation (also known as Injana Formation), the contact between which is conformable and gradational. As such, the Upper Fars Formation has not been recognized in the subsurface sections of southern Iraq and has probably been included within the lower parts of the Dibdibba Formation.

Gypseferous Soils

Gypseferous soils are commonly found in Mesopotamia soils, where the annual rainwater is inadequate for leaching (Buringh, 1960). In general, salinity of soils increases southward across Iraq. The elevated concentration of gypsum is the result of:

- the weathering of localised gypsum-bedded rock formations (Fooks & Collis, 1975);
- lack of precipitation (Deil & Muller-Hohenstein, 1996);
- the extremely high evaporation rates which causes the manifestation of salts in the intertidal zone as the tide recedes. In fact, research has shown that the rate of evaporation in the Gulf exceeds the freshwater input by at least a factor of 10 (Sheppard, 1993); and
- due to the permeable nature of the superficial deposits, it is highly likely that the groundwater table is affected by saline intrusions. The high evaporation rate provokes significant capillary rise of moisture which, as a consequence, leaves a heavy crust of salt in the upper subsoils (A. Saleh, et al., 1999) . When a thick crust has developed, evaporation ceases, and soils underneath may still be saturated with groundwater.

It is important to note that the dissolution of gypsum can change the engineering and geotechnical properties of soils thereby causing potentially problematic settlement (Al-Marsoumi, et al., 2008).

Photograph 6-2: Salt pans on the eastern bank of the Khor Al-Zubair

6.2.4 Geotechnical Site Investigation

Between December 2016 and February 2017, Fugro Middle East undertook an onshore and nearshore geotechnical site investigation to determine the soil characteristics for the design of the quay and port structure foundations (Fugro Middle East, 2017).

The site investigation comprised:

- Nine boreholes down to 30m below ground level (bgl) with continuous sampling;
- 13 boreholes down to 50m bgl with continuous sampling;
- A comprehensive suite of laboratory testing on selected borehole samples;
- 34 piezocone penetration tests (CPT) to refusal; and
- Five standpipe piezometers to 20m bgl.

The information from the site investigation was subsequently used by 2ER Consulting Engineers to prepare a geotechnical interpretative report (2ER Consulting Design & Supervision and Trade Co., 2017). This report identified the following geological units:

- Made Ground (locally only): Medium Dense to Dense, Fine to Coarse Gravelly Sand. The deposits are logged as 'probable fill' by Fugro, as it is inferred that these soils were placed during the construction of the existing quay wall at the North-Western end of the new proposed quay wall.

- Qt-Clay: Soft to medium clay originating from tidal deposition. These deposits were generally present from ground surface or very shallow depths down to around 8 m to 13m bgl. These clays are considered to be geologically recent tidal muds of Quaternary age. Plasticity of the unit medium to high.

- Qa-Sand: Older alluvial soils of Quaternary age, comprising Dense to Very Dense, occasionally soft rock-like and cemented sand. Relative density of the unit is in the range of 65%-90% according to CPT readings. This unit underlies the Qt-Clay unit and encountered in all verticals executed in the port area.

- Qa-Clay: Older alluvial soils of Quaternary age, comprising Very Stiff to Hard clay, logged as very weak claystone by Fugro. These clays are encountered as sequentially interbedded units in Qa-Sand, with varying thickness.

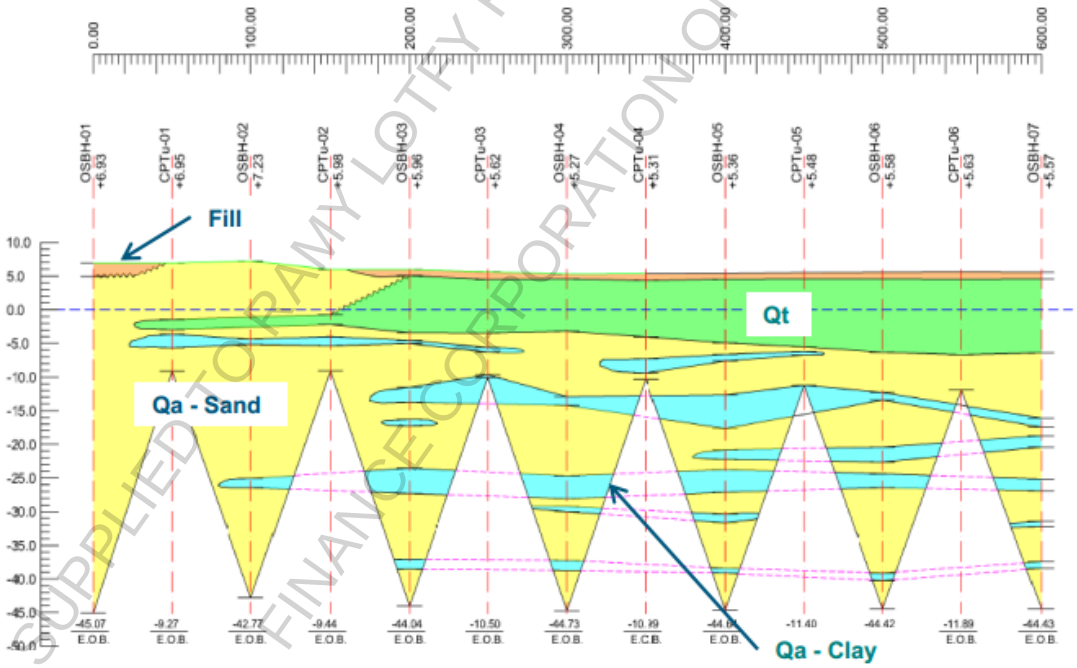

Figure 6.6*:* Geological cross-section along the quay wall (2ER Consulting Design & Supervision and Trade Co., 2017)

6.2.5 Available Chemical Analysis

At the time of preparation of this report there are no known chemical site investigations or soils chemical data (pertaining to contamination from anthropogenic activities) related to the project site. The nearest such study that EAME is aware of at KZP (WTPS Marine Terminal Project).

Figure 6.7*:* Location of the WTPS site in relation to the Project area

Although no evidence of potential contamination was observed on that site it is considered too remote from the subject site to be of relevance and a bespoke site investigation will be required as part of the ESIA process.

6.2.6 Seismic Activity

The Project area is located in a medium seismic hazard zone according to the Uniformed Building Code 1997.

Iraq lies in the northern portion of the Arabian Plate bounded in the east and north by the Bitlis-Zagros Fold and Thrust Belt, where the convergent tectonic boundary between the Eurasian and Arabian plates generates intense earthquake activity. The rest of Iraq is largely located on Arabian Platform, away from major plate boundaries (Onur, et al., 2016).

As shown in **Figure 6.8**, the Dead Sea fault system, a major left-lateral transform fault forms the western boundary of the Arabian Platform, about 250km away from the westernmost part of Iraq. Another significant tectonic feature in the region is the Makran Subduction Zone; however, the closest edge of the potential rupture zone is more than 1,000km southeast of Iraq.

The Project area is located in the northeast of the Arabian plate. The most hazardous source for Umm Qasr corresponds to Bitlis-Zagros Fold and Thrust Belt of the Alpine Orogen, which is a seismically active zone (Jackson, et al., 1981); (Hessami & Jamali, 2006) with intense earthquake activity. Here, the northward moving Arabian Plate is in oblique collision with the Turkish and Iranian plates along the NW-SE trending suture zone between the colliding plates. The oblique collision results in stress partitioning of the northward stress of the Arabian Plate movement into a NE-SW trending stress perpendicular to the direction of the suture zone, and a NW-SE trending stress parallel to the direction of the suture zone (Numan, 1997). In this region, many of the NE-SW trending (transverse) faults are active, such as the Lower Zab Fault and the Diyala River Fault, as well as the listric (longitudinal) faults that are parallel to the fold axes (Onur, et al., 2016).

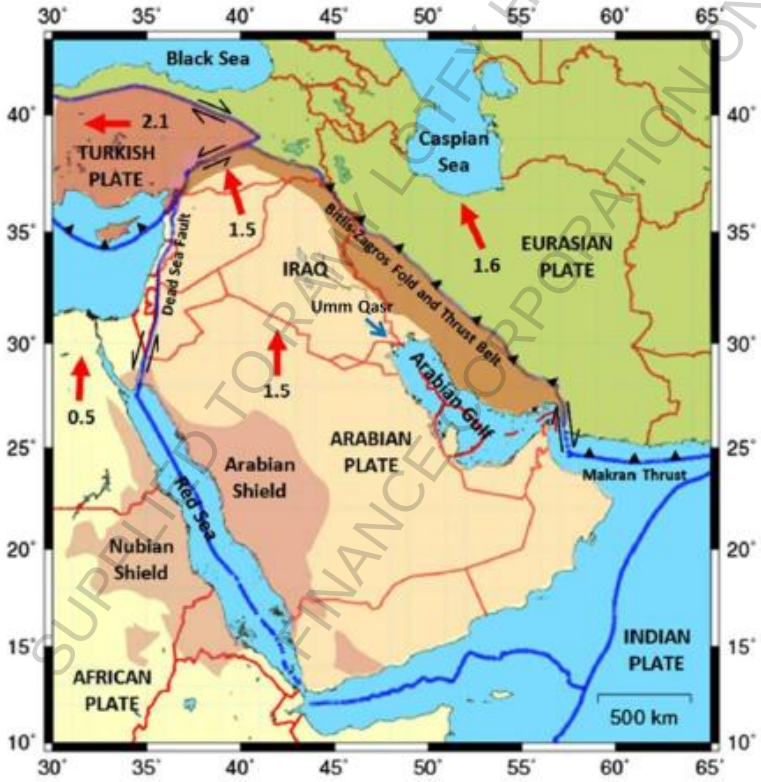

Figure 6.8: Tectonic setting of Iraq - red arrows indicate plate movement in cm/year (Onur, et al., 2016)

Earthquakes in Iraq after 1900 are recorded with magnitude ranges of 2.7 to 7.2. There is a general and distinguishable increase in the seismicity of Iraq from south to north and from west to east. The northern seismically active zone depicts the highest active seismicity in Iraq with a maximum magnitude of M ≤7.0; no earthquakes of magnitude exceeding 7.2 have been recorded in Iraq (Jasim, 2010). Please note that in November 2017, an earthquake, with a magnitude of 7.3, stuck the Iraq – Iran border area. The earthquake killed more than 400 people and injured more than 7,000 (BBC News, 2017).

It should be noted that knowledge on the seismic hazard from the region has changed substantially since the publication of the Iraqi Seismic Code 1997. There is an ongoing effort towards the development of a new code.

6.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to geology and soils.

6.3.1 National Policy and Legislation

Law No.6 of 1962 Irrigation Law. This law aims at regulating irrigation activities and protecting water resources. It sets out the responsibilities of private and public authorities, to monitor, maintain and protect lakes and rivers and the establishment, maintenance and restoration of public irrigation. Land owners are responsible for the irrigation of land. Penalties for offenders who pollute watercourses are also covered.

Law No.27 of 2009 Protection and Improvement of the Environment. This law aims to protect and improve the environment through the elimination of existing damages or the prevention of damages likely to be caused. It covers the need to gain approval from the Ministry in order to conduct activities that may cause environmental damage as well as articles on the protection of the environment from water/sewage based contamination.

6.3.2 International Guidance and Standards

The following are international regulations and standards to protect the soils from erosion and contamination.

- The World Soils Agenda 2002 and Soils on the Global Agenda 2006 of the International Union of Soil Sciences (IUSS).
- International Union for Conservation of Nature (IUCN) World Conservation Congress Resolutions on Sustainable Use of Soil, October 2008.

- UNEP Montevideo Programme (IV) for the Development and Periodic Review of Environmental Law, 2009 and Strategy on Land Use Management and Soil Conservation, 2004.
- UN Conference on Environment and Development Agenda 21 and UN Rio Declaration on Environment and Development, 1992.
- Plan of implementation of the World Summit on Sustainable Development (WSSD)/Johannesburg Declaration on Sustainable Development or Earth Summit 2002.
- UN's 10-year strategic plan and framework to enhance the implementation of the Convention to Combat Desertification, September 2007.
- Millennium Development Goals.
- UN Global Soil Forum - 2030 Agenda for Sustainable Development / Sustainable Development Goals - Governments have committed themselves to "strive to achieve a land degradation neutral world" by the year 2030.
- FAO International Code of Conduct on the Distribution and Use of Pesticides 1985

6.3.3 International Conventions

Relevant conventions to soils and land use include:

- Basal Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 22 March 1989.
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, 2001.
- Montreal Protocol on Substances that deplete the Ozone Layer, 1987.
- Kyoto Protocol (Green House Gases Emissions) on Climate Change, 1997.
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemical and Pesticides in International Trade, 1998.
- Stockholm Convention on Persistent Organic Pollutants (POPs) especially as it concerns dioxins emission and the management of Polychlorinated Biphenyls (PCBs), 2001.

6.4 Area of Influence

The AOI will include the footprint of the Project, including any temporary facilities and disturbance areas that may experience impacts from erosion and contamination (e.g. oil spills) or loss of an existing land use. As the impact of the Project may go beyond the boundary of the Project area, the other areas that will be considered at a more conceptual spatial level include:

- Emplacement of unsuitable dredgings; and
- Soils, surface water bodies and groundwater generally - spillage of chemicals used on-site and its mixture with the natural drainage water can have an impact on these receptors.

6.5 Baseline Key Data Gaps

The available information and data has been reviewed and some gaps remain. Key gaps include:

- Site-specific soil contamination testing; and
- Confirmed location for the deposition of the unsuitable dredgings.

6.6 Identification of Potentially Significant Effects

6.6.1 Construction

During construction, there are several potential effects related to geology, soils and direct impacts on land use that may arise as a result of the Project:

- **Potential effects arising from hazards such as earthquakes**. These include damage to proposed infrastructure and/or associated services; direct loss of life or severe injury to persons; loss of livelihood as a result of environmental degradation arising from equipment damage e.g. pollutant leaks; contamination of aquifers and waterways as a result of pollutant leaks arising from equipment damage; soil; and damage and deterioration of biodiversity as a result of contamination of soil, waterways and local aquifers.
- **Contamination or deterioration of soil quality during construction.** The Project may have an effect on soil quality, and consequently land use, through loss of land due to the footprint of the project and associated construction areas, and degradation, depletion of nutrients, erosion, compaction and pollution associated with site

clearance, movement of construction equipment and construction traffic and project infrastructure development (including roads). Effects may also arise during the reinstatement of soils.

- **Changes to landform.** This may occur through construction activity which changes the landscape, associated drainage and erosion as a result of the temporary and permanent loss of vegetation cover which in turn could result in impacts on quantity and quality of environmental resources such as surface water and groundwater.

- **Contamination due to the emplacement of contaminated dredgings**. Any contaminated dredgings placed on-site may cause contaminated of the soils and groundwater.

Table 6.2: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Soils and land	Potential for contamination of soils as a result of seismic events which could cause damage to construction equipment and structures
Soils and water	Potential for contamination of soils and groundwater due to emplacement of contaminated dredging on-site.
Water	Potential for contamination of groundwater aquifers and damage to waterways as a result of seismic events which could cause damage/collapse of proposed infrastructure
Human health	Potential threat to life and loss of livelihood as a result of seismic events which could cause damage/collapse of proposed infrastructure further promoting contamination leaks and unplanned event such as fires.
Biodiversity	Potential for damage and deterioration of terrestrial habitat and biodiversity as a result of contamination of soil, waterways and local aquifers arising from infrastructure damage
Soil quality	Reduction in soil quality due to loss, degradation and deterioration and pollution as a result of construction activities.

6.6.2 Operation

As identified for construction, there remains during operation a risk to soils and land use associated with hazards such as earthquakes. Operational activities that result in accidental spills may also have an impact on soils and adjacent land uses.

Table 6.3: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Soil quality	Reduction in soil quality and productivity due to degradation and deterioration and pollution as a result of operation activities such as accidental spill or permanent changes to the drainage regime. Pollution events during operational activities

6.6.3 Decommissioning

As identified for construction and operation, there remains during decommission a risk to soils and land use associated with hazards such as earthquakes damaging containment infrastructure and leading to localised pollution.

Table 6.4: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant Effects**
Soil quality	Reduction in soil quality and productivity due to degradation and deterioration and pollution as a result of decommissioning activities such as accidental spill or permanent changes to the drainage regime. Pollution events during decommissioning activities

6.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 6.5: Scoping Summary – Geology and Soils		
Issue	**Scoping Assessment**	**Justification**
Potential for contamination of soils as a result of seismic events which cause damage/collapse of proposed equipment and infrastructure during the construction and operation phase.	Scoped out	The design of the terminal will incorporate any seismic risks.

Table 6.5: Scoping Summary – Geology and Soils		
Issue	**Scoping Assessment**	**Justification**
Reduction in soil quality and productivity due to loss, degradation and deterioration and pollution as a result of the Project footprint and construction activities.	Scoped in	Potential for construction activities to give rise to a deterioration in soils if not managed properly.
Contamination of soils and groundwater by emplacement of contaminated dredgings	Scoped in	Potential for contaminated dredgings to contaminate both the soils and groundwater
Reduction in soil quality and productivity due to loss, degradation and deterioration and pollution as a result of Project operation	Scoped out	During operation these effects are not considered to be significant and can be managed through the ESMP, including a Spill Management Plan.
Impact on cultivators in and around the project site as a result of temporary and permeant loss of land due to the footprint of the Project and due to accidental pollution arising from construction activities.	Scoped out	No agricultural activities undertaken in the vicinity of the Project area.

6.8 ESIA Approach and Methodology

The assessment will also consider the direct and indirect impacts on soils and land uses as a result of the Project. This will include consideration of:

- The direct loss of land uses as a result of the Project footprint, and any indirect impacts this may have on adjacent remaining land uses;
- An assessment of the impacts on soil quality; and
- Determination of the impacts on soil quality.

Recommendations on soil and water conservation and erosion management could be incorporated into the design of infrastructure in the Project Area. Recommendations will also be extended, where necessary, to the management of chemicals and wastage disposal.

7 Surface Water Resources

7.1 Introduction

This section summarises applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to the water resources and flood hydrology. It also sets out the methodology and approach to the ESIA for this topic. Surface water quality is addressed in Section 8; and groundwater is discussed in Section 9.

7.2 Baseline Conditions

Khor Al-Zubair

UQP is located on the Khor Al-Zubair, a tidal inlet, which, since 1983 has been connected to the Shatt Al-Basra Canal. Prior to that artificial connection being made, the Khor Al-Zubair was a marine lagoon.

The Khor Al-Zubair is a strategically important waterway for commercial shipping providing access to Umm Qasr and Khor Al-Zubair Ports and the Liquefied Natural Gas (LNG) terminal. It should be noted that the Khor Al-Zubair carries many commercial, military and fishing vessels and there are also wrecks within the channel who may have been carrying hazardous cargo including chemicals, crude and refined oil, bunker oil, battery acids, asbestos, other chemicals, short-range missiles and unexploded ordinance.

The tides in this region are termed 'irregular semi-daily tides' with two high and two low tides per day with markedly differing heights and a maximum tidal range in the order of 5m with no discernible wave action as the narrow channel of the Khawr Abd Allah restricts the recirculation of the two water bodies. The ebb current, which runs strongly and has considerable eddy currents, can attain a rate of 3 – 5 knots. The volume of suspended sediment within the channel is noted to be approximately 157 tonnes per hour; however, maintenance dredging operations only deal with 28 tonnes per hour (National Geospatial-Intelligence Agency, 2017). As a result, heavy siltation can occur rapidly, especially out of the dredging zones.

The surface watercourses in the vicinity of the Project area have been heavily modified resulting in a complicated and confusing picture. **Figure 7.1** provides a pictorial representation of the surface water watercourse regime

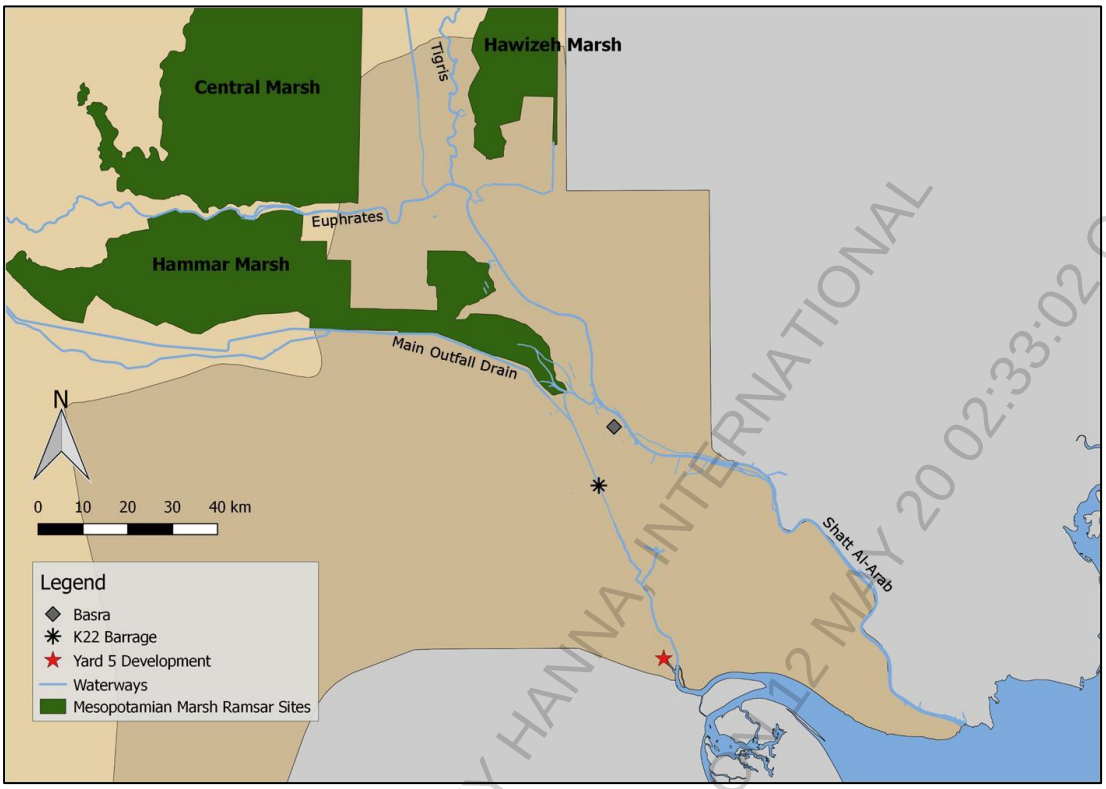

Figure 7.1*:* Relevant water features in the vicinity of the Project Area

Khawr Abd Allah

The Khor Al-Zubair flows into the estuary of Khawr Abd Allah before discharging into the Arabian Gulf. The Iraq-Kuwaiti border divides the lower portion of the estuary and, in 2013, the two countries agreed on a deal (UN Resolution 833) regulating the use of the estuary.

Shatt Al-Basra Canal

The Shatt Al-Basra Canal is an 80km long artificial waterway constructed in the early 1970s as a flood relief channel to protect the west of Basra City and to provide a more direct navigation than the Shatt Al-Arab Waterway from the Gulf to the interior. The Shatt Al-Basra receives water from the Main Outfall Drain (MOD) and flows into the Khor Al-Zubair.

It is understood that the Shatt Al-Basra Canal was navigable to shallow-draft vessels prior to the 1991 conflict; however, its current condition is not known (Global Security, n.d.).

K22 Tidal Regulator

The K22 Tidal Regulator (also known as the Karla Regulator) was constructed on the Shatt Al-Basra Canal to prevent tidal inflow from the Persian Gulf via the Khor Al Zubair. At present, it

is not known if the Tidal Regulatory is operational as it was undergoing long-term repair (25-month programme started in September 2013) and, as a consequence, a series of parallel pipes in an earth berm were installed to drain water towards the Gulf when the water level is high enough. Non-return valves had been installed on the downstream side of these pipes to prevent upstream flow; however, these valves have been subject to vandalism and removed. As such, there is no mechanism to prevent the upward intrusion of saline water into the upper reaches of the Canal and the MOD; however, this will only occur during high water levels.

Large vessels cannot proceed upstream beyond the K22 Tidal Regulator (and in fact no large vessels travel beyond KZP).

Main Outfall Drain

The 565km long MOD (also known as Third River or Saddam's River) starts north of Baghdad at Balad. It collects saline drainage water from more than 1.5 million ha of agricultural land to prevent it flowing into the Euphrates. The main objective of the MOD is to resolve the chronic salinity problems affecting farmland between the Euphrates and Tigris. The MOD discharges into the Arabian Gulf via the Shatt Al-Basra Canal.

Mesopotamian Marshlands

The Mesopotamian Marshlands were once the third largest wetlands in the world, originally extending between 12,000 and 15,000km^2. A rare aquatic landscape in the desert, the Marshlands provides a habitat for important populations of wildlife, including endemic and endangered species. Although, the Marshes are unlikely to contribute any flows to the Khor Al-Zubair, they do have a significant impact on the hydrology of Southern Iraq as a whole.

Following the end of the first Gulf War, the Marsh Arabs rebelled against Saddam Hussein's regime and as a punishment; Hussein implemented an intensive system of drainage and water diversion structures that desiccated over 90% of the marshes. In addition, the reed beds were also burned, and poison introduced to the waters. It is estimated that more than 500,000 Marsh Arabs were displaced and by January 2003, most of the marshes were desertified.

In May 2003, water began to return to the marshlands through the actions of the Marsh Arabs, Coalition Forces and the MoWR, which involved demolishing the dikes and canals draining the marshes. In addition, the Marsh Arabs also started to return to their traditional lifestyles within the re-flooded areas. In July 2013, a 1,000km^2 section of the marshland was declared the Iraq's first national park (Environment News Service, 2013).

The building of upstream dams and reservoirs has disrupted the traditional water cycle of the marshes. The spring floods that used to flush out accumulated salt deposits and replenish the marshland with nutrients no longer occur. As a result, the marshes are becoming more saline,

affecting the ecology of the area. Furthermore, the draining of the marshes and construction of dams and reservoirs and resultant effect on the marshes has led to an increase in the salinity of the Shatt Al-Arab Waterway as well as allowing saline water to intrude further up the Shatt Al-Arab Waterway.

The drainage of the Mesopotamian Marshes has had a negative impact on the Arabian Gulf, which is now noticeably degraded along the Kuwaiti coast. According to a study of sediment quality in Kuwait's northern coastal zones, the drainage of the marshes resulted in a rise in toxic sediments between 2001 and 2003. The study concluded that under normal conditions the marshes would act as a filter, removing pollutants before the water flows into the Gulf (Beg & Al-Ghadban, 2003).

The impacts of marshland desiccation on wildlife were devastating and several endemic species of mammals, birds, and fishes may have become extinct. The marshlands' disappearance as a key wintering and staging site in the intercontinental migration of birds placed an estimated 40 species of birds at risk and caused significant reductions in their populations. Fisheries in the marshlands disappeared, and Gulf fisheries, dependent on the marshland habitat for spawning migrations and nursery grounds, also experienced significant reductions. Furthermore, the systematic draining of these marshes has affected the overall hydrodynamic regime in the area by significantly increasing the rate of sedimentation. Additionally, the draining of the marshes resulted in the drying of the land, and during times of high winds dust storms are generated, with much of the dust being deposited in the river system.

Figure 7.2 illustrates the former extent of the Marshes of Southern Iraq and their planned future extent under the "New Eden" programme (or related attempts to re-flood the drained marshes). The first diagram shows shaded in blue the original extent of the marshes in 1970. The second illustration shows how much the marshes had contracted due to deliberate drainage policies by 2002. The third slide shows the extent of rehabilitation achieved by 2005 as part of a programme of re-flooding the marshes. This programme of rehabilitating the marshes will have a direct influence over the hydrology of Southern Iraq.

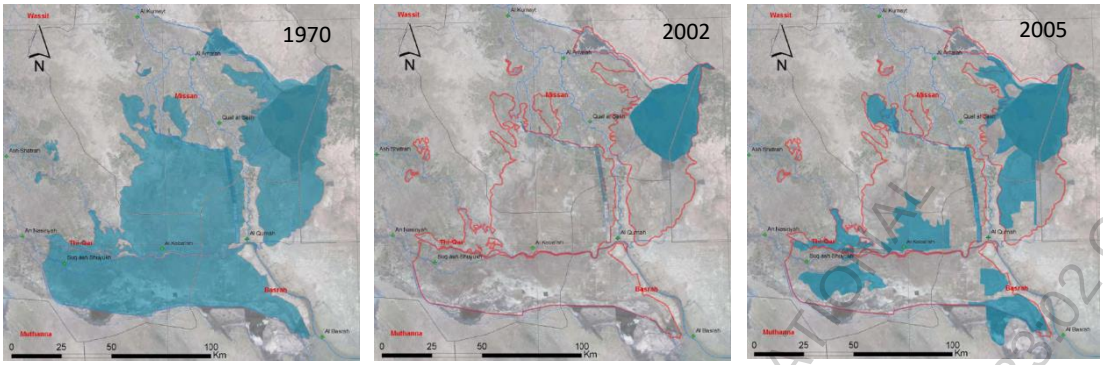

Figure 7.2: Changing extent of the Marshes of Southern Iraq

(The Italian Ministry for the Environment and Territory and Free Iraq Foundation, 2005)

According to the United Nations Development Programme (UNDP), there are 282 shipwrecks within the Umm Qasr region (Japan Bank for International Cooperation, 2005) and GCPI database (dated: October 2010) indicates the presence of forty-nine wrecks within the Khor Al-Zubair, of which twenty-nine have been removed. The wrecks are not believed to be an impediment to navigation along the channel, however, there is debris along the river bank of the Project Area.

Water Security

There is a need to understand the current and future major infrastructure developments upstream as these are likely to have a major impact on water flow in Southern Iraq. For example, since 1975, Turkey's dam and hydropower constructions on the Tigris and Euphrates Rivers have cut water flow to Iraq by 80% and to Syria by 40%.

Furthermore, the building of upstream dams and reservoirs has disrupted the traditional water cycle of the Mesopotamian Marshes. The spring floods that used to flush out accumulated salt deposits and replenish the marshland with nutrients no longer occur. As a result, the marshes are becoming more saline, affecting the ecology of the area (Walker, 2011).

The limited availability of drinking water in Basra is directly connected to several environmental problems threatening Basra's fresh water supply. Dams and irrigation projects on the Tigris and Euphrates rivers have diverted much of the water flow heading to the Shatt Al-Arab and with the receding water levels in the rivers, salt water from the Arabian Gulf has been reaching ever further inland. Waste water from both Iraq's and Iran's industry and households flow into the rivers untreated, further diminishing the water supply. Salinization and pollution do not only threaten the drinking water supply but also have devastating effects on agriculture and ecology (NCCI, 2015).

Water quality has also become a serious issue along both rivers: return flows from agricultural drainage cause salinity problems that are exacerbated along the river course (Section 8).

Climate Change

Climate change is a significant risk in the wider Middle East and North African (MENA) region. The most significant changes are the increased average temperatures, less and more erratic precipitation, and sea level rise. The Intergovernmental Panel on Climate Change (IPCC) argue the warming of the global climate system is unequivocal, inferring a range of deleterious impacts on regional resources and wider ecosystem resilience at local catchment scale; this situation is reflected in the wider MENA region (IPPC, 2014a). In the MENA region, the most significant changes are the increased average temperatures, less and more erratic precipitation giving way to species/habitat loss, desertification and sea level rise.

Regional flood frequency is also influenced by climate variability. The Inter-Agency Information and Analysis Unit (IAU, 2012), argue that most recently following the 2007 - 2009 drought in Iraq, there were several months of extreme rainfall up to 200% of normal values. The long-term climate prognosis is increasing variability within global climate patterns and an increasing trend of severe weather events including extreme precipitation and flooding at regional catchment scale (IPPC, 2014b).

7.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to surface water resources.

7.3.1 National Policy and Legislation

Law No.2 of 2001 on Conserving Water Resources. The law is a federal law which emphasizes an importance of water resources management in environmentally, economically and socially appropriate manners, and the growing phenomenon of water pollution alongside the scarcity of water resources, since it had become necessary to issue laws regulating the utilization of water for purposes other than domestic use. It also includes provisions on the discharge of wastes into public waters, determining how to dispose of or recycle wastewater. Article 4 prohibits discharging any pollutant into public waters, while article 5 regulates environmental restrictions pertaining to the quality of public water as well as the quality of water discharged into public water, sewage systems, or rainwater.

Law No.30 of 2009 on Forests and Woodlands. This law is a federal law which aims to prevent logging in order to protect waterways and springs. It attempts to create a balance between protecting the environment and green spaces on the one hand, and it also aims to conserve

water resources on the other for being decisive through protecting the ecosystem as water recharge. Article 9 states that tree cutting by private sector is prohibited unless it has technical necessity or in return of a fair compensation.

7.3.2 International Guidance and Standards

The main international guidance in relation to water resources include:

- IFC PS3: Resource efficiency and Pollution Prevention.
- WBG EHS Guidelines - Infrastructure: Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals, 2017: These provide general and industry-specific example of GIIP.

7.3.3 International Conventions

The Khor Al-Zubair is not subject to any international conventions or river agreements.

7.4 Area of Influence

The AOI has been defined as the immediate downstream catchment area, with a higher-level assessment only of the wider downstream catchment.

7.5 Baseline Key Data Gaps

The available information and data has been reviewed and some gaps remain. Additional data which would be useful, although not essential for the study:

- Anecdotal data from previous flood events; and
- Information from previous flood studies in the area (reports, data used).

7.6 Identification of Potentially Significant Effects

7.6.1 Construction

Provided GIIP is followed, construction activities are not expected to result in quantitative effects on water resources in the Project area. It is assumed that water supply for the construction activities will be provided through existing supplies and therefore no adverse impacts to receptors are anticipated. Therefore, this issue has been scoped out of the assessment.

7.6.2 Operation

The following effects are considered to be potentially significant during operation:

Table 7.1: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Surface water hydrology	Site drainage and stormwater management, plus topographical changes from construction and groundwork, leading to changes in local hydrology, with associated impacts (including flood risk).

7.6.3 Decommissioning

Provided GIIP is followed, decommissioning activities are not foreseen to result in quantitative long-term effects on water resources in the study area. It is assumed that water supply for the decommissioning activities will be provided through existing supplies and therefore no adverse impacts to receptors are anticipated. Therefore, this issue has been scoped out of the assessment.

7.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 7.2: Scoping Summary - Surface Water		
Issue	**Scoping Assessment**	**Justification**
Water supply for construction activities	Scoped out	Assumed to use existing water supplies
Effects on surface water hydrology during operation	Scoped in	Site drainage and stormwater management may result in changes in surface water run off rates, and potential changes in flood risk
Effects on surface water hydrology as a result of decommissioning	Scoped in	Changes in Site drainage and stormwater management.
Water supply for decommissioning activities	Scoped out	Assumed to use existing water supplies

7.8 ESIA Approach and Methodology

7.8.1 Water Resources

The aim of the surface water resources component of the ESIA will be to assess the potential impact of the Project on the surface water hydrology and changes in flood risk.

In liaison with the Biodiversity team, instream impacts on ecology and habitat will also be assessed. The results of the water assessment will also feed into the social impact assessment, in terms of assessing any potentially effects arising from any changes in downstream flows on communities, livelihoods and ecosystem services.

7.8.2 Flood Hydrology

The aim of the flood hydrology component of the ESIA will be to assess the potential impact of the proposed Project on flood risk. Rainfall for a range of return periods will be estimated and changes to surface runoff as a result of the development estimated.

8 Water Quality

8.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to water quality. It also sets out the methodology and approach to the ESIA for this topic.

8.2 Baseline Conditions

The leaching of chemicals such as fertilisers and pesticides from agricultural land and the disposal of untreated domestic and industrial effluents into surface watercourses has a detrimental effect on surface water quality. However, the increasing salinization of both soils and surface water resources is of acute concern, potentially threatening the Mesopotamian Marshlands. The oilfields also pose a further pollution risk.

8.2.1 Available Chemical Data

Information Collection Survey for Iraq Port Sector Development, JICA, 2012

In March 2012, EAME undertook water quality sampling of the Khor Al-Zubair at both low and high tide. This sampling was undertaken for JICA as part of Information Collection Survey for Iraq Port Sector Development (see Section 4.4.3).

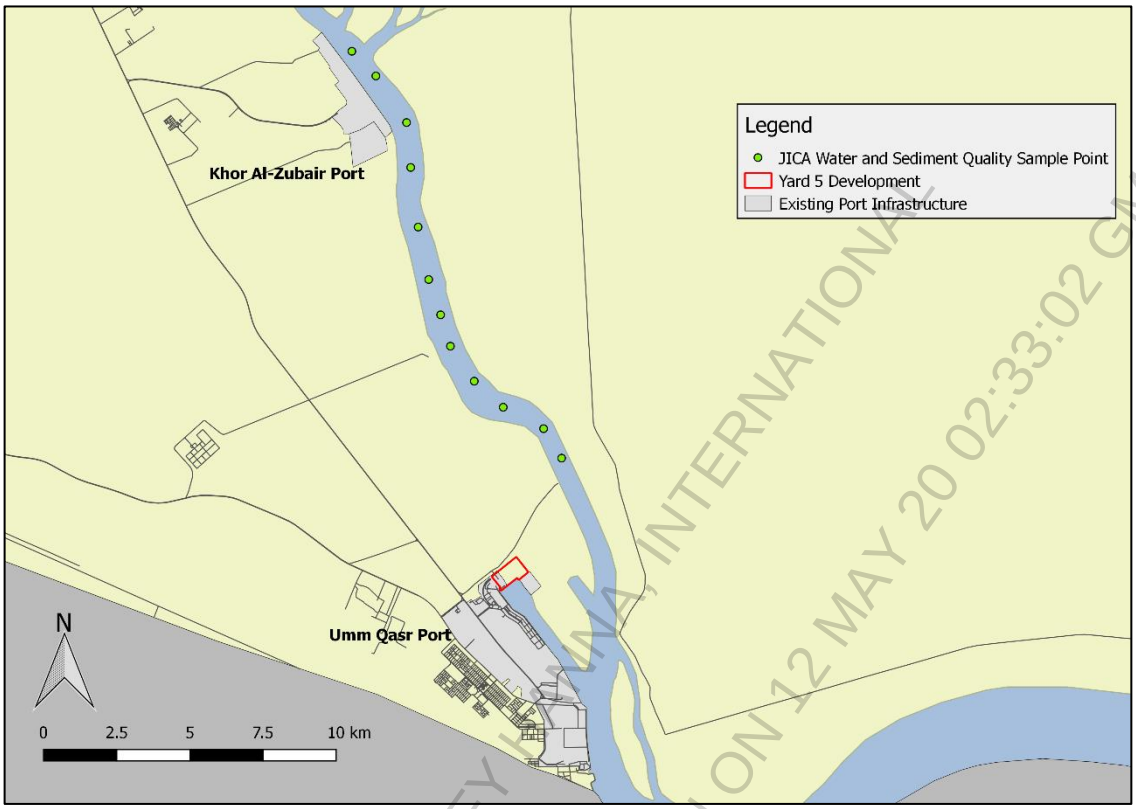

Figure 8.1: Location of the JICA water quality sampling points in relation to the Project area

The principal findings of the sampling were:

- A general lack of evidence of significant pollution in the water samples that were tested;
- The levels of contaminants observed are not a significant cause for concern and should not prove to be an impediment to any dredging and disposal operations;
- However, elevated concentrations of Biological Oxygen Demand (BOD) and Total Coliform Counts were noted which indicate that raw or poorly treated sewage discharges directly into the Khor Al-Zubair.

ESIA, WTPS, 2014

As part of the ESIA for the proposed oil terminal adjacent to KZP, EAME undertook water sampling at five locations, at both high and low tide, of the Khor Al-Zubair. In summary:

- In-situ physico measurements indicated that stratification does not occur;
- Elevated concentrations of Total Coliforms;

- All samples were found to have elevated concentrations of sulphate and chloride, above the relevant guideline values, however, this was not unexpected due to the hyper-saline environmental of the Khor Al-Zubair; and
- Elevated concentrations of mercury were noted in all samples. These concentrations could be the result of natural accumulations in the environment (of geological origin) but may also be related to anthropogenic sources given the proximity of a port, heavy industry and major city, with limited pollution control measures employed.

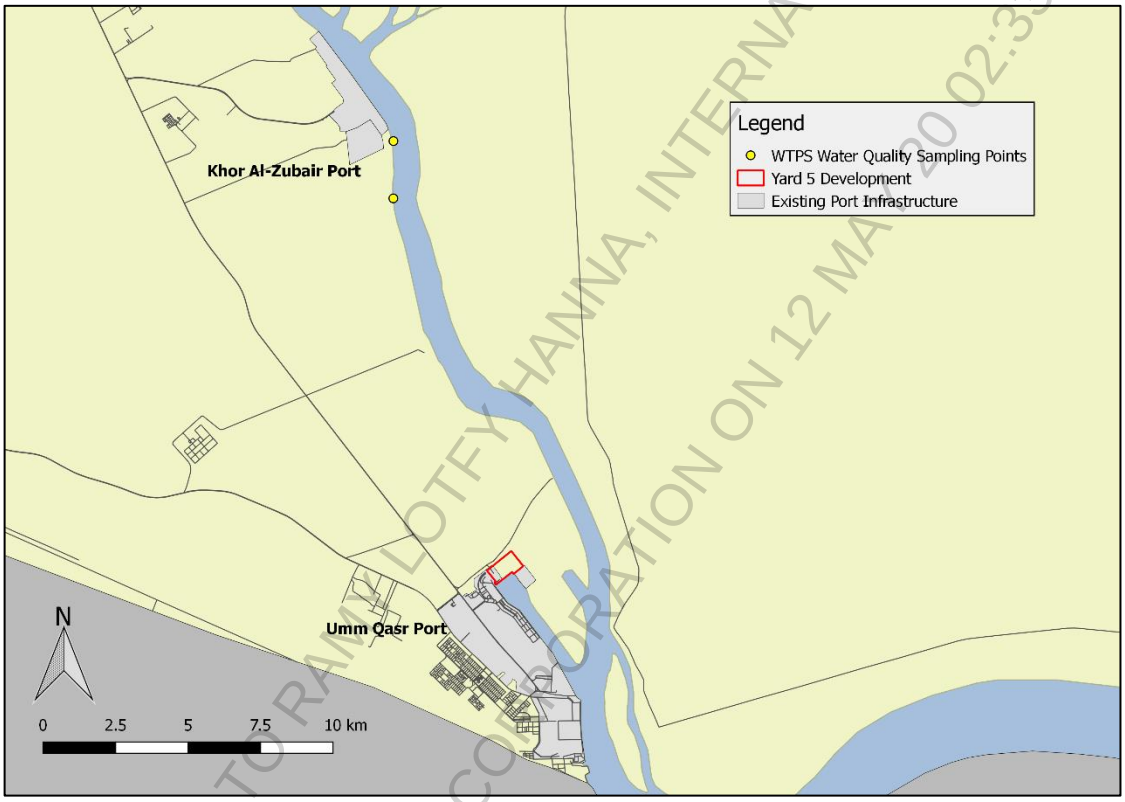

Figure 8.2: Location of the WTPS water quality sampling points in relation to the Project area

8.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to water quality.

