KAZ OIL TERMINAL PROJECT

Environmental and Social Impact Assessment Non-Technical Summary

On behalf of:
Waterway Trading & Petroleum Services LLC

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Contents

Acronyms and Abbreviations

CEMP	Construction Environmental Management Plan
CO	Carbon Monoxide
CSSF	Common Seawater Supply Facility
dB	Decibel
DWB	Deeper Water Berth
DWT	Deadweight Tonnage
EAME	Earth & Marine Environmental Consultants
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
GCPI	General Company Ports of Iraq
GDP	Gross Domestic Product
HAZOP	Hazard and Operability Study
HAZID	Hazard Identification
KAZ	Khor Al-Zubair Oil Terminal Project
Km	Kilometre
Km^2	Square kilometre
KZP	Khor Al-Zubair Port
IUCN	International Union for Conservation of Nature
IS	Islamic State
m	Metre
m^3	Cubic metres
MoF	Ministry of Finance
NGO	Non-Governmental Organisation
NOx	Nitrogen oxides
NTS	Non-Technical Summary
OSERP	Oil Spill Emergency Response Plan
SKA	SKA International Group
SOx	Sulphur Oxide

SRFO	Straight Run Fuel Oil
SVOC	Semi-Volatile Organic Compound
UQP	Umm Qasr Port
VOC	Volatile Organic Compound
VR	Vacuum Residue
WTPS	Waterway Trading & Petroleum Services LLC

1 Introduction

Waterway Trading & Petroleum Services LLC (WTPS) have commissioned an Environmental and Social Impact Assessment (ESIA) of the proposed Khor Al-Zubair (KAZ) Oil Terminal Project in order to assess the potential adverse and beneficial impacts and associated mitigation and management measures. An ESIA is a detailed study of the environmental and social conditions in the project area and an assessment of how the project may change these conditions. If these changes are deemed to be negative and severe, the study has defined measures to reduce or eliminate these impacts.

This document is the Non-Technical Summary (NTS) of the ESIA.

1.1 Project Overview

As a result of armed conflicts, trade sanctions and isolation from the international community for decades, Iraq does not presently have the resources to provide refined petroleum products at a sufficient rate to meet demand. As such, WTPS intends to construct a new petroleum products Terminal on the Khor Al-Zubair River, close to the Khor Al-Zubair Port (KZP) in Southern Iraq. The proposed Terminal will provide a modern import facility and also a future export terminal for refined petroleum products that will be produced in Iraq.

The Terminal will provide berthing facilities, storage infrastructure, truck loading/unloading facilities and all associated utility and support systems for multiple berths capable of discharging vessels up to 47,000 deadweight tonnage (DWT). The construction of the Terminal will be phased: the first phase being a single Deeper Water Berth (DWB) and associated pipeline connection to the existing SKA Terminal. Subsequent additional phases will include storage tanks and associated utilities, with a potential storage capacity of up to 300,000m^3. The Terminal will be constructed to the appropriate international industry standards using reliable and proven technology and will be operated in accordance with standards and practices generally prevailing in the petroleum marine terminal and storage industry.

An indicative layout of the Terminal is presented in *Figure 1.1*. It should be noted that this is based on current state of knowledge and ground conditions and may be subject to change as more detailed design studies take place. The overall concept is not expected to change significantly any material environmental impact however.

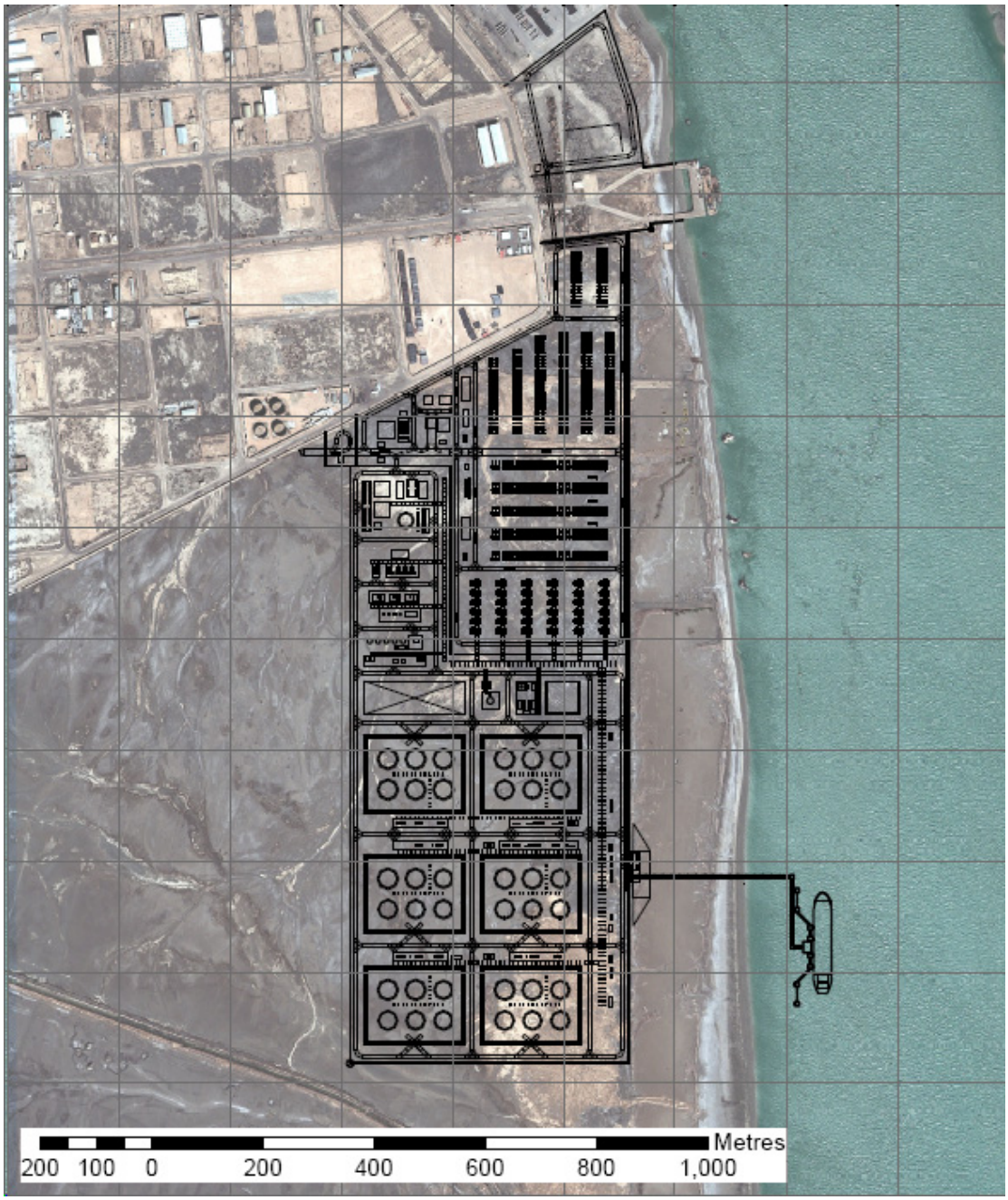

Figure 1.1: *Conceptual Development Layout*

1.2 Project Location

The proposed development is located on the western bank of the Khor Al-Zubair, adjacent to the KZP and the KZP Freezone. Umm Qasr Port (UQP) is 14km south of the site, Basra City Centre is 37km to the north and the border crossing into Kuwait at Safwan is located 19km to the south-west of the site (*Figures 1.2* and *1.3*).