8.3.1 National Policy and Legislation

Regulation No.25 of 1967 on Preservation of Rivers and Public Waters from Pollution. The law is a set of regulations introduced to address several matters related to discharge into

public water and sewage systems. According to this law, Article 7 prohibits discharging wastewater into public water where the effluent pollutants exceed national standards. Wastewaters may not be drained into public waters unless upon a licence and under special instructions issued by the Health Authority. Articles 8 and 9 of the law provide mechanisms to control water pollution caused by discharges of wastewater into public water body. This law also sets standards for discharges into the sewerage system. The law regulates quality and quantity of wastewater that is allowed to be discharged into natural waters.

Law No.2 of 2001 on Conserving Water Resources. This law regulates the utilization of water for purposes other than domestic use. The law deals, inter alia, with how to dispose of or recycle waste water. It also introduces mechanisms for the preservation of public water. Provincial councils are authorized to protect and improve the environment through coordination with local peoples' councils. They are also in charge to protect public water from pollution and improve its quality. The provincial councils' plans have to identify the sources of pollution in public water and indicate the proposed treatment method.

Instruction 1 (related to Regulation No. 25 of 1967 on Preservation of Rivers and Public Waters from Pollution). This sets out Wastewater discharge concentration limits.

Regulation No. 25 of 1997 on Maintenance of Rivers and Public Water from Contamination.

8.3.2 International Guidance and Standards

IFC EHS General Guidelines – Environmental: Wastewater and Ambient Water Quality, 2007. These provide guideline standards for sanitary wastewater treatment and discharge, and indicates that these should be applied to storm water in the absence of national standards. The guidance also indicates that priority should be given to the treatment of 'first flush' storm water (i.e. discharges following dry periods) and indicates that storm water should be managed as a resource where practicable (e.g. for pipeline flushing).

8.3.3 International Conventions

There are no international conventions to which Iraq is a signatory that are directly relevant to this topic.

8.4 Area of Influence

The AOI of the Project on water quality will be the Khor Al-Zubair. The downstream extent of the influence will be determined as part of the assessment proposed in Section 7.8.

8.5 Baseline Key Data Gaps

In order to assess the impact of the proposed development on baseline conditions the following data gaps would need to be addressed:

- Site-specific water quality sampling.

8.6 Identification of Potentially Significant Effects

The main aspects of the Project that could impact on the river water quality include: pollutant or sediment release during construction activities (wastewater or stormwater); increases in water turbidity and oxygen demand from any sediment release; any water abstraction required for construction or operation purposes; storm water and failure of drainage containment or other non-routine events during operation; and physical changes to hydrological flows and levels associated with the site footprint and drainage system during operation.

8.6.1 Construction

Table 8.1 summarises the potentially significant effects that will require consideration during the construction phase. Localised impacts to water quality may occur during construction of the scheme particularly works in close proximity to water courses.

Table 8.1: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Khor Al-Zubair and Khawr Abd Allah	Washout of material or spillages into the Khor Al-Zubair, leading to contamination of the watercourse
	Impacts from the construction waste stream, including sanitary and food waste, office waste and waste arising from mobile plant.
	Direct contamination from construction machinery (e.g. fuel spills) working in or over the river
	Unmanaged erosion/sediment depositions and suspended solids generated from ground disturbance could travel directly by surface run-off.

8.6.2 Operation

During operation, there are several issues to consider that could have an impact on the river in the event of failure of suitable management or control, as summarised in **Table 8.2.**

Table 8.2: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Khor Al-Zubair and Khawr Abd Allah	The discharge of effluent from the Site may present a pollution risk, as well as other operational waste streams, such as hazardous wastes including fuel oils and cleaning solvents.
	There is the need to guard against accidental spillages of chemicals that are housed onsite into the Khor Al-Zubair. Inadequate storage and management of raw materials, such as diesel, leading to contamination of the river.
	Poorly designed site drainage providing inadequate control of, in particular, storm water runoff, with a resulting risk of low quality surface water entering the Khor Al-Zubair.

8.6.3 Decommissioning

It is understood that the proposed project has a lifespan of 50 years. A site closure and restoration plan would be developed prior to initiation of decommissioning activities. Potential effects from decommissioning are summarised in **Table 8.3**. Localised impacts to water quality may occur during decommissioning of the scheme particularly works in close proximity to the Khor Al-Zubair.

Table 8.3: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant Effects**
Khor Al-Zubair and Khawr Abd Allah	Washout of material or spillages into the Khor Al-Zubair, leading to contamination of the watercourse
	Impacts from the decommissioning waste stream, including sanitary and food waste, office waste and waste arising from mobile plant.
	Direct contamination from decommissioning machinery (e.g. fuel spills) working in or over the river
	Unmanaged erosion/sediment depositions and suspended solids generated from ground disturbance could travel directly by surface run-off.

8.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 8.4: Scoping Summary - Surface Water

Issue	Scoping Assessment	Justification
Potential for construction activities to affect surface water quality	Scoped in	Construction related pollution risks associated with working in or near to water courses will need to be considered in the ESIA to ensure appropriate mitigation is adopted during construction.
Potential for operations to affect surface water quality	Scoped in	Any spillages during operations, such as fuels or oils, which may enter the Khor Al-Zubair.
Potential for accidental spills to affect surface water quality	Scoped out	There is the need to guard against accidental spillages of chemicals that are housed onsite into the river. As long as GIIP is followed, this issue can be scoped out and addressed in the ESMP only.
Potential for decommissioning to affect surface water quality	Scoped in	Decommissioning of infrastructure and machinery on site introduces a pollution risk to the Khor Al-Zubair. Decommissioning related pollution risks associated with working in or near to water courses will need to be considered in the ESIA to ensure appropriate mitigation is adopted during decommissioning.

8.8 ESIA Approach and Methodology

This component will focus on the impact of the Project on the water quality of the Khor Al-Zubair. As flow is a key constituent of any water quality assessment this aspect will be closely linked to the Hydrology component. It will also draw on the results of the social surveys in terms of downstream users.

The assessment methodology will focus on the effect of any new discharges made directly to the Khor Al-Zubair. One element will be covered in the water quality assessment; the potential for introducing pollution into the Khor Al-Zubair via drainage discharge.

In order to establish the effect of the surface water discharge in terms of water quality it is necessary to determine the loads of key pollutants already in the river, and entering the river from key pollution sources. The impact on water quality should be assessed against regional environmental standards; where gaps exist, the appropriate international standards will be adopted.

If grid reference data is available, the baseline key pollutants will be assessed with a Geographic Information System (GIS) approach, by plotting the water quality measurements and other relevant information in GIS. This facilitates a geographical overview of where standards are being met.

In conclusion, it is considered that the ESIA will include the following:

- a description of baseline conditions using water quality monitoring data were available set out against relevant standards;
- an assessment of the potential impacts of construction and operation on the Khor Al-Zubair; and
- input to the ESMP, including recommended measures to control impact on water quality during construction and operation.

This topic will interface with the biodiversity impact assessment in relation to changes in water quality affecting ecosystem services.

9 Groundwater

9.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to groundwater resources. It also sets out the methodology and approach to the ESIA for this topic.

9.2 Baseline Conditions

Tidal Flat/Alluvial Deposits

The porous nature of the Tidal Flat/alluvial deposits suggests that any perched groundwater contained within them is likely to be in hydraulic continuity with the adjacent Khor Al-Zubair, and the groundwater level is likely to rise up and down with the ebb and flow of the tides to a certain extent. As such there is unlikely to be a strong groundwater flow direction. As such, the groundwater contained in these deposits is likely to demonstrate high salinity levels.

Hammar Formation

It should also be noted that the Hammar Formation and the higher horizons of the Dibdibba Formation may also be in continuity with the Khor Al-Zubair.

Dibdibba Formation

The Dibdibba Formation comprises gravels and coarse-grained sandstones which is important in supplying water for irrigation purposes. Due to high porosity of the deposits over the site, any rainfall will either evaporate or will percolate into the ground. Water in great quantities can be found stored in this Formation, however, its quality may be highly variable, especially if the Formation is in continuity with the Khor Al-Zubair and saline intrusion is occurring. In addition, the over abstraction of water from the Dibdibba Formation as lead to unsaturation in several areas (UN-ESCWA and BGR, 2013).

This Formation reportedly contains two groundwater lenses, an unconfined upper layer containing brackish water and a lower, semi-confined containing saline water. These layers are separated by a hard clay bed locally known as 'Jojeb'. The salinity in the upper layer does not exceed 10,000mg/l, while the lower layer is characterized by salinity in excess of 10,000mg/l in most areas.

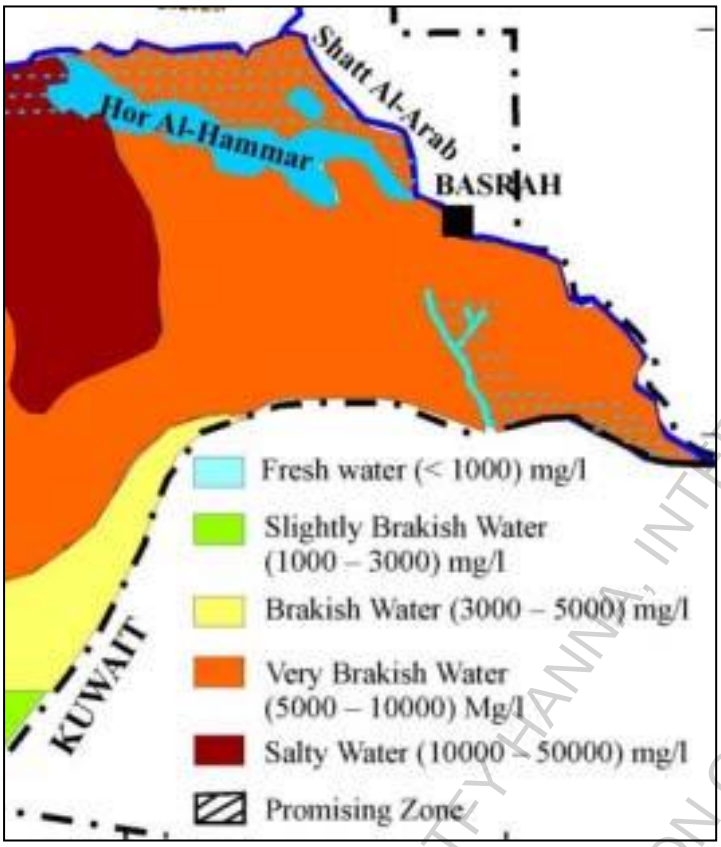

Figure 9.1: Hydrochemical map of the Mesopotamia Plain (Al-Jiburi & Al-Basrawi, 2009)

As stated earlier, it is likely that the higher horizons of the Dibdibba Formation are in hydraulic continuity with the Khor Al-Zubair and as such, the groundwater level will rise and fall with the tide to an extent, especially closer to the channel, however, this may only be to a very small extent. The lower horizons may not be in continuity and natural slope of the Mesopotamia Plan suggests groundwater flow direction is towards the Arabian Gulf.

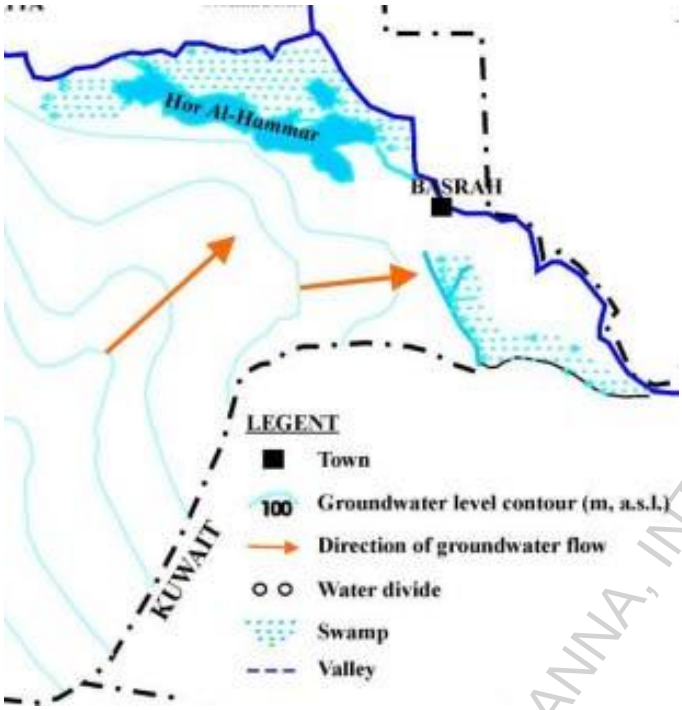

Figure 9.2: Groundwater flow direction in Southern Iraq (Al-Jiburi & Al-Basrawi, 2009)

Groundwater Abstraction and Use

In southern Iraq, the Dibdibba Formation has been exploited through many – mostly hand-dug – wells in the area west of Basra. A 1998 official survey found that nearly 5,000 wells were in use in this area. Annual groundwater abstraction for agricultural purposes was estimated at around 370 million cubic metres (MCM) in the 1980s and a substantial part of the extracted water returns back to groundwater through the permeable soils (a return flow of about 84%).

Groundwater in the Dibdibba Formation is not suitable for human consumption with the exception of limited freshwater lenses in the Sabriah and Barjisiyah oilfields near Zubair in southern Iraq. The two freshwater lenses in Kuwait may have been polluted by oil spills during the second Gulf War in 1991 (UN-ESCWA and BGR, 2013).

9.2.1 Geotechnical Site Investigation

As part of the Fugro site investigation (Fugro Middle East, 2017), five standpipes piezometers were installed to 20m bgl. Monitoring of the groundwater levels in the piezometers has indicated that the groundwater is influenced by tidal variations with diurnal variations of up to ~0.5m.

9.2.2 Available Chemical Data

As part of the WTPS ESIA, EAME excavated seven boreholes on the proposed development site which were installed as permanent groundwater monitoring wells. The location of the WTPS site in relation to the Project area is shown in **Figure 6.7**.

Groundwater samples were collected from each borehole and submitted for chemical analysis. Several contaminants were elevated when compared to relevant guideline values including sulphate, chloride, nitrate, manganese, mercury and nickel. The elevated sulphate, chloride and manganese concentrations were not unexpected due to the hypersaline marine environment of the area and such levels are considered natural.

The elevated mercury may be a result of its natural occurrence in the environment, significant mercury deposits exist in the Alpine – Himalayan orogenic belt but there could also be an anthropogenic contribution from nearby industrial emissions. Similarly, Nickel could be both natural and anthropogenic in origin.

TPH was noted, above laboratory's level of detection, in three boreholes. No hydrocarbon contamination was noted in the soil samples or observed on-site, which suggests that the hydrocarbons observed may the remnants of historic contamination that may have occurred on the site. The levels were not considered to be problematic.

One VOC, 1,2-dichloroethane, was detected in all groundwater samples. This compound is added to leaded gasoline as a lead scavenger. This implies a generally low level of contamination throughout the groundwater body.

In total, three SVOCs were detected in the groundwater samples:

- 2-Methylnaphthalene, a natural component of crude oil and coal and is found in pyrolysis, combustion products such as used oils and emissions from combustion engines;
- Diethyl phthalate (DEP). This compound is a solvent most commonly used to make plastics more flexible; and
- Dimethyl phthalate (DMP). DMP has many uses including in solid rocket propellants, lacquers, plastics, safety glasses, rubber coating agents, moulding powders, insect repellents and pesticides.

Again, the presence of these substances at these levels were not considered to be problematic but it is indicative of low levels of contamination.

9.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to the groundwater environment.

9.3.1 National Policy and Legislation

Regulation No.25 of 1967 on Preservation of Rivers and Public Waters from Pollution. This relates to the protection of rivers and public water bodies from contamination**.**

9.3.2 International Guidance and Standards

IFC EHS General Guidelines – Environmental: Wastewater and Ambient Water Quality (2007). These provide guideline standards for storm water in the absence of national standards. The guidance also indicates that priority should be given to the treatment of 'first flush' storm water (i.e. discharges following dry periods) and indicates that storm water should be managed as a resource where practicable.

9.3.3 International Conventions

There are no international conventions to which Iraq is a signatory that are directly relevant to this topic

9.4 Area of Influence

The AOI for this assessment will be the immediate Project area.

9.5 Baseline Key Data Gaps

To more comprehensively establish the most relevant baseline conditions ahead of the proposed Project, the following data gaps would need to be addressed:

- Groundwater quality.

9.6 Identification of Potentially Significant Effects

The main aspects of the Project that could impact on the groundwater environment include: pollutant or sediment release during construction activities; any water abstraction/ control required for construction or operation purposes; pollutant release associated with storm water or failure of containment or other non-routine events during operation; and any other

physical changes to groundwater levels and flows associated with site footprint and associated drainage systems.

9.6.1 Construction

Table 9.1 summarises the potentially significant effects that will require consideration during the construction phase.

Table 9.1: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Groundwater	Reduction in local groundwater levels caused by construction dewatering activities.
	Accidental spills or leaks of materials required for construction, leading to contamination of groundwater.
	Impacts from the construction waste stream, including sanitary and food waste, office waste and waste arising from mobile plant if not adequately managed.
	Changes in land use associated with construction. For example, vegetation clearance and the creation of significant areas of hard standing within the Project footprint, that may lead to localised changes to groundwater recharge/flow.

9.6.2 Operation

During operation, there are several issues to consider that could have an impact on groundwater in the event of failure of suitable management or control, as summarised in **Table 9.2**.

Table 9.2: Summary of Potentially Significant Effects during Operation

Receptor	Potential Significant Effects
Groundwater	Failure of security with the potential for groundwater contamination by materials stored at site or loss of water resource to ground.
	Inadequate storage and management of raw materials, such as diesel, leading to contamination of the groundwater.
	Poorly designed drainage providing inadequate control of, in particular, storm water runoff, with a resulting risk of low quality surface water recharging and contaminating the groundwater.

9.6.3 Decommissioning

It is understood that the Project has a lifespan of 50 years. A site closure and restoration plan would be developed prior to initiation of decommissioning activities. Potential effects from decommissioning are summarised in **Table 9.3**.

Table 9.3: Summary of Potentially Significant Effects during Decommissioning

Receptor	Potential Significant Effects
Groundwater	Contamination of the groundwater from dismantling of infrastructure and machinery, prior to disposal at licensed disposal sites.

9.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 9.4: Scoping Summary - Surface Water

Issue	Scoping Assessment	Justification
Potential for construction activities to affect groundwater levels and flows	Scoped In	Construction activities may involve excavations below the water table and therefore require the management of groundwater ingress to excavations (dewatering)
Potential for construction activities to affect groundwater quality	Scoped In	Construction related pollution risks associated with the management of materials and wastes
Potential for operation of the Project to affect groundwater levels and flows	Scoped Out	Groundwater control not required as an ongoing operation during the life of the Project
Potential for operation of the Project scheme to affect groundwater quality	Scoped In	Operation of the Project requires that pollution risks associated with the handling of raw materials and waste streams are adequately managed
Potential for decommissioning of the Project to affect groundwater quality	Scoped In	Decommissioning of infrastructure and machinery on site is a potential pollution risk to the groundwater

9.8 ESIA Approach and Methodology

The approach to impact assessment will cover the following:

- A description of baseline hydrogeology using borehole log, ground elevation and groundwater level data, where available;
- Collection and analysis of groundwater samples from the Project area in order to establish baseline groundwater quality conditions and from which it would be possible to monitor any impacts of the scheme on groundwater quality;
- From the above, groundwater vulnerability can be assessed, particularly with respect to contamination from surface activities and materials, and in the context of the historical drainage system/supply system;
- Review of any groundwater-dependent ecosystems (including surface watercourses) in the vicinity of, or potentially affected by, the components of the development and their operation;
- Depending on the extent of data available, options for mitigation via a suitable, targeted water management plan; and
- Anecdotal information on water management and any local policies or initiatives.

10 Biodiversity

10.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to biodiversity. It also sets out the methodology and approach to the ESIA for this topic.

10.2 Baseline Conditions

10.2.1 Introduction

Biodiversity of Iraq

Due to the variety of habitats in Iraq, the region is biologically diverse. In terms of avifauna, more than 400 species have been recorded – several of which are critically endangered, such as the Northern Bald Iris, Slender-billed Curlew and Sociable Lapwing. There is a total of 32 Globally Threatened bird species (three Critically Endangered, five Endangered, eight Vulnerable and 13 Near Threatened Species).

Several migration routes cross Iraq, including the African-Eurasian flyways. Millions of birds depend on the wide variety of habitats that Iraq has to offer as well as vital stopover sites in their annual migration. The diversity of Iraq's extends to other flora and fauna with over 2,500 plant species, 90 mammals, 98 reptiles, 10 amphibians, and 100 freshwater and marine fish species. Information available on the species diversity and population distribution throughout Iraq is limited.

A total of 12 species of Global Conservation Concern, defined by the IUCN as '*the site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern'*, have been observed in Iraq with nine of these species in numbers reaching or exceeding the qualifying thresholds (Nature Iraq, 2017).

Human Influence on Biodiversity

The biodiversity of Iraq has been affected by Iraq's recent tumultuous history. Conflict, including extensive burning, heavy bombing and the widespread use of chemical weapons, has resulted in chronic environmental problems and degradation of the general environment whilst the economic sanctions imposed on Iraq resulted in little or no access to state of the art technology, spare parts or basic investment will have also limited the biodiversity in the Project Area.

Furthermore, the addition of freshwater into the Khor Al-Zubair via the Shatt Al-Basra Canal is likely to have led to major and permanent changes to the Khor Al-Zubair.

10.2.2 Terrestrial Ecology

Designated Biodiversity Conservation Areas

Important Bird Areas

Iraq does not have any environmentally statutory protected areas; however, an Important Bird Area (IBA) has been identified by BirdLife International adjacent to the Project area. This site, Khor Az-Zubayr, comprising 31,854ha, was allocated IBA Status for its importance in providing suitable habitat to wintering water birds (Evans, 1991). However, it should be noted that '*the site appears never to have been visited by an ornithologist, though it was considered by Scott and Carp (1982) to be possibly of great importance for wintering waterbirds. The khawr was listed as a wetland of international importance by Carp (1980)*' (Birdlife International, 2017).

A second IBA, Khawr Abdallah, extends along the coast of Iraq. This location comprises approximately 90,000ha of swampy grassflats and approximately 36,000 ha of intertidal mudflats. The huge expanses of suitable habitat resulted in the site being recognized as internationally important for populations of Eurasian Curlew (*Numenius arquata*), Crab Plover (*Dromas ardeola*) and Gull Billed Tern (*Gelochelidon nilotica*) (Burnham & Bachman, 2009). Furthermore, the IBA supports resident populations of Iraq Babbler (*Turdoides altirostris*) as well as 1% or more of the recorded global population of wintering African Sacred Ibis (*Threskiornis aethiopicus*).

Please note that EAME have kept the BirdLine spellings of the IBAs.

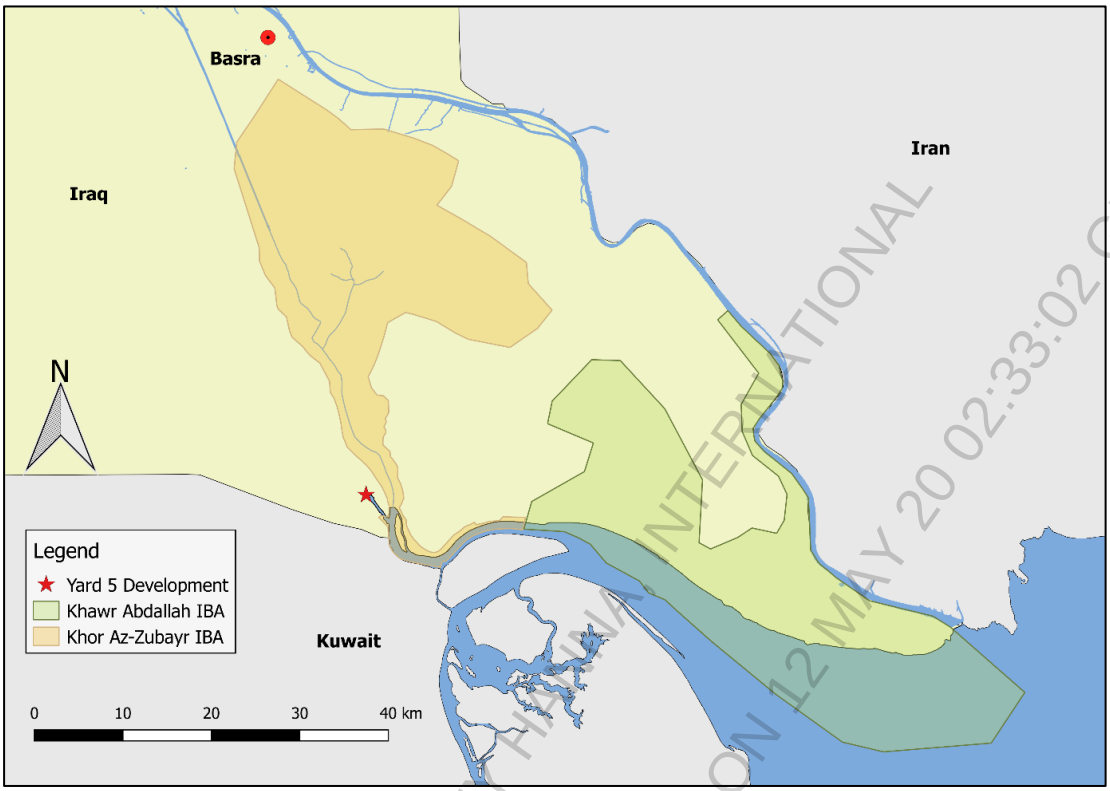

Figure 10.1: Khor Az-Zubayr and Khawr Abdallah IBAs

Endemic Bird Area

The Mesopotamian Marshes has been classified as Endemic Bird Area (EBA). The Mesopotamian Marshlands EBA extends over an area of approximately 130,000ha. Birdlife International states that the marshlands are recognized as one of the most extensive wetland ecosystems in western Eurasia. The EBA comprises of a complex system of interconnected, shallow, freshwater lakes, marshes and seasonally inundated floodplains solely reliant on the Tigris and Euphrates rivers. The marshes extend from Baghdad in the north to the Basra region in the south and east to Iran. Throughout these wetlands, the emergent vegetation is dominated by reeds *Phragmites*, *Typha* and *Cyperus*, along with a rich diversity of aquatic plants.

According to BirdLife International, the Marshes supports two restricted range bird species that are endemic to this EBA. Firstly, the Iraq Babbler (*Turdoides altirostris*) is confined to the lower Tigris and Euphrates valleys of central and southern Iraq. The distribution of the Iraq Babbler is closely associated with the reedbeds of the marshes, however it also occurs throughout rural habitats established along river and irrigation canals. Secondly, the Basra Reed-warbler (*Acrocephalus griseldis*) is a summer visitor, breeding in reedbeds between Baghdad and Basrah, and wintering in central East Africa. Known subspecies of a further two

widespread water birds are believed to be endemic to the Mesopotamian Marshland EBA. The Little Grebe (*Tachybaptus ruficollis iraquensis*) and African Darter (*Anhinga rufa chantrei*) are known residents of the EBA. In addition, Mesopotamian Crow (*Crow Corvus* (corone) is also recorded as endemic to this EBA (BirdLife International, 2017).

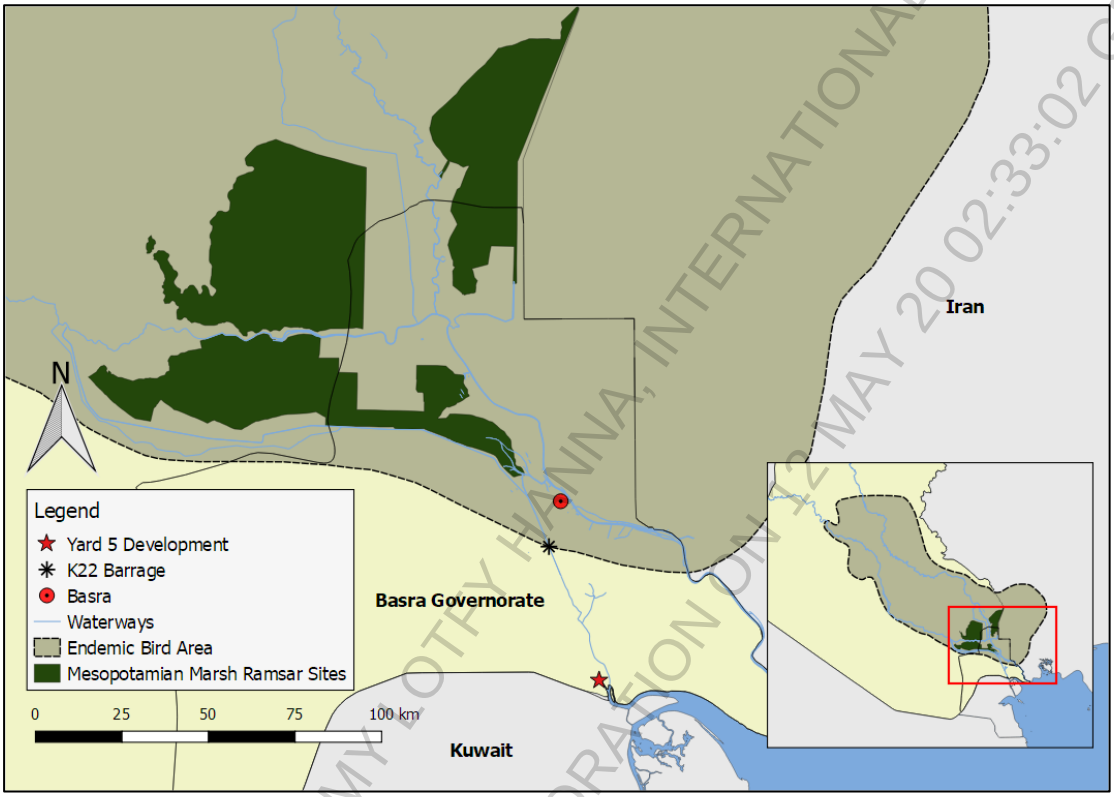

Figure 10.2: Mesopotamian Marshlands Endemic Bird Area

Key Biodiversity Area

In addition to being internationally recognized as an IBA by BirdLife International, Nature Iraq, an Iraqi NGO working with the MoHE and MoWR, has identified the Khor Al-Zubair (spelt as Khor Az-Zubayr) as a Key Biodiversity Area (KBA) and identified 53 different bird species including the Iraq Babbler *(Turdoides altirostris).*

Table 10.1: Details of the Khor Az-Zubayr KBA	
Name	Khor Az-Zubayr
Site Code	IQ081
Area (ha)	31,854

Table 10.1: Details of the Khor Az-Zubayr KBA	
Ecoregion	South Iran Nubo-sindian desert and Semi-desert (PA1328) Arabian Desert and East Sahero-Arabian Xeric Shrublands (PA1303) Gulf Desert and Semi-desert (PA1323)
IBA Criteria	A2: The site is known or thought to hold a significant component of restricted-range species. *Iraq Babbler (Turdoides altirostris). Resident – 50 breeding pairs*
IPA Criteria	B1: The site is a particular species rich of a defined habitat type *Salt Pioneer Swards vegetation habitat type and Desert-Shrub vegetation habitat type.*

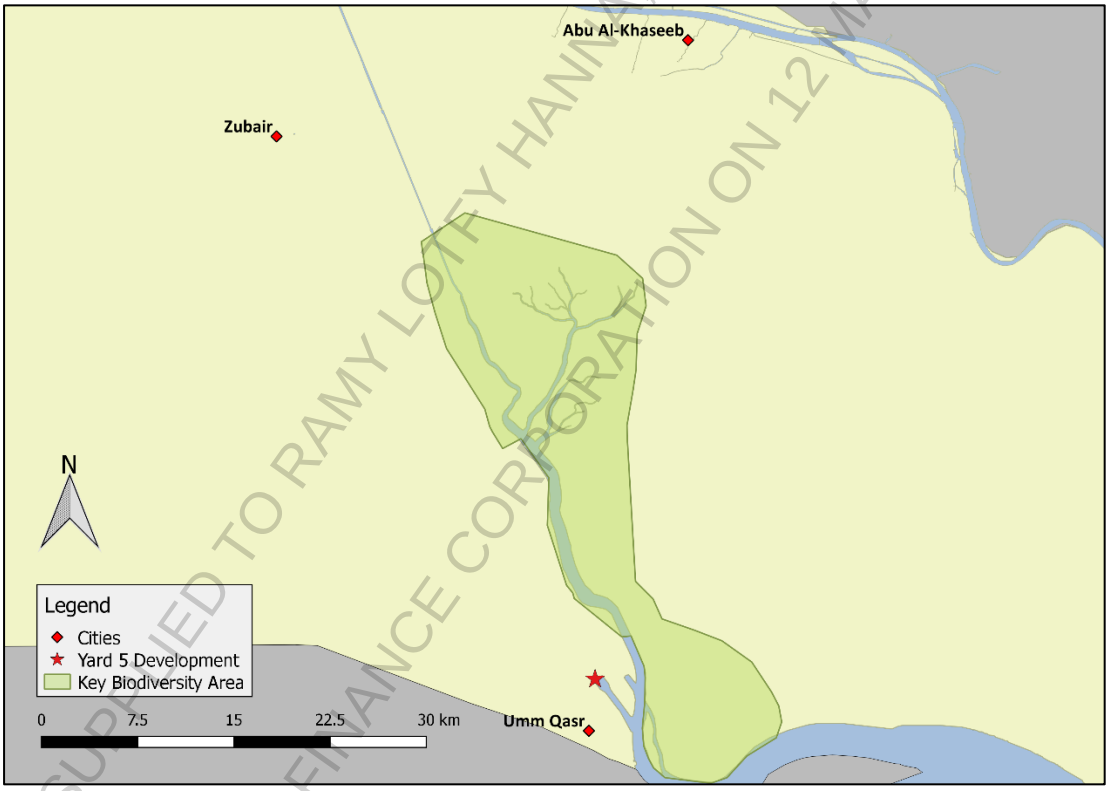

Figure 10.3: Khor Al-Zubair KBA

Please note that the Khawr Abdallah IBA could not be surveyed by the KBA team.

Project Area Habitats

No detailed studies on the vegetation of Iraq have been published for 40 years as such, EAME has undertaken remote sensing from Landsat satellite imagery to determine the land uses in and around the Project area.

The Project area comprises of four key terrestrial habitats: alluvial plains, sabkha floodplain, land impacted by human activities and intertidal mudflats. The study and surrounding areas shows signs of anthropogenic impacts.

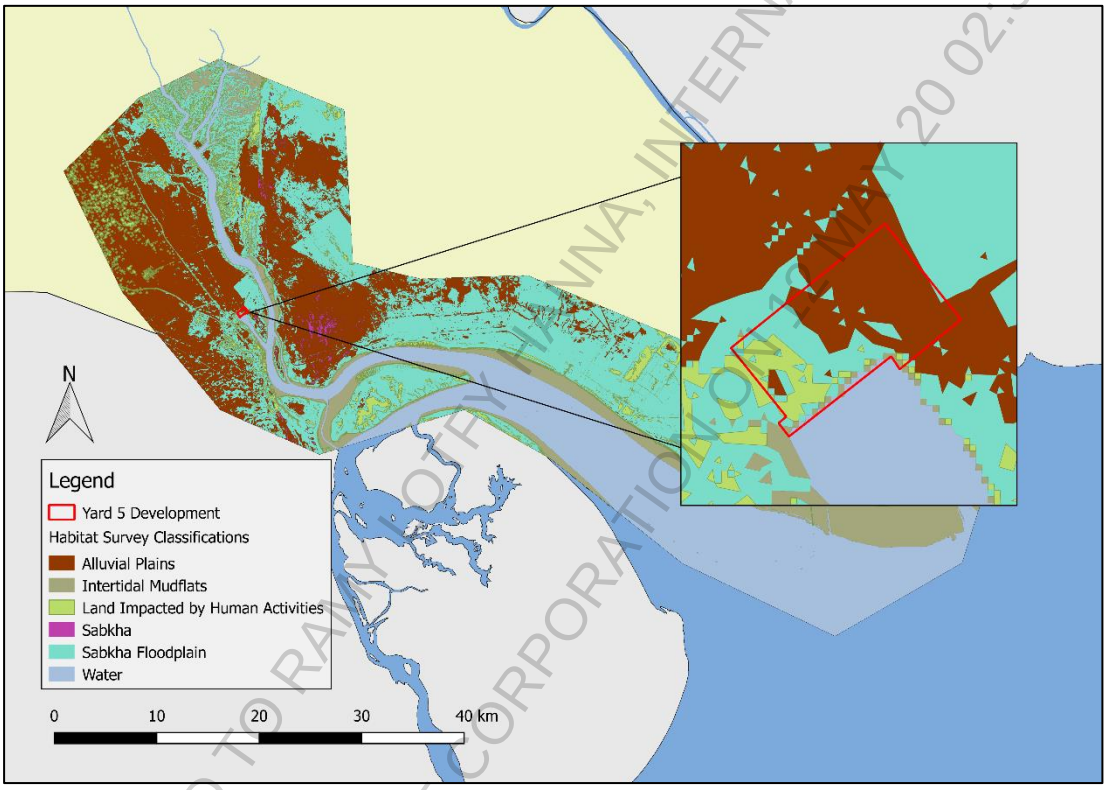

Figure 10.4: Remote sensing - habitat mapping

Endemic Flora and Provisional IUCN Red List Assessment

Endemic species are those with restricted distributions, existing in only one geographic region. A data assessment, carried out as part of the Provisional IUCN Red List assessment of Iraq's endemic plants (Miller & Neale, 2015) indicated that no Iraqi endemic species occur in the Basra region. Plant life throughout the Project area is probably limited due to the high saline levels in the soil and associated disturbance from anthropogenic activities. Species inclusive of *Phragmites australis, Salicornia herpatia* and *Suaeda sp* were recorded by Nature Iraq in 2009 (Abdulhasan & Salim, 2008).

Additional flora likely to be present will predominantly include halophytes such as species of the families *Boraginaceae, Chenopodiaceae* and *Zygophyllaceae*. The species recorded by Nature Iraq are listed as common and of no conservation importance (Garstecki & Amr, 2011).

Avifauna

During the surveys undertaken by Nature Iraq as part of the KBA programme, 53 bird species were observed. The Greater Spotted Eagle (*Aquila clanga*) was also recorded in the winter, albeit are numbers blow the IBA threshold criteria. The Crab Plower (*Dromas ardeola*) was also noted regularly.

Mammals

The nature of the Project area and associated high anthropogenic activity potentially limits the number of native mammal species likely to be present. It is probable that those species which do exist within the Project area, are to some degree tolerant to the existing activities.

The habitats associated throughout the Project area are likely to support small mammal species, in particular, rodents, particularly near areas of human habitation or activities such as wharf sites and industrial areas. During the reconnaissance of the Project area, dog foot prints were noted on-site, these are likely to be attributable to the stray dogs which inhabit the Port and surrounds.

Similarly, alluvial plains are known to support populations of Lesser Jerboa (*Jaculus jaculus*). The population of this species throughout Iraq and Arabia is stable and in combination with its wide spread distribution, it is listed as Least Concern on the IUCN Red List. A member of the Jerboa Family, Euphrates Jerboa (*Allactaga euphratica*), possibly exists in Iraq, however there have been no recent confirmations. Populations of Euphrates Jerboa is always lower when found in areas populated by Lesser Jerboa. This species is currently listed as Near Threatened on the IUCN Red List due to a decreasing population and distribution throughout Arabia.

Reptiles

A significant lack of available literature on the presence and distribution of reptiles throughout southern Iraq has been identified. It was noted that species which could potentially exist within the Project area included geckoes, diurnal lizards and snakes. However, given the highly disturbed nature and presence of human activities, the likelihood of snakes existing within the Project area is very low.

10.2.3 Aquatic Ecology

The availability of area specific modern literature for the study area is very limited. Most aquatic studies are broad, regional and do not locate species on a spatial scale. The findings of this review have taken every precaution to be specific to the study area.

Habitats

The Khor Al-Zubair is a tidal inlet with intertidal mudflats and an extension of the Arabian Gulf waters. There are tidal channels throughout the area, which become exposed as soft mud as the tide ebbs. Four distinct biofacies have been identified in Khor Al-Zubair tidal flats;

- marine with estuarine condition;
- mangrove swamp;
- lagoonal of high salinity; and
- brackish – marine environment.

Flora

There is little to no information regarding the submerged aquatic flora of either Khor Al-Zubair or Khawr Abd Allah. Incidental reference by terrestrial surveys is made in various articles but this is limited to fringe vegetation such as the emergent species *Phragmites australis*. Previous EAME field studies in the area found the environment barren in terms of vegetation and no sea grass or seaweed was found, however, a coral reef has been discovered at the mouth of the Shatt Al-Arab Waterway which indicates that coral reefs can be present in the northern Arabian Gulf.

Piscifauna

The freshwater species, Goldfish (*Carassius auratus*) and Greenbacked Mullet (*Liza subviridis*), are species of economic importance; whilst Yellow-finned Seabream (*Acanthopagrus latus*), Abu mullet (*Liza abu*), Klunzingers Mullet (*Liza klunzingeri*), and Hilsa Shad (*Tenualosa ilisha*) are of conservation concern and also economically important. *Silurus triostegus* [Heckel] was also observed and though it is of no economic importance (scaleless), it is ecologically important as a predator fish and its conservation status in Iraq is not well understood (Coad, 2010).