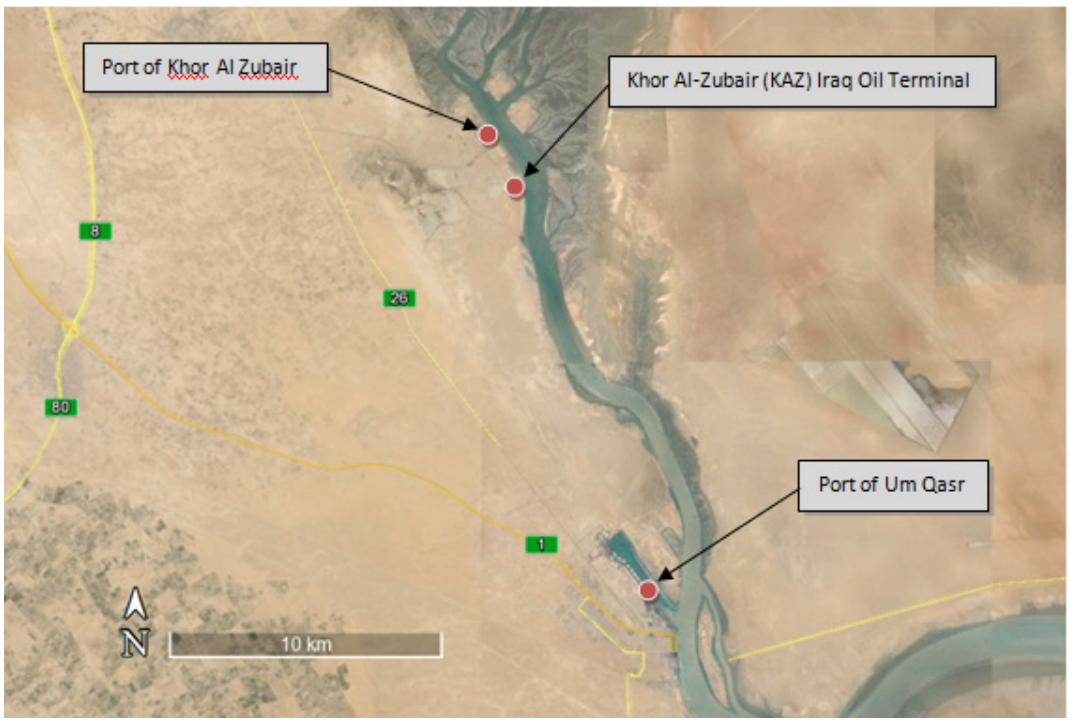

Figure 1.2: *Location of the proposed Terminal development*

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Figure 1.3*: Proposed Terminal outline*

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1.3 Project Schedule

The precise schedule has not been specified at this stage as political disruption in Baghdad associated with the Islamic State (IS) insurgency and change of government has placed some uncertainty on the anticipated date of approvals to start, however, construction works for Phase 1 are expected to commence in early 2015.

1.4 ESIA Process and Methodology

The main objective of the ESIA process is to identify potentially significant negative impacts on the physical, human and natural environment that could arise through the entire life of the project. Where such impacts are identified, the process identifies measures to eliminate or mitigate them and management measures for any residual impacts. It also provides an opportunity for consultation with potentially affected stakeholders.

The assessment process constitutes a systematic approach to the evaluation of the proposed project in the context of the natural, regulatory and socio-economic environments in which the development is proposed.

The potential environmental and social effects resulting from the Terminal project have been assessed against:

- Applicable regulations, standards and guidelines;
- Existing environmental and socio-economic conditions; and
- Issues and concerns raised by identified stakeholders.

The ESIA and the identification of associated recommendations has been developed by desk based research, fields studies (to establish baseline conditions), assessment of results, stakeholder consultation and expert opinion.

The baseline environmental and social conditions of the Terminal project were identified initially from a comprehensive desk study. This exercise helped to narrow down the most critical environmental and social issues requiring detailed evaluation. These issues were then investigated via a series of studies including:

- A comprehensive desk study including socio-economic baseline information;
- Baseline land quality assessment including the excavation of boreholes and soil sampling;
- Baseline air quality measurement;

- Baseline noise assessment;
- Surface water and sediment quality sampling of the Khor Al-Zubair;
- Baseline groundwater assessment;
- Baseline terrestrial ecology;
- Baseline marine ecology of Khor Al-Zubair;
- Surveys of fishermen on the Khor Al-Zubair;
- Marine Traffic Survey; and
- Traffic survey at a key point on Highway 28.

The sensitivity of the environmental and social receptors, and the magnitude of the potential impacts were then identified and used to determine impact significance. Potential and residual impacts (*i.e.* those remaining after the application of mitigation measures) were characterised as being of "low", "medium" or "high" significance or as "beneficial". Wherever practicable, additional mitigation measures were identified to reduce further those adverse residual impacts that were considered to be of medium or high significance.