The following fish species observed in the surrounding area are not mentioned in Coad (2010): Malabar Trevally (*Caranx malabaricus*), Dorab Wolf-herring (*Chirocentrus dorab*), Large-scale Tonguesole (*Cynoglossus arel*), and Four Finger Thredfin (*Eleutheronema tetradactylum*). Also,

the following species have been found, however, there is little information about them: Oriental Sole (*Brachirus orientalis*), Belangers Croaker (*Johnius belangerii*), Tigertooth Coraker (*Otolithes ruber*), and Silver Sillago (*Sillago sihama*) (Coad, 2010). In addition, Waltons Mudskipper (Periophthalmus waltoni) was observed, an amphibious air-breather and can be found in the soft mud within the tidal range and is unique to this area of Iraq.

Survey findings identified the presence of two resident Anchovy species, *Thryssa mystax* and *T. hamiltonii*, within the waters of Khor Al-Zubair indicating that they are both feeding and spawning in this area. The breeding period is prolonged with two peaks, December-January and March-April. These are both economically important species (Hussain & Ali, 2011).

None of these fish species are included on the IUCN Red List of Threatened Species.

Crustacean

The sesarmid crab species, *Parasesarma persicum*, has been recently identified and collected from the intertidal zones of Khor Al-Zubair. The crabs live on muddy-silty substrata at the upper intertidal zone, and shelters among rocks, vegetation and man-made structures (Naser, 2011). During a 2012 EAME field assessment, Long Eyestalk Crab (*Macrophthalmus depressus*) were also identified as being wide-spread across the interidal zone of the Khor Al-Zubair.

Pelagic species, such as the Blue Swimming crab (*Portunus pelagicus*) are likely to utilize the Khor Al-Zubair and tributary channels during their juvenile growth phases. Spawning takes place all year round, however, females will only mate once per year.

The Jinga Shrimp (*Metapenaeus affinis*), Kiddi Shrimp (*Parapenaeopsis stylifera*) and the Roshna prawn (*Exopalaemon stylifera*) were all caught and identified during previous EAME field surveys around the Fao Peninsula. *E.stylifera* is known to inhabit brackish-fresh waters and it is possible that it could be found along the length of the Khor Al-Zubair, perhaps even using the marshes at the northern extent of Khor al-Zubair.

Gastropoda and Mollusca

The main constituents of fauna in the studied biofacies were the Mollusca/Gastropoda assemblages which are represented by *Tachyrynchus sp.*, *Aclis (Graphis) sp., Retusa canaliculata, Odostomia sp., Littorina sp.* and *Turritella fultoni*. All of these species indicate an intertidal flat zone of a marine environment, except *Retusa canaliculata*, which inhabits sandy sediment in an estuarine environment (Issa, et al., 2009).

Eight species of Gastropod were found in the surveys carried out by Abdul-Sahib (2008) at both Khor Al-Zubair and Khawr Abd Allah (Food and Agriculture Organization of the United Nations, 2009). Only seven species were found to be common between the sites, *Neritina*

violacea, Cerithidea fluviatilis, Murex tribulus, Murex anguliferus, Odostomia laevis, Thais carinfera, and *Nassarius arcularius plicatus*. All species were found to be abundant at both locations except *Neritina violacea* which was deemed common by the authors. The species, *Gibbula kotschyi*, was found to be present at Khor al-Zubair, whilst *Theodoxus jordani* was recorded at Khawr Abd Allah.

Both areas had the same bivalve species composition, seven species recorded, with all except one recorded as Abundant [*Corbicula fluminea* = common]. The six-species identified are *Arca holoserica, Placenta, Crassostrea cucullata, Corbicula fluminalis, Caryactis cor, Abra cadabra*.

Benthic Infauna

Specific and comprehensive studies on the benthic infauna of the sediments of Khor Al-Zubair are lacking. Kadhim (2008) noticed that the benthic infauna organisms, such as Ostracods, Nematodes, Turbellorians, Foraminifera and Copepods, are commonly distributed in the Khor Al-Zubair area (Kadhim, 2008). The densities of all these organisms varied significantly among the differing habitats found within the area.

A previous EAME study (2010/2011) on the Fao Peninsula identified a total of 23 species of benthic fauna with seasonal variation in biomass. The warmer periods exhibited a larger biomass value than the cooler months, which is expected as warmer conditions increase biological productivity. The marine benthic infauna survey discovered a diverse and species high community including 106 invertebrate groups.

Herpetofauna

While Green Turtles (*Chelonia mydas)* have been recorded and surveyed in Kuwaiti and Iranian waters of the Arabian Gulf, no recordings have been identified in Iraqi waters. Green turtles are highly migratory, and they undertake complex movements and migrations through geographically disparate habitats. It is possible that these turtles frequent the near shore region of Khor Abdullah in search of feeding and breeding grounds, but they would not venture into the estuary or riverine complex of the Khor Al-Zubair. The Green turtle is listed as Endangered on the IUCN Red List of Threatened Species (2013).

No other Herptofauna has been described for the study area.

Mammals

No freshwater mammals have been recorded in the Khor Al-Zubair or Khawr Abd Allah. Nature Iraq states that frequent reports have been obtained from locals and hunters that otters occur in the area near to the Shatt Al-Arab Waterway (Nature Iraq, n.d.). These might be Smooth-

coated otter (*Lutrogale perspicillata)*, however, this species is often confused with the Eurasian Otter (*Lutra lutra)*.

There is no reported evidence, in the Khor Al-Zubair, of the two Otter species reported in and around the Shatt Al-Arab Waterway i.e. Eurasian Otter (Lutra lutra) and the Smooth Coat Otter (Lutra perspicillata maxwelli).

There are marine mammals within the Arabian Gulf that may possibly enter the water systems either searching for food or by becoming disorientated. Cetaceans likely to be encountered include the Black finless porpoise (*Neophocaena asiaeorientalis*) which are found mainly in coastal waters, including shallow bays, possibly mangrove swamps, estuaries, and some large rivers and appear to have a strong preference for waters with a sandy or soft bottom.

Also, the Indo-Pacific Humpbacked Dolphin (*Sousa chinensis*) sometimes enter rivers, but rarely move more than a few kilometres upstream and usually remain within the range of tidal influence. The IUCN Red List status is outlined within **Table 10.2.**

Table 10.2: Aquatic Mammals near the Project Area

Common Name	Latin Name	IUCN Red List
Finless Porpoise	*Neophocaena asiaeorientalis*	Vulnerable
Indo-Pacific Humpbacked Dolphin	*Sousa Chinensis*	Near Threatened
www.iucnredlist.org		

10.2.4 Summary

In summary, whilst from a bird life perspective the wider area is on international ecological importance, the Project area itself is likely to be of low ecological sensitivity.

10.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to biodiversity.

10.3.1 National Policy and Legislation

- Iraq Law No. 17 (Repeals Law No. 21 of 1979) - Law on the protection of wild animals (2010)

- Iraq Law No.48 of 1976 amended by Law No.10 of 1981 - Regulating the Exploitation and Protection of Aquatic Life (1981)
- Iraq Law No. 31- Convention on Biological Diversity (2009)

Two further laws that may be relevant are:

- Forests and Orchards Law (formerly Law #75 of 1955) 30 2009 - Effective
- Pasture Protection Act 106 1965 – Effective

10.3.2 International Guidance and Standards

IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. This provides a framework for addressing biodiversity risks and is recognised as GIIP for infrastructure projects.

10.3.3 International Conventions

- Iraq Law No. 31 – Convention on Biological Diversity (2009)

10.4 Area of Influence

With reference to the definition provided by the IFC (PS1) the Project has been reviewed in order to identify the spatial scale (AOI) at which biodiversity could be affected. This in turn helps to define the extent of the study area required for ecological assessment. The defined AOI is intended to encompass all predicted positive and negative effects of the scheme, including those which will occur by habitat damage or loss and those which will occur through disturbance or other indirect means.

The construction of the Project will cause direct impacts in area within the immediate Project footprint, however, due to the surrounding activities, it is not considered that the impacts with extend much beyond the Project area.

The construction and operation of the Project is likely to influence the Khor Al-Zubair, through excavation, earth moving, general disturbance and to changes to their hydromorphology and chemical composition (water quality). The exact extent of downstream propagation will ultimately be dependent on the magnitude of change relative to existing pollutant loading. On this basis, a precautionary approach will be taken with the potential for downstream effects.

10.5 Baseline Key Data Gaps

The following are considered to be the key data gaps:

- Lack of site-specific ecological survey;
- the fauna of Iraq is poorly documented. Endemic flora localities from historical records are poorly annotated and lack precise locality information as to where plants were collected. (Hence the presence of any endemic plant species of conservation interest in the AOI is not known);
- Knowledge of the vegetation/floral seasons (phenology) is lacking;
- The fauna of Iraq is poorly documented;
- Detailed information on the distribution and abundance (status) of mammals, reptiles and amphibians is lacking;
- Legal protection status of endemic and notable flora and fauna;
- Lack of fisheries data; and
- Information relating to the Khor Al-Zubair habitats.

10.6 Identification of Potentially Significant Effects

The main aspects of the Project that could impact on the groundwater environment include: pollutant or sediment release during construction activities; any water abstraction/ control required for construction or operation purposes; pollutant release associated with water treatment materials, wastewater discharges, storm water or failure of containment or other non-routine events during operation; and any other physical changes to groundwater levels and flows associated with site footprint and associated drainage systems.

10.6.1 Construction

Table 10.3: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Khor Al-Zubair IBA and KBA	Impacts on the IBA and KBA.
Flora present in Project area	Loss/damage through site clearance.

Table 10.3: Summary of Potentially Significant Effects during Construction	
Receptor	**Potential Significant Effects**
Fauna present in Project area	Noise and vibration; human and other disturbance (e.g. piling, trenching; movements by people, plant and machinery; lighting).
	Loss of habitats used for breeding or foraging.
Flora and fauna	Damage to habitats and fauna from un-managed disposal of waste at undesignated off-site locations (fly-tipping).
Fisheries and other aquatic receptors	Construction related discharges e.g. chemical spills and fine sediment ingress, have the potential to cause detrimental effects on habitat and water quality that could result in negative effects on fish species and/or a reduction in fish recruitment potential.

10.6.2 Operation

Table 10.4: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Fauna	Disturbance, especially noise and vibration, from various sources (people, traffic, equipment, lighting) at permanent, above ground facilities. This could affect breeding success and impede the movement of any wildlife.
Fisheries and other aquatic receptors	Negative effects as a result of changes to water chemistry.

10.6.3 Decommissioning

Table 10.5: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant Effects**
Habitats, flora and fauna	Damage from un-managed disposal of waste at undesignated off-site locations (fly-tipping)
Fisheries and other aquatic receptors	Demolition related discharges and unmanaged solid waste disposal e.g. chemical spills and fine sediment ingress, have the potential to cause detrimental effects on habitat and water

Table 10.5: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant Effects**
	quality that could result in negative effects on fish species and/or a reduction in fish recruitment potential.

10.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 10.6: Scoping Summary - Biodiversity		
Issue	**Scoping Assessment**	**Justification**
Permanent or temporary damage to ecologically designated sites.	Scoped in	Direct impact to the Khor Al-Zubair IBA and KBA. Assessment and mitigation should lead to no significant impacts.
Temporary indirect impacts to ecologically designated sites	Scoped in	Damage to the Khor Al-Zubair IBA and KBA through construction activities. Increase in dust in atmosphere settling on plant affecting photosynthesis to the detriment of plant health.
Permanent or temporary loss of and damage to non-designated habitats. This includes impacts on habitats themselves (especially watercourse and riparian habitat) and also Impacts on species using those habitats.	Scoped in	Dust covering of vegetation, and crops, from vehicular use on the additional access roads is likely.
Temporary indirect disturbance or damage of habitats and species on or immediately adjacent to the scheme (includes noise, dust and waterborne pollutants)	Scoped in	Potential impacts on habitats and species, especially with respect to disturbance at potential nesting sites of bird species and potential pollution of the aquatic environment of the Khor Al-Zubair.

Table 10.6: Scoping Summary - Biodiversity		
Issue	**Scoping Assessment**	**Justification**
Temporary risk of killing or injury of species, especially notable or protected species	Scoped in	Potential impacts on reptiles, mammals and breeding birds from construction – especially notable or protected species
Impacts on the fisheries and aquatic receptors	Scoped in	All receptors may be affected as a result of changes to water quality.

10.8 ESIA Approach and Methodology

10.8.1 Guidance and General Approach

The proposed ecological assessment will align with that used within the wider ESIA, making particular reference to:

- IFC PS6 on 'Biodiversity Conservation and Sustainable Management of Living Natural Resources' which provides a framework for addressing biodiversity risks;
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester; and
- Convention on Biodiversity Subsidiary Body on Scientific and Technological Advice (SBSTTA) Pilot Assessments and National Level Indicators.

The approach adopted will aim to establish the significance of potential impacts by taking account of the status and level of importance of 'receptors' and the predicted magnitude of any impacts. The nature conservation value or potential value of an ecological feature (habitat or species) will be determined within a defined hierarchical/geographic context (international importance, national importance, regional importance etc).

The findings of the assessment will be used to prescribe appropriate mitigation that will avoid, reduce and/or compensate for any significant impacts that have been identified during the construction and operation phases of the proposed scheme options. Any residual impacts and their consequent effects will also be determined.

In the absence of detailed fisheries data, a precautionary approach would need to be adopted in the assessment of effects on fisheries.

The assessment of the effects on the wider fishery, aquatic macroinvertebrate assemblages and marginal vegetation communities of the Khor Al-Zubair would be determined through reference to the magnitude of change in water quality and the spatial and temporal scale of any change as reported in the Water Resource chapter. Expected beneficial effects will be made clear

10.8.2 Baseline Surveys

Further to the initial desk based review, an ecological survey across the Project area is proposed. This would include plant flora and fauna including threatened plant species or other of conservation concern, bird usage of the Project area, reptile and mammal species of conservation concern.

Due to the paucity of fisheries data of the Khor Al-Zubair, the ESIA will look to obtain information on the fish species by speaking to local fishermen and the local fishing union. EAME shall collect surface water samples and sediment grabs from the basin pocket in order to test for phytoplankton, zooplankton and macrobenthic invertebrates.

Through the Social Impact Assessment (SIA) task it is proposed that additional historic and anecdotal evidence on fisheries and fishing is acquired from key stakeholders such as the fishing unions and syndicates

10.8.3 Impact Assessment

The assessment of the potential impacts of the Project needs to take into account both on-site impacts and those that may occur at adjacent and more distant ecological features. Impacts can be positive or negative. Negative impacts can include:

- Direct loss of wildlife habitat;
- Disturbance to species from noise, vibration, light, people etc.;
- Changes to key habitats e.g. the Khor Al-Zubair IBA and KBA; and
- Changes to water quality that may affect aquatic and riparian vegetation communities.

Negative and positive impacts on nature conservation features can be characterised based on predicted changes as a result of the proposed activities. In order to characterise the impacts on each feature, the following parameters will be taken into account:

- The magnitude of the impact;
- The spatial extent over which the impact would occur;

- The temporal duration of the impact;
- Whether the impact is reversible and over what time frame; and
- The timing and frequency of the impact.

The assessment will identify those positive and negative impacts which would be 'significant', based on the integrity and the conservation status of the ecological feature. Impacts are unlikely to be significant where features of local value or sensitivity are subject to small scale or short-term impacts. However, where there are several small-scale impacts that are not significant alone, it may be that, cumulatively, these may result in an overall significant impact.

11 Traffic and Transport

11.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to traffic and transport. It also sets out the methodology and approach to the ESIA for this topic.

11.2 Baseline Conditions

11.2.1 Highways

The General Authority for Roads and Bridges, within the Ministry of Construction and Housing (MoCH) is the key agency for the maintenance and development of Iraq's inter-city road infrastructure.

Before 2003 the national road network was of relatively good quality. However, during the subsequent war much of the network was damaged or destroyed as a result of military operations, sabotage, and lack of maintenance. As a result, the road network does not meet the countries requirements. This is especially true in the rural areas where community development is dependent on a good transport system. The total length of the external road network (outside the borders of Baghdad's municipalities and mayoralty) is around 48,941km.

Table 11.1: Iraqi Road Network

Category	Distance (Km)
Highways	1,084
Arterial Roads	11,254
Rural Roads	10,357
Border Roads	11,000
Secondary Roads	15,246
(Ministry of Planning, 2013)	

With regard to bridges, there are 1,260 concrete and iron bridges and 52 floating bridges spread throughout all of the country's governorates. However, this network does not meet the country's need, especially for rural roads which are one of the pillars necessary for rural community development.

Iraq suffers from a poor traffic planning and management as well as inadequate and poorly maintenance road network. In particular, the road network servicing the poor cannot cope with the existing traffic generated by the Port with backlogs of HGVs entering and exiting the Port.

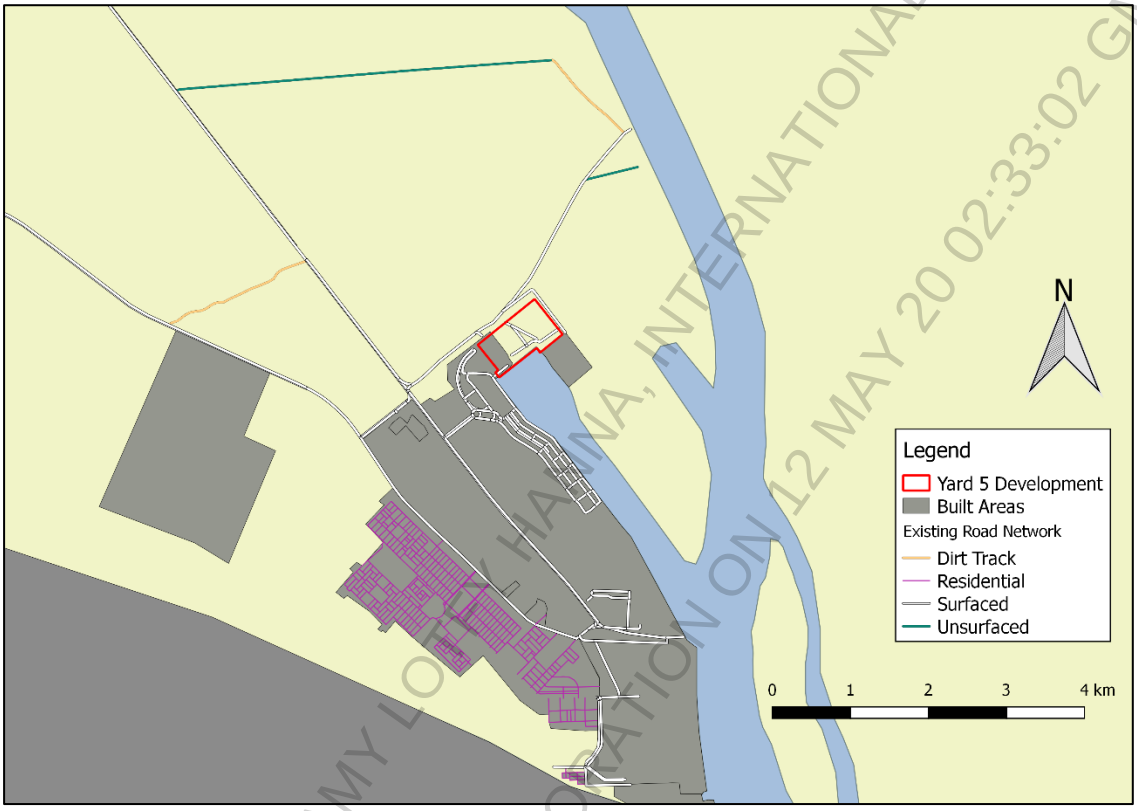

Figure 11.1: Current road layout around UQP

11.2.2 Vehicles

According to the Ministry of Planning (MoP), Iraq has experienced a 437% increase in the number of vehicles between 2007 and 2013, for example, in 2007, there were 56,514 registered cars in Basra Governorate, in 2013, there were 199,478.

11.2.3 Freight Sector

Freight services are provided by a trucking sector that is highly fragmented using a generally outdated fleet. Most trucking companies own only one HGV, although a few small fleets are operated.

Iraq's trade is primarily with Turkey with significant goods transported across the main border crossing at Ibrahim Al-Khalil. However, several other borders crossings exist with Iran. About

50% of Iraq's imports come through its north–south corridor and enter through the Ibrahim Al-Khalil border crossing from the European Union (EU), Russia, and Central Asia via Turkey. In 2013, about 3,000 heavy trucks entered Iraq daily from Turkey through this crossing. In recent months this figure has dropped to fewer than 700 a day as a consequence of the current crisis (World Bank, 2015).

Cargo throughput of UQP has increased dramatically between 2006 and 2014, with the container cargo volume and the conventional cargo volume have increased from 134,000 to 736,000 TEUs, and between 4.64 million and 6.84 million tonnes, respectively (JICA, 2015). All of these goods would require vehicles to transport them to their point of delivery, and the large increase has had a negative effect on the road network around the Port. This increase in HGV traffic, a fragmented traffic management system outside the Port and inefficient logistics within, leads to long delays with HGVs potentially queuing for several days to enter the Port.

11.2.4 Marine Traffic

In 2011, 900 vessels arrived at UQP and in 2012, 834. According to 2012 data, 347 container, 87 RoRo, 44 pure car/truck carrier (PCTC), 356 bulk and general cargo ships arrived at UQP.

11.2.5 Public Transport

There is no formal mass transit system are present in Iraqi cities, therefore, the public transport system is dominated by taxis and passenger mini-buses. There are no regular timetables for taxies, mini-buses and small buses, they simply start when full, although, there is a series of unofficial routes.

11.2.6 Accidents

Data has only been sourced for wider Iraq national level, although a review has been undertaken of available international statistics on deaths resulting from road traffic accidents (WHO, 2017). In 2013, Iraq had a rate of 20.2 deaths per 100,000 population in terms of road traffic accidents, placing it 68 out of 179 nations and above the global average of 16.7. In 2014, there were 8,814 reported crashes in Iraq resulting in 2,769 deaths (CSO, 2016). This identifies road safety as a key consideration for the Project.

Iraq are investing in improving Iraq's road infrastructure and safety. In 2013, the World Bank, in collaboration with the government of Iraq and the Islamic Development Bank approved the Transport Corridors Project, which has an estimated total cost of US$1.2 billion for road rehabilitation and new construction. The World Bank estimates the project will reduce traffic fatalities by nearly 25% on two national transport corridors. Iraq has also made a commitment

to road safety and publicly launched the Decade of Action for Road Safety 2011–2020 aimed at reducing road traffic fatalities (Leidman, et al., 2016).

11.2.7 Railway Network

Iraq has a railway network, opened in 1914, of about 2,100km extending from Basra in the south through Baghdad to Qaem and the Syrian border to the west, and to Kirkuk, Mosul, and Rabiah at the Syrian border to the north. The network is largely dilapidated (World Bank, 2015). The Iraqi Railway Company (IRC), which is responsible for planning, managing and operating railway services in Iraq, was established in 1998 as an independent entity under the MOT. The railway system in Iraq consists of four lines:

- North Line: Baghdad – Baiji – Mosul – Rabia'a;
- South Line: Baghdad – Hilla – Diwaniya – Samawah – Nasiryah – Basra – Umm Qasr
- West Line – Baghdad – Ramadi – Haqlaniya – Qaim - Akashat; and
- Transverse Line: Haitha – Kirkuk

The North and the South Lines are currently under rehabilitation, when completed, the total length of the North and the South Lines will be 2,288km with a design speed of 120km/hour. Large parts of the current rail network in Iraq were obsolete and suffered from outdated designs and malfunctioning signal and communication systems, and some lines were in bad condition. These factors caused operating speeds to drop to low levels and exposes passengers and freight to danger. Thus, these lines have been rehabilitated to boost performance, increase operating speeds and improve their specifications. Work is also underway to convert single-track lines to double track lines in order to increase capacity and provide a higher level of safety.

The railway lines run into UQP, however, the tracks are damaged, and the rolling stock is in a dilapidated condition.

11.2.8 Airports

Iraq currently operates six international airports, located in Baghdad, Mosul, Basra, Erbil, Sulaimani and Najaf. Built in the 1980s and reopened in June 2004, Basra International Airport has an annual capacity for 2 million travellers.

11.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to traffic and transport.

11.3.1 National Policy and Legislation

Law No.35 on Public Roads of 2002. This details procedures and practices to be followed on resettlement and acquisition of land and property relating to road construction and rehabilitation. (Annex 3) Part III of the road law covers land acquisition and compensation procedures for the public roads construction.

11.3.2 International Guidance and Standards

As there is no national legislation on how traffic and transport assessments should be undertaken, the following UK guidance document is considered relevant GIIP, and principles therein will be adopted to support the traffic and transport impact assessment:

- Department for Transport (2007) Guidance on Transport Assessment.

Whilst there are examples of Traffic Impact Study (TIS) guidance across the Middle East, these generally set a higher (and therefore less inclusive) benchmark for significance of impact reflecting scale of development. These are therefore considered less appropriate for application in EIA and particularly construction impacts. The following UK and European guidance will therefore also be used to assess the significance of temporary traffic and transport impacts of the Project:

- Design Manual for Roads and Bridges (1993 and updates) Volume 11: Environmental Assessment;
- Department for Transport's Web Transport Analysis Guidance (WebTAG);
- Institute of Environmental Assessment (I993) Guidelines for the Environmental Assessment of Road Traffic; and
- Institution of Highways and Transportation (1994) Guidelines for Traffic Impact Assessment.

11.3.3 International Conventions

There are no international conventions to which Iraq is a signatory that are directly relevant to this topic.

11.4 Area of Influence

In the absence of traffic modelling, volumes or identification of baseline network conditions, the area to be covered by the assessment has been identified by professional judgement based on interpretation of plans and information provided by BMT.

The assessment will focus on traffic and transport issues resulting from the Project area, the presence of construction HGV traffic on the local road network, and effects on routes crossing the construction areas (footpaths and highways).

The AOI will therefore include the highway network (including parking, loading and access arrangements) affected by construction and on routes used by construction traffic, focusing on the secondary and local road network between and inclusive of:

1) Movement of vehicles and material on the arterial road network between the port of delivery and the approach to the Project area; and

2) Movement of construction workers from gathering points to the Project area.

Whilst the broad route to the Project area will be identified, assessment of the whole route is not proposed, primarily because the regional road network is inherently intended for the strategic movement of people and goods.

Taking the above into account, the broad study area for the Project will encompass the following roads:

- Adjacent road which will provide access to the Project area;
- Highway 26 between Zubair and Umm Qasr; and
- Highway 1 between Umm Qasr and Baghdad.

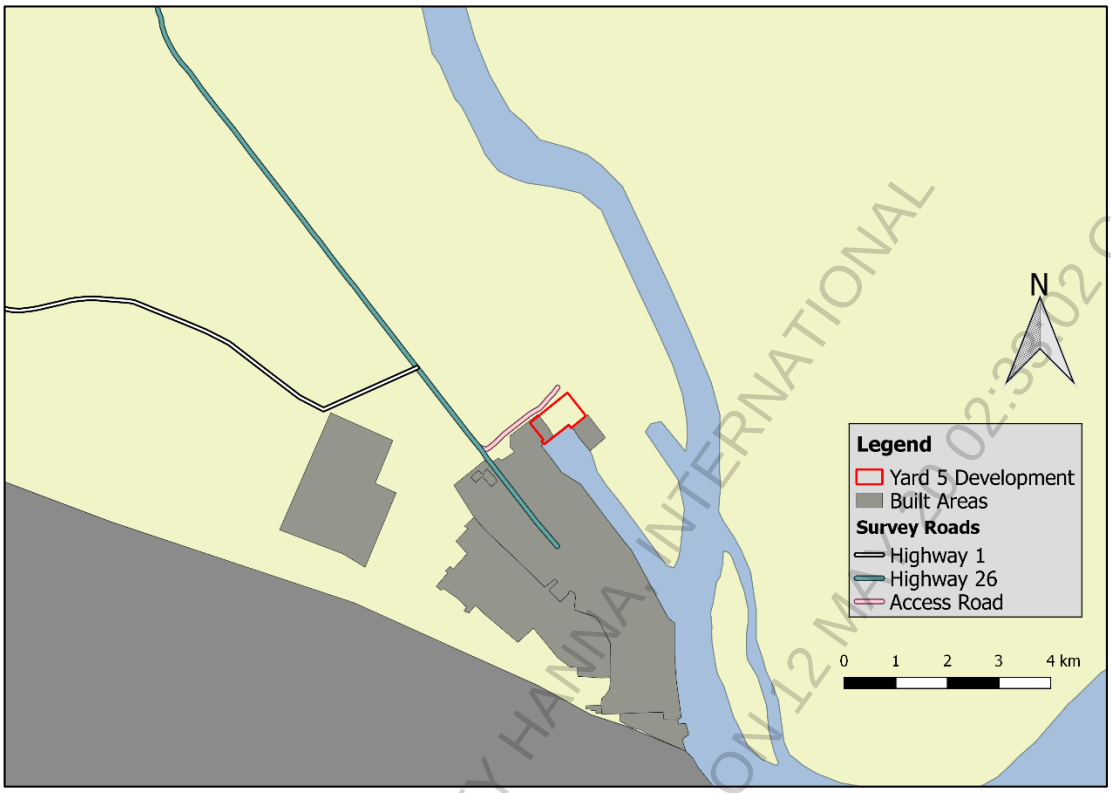

Figure 11.2: Roads to be included within the traffic and transport assessment

11.5 Baseline Key Data Gaps

The following key data gaps have been identified:

- Road network hierarchy, classification and dimensions;
- Junction configurations and methods of control;
- Accident data;
- Public transport services/routes and stations/stops;
- Footways and sustainable travel mode infrastructure;
- Traffic data – road speeds and volume data (automatic or manual); and
- Identification of network peak hours.

11.6 Identification of Potentially Significant Effects

11.6.1 Construction

During construction, all imported goods are likely to be shipped into UQP and then transported by road to the construction area. Other required materials will also be transported to the construction area by road. Most of the construction workers will travel to the construction area by public and private transportation.

It is evident that the current road configuration and driver behaviour leads to risks of incidents that will likely to be exacerbated by the increased presence of HGV traffic arising from the construction works.

For the construction phase, the following key effects likely to occur are:

- Large or long vehicles being transported to and from the site(s) on the existing road network;
- Transportation of materials to and from the site by road in terms of size and frequency of HGV movements and the sensitivity of routes used;
- Operations at key junctions and links in the vicinity of construction;
- Safety and amenity on road traffic;
- Disruption to public transport services; and
- Temporary impacts to on-street parking and parking for site operatives.

Table 11.2: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Road Users	Construction traffic movements to and from the site may result in the following potentially significant effects: ▪ Driver delay ▪ Pedestrian delay ▪ Pedestrian amenity ▪ Severance ▪ Fear and intimidation ▪ Accidents and safety

11.6.2 Operation

Once completed, it is anticipated that the Project will generate potentially significant effects:

Table 11.3: Summary of Potentially Significant Effects during Operation

Receptor	Potential Significant Effects
Road Users	Construction traffic movements to and from the site may result in the following potentially significant effects: ▪ Driver delay ▪ Pedestrian delay ▪ Pedestrian amenity ▪ Severance ▪ Fear and intimidation ▪ Accidents and safety

11.6.3 Decommissioning

There are no traffic and transport related significant effects during decommissioning that can be reasonably assessed on a 25-year horizon, as whilst there is sizable investment required and proposed to all forms of transport in response to the fast-changing car ownership and travel patterns in the region, there is no forecast data available for what transport networks will look like over that period.

11.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 11.4: Scoping Summary - Traffic and Transport

Issue	Scoping Assessment	Justification
Severance	Scoped out	Perceived separation that can occur within a community; thus, an increase or decrease in traffic can have an effect in terms of severance.
Driver delay	Scoped in	Increased in traffic volume is likely to result in driver delay
Pedestrian amenity	Scoped out	Limited spatial relevance

Table 11.4: Scoping Summary - Traffic and Transport		
Issue	**Scoping Assessment**	**Justification**
Fear and intimation	Scoped out	Limited spatial relevance
Accidents and safety	Scoped in	Poor driving standards

11.8 ESIA Approach and Methodology

The Traffic and Transport section of the ESIA will cover a description of baseline conditions and an assessment of the impacts on traffic and transport, including highways, public transport and sustainable modes (pedestrians and cyclists).

Once impacts have been identified, prediction methods will be used to identify the magnitude and nature of changes resulting from the Project, some of which will be quantitative and some qualitative.

Field data collection for traffic counts is proposed, but using locally employed manual counters the proposed access road and main port road intersection (near the port approach checkpoint). The use of ATCs would be problematic in availability and for both security reasons in terms of the physical presence of the counter, and in terms of the ATC not being sabotaged or taken by people. The approach to the impact assessment below covers both the scenario of receiving comprehensive existing traffic data from GoI (unlikely), or should further baseline data not be available after local traffic counts have been completed.

The criteria outlined below will be used to assess the significance of temporary traffic and transport impacts during the construction of the Project.

11.8.1 Limitations

Qualitative methods predict measurable changes, and hence rely on accurate measurements of baseline conditions. Qualitative techniques rely on expert judgement and clear distinction should be made here between matters of fact and professional judgement, the latter of which will in the absence of baseline data, form the key evidence base for the impact assessment.

11.8.2 Traffic Flows and Delay to Road Users

In the absence of baseline traffic data, the assessment will otherwise refer to Guidance on Transport Assessment (Department of Transport, 2007) where the threshold for detailed traffic assessment is where a development generates 30 or more two-way peak hour vehicular

trips. As this assessment will primarily relate to construction activity, this will be converted to passenger car units (PCUs), which would be equivalent to 15 HGVs; i.e.:

- The generation of 30 two-way peak hour PCUs.

In addition, it will be defined by any one of the following:

- Where a significant change in delay relating to junction congestion resulting from the construction of the Project is expected; or
- A road closure or diversion is required for more than four consecutive weeks in any 12-month period that leads to an increase in journey length of more than 1km.

Based on desktop reviews and the video surveys, taxis appear to be main form of public transport. Therefore, in the assessment, there will be no differentiation between taxis and private vehicles to distinguish between types of road user.

Overall construction period is 22 months. In identification of severity of impact, the above threshold of four consecutive weeks in any 12-month period by site will as an inclusive figure be treated as a benchmark alongside the 30 PCUs/hour to identify a threshold for assessment for each location. Beyond this, the severity of impact will be determined by the volumetric HGV data whereby less than a PCU per minute is categorised as a 'low' impact and over two PCUs per minute (i.e. more than one HGV per minute), will be categorised as a high impact.

Table 11.5: Traffic Flows and Delay to Road Users – Severity of Impact Thresholds

Construction Traffic volume	Severity of Impact
Negligible	<30 PUCs/hr
Low	30 – 60 PCUs/hr
Medium	60 – 120 PCUs/hr
High	120 PCUs/hr

A large percentage change in total traffic volumes or HGVs on a major road is likely to be more significant than on a local road where baseline volumes of traffic will be less. However, in the absence of baseline data we can only review construction data and assess this against road network hierarchy – i.e. a large increase in HGVs on a local road will be more significant than the same volumetric increase on an arterial roadway as it will be likely to reflect a higher percentage increase based on the inherent design capacity of the road.

Local roads will have a higher proportion of 'other' road users such as pedestrians and cyclists present, and as such will inherently integrate severance impacts into the assessment of impact for traffic flow and delay as a more sensitive receptor.

The assessment will also consider the sensitivity of the road in terms of land use characteristics and specifically for the purpose of assessment presence of any identified mosques, schools, care homes and hospitals fronting the highway, with those roads where these land uses and associated pedestrians are present classified as retaining notifiable characteristics (presence of mosque, school, care home or hospital), and those roads where these land uses and associated pedestrians are not present classified as with notifiable characteristics (no mosque, school, care home or hospital present).

Table 11.6: Traffic Flows and Delay to Road Users – Receptor Importance and Sensitivity

Road Type	Receptor Importance and Sensitivity
Local Road (urban)	
Notifiable characteristics	Very high
Unnotifiable characteristics	High
Secondary Road	
Notifiable characteristics	High
Unnotifiable characteristics	Medium
Arterial Rod	
Notifiable characteristics	Medium
Unnotifiable characteristics	Low
Rural Road	
Notifiable characteristics	High
Unnotifiable characteristics	Medium

For this assessment, severance will also be more broadly reflected in the assessment of traffic flows and delay to road users where presence of pedestrians is reflected in the classification of road characteristics.

11.8.3 Accidents and Safety

In the absence of traffic accident data, any assessment will need to rely on professional judgement to arrive at a qualified assessment of the likely significance of impact arising from the construction works, where:

Roads that are subject to an increase of more than 30 peak hour PCUs during construction for a period of more than four consecutive weeks in any 12-month period, with professional judgement will be applied to define a qualitative consideration of likelihood of a significant impact.

Overall construction period is 22 months. In identification of severity of impact, the above threshold of four consecutive weeks in any 12-month period by site will as an inclusive figure be treated as a benchmark alongside the 30 PCUs/hour to identify a threshold for assessment for each location. Beyond this, the severity of impact will be determined by the volumetric HGV data whereby less than a PCU per minute is categorised as a 'low' impact and over two PCUs per minute, i.e. more than one HGV per minute, will be categorised as a high impact.

Table 11.7: Accidents and Safety – Severity of Impact Thresholds

Construction Traffic volume	Severity of Impact
Negligible	<30 PUCs/hr
Low	30 – 60 PCUs/hr
Medium	60 – 120 PCUs/hr
High	120 PCUs/hr

The importance of the road as a receptor will be informed by a review of road network conditions and configuration to identify baseline conditions and levels of risk on each route section.

It is generally expected that in application of GIIP, the total number of accidents might be greater on road carrying more traffic (i.e. dual carriageways). However, the rate of accidents per vehicle kilometre will be greater on single two-lane carriageway and/or 'older' roads not built to modern design standards and/or in poor state of repair. The definition between older roads and those built to modern design standards will be based on professional judgment.

Table 11.8: Accidents and Safety – Receptor Importance and Sensitivity		
Road Type	**Older**	**Modern**
Local Road (urban)		
Single	Medium	Low
Secondary Road (urban)		
Single	High	Medium
Multi-lane	Medium	Low
Dual	Low	low
Arterial Road		
Single	Very high	High
Multi-lane	Medium	Medium
Dual	Medium	Low
Rural Road		
Single	Very high	High
Multi-lane	High	Medium

For any adverse impacts identified on driver delay or safety, mitigation measures and a Management Plan will be proposed.

11.8.4 Operation

Due to the predicted increase in HGV's as a result of operational activities, the same approach to predicted significance of environmental effect will be applied to the operational assessment of traffic generation as construction assessment. The operational study will, however, take into account the amount of traffic reduction that might occur at Yard 3 once Yard 5 comes online.

12 Air Quality

12.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to air quality. It also sets out the methodology and approach to the ESIA for this topic.

12.2 Climate and Meteorology

General Conditions

Iraq is characterised by hot, dry climate conditions associated with desert conditions ('BWh' according to the Köppen-Geiger climate classification system), having long, hot, dry summers and short cool winters, although night time temperatures often remain above freezing. Temperatures frequently exceed 100°F (38 Celsius) during late spring and summer afternoons, and will often remain above 80°F (26 Celsius) overnight during the summer. For example, in Baghdad, temperatures range from an average July maximum of 110F (43 Celsius) to an average January minimum of 38°F (3 Celsius). Dew point and humidity are usually quite low, with the exception of areas closer to the Arabian Gulf where moisture content of the air is slightly greater.

The winter and spring season are very short, usually consisting of a two-month winter typically occurring in December and January, and often, only a single spring month, usually occurring in March or April. Small amounts of rainfall occur in the winter and spring.

Wind

The Project area experiences two main different wind phenomena: the *Shamal* (Arabic for north wind), a steady wind from the north and west-northwest (blowing towards the south and east-southeast) and the southern and south-easterly (blowing in a north and north-westerly direction) *Sharqi* (also known as the *Kaus, Kous or Sharki)*.

The *Shamal* is considered to be the most prominent winds that prevail in this region. The *Shamal* is funnelled into the Arabian Gulf by the mountains of Turkey and Iraq to the northeast and the high plains of Saudi Arabia to the southwest and displays different characteristics with regards to the changing of the seasons, for example, in winter the *Shamal* is of a squally type and it has much more violent characteristics than the summer *Shamal* and is of shorter duration. It has been reported that most of the weather stations in the Gulf, report Shamal winds for more than 75% of the times while the remaining directions are related to the *Sharqi* winds, sea breezes or local effects. It should be noted that the direction of the *Shamal* wind

varies within the Gulf, for example, in the middle of the Gulf; the *Shamal* tends to be west-northwest compared to the north to west-northwest in the north of the Gulf (i.e. Iraq). On the whole the *Shamal* is more disturbed than that which accompanies the *Sharqi* wind.

The summer *Shamal* brings very dry air causing intensive sun heating of the land surface but also providing some cooling effect. In fact, the summer *Shamal* occurs during the entire warm season, approximately nine months of the year, and reach their greatest strength at about midsummer during the so-called 40-day *Shamal*. The summer *Shamal* lasts longer than the winter version. During the summer months, the *Shamal* is often gusty and laden with sand and dust from the desert which reduces the visibility, but it is rarely associated with thunderstorms or sudden squalls; the air is very dry and the sky usually cloudless. During a summer *Shamal* dust haze fills the atmosphere and the sky at times is partially obscured.

The winter *Shamal* occurs as frequently as two to three times per month between December and February for between 24 – 36 hours. However, a persistent three to five-day event occurs once or twice a winter, and is accompanied by very high winds and waves.

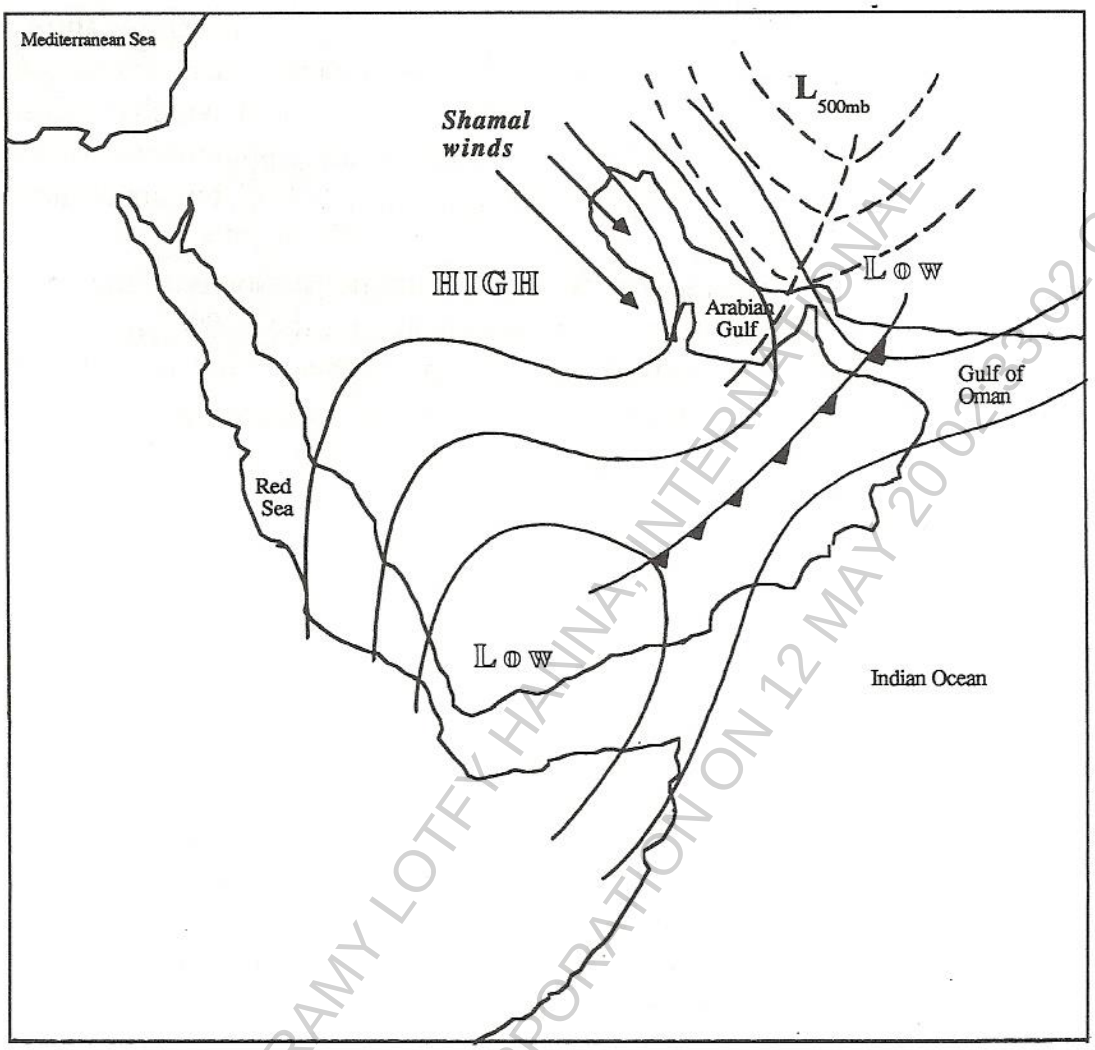

Figure 12.1: Direction of the Shamal Wind (Ali, 1994)

The *Sharqi* is the local name for a south-easterly dry, dusty wind which occurs in much of the year. In general, these occur prior to the onset of Shamal winds. Between December and April, these winds usually occur in advance of depressions during the warm-front period. They are accompanied by falling pressure, damp and gloomy weather, severe squalls and sometimes by thunderstorms with considerable cloud gradually turning to drizzle and rain which may be heavy. The winds gradually strengthen and are strongest towards the end of their existence. The wet and cloudy weather may last for a prolonged period; however, the wind seldom persists for more than three days; the strongest often last only one day.

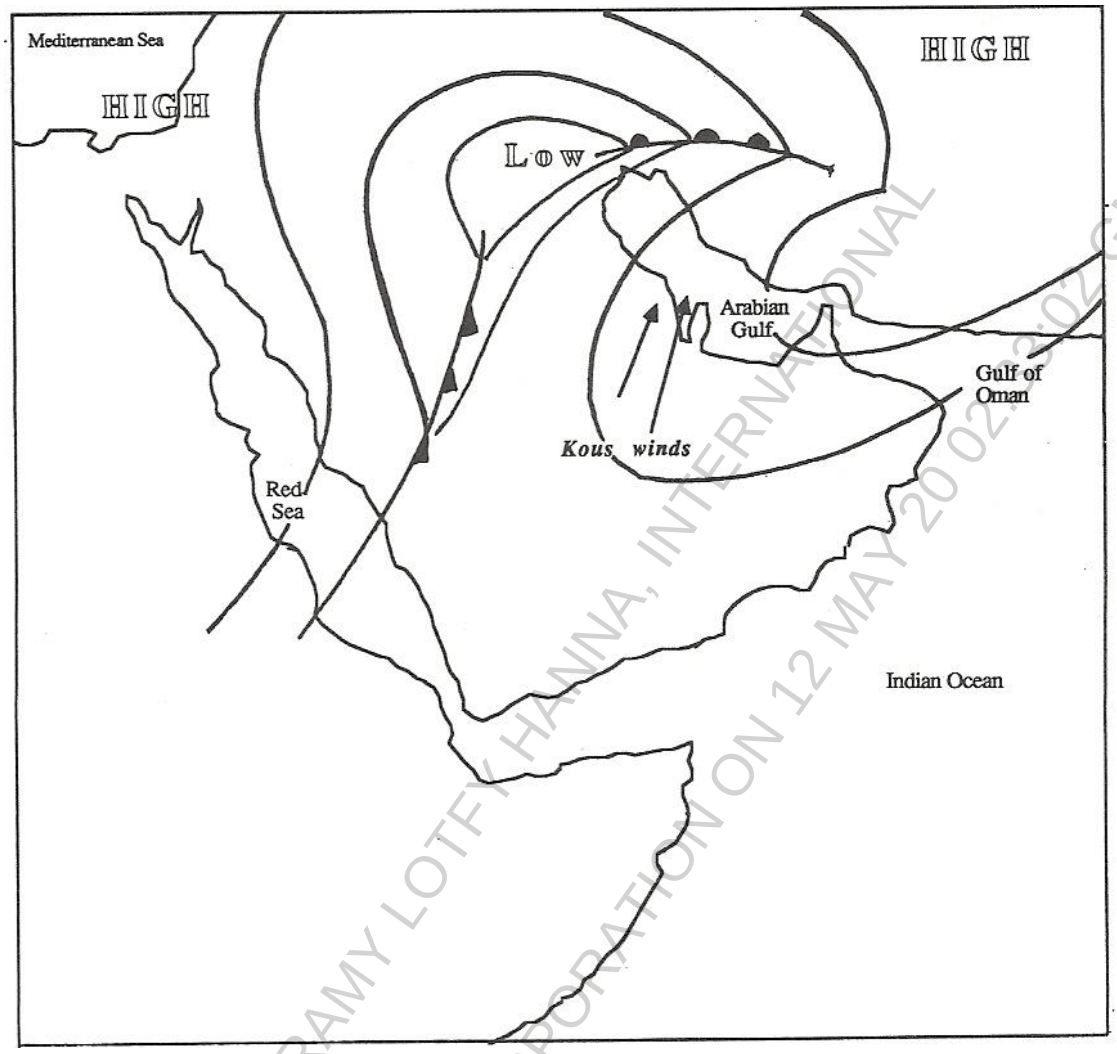

Figure 12.2*:* Direction of the Sharqi Wind (Ali, 1994)

Precipitation

Iraq experiences a wet season from winter through to early spring, the rainfall being more abundant in the mountainous areas of the north. The western and southern desert regions of Iraq receive brief violent rainstorms in the winter. Annual precipitation averages for most of the country are less than 25cm per year, although the driest desert areas of Iraq have less than 10cm. Roughly 90% of the annual rainfall occurs between November and April, most of it between December and March. The remaining six months, particularly the hottest ones of June, July, and August are dry. Due to the aridity of the Gulf region, the rate of evaporation is very high. The amount of rainfall in Iraq varies and this variability is primarily due to the occurrence of thunderstorms which, in general, do not have a well-defined pattern of occurrence.

The amount annual precipitation in the Basra area is approximately 130mm due to the proximity to the coast and to brief and violent winter thunderstorms (Al-Marsoumi, n.d.).

Temperature

Seasonality in the region is closely correlated with air temperature; winter is characterized by a mean daily temperature below 70°F (21°C), with the summer season consistently having temperatures greater than 100°F (38°C). The annual temperature range for this region are wide, approximately 75°F (24°C) (Naval Environmental Prediction Research Facility, 2007).

Temperatures frequently exceed 120°F (45°C) during late spring and summer afternoons, and will often remain above 80°F (27°C) overnight during the summer. However, on the coast, these temperatures are slightly reduced by sea breezes.

Humidity

The daily average relative humidity varies from approximately 60% during summer months to about 90% during the much shorter winter period (Maslehuddin & Al-Gahtani, 2002). The influence of the Arabian Gulf means that the humidity is likely to be higher in the survey area than in other parts of Iraq (Global Security, n.d.).

12.3 Air Quality Baseline Conditions

The overall air quality in Basra Governorate has been deteriorating as development, population, traffic and industrial activity have increased. Furthermore, the lack of management and control of the pollutant discharges and open burning of domestic waste have also had an effect on air quality and the growing use of diesel generators due to the absence of reliable power. There are also natural air quality issues in the form of fine dusts that are generated from the periodic and sometimes prolonged dust storms that affect the region.

The population of Basra Governorate are in direct daily contact with the different pollutants that are caused by daily urban activities, mostly by increasing the use of fossil fuel combustion from electrical generators and motors vehicle, as well as exposing the population to industrial activities. Previous studies have indicated high concentrations of carbon monoxide (CO), oxides of nitrogen (NOx) and oxides of sulphur (SOx) within the industrial areas of Basra (Douabel, et al., 2013).

Existing sources of emissions to air in the Project vicinity include road traffic, light and heavy industry, flaring petrochemical industries, domestic fuel use, marine traffic, and the port itself. Fugitive dust emissions from exposed dry soil surfaces and unpaved roads are likely to contribute to localised ambient concentrations of particulate matter. In addition, sand and

dust storms could contribute to increased volumes of particulate matter, particularly in the dry summer months.

The MoHE has established an air quality monitoring network at ten fixed locations including Basra and Zubair. Total Suspended Particle (TSP) data from the Basra monitoring station for 2009 is presented in Error! Reference source not found..

Table 12.1: Basra Air Monitoring Station (MoHE) 2009 TSP Data

Month	Minimum (µg/m³)	Maximum (µg/m³)	PM2.5 WHO Guideline Values (µg/m³) *		PM10 WHO Guideline Values (µg/m³) *	
			Annual	24-hour	Annual	24-hour
May	311	358	10	25	20	50
June	2,181	8,593				
July	852	5,244				
August	559	1,350				
September	359	1,393				
October	202	941				
November	445	6,400				
December	604	1,764				
* (WHO, 2005)						

The minimum concentration of TSP was above the annual and 24-hour of relevant guideline values. This is not unexpected due to the dusty climate of Iraq. Air quality data from the Basra and Zubair monitoring stations is presented in Error! Reference source not found. and Error! Reference source not found..

Table 12.2: Air Quality Data - Basra Monitoring Station 31st March 2013 (ppm)

Time	SO_2	Guideline #	NO	NO_2	NOx	Guideline*	CO	Guideline #
09:00	0.055	1 hr: 0.075	0.016	0.031	0.047	1hr: 0.104	0.548	1hr: 35
10:00	0.0031		0.018	0.032	0.051		1.405	
11:00	0.0029		0.008	0.024	0.032		0.802	

Table 12.2: Air Quality Data - Basra Monitoring Station 31st March 2013 (ppm)								
Time	**SO_2**	**Guideline #**	**NO**	**NO_2**	**NOx**	**Guideline***	**CO**	**Guideline #**
12:00	0.0079		0.005	0.022	0.027		0.626	
13:00	0.0067		0.004	0.018	0.022		0.56	
14:00	0.002		0.001	0.076	0.009		0.376	

* NO_2 value - IFC Environmental, Health, and Safety Guidelines, Onshore oil and gas development (2007)

US EPA National Ambient Air Quality Standard

Table 12.3: Air Quality Data - Zubair Monitoring Station 4th April 2013 (ppm)								
Time	**SO_2**	**Guideline#**	**NO**	**NO_2**	**NOx**	**Guideline***	**CO**	**Guideline#**
09:00	0.031		0.000	0.01	0.0		9.785	
10:00	0.029		0.015	0.008	0.0		11.58	
11:00	0.027	1 hr: 0.075	0.016	0.008	0.0	1hr: 0.104	11.68	1hr: 35
12:00	0.028		0.017	0.005	0.0		11.11	
13:00	0.026		0.017	0.003	0.0		10.89	
14:00	0.038		0.016	0.004	0.0		11.75	

* NO_2 value - IFC Environmental, Health, and Safety Guidelines, Onshore oil and gas development (2007)

US EPA National Ambient Air Quality Standard

No elevated concentrations of SO_2, NOx and CO were detected above the relevant guideline values at either location.

12.3.1 Available Data

EAME undertook air quality monitoring at the WTPS terminal development (see **Figure 6.7**). The results indicated the following:

- The concentrations of CO, NO_2, SO_2 and VOCs were not found above relevant guideline values; and

- The concentration of particulate matter in the air was above guideline values. However, the ambient air quality of Iraq is affected (with regards to particulate matter) by occasional sand storms, which are a frequent phenomenon. The measured high levels of total particulate matter and respirable (below 10 microns) particulate matter observed during the survey period are most likely attributable to these windblown dusts and sands, rather than from industrial sources. Consequently, this will remain a dominant influence on the local air quality regardless of any construction works associated with the Project or other built development.

12.4 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to air quality.

12.4.1 National Policy and Legislation

Policy

The 2013-2017 NDP (Ministry of Planning, 2013) indicates that one of the goals to *'environmentally sustainable development'* is by protecting and improving air quality.

Legislation

- 1979 Clean Air Act provides details of the local air quality standards;
- Ministry of Oil Air Quality Standards; and
- MoHE unpublished instruction details ambient air quality standards.

12.4.2 International Guidance and Standards

World Health Organisation Air Quality Guidelines

The WHO has produced a series of Air Quality Guidelines for a wide range of pollutants (WHO, 2006). It is recognised that pollutant concentrations in many developing countries exceed the recommended WHO guidelines. The WHO has therefore also proposed a series of interim target levels to promote steady progress towards meeting the guidelines. The most relevant pollutants to the Project that are included in the WHO Air Quality Guidelines are NO_2, fine particulate matter (PM_{10} and $PM_{2.5}$) and carbon monoxide (CO), as these are the principal pollutants that are associated with vehicle emissions.

IFC EHS Guidelines

IFC General EHS Guidelines – Environmental: Air Emissions and Ambient Air Quality (2007). This guideline applies to projects that generate emissions to air at any stage of the project life-cycle, and provides an approach to the management of significant sources of emissions, including advice for assessment and monitoring of impacts. It notes that projects with significant sources of air emissions should ensure that "*emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines or other internationally recognized sources.*"

IFC PS3: Resource Efficiency and Pollution Prevention (2012). The objective of this standard of relevance to air quality is to "*avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities*".

Dust Deposition

There are no national standards or guidelines for dust deposition currently set by any international organisation. This is mainly due to the difficulty that any standard set would need to relate to dust deposition being a perceptual problem, rather than being specifically related to health effects. A threshold of 200 mg/m^2/day is recommended as a level for action by the UK's Institute of Air Quality Management (IAQM) (IAQM, 2012). The threshold, expressed as an average daily deposition rate, is typically derived from sampling periods of between a week to a month. When referring to such indicative guidelines it should be appreciated that the various methods available for dust deposition measurements are associated with varying degrees of uncertainty, and there is no widely accepted "reference method" or sampling period.

Dust and particulate impacts are a problematic issue to assess in Iraq as there are already very high background levels associated with:

- Venting and flaring of oil fields;
- Open burning of refuse;
- Domestic Open fires (in winter);
- Heavy reliance on point of use diesel generators and fossil fuel power plants;
- Dust kicked up by heavy traffic of unsurfaced roads;
- Numerous poorly controlled industrial processes and cement batching plants; and

- Frequent natural sandstorms.

Against this background, environmental benchmarks and impact assessments against such are difficult to set and achieve. Monitoring for dust impacts from single project contributions is a pointless exercise in such an environment.

12.4.3 International Conventions

UN Framework Convention, Kyoto protocol and Paris Agreement to the UN Framework Convention on Climate Change. This convention is an intergovernmental treaty which sets out objective criteria of stabilising greenhouse gas concentrations in the atmosphere at a level intended to prevent human-induced interference with the global climate. To date it has been ratified by 197 countries. The treaty is legally non-binding and sets no mandatory limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. The Kyoto protocol commits Iraq to reducing greenhouse gas emissions. The Paris Agreement commits Iraq to plan and report its contribution it should make in order to mitigate global warming.

Vienna convention and Montreal protocol to protect the ozone layer. International treaty designed to protect the ozone layer by phasing out production of ozone depleting substance.

Neither of these international conventions are relevant to the Project.

12.5 Area of Influence

The area affected by the Project will be determined based on the extent of the area where changes in pollutant concentrations or dust deposition could affect sensitive receptors.

It is considered likely that receptors could potentially be affected by changes in air quality where they are within 200m of a road due to changes in traffic and vehicular emissions (Highways Agency, 2007); or by an increase in dust and particulate matter where they are within 350m of construction activities or 50m from the route used by construction vehicles on the public highway, up to 500m from the site entrance (Holman, et al., 2014).

12.6 Baseline Key Data Gaps

The following key data gaps have been identified:

- Baseline air quality – air quality monitoring data of NO_2, SO_2, Ozone (O_3), Benzene, toluene, ethylbenzene and xylene (BTEX), and Hydrogen Sulphide (H_2S) to confirm baseline concentrations of key pollutants; and

- Data on vehicle movements – confirmation of the preliminary numbers presented in Section 2, as well as expected local routes arising during construction and operation.

12.7 Identification of Potentially Significant Effects

12.7.1 Construction

During construction local air quality could potentially be affected by: emissions of dust and other particulate matter; and from vehicle exhaust emissions, principally including NOx and particulate matter.

Fugitive dust emissions could occur during site clearance and earth moving works prior to construction, and also from the movement of plant and vehicles over unpaved roads.

There are no residential receptors or agricultural land within 350m of the Project area which could be affected, although UQP is located adjacent.

Construction is expected to commence in March 2018 and to be complete within 22 months, hence any effect on nearby receptors will be of a temporary nature only. Dust emissions can usually be readily mitigated through the application of GIIP measures and site management procedures. Provided suitable mitigation measures are applied, there should not be any significant effects on air quality arising during construction.

Estimates of numbers of vehicles required during construction will need to be confirmed prior to undertaking the ESIA.

Table 12.4: Summary of Potentially Significant Effect during Construction

Receptor	Potential Significant Effects
Adjacent site users	Annoyance from fugitive dust emissions
Residential properties near to roads affected by any construction traffic	Potential change in air quality arising from vehicle emissions

12.7.2 Operation

Local air quality could potentially be affected by vehicle exhaust emissions as a result of HGVs entering and exiting the terminal as well as from vessels utilising the terminal. On a much smaller scale, result of workers travelling to and from the terminal (it is anticipated that such traffic movements are likely to be minor and hence prove not to be significant).

Table 12.5: Summary of Potentially Significant Effect during Operation	
Receptor	**Potential Significant Effects**
Residential properties near to roads affected by any operational traffic	Potential change in air quality arising from vehicle emissions.
	Potential increase in dust emissions due to increase vehicle movements
Adjacent site users	Annoyance from fugitive dust emissions due to vehicle movements
	Potential change in air quality arising from vessel emissions (including when at berth)

12.7.3 Decommissioning

During decommissioning, local air quality could potentially be affected by emissions of dust and other particulate matter arising from dismantling of infrastructure. In addition, air quality could potentially be affected by emissions from vehicles as a result of any changes in vehicle numbers travelling to and from the location of decommissioning activities. However, it is highly unlikely that the numbers of vehicles required for decommissioning will be known at this stage, so cannot be assessed further.

It is anticipated that decommissioning works would be carried out in the context of a management plan that would specify appropriate practical dust mitigation methods.

Table 12.6: Summary of Potentially Significant Effect during Decommissioning	
Receptor	**Potential Significant Effects**
Adjacent site users	Annoyance from fugitive dust emissions
Residential properties near to roads affected by any additional traffic movements during decommissioning	Potential change in air quality arising from vehicle emissions

12.8 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 12.7: Scoping Summary - Air Quality

Issue	Scoping Assessment	Justification
Construction dust and increased concentration of particulate matter from Project activities	Scoped out	No receptors within 350m of potential dust-raising activities and very high ambient levels.
Construction traffic	Scoped in	Numbers of additional construction vehicles not yet known so cannot rule out
Emissions to air during standard operations	Scoped out	Not expected to be any sources of air pollutants arising from the Project
Operational traffic (land and marine)	Scoped in	Large number of HGVs anticipated Vessels emissions (including those at berth)
Operation of standby generators	Scoped out	Only for standby operations

12.9 ESIA Approach and Methodology

It is considered that the ESIA would need to include the following:

- a description of baseline conditions using air quality monitoring data where available;
- baseline air quality monitoring data;
- preparation of a management plan which would recommend measures to control dust during construction, based on UK best practice and supplemented by site specific recommendations; and
- a review of additional traffic during both construction and operation to determine the likely significance of any effect following guidance and criteria for assessment provided by IAQM (IAQM, 2017) and professional judgement in the absence of national air quality guidance.

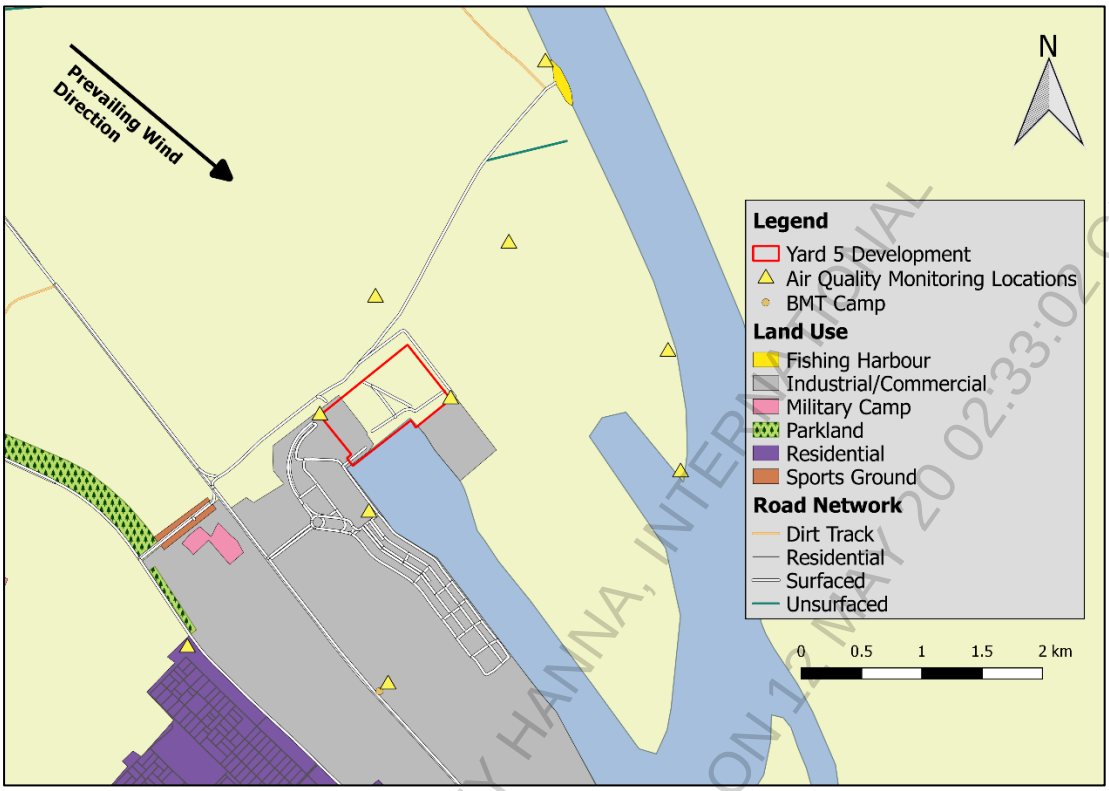

Figure 12.3: Proposed monitoring locations

13 Noise and Vibration

13.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to noise and vibration. It also sets out the methodology and approach to the ESIA for this topic.

13.2 Baseline Conditions

At this stage of the Project, measured baseline sound level information is not available; however, a baseline sound level survey will be conducted as part of the ESIA. Appropriate maps showing the study area and project description documents have been reviewed and will be used in order to inform the survey methodology.

The existing soundscape is likely to be dominated by noise from road traffic flows around the site as well as, but to a lesser extent, vessel noise and port operations. **Figure 13.1** details the proposed baseline monitoring locations.

13.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4.

This section sets out the national legislation and international conventions and guidance that are specifically relevant to noise and vibration and will be considered where required within the assessment process.

13.3.1 National Policy and Legislation

- Iraq Law No.21, 1966, Law on noise prevention - Prevention of excessive noise in public places.
- Law No. 41 of 2015 on Noise Protection and Control - Amends previous legislation and regulates methodological issues in noise control, sets limits for exposure times to continuous noise levels and determines daytime and night-time standards for outdoor noise exposure.

13.3.2 International Guidance and Standards

The key international guidance and standards which are relevant to the assessment of potential noise and vibration impacts are summarised below:

- *WHO Guidelines for Community Noise, 1999. Geneva.* Contains guidance values for community noise in specific environments, including inside and outside dwellings and in outdoor amenity areas (gardens etc). The guidance provides guidelines levels of noise before adverse health effects, including annoyance, may occur.

- *IFC EHS Guidelines, General EHS Guidelines: Environmental, Noise Management, 2007. Washington, DC.* Sets noise level guidelines for residential and industrial areas. Values are in line with the WHO guidance.

- *ISO (1993). ISO 9613 parts (1993) and 2 (1996) Acoustics – Attenuation of sound during propagation outdoors* – Provides a method for the calculation of noise propagation outdoors from individual or multiple sound sources.

- ISO 1996 parts 1(2016) and 2 (2017) *Acoustics -- Description, measurement and assessment of environmental noise* – Provides methods for the quantification of a number of noise metrics and assessment procedures.

There are several additional European and UK standards and guidance documents which are relevant to the assessment of noise and vibration from the Project, as listed below:

- WHO "Night Noise Guidelines for Europe" (2009).

- British Standards Institute (BSI), BS 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise".

- BSI, BS 5228-2:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration".

- BSI, BS 4142:2014 "Methods for rating and assessing industrial and commercial sound".

- BSI, BS 8233: 2014 "Guidance on sound insulation and noise reduction for buildings".

13.3.3 International Conventions

There are no international conventions to which Iraq is a signatory that are directly relevant to this topic.

13.4 Area of Influence

The area affected by the Project will be determined based on the extent of the area where changes in noise and vibration over existing ambient levels of noise and vibration could affect sensitive receptors.

For the purposes of the operational noise assessment, it is considered likely that the study area will be limited to within 1.5km of the Project area. The study area for assessing the potential construction and decommissioning noise impacts during the day is expected to be limited to the closest Noise Sensitive Receptors (NSRs) to the proposed construction activities. Currently these have been identified as:

- BMT Accommodation Camp;
- Residential properties at Umm Qasr; and,
- Khor Al-Zubair KBA (see **Section 10**).

Additional NSRs to be included within the assessment of both operational and construction noise may be added if identified during the baseline sound level survey.

13.5 Baseline Key Data Gaps

The key data gaps at the time of this assessment are as follows:

- Baseline sound level monitoring data at key sensitive receivers in dB LAeq, LA90, LAmax over representative periods of time;
- Existing traffic sound levels on the local road network, as well as anticipated traffic flow levels during construction and operational phases;
- A detailed construction programme with a full plant list and activity schedule; and
- Sound level emission data for proposed fixed plant and installations.

13.6 Identification of Potentially Significant Effects

13.6.1 Construction

The potential impacts from construction works and associated activities would depend on the type, phasing, duration, timing, location of activities, in addition to distance from receivers, number of plant in use and ambient noise levels in the Project area. The type of noise-sensitive receivers (NSRs) would determine the magnitude of impacts and significance of various effects.

Detailed construction methods and a construction programme are not currently available. However, based on the information available at this stage, it is likely that activities will include:

- General construction works, including site preparation and concreting operations;

- Several journeys by small and HGVs near NSRs; and
- Construction compounds, and associated activities.

During the detailed assessment for the ESIA, the noise levels from various activities would be calculated at representative NSRs or typical distances from proposed construction activities. These levels would be compared with the measured ambient sound levels to determine the magnitude of impacts.

The noise impacts from construction vehicles will depend on the routes for construction traffic, existing levels of traffic on the local roads, the timing of the movements and the proximity and the number of NSRs near the routes.

Due to the temporary nature of construction activities, the potential noise impacts would be expected to be limited in duration. Due to the separation distances between the Project area and the closest NSRs, vibration effects are not anticipated to be significant. Therefore, vibration is proposed to be scoped out of the ESIA assessment.

Table 13.1: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Adjacent site users including accommodation camps in the port itself	Temporary and short-term noise annoyance during construction
Residential and other noise-sensitive properties along roads affected by changes in traffic due to construction traffic.	Temporary and short-term noise annoyance from construction works.

13.6.2 Operation

The potential impacts during the operational phase of the Project would depend on the type and number of mechanical plant used, number of vehicles entering and exiting the Project area (although many would be rerouted from Yard 3), background sound levels in the study area well as the proximity of NSRs. It is likely that the terminal would be operational 24 hours a day and the more sensitive night-time periods would define the significance and magnitude of noise impacts.

Table 13.2: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Residential and other noise-sensitive properties along roads affected by changes in traffic due to operational traffic.	Permanent and long-term noise annoyance
Adjacent site users including accommodation camps in the port itself	Permanent and long-term noise annoyance

13.6.3 Decommissioning

During decommissioning of the Project, there will be potential for noise impacts where demolition is taking place. Following the operational life of the Project, anticipated to be 50 years, site decommissioning is likely to involve demolition of site structures and removal of the slab foundations. There will also be works compounds on the site, likely to incorporate stockpiles of recovered materials and the use of mobile plant including concrete crushers.

Decommissioning of the Project is likely to produce similar effects to those identified for construction noise. Therefore, the noise assessment undertaken for the construction phase is considered to be applicable for the decommissioning phase.

Table 13.3: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant Effects**
Adjacent site users including accommodation camps in the port itself	Temporary and short-term noise annoyance from decommissioning
Residential and other noise-sensitive properties along roads affected by changes in traffic due to decommissioning traffic.	Temporary and short-term noise annoyance from decommissioning

There remain several unknown factors associated with decommissioning, including future guidance and standards, the presence and location of nearby receptors, future background noise and prevailing GIIP decommissioning methods at the time of decommissioning. It is likely that prior to decommissioning, further assessments would be required to better reflect the extant baseline and regulatory regime.

13.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 13.4: Scoping Summary - Noise and Vibration

Issue	Scoping Assessment	Justification
Construction noise	Scoped in	Noise may impact the nearby Khor Al-Zubair KBA as well as accommodation camps in the port and residential properties in Umm Qasr.
Construction noise from construction traffic	Scoped in	The current levels of traffic on the local road network, additional construction vehicles, the routes for construction traffic and the number of NSRs are not known at this stage
Construction Vibration	Scoped out	Given the relatively large separation distances between construction activities and the nearest identified NSRs it is unlikely that vibration effects will occur.
Operational noise	Scoped in	Noise may impact the nearby Khor Al-Zubair KBA as well as accommodation camps in the port and residential properties in Umm Qasr.
Operational noise from development-generated traffic	Scoped in	Once operational, the Project is expected to result in an increase in traffic levels on the local road network, however, many of these will be re-routed from Yard 3.
Operational Vibration	Scoped out	Given the relatively large separation distances between construction activities and the nearest identified NSRs it is unlikely that vibration effects will occur.

13.8 ESIA Approach and Methodology

It is considered that the ESIA would need to include the following:

- a description of baseline conditions using sound level monitoring data where available;
- identification of the full extent of construction works and a proportionate assessment of the potential impacts of construction noise, considering the types of activities to be undertaken and their duration, with reference to nearby receptors;
- identification of the full plant lists, including noise emission characteristics for proposed mechanical plant and details of any buildings in which these are housed, and a proportionate assessment of the potential impacts of operational noise, with reference to nearby receptors;
- a review of additional traffic during construction to determine the likely significance of any effect;
- recommendations on mitigation measures to minimise potential significant impacts; and
- identification of potential significant residual impacts, remaining following the implementation of mitigation measures.

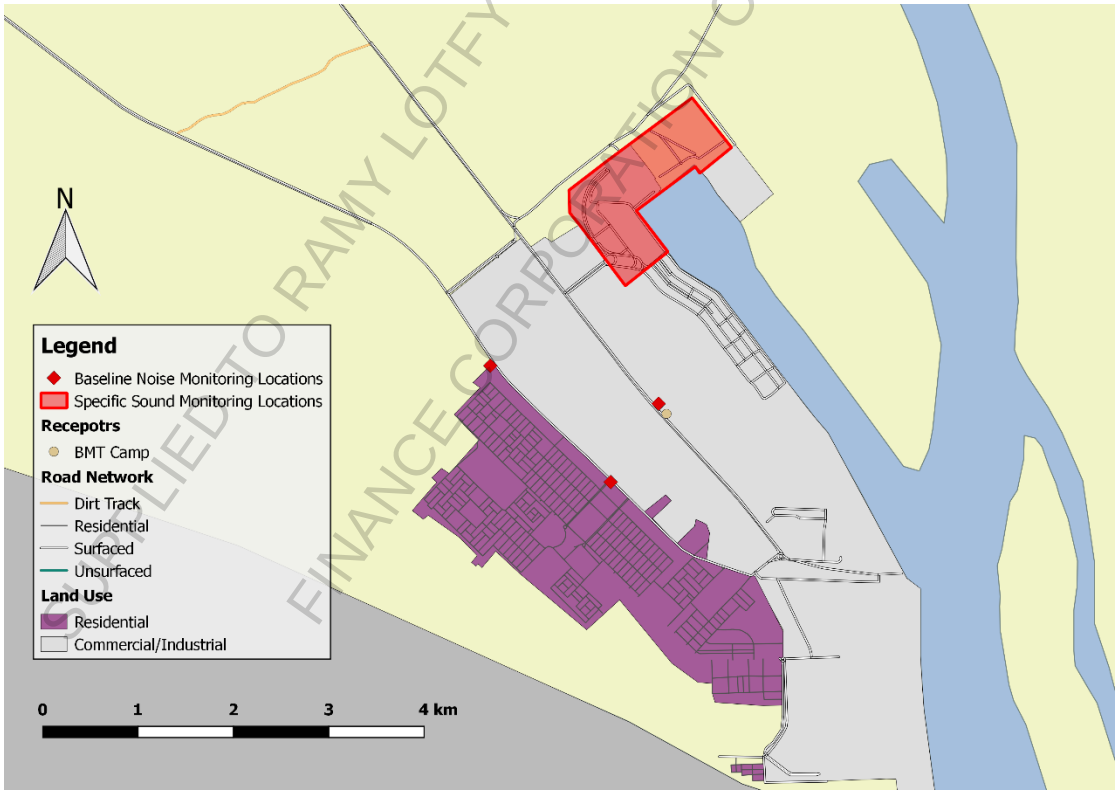

Figure 13.1: Proposed monitoring locations

14 Waste Management

14.1 Introduction

This section summarises baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to waste management. It also sets out the methodology and approach to the ESIA for this topic.

14.2 Baseline Conditions

Iraq

It is suggested by Central Statistics Office (CSO) (2016), that Iraq's relatively underdeveloped solid waste sector lacks the integrated capacity and strategic planning to deliver an effective national solid waste solution. This is evidenced by the lack of facilities with environmental protection measures and an under developed, *ad-hoc* recycling market. There are marked differences between the waste collection in rural and urban areas. Furthermore, collected material is not always recycled or disposed of in an environmentally-sound landfill. Much of the waste collected is dumped and burned in the outskirts of the major cities where an "informal" community of recyclers composed of waste pickers (or scavengers) scour waste dumps removing metal and other recyclables. Most rural households bury or burn their household waste.

Table 14.1 provides general information on Iraqi waste management. It should be noted that although national (Law 8) and international legislation (Basel Convention) establish both regulatory requirements and statutory obligations, there appears to be a lack of institutional capacity to deliver essential enforcement.

Table 14.1: Iraqi Waste Management

Parameter	Iraq
Urban population served with waste collection service	92.5%
Rural population served with waste collection service	62.6%
Amount of waste removed	12,301,092 tonnes
Number of environmental approved landfill sites	26
Source: (CSO, 2016)	

Iraq's sewage infrastructure is largely in a state of disrepair with insufficient operating budgets, poorly trained staff, lack of strategic co-ordination between government departments, unreliable electricity and lack of long-term planning. Access to sewage networks in rural areas is significantly lower than that of urban households, however, even in urban areas, much of the wastewater is not sent to a treatment plant but rather is piped directly into a waterway or into predetermined pumping areas (Dunia, 2013).

Basra Governorate

Basra district alone produces approximately 647 tonnes of Municipal Solid Waste (MSW) a day. However, the solid waste disposal sector in the Governorate follows a similar picture to the national trend and has deteriorated recently to the point that only limited waste collection is undertaken in certain urban areas, and disposal is largely to uncontrolled dump sites (Abbas, et al., 2016).

Over 40% of households within the Governorate report that their waste is not collected. They either burn, bury or dump their domestic waste. Only 19% of households evaluated garbage disposal services as "Good" or above. Only 7.1% of Basra households report that solid waste is collected from their dwelling, the national average is 31.8% (Central Statistical Office, 2011).

Over 62% of Basra households have access to "improved sanitation facilities" (24.8% primarily use the public network; 37.8% primarily use septic tanks). The majority of the remaining population rely on covered canals to dispose of waste water (Central Statistical Office, 2011).

Again however, there is disparity in statistic and a large divide in service provisions between rural and urban populations. It has been suggested that rural connection to the public sewage network in Basra is as low as 2%. In these rural areas it is often that dwellings are connected to an ad hoc pipe network that drains wastewater either into the Shat al-Arab or into empty areas (Dunia, 2013).

The Hamadani sewage treatment plant in Basra is the Governorates only major sewage treatment plant. The plant is estimated to process 70,000m^3 of wastewater daily. However, despite construction having commenced on this plant in the 1980's, it has never been completed to original designs and the amount of wastewater produced by Basra has increased greatly (Dunia, 2013). Only 8.7% of households in Basra evaluate the wastewater services as "Good" or better (Central Statistical Office, 2011).

14.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to waste.

14.3.1 National Policy and Legislation

The 2013 – 2017 NDP states that Iraq '*aims to achieve sound waste management, especially of solid wastes, hazardous and non-hazardous, in a way that guarantees environmental safety and community health*.' The NDP further states that it is the responsibility of both public and provide sectors to help develop waste management in Iraq.

Iraqi legislation concerning waste management:

- Law No.27 of 2009: The law for protection and improvement of environment;
- Law No.29 of 2009: Regulation of Landfills;
- Law No. 89 of 1981: Public Health Act;
- Law No.3 of 2009 on joining Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal;
- Instruction 2 of 2014: Environmental Protection from Municipal waste;
- Instruction No. 4 of 1989: Safe Storage and Handling of Chemicals;
- Instruction No. 3 of 2015: Hazardous Waste Management; and
- Directive No. 4 of 1993: Occupational health, protection of workers against vibration.

14.3.2 International Guidance and Standards

IFC EHS General Guidelines: Waste Management (2007). This guideline provides general guidance for projects on waste management matters such as waste prevention, storage, transport and disposal.

IFC EHS General Guidelines: Construction and Decommissioning (2007). This guideline provides general guidance on the construction and decommissioning of project.

IFC PS3: Resource Efficiency and Pollution Prevention (2012). PS3 details the approaches that should be adopted by projects with regards to Resource Efficiency and Pollution Prevention. Two of the major aims of the standard are to minimise adverse impacts of human health and the environment from pollution and to promote more sustainable use of resources.

IFC PS4: Community Health, Safety, and Security (2012). Addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety and security that may arise from project related activities, with particular attention to vulnerable groups.

14.3.3 International Conventions

The Basel Convention (1994) on Transboundary Movement of Hazardous Waste. The Convention governs the generation, collection, storage, transportation, pre-treatment, treatment, disposal, export, import and transboundary movement of hazardous waste.

14.4 Area of Influence

The area affected by the Project will be determined to be the footprint of the Project area and extent to include any potential facilities receiving waste from the Project.

14.5 Baseline Key Data Gaps

The following key data gaps have been identified:

- Data on anticipated excavation activities - quantity of excavated unsuitable dredgings, as it is known that unsuitable dredgings will be the major waste stream;
- Data on construction material to be imported – material type and quantities;
- Data on solid hazardous and non-hazardous waste stream quantities during operation, preliminary high-level waste streams identified to date further details required; and
- Waste management facilities to be used.

14.6 Identification of Potentially Significant Effects

14.6.1 Construction

During construction of the terminal, waste will inevitably be produced. The major waste streams generated are likely to be excavated unsuitable dredgings and surplus construction materials from the site. Other wastes produced are anticipated to include domestic waste including: sanitary and food, office waste, organic material and small volumes of mobile plant waste. Site clearance work is also likely to generate cleared vegetation and building materials as well as domestic and other wastes that have been dumped on-site.

As part of the ESIA, an assessment will be made of likely high level solid waste streams to be generated during the construction phase. The quantity will then be assessed for significance against the existing waste collection, recycling and disposal route/infrastructure in the local area. **Table 14.2** outlines key receptors and their associated potentially significant effects during the construction phase:

Table 14.2: Summary of Potentially Significant Effects during Construction	
Receptor	**Potential Significant effects**
Local waste receiving facilities	Moderate effect of local waste receiving facilities by increasing pressure and usage. Waste needs to be correctly sorted, classified and safety transported off-site.
Local communities	Moderate effect on local communities if waste is not disposal off correctly (i.e. dumped or burned). Accidental spillages (e.g. mobile plant oils) could also affect the adjacent Khor Al-Zubair.
Local ecology	Effective waste management must cover the safe handling, storage and transportation of waste and hazardous substances to avoid adverse effects on ecology.