The mitigation and enhancement measures that have been proposed in the ESIA to reduce adverse impacts (and enhance potential benefits) have been captured in a commitments register. The commitments that relate to the operating phase of the Terminal will be incorporated into the Environmental and Social Monitoring and Management Plan (ESMMP).

2 Stakeholder Consultation

Stakeholder consultation is of crucial importance to understand how the Terminal would impact on stakeholders and to obtain their input on which impacts should be included and excluded. WTPS recognises the importance of consultation and that it is also an early opportunity for stakeholders to become better informed about the planned Terminal.

Stakeholder consultation comprised two parts:

- the development and issue of a Scoping Report; and
- the direct consultation with potentially affected communities.

The Scoping Report (*014-1287 WTPS Iraq Oil Terminal Environmental Scoping Report REV03, EAME, August 2014*) was prepared at the start of the ESIA process. It is a standalone document that describes the project, sets out the environmental issues that will be assessed through the ESIA (and those that have been screened out), explains how these will be assessed and seeks feedback from the consultees on these issues and any additional information that they have. The Scoping Report was sent to government departments, Non-Governmental Organisations (NGO's), local businesses, regional environmental organisations and public representatives in August and September 2014. Over one hundred copies of the Scoping Report were issued, however, replies were only received from three entities, none of which provided any additional information or sought to amend the proposed approach.

This low level of responsiveness is not unusual for Iraq which only has a short history and experience of ESIA's being performed and no formal requirements for public or statutory consultation. Also, there are no residential communities in the area and the nearest businesses that could be affected (SKA and KZP) are direct stakeholders in the project.

The consultation with local people (especially fishermen) is described in the Social Impact Assessment section of this NTS.

3 Project Description

3.1 Introduction

The proposed Terminal development is located on the western bank of the Khor Al-Zubair, adjacent to the KZP and the KZP Freezone. The onshore proportion of the site covers a piece of land approximately 1,500m by 500m, covering a total area of approximately 0.95km^2 (95ha) with a perimeter of roughly 4,944m.

It is understood that WTPS have secured a 25 year access/licence agreement with General Company for Ports of Iraq (GCPI) to develop the site.

The Terminal will ultimately be designed to handle up to five different products: gasoline, gasoil, naphtha, Straight Run Fuel Oil (SRFO) and Vacuum Residue (VR). Gasoline and gasoil will be imported by marine tankers and offloaded into the tank farm before being exported via road tanks. Simultaneous truck loading and marine tanker unloading will increase the efficiency of the Terminal. Naphtha, SRFO and VR are expected to be brought to the Terminal via road tankers and loaded onto marine tankers for export.

The offshore elements of the (ultimate) project include:

- Jetty facility providing two berths of vessels ranging from 27,000 to 47,000 DWT;
- Access trestle to the jetty; and
- Topside elements to facilitate the import and export of products.

The jetty facilities will be designed to allow for unloading and loading of different products with from a maximum of two vessels at any one time.

When the Terminal is fully developed, it is envisaged that the site could comprise around twenty buildings of six generic building types and in the region of thirty tanks totalling approximately 300,000m^3 of storage.

Current Site Conditions

The majority of the site, approximately 95%, is undeveloped and vacant with sparse halophytic vegetation [vegetation that grows in very saline soils or sediments], unsurfaced access roads and evidence of fly-tipped waste. There is evidence of disturbance of some of the soils by heavy plant and some accumulations of earth mounds from earthworks activities. Also there is an earth bank road running along the site parallel to the shoreline with two smaller earth bank roads extending to the water line.

The northern elevation of the site comprises KAZ Jetty No. 1 and areas of unsurfaced, derelict land with areas used for the storage of scrap metal, much of which appears to be marine-derived (ship wreck clearance).

It is understood that the majority of the site has never been developed, however, the site walkover by EAME, various maps of the region and remote sensing data has indicated signs of human impacts including fly tipping/dumping, off road vehicle activities and the remnant signs of war.

Photograph 2.1: *Project site land area*

Photograph 2.2: *Project site intertidal area*

3.2 Consideration of Alternatives

The environmental and social implications of alternative development sites or a no-development option were considered.

It is important to appreciate the location specific constraints represented by the Iraqi coastline (*i.e*. only 58km in length) and the presence of only two navigable rivers suitable for the location of a Terminal. The proposed site is ideal for this project as adjacent to it is the SKA Terminal (an existing small capacity storage facility jointly owned by WTPS that will be connected to the new berth). The SKA Terminal will not be able to entirely fulfil the long term requirements particularly as there is little room for expansion. It does, however, allow for considerable operational benefits, but must necessarily have the berths located close to it.

Furthermore, from early bathymetric studies of the area, it seems that the channel maintains a natural scoured minimum depth of around 12m in this location, which means it forms a natural deeper water location for a loading berth, with minimal dredging requirement (and its

associated environmental disturbance). It is also close (with direct access to) the port distributor roads which connect to the main highway to Basra and the various development zones of the Southern Region.

The opposite bank of the Khor Al-Zubair is largely undeveloped and has no established transport infrastructure, so the construction project and logistics would be considerably larger than a development on the west side of the channel (as well as the related impacts).

The only alternative channel which could receive relatively large ships is the Shatt Al-Arab Waterway, however, there is a sandbar on the entrance to the channel that dries on certain tides (limiting accessibility times) and the channel has been neglected for many years in terms of maintenance dredging so is only around 8 – 10m in depth which is insufficient for the vessels required.

The Khor Al-Zubair is, therefore, the only logical option for such a berth and the only zone that is reachable from the navigable channel and accessible to transport infrastructure is the west bank where the proposed Terminal is to be developed.

If the project does not go ahead, there will evidently be no environmental and socio-economic impacts from construction or operation of such a facility, however, the potential positive benefits would also be lost, including:

- Loss of dedicated import and export facilities for refined petroleum products;
- The continued use of inefficient and poorly maintained infrastructure at KZP which prevent its reversion to its original design use of dry cargo (for which there is also a pressing requirement); and
- Loss of the social benefits of the employment opportunities and economic stimulus that the Terminal would generate.

Apart from the storage of large fragments of shipwreck scrap, the site is unused and unoccupied and alternate potentially beneficial uses are not presently proposed. The most likely alternative use of the site would probably be for similar port/logistics related facilities with similar attributes and impacts as those proposed for the current project.

4 Environmental Impact Assessment

4.1 Introduction

Baseline environmental conditions were identified during the Scoping Exercise for a range of parameters including:

- Air Quality;
- Noise Quality;
- Soil Quality;
- Sediment Quality;
- Surface Water Quality;
- Groundwater Quality; and
- Ecology and Biodiversity.

Each of these are discussed in more detail in the full ESIA and summarised below in terms of baseline conditions, impact assessment, mitigation and residual impacts.

4.2 Air Quality

Air Quality Baseline

Exposure to high levels of atmospheric pollutants or dust can sometimes cause adverse effects on human health so it is important to understand the levels of such pollutants in the environment. The ESIA focussed on Volatile Organic Compounds (VOCs), sulphur dioxide (SOx), oxides of nitrogen (NOx), carbon monoxide (CO) and breathable dust in particular as the project could release quantities of some or all of these pollutants to atmosphere.

The existing levels were measured at five locations around the project site using a combination of passive diffusion tubes left out for 30 days (for SOx, NOx and VOCs), instantaneous measurements of particulates using a dust meter and direct capture (laboratory analysis measurements) for CO using a pumped sample capture system.

Baseline ambient air quality monitoring at the site was found to be below published environmental benchmarks.

For particulate matter, the ambient air quality of the site is likely to be affected negatively by occasional sand storms, which are frequent events in this region. These sandstorms move large volumes of fine dust into the atmosphere and can last from several hours to several days. The measured high levels of total particulate and breathable (below 10 microns) particulate matter observed during the survey period are very probably due to these windblown dusts and sands, rather than from industrial sources. Therefore, this will remain the main influence on the local air quality regardless of any construction works associated with the Terminal project or other built development.