14.6.2 Operation

During the operational phase, waste material will be generated on a day to day basis by the terminal, workers and visitors. Most of the wastes generated are likely to be non-hazardous municipal type wastes (e.g. paper, food, packaging), although, there may be a small amount of hazardous waste from mobile plant (e.g. oil, fuels, lubricants).

Stormwater is considered in Section 7.

Table 14.3: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant effects**
Local waste receiving facilities	Moderate effect of local waste receiving facilities by increasing pressure and usage. Waste needs to be correctly sorted, classified and safety transported off-site.
Local communities	Moderate effect on local communities if waste is not disposal off correctly (i.e. dumped or burned). Accidental spillages (e.g. mobile plant oils) could also affect the adjacent Khor Al-Zubair.
Local ecology	Effective waste management must cover the safe handling, storage and transportation of waste and hazardous substances to avoid adverse effects on ecology.

14.6.3 Decommissioning

For the decommissioning phase, the following potentially significant effects may arise:

Table 14.4: Summary of Potentially Significant Effects during Decommissioning

Receptor	Potential Significant effects
Local waste receiving facilities	Moderate effect of local waste receiving facilities by increasing pressure and usage. Waste needs to be correctly sorted, classified and safety transported off-site.
Local communities	Moderate effect on local communities if waste is not disposal off correctly (i.e. dumped or burned). Accidental spillages (e.g. mobile plant oils) could also affect the adjacent Khor Al-Zubair.
Local ecology	Effective waste management must cover the safe handling, storage and transportation of waste and hazardous substances to avoid adverse effects on ecology.

14.6.4 Limitations

With a better understanding of the construction materials to be used, anticipated quantities of operational waste and of the proposed treatment and/or disposal of waste facilities, it would be possible to assess the potential effects of the Project in terms of waste management demands and requirements. Currently, the assessment of waste is limited by a lack of site-specific waste volumes and proposed destination facilities for treatment and/or disposal of waste.

14.7 Summary of Topics Scoped In/Out

As part of the ESIA an assessment will be made of likely high level solid waste streams to be generated during the operational phase. The quantity will then be assessed for significance against the existing waste collection and disposal route/infrastructure in the local area.

For the decommissioning phase, design as far as is developed at this stage, will be reviewed to identify the potential areas for waste generation and their magnitude assessed in order to establish the likely mitigation measures required. An understanding of proposed construction methods and the potential for onsite reuse will be important for this.

The following topics have been scoped in/out:

Table 14.5: Scoping Summary - Waste		
Issue	**Scoping Assessment**	**Justification**
Stormwater	Covered in Section 7	-
Solid waste from construction, demolition, operation and decommissioning phases	Scoped in	Unknown volumes of waste will be generated from all phases of this project.
On-site GIIP in waste management	Scoped in	To determine the waste hierarchy

14.8 ESIA Approach and Methodology

For the topic of waste, it is considered that the ESIA would require the following:

- A review of available waste legislation and national, regional and local planning policies/strategies to identify waste management objectives and targets that the project is required to comply with;
- An assessment of the likely types and volumes of solid waste generated by the Project will be undertaken for each of the following lifecycle stages:
  - construction of new Project (including demolition of existing structures and enabling/site clearance work); and
  - operation of Project.
- Detail proposed waste treatment and/or disposal facilities (both formal and informal) to be adopted for the project as identified during feasibility stages of the Project.

For the demolition of existing structures (during site clearance) and the construction phase, designs to date, will be reviewed to identify the potential areas for waste generation and their magnitude assessed to establish the likely mitigation measures required. An understanding of proposed construction methods and the potential for onsite reuse will be important for this. The assessment will therefore be undertaken such as to positively influence the process of waste generation (with a view to avoidance and minimisation). The assessment will feed into the development of a construction, operational and decommissioning management plans for waste related activities as part of the Project ESMP.

Using the above information, impacts will be identified and the significance of the impacts whilst demonstrating consistency with the relevant IFC EHS Guidelines outlined in Section 14.3.2.

15 Sediment

15.1 Introduction

This section summarises baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to the sediment environment. It also sets out the methodology and approach to the ESIA for this topic.

15.2 Baseline Conditions

The Khor Al-Zubair is a high sediment environment and requires continuous maintenance dredging, however, it is understood that this dredging is insufficient, and the inadequate disposal of dredged material back into the river is counter-productive.

Discussions with GCPI have indicated that UQP is dredged four times per day; six times a week by seven dredgers to a depth of 12m below sea level with 6,000 – 8,000m^3 of sediment is dredged per day. It is understood that the limited dredging is undertaken on Sundays.

The IPA has calculated that 3 – 4 million m^3 of material is required to be dredged per year for general maintenance. It is understood that the current spoil dumping point, from routine dredging undertaken by IPA, is to the south of Hecham Island (also known as Hisham or Hijam Island) (Japan Bank for International Cooperation, 2005).

The high rate of sedimentation in the Khor Al-Zubair is understood to be due to:

- The soft sea and riverbed is easily disturbed and at high tide, the sediments are carried towards up the Khor Al-Zubair. The heavier and bigger suspended sediments are then deposited during the ebbing tide, predominantly in the upper reaches of the Khor Al-Zubair;
- The routine maintenance dredging, in fact, can cause additional sedimentation. The channel depth differences caused by dredging, allow eddy currents to disturb seabed sediments, when are the deposited elsewhere;
- Dumping of routine dredgings is likely to have affected the flow and sediment patterns; and
- Sediments carried by the upriver from normal physical processes and carried from irrigation waters into the Khor Al-Zubair.

Photograph 15-1: Dredging of the Khor Al-Zubair

The sediments of the Khor Al-Zubair may be potentially contaminated due to domestic and industrial effluent, shipwrecks within the river channel, oil spills and shipping activities. However, the highly turbid and mobile environment of the Khor Al-Zubair may mean that the deposition of such contaminants does not occur, and the movement of the water may dilute any contamination to reduced concentrations.

15.2.1 Available Chemical Data

SAPROF Study on Port Sector Rehabilitation Project in the Republic of Iraq, 2006

The SAPROF study (JBIC, 2006) indicated that over 200 sediment samples have been taken from forty locations within the Khor Al-Zubair; this includes thirty-five wrecks sites and five mid-channel sites. When compared to North American Guideline values, acceptable levels of sediment contamination have been noted:

- With reference to relevant guideline values, no elevated concentrations were noted;
- Relatively high levels of chromium, nickel and some other metals were attributed to high natural concentrations in the sediment;
- Uranium concentrations were also consistent with the crustal abundance;
- Hydrocarbon pollution was evident at several wreck sites distributed throughout project waters;

- Two samples submitted for Polycyclic Aromatic Hydrocarbons (PAHs) analysis reported concentrations that exceeded North American guideline value;
- There is no evidence of pollution from chlorinated pesticides and PCBs; and
    - For Unexploded ordnance (UXO) related reasons, no sediment samples were taken from deeper sediments during this study.

The location of these samples was not provided.

Information Collection Survey for Iraq Port Sector Development, JICA, 2012

In March 2012, EAME undertook water quality sampling of the Khor Al-Zubair at both low and high tide. This sampling was undertaken for JICA as part of Information Collection Survey for Iraq Port Sector Development (see Section 4.4.3).

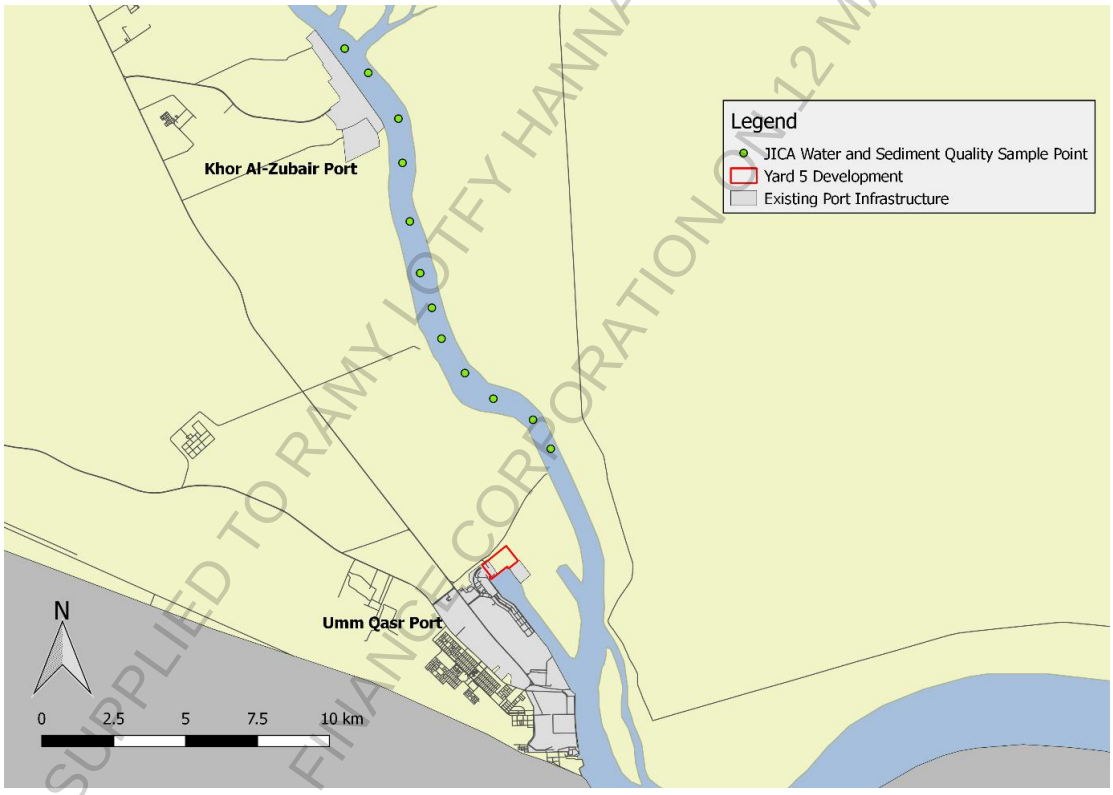

Figure 15.1: Location of the JICA sediment sampling points in relation to the Project area

The principal findings of the sampling were:

- Lack of evidence of significant pollution in the sediment samples analysed; and

- The levels of contaminants observed are not a significant cause for concern and should not prove to be an impediment to the dredging and disposal operations.

ESIA, WTPS, 2014

As part of the ESIA for the proposed oil terminal adjacent to KZP, EAME undertook sediment sampling of the Khor Al-Zubair.

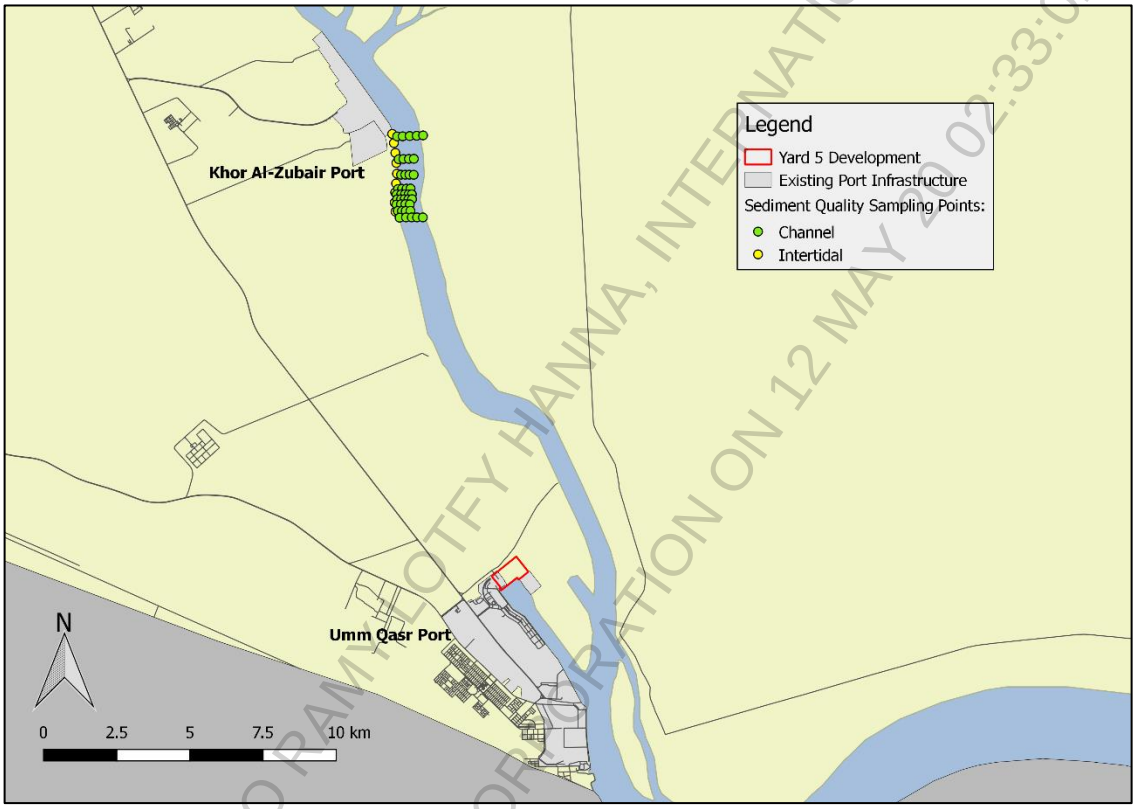

Figure 15.2: Location of the WTPS ESIA sediment sampling points in relation to the Project area

The principal findings of the sampling were:

- A the only elevated parameter above its respective screening criteria was lead. All other parameters were recorded at concentrations below the relevant screening criteria are not considered to be environmentally significant; and

- All concentrations of lead were above the Canadian Interim Sediment Quality Guidelines below which adverse biological effects are not expected but the results were below the Probable Effect Level (PEL) above which adverse effects are expected to occur frequently. The level of contamination is considered to be moderate.

15.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to sediments.

15.3.1 National Policy and Legislation

The 2013 – 2017 NDP (Ministry of Planning, 2013) states that Iraq's development must be environmentally sustainable and that there is the need for protecting and improving the quality of water resources.

There is no legislation related to dredging or disposal of dredgings, however, consultation with the MoHE is requested prior to the commencement of any disposal.

15.3.2 International Guidance and Standards

- Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Canadian Council of Minister for the Environment, 2001

15.3.3 International Conventions

None.

15.4 Area of Influence

The AOI has been defined as the immediate downstream catchment area, with a higher-level assessment only of the wider downstream catchment.

15.5 Baseline Key Data Gaps

The following key data gaps have been identified:

- Sediment-sampling of the material to be dredged; and
- Details of suitability of dredged material for reuse.

15.6 Identification of Potentially Significant Effects

15.6.1 Construction

Table 15.1: Summary of Potentially Significant Effects during Construction	
Receptor	**Potential Significant effects**
Khor Al-Zubair and Khawr Abd Allah	Increased sediment loading during construction and dredging activities.
	Impacted by increased sediment loading and dredging activities may impact biodiversity.
	Reduction in sediment quality due to loss, degradation and deterioration and pollution as a result of construction activities.
	Impacts from the construction waste stream, including sanitary and food waste, office waste and waste arising from mobile plant.
	Unmanaged erosion/sediment depositions and suspended solids generated from ground disturbance could travel directly by surface run-off.

15.6.2 Operation

Table 15.2: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant effects**
Khor Al-Zubair and Khawr Abd Allah	Impacted by increased sediment loading and dredging activities may impact upon biodiversity.
	Reduction in sediment quality due to degradation, deterioration and pollution as a result of operational activities including dredging.
	Poorly designed site drainage providing inadequate control of, in particular, storm water runoff, with a resulting risk of low quality surface water entering the Khor Al-Zubair, thereby, impacting sediment quality.
	The discharge of effluent from the Site may present a pollution risk to sediment quality, as well as other operational waste

Table 15.2: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant effects**
	streams, such as hazardous wastes including fuel oils and cleaning solvents.

15.6.3 Decommissioning

For the decommissioning phase, the following potentially significant effects may arise:

Table 15.3: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant effects**
Khor Al-Zubair and Khawr Abd Allah	Reduction in sediment quality due to degradation, deterioration and pollution as a result of decommissioning activities.
	Impacts on sediment quality from the decommissioning waste stream, including sanitary and food waste, office waste and waste arising from mobile plant.
	Direct contamination from decommissioning machinery (e.g. fuel spills) working in or over the river.
	Unmanaged erosion/sediment depositions and suspended solids generated from ground disturbance.
	Impacted by increased sediment loading and dredging activities may impact upon biodiversity.

15.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 15.4: Scoping Summary - Sediment		
Issue	**Scoping Assessment**	**Justification**
Potential for construction activities to affect sediment quality	Scoped in	Construction related pollution risks associated with working in or near to the Khor Al-Zubair will need to be considered in the ESIA to ensure

Table 15.4: Scoping Summary - Sediment		
Issue	**Scoping Assessment**	**Justification**
		appropriate mitigation is adopted during construction.
Potential for operations to affect sediment quality	Scoped in	Any spillages during operations, such as fuels or oils, which may enter the Khor Al-Zubair and impact sediment quality.
Potential for accidental spills to affect sediment quality	Scoped out	There is the need to guard against accidental spillages of chemicals that are housed onsite into the river. As long as GIIP is followed, this issue can be scoped out and addressed in the ESMP only.
Potential for decommissioning to affect sediment quality	Scoped in	Decommissioning of infrastructure and machinery on site introduces a pollution risk to the Khor Al-Zubair. Decommissioning related pollution risks associated with working in or near to the Khor Al-Zubair will need to be considered in the ESIA to ensure appropriate mitigation is adopted during decommissioning.

15.8 ESIA Approach and Methodology

This component will focus on the impact of the Project on the sediment quality of the Khor Al-Zubair. This topic will interface with the biodiversity impact assessment in relation to changes in sediment quality affecting ecosystem services.

The ESIA chapter will include:

- baseline data collation relating to sediment quality;
- Comparison of sediment and water quality data to relevant guideline values; and
- Identification the potential impacts on the local tidal flows, wave conditions, sediment transport regime and suspended sediments arising from the proposed development.

16 Social Impact Assessment

16.1 Introduction

This section summarises the social baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to the SIA. It also sets out the methodology and approach to the ESIA for this topic.

SIA is the process of identifying and managing the social issues of project development as well as the engagement of affected communities in the identification, assessment and management of social impacts.

Although SIA is still used as an impact prediction mechanism and decision-making tool in advance of a permitting or licensing decision, the SIA will also contribute to the ongoing management of social issues throughout the whole project development cycle.

16.2 Baseline Conditions

16.2.1 Historic and Political Context

The modern boundaries of Iraq were drawn in 1920 to 1925 by the League of Nations in the Treaty of Sèvres upon the collapse of the Ottoman Empire after the First World War. The country, comprising three provinces of the Ottoman Empire (Mosul, Baghdad and Basra), became the British Mandate of Mesopotamia under the Control of the United Kingdom until its independence in 1932. The monarchy installed by the British were overthrown in 1958 and a republic was proclaimed. A series of dictators ruled the country until the Ba'athist Party took control from 1968, Saddam Hussein ruled from 1979 until his removal in 2003. During his presidency, Iraq fought three destructive wars (Iran – Iraq War (1980 – 1988), the Gulf War (1990 – 1991) and the 2003 Invasion of Iraq) as well as suffered 13 years of economic sanctions (1990 – 2003).

Following ousting of Saddam Hussein, under the CPA, a governing council was formed in order to return Iraq to democracy. The Iraqi Governing Council included 13 Shiites, five Sunnis, five Kurds, one Turkmen and one Assyrian with three of the councillor's women. The governing council soon became the Iraq Interim Government which served as Iraq's first provisional constitution when it passed in March 2004.

In January 2005, Iraq participated in elections which would lead to the creation of Iraq's National Assembly. The National Assembly had a primary goal of creating a working and final constitution. The constitutional drafting committee comprised of 55 members of which 15 were Kurdish. The Constitution was ratified in October 2005 following a referendum. The

Constitution recognised the legitimacy of the Kurdistan Regional Government (KRG) and allowed for greater autonomy over foreign affairs and domestic politics.

With the ratification of the Constitution, parliamentary elections to elect the legislative body of the permanent government occurred in December 2005 which marked the transition to Iraq's full-term government.

16.2.2 Administrative Framework

Iraq has 19 Governorates headed by a Governor, four of which are in KRI, which are then sub-divided into districts (Qadhas) headed by district officers. Districts are further divided into sub-districts (Nahiyas), which are themselves divided into quarters. Basra Governorate is divided into seven Districts. The Project area is located in Al-Zubair district (see **Figure 16.1**).

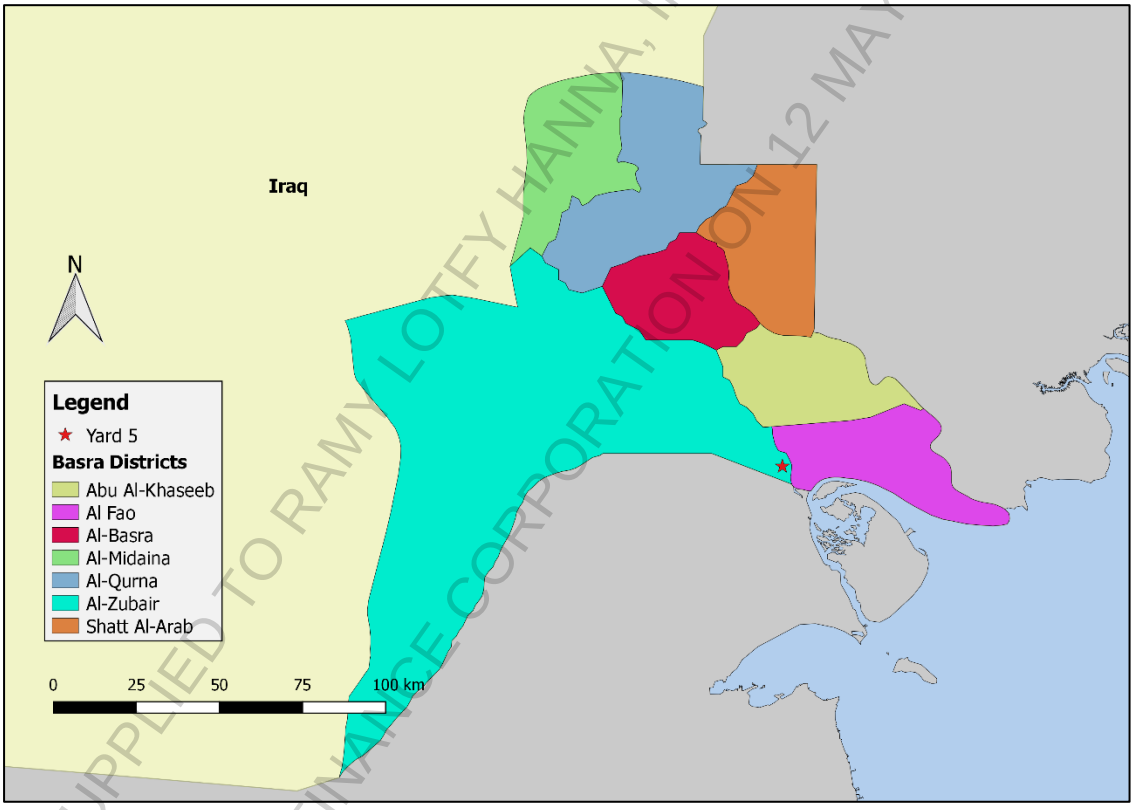

Figure 16.1: Basra Governorate districts

16.2.3 Demographics

Iraq

The last nationwide census was in 1987. The 1997 census did not cover the Kurdish Governorates and is likely to have been contaminated by political considerations as at the time Iraq was under UN sanctions. It was important that the census did not reveal the high humanitarian cost of the sanctions but did show robust growth among groups that supported Saddam Hussein. Further complicating estimates of population are the effects of violence and conflict which has resulted in large number of internal and external refugees (Gunter, 2013). A more recent trend is the return of refugees to Iraq as a result of the conflict in Syria before the conflict with IS also engulfed Iraq.

As such, current population estimates are based upon multi-decade extrapolation of old census data adjusted by estimates of deaths, international refugees, the results of small surveys and professional judgement. Due to the uncertainty about birth, death, migration rates and deliberate distortions introduced to favour particular ethnic or religious groups, the estimates of Iraq's population are an educated guess (Gunter, 2013). According to the Central Statistical Organization of the Ministry of Planning, the total Iraqi population in 2016 is 37,883,543 (COSIT, 2016) whilst the CIA have estimated that in July 2015, the total Iraqi population was 37,056,169 (CIA, 2016).

It should be noted that Iraq has one of the highest fertility rates in the world and Iraqis aged under 15 years' account for approximately 40% of Iraq's total population. Iraq has an approximate 2.5% annual population growth (COSIT, 2016), suggesting that the country's population will double in 25 years. Combined with the recent conflicts, rapid population growth has severely challenged the ability of the government to provide universal elementary education and basic essential services (Gunter, 2013).

Table 16.1: Iraq Demographics

Parameter	Result
Population	37,883,543
Male – Female Ratio	50.52% males, 49.48% females
Age Structure: 0 - 4	14.9%
Age Structure: 5 - 14	25.3%
Age Structure: 15 – 49	25.3%
Age Structure: 15 - 64	49.1%

Table 16.1: Iraq Demographics	
Parameter	**Result**
Age Structure: 65 and over	3.2%
Median Age	19.1 years
Life Expectancy	69.5 years
Male Life Expectancy	68.0 years
Female Life Expectancy	71.2 years
Population Growth Rate	2.5%
(COSIT, 2016)	

Basra Governorate

As previously mentioned, there are often discrepancies resulting from data being extrapolated from a from a decades old census, exacerbated by uncertainties in birth rates, death rates, migration rates etc. For example, the total population for Basra Governorate is stated by International Organization for Migration (IOM) in 2015 to be 1,912,533, whilst the NGO Coordination Committee for Iraq (NCCI) state the population in 2015 to be 2,403,301. Despite the discrepancies however, it is recognised that only Baghdad Governorate has a larger population than that of Basra.

Table 16.2: Basra Governorate Demographic Data	
Gender Distribution	50% Male 50% Female[*2]
Geographical Distribution	20.1% Rural 79.9% Urban[*1]
Dominant Religion	Shia Islam[*1]
Key Tribal Groups	Tameem, Beni Malek, Albu Mohammed, Suad, Alibadi, Al-Gitarna, Awlad Lamer, Al-Sadoon, Al-Imara, Al-Sarrai and Al-Halaf[*3]
[*1] (NCCI, 2015) [*2] (IAU, 2010) [*3] (UNHCR, 2006)	

16.2.4 Indigenous Peoples

Iraq

Tribalism is a strong sub-stratum that runs beneath the business and political communities, connecting people. In modern tribal settings in Iraq, the sheikh performs several functions related to the inner life of the tribe and its relations with the non-tribal world and the authorities.

The relative importance of tribalism in Basra is completely context-specific. In remote rural areas, particularly those with large poor populations, the tribal sheikhs may be the most recognisable representatives of their communities and their influence will be relatively easy to identify. With the exception of the undercurrent of tribalism in Basra's large working-class slums, tribalism in urban settings is generally subtler and a reflection of long-term relationships and reputations built up by certain political and mercantile families. Senior sheikhs from major tribal confederations and tribes are able to trade on their connections and the recognisability of their tribal names.

Iraq is home to roughly 150 tribes that are composed of approximately 2,000 smaller clans, each of varying size of influence. The largest tribe has over a million members while the smallest comprises a few thousand. Approximately 75% of the Iraqi population are members of a tribe or have a kinship to one.

Social organisation within Iraq is powerfully bound by tribal ties and a strict honour code, but is also crosscut by ethnic background and religion. It is, therefore, possible to find tribes with both Sunni and Shia members.

Iraq's tribes and their sheikhs have a significant degree of influence in society and politics, particularly in rural areas. Tribal leadership is pyramidal and hereditary, and the roles played by tribes include:

- Resolving intra and inter-tribal conflicts;
- Tribal defence;
- Social solidarity at funerals and weddings; and
- Hospitality and consultation gatherings.

The Bedouin

The Bedouin is a grouping of stateless, nomad Arab peoples who have historically inhabited the desert region in North Africa and the Arabian Peninsula including Iraq. However, since the

1950s, large number of Bedouin have left their traditional, nomadic life to settle due to governmental policies as well as a desire for improved standards of living.

Governorate of Basra

Tribes from across Mesopotamia and the Middle East have migrated through the area over the centuries, creating a diverse tribal ancestry. Tribes currently present in Basra Governorate include the Tameem, Beni Malek, Albu Mohammed, Suad, Alibadi, Al-Gitarna, Awlad Lamer, Al-Sadoon, Al-Imara, Al-Sarrai and Al-Halaf tribes (UNHCR, 2006).

The indigenous people of the Mesopotamian Marshes, the Marsh Arabs, have practiced sustainable traditional resource management for thousands of years, developing an iconic way of life that ties them intimately to their wetland landscape. The Marsh Arabs and their historic way of life is increasingly threatened by multiple factors. The Marshes themselves, so central to the Marsh Arabs culture, have a turbulent recent history and remain under threat. Systematic draining of over 90% of the Marshes under Saddam Hussein's governance was designed to crush its inhabitants. After the fall of the previous regime and despite parts of the Marshlands being subsequently reflooded, few Marsh Arabs have returned, and many continue to residue outside of the Marshlands.

The Bedouin are present in Basra Governorate, particularly in the Zubair district.

16.2.5 Vulnerable Groups and Gender

Iraq

Iraq has several vulnerable populations including (Institute for International Law & Human Rights, 2013):

- Bahha'is;
- Bedouin;
- Black Iraqis;
- Circassians;
- Christians (Assyrian, Chaldean, Armenian and others);
- Faili Kurds;
- Jews;
- Kaka'I;

- Lesbian, gay, bisexual, transgender and intersex (LGBTI) individuals;
- Mandaen-Sabeans;
- Roma (Dom);
- Shabaks;
- Turkmen;
- Women (with specific profiles or in specific circumstances);
- Yezidis;
- Children;
- Elderly; and
- Refugees and Internally Displaced Persons (IDPs)

Basra Governorate

Basra's relative safety and stability make it an attractive location for IDPs fleeing violence that swept north-western Iraq since 2014 (NCCI, 2015). The months following June 2014 saw increasing numbers of IDPs arriving. These IDPs primarily fled IS violence in Ninewa, however families arrived from Babylon, Baghdad, Diyala, Kirkuk and Salah al-Din. In addition, there was an influx of Iraqi returnees who had previously taken refuge in Syria. The overall flow of IDPs remained relatively stable until April 2015, recording additional flows only sporadically afterwards. There are currently 10,320 IDPs in the Governorate of Basra. The majority of these individuals (5,322) are in the Basra district and there are just 96 individuals in the Fao district (International Organisation for Migration, 2017).

Arab Shias and Arab Sunnis make up most of those displaced in Basra, to which they were attracted because of the Sunni/Shia mixed composition of the Governorate. 6% of the IDPs are Turkmen Shias and Chaldean Christians and Arab Christians account for 1% (International Organisation for Migration, 2017).

Most of the IDP population (62%) are currently living in rented housing. Many IDPs, 21%, were attracted to Basra by the presence of their relatives, who accommodated them on arrival whilst 6% are residing in hotels/motels. The rest of the IDP population is settled in critical shelters such as informal settlements (10%) and religious buildings (1%). There is no camp population in Basra.

The overall relationship between the IDPs and the host communities has been depicted as good virtually everywhere within the Governorate. No cases of discrimination or of restriction of movement were reported. This positive assessment, which differs from the average situation In Iraq, can be attributed to the relative security and stability of the governorate (International Organisation for Migration, 2017).

Although to date there have been no focused empirical studies of Female Genital Mutilation (FGM) in the south of Iraq (Institute for International Law & Human Rights, 2013), the German NGO Wadi (Development Now) has reported that the practice does occur in areas such as Basra (US Bureau of Democracy, Human Rights and Labor, 2011).

Some sources indicate that black Iraqi's make up 15 to 20% of Basra Governorate population. Black Iraqis are subject to social and cultural discrimination and political exclusion in Iraq. Many black Iraqi's live in extreme poverty with nearly 80% illiteracy and reportedly over 80% unemployment (Institute for International Law & Human Rights, 2013).

The Marsh Arabs and Bedouin suffer from economic and social discrimination, poverty and a lack of social inclusion. Furthermore, the Bedouin are stateless with have limited access to healthcare and as their marriages are not recognised by the state, women do not have any marital or property rights.

Women face many special challenges in Iraq. Key equalities are education and literacy, education is markedly associated with gender, and employment and income. Female unemployment is considerably higher than male unemployment in Basra. In rural and poverty-stricken areas, women are especially vulnerable. Due to decades of war and insurgency, there are many single female heads of household. Basra hosts 13% of female headed households, the second highest figure in the country (International Organisation for Migration, 2017). Many widows and divorcees need to supplement income with begging and other desperate measures.

16.2.6 Ethnicity and Religion

Iraq

Several ethnic groups are present in Iraq, the most numerous being Arab (75 – 80%), followed by Kurds (15 – 20%), Iraqi Turkmen, Assyrians/Chaldren and others (5%) (CIA, 2016).

Islam is the official religion of Iraq with 99% of the total Iraqi population being Muslim. Shi'a Islam is the dominant branch of Islam in Iraq with approximately 55 – 60% of the Iraq Muslim population worshiping this particular movement. Approximately 40% of the Iraqi Muslim population worship Sunni Islam and 0.8% Christianity (CIA, 2016).

Since the fall of Saddam Hussein's regime in 2003, it is understood that the Christian population of Iraq has fallen by as much as 50% (CIA, 2016).

Basra Governorate

The predominant religion in Basra Governorate is the Shiite branch of Islam, although the Governorate also has a sizeable Sunni population as well as Mandaean, Chaldean and Assyrian Christian communities, all of which contribute to the Governorate's rich cultural history (UNHCR, 2006).

16.2.7 Economy and Livelihoods

Iraq

The Iraqi economy is facing severe and pressing challenges. The decline in oil prices and ongoing conflict with IS have contributed to a sharp deterioration of economic activity, public finances and the balance of payments. It is estimated that $40 billion in revenue is lost each year because the country lacks the electricity supply needed to stimulate more business activity from various economic sectors, including agriculture, commerce, and tourism.

Iraq is the second-largest crude oil producer in the Organization of the Petroleum Exporting Countries (OPEC) after Saudi Arabia, and it holds the world's fifth-largest proved crude oil reserves after Venezuela, Saudi Arabia, Canada, and Iran. Iraq is re-developing its oil and natural gas reserves after sanctions and conflict and its crude oil production grew by almost 1.5 million barrels per day (b/d) over the past five years, increasing from 2.6 million b/d in 2011 to almost 4.1 million b/d in 2015 (including KRG). The country's production grew at a slower rate than the Iraqi government had expected over the past decade, however, Iraq's production boomed in 2015, increasing by almost 700,000 b/d compared with the level in 2014 and representing the largest year-over-year increase since Iraq's production recovery in 2004. At the end of 2015, Iraq held 143 billion barrels of provide crude oil reserves and 112 trillion cubic feet (Tcf) of proved natural gas reserves.

Despite the near-record level production growth in 2015, the Iraqi government lowered its future oil production targets and slashed investment plans. Iraq has been struggling to keep up its share of payments to the international oil companies operating its oil fields.

Iraq's economy is heavily dependent on oil revenues. In 2014, according to the International Monetary Fund (IMF), crude oil export revenue accounted for 93 % of Iraq's total government revenues. In 2015, Iraq (excluding KRG) earned slightly more than $49 billion dollars in crude oil export revenue, $35 billion less than in 2014, despite a substantial increase in export volumes (US Energy Information Administration, 2016). Despite crude oil exports accounting

for the vast majority of Iraq's total revenues, the oil sector currently employs only around 1 % of the total labour force (UN Iraq, 2016).

According to the UN, the unemployment rate in Iraq is 11% nationally with 7% male and 13% of females unemployed. 653,000 people are unemployed, of which 496,000 are male and 157,000 are female. Approximately 44% of Iraqis are working with 72% of males working and 13% of females. Unemployment of young people (15 – 24 years) is higher than the national average and unemployment is higher among young people with a high education (UN Iraq, 2016).

Female participation in Iraq's labour force continues to be severely constrained by religious and cultural issues. In 2010, an estimated 69% of Iraqi males 15 years or older were in the labour force whilst the estimate for females was approximately 14% (World Bank, 2012). A remnant of Saddam Hussein's policies, 60% of all working females are employed within the government sector (UN Iraq, 2016) with 30% of all government jobs filled by females compared to only an estimated 5 % of private sector jobs. Overall, Iraqi women have a lower labour force participation rate combined with fewer employment options for those who seek employment and earns much lower wage than her male counterpart (Gunter, 2013).

As a result of Iraq's high fertility rate, Iraq is a youthful country with over 40% of the population under 15 years old (COSIT, 2016). Adjusting for retirements and deaths along the working population as well as the low labour force participation rate among females indicates that Iraq must create 250,000 additional jobs each year (Gunter, 2013). Job creation has not kept pace with the growth in the labour force and new jobs are increasingly created in the public rather than private sector. Between 2007 and 2012, more than 750,000 new jobs were created in Iraq, however, more than 80% were within the public sector (World Bank Group, 2014). The government provides 40% of all jobs; the remainder is in the private sector. It provides 45% of all employment in urban areas and 28% of employment in rural areas (UNDP, n.d.).

Basra Governorate

Basra's vast oil reserves and strategic location has made the Governorate's economy one of Iraq's most important. Basra is Iraq's most southerly Governorate and the only area of Iraq to have a coast line which has meant that Basra has been a centre for trade, transportation and storage.

Basra's massive oilfields produce two thirds of Iraq's oil output (NCCI, 2015), with further plans for increased production (Bloomberg, 2017). The strategically important al-Basra oil terminal has been the main oil outlet of Iraq, as export pipelines to the north (i.e. the Kirkuk-Ceyhan pipeline) have suffered repeated attack (UNHCR, 2006).

Date production and agriculture also form important employment sectors in the Governorate and construction and trade in electrical goods have been considered growth sectors since 2003 (UNHCR, 2006).

Fishery is conducted throughout the Shatt Al-Arab Waterway, Khor Al-Zubair and Khawr Abd Allah. Extensive commercial fishing is not conducted and most of fishermen conduct their works using small boats. There are few studies on fishery around the study area. Around KZP, fishermen activities are seasonal, their efforts increase from April to August. They make no more than $200 in winter periods where activities are extremely limited due to weather and safety conditions and the available fish species. This value raises to an average of $800- 1,000 in high seasons

Iraq's recent history has left the economic infrastructure damaged and has resulted in ageing oil installations, limiting the economic growth of the region. The conflicts have left, primarily rural Basra, with a significant mine and UXO legacy that particularly hinders the agricultural sector. The receding level of the Tigris and Euphrates, increased salinization and insufficient waste water treatment also hamper Basra's agricultural sector (NCCI, 2015).

Within the Basra Governorate 72.5% of males are considered to be with in the Labour Force, in comparison to just 9.6% of females. The overall unemployment rate for the individuals within the Labour Force is 7.4% (8.9% for females and 7.3% for males) (Central Statistical Office, 2011).

The percentage of people living under the poverty line of $2.5 per day in the governorate of Basra is higher than the national average. Moreover, the level of poverty had seen an increase from 14.3% in 2007to 16.1% in 2011 (NCCI, 2015).

Table 16.3: Economically Active Population (inside Labour Force) (%)

Governorate	Employed	Under-employed	Unemployed
Males			
Basra	68.3	24.4	7.3
Iraq	75.9	16.6	7.4
Females			
Basra	86.7	4.3	8.9
Iraq	83.6	3.8	12.6
(Central Statistical Office, 2011)			

Port Sector

Iraq benefited from an average economic growth rate of 6.7% from 2005 to 2012 and the IMF estimated a growth rate or between 5.5% and 9.5% for 2012 - 2025. In practice this growth rate has fluctuated since 2014, however, Iraq perceives the restoration and development of its port sector as vital to sustaining this level of growth.

In 2008, Iraq signed the $272 million "Port Sector Rehabilitation Project" agreement with Japan, concerning the restoration and development of UQP. An additional agreement was signed with Japan in 2014, concerning the restoration and development of the KZP.

The 2013-2017 (Ministry of Planning, 2013) set a goal to 'boost current port capacity and navigable corridors'. This included setting the development targets outlined in **Table 16.4**.

Table 16.4: National Development Plan for Increased Port Capacity

Port Name	2012		Project Terminals to be added over 2013-2017 plan duration	2017	
	No. of terminals	Capacity (million tons/year)		No. of terminals	Capacity (million tons/year)
UQP	22	7.5	19	41	14
KZP	12	6.4	13	25	10.65
Abu Flous	3	0.5	-	3	0.75
Al-Maqal	9	2.25	5	14	3.6
Total	46	16.65	37	83	29

(Ministry of Planning, 2013)

Iraq's port sector currently operates mostly via a 'feeder' method, by which, cargo is offloaded from larger vessels at a UAE port. The cargo subsequently loaded onto smaller vessels which then transport the goods to on to one of the Iraqi ports (the opposite is also the case for exports). Total cargo volume handled by Iraqi ports struck a low of 1,811,000 in 2003. **Table 16.5** shows the total cargo volume handled and ship calls in Iraqi ports since 2008. In general, it shows an increase in cargo volume from 2008 to 2014, with increasing container volume. However, despite increase in cargo volume, the increase in container volume has resulted in

fewer ship calls. The port handling both the largest cargo volume and most ship calls has remained the UQP. KZP is the primary port used for import/export of oil products.

Table 16.5: Cargo Volumes and Ship Calls in Iraqi ports

Year	UQP		KZP		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	Container volume	Ship calls
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	150	877	743	14,944	589,295	2,346
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

(JICA, 2015)

Cargo throughput of UQP and KZP, between 2008 to2014, is summarized in **Table 16.6** and **Table 16.7** respectively. It is noted that; whilst the quantity of imports handled at UQP is greater than that at KZP, KZP is substantially more important for exports; container volumes handled at UQP increased substantially between 2008 and 2014, but decreased substantially at KZP; the volume of conventional cargo handled by both ports has fluctuated through the years but UQP has generally maintained higher quantities, with the exception of 2014.