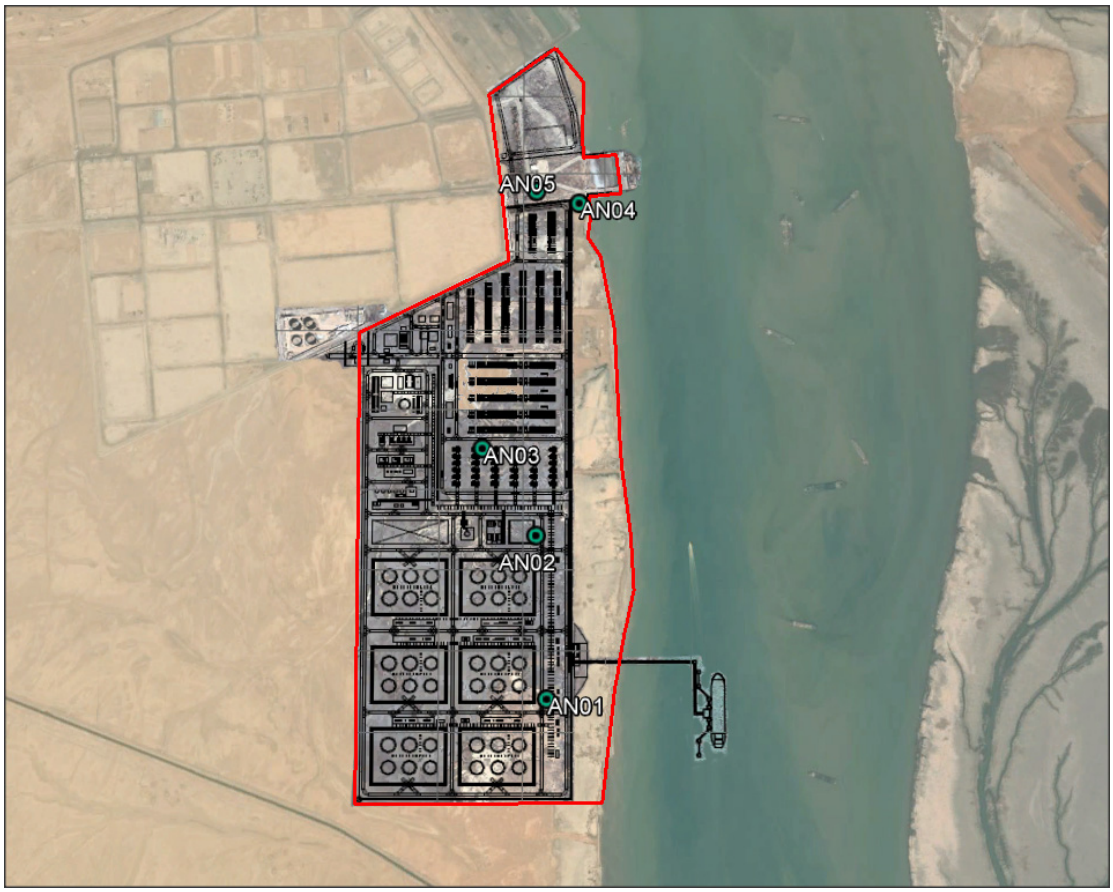

Figure 4.1: *Air and noise sampling and monitoring positions*

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Air Quality Impacts and Mitigation

During construction, diesel-powered vehicles, construction plant and power generators would emit atmospheric pollutants, including nitrogen oxides. These emissions would be produced for a limited time and from mobile sources over a wide area so, given the good baseline air quality in the Project area, it is not anticipated that they will affect human health (the nearest habitation being over 5km away).

Construction vehicles and earth moving activities have the potential to generate dust, but typically these only travel a few hundred metres at most from the source activity. It is considered that with an appropriate Construction Environmental Management Plan (CEMP) the potential for dust during construction to cause any nuisance will be minimal. The CEMP should require weather monitoring and damping down of dusts during periods of high activity. The dusts that can be generated as a result of construction activities are localised and short lived and are insignificant compared to natural dust from dust and sandstorms which occur frequently.

When the Terminal is operational, the dust generation potential would be insignificant as the site vehicles would be travelling over hard-standing areas and hard-surfaced site roads.

VOCs associated with tank venting during loading and transfer operations would be minimised by using industry standard pumping and transfer facilities and tank inventory management programmes. At present, petroleum products are loaded and unloaded directly into tankers at KZP with no such controls. The proposed Terminal will utilise bulk tank storage, thereby, reducing ship discharge times and associated emissions.