Table 16.6: Cargo Handling Volumes at UQP

	2008	2009	2010	2011	2012	2013	2014
Imported Cargo							
1. Container (TEU)	128,132	146,215	211,213	198,283	265,634	352,899	367,893
2. Conventional Cargo							
(1) Grain (Wheat etc.)	3,279,105	2,898,591	1,800,999	2,748,557	2,637,732	2,294,273	1,580,553

Table 16.6: Cargo Handling Volumes at UQP							
	2008	2009	2010	2011	2012	2013	2014
(2) Rice	960,670	654,342	947,383	1,049,057	1,092,684	1,110,879	640,628
(3) Sugar	568,310	260,327	455,656	783,413	714,794	624,783	676,226
(4) Cement	444,850	889,980	456,734	425,391	129,008	90,843	1,971
(5) Steel & Pipes	183,832	121,967	347,461	232,553	514,862	929,707	1,040,005
(6) Vehicles	44,326	94,636	100,136	58,376	88,784	39,406	76,615
(7) Others	326,302	446,883	528,659	662,628	681,959	917,346	831,483
Sub-total	5,8073,95	5,366,726	4,637,028	5,959,975	5,859,823	6,007,237	4,847,481
Exported Cargo							
1. Container (TEU)	128,132	146,215	211,213	198,283	265,634	352,899	367,893
2. Conventional Cargo	0	0	0	0	0	0	0
Total							
Container (TEU)	256,265	292,431	422,426	369,566	513,267	705,798	735,786
Conventional Cargo	5,807,395	566,726	4,637,028	5,959,975	5,859,823	6,007,237	4,847,481
Units = tonnes (except containers in TEU) Source: (JICA, 2015)							

Table 16.7: Cargo Handling Volumes at KZP							
	2008	2009	2010	2011	2012	2013	2014
Imported Cargo							
1. Container (TEU)	4,204	1,780	2,456	1,611	725	0	96
2. Conventional Cargo							
(1) Grain (Wheat etc.)	14,043	14,770	10,307	13,004	7,051	6,061	1,660

Table 16.7: Cargo Handling Volumes at KZP

	2008	2009	2010	2011	2012	2013	2014
(2) Rice	7,903	350	0	0	0	0	0
(3) Sugar	133,727	86,578	91,325	42,308	27,445	42,829	27,602
(4) Cement	585,862	981,981	1,202,455	1,081,756	731,793	294,751	188,251
(5) Steel & Pipes	178,805	328,947	146,251	94,798	219,267	201,277	113,768
(6) Vehicles	0	0	0	0	0	0	0
(7) Others	357,107	400,680	174,228	84,297	90,072	456,625	319,075
Sub-total	1,277,447	1,8133,06	1,624,566	1,316,163	1,075,628	1,001,543	650,356
3. Liquid Bulk	735,239	574,049	866,252	1,767,324	2,731,572	2,707,788	3,076,753
Exported Cargo							
1. Container (TEU)	5,425	2,581	2,280	1,619	720	0	96
2. Conventional Cargo							
(1) Dates	172,937	227,793	206,816	112,069	82,510	46,885	95,997
(2) Other	0	0	0	0	0	0	2,788
Sub total	172,937	227,793	206,816	112,069	82,510	46,885	98,785
3. Liquid Bulk	1,812,521	660,090	88,077	296,946	365,772	516,452	1,232,931
Total							
Container (TEU)	9,629	4,361	4,736	3,230	1,445	0	192
Conventional Cargo	3,998,143	3,275,238	2,785,711	3,492,502	4,255,482	4,272,668	5,058,825
Units = tonnes (except containers in TEU) Source: (JICA, 2015)							

16.2.8 Food Security

Iraq

The after effects of war, the current IS crisis and the general economic slowdown, further exacerbated by 12 years of economic sanctions, have adversely affected Iraq's food security. The prevailing climate of insecurity and political uncertainty further complicates the situation. As a result, large parts of the population depended on the monthly food ration provided by the Public Distribution System (PDS) with more than 60% of the population depending on the PDS as their main source of food.

In 2006, the Federal Ministry of Planning and Development Cooperation's Central Organization for Statistics and Information Technology (COSIT) published a study on the food security situation in Iraq. The report concluded that just over four million people (15.4% of the population) were food insecure and in dire need of humanitarian assistance despite the PDS rations that they were receiving. The survey also indicated that a further 8.3 million people (31.8% of the surveyed population) would be rendered food insecure if they were not provided with the current PDS rations. The chronic malnutrition rate of children in food insecure households was estimated as 33% and acute malnutrition amongst Iraqi children was at 9% (United Nations World Food Programme, 2008).

The droughts of 2007 and 2008, amplified by water security issues, will also have had an effect on the agricultural production of Iraq.

This report identified the main factors on which food security depends:

- Wealth status;
- Income and expenditure;
- Education level of the head of households;
- Geographic location (urban vs. rural); and
- Sex of household head (female headed more vulnerable).

Table 16.8: Percentage of Households Experiencing Food Shortage per Governorate							
10-19	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**
Erbil, Sulaimani, Diyala, Basra	Missan, Dohuk	Nineva, Baghdad, Muthana, Salah al Din, Anbar	Wassit, Kirkuk, Thi-Qar	Qadissa	-	Najaf, Babil	Karbula
(United Nations World Food Programme, 2008)							

In 2014, the FAO stated that Iraq faced serious food security concerns as a result of the IS, prevailing insecurity and associated access problems, labour shortages, and disruptions in transport and marketing (FAO, 2014). Furthermore, many of Iraq's grain silos, which also serve the IKR, were captured and looted by IS. As such, cereal imports are expected to rise as are the costs of stable commodities. This has resulted in a lower availability of produce which has meant that the PDS has become less effective in providing vital food support and is now "not functioning optimally" (World Bank, 2015).

Basra Governorate

Poverty and food insecurity (21%) vary greatly between the various districts of the Governorate (NCCI, 2015).

16.2.9 Land Tenure

Iraq

There are three different land tenures in Iraq:

- private ownership, in which the landowner has the right to buy and sell land and to raise capital against the value of the land;
- land leased from the government on a long-term basis; and
- inherited land, which has been passed from generation to generation but frequently results in an unmanageable number of owners.

Land registration and property rights in Iraq have deep historical foundations reaching back to the Hammurabic period (c. 1750 BC). However, the current land registration system owes

more to the 400-year Ottoman occupation of Iraq and the subsequent interval under the British mandate.

Under these regimes, land policy was self-serving and designed to maintain and reinforce the existing political power. This was done through the allocation of land to influential individuals who supported the incumbent regime. This policy led to large accumulations of land and an agricultural economy based on poor peasants who had limited rights of tenure. During the early Ba'athist period, large-scale land reform was implemented in the rural tribal areas. Under this reform, limitations on the size of holdings were enacted in law, and collective ownership of property and means of agricultural production were made possible. The results of that land reform remain in place.

In the latter Ba'athist period, government land was allocated to supporters of the regime, while Kurds and ethnic Iranians were deprived of property for which they held title. Historically, land administration during the Ottoman period, known as the TAPU (title deed) system, included a land register and an issuance of title deeds. Land was classified into several categories, including a category that provided individual property rights. Individual property rights were maintained throughout the Ba'athist period, but additional categories of group ownership were authorized.

By 1974, the TAPU system was replaced by the Real Estate Registration Law, which created an improved title issuance system and established Real Estate Registration Departments (RERDs) throughout the country. The Real Estate Registration Law replaced the old Ottoman Permanent Title Deed with a new Title Deed document. The title document held by the owner is also a hand-written copy of the original, official record-book document. It is the only proof of ownership. The RERD holds the original in its registry.

The Title Deed document incorporates the following information:

- Complete name of the owners(s);
- The category of the property – residential, arable, commercial or industrial;
- The type of property:
  - Private Real Estate – estates owned by the owner whose name(s) is registered in the Title Deed document with no other partner;
  - Public Estates – these belong to the state and are divided into two parts: (1) properties given by Alezman (an old Ottoman system based in the idea of reclamation of a plot of land, which is a public estate, by cultivating it) and (2) government estates entrusted to the RERD. Both types of ownership affirm that

the state is a partner owner with the individual accorded some ratio or period of use.

- Endowment (inheritance) – the property is registered in the Endowment Department under it protection.

The land administration system, while distributed widely throughout Iraq, remains a centralized system. Land registration is administered locally, but the benefits of this registration are not realized at the local level. Citizen oversight on local land-use issues is limited, and land registration does not raise local revenue through property taxation.

After the 2003 conflict, several problems relating to real estate registration arose:

- Forgery of title deed documents. Forged documents claiming title began to appear;
- Appropriation of public property. People without housing have appropriated many public buildings and converted them into living space;
- Encroachment onto public land. Landless people have occupied public land and illegally built houses for themselves; and
- Old confiscations. During the former regime, many people were forced out of Iraq. Many of them have now returned to find that their property has been given to other Iraqi citizens. This was illegal in the sense that the legal sell—buy process was not followed. Thus, it is possible that both parties can possess legally registered title deeds to the same property (RTI International, 2005).

As a result of the IS conflict, the widespread loss of civil and property documentation among the displaced has been reported, particularly among Yezidi IDPs who experienced property discrimination prior to the current crisis. It has also been reported that at IS checkpoints, people have been stripped of any valuable possessions including property documentation.

Furthermore, many government departments and institutions in the areas under IS control have been the explicit target for looting, destruction and systematic appropriation of its archives. In November 2012, UN Habitat reported that several Land Registry Offices have been looted, taken over or destroyed (IOM, 2015).

Compensation is guaranteed by both law and custom. Subject to the title of the land and its proposed use, various specific legislation, including that related to industry, roads and free trade zones, provide for the compulsory acquisition of land. Yet the Iraqi Constitution and the Civil Code of Iraq provide that no one can be deprived of ownership of land except in the

manner provided for by law and in consideration of fair compensation. SOC will compensate any leaseholders or freeholders.

Although the law seems to allow for summary action against people whose occupancy is unlawful or whose status is ambiguous, there appears a reluctance to do so, with evidence suggesting that steps are being made to ensure that the process is fair, and that legislation is adhered to. Land confiscations are a rare occurrence.

Basra Governorate

Recognised disposal rights of land in Basra is currently distributed roughly as follows:

- Ministry of Agriculture – 45%;
- Southern Oil Company – 25%;
- Private ownership – 10%;
- Municipality – 10% (including all urban land); and
- Other ministries (Defence, Health, Transport, Industry) and agencies (Ports) – 10%.

Many of the people occupying land have no legal documentation determining ownership. The granted ownership of land does not preclude the land's use by other parties. Tribal, private, family and governmental claims overlap, and various assets are divided out. A person may own the date palms, but not the land. Another person owns the water rights. One person can graze sheep; another can plant crop.

16.2.10 Housing

Iraq

Due to the increasing population of Iraq as well as the existing shortage of new housing and dilapidation of existing properties, one of the largest challenges facing Iraq is providing adequate housing. Estimates of the current shortfall range from 2 – 3.5 million homes. In 2014 Iraq had an estimated population density of 80.15 people per km^2 (Trading Economics, 2016).

As a result of the housing shortage, 12% of households suffer from overcrowding (having more than three persons per room in a household), rising to 17% in rural areas and 25% among households living in non-durable structures, such as clay, wood and metal plating. Overcrowding is particularly common in rural areas. Nearly 10% of Iraqi houses are made of non-durable materials, such as clay, wood, or metal plating and such properties are more likely to be found in rural areas (IKN, 2011).

It has been reported that IS has engaged in systematic looting and destruction of private and public property in under its control, particularly those owned by individuals associated with the government and security forces, which has increased the housing shortage. Furthermore, IS has been renting and selling properties confiscated from their rightful owners primarily targeting religious and ethnic minorities (IOM, 2015).

Basra Governorate

Average household size in Basra Governorate is similar to wider Iraq at 6.4 persons (6.2 in urban areas and 6.4 in rural areas). The majority of residents live in a house (97.2%), and statistics imply that overcrowding is a common issue in the Governorate, with only 29.8% of households containing more than 2 bedrooms (Central Statistical Office, 2011).

Between 10 - 22% of people in rural regions of Basra live in structures built from non-durable materials (IKN, 2011).

16.2.11 Healthcare Infrastructure

Iraq

From 2002 to 2010, the number of hospitals in Iraq increased to 235 while the number of clinics decreased in number to 315 (COSIT, 2012). There are 7 doctors per 10,000 people in Iraq and only 14 nurses and midwives per 10,000 people (Gunter, 2013). Breakdowns of other health professionals in Iraq include two dentists per 10,000 people and one pharmacist per 10,000 population (RAND, 2014).

Table 16.9: Healthcare Infrastructure in Iraq (2014)

Parameter	Total number
Number of private and public hospitals	368
Number of public hospitals	257
Number of private hospitals	111
Number of beds in private and public hospitals	40,357
Number of beds in public hospitals	36,772
Number of doctors	30,083
Number of dentists	8,045
Number of pharmacists	8,608

Table 16.9: Healthcare Infrastructure in Iraq (2014)	
Parameter	**Total number**
Number of primary health care centres	2,632
Average population per beds	892
Average population per doctor	1,259
Average population per dentist	4,475
Average population per pharmacist	4,183
(COSIT, 2016)	

Most doctors in public hospitals and public healthcare centres are almost exclusively on the obligatory one-year service of junior general physicians who have completed one or two years of post-graduate clinical (residency) training and return afterward for a final year of residency training in which they can begin to specialise. The most highly qualified among them are able to secure coveted urban placements while the others are assigned to more rural or remote areas. Many physicians provide clinic services in the morning and see private patients in the afternoon. All physicians who complete their clinical training have guaranteed government jobs (and pensions), however, they receive relatively meagre salaries for public sector work and derive much more substantial income from seeing private patients.

The average Iraqi household is just over twenty minutes away from a health facility, however, for rural households, this figure is 32 minutes with the longest average journey times are experienced in rural Baghdad and Wassit (almost 50 minutes).

Most households will either go to a public hospital (48%) or a government clinic (24%) when a family member is ill. The primary barrier to access for these services is lack of medical equipment (38%), however, 29% of households also stated that lack of doctors is a problem and 29% stated that there are insufficient female staff members. Just over 20% of households go to either a private hospital or private clinic, rising to 37% among households in the highest per capita expenditure quintile. Lack of affordability is a barrier to access to private facilities for 71% of households (IKN, 2011).

Use of public healthcare centres varies widely across Governorates and is generally higher in rural areas. Over half (58%) of household's nationwide experience at least one obstacle to accessing a public healthcare centre. The most common reason was insufficient staffing and facilities while almost half (44%) of households cite lack of medical staff or equipment as an obstacle to access.

Under a third of households (29%) have a positive opinion of health services. This figure is much lower in rural areas (18%) than in urban areas (33%). Highest approval ratings are found in urban areas of Muthanna, Najaf, Karbala and Kurdistan. The worst ratings are found in rural areas of Wassit, Thi-Qar, Missan, Kirkuk and Baghdad (IKN, 2011).

Basra Governorate

In 2012 Basra has 15 hospitals and 39 public medical clinics and over 2,500 inpatient hospital beds. In 2003 there were 862 general practice medical doctors in the province, both male and female (USAID, 2012).

54.3% of Basra households will use a public hospital when a member of the household is ill. Only 13% of residents will use a private facility. It will take less than an hour for 98.4% households to reach the nearest medical service. Despite the infrastructure in Basra, only 19.4% of households in Basra evaluate healthcare as "Good". 80.4% of Basra households evaluate healthcare services as either "Very Bad", "Bad" or "Neither Bad nor Good".

Households within the Governorates experience various obstacles in accessing public hospitals (the most commonly used healthcare service in Basra), including unavailability of medical equipment (36.2%); unavailability of doctor (27.9%); unavailability of female doctor (25.9%); road blockage (21.4%); unable to secure transport (19.3%); unsafe there (18.5%); unsafe traveling there (15.5%); do not trust the qualifications of public health service (12.8%); expense (10.3%); medical attention was refused there in the past (6.6%); previous bad experience in the health centre (5.8%) (Central Statistical Office, 2011).

16.2.12 Educational Infrastructure

Iraq

Iraq's education system, although dramatically improved since 2003, continues to suffer from a number of problems:

- Insufficient number of schools resulting in double or triple shifts in school buildings;
- Teachers are often unskilled, unmotivated or absent;
- Curriculum is generally outdated;
- Book and educational material shortage; and
- School buildings being in a state of disrepair and lacking appropriate lighting, running water and sanitation facilities.

Many new buildings have been built, however, many have not been put to use and have been looted or confiscated for non-educational purposes (Gunter, 2013). Although the education sector in Iraq has expanded and improved, the country's young population will require further growth in capacity.

Table 16.10: Educational facilities in Iraq, not including KRI (2014/2015)

Facility	Total number
Kindergarten	804
Kindergarten teachers	6,373
Primary schools	10,779
Primary school staff	223,310
Secondary schools	4,953
Secondary school faculty members	128,667
Vocational schools	223
Vocational school faculty members	10,527
Teaching training institutions	112
Teacher training institute faculty members	1,878
Public universities	28
Private colleges	42
(COSIT, 2016)	

Basra Governorate

In 2012, Basra has one university (Basra University, 7,000 students), 320 secondary schools, 14 vocational schools (commercial, industrial and technical), 14 teacher training institutes (USAID, 2012).

Only 27.3% of Basra households evaluate the education services as "Good". None evaluate it as above "Good" and 72.4% evaluate it as "Very Bad", "Bad" or "Neither Bad nor Good" (Central Statistical Office, 2011).

Table 16.11: Educational Indicators			
Location	**Enrolment in Primary Education**	**Enrolment in Secondary Education**	**Literacy**
Basra Governorate	91.4	43.6	81.9
National Averages	91	48.6	79
(NCCI, 2015)			

16.2.13 Power infrastructure

Iraq

Demand for electricity by a growing economy and a surge in consumer purchases of appliances and electronics has frequently outstripped capacity leading to black outs particularly during the summer months (Rasheed, 2016). Furthermore, it should be noted that electricity is heavily subsidised in Iraq, which has led to increased demand and inefficient practices.

Iraq's electricity supply totalled almost 79 billion kilowatt-hours (kWh) in 2013, of which more than 69 billion kWh was generated from domestic power plants and more than 9 billion kWh was imported from Iran and Turkey. Electricity net generation in Iraq grew by an annual average of 15% from 2009 to 2013, recovering from the 2003 dip in electricity generation associated with the invasion by coalition forces. Although generation in Iraq has increased, distribution losses have also increased, for example, from 2005 to 2013, distribution losses averaged 38% of total electricity supply. The distribution system, outside of Kurdistan, has deteriorated because of poor design, lack of maintenance, and electricity theft, resulting in large distribution losses, low voltage levels, and frequent disconnections.

From 2003 to 2011, power outages lasting 16 to 22 hours per day were common. Although many parts of Iraq, outside of Kurdistan, still suffer from power blackouts and load shedding particularly during the summer, the problems have been reduced somewhat as both on-grid and off-grid generation capacity has increased, along with electricity imports from Iran and from Turkish floating power plants sited along the Khor Al-Zubair and Shatt Al-Arab Waterway.

Peak summer demand has typically exceeded actual generation by almost 50%, causing power shortages that have sparked protests, particularly in southern Iraq. Iraqi households and businesses must rely on expensive off-grid, private diesel-fuelled generators to address the shortfall, with those in Baghdad alone providing an additional 1 gigawatt (GW) of capacity.

Iraq has made some progress to increase its generation capacity over the past few years. Most recent electricity projects in Iraq have focused on installing turbines that were purchased in 2008 but remained in storage for several years. In 2008, Iraq purchased 74 turbines, with a total capacity of 10.2 GW, however, no progress in installation was made until recently because of budgetary, contracting, and political difficulties. Iraq's Ministry of Electricity has also allowed foreign oil companies to construct small electricity plants to power their oil and natural gas operations (US Energy Information Administration, 2016).

Iraq also burns crude oil directly at power plants to make up for its limited traditional feedstock. Crude oil burned at power stations significantly increased in 2015, averaging almost 223,000 b/d during the hot summer months (July to September), which was 71,000 b/d higher than volumes burned during the same time in 2014 (US Energy Information Administration, 2016).

Iraq also receives hydroelectric power from the Mosul dam. IS briefly took control of the dam in June 2014, however, Peshmerga forces and the Iraqi army regained control of the dam shortly after. In early 2016, Iraq resumed electricity and water supplies from the dam to Mosul, which is still occupied by IS. The water levels at the dam were rising, placing increased pressure on the dam's barrier wall and increasing the risk of collapse. Restarting the dam's operations alleviated the pressure. According to several evaluations, the dam is at risk of catastrophic collapse because of its initial poor construction as it was built on a foundation of water soluble gypsum. The dam has been poorly maintained since the IS occupation of Mosul began as the dam's workers had fled (US Energy Information Administration, 2016).

The public network on average is only able to supply eight hours of power to Iraqi households per day, even during periods of low demand; on average, households receive 14.6 hours of electricity per day through a combination of the public network or private generators (UN Iraq, 2016). 90% of Iraqi households supplement the public network with private generators (whether owned by the household or shared with another household). Households with two sources of electricity receive an average daily supply of 15 hours, while those with three sources receive 16.4 hours per day.

Rural areas suffer from poorer electricity supplies than urban areas due to lack of access to generators. Almost a third (31%) of rural households rely entirely on the public network for their electricity, compared to 5% in urban areas. As a result, rural households receive an average of 11.4 hours of electricity per day, compared to 15.8 hours in urban areas

Just 17% of households receive more than 20 hours per day from all sources (private and public), dropping to 8% in rural areas. Almost all households, 98%, are connected to the public network, however, the public network provides households with any average of just 7.6 hours of electricity per day. Only one % of households receive more than 20 hours of electricity per

day from the public network. The majority (82%) receive ten hours or less from the public network (IKN, 2011).

Table 16.12: Iraqi Electricity Sector Output and Demand (Megawatt (MW))

	2006	2013	2016
Output	4,280*1	10,000*2	13,000*3
Demand	8,180*1	14,000*2	21,000*3

*1= (United States Government Accountability Office, 2007);

*2= (ifpinfo, 2013) ;

*3= (Rasheed, 2016).

Basra Governorate

More than 80% of Basra households report power cuts of at least three hours daily (NCCI, 2015). This means that although 97.9% of Bara households describe the public network as their first source of electricity, 87% of household's report that they rely on at least one additional source of electricity (Central Statistical Office, 2011).

Only 3.4% of Basra households evaluate the electricity services as "Good" or above. 68.7% evaluate it as either "Bad" or "Very Bad" (Central Statistical Office, 2011).

Table 16.13: Duration of first source of electricity in the housing unit (hours/day)

	Public network	Community generator	Private generator
Basra	11.9	11.9	9
National average	8.4	8.6	7.1

(Central Statistical Office, 2011)

16.2.14 Drinking Water Infrastructure

Iraq

Overall, 65% of households use the public network as their main source of drinking water, however, tis rate declines sharply in southern Governorates due to salinity. Approximately 47% of rural households use the public network as their dominant water source compared to 72% in urban areas (JAPU, 2016).

The public supply network provides 25% of its users with less than two hours of water per day. Nationwide, rural households have poorer access to the public network with just 47% of rural households using the public network as their major water source compared to 72% in urban areas.

Water salinity is a major issue affecting the public network towards the south east. Public network use is particularly low in the southern Governorates whereas in the rest of the country, use of the public network is much more widespread, particularly in urban areas (IKN, 2011).

Table 16.14: Sources of Drinking Water

Parameter	Average	Urban	Rural
Access to improved drinking water resources	86.6%*1	93.8%*1	70.1%*1
Access to unimproved drinking water source	6.1%*1	31.5%*1	14.6%*1
Average hours in a day that water is available through the public network	7.7 hours*2	7.9 hours*2	7.2 hours*2
Households rating the quality of drinking water services as good	3.3%*2	4.1%*2	1.3%*2
Improved drinking water sources that are reliable	52.3%*2	53.3%*2	49.4%*2
Households who use a mobile water tank as a source of their drinking water	6.9%*2	4.3%*2	13.8%*2
Households who report bottled water as a source of their drinking water	4.0%*2	1.7%*2	10.0%*2
Households who report stream, river or lake water as a source of their drinking water	3.7%*2	0.0%*2	13.2%*2
Households who use the general network as a source of their drinking water	68.8%*2	72.9%*2	47.4%*2
Households that report having less than 2 hours of water available through the general network	18.3%*2	18.7%*2	17.1%*2

*1= (CIA, 2016)

*2= (JAPU, 2016)

Basra Governorate

Basra Governorates drinking water is drawn from two primary sources: the al-Badaa Canal emanating from nearby Dhi Qar Province, and the Shatt Al-Arab Waterway. Demand Governorate wide has been estimated at as much as 1,900,000m^3 per day (Dunia, 2013).

There is conflicting information regarding the total supply of potable water in Basra, the amount can range from 570,000m^3 per day to 890,000m^3 per day. However, it is suggested the disparity is largely academic when considered alongside the consensus that the majority of the water supplied is undrinkable. This is particularly true for water sourced from the Shatt Al-Arab Waterway which is increasingly polluted and rapidly increasing in salinity (Dunia, 2013).

An additional stress on Basra's water supply is the ratio of leakage in the supply line, although again, the statistics are largely unknown and can range from 10% to 50%. The two main causes of 'leakage' are the pipeline networks state of disrepair and illegal tapping of the network by Basra residents (Dunia, 2013).

Only 23.1% of Basra households evaluate the availability of drinking water as "Good" or better, whilst almost half report it as "Bad" or "Very Bad", resulting in most households using bottled water as their primary source of drinking water. Only 1.2% of households in Basra report that they have access water from the public network for the full day (the national average is 15.6%) and 17.8% have access for less than two hours per day (Central Statistical Office, 2011).

Table 16.15: Distribution of Households by Main Source of Water (%)

	General Network	Bottled Water	Closed well spring	Watertanker or vehicle	Stream, river, lake or other
Basra	0.9	68.4	0	30.4	0.2
National average	60.1	23.3	4.8	9.8	4.7
(Central Statistical Office, 2011)					

16.2.15 Educational Indicators

Iraq

In 2010 – 2011, approximately 4.9m million Iraqi's attended primary school, of which 54% were boys. Teacher - student ratio was approximately 1 to 19. During the same period, there were 2.0 million secondary school students with boys accounting for 58% (Gunter, 2013).

Table 16.16: National Education Indicators					
Parameter	**Urban %**	**Rural %**	**Male %**	**Female %**	**Average %**
Literacy rate (15 years+)	-	-	85.7*1	73.7*1	79.7*1
Illiteracy rate (>10 years)	13.5*2	25.3*2	10.5*2	24.4*2	17.5*2
Net Primary enrolment rate (ages 6-11)	88.8*2	76.9*2	87.2*2	82.1*2	84.8*2
Net Intermediate enrolment (ages 12-14)	43.5*2	22.8*2	40.1*2	33.3*2	36.7*2
Net Secondary enrolment (ages 15-17)	25.5*2	10.9*2	22.5*2	19.9*2	21.2*2
Percentage of individuals (aged >15 years) who are illiterate	18.0*2	32.8*2	14.1*2	30.6*2	22.3*2
Percentage of youth (aged 15 – 24) who are illiterate	10.0*2	25.3*2	10.8*2	18.3*2	14.4*2
Primary school completion rate	53.0*2	32.0*2	47.3*2	40.1*2	43.0*2
Secondary school net attendance rate	49.1*2	24.4*2	46.0*2	34.0*2	40.1*2
*1= (CIA, 2016) *2= (JAPU, 2016)					

Basra Governorate

Similar to the country as a whole, there are disparities in education between genders and between rural and urban location within Basra, leaving rural women as the least educated group (with an average of 7.8 years in education) and urban males as the most educated (an average of 8.2 years in education). However, Basra Governorate does, on the whole, benefit from higher education rates than the national averages.

Table 16.17: Educational Indicators for Basra Governorate (%)		
Indicator	**Basra**	**National average**
Illiterate	18.1	23.2

Table 16.17: Educational Indicators for Basra Governorate (%)		
Indicator	**Basra**	**National average**
Read and Write	17.6	19.1
Elementary	31.8	30.4
Intermediate	14.8	11.6
Preparatory	7.0	6.5
Diploma	5.3	4.8
Bachelor and more	5.4	4.5
(Central Statistical Office, 2011)		

16.2.16 Human Health Indicators

Iraq

Between 1960 and 1990 the infant mortality rate fell approximately two-thirds from 117 deaths per 1,000 live births to 40 and child mortality fell by 70% from 171 to 50 deaths per 1,000 live births. However, since 1990, there was a disastrous decline in the health of the Iraqi populace as a result of a sharp rise in poverty, poor sanitation and water supplies, poor nutrition, decline in educational, unhealthy lifestyles, deterioration of preventive health programmes, high number of injuries and death from violence, conflict and road traffic accidents and a decline in the accessibility and quality of health services. As such, since 2003, Iraq has had to make significant strides to rebuild and rehabilitation healthcare infrastructure, reducing health risks, increasing immunization coverage, tackling the main causes of the rise in communicable and non-communicable diseases and retraining the healthcare workforce, however, much remains to be done (World Bank, 2015), (CIA, 2016), (KRSO, 2013).

Table 16.18: Iraq Human Health Indicators	
Parameter	**Iraq**
Infant mortality rate (deaths per 1,000 live births)	37[*1]
Under-five mortality rate (deaths per 1,000 children)	37[*1]
Maternal mortality rate (deaths per 100,000 live births)	50[*2]
Measles immunization coverage at 12 months	65.8%[*3]

Table 16.18: Iraq Human Health Indicators	
Parameter	**Iraq**
TB immunization coverage at 12 months	89.7%*3
DPT immunization coverage at 12 months	64.8%*3
Polio immunization coverage at 12 months	70.6%*3
Full immunization coverage at 12 months	45.4%*3
Births delivered by skilled attendant	90.9%*3
Source: *1= (World Bank, 2015) *2= (CIA, 2016) *3= (KRSO, 2013)	

Basra Governorate

There is little available data regarding the human health indicators from the Basra Governorate. Self-reported data from 2011 indicates Basra individuals perceive themselves to be less healthy than the national average.

Table 16.19: Health Status of Individuals (self-reported) (%)				
Governorate	**Very good health**	**Good health**	**Poor health**	**Very poor health**
Basra	62.3	35.3	2.2	0.2
National Average	79.6	17.5	2.5	0.4
(Central Statistical Office, 2011)				

16.2.17 Security

Iraq

As a result of the conflict with IS, 20,035 civilians were killed in Iraq in 2014, the highest number since 2007 with a further 17,080 were killed in 2015. It is estimated that a total of 151,383 civilians were killed due to violence between 2003-2015 (World Bank, 2015).

At present, the UK Foreign and Commonwealth Office (FCO) advise against all travel to Anbar, Ninevah, Salahaddin, Diyala and Kirkuk Governorates as well as the area to the south of Road 80 and within 10km of the border with Ninewah Governorate between Road 80 and Road 2. The FCO advises against all but essential travel to the rest of Iraq including the remainder of KRI.

IS and other armed groups control parts of Iraq, particularly in Anbar, Ninewah, Salah-Al-Din and Diyala provinces. The front line between IS and Iraqi and Kurdish Security Forces is changeable. There's an increased risk within 10km of the front line. The security situation in Iraq remains uncertain and deteriorates quickly (FCO, 2017).

Basra Governorate

The security situation in Basra is considered to be generally stable and is controlled by the Iraqi Security Forces. The governorate has suffered from Vehicle-Borne Improvised Explosive Devices (VBIED), but no security incidents have affected large numbers of people; some kidnapping for ransom and theft incidents occasionally occur. As well, some individual incidents or tribal conflicts have taken place in the northern part of the governorate, requiring the intervention of the security forces. It is worth noting that no armed groups patrol the governorate. The Police, Iraqi Army, National Security and Intelligence Services maintain security in Basra and no particular group, are under threat. All IDPs surveyed report feeling safe in the governorate. Data indicates that Basrawi households perceive security to be better than the national average. However, they have a less positive evaluation of the justice system than the national average.

Table 16.20: Households Perceptions of Security (%)

	Very insecure	Insecure	Neither secure nor insecure	Secure	Very secure
Basra	-	1.8	10.1	73.2	14.4
National Average	2.7	6.7	13.1	54.8	27.2

(Central Statistical Office, 2011)

Table 16.21: Households Evaluation of the Quality of the Justice System (%)						
	Very Bad	Bad	Neither good nor bad	Good	Very good	Don't know
Basra	4.9	21	34.6	25.2	-	13.9
National Average	10.2	16.9	29.1	32.1	4.1	9.3
(Central Statistical Office, 2011)						

16.2.18 Manmade Hazards

Mines and Unexploded Ordnance

Landmines, UXO and abandoned explosive ordnance (AXO) (i.e. ammunition and arms) are seen as a major threat to the rebuilding of Iraq's economy and its infrastructure. It should be noted that the full extent (i.e. quantities, locations etc) of this issue is not known, however, the data that is available suggests that the contamination is Iraq's largest public safety concern and a barrier to the country's continued development and stabilisation (UNDP/UNICEF, 2009).

Iraq is believed to be one of the world's most heavily mined countries. The contamination of Iraq, by landmines, UXO and AXO, is a result of the various conflicts undertaken in the region; the Iraq - Iran War (1980 – 1988), the invasion of Kuwait (1990), the UN-authorised invasion in 1991, the US-led invasion in 2003 and the various skirmishes between ethnic and political parties. Kurdistan itself is one of the heavily mined areas of the world with 1,428 affected communities, with minefields focused along the borders with Iran and Turkey.

It is believed that ordnance and landmines dating from the Second World War may also be a potential issue (JMU, CISR, 2003), however, in the saline environment of Iraq, it is likely that they will be heavily corroded. The risk may be worsened by the unstable nature following corrosion.

In 2009, landmines and UXO killed or injured two Iraqis every week with 80% of victims were young men aged 15 to 29. Between 48,000 and 68,000 Iraqis have undergone amputations due to landmines and UXOs. Children are often not educated about the dangers associated with approaching or disturbing landmines and UXOs which has resulted in 24% of the victims were under the age of 14. Many children lose their limbs, sight, or hearing resulting in lifelong disability. Child victims are often perceived as a burden to their families and are discriminated

against by society. Deaths also take away sources of family emotional and financial support as 44% of victims during the last forty years were the family bread winner (IAU, 2011).

Under Article 5 of the Anti-Personnel Mine Ban Convention (to which Iraq acceded in August 2007) Iraq is required to destroy all anti-personnel mines in mined areas under its jurisdiction or control by 1/02/2018 (Anti-Personnel Mine Ban Convention, 2016). Iraq's mine action plan has two distinct components. In northern governorates under the KRG, mine action is managed by the Iraqi Kurdistan Mine Action Agency (IKMAA) which, in 2012, united with the General Directorate of Mine Action (GDMA) (Landmine & Cluster Munition Monitor, n.d.). In central and southern Iraq responsibility for mine action lies with the MoHE which, in 2008 set up the Department of Mine Action. This is now the body that is responsible for planning, accreditation, project coordination, setting standards, quality management and managing a mine action database.

Iraq is still working to produce a comprehensive estimate of the extent of the problem based on consistent survey standards (Mine Action Review, 2016). While there is considerable uncertainty regarding the exact figures, the Landmine Impact Survey (2004 - 2006) indicates that there are around 4,000 suspected hazardous areas (SHA's), some 20 million mines, spread through the majority of Iraq's Governorates, covering an estimated 1,730km^2, affecting 1,622 communities and 1.6 million people (UN Iraq, 2013).

Iraq's mine action programme has made significant progress in the south, however, in central and northern Iraq, the conflict with IS has diverted attention and resources to priorities other than clearance of cluster munition remnants (CMR). CMR contaminant significant areas of central and southern Iraq, a legacy of the 1991 Gulf War and the 2003 invasion of Iraq. Iraq has claimed that CMR in confirmed hazardous areas (CHAs) cover a total of 200km^2 across nine central and southern governorates of which 95% was said to be in just the three governorates of Basra, Muthanna, and Thi Qa.

The highway between Kuwait and Basra was heavily targeted by cluster bomb strikes in the 1991 Gulf War, and cluster munitions were also used extensively during the 2003 invasion of Iraq, particularly around Basra, Nasiriyah, and the approaches to Baghdad. It is reported that Basra Governorate has 154 CHAs covering an area of 25,524,912m^2 (Mine Action Review, 2017).

Depleted Uranium

In essence depleted uranium (DU) is one of the by-products or wastes of the enrichment process of natural uranium which is used as part of the fission process in nuclear reactors to produce energy. It is a heavy metal with a density of 1.7 times that of lead. This, coupled with its pyrophoricity and special mechanical properties make it extremely effective at piercing armour and destroying tanks and other heavy weaponry. It is therefore highly valued in the

military industry (NCCI, 2013). DU was used in munitions in large quantities in Iraq for the first time in the 1991 Gulf War. It was used in both 30mm and 25mm rounds by American and UK forces. The Americans fired a total of 783,514 rounds of the 30mm rounds, each containing 302 grams of DU. Combined with all other munitions used by the USA and UK (both armies and air force) over 286 tonnes of DU was used during this conflict in Iraq and Kuwait (Zwijnenburg, 2013). DU was used again by UK and USA forces in the 2003 invasion. The total amount of DU used during this conflict is still unknown but speculative figures from various studies range between 170 and 1,700 metric tonnes (UNEP, 2007). The US has to date not released information on target coordinates for the 1991 and 2003 wars (UNEP, 2007). The only geographical data on DU use in the 1991 conflict released by the US is a map showing in very general terms the 'Estimated primary areas of 30mm expenditure' (Zwijnenburg, 2013). This means it is very hard to know exact areas of contamination, the Center of Radiation Protection reported that there were 315 polluted sites, whilst experts from UNEP estimate there are thousands of contaminated sites (Al-Muqdadi & Al-Ansari, 2011).

When a weapon with a DU head hits its target, it ignites and burns at temperatures around 3,000^{o}C enabling it to easily melt through steal armour and ignite other metals in the target. These materials, including the DU, becomes aerosolised. These metal fumes then settle and consolidated and DU is converted into a fine dust (Zwijnenburg, 2013). The extent of the risk posed by this dust is a contentious issue, however the dust is both toxic and radioactive and UNEP list several potential risks to the environment and to human health:

- Inhalation of DU dust at the time of munition impact, leading to potentially serious additional health risk to anyone in the immediate vicinity who survived the initial blast and subsequent fire.
- Widespread, low-level contamination of the ground surface.
- Presence of intact DU penetrators buried in soft ground (which may be handled by unprotected individuals leading to low-level but unnecessary beta radiation dose.
- Possible migration of DU into ground water (and therefore drinking water) (UNEP, 2003).

Dust, once inside the body may cause harm due to its chemical toxicity and radioactive nature. Doctors in Iraq report a marked increase in cancer cases. Prior to the outbreak of the first Gulf War in 1991 the rate of cancer cases in Iraq is reported to have been 40 out of 100,000 people, by 2005 it is reported that 1,600 out of every 100,000 were affected by cancer. Increases in many other severe health phenomena have been observed such as sever congenital birth defects, complex nervous system problems and miscarriages (NCCI, 2013). Many attributes these observations to DU contamination and it has even been hypothesised that Gulf War Syndrome may be linked to the use DU with in these conflicts. However, there is a distinct lack

of scientific research (PAX, 2014). Despite laboratory studies on rats indicating both short and long-term health effects, only a few dozen people with verified exposures have been assessed and as a result evidence of human health effects caused by DU is inconclusive. DU is just one of a range of other environmental contamination events that occurred during this time period (take for example the oil well fires) (UNEP, 2003) and with the research available it is impossible to establish a causal link between DU exposure and the current health phenomena within Iraq.

Basra Governorate

Basra received heavy bombardments of DU ammunition. Intense fighting took place in and around the city in 2003, as Coalition forces advanced into the city. Multiple tank battles and aircraft attacks using DU munitions were reported in the area. Zubair was also the site of intense conflict in April 2003, as Coalition troops moved toward Basra. DU munitions were reportedly used during A-10 aircraft attacks throughout the city (UNEP, 2007).

16.2.19 Natural Hazards

The following natural hazards occur in Iraq, and are discussed in turn where information is available:

- Drought;
- Flooding;
- Sand and dust storms; and
- Seismic activity (see Section 6.2.6).

Drought

Drought is a recurrent natural hazard that is expected to increase in the future due to anthropogenic climate change (Eklund & Seaquist, 2015). There are generally considered to be three types of drought that impact Iraq:

- Metrological drought (climate variables impacting precipitation rates);
- Agricultural drought (soil moisture, texture, crop water requirements); and
- Hydrological drought (relating available surface waters and aquifer resources).

Flooding

The Project area will potentially at risk from tidal ingress, fluvial flooding and pluvial flooding.

In late 2013, however, Southern Iraq experienced unprecedented heavy and intensive rainfall over several days, some of which was sufficient to cause flooding and property damage where buildings were weakened by the water. There were further heavy rainfall events in the area through into January also. Given the high groundwater levels in the Basra area and the intense rainfall and lack of drainage infrastructure much of the incident rainfall and associated flooding remained on the ground for many weeks after the rain.

Photograph 16-1: Flooding in Basra City (January 2014)

Sand and Dust Storms

Dust and sandstorms are one of the important weather phenomena in southern Iraq and the Gulf. This area is susceptible to these storms because of the low topographic relief, scant vegetation cover, light-textured topsoil and recurring strong and turbulent winds. It has long been noted that dust storms associated with the development of low pressure systems over the south-western desert of Iraq. These dust storms are considered to be a major source of marine sediments, and a possible knock-on effect of this dust fallout is on the movement and fate of oil spills on the sea surface, whereby the dust acts as a sinking mechanism for oil droplets. Dust storms accompany the *Shamal* wind and may rise to height of several kilometres, causing hazardous flying conditions and closing airports. However, it should be

noted that the summer *Shamal* is drier and causes dust and sandstorms more than the winter *Shamal.*

Typical sandstorms only reach heights of up to 15m, contain sand particles with average sizes between 0.15 to 0.30mm and have wind speeds exceeding 10mph. However, dust storms have a distinctly different characteristic, they form in semi-arid and arid regions where small dust (and sand) particles are literally blown into the air. Unlike in pure sand storms, dust particles are small enough to be lifted aloft by currents of turbulent air and carried into suspension. The average height of a dust storm is 3,000-6,000 feet and stronger storms have dust to 8,000-10,000 feet. Haze and dust with extreme storms have been documented as high as 35,000-40,000 feet (National Oceanic and Atmospheric Adminstration, 2003).