Overall, the residual impacts on air quality are not considered likely to result in any detrimental effects on human health and ecosystems. The significance is considered to be “low”.

4.3 Noise Quality

Noise Baseline

During the monitoring period, the general noise levels were considered “low” with no discernible obtrusive tonal or noise impacts being observed. No significant differences were noted between the monitoring locations. The locations are depicted in *Figure 4.1*.

Using 1993 Iraqi Noise Standards, none of the maximum values or calculated averages were found to be above the 70 dB standard for industrial and commercial properties and overall the site can be considered to be a quiet, low noise environment at present. The most noticeable noise on the site is the wind and occasional bird song from wading birds on the foreshore.

Exposure to noise at extremely high levels for a long period of time can harm the hearing of humans and animals. At lower levels, noise can also be a nuisance.

Noise Impact Assessment and Mitigation

It is inevitable with any major development that there will be some noise, particularly during the site clearance and construction phase when heavy plant and machinery would be used. Typically, however, noise disruption due to construction is localised, temporary and only

people living or working within a few hundred metres of the site boundary are likely to be impacted. It is possible, however, that workers on the adjacent Freezone and KZP would receive noise impacts because of their closeness to the works. The main noise would be from the engines of heavy plant and equipment during earthworks activities and the piling rigs. The noise levels would, however, be transient and will be masked to some extent by local activities within the port such as crane loading and ship engine running during berthing operations. There are no significant activities (that would involve personnel being present for prolonged periods of time) in the port and Freezone areas closest to the Terminal. Therefore, given the natural attenuation of noise by buildings, the exposure time of personnel in areas likely to be affected would be very small.

The main noise generating activities likely to be associated with the proposed development, (once operational) would include generators, compressors, pumps, mechanical equipment and maintenance activities. Given the distance between the proposed operational areas and noise-sensitive receptors, it is considered that noise from the day to day site operations (and associated mechanical plant and equipment) is unlikely to be noticeable at those noise-sensitive receptor locations (such as the nearest residences which are over 5km away). It is likely that operational noise from the Terminal will be audible in the Freezone and port area but the duration and level of exposure to operatives in those locations would be negligible.

Also, the wind conditions are fairly consistent and predictable in Iraq with the main wind being the *Shamal* which blows from the west and north-west on most days. This would, on most occasions, carry any noise generated on the site out onto the open water of the Khor Al-Zubair, away from neighbouring land uses and distant residential properties.

It is reasonable to conclude, therefore, that noise impact would be of “low” significance.

4.4 Soil Quality

Soil Baseline

EAME collected 20 surface soil samples from across the site and also drilled seven boreholes to allow the collection of samples with depth (three from each borehole). The samples were sent to an independent laboratory for chemical analysis for a range of common contaminants. Sample locations are shown in *Figure 4.2*.

None of the soil samples obtained showed concentrations above their respective screening criteria for risk to human health (where published criteria exist). None of the samples were positively identified in the radiation screening as having detectable radioactivity. Furthermore, there was no evidence of hydrocarbon contamination on the site.