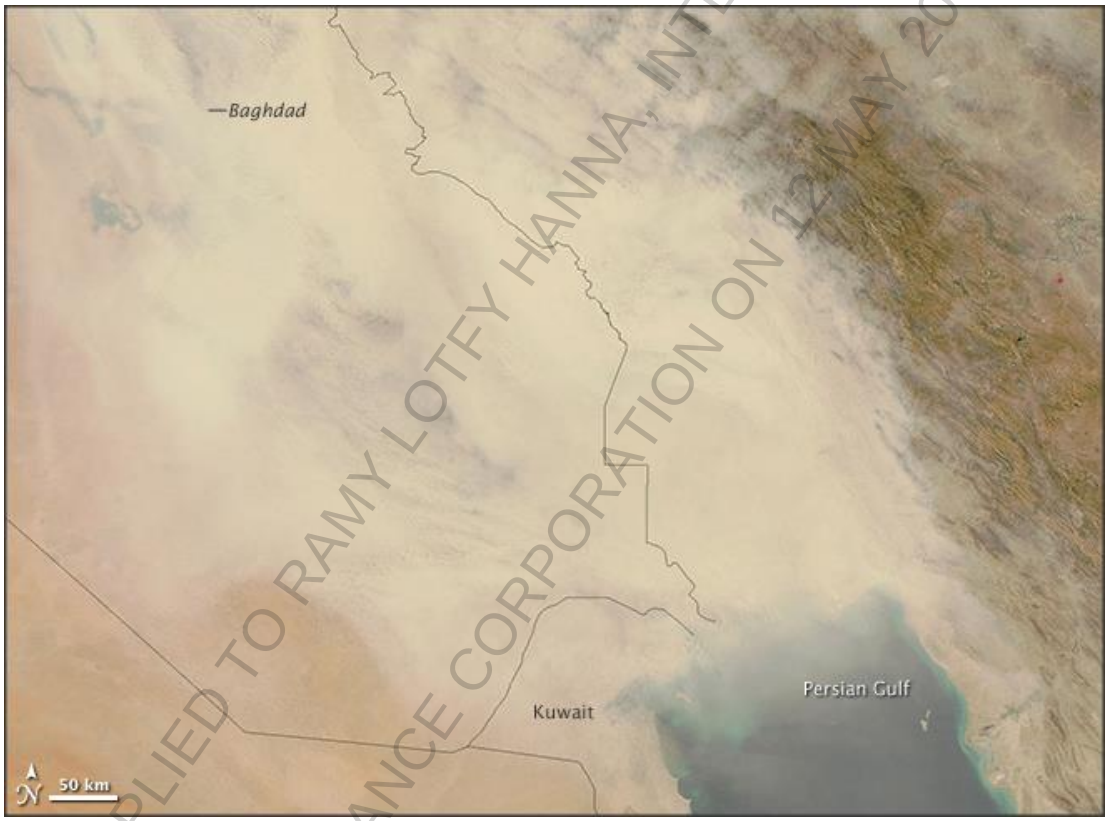

Figure 16.2: Dust storm in Iraq (5th July 2009) (NASA, 2009)

In 2008, 122 dust storms and 283 dusty days were recorded in Iraq, however, it is calculated that within the next 10 years, Iraq could experience 300 dust storms per year (Iraq-business News, 2013).

The dust storms can have negative effects on human health such as asthma, bronchitis and lung diseases, due to the micro-organisms (such as bacteria, fungi, spores, viruses and pollen) and the sharp-edged particulates (Al-Dabbas, et al., 2011). A study of dust deposits in the

Babylon Governorate has indicated that dust deposits were found in quantities greater than the allowable limits of the WHO. For example, the yearly average of dust deposits in 2008 exceeded the WHO standard by over four times. The study also indicated that increased dust deposition occurred in the summer, this has been attributable to the absence of precipitation and temperature increase, which increased dust agitation (Hashim, 2012).

16.2.20 Communications

Internet

Internet access in Iraq is relatively new and tends to be restricted to urban areas, however, speed and reliability can be an issue. As with many parts of the Middle East, the internet is tightly controlled with the government trying to control or block internet access to stop social media services being used to rally public support as well as insurgents and propaganda purposes. Internet penetration was estimated at only around 11% in 2014.

Landlines

The use of landlines in Iraq is limited due to limited telecommunication wiring infrastructure. There is limited coverage and the landline service is of low quality and high cost, as such, mobile phones are the most popular communication source in Iraq.

Mobile Phone

The number of mobile phone service subscribers have increased dramatically as a result of the lack of landlines services and the inherent popularity of mobile communications. Mobile subscriptions are predominantly prepaid. Iraqi people often have several mobile phones across all cellular networks to ensure continual use. At present the, mobile phone penetration in Iraq is 77 % (Invest in Group, 2013).

Iraq is still reliant on 2G technology, however, in 2015, 3G services were rolled out by the three major mobile operators – Zain Iraq, Asiacell and Korek Telecom. Furthermore, 4G LTE services will reportedly be available in the near future. Prior to the IS crisis, 4G LTE had been deployed in some areas of Iraq and there was also progressive fibre optic deployment in parts of Iraq (Budde Comm, 2016).

Throughout Iraq, Zain Iraq is the largest operator, with 13.5 million subscribers, followed by Asiacell and Korek, with 10 million and 4.8 million subscribers, respectively. Zain Iraq, however, is based in Baghdad and operates primarily in southern and central Iraq (Invest in Group, 2013).

Table 16.22: Iraqi Communication Indicators (2014)	
Parameter	**Number**
Number of landline exchanges	323
Number of landlines	2,172,373
Number of mobile phones	35,846,824
(CSO, 2016)	

16.2.21 Land Use

The Project area is adjacent to UQP, which is Iraq's only deep seaport and is crucial to the country's continued growth. At present, there is a large shortfall between the design capacity of the Iraqi port sector and Iraqi projected import/export demand. As such, there is a need to develop, expand and modernise the Iraqi port sector.

Table 16.23: Adjacent Land Uses				
North–east	**South-east**	**South**	**South-west**	**North-west**
Access road to Basra Gateway Terminal	Basra Gateway Terminal	Artificial channel off the Khor Al-Zubair	UQP	Access road between Highway 1 and Basra Gateway Terminal

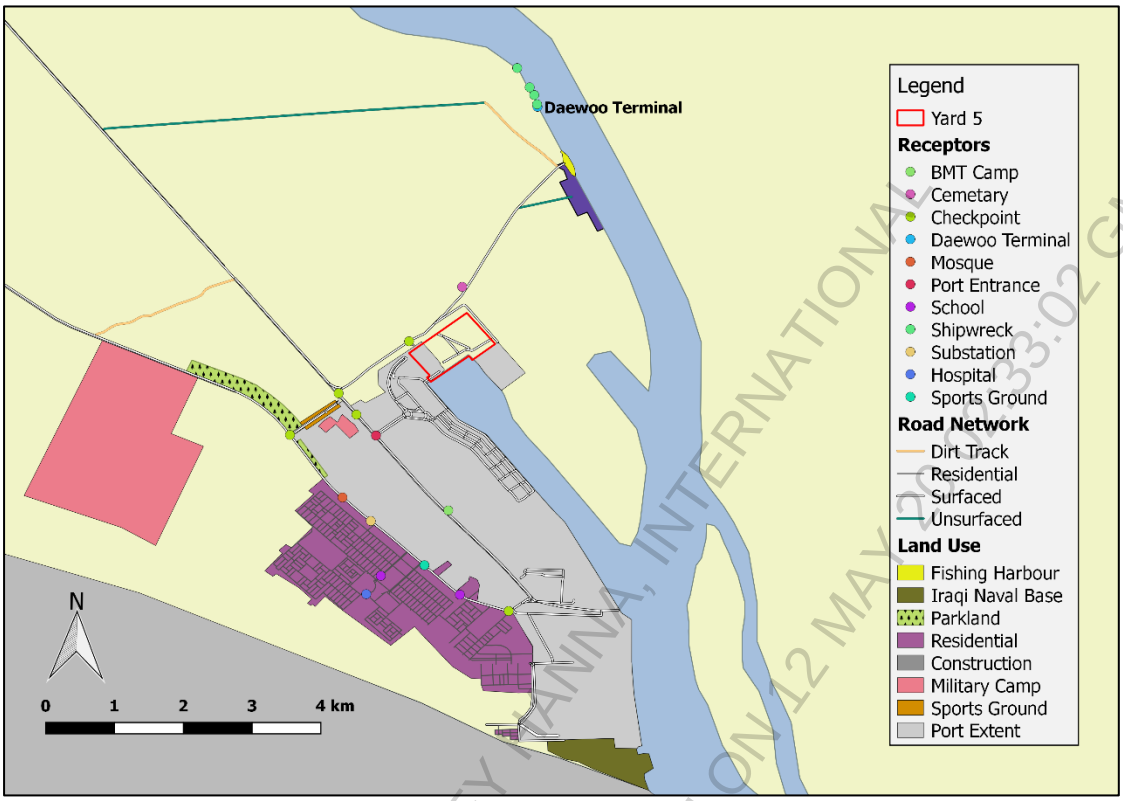

Figure 16.3: Adjacent Land uses

16.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to social impacts.

16.3.1 National Policy and Legislation

The expectation of SIA is not yet enshrined in national legislation; however, such assessments are required for internationally financed projects in order to align with international standards.

16.3.2 International Guidance and Standards

As a result of the lack of appropriate local legislation and weak enforcement of the legislation that does exist, the project will be assessed using GIIP and guidance including 'Social Impact Assessment: Guidance for assessing and managing the social impacts of projects' (2015) published by International Association of Impact Assessment (IAIA).

Furthermore, the following international guidelines are relevant:

- IFC PSs, in particular PS2: Labour and Working Conditions; PS4: Community Health, Safety, and Security; PS5: Land Acquisition and Involuntary Resettlement; PS6: Biodiversity Conservation and Sustainable Management of living Natural Resources; and PS7: Indigenous Peoples; and
- WBG EHS Guidelines.

16.3.3 International Conventions

There are no international conventions to which Iraq is a signatory that are directly relevant to this topic.

16.4 Area of Influence

In general, this will take into account the distance from the project over which changes to the social environment are likely to occur as a result of the construction or operation of the Project. The spatial scope of this SIA will take into account the following factors:

- The physical extent of the project;
- The nature of the baseline social environment; and
- The manner in which effects are likely to be propagated.

The significance of effects also varies spatially – many effects may only be locally significant; however, others will be significant at a Governorate level. The anticipated areas of influence are summarised in **Table 16.24**.

Table 16.24: Anticipated Areas of Influence

Topic	Local (within a 1km radius)	Governorate	Regional/National
Land tenure	X		
Employment, skills, likelihood		X	
Economy		X	
Infrastructure and services			X

Table 16.24: Anticipated Areas of Influence			
Topic	**Local (within a 1km radius)**	**Governorate**	**Regional/National**
Occupational health and safety		X	
Cultural heritage	x		

16.5 Baseline Key Data Gaps

There is reasonable data regarding the socio-economics at national and Governorate level, however, Project-area specific data is not available. The following data gaps exist:

- Concerns of local communities and groups that might be directly or indirectly affected by the Project;
- Location of any religious or culturally significant sites within or close to the Project area footprint; and
- Key sensitive receptors along proposed haulage routes.

16.6 Identification of Potentially Significant Effects

16.6.1 Construction

During construction, there may be several potential social and socio-economic impacts, as summarised in **Table 16.25**.

Table 16.25: Summary of Potentially Significant Effects during Construction	
Receptor	**Potential Significant Effects**
Community health	Noise and dust pollution related to construction activities.
	Increased irritation especially with directly affected communities which may cause social distress and reaction against the project.
	Population influx through construction works and job seekers resulting in social tensions, including potential for increased cultural marginalization of distinct or vulnerable groups.
	Heightened community expectations

Table 16.25: Summary of Potentially Significant Effects during Construction	
Receptor	**Potential Significant Effects**
	Human rights violations
	Degraded cultural and social practices triggered by population influx.
	Increase in traffic and safety hazards to the population and constriction workers.
Employment, skills and livelihoods	Creation of employment opportunities
	Opportunities for skills development and training.
	Resentment between local people employment on the people and those whose applications were unsuccessful
	Inequalities in pay and conditions between local and foreign workers.
	Improved availability of unskilled and skilled employment.
Local Businesses	Increase in business opportunities in local services caused by increased demand for goods and services and spending power from construction workers.
Infrastructure and Services	Increased pressure on local infrastructure and services due to presence of construction workforce.
Occupational health and safety	Heightened risk of terrorism, kidnapping, piracy and banditry and increased social tensions and ethnic conflict as a result of: project, and project employees, representing a political, economic and cultural target. This is addressed in Section 21: Conflict Sensitivity.
Cultural heritage	Damage or destruction of any cultural or religious heritage sites (see Section 17: Cultural Heritage and Archaeology).

16.6.2 Operation

During operation there may be several potential social and socio-economic impacts, as summarised in **Table 16.26**.

Table 16.26: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Community health	Heighten community expectations.

Table 16.26: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
	Increase in traffic and safety hazards to the population and site workers.
	Noise pollution related to general day to day activities.
	Population influx due to operational workforce and job seekers resulting in social tensions.
	Human rights violations.
	Exposure to potentially hazardous material in event of an accident spill.
	Tensions between security and local people
	Improve standard of living for local households employed by the Project.
Employment, skills and livelihoods	Small-scale to long-term employment will bring some social benefits.
	Employment opportunities for local people
	Resentment between local people employment on the people and those whose applications were unsuccessful.
	Inequalities in pay and conditions between local and foreign workers.
	Improved availability of unskilled and skilled employment.
	Enhance skills among local workforce
	Enhanced circulation of money in local economics resulting in overall economic growth albeit in small scale.
Local businesses	Increase in business opportunities in local services caused by increased demand for goods and services and spending power from construction workers.
Regional economy	Improved infrastructure promoting a higher level of investment and growth within the Governorate.
Infrastructure and Services	Increased pressure on local infrastructure and services due to presence of operational workforce.
Occupational health and safety	Heightened risk of terrorism, kidnapping, piracy and banditry and increased social tensions and ethnic conflict as a result of: project, and project employees, representing a political, economic and cultural target. This is addressed in Section 21: Conflict Sensitivity.

16.6.3 Decommissioning

During decommissioning there may be several potential social and socio-economic impacts, as summarised in **Table 16.27**.

Table 16.27: Summary of Potentially Significant Effects during Decommissioning

Receptor	Potential Significant Effects
Employment, skills and livelihoods Local businesses Community health	Temporary increase in employment followed by a decrease.
	Change in economic benefits.
Infrastructure and Services	Increased pressure on local infrastructure and services due to presence of decommissioning workforce.
Community health	Noise and dust pollution related to decommissioning activities.
	Exposure to potentially hazardous material in event of an accident spill.
	Tensions between security and local people.
	Increase in traffic and safety hazards to the population and decommissioning workers.
Occupational health and safety	Heightened risk of terrorism, kidnapping, piracy and banditry and increased social tensions and ethnic conflict as a result of: project, and project employees, representing a political, economic and cultural target. This is addressed in Section 21: Conflict Sensitivity.

16.7 Summary of Topics Scoped In/Out

It has not been possible to scope out any of potential significant effects detailed in **Table 16.25**, **Table 16.26** and **Table 16.27** as they are not transient in nature or the information required to scope them out is not yet known.

16.8 SIA Approach and Methodology

Due to the lack of available site-specific data, baseline socio-economic data will be collected through field reconnaissance surveys and public exhibitions. As such, it is anticipated that the following data will be obtained:

- Baseline socio-economic data of users within the Project area footprint as well as any communities within a 1km radius through a standardised survey focussing on household composition, education levels, general health status, livelihood strategies, employment, water use, income and expenditure;
- Public exhibitions and focus groups to gain further understanding of the social environment as well as the identification of environmental and social concerns (baseline and regarding the project;
- Identification of existing and temporary structures on-site which will be affected by the project;
- Identification of religious and cultural sites followed by baseline cultural heritage assessment;
- Identification and mapping of key social receptors along proposed traffic routes; and
- Engagement with appropriate key stakeholders.

This information will then be used to establish more specifically where possible, the baseline conditions within and adjacent to proposed infrastructure.

The SIA will then be undertaken using the following methodology:

- Definition of the **direction** of an impact may be positive, neutral or negative with respect to the particular impact;
- Determination of **magnitude** is a measure of the degree of change in a measurement or analysis, and is classified as none/negligible, low, moderate or high. The categorization of the impact magnitude may be based on a set of criteria (e.g. health risk levels, ecological concepts and/or professional judgment) pertinent to each of the discipline areas and key questions analysed. The specialist study must attempt to quantify the magnitude and outline the rationale used. Appropriate, widely-recognised standards are used as a measure of the level of impact;
- Determination of duration refers to the length of time over which an environmental impact may occur: i.e. transient (less than 1 year), short-term (0 to 5 years), medium term (5 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project) or permanent;
- Identification of Scale/Geographic extent refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international; and

- Determination of probability of occurrence is a description of the probability of the impact actually occurring as either improbable (less than 5% chance), low probability (5 to 40% chance), medium probability (40 to 60% chance), highly probable (most likely, 60 to 90% chance) or definite (impact will definitely occur). Impact significance will be rated using the scoring system shown in **Table 16.28**.

Table 16.28: Scoring System for Assessment of Significance

Magnitude	Duration	Scale	Probability
10 Very high/ unknown	5 Permanent	5 International	5 Definite/unknown
8 High	4 Long-term (impact ceases after closure of activity)	4 National	4 High (60 – 90% chance)
6 Moderate	3 Medium-term (5 to 15 years)	3 Regional	3 Medium (40 – 60% chance)
4 Low	2 Short-term (0 to 5 years)	2 Local	2 Low (5 – 40% chance)
2 Minor	1 Transient	1 Site only	1 Negligible (<5% chance)
1 None			0 None

After ranking these factors for each impact, the significance of the two aspects, occurrence and severity, can be assessed using the following formula:

SP (significance points) = (magnitude + duration + scale) x probability

The maximum value is 100 significance points (SP). The potential social impacts can then be rated as of High (SP >70), Moderate (SP 41 – 70) or Low (SP<40) significance, both with or without mitigation measures on the following basis:

Table 16.29: Assessment of Significance

Significance Points	Significance	Comment
SP>70	High social significance	Where it would influence the decision regardless of any possible mitigation. An impact which

Table 16.29: Assessment of Significance		
Significance Points	**Significance**	**Comment**
		could influence the decision about whether or not to proceed with the project
SP 40 – 70	Moderate social significance	Where it could have an influence on the decision unless it is mitigated. An impact or benefit which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged
SP <40	Low social significance	Where it will not have an influence on the decision. Impacts with little real effect and which should not have an influence on or require modification of the project design or alternative mitigation
*	Positive Impact	An impact that is likely to result in positive consequences / effects

Finally, the SIA will include the identification of mitigation and enhancement measures to include in the ESMP.

17 Cultural Heritage and Archaeology

17.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to cultural heritage and archaeology.

17.2 Baseline Conditions

17.2.1 Iraq

Referred to as the Cradle of Civilization, Iraq has an extensive cultural history, with over 10,000 recorded archaeological sites and monuments, the majority of which have not been excavated (GCI, 2015). The Iraq State Board of Antiquities and Heritage (SBAH) is responsible for maintaining official records of known cultural heritage sites and features in Iraq. As of late 2011, the SBAH had over 13,000 registered historical and archaeological sites, dating back over ten thousand years. However, thus far, no systematic archaeological surveys have been conducted as far south as Umm Qasr, so no sites are yet recorded in the near vicinity of this project.

However, widespread looting has decimated hundreds of Iraq's archaeological sites, following the 1991 Gulf War and the 2003 US-led invasion, and during the subsequent insurgency. Since the IS crisis, further looting has been undertaken. Furthermore, IS have also engaged in the widespread destruction of places of religious and cultural significance for being 'un-Islamic' (IOM, 2015).

In 2015, the Iraqi Ministry of Tourism and Antiquities launched a national campaign for the protection of Iraqi archaeology (Bassem, 2016).

17.2.2 Basra Governorate

Governorate Overview

In July 2016, UNESCO formally accepted "The Ahwar (Marshes) of Southern Iraq" as a cultural and natural World Heritage Site. Straddling portions of Thi Qar, Basra, and Maysan governorates, this landscape, comprising three archaeological sites and four wetland marsh areas, includes ancient Sumer (southern Thi Qar) and "The Sealands" (Basra), the bridge between Sumer and ancient Elam (southwestern Iran) described in the Epic of Gilgamesh. The Awhar lies well to the north of the scope of this study, but attests to the antiquity of human activity in the region: the *recorded* cultural history of the area spans five millennia, from the

dawn of human civilization to the present. Its archaeology in Basra Governorate—far less well known than that of Thi Qar—will no doubt prove to extend back to the origins of regional trade three millennia earlier. At the other end of the historical spectrum, Um Qasr Port is itself the direct descendant of a series of ports, founded through time at rivers' mouths in order to facilitate that trade. Between those bookends, Basra Governorate hosts shrines and religious sites revered by multiple Jewish, Christian, and Muslim denominations, old merchant's quarters packed with historic houses, and boasts major contributions to world science and literature.

Basra City

Basra City, capital of the governorate, was founded in 636 CE at present-day Zubayr, on the west bank of the former main channel of the Euphrates River, which at that time debouched directly into the Gulf through what is now the Khor Az Zubayr/Khor Abdullah (Khwar Abd Allah). From its foundation to the present, Zubayr/Basra has served as the primary entrepôt for trade with the Gulf, South Asia, East Asia, Africa, and Europe. Following irremediable siltation of its port and river channel, in the late 1500s Basra was re-located to its modern situation on the west bank of the Shatt Al-Arab.

Old Zubayr was named for Az-Zubayr ibn Al-Awam (594–656 CE), companion of Prophet Muhammad and loyal commander in 'Ā'ishah bint Abī Bakr's (613/614 – 678 CE) army, following the Battle of the Camel or Battle of Basra) on 7 November 656 CE. That battle demarcated onset of the First Fitna (Civil War) during the First (Rashidun) Caliphate, fought over legitimacy of successorship to Muhammed as well as interpretation of spiritual practice. It thus remains historically significant today.

Zubayr had served as a military port and army garrison from at least Alexandrian times (third century BCE). A Persian garrison displaced the Seleucid encampment there during the Sassanian dynasty (224–631 CE), and renamed the settlement (Vaheštābād Ardašīr). That settlement was destroyed on the arrival of the armies of the First (Rashidun) Caliphate, which used it as an encampment, garrison, and staging area for the earliest campaigns beyond the Arabian Peninsula—the conquest of Persia and defeat of the Sassanid Empire 641–652 CE.

The first architecturally significant mosque in Islam was constructed there in 665 CE. It was, at its peak in the eighth and ninth century, home to renowned poets, writers, scholars, theologians, mathematicians, astronomers, and scientists (such as Ibn Al Haytham al Basri, founder of the modern science of physical optics). It remained occupied through at least the 13th Century. By the 14th Century, neglect and the Mongol invasions left little of the original city standing.

Although suffering from severe encroachment by unlicensed construction to serve the needs of the burgeoning IDP population in and around Zubayr, nearly 500 ha of dense archaeological

debris dating from Hellenistic to late Islamic (Abbasid) periods remain evident today (Hritz, Pournelle, and Smith 2013). Old Zubayr has undergone several pedestrian and geophysical surveys, and was partially excavated by the State board of Antiquities and Heritage in the 1960s. Discoveries included palaces, mosque foundations, foundations of the city wall, and houses. A shrine and interpretive centre dedicated to Muhmmad's widow Ā'ishah, her commander Az Zubayr, and the fallen at the presumed battlefield location is maintained there, as is the tomb of Sufi religious scholar Imam Ḥasan al-Baṣrī, (Hasan of Basra), dating from circa 730 CE during the Second (Umayyad) Caliphate.

At the turn of the 16th century, the city was relocated to the western bank of the Shatt Al-Arab Waterway, at the site of ancient Al-Ubulla. Laced by a regular network of canals and tidal creeks, Old Basra became known as "the Venice of the East." Like Venice, it was (and remains) the primary trade hub between inland river traffic and maritime shipping to and through the Gulf. By the early 20th Century, it was home to a thriving economic boom integrated with South Asian and East Asian markets. Its canals and creeks were integral to this effort, connecting its harbours and quaysides to city markets and manufacturing.

However, beginning with the Iran-Iraq war of the 1980s, deforestation of the orchards once irrigated by "tidal push" along the Shatt Al-Arab Waterway creek system (some nine *million* date palms were felled to clear fields of fire); upstream damming, resulting in a catastrophic drop in water levels (which disrupted the twice-daily tidal flushing of the system); and accumulation of trash and effluent from hundreds of pollution point sources, rendered them unnavigable and unfit for any purpose. They are now ecological dead zones (Pournelle, 2016). Nevertheless, the Department of Antiquities has undertaken stabilization and restoration of several classic Ottoman-Era "Shanasheel" (wood-faced) merchant houses in the Old Quarter, and entered a number of properties onto the historic register (Al-Abeed, 2014).

Umm Qasr to the Arabian Gulf

South of Basra and east of Umm Qasr, between the relict Euphrates and the present-day Shatt Al-Arab Waterway, surface sediments are all geologically recent, all having been deposited after Alexandrian times. This evolving estuarine environment has in the past comprised fresh and salt marshes, mud flats, tidal reaches, and evaporitic *sabkha*. Any enduring occupation there is restricted to mounded turtlebacks or salt domes surmounting plain level. Several boreholes and soundings provide a general sequence of the mid-late Holocene environmental context, especially for marine transgression and fluvial progradation in the area. Broad swathes of Islamic-era crop and orchard lands, mapped in the 1950s, along with relict channels and irrigation fixtures, remain visible to this day (Lees & Falcon, 1952). Please see **Figure 17.1**.

Figure 17.1: Known archaeological setting for Umm Qasr

To the west of the port, table lands of the Wadi Batin alluvial fan climb sharply from the river delta, punctuated only by the massive diaper at Jebel Sinam (Safwan Hill). With the advent of diesel-powered pumps, agricultural expansion became possible here. Only haphazardly surveyed, a few late Islamic villages are known, mostly limited to the artesian spring line around the base of Jebel Sinam (Solecki, 1955); (Pournelle, et al., 2013).

To the south, at As Subiyah, along the northern coast of Kuwait Bay, substantial fifth millennium BCE sites include fishing and fish drying camps, shellfish middens, Mesopotamian ‘Ubaid-type pottery scatters, boat models, and boat fragments related to inland administrative centres. These make clear that maritime trade in (probably) dried fish and pottery between southern Mesopotamia and the Gulf extends back well into Neolithic times (Carter, 2006). Examination of aerial imagery suggests that beach ridges, indicative of the paleoshoreline associated with the Kuwaiti coastal sites, extend northward along the Khor Abdullah, passing slightly eastward of UQP. This raises the possibility of additional Ubaid sites or fishing camps as yet undiscovered along that line. Over the past five decades, similar trade ports dating from the second millennium BCE, through the Seleucid period of Old Zubayr’s occupation, and on into Islamic times have been excavated and identified on Falaika, Warba,

and Bubyan Islands in Kuwaiti waters, extending the range of potential estuary/coastal occupation near Um Qasr by several millennia.

Given the known archaeological setting for the port, any archaeological evidence at Um Qasr would likely be associated with one or more activities: fishing, livestock transhumance, agriculture, or extra-urban manufacturing (such as pottery, glass, brick, or metallurgical kilns).

Fishing camps are often associated with calcareous beach rock, marine shell, and limestone fragments. However, the only brief pedestrian reconnaissance along that line of beach ridges, conducted approximately 13km north of Umm Qasr, indicated that in undisturbed areas any evidence of these is probably buried beneath up to 5m of later silt deposits. Nevertheless, following ground disturbance (tillage) or earth moving operations (such as for horizontal construction), we would expect to see organic sediments, shell, potsherds, and/or lithic fragments cast up onto the surface along with geological material. While beachrock and limestone fragments are indeed ubiquitous around Um Qasr, no associated anthropogenic or organic material was observed.

Agricultural activities and settlements are invariably (and of necessity) associated with a source of fresh water. A relict estuarine channel appears to pass immediately adjacent to the site, making possible its use at some point for a pastoral camp or agricultural household. Two slightly raised mounds that could in the past have been associated with that feature were identified on imagery (see **Figure 17.2**). On one of these, the traces of former building foundations were evident; however, these could date from any period up to the very recent past (see **Figure 17.3**).

Figure 17.2: Umm Qasr Port showing relict estuary channel with potentially associated on and offsite mounds

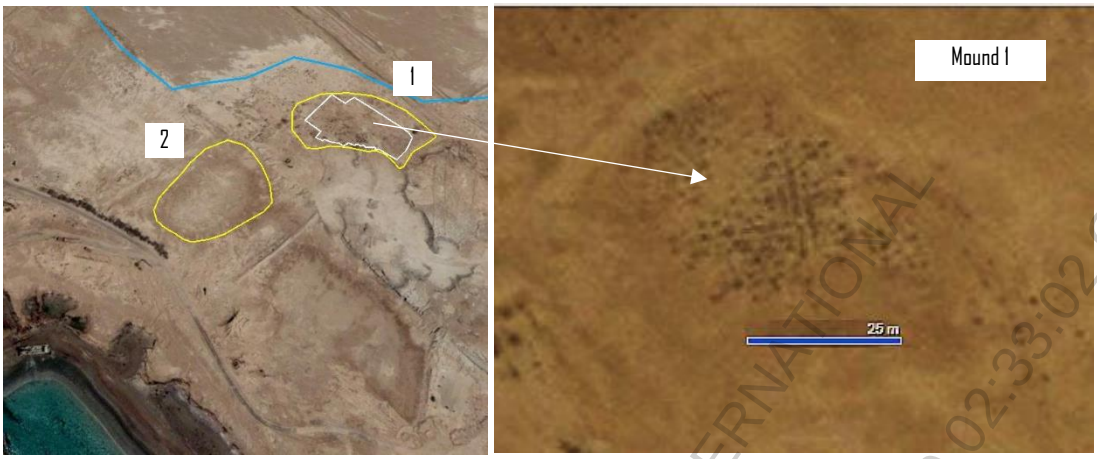

Figure 17.3: (L) On-site Mounds 1 and 2. About 50% of Mound 1 has been cleared away by earth-moving operations. (R) Earlier image of intact Mound 1. Vegetation marks indicate relict rectilinear features that are most likely remnants of an undated agricultural homestead.

Archaeological evidence of historical (Islamic) occupation or industry on these mounds would likely include surface remnants of domestic and/or production activities such as those found at old Zubayr (klinker, slag, kiln wasters, burnt brick, metal prill, vitrified materials); architectural debris (fragments of baked or fired brick, ceramic glazes, plaster, limestone or beach rock, mortar); and/or household debris (potsherds, coins, votives and lamps, garbage middens, charcoal, remnants of hearths, ovens or wells). None of this material was evident on-site (**Photograph 17-1**).

Photograph 17-1: *Overview of Mound 1, showing comprehensive prior disturbance. Inset: Anthropogenic debris visible at surface is limited to fragments of modern material like this asphalt.*

17.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to cultural heritage and archaeology.

17.3.1 National Policy and Legislation

Law No.55 of 2002 for the Antiquities and Heritage of Iraq. This provides the legal framework for the identification, protection, excavation and conservation of fixed and movable heritage items and antiquities including archaeological sites, historic buildings and artefacts.

17.3.2 International Guidance and Standards

IFC PS8: Cultural Heritage (2012). This provides accepted parameters and conditions for undertaking cultural heritage assessments and ensuring that cultural heritage impacts are addressed throughout the project process. In line with IFC PS8: Cultural Heritage, cultural heritage refers to (i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and (iii) intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge and practices of communities embodying traditional lifestyles. Information on socially-related cultural heritage features will be obtained as part of the SIA.

Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, International Council on Monuments and Sites (ICOMOS) (2011). This provides a standardised approach to assessing potential physical and setting impacts on the Outstanding Universal Value of World Heritage Sites (WHSs). The methodology is also of relevance to the assessment of impacts on other forms of cultural heritage features and archaeology sites.

17.3.3 International Conventions

The 1972 Convention concerning the Protection of the World Cultural and Natural Heritage. As a signatory to the Convention, Iraq is obliged to take measures to identify, conserve and protect its heritage, including (but not limited to) any WHSs within its boundaries.

17.4 Area of Influence

The Project has the potential to affect cultural heritage and archaeology through three primary mechanisms. The following sets out the relevant areas of influence:

- **Direct physical impacts.** These include, amongst others, the total or partial removal of features, damage to features from construction related vibration, the burial of a feature under spoil etc. The impacts are generally permanent and non-reversible. These forms of impact are largely contained within the development footprint, although vibration during construction can affect features at a distance from worksites. At this time the construction methods have not been defined so the scale of potential vibration impacts cannot be determined. A precautionary approach will therefore be taken and the AOI is determined to be the land required for construction purposes and a 200m buffer zone around major construction sites where piling will occur.

- **Changes to the setting of features.** These include visual, noise or activity based changes to the environment in which a feature is situated or a change that affects their relationships with other known features. Construction related impacts are temporary and are not considered further. Post-construction impacts are generally permanent and non-reversible. The AOI is therefore defined as the zone of visual influence around all above ground related infrastructure. The zone of visual influence will be determined by the Landscape and Visual Assessment (see Section 18).

- **Changes to environmental conditions** on archaeological or other heritage sites **due to dewatering or soil chemistry changes**. The AOI would be constrained to the affected areas of land and any features within it. Any such impacts and their extent will be examined in the ESIA, once further details on construction activities are known and their potential on impacts on Geology and Soils (see Section 6).

17.5 Baseline Key Data Gaps

No known cultural heritage features were identified within the construction footprint of the terminal and its zone of visual influence. No unrecorded archaeological sites were identified on imagery, walkover, or examination of the section cut away at Mound 1. While deeply buried archaeological features not visible from surface survey are always possible, the likelihood of encountering these within the construction footprint of the terminal is remote.

The extent of areas likely to be subject to dewatering or changes in soil chemistry are not known, however, any impacts of same within the construction footprint of the terminal is remote.

17.6 Identification of Potentially Significant Effects

17.6.1 Construction

The construction of the Project has little or no potential to remove or degrade archaeological sites and cultural heritage features within the Project area. Any direct impacts would occur as a result of deep (>2m) excavation related to the construction of facilities, pipelines, reservoirs, or works compounds. Receptors that could be affected include only unknown, deeply buried, ephemeral archaeological and paleo-ecological sites. Vibration from construction activity, would be highly unlikely to damage such undiscovered sites or features.

Table 17.1: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant effects
Archaeological sites and other cultural heritage features	Damage to, or removal of, sites and features within the construction footprint
Archaeological sites and other cultural heritage features	Damage arising from vibration

17.6.2 Operation

The presence of the terminal facilities could adversely affect the setting of unknown archaeological sites and cultural heritage features and relationships between them, but no such sites are known or were detected.

Operations could result in localised dewatering of areas of land and changes in soil chemistry which could adversely affect unknown, deeply buried and paleo-ecological archaeological sites.

Table 17.2: Summary of Potentially Significant Effects during Operation

Receptor	Potential Significant effects
Archaeological sites and other cultural heritage features	Degradation of the setting of sites and features within the zone of visual influence and / or degradation of linkages between sites and features
Archaeological sites and other cultural heritage features	Degradation of remains due to dewatering and soil chemistry changes

17.6.3 Decommissioning

Decommissioning activity is highly unlikely to affect cultural heritage and archaeology features. A potential risk exists for accidental damage to sites and features outside of the original construction footprint. This risk can be addressed by ensuring decommissioning works are wherever possible contained to the original construction footprint and that archaeological sites and cultural heritage features within or in proximity to the construction footprint are adequately marked and avoided by construction traffic and activity.

Table 17.3: Summary of Potentially Significant Effects during Decommissioning

Receptor	Potential Significant effects
Archaeological sites and other cultural heritage features	Accidental damage to sites and features outside of the construction footprint during decommissioning works

17.7 Summary of Topics Scoped In/Out

The following topics have been scoped in/out:

Table 17.4: Scoping Summary - Cultural Heritage and Archaeology

Issue	Scoping Assessment	Justification
Physical damage to and degradation of archaeological sites and other cultural heritage features within the footprint of construction sites	Scoped out	Risk is low. No known features are recorded, visible on imagery, or visible on surface walkover. Further, location has already been subject to considerable previous construction-related surface and sub-surface disturbance, with no archaeological sites or other cultural heritage features noted. Should construction excavation encounter deep subsurface material, handle IAW chance finds policy.
Physical damage to archaeological sites and other cultural heritage features due to construction related vibration	Scoped out	Risk is low. Should undetected sub-surface features exist, they are extremely unlikely to comprise substantial architecture. More likely would be ecofactual material such as fish bones, shell middens, and/or pottery scatters. Should construction excavation encounter

Table 17.4: Scoping Summary - Cultural Heritage and Archaeology		
Issue	**Scoping Assessment**	**Justification**
		deep subsurface material, handle IAW chance finds policy.
Degradation of archaeological sites and other cultural heritage features due to dewatering and soil chemistry changes due to construction activities	Scoped out	Dewatering would have primary impact on buried organic ecofacts (hastening decomposition) and ceramics (evaporating salts can erode surface decoration and break down ceramic fabric). Given prior disturbance and lack of surface evidence, risk is low. Should construction excavation encounter deep subsurface material, handle IAW chance finds policy.
Degradation of the setting of archaeological sites and other cultural heritage features within the zone of visual influence and / or degradation of linkages between sites and features during operation	Scoped out	Given the extent and history of pre-existing construction and disturbance, any additional impact is nil.
Degradation of archaeological sites and other cultural heritage features due to dewatering and soil chemistry changes during operation	Scoped out	Dewatering would have primary impact on buried organic ecofacts (hastening decomposition) and ceramics (evaporating salts can erode surface decoration and break down ceramic fabric). Given prior disturbance and lack of surface evidence, risk is low. Should construction excavation encounter deep subsurface material, handle IAW chance finds policy.
Accidental damage to sites and features outside of the construction footprint during decommissioning works	Scoped out	Risk is low and can be addressed by ensuring decommissioning works are wherever possible contained to the original construction footprint and that archaeological sites and cultural heritage features within or in proximity to the construction footprint are adequately marked and avoided by construction traffic and activity.

17.8 ESIA Approach and Methodology

17.8.1 Tasks Completed

- An accurate baseline of known archaeological sites and heritage features within a 100-km radius of the port, derived from published site registries, comprehensive literature review, analysis of satellite imagery and aerial photography, and pedestrian survey;
- An accurate baseline of unknown archaeological sites and heritage features within a 1km radius of proposed Project footprint derived from analysis of satellite imagery and aerial photography, pedestrian survey, and ground photography;
- Mapping of all cultural heritage, archaeological and paleontological features identified; and
- Qualitative assessment of the potential impacts on identified archaeological sites and cultural heritage features, using the methodologies set out in appropriate guidance.

17.8.2 Remaining Tasks

Although, Cultural Heritage and Archaeology have effectively been scoped out, the following measures will be implemented:

- Preparation of a chance finds and mitigation plan which would establish measures to sample and record features exposed incidental to construction excavations;
- Interface with the social impact assessment team to gather anecdotal information on the locations of historical features;
- Interface with the visual impact team to explore the overlap of the cultural landscape and social heritage;
- Identification of areas that may be subject to vibration, dewatering or soil chemistry changes and identify archaeological sites and cultural heritage features in those areas that may be affected; and
- Review of emerging design to seek to reduce damage to identified sites and features.

18 Landscape and Visual

18.1 Introduction

This section summarises the baseline conditions, applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to landscape and visual impacts. It also sets out the methodology and approach to the ESIA for this topic.

18.2 Baseline Conditions

Topographically, Iraq is shaped like a basin containing the great Mesopotamian plain of the Tigris and Euphrates rivers and the Project area lies within the flat, low-lying floodplain of the Khor Al-Zubair. The general landscape of the Project area is flat, broad and open adjacent to the existing UQP.

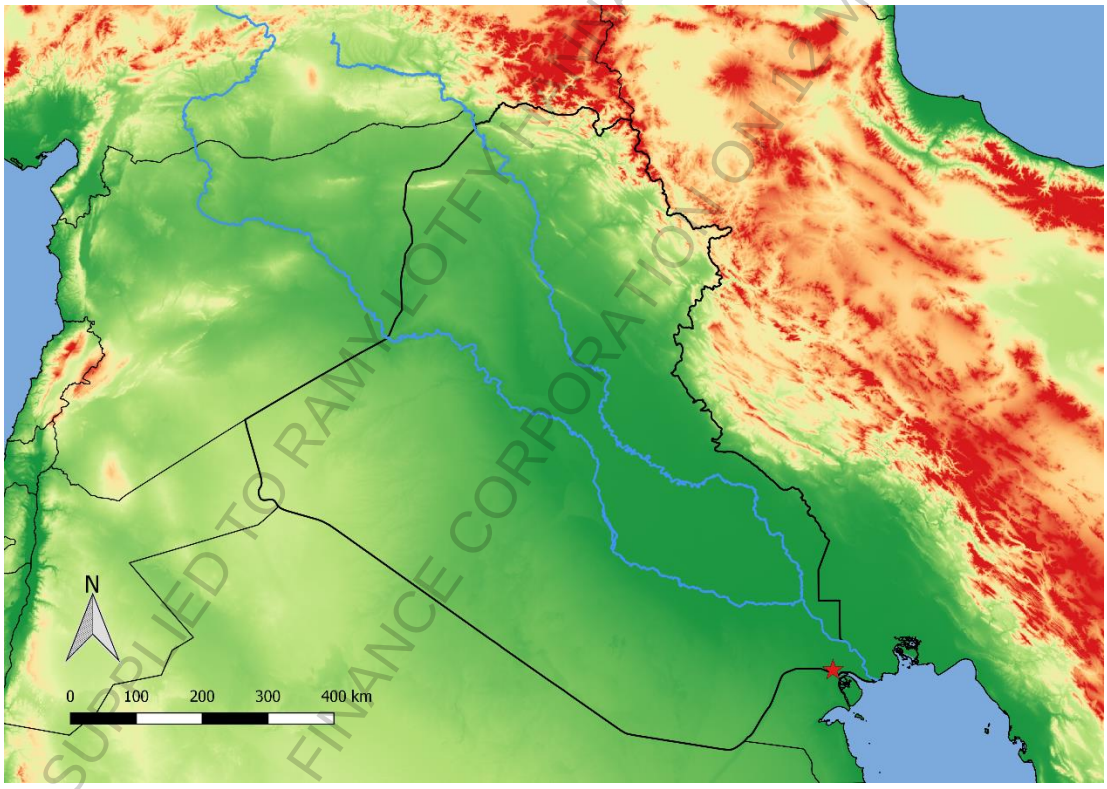

Figure 18.1: Topography of Iraq

18.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to landscape and visual impacts.

18.3.1 National Policy and Legislation

Law No.35 on Public Roads of 2002. This details procedures and practices to be followed on resettlement and acquisition of land and property relating to road construction and rehabilitation. (Annex 3) Part III of the road law covers land acquisition and compensation procedures for the public roads construction.

18.3.2 International Guidance and Standards

The following UK guidelines are relevant to landscape and visual impact assessment:

- Landscape Institute and the Institute for Environmental Management and Assessment – UK Guidelines for Landscape and Visual Impact Assessment (GLVIA) 2013; and
- Natural England and Department for Environment, Food & Rural Affairs - Landscape and Seascape Assessment Guidance, 2014.

18.3.3 International Conventions

There are no international conventions to which Iraq is a signatory that are directly relevant to this topic.

18.4 Area of Influence

The AOI (referred to as the Zone of Theoretical Visibility (ZTV) in landscape and visual assessment) has taken into account the location of the proposed infrastructure, whether they are permanent or temporary features, and the presence of key receptors and their views around the infrastructure as inferred from the reconnaissance site visit. Due to the flat topography of the Project area and surrounds, an approximate 2km limit of extent of the study area from all the elements has been identified, as that is considered to be the furthest distance within which significant effects are likely to be perceived.

It is not considered likely that the terminal will have significant visual or landscape impacts during either construction or operation, provided that unsuitable dredgings are disposed of without significant local changes to landform. Therefore, it is considered that, depending on the height, scale and built form of the proposed structures, it is unlikely that they will have

significant impacts on the landscape character, since it is such a broad scale landscape which can absorb structures of the type proposed.

18.5 Baseline Key Data Gaps

The following key data gaps have been identified:

- Landscape character and landscape value at a regional and local scale; as these data may not be available within Iraq, it is proposed to use other data such as land cover, agricultural profiles, cultural heritage, etc to identify broad areas of landscape character;
- Mapping and data on culturally and/or historically significant features; and
- Mapping of landform.

18.6 Identification of Potentially Significant Effects

18.6.1 Construction

Table 18.1: Summary of Potentially Significant Effects during Construction

Receptor	Potential Significant Effects
Human receptors e.g. classified according to sensitivity (in homes, hospitals, schools, tourists, drivers on highways etc.)	Visual impacts during construction from equipment, construction traffic and activities, dust clouds, spoil heaps, elements under construction, excavations etc
Physical landscape and landscape character	Changes to land cover and landform inconsistent with the landscape as a result of site clearance.

18.6.2 Operation

Table 18.2: Summary of Potentially Significant Effects during Operation

Receptor	Potential Significant Effects
Human receptors e.g. classified according to sensitivity (in homes, hospitals, schools, tourists, drivers on highways etc.)	Visual impacts during operation from equipment, maintenance and operational activities, and the presence of the infrastructure during operation.

Table 18.2: Summary of Potentially Significant Effects during Operation	
Receptor	**Potential Significant Effects**
Physical landscape and landscape character	Changes to land cover and landform inconsistent with the landscape. From site reconnaissance, it seems unlikely that site clearance works will have potential significant effects.

18.6.3 Decommissioning

Table 18.3: Summary of Potentially Significant Effects during Decommissioning	
Receptor	**Potential Significant Effects**
Human receptors e.g. classified according to sensitivity (in homes, hospitals, schools, tourists, drivers on highways etc.)	Visual impacts during decommissioning from decommissioning traffic, equipment, and activities
Physical landscape and landscape character	Changes to land cover and landform inconsistent with the landscape, for example, derelict structures or disturbed land not fully restored.

18.7 Summary of Topics Scoped In/Out

As identified in Section 18.1, a pragmatic approach to the landscape and visual impact assessment is proposed; with a focus on those key areas where visual impact may be a concern, based on the field notes reviewed to date.

Table 18.4: Scoping Summary - Landscape and Visual		
Issue	**Scoping Assessment**	**Justification**
Visual impacts during construction from equipment, construction traffic and activities, dust clouds, spoil heaps, elements under construction, excavations etc	Scoped out	Visual impacts will be temporary and can be managed by good site practises during construction. Mitigation and management measures will be included in the ESMP.

Table 18.4: Scoping Summary - Landscape and Visual		
Issue	**Scoping Assessment**	**Justification**
Changes to land cover and landform inconsistent with the landscape as a result of site clearance	Scoped out	From site reconnaissance, seems unlikely that site clearance works will have potential significant effects, particularly given the scale and character of the landscape
Visual impacts during operation from equipment, maintenance and operational activities, and the presence of the infrastructure during operation	Scoped out	Adjacent to other port structures.
Visual impacts during decommissioning from decommissioning traffic, equipment, and activities	Scoped out	Visual impacts will be temporary and can be managed by good site practises during construction. Mitigation and management measures will be included in the ESMP.
Changes to land cover and landform inconsistent with the landscape, for example, derelict structures or disturbed land not fully restored	Scoped out	It is not possible to predict the changes that will occur during decommissioning currently; Mitigation and management measures will be included in the ESMP.

18.8 ESIA Approach and Methodology

The landscape and visual assessment will interpret the physical elements and features that will be affected by those key elements of the Project identified above, and assess the impact and likely significance of effect. In addition, the assessment will ensure through mitigation by design that the preferred options for each project component protect or enhance the best and most important elements and features of the landscape.

The next steps for the landscape and visual aspects of the ESIA will therefore include the following:

- Liaison with Social, Biodiversity and Cultural Heritage teams to inform the baseline conditions for factors that inform landscape character and visual impact, such as land cover, land use, ecology and management; and cultural and historical associations;

- Determination of landscape character areas and constituent components that give each their character;
- Ongoing liaison with design team to ensure full understanding of design and construction methodology, to include iterative feedback of mitigation suggestions both inherent (changing the design to mitigate impacts) and additional (adding landform, planting and/or other design elements, to assist in integration and screening); and
- Assessment and identification of mitigation measures, using the UK guidelines outlined in Section 18.3.

19 Labour Issues

19.1 Introduction

This section summarises applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to labour issues. It also sets out the methodology and approach to the ESIA for this topic.

19.2 Baseline Conditions

Legislation

Iraq has issued a new Labour Law, 7/2015 (the new Labour Law) which replaces the old Labour Law, number 71 of 1987. The new Labour Law entered into force on 7 February 2016. Public sector workers are not covered by the new Labour Law; however, private sector workers are. It is envisaged that all Project construction and operation employees will enter into contracts, terms and conditions established by BMT and therefore be private sector workers.

Enforcement of Legislation

As the new Iraqi Labour Law only came into effect in February 2016, it is too early to tell how effective enforcement of this legislation is. Laws that regulate the employment of foreign workers are also not strongly enforced, which is resulting in employers providing work to foreign workers instead of Iraq residents.

Labour Market

Iraq depends on oil revenue and the role of the private sector is marginal. While accounting for 65% of Iraq's GDP, the oil sector currently employs only 1% of the total labour force. Therefore, job-seeking Iraqis are dependent on public sector employment, or smaller private industries for work. While men tend to find opportunities in construction and security, women in Iraq largely find work in agriculture or services.

In Iraq, formal employment–where employees receive a wage and are entitled to workers' rights–is largely represented by public sector openings (approximately 62% of waged employees). Private sector opportunities are fewer and primarily limited to the oil and security industries. An estimated 45% of urban employment is accounted for by public and government sectors, and 28% of rural employment. Although women comprise of less than one-fifth of the labour force in Iraq, 60% of working women are employed by the public sector. Labour market participation is also extremely low for youth, Iraq is one of the youngest

countries in the world, with Iraqis under 24 years old accounting for 59% of the population. But 33% of male youth (14 to 24 years old) and 60% of female youth are unemployed.

The informal sector, the part of Iraq's economy that is neither regulated or taxed by the government, fills the gaps where formal public and private employment cannot. Participation in informal sectors is spread out evenly between manufacturing and construction, wholesale, transport, services, and public administration and social services (involvement in informal agriculture was considerably smaller). The informal economy is not illegal and in many ways, supports the activities of the formal public and private sectors by acting as an intermediary for goods and services, although the former delivers finished products as well. Many Iraqis move into the informal economy to gain experience, and then try to transition into formal employment. Thus, the underground sector is a large employer of Iraqis and absorbs a good amount of the labour force.

The displacement of millions of people in Iraq and the Syrian crisis has had a negative impact on employment and inflated the informal sector.

Wages

In Iraq, the minimum wage is set by the GoI. There is no collective bargaining in the public sector, which covers the majority of workers. The private sector minimum wage is US$200 per month and is set by a tripartite committee. Enforcement is a major problem and there are many demonstrations over unpaid wages.

Due to IS and the reduction in the oil price, public sector employees have experienced delays as well as reductions in their salaries.

Child Labour

Due violence and displacement, it has been estimated that more than half a million Iraqi children are at work rather than at school (Nazeh & Hameed, 2016). In addition, armed groups engaged in combat against the IS, recruited and used children, some of whom were as young as 12 years old. Children in Iraq also engage in other forms of child labour, including forced begging and commercial sexual exploitation, each sometimes as a result of human trafficking (US Department of Labor, 2016).

19.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to labour.

19.3.1 National Policy and Legislation

Law No. 37 of 2015 (Iraqi Labour Law). The law provides legal protection for workers in the private and cooperative sectors against unethical practices from employers, covering collective bargaining, freedom of association, anti-discrimination, and child labour. However, workers in the public sector are not covered. This law is largely consistent with core ILO Conventions except C087 on freedom of association.

Law No. 8 of 2006. The law states the Ministry of Labour and Social Affairs (MoLSA) should provide a minimum wage at a level that guarantees an income for decent living, enhance awareness of workplace safety, and provide equality of job opportunities. This is currently set at 250,000 dinars per month in the private, mixed and cooperative sectors. The Project should therefore comply with the requirements of the MoLSA.

Directive No. 4 of 1993. This establishes work place procedures designed to minimise vibration and any harmful effects that it might have on workers. It stipulates maximum total daily limits for exposure to vibration.

19.3.2 International Guidance and Standards

IFC PS2: Labor and Working Conditions. This PS is applicable to the construction and operation phases of the Project, when suppliers and nationals may be employed. The objective of IFC PS2 is to promote the fair treatment, non-discrimination, and equal opportunity of workers; establish, maintain, and improve the worker-management relationship; promote compliance with national employment and labour laws; protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain; promote safe and healthy working conditions, and the health of workers, and; avoid the use of forced and child labour.

While this assessment either falls within an analysis of legislative provisions or a determination of the risk of likely breaches of labour standards occurring, this is all aimed at providing an indication of likely impact and identifying particular actions, information requests or policies that need to be put in place to contribute to IFC PS2 compliance.

19.3.3 International Conventions

Iraq has ratified seven out of the eight ILO Core Conventions. The Convention that it has yet to ratify is C087 on Freedom of Association and the Right to Collective Organisation. Below outlines the seven Conventions that have been ratified and their relevance to the project. For a full list of the other ILO Conventions ratified by Iraq, see Section 4.

- ILO C029 - Forced Labour Convention, 1930 & ILO C105 - Abolition of Forced Labour Convention, 1957: Both are aimed at eliminating all forms of forced or compulsory labour. It is possible that the workers employed in the Project may be vulnerable to abuse, and as Iraq has ratified both, the project should follow and adhere to their requirements.

- ILO C098 - Right to Organise and Collective Bargaining Convention, 1949: It provides workers' and employers' organisations from interference by each other or the authorities. Whether the Project employs local workers or workers from abroad it is important they are given the right to organise and bargain for their rights.

- ILO C100 - Equal Remuneration Convention, 1951: As the Project will likely employ workers of different genders from different ethnic, national, and linguistic backgrounds this Convention is important as it provides the right to equal remuneration for equal work.

- ILO C111 - Discrimination (Employment and Occupation) Convention, 1958: Prohibits discrimination on the basis of race, colour, sex, religion, political opinion, national extraction or social origin in employment or occupation, which is especially relevant to this Project where there are workers from a variety of backgrounds.

- ILO C138 - Minimum Age Convention, 1973 & ILO C182 - Worst Forms of Child Labour Convention, 1999: Both Conventions are relevant to the project as they prohibit the use of labour below a certain age, from being exploited, as well as the use of young workers in dangerous or hazardous work.

19.4 Scope

There are several factors which contribute to impacts on labour rights issues that are important for the Project to consider, including: gaps in labour legislation, enforcement of labour legislation, labour market conditions and growing unemployment, low wages, discrimination and, child labour. The focus of the labour issues under consideration in this report are those issues that have been scoped as specific issues within Iraq.

19.5 Baseline Key Data Gaps

There are a number of factors which contribute to impacts on labour rights issues that are important for the Project to consider, including: gaps in labour legislation, enforcement of labour legislation, labour market conditions and growing unemployment, low wages, discrimination and, child labour.

Key data gaps are outlined below.

Enforcement

- Information on hold the 2015 Labour Law is being enforced;
- Data on number of labour inspectors; and
- Nature and frequency of existing complaints.

Labour market

- Further details on demographics of the local population (by nationality, citizenships status, religion, ethnicity);
- Information on existing labour market conditions, disaggregated by gender; and
- The breakdown of workers being hired on the Project, by skills, nationality, languages spoken, gender, ethnicity and religion; these data are anticipated from BMT at the impact assessment stage.

Wages

The rates of pay for workers on site and the process for workers being paid these data are anticipated from BMT at the next phase.

Discrimination

- Employment practices: how are the workers being hired; how long are the contracts of employment for; how many contractors are being used to recruit workers; who is responsible for sourcing/supplying labour. These data are anticipated from BMT at the next phase.
- Identification of economically vulnerable groups in the areas; this will be identified through the proposed social surveys (Section 16).

Child labour

- Checks that are in place to verify ages of workers on the project.

19.6 Proposed Methodology and Approach

In relation to labour issues, subsequent studies will more clearly address the following issues:

- Which labour rights issues of direct and indirect workers will likely be affected by which phases /activities of the Project;

- The policies and procedures that are already in place to mitigate or reduce those impacts; and
- Recommended additional steps and actions that should be put in place to mitigate risk.

In carrying out these studies it is important that the assessment looks not only at the likely impact of workers on communities, but rather considers who the workers themselves are that may be impacted by the project. It is proposed that this will be conducted through a separate chapter based on IFC PS2 in the ESIA.

20 Human Rights

20.1 Introduction

This section summarises applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to human rights. It also sets out the methodology and approach to the ESIA for this topic.

20.2 Baseline

Ethnic Discrimination

Ethnic discrimination is a key risk. The country's population included Arabs, Kurds, Turkmen, and Shabaks as well as ethnic and religious minorities, including Chaldeans, Assyrians, Armenian Orthodox, Syriacs, Yezidis, Sabean-Mandean, Bahai, Kaka'i, and a very small number of Jews. The country also had a small Romani community, as well as an estimated 500,000 citizens of African descent, referred to as "Black Iraqis," who reside primarily in Basra and the South.

In October 2015, Parliament passed The National Identity Card Law, which came into effect in February. This law automatically registers minor children as Muslims if they are born to at least one Muslim parent, or if either parent converts from another religion to Islam. Additionally, the law does not allow non-Muslims to self-identify with their ethnic group nor does it allow Muslims to convert to other religions.

Gender Discrimination

Although the constitution forbids discrimination based on gender, conservative societal standards impeded women's ability to enjoy the same legal status and rights as men in all aspects of the judicial system. Throughout the country, women reported increasing social pressure to adhere to conservative social norms.

Law and custom generally do not respect freedom of movement for women. For example, the law prevents a woman from applying for a passport without the consent of her male guardian or a legal representative. Women could not obtain the Civil Status Identification Document - required for access to public services, food assistance, health care, employment, education, and housing - without consent of a male relative.

In August 2015, as part of the prime minister's reform package, authorities dissolved the Ministry of State for Women's Affairs, which had functioned primarily as an advisory office

without an independent budget. The former ministry was largely ineffective at solving problems facing women, according to civil society and international women's rights groups.

Freedom of Expression

The constitution broadly provides for the right of free expression that does not violate public order and morality, express support for the banned Ba'ath party, or advocate altering the country's borders through violent means. The main limitation on individual and media exercise of these rights was self-censorship due to credible fear of reprisals by the government, political parties, ethnic and sectarian forces, terrorist and extremist groups, or criminal gangs.

Despite the constitutional protection for freedom of expression, GoI oversight and censorship interfered with media operations, at times resulting in closures of media outlets, restrictions on reporting, and interference with internet service. Individuals were able to criticize the government publicly or privately, but not without fear of reprisal.

Governance

Legislation provides criminal penalties for corruption by officials, however, the GoI does not implement the law effectively. There were numerous reports of government corruption during the year. Officials in all parts of the government often engaged in corrupt practices with impunity, and investigation of corruption was not free from political influence. Family, tribal, and religious considerations significantly influenced government decisions at all levels. Bribery, money laundering, nepotism, and misappropriation of public funds were common.

The Ministry for Human Rights was disbanded in 2015 in response to public demonstrations against corruption and government inefficiency.

20.3 Applicable Standards and Guidance

An overview of the overarching laws and guidance that relate to the ESIA process are set out in Section 4. This section sets out the national legislation and international conventions and guidance that are specifically relevant to human rights.

20.3.1 National Policy and Legislation

Iraqi Constitution (2005). This Project will directly affect people living and working in the areas that facilities are being built, either through displacement of land or tenure or through other effects on health facilities and other resources. Section 2 of the Constitution establishes rights and liberties, including civil and political, and social, cultural and economic rights.

20.3.2 International Guidance and Standards

IFC PS4: Community Health, Safety, and Security. This PS applies to project activities that could potentially impact the health, safety or security of project-affected communities. The objectives of the standard are to (i) anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances, and (ii) to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner, that avoids or minimizes risks to the Affected Communities.

IFC PS5: Land Acquisition and Involuntary Resettlement. The physical footprint of the Project, and its associated activities and infrastructure, could involve the physical or economic displacement of a small number of people from their existing properties, including their land and livelihoods. Objectives of the standard are to; avoid and minimize displacement by exploring alternative project designs; avoid and minimize adverse socio-economic impacts from land acquisition; and, to improve, or restore, the livelihoods of economically displaced persons; and, to improve the living conditions of physically displaced persons by providing adequate replacement housing with security of tenure at resettlement sites.

IFC PS7: Indigenous Peoples. This PS applies to project activities that could significantly impact Indigenous Peoples (IPs). The objectives of this standard are to ensure that; the project development process fosters respect for the dignity, human rights, and cultural uniqueness of IPs; adverse effects on IPs during development are avoided, minimized, mitigated or compensated; ensure that IPs receive culturally appropriate and gender and inter-generationally inclusive socio-economic benefits; relationships with IPs are based on informed consultation and participation (ICP) throughout the project's lifecycle; and, the free, prior, and informed consent (FPIC) of IPs when circumstances outlined in the Performance Standard are present.

IFC PS8: Cultural Heritage. This PS becomes applicable in the event that cultural heritage resources are identified within the project area. This includes spiritual, historical, architectural, religious, aesthetic, or other cultural significance at the local, provincial or national level, or within the international community. The objective of this policy is to protect cultural heritage from the adverse impacts of project activities and support its preservation and promote the equitable sharing of benefits from the use of cultural heritage.

20.3.3 International Conventions

Below are some of the key international conventions protecting human rights that have been ratified by Iraq, and which are likely to be relevant to the construction and post-construction phases of this Project:

- **International Covenant on Civil and Political Rights.** International human rights instrument that is intended to protect the right to life, freedom of religion, freedom of speech, freedom of assembly etc. As the human rights of workers and communities surrounding the project may be affected, the Project should adhere to the Covenant.
- **International Covenant for Economic Social and Cultural Rights.** Objective is to provide labour rights, the right to health, the right to education and the right for an adequate standard of living etc.
- **International Convention on the Elimination of All Forms of Racial Discrimination**. Prohibits racial discrimination.
- **Convention on the Elimination of All Forms of Discrimination against Women**. Prohibits discrimination against women and gives women the equal right to access, and equal opportunities in political and public life – including voting, standing for political office, in education, healthcare, and employment.

20.4 Scope

The methodology for this section involved the following: an identification of the likely human rights issues to be affected by the Project; and an assessment of the relevant legislation and other standards related to human rights in the region and assessment of the pattern of human rights issues that are relevant for the Project, based on quick desk-based research.

There are several human rights that could be affected by the Project including, enforced physical displacement arising from the footprint of the Project's site and infrastructure or discriminatory practices against particular community groups or based on gender. The scope of the human rights assessment will therefore include the following subtopics: ethnic discrimination; gender discrimination; freedom of expression; land; and governance.

20.5 Baseline Key Data Gaps

There are several human rights that could be affected by the Project including discriminatory practices against particular community groups or based on gender.

Legislation

- Actions taken by the GoI to improve human rights; and
- Legislation protecting human rights (including laws against sexual harassment, rape etc).

Ethnic groups

- Status of different groups in terms of constituting 'indigenous people';
- Data of different ethnic groups residing close to the Project area; and
- Data on changes in size of different ethnic groups residing close to the Project area.

Gender discrimination

- Data on inheritance rights of women.

Governance

- Data down to local level of formal and informal governance structures, their functions and processes; and
- Data on judicial capacity to enforce laws.

20.6 Proposed Approach and Methodology

All of the scoped human rights issues identified above should be addressed to align the ESIA study fully with the IFC PSs, in particular those identified above. However, there are strong arguments that a separate human rights impact study may be a preferable route in terms of both focus on the relevant issues and also to ensure that there is a greater degree of control over the degree to which the human rights impact study information is disclosed and shared.

To ensure that there is full assessment of human rights, the SEP will be screened to ensure that human rights questions are put to the appropriate stakeholders and, in addition, there are additional human rights experts or advocacy groups included in the scope of engagement.

21 Conflict Sensitivity

21.1 Introduction

This section summarises applicable standards, key receptors and potential effects that could arise as a result of the Project in relation to conflict sensitivity. It also sets out the methodology and approach to the ESIA for this topic.

21.2 Baseline Conditions

There are numerous potential triggers to conflict in Iraq, including:

- **Water security**: a significant issue regarding the stability of Iraq. The control of water sources has also become a key strategic objective for all groups in the region.
- **Unemployment and poverty:** The downsizing of the public sector and rising unemployment in the region, added to an increase in the number of IDPs and refugees fleeing is increasing political pressure and opposition. This is also leading to a strain on resources including water, sanitation, electricity, food, health services, housing and quality education.
- **Ethnic discrimination:** Widespread discrimination of Marsh Arabs and informal discrimination along tribal or familial lines.
- **Islamic State:** Ongoing conflict with IS a persistent threat to the stability of the Iraq.
- **Sectarianism:** Although the Shias represent the largest ethnic strand in Iraq, the Sunnis have politically dominated Iraq for centuries until 2003, when following the U.S. occupation, the state's power was consolidated in the hands of Shia parties which has left Sunnis felt increasingly marginalized.
- **KRI independence.** In September 2017, the KRI held an independence referendum despite Iraq's Supreme Court ordering its suspension. Approximately 93% of the votes cast in favour of independence, however, the referendum's legality was rejected by the GoI. The referendum also took place in disputed areas occupied by the Kurdish Peshmerga following military operations against IS. Consequently, the GoI closed Kurdish airspace, Turkey, Iran and Iraq closed border crossings and GoI launched operations to regain the disputed areas.

21.3 Proposed Approach and Methodology

To better assess the likely conflict implications of the Project and the steps that might be taken, an additional separate short study will be carried out, to both protect the Project against such risks, and also to determine the degree to which the Project may – perhaps unwittingly – contribute to enhanced conflict risks.

The study will include the following elements:

- An assessment of the key conflict triggers in the region; and
- An analysis of the aspects of the project activities – including, employment, community impact, physical impacts such as water security, land and government relations – which are most likely to give rise to conflict risks.

22 Other Projects in the Area

There are several other developments taking place in the vicinity of the Project as detailed in **Figure 22.1**. These could have an influence on, or be influenced by, the Project:

- **WTPS Oil Terminal.** WTPS is to develop an oil product import facility on the Khor Al-Zubair close to the KZP;
- **Grand Fao Port.** Grand Fao Port has been designed in order to move about 36 million tonnes of containerized freight (4 million of TEU) and about 22 million tonnes of dry bulk by 2028, to be increased respectively to 7.5 million of TEU and 33 million of tonnes respectively by 2038. The project includes 2,000,000m^2 of yard for terminal container stacking, 600,000m^2 for dry bulk yards and 1,000,000m^2 of land yard for buildings and warehouses 200,000m^3 of silos for wheat. A double lane road (2,000 - 3,000 commercial vehicles during peak hours) and a double track railway (80 - 90 couples of train/day) will connect the new port to the existing transport network. The Port will be protected by rubble mound breakwaters approximately 15km long, however, as yet, only the breakwaters have been completed and no other developments have taken place;
- **Port Sector Rehabilitation Project Phase II**. As part of the Japanese ODA loan agreement, a series of rehabilitation works at KZP are to be undertaken including the construction of a Dredger Service Berth, a new berth between berths 1 and 2 and a paving area for HGVs. During the Project area reconnaissance undertaken in October 2017, it was noted that the Dredger Service Berth area had been fenced off;
- **Iraq National Water and Wastewater Scheme.** The GoI has highlighted Basra has having a priority requirement for water supply and sanitation. As such, new water supply infrastructure for Basra City and for the south-west and south-east of the Governorate is to be constructed including three water treatment plants (two of which will abstract from the Khor Al-Zubair), storage facilities and associated pipelines;
- **Common Seawater Supply Project (CSSP).** The aim of the CSSP is to provide 12.5 million barrels of water per day of treated seawater, from the Khor Al-Zubair, to oilfields across two phases. However, the anticipated project start year has been pushed back a few times due to change in management, administrative delays, and financing hurdles. CSSP's current status is still in flux; and
- **Basra Gateway Terminal.** In October 2017, ICTSI announced that two new berths are to be developed at Basra Gateway Terminal to double its container handling capacity to 1.2 million TEU. Berths 25 and 26 will be equipped with quay and landside container handling

systems to enable them to handle container vessels of up to 10,000 TEU. Once complete, the terminal will offer a continuous berthing line of 600m and 50 hectares of yard area.

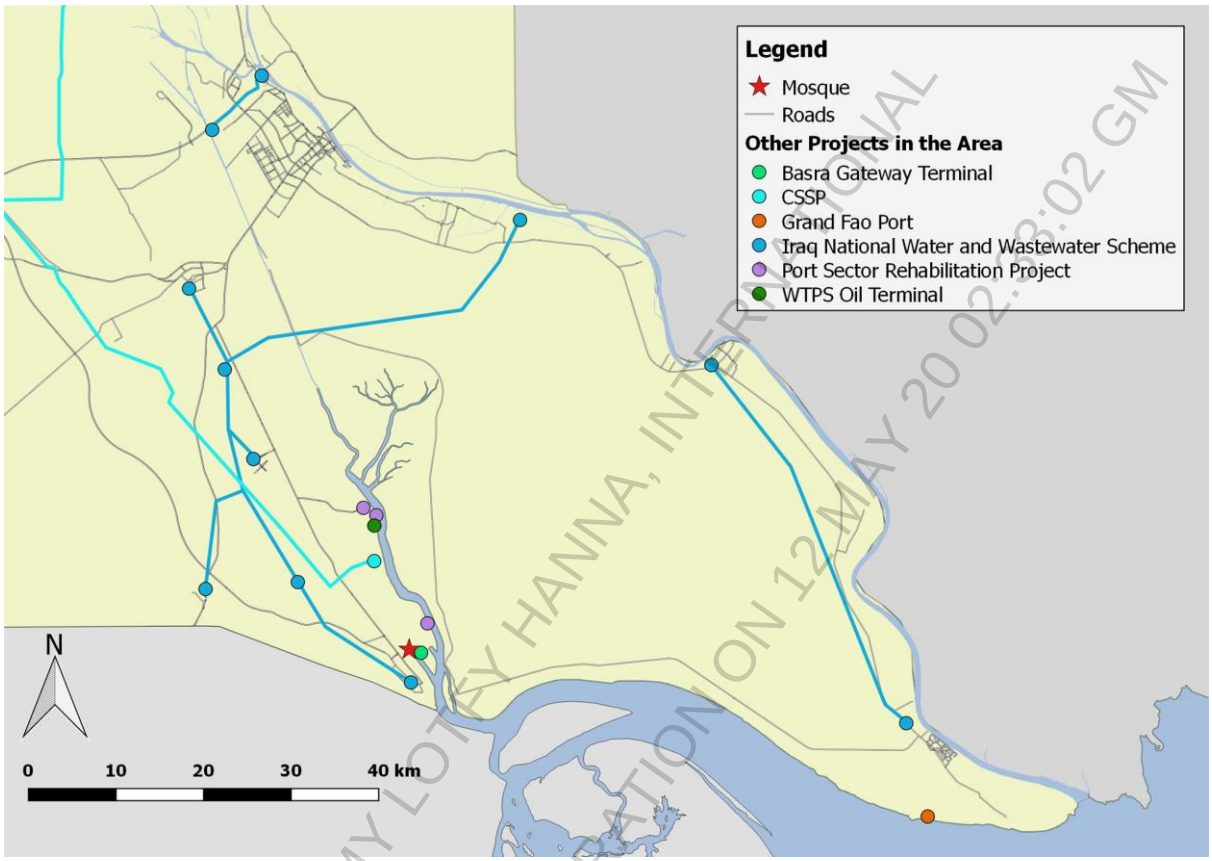

Figure 22.1: Other Projects in the Area

23 Stakeholder Engagement

23.1 Introduction

This section summarises the proposed plan for stakeholder engagement. The detailed approach to stakeholder engagement is set out in the Stakeholder Engagement Plan (SEP).

23.2 Stakeholder Engagement Commitments

Stakeholder engagement for the Project will be undertaken in accordance with:

- National requirements as set out in the legal framework for ESIA in Iraq; and
- International guidelines.

23.2.1 National Requirements for Stakeholder Engagement

There is no direct local legislation regarding the provision of a SEP, however, Chapter 1, Article 1 of the Law No. 27 of 2009 – Protection and Improvement of the Environment, states the following:

'This law aims at protecting and improving the environment through removing and treating the already existing damages or that which may happen and saving the public health, natural resources, the biological diversity and the cultural and natural heritage in cooperation with competent authorities to accomplish the sustainable development and to achieve the international and territorial cooperation in this field'.

Whilst paragraph 5 of Chapter 14, Article 14 of Law No. 13 of 2006 – The Investment Law states that the investor must:

'…..protect the safety of the environment and to adhere to the valid quality control systems in Iraq and international regulations accredited in this field, also the laws related to security, health, public order and values of the Iraqi society'.

At a national level, whilst environmental protection is espoused in several legislative instruments, the expectation of public participation and stakeholder engagement is not yet enshrined in federal and national legislation. Furthermore, where environmental legislation does exist it tends to be focussed on oil and gas activities and is more aspirational than a rigorously monitored and enforced regime. There is, however, clearly an acknowledgement that social issues should be considered and a recognition that International Standards should be applied.

23.2.2 International Guidelines

As a result of the lack of appropriate local legislation and weak enforcement of the legislation that does exist, international projects rely on international best practice and associated guidelines.

IFC Performance Standards

The IFC Performance Standards on Environmental and Social Sustainability (IFC, 2012) provide guidance to a developer in planning good practice stakeholder engagement. The IFC Performance Standards require clients to engage with affected communities through the disclosure of information, consultation and informed participation, in a manner commensurate with the risks to and impacts on the affected communities.

The following IFC procedures, policies and practical manuals are relevant:

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts

One objective of this Performance Standard (PS) is to promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated. PS 1 also supports the use of an effective grievance mechanism that can facilitate early indication of, and prompt remediation for those who believe that they have been harmed by a client's actions.

Effective consultation is a two-way process that should: (i) begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise; (ii) be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to Affected Communities; (iii) focus inclusive engagement on those directly affected as opposed to those no directly affected; (iv) be free of external manipulation, interference, coercion, or intimidation; (v) enable meaningful participation, where applicable; and (vi) be documented.

Performance Standard 5: Land Acquisition & Involuntary Resettlement

PS 5 notes that there should be consultation and informed participation of affected persons and communities in decision-making processes related to settlement. A grievance mechanism should also be established to receive and address specific concerns about compensation and relocation.

Vulnerable people

IFC recommend special attention is given to vulnerable stakeholders. Vulnerable people include those who by virtue of their gender, ethnicity, age, physical or mental disability, economic disadvantage or social status may be more adversely affected by a project than others, and who may be limited in their ability to take advantage of a project's development benefits.

Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets

The IFC has prepared an updated and revised guide entitled Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets (IFC, 2007). This guide details the procedure for managing stakeholder engagement. The Handbook emphasises the need for the project sponsor to ensure that the process of public consultation is accessible to all potentially affected parties, from national to local level. The sponsor should ensure that:

- All stakeholders have access to project information;
- The information provided can be understood;
- The locations for consultation are accessible to all who want to attend; and
- Measures are put in place which ensure that vulnerable or minority groups are consulted.

Handbook for Preparing a Resettlement Action Plan

The consultation requirements for projects requiring physical or economic displacement are outlined in the IFC's 'Handbook for Preparing a Resettlement Action Plan' (IFC, 2002).

23.3 Stakeholder Engagement Plan

A SEP has been developed for the ESIA. The SEP will be used as a working document and framework to deliver a robust level of stakeholder engagement on the Project. The SEP will be updated throughout the ESIA process, to report on engagement that has been undertaken throughout the ESIA process.

The SEP has been designed around the following phases of engagement within the ESIA process, namely:

- Initial engagement and scoping;

- Impact assessment phase;
- Disclosure of the ESIA Report;
- Construction; and
- Operation.

23.4 Stakeholders

Stakeholder identification is an on-going process, requiring regular review and updates. Stakeholders have and will be identified through:

- Consideration of engagement undertaken to date by BMT;
- Secondary data review;
- Discussions with Ministries including the MoHE;
- Consideration of the AOI of the Project insofar as it has been defined in the ESIA;
- Referrals from other stakeholders; and
- Contact made by organisations expressing an interest in the Project.

Stakeholders have been grouped into the following categories:

- Government authorities: National authorities;
- Community leadership: Mayors of surrounding sub-districts;
- Project developers and financial lenders: BMT, GoI, IFC and private sector financial institutions;
- Communities: Project Affected Communities and Individuals, Vulnerable Groups and surrounding communities;
- NGOs: International, regional and local environmental organisations and social focused organisations;
- Research/Academic Organisations: International, regional and local groups; and
- Business: small medium enterprises and formal organisations.

A stakeholder database has been compiled and will continue to be updated throughout the ESIA. The stakeholder database is contained within the SEP.

23.5 Initial Engagement and Scoping

The engagement undertaken as part of scoping will be recorded in the SEP databases.

An abbreviated Scoping Report, in English and Arabic, will be submitted to stakeholders for their review.

23.6 ESIA and Project Execution

The stakeholder engagement proposed is set out in **Table 23.1**:

Table 23.1: Summary of Stakeholder Engagement Activities

Phase	Summary of Activities
Issue of Scoping Report/ Impact Assessment Stage	▪ Ongoing collection of data and consultation in relation to assessments of specific topics. ▪ One to one meetings with key stakeholders to present the Project and submit the abbreviated Scoping Report for review. ▪ Public exhibition to discuss the Project, collect socio-economic data via standardised surveys. ▪ Agreement and verification of information attained.
Draft ESIA	▪ One to one meetings with key stakeholders to disclose of the draft ESIA to key stakeholders. ▪ Public exhibition to present findings of draft ESIA. ▪ Agreement and verification of information attained. ▪ Disclosure of the draft ESIA. ▪ Any issues raised will be incorporated into mitigation/management plans
Final ESIA	Disclosure of the final ESIA.
Construction	Notification of construction start, proposed work areas, programme, details of grievance mechanism, project updates and progress, general community liaison
Operation	Project updates, grievance mechanism, ongoing general community liaison

24 Draft Structure of the ESIA and ESMP

24.1 Introduction

This section outlines the content requirements for both the ESIA Report and the ESMP in accordance with the relevant national legislation and international standards and guidelines; and sets out the proposed draft structure for these reports.

24.2 Draft Structure of the ESIA

24.2.1 National Requirements of ESIA Report

There are not national requirements for the contents of an ESIA. However, within the Technical Service Contracts (TSCs) issued to oil companies, contractors are contractually bound to follow '*Best International Petroleum Practices*', therefore, ESIAs should follow the format used in other comparable global operations.

24.2.2 Proposed Draft ESIA Structure

In line with national and international requirements on ESIA content, and Project requirements, the proposed draft structure of the ESIA Report is presented in **Table 24.1**:

Table 24.1: Proposed Draft Structure of the ESIA Report

Section	Sub-heading
List of Abbreviations and Acronyms	-
Non-technical summary	-
Section 1 - Introduction	1.1. Background to the Project 1.2. Project rationale 1.3. Purpose of the ESIA Report 1.4. Project proponents 1.5. Project team 1.6. ESIA report structure 1.7. Links to other documentation
Section 2 - Project Description	2.1. Introduction 2.2. Project overview 2.3. Project description

Table 24.1: Proposed Draft Structure of the ESIA Report	
Section	**Sub-heading**
	2.4. Construction phase 2.5. Commissioning phase 2.6. Operational phase 2.7. Decommissioning phase 2.8. Associated facilities 2.9. Outline programme
Section 3 - Analysis of Alternatives	3.1. Introduction 3.2. Evaluation process 3.3. Alternative site locations 3.4. Alternative site layouts 3.5. Alternative technologies and processes 3.6. No go alternative 3.7. Preferred option
Section 4 - Policy, Legal and Institutional Framework	4.1. Iraqi regulatory framework, regulations and legislation 4.2. International conventions 4.3. Environmental standards 4.4. Permitting requirements
Section 5 - ESIA Process, Approach and Methodology	5.1. Introduction 5.2. ESIA requirements 5.3. ESIA process
Section 6 - Stakeholder Engagement	6.1. Introduction 6.2. Approach 6.3. Engagement undertaken during scoping 6.4. Engagement undertaken during ESIA 6.5. Disclosure 6.6. Project execution
Section 7 - Environmental Baseline Conditions	7.1. Introduction 7.2. Environmental Baseline Conditions
Section 8 - Social Baseline Conditions	8.1. Introduction

Table 24.1: Proposed Draft Structure of the ESIA Report	
Section	**Sub-heading**
	8.2. Social Baseline Conditions
Section 9 - Other Developments in the Area of Influence	-
Environmental Impact Assessment **Social Impact Assessment**	10.1. Aims and objectives 10.2. Standards and guidelines 10.3. Methodology 10.4. Assumptions and limitations 10.5. Area of influence 10.6. Sensitive receptors 10.7. Construction phase 10.8. Operational phase 10.9 Decommissioning phase 10.10 Conclusion
Section 21 - Labour and Human Rights	21.1. Aims and objectives 21.2. Standards and guidelines 21.3. Methodology 21.4. Assumptions and limitations 21.5. Issues 21.6. Management
Sections 22 - Summary of Effects, Mitigation and Management Measures	24.1. Introduction 24.2. Construction 24.3. Operation 24.4. Decommissioning
Section 23 - Cumulative Impact Assessment	-
Section 24 - Environmental and Social Management Plan	-
Section 25 - Conclusions	-
Section 26 – References	-

24.3 Requirements of an ESMP

The ESMP identifies the principles, approach, procedures and methods that will be used to control and minimise the environmental and social impacts of all construction and operational activities of the Project.

24.3.1 National Requirements

There are no national requirements for an ESMP. However, within the TSCs issued to oil companies, contractors are contractually bound to follow 'Best International Petroleum Practices', therefore, ESMPs should follow the format used in other comparable global operations.

24.4 Draft Structure of the ESMP

The Project ESMP will cover BMT's activities associated with the Project, and determine the needs and priorities for future environmental mitigation measures and improvements to ensure compliance with national regulatory requirements and international environmental standards/ GIIP.

The ESMP will provide the overarching framework for the development of procedures and plans that provide the link between the significant effects, relevant mitigation measures and monitoring approach identified in the ESIA. It will describe the measures and actions that will be implemented by BMT and its contractors during project construction and operation/maintenance to address key potential impacts identified in the ESIA.

The ESMP will be developed with BMT to ensure buy in to the process and to embed measures into the core operational practices of BMT.

The proposed draft structure of the Project ESMP is as follows:

- List of Abbreviations and Acronyms
- Section 1 - Introduction
  - Purpose of the ESMP
  - Background
  - Scope
  - Objectives

- Structure of the ESMP

- Section 2 - Environmental and Social Management System Overview
- Section 3 - Standards and Guidelines
  - 3.1. Iraqi standards and guidelines
- Section 4 - Project Description
  - 4.1. Construction activities
  - 4.2. Operational activities
- Section 5 - Summary of Effects and Management Requirements
- Section 6 - Monitoring Plan
- Section 7 - Organisation, Roles and Responsibilities
  - 7.1. Proposed organisation during construction
  - 7.2. Proposed organisation during operation
  - 7.3. Key project personnel
- Section 8 - Training, Education and Competency
- Section 9 - Assessment and Improvement
- Section 10 - Incident Management
- Section 11 - Reporting Requirements
- Section 12 - Monitoring and Auditing
- Section 13 - Public Consultation and Disclosure
- Section 14 - Communication to Stakeholders
- Appendix A. Management Plans

Section 25: References

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