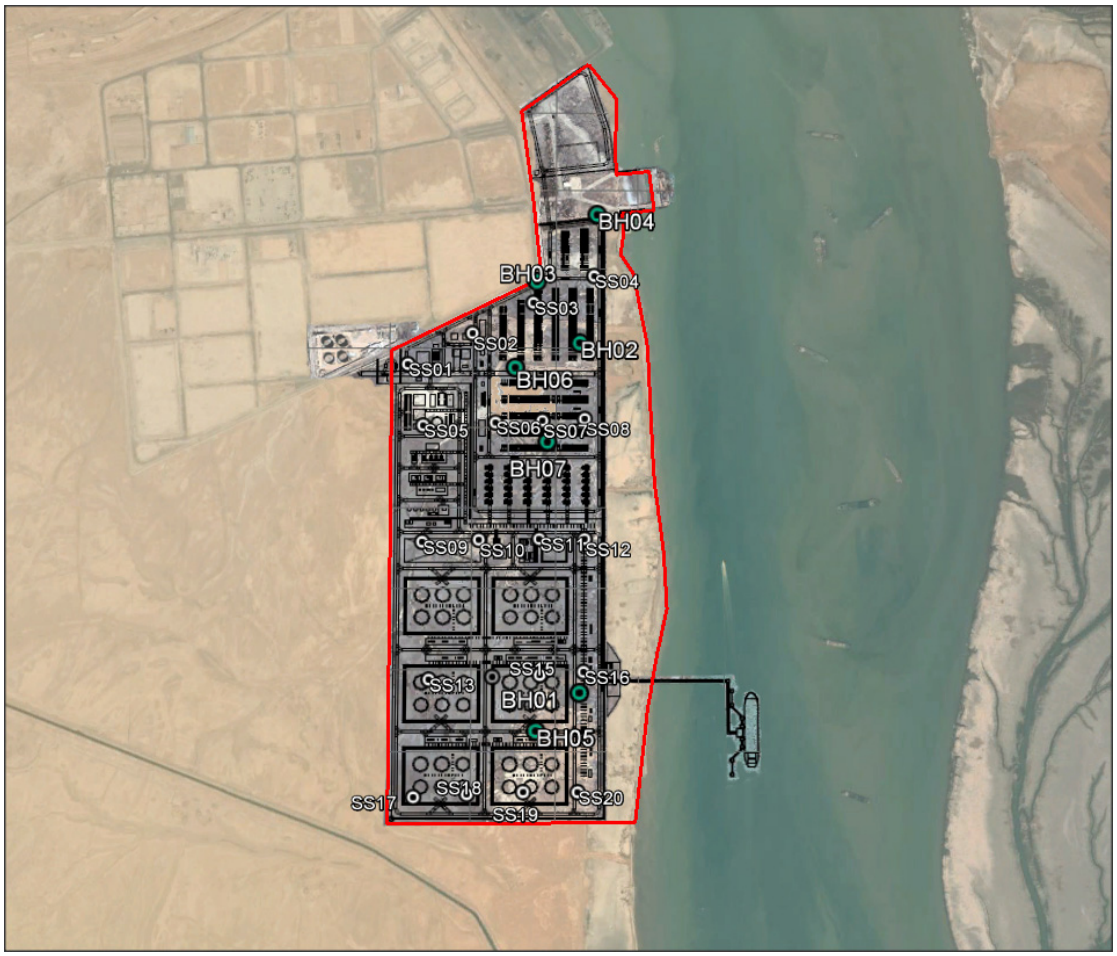

Figure 4.2: *Borehole and Surface soil sampling locations*

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Cemented asbestos sheeting was observed within the area of scrap metal storage on the northern part of the site. One soil sample, here, was found to contain loose asbestos fibres which is a danger to human health and must be removed.

The baseline assessment shows that the site is effectively uncontaminated with any of the species targeted for analysis and, in that regard, there are no obvious contamination legacy issues that need to be addressed as part of the site development works.

Soil Quality Impacts and Mitigation

Soil is an important environmental resource that can sometimes be adversely affected by construction activities and is closely associated with the functioning of other resources such as landscape, ecology, agricultural and productivity. Off-road use of vehicles, heavy plant and equipment can compact soil, alter its drainage characteristics and reduce soil aeration levels,

which could decrease the ability of vegetation to grow back. However in the context of this site, all soil areas will be developed and important agricultural or ecological communities do not exist on the site or close to it.

With the exception of the loose asbestos fibres, no significant soil contamination was found in the project area so disturbance and spread of contamination is unlikely. However, spills of fuel and other hazardous materials from construction plant or stored materials could contaminate the soils and sediments of the Khor Al-Zubair unless care is taken during construction.

The construction works would be performed under a CEMP that would set out specific environmental protection and pollution prevention measures and any response measures to be used if any contamination is discovered or spills occur.

The operational development would implement a pollution prevention plan and Oil Spill Emergency Response Plan (OSERP) to deal with the storage of fuel and hazardous materials and the response to any spill events. There would also be a waste management plan to deal with the disposal of routine wastes and contaminated soil from any incident. This would set out measures to prevent pollution from the disposal of any such wastes.

The residual impacts of the project on soil are, therefore, expected to be of “low” significance - except for the removal of fly-tipped waste (asbestos sheeting), scrap metal and foreshore debris, which would, actually, be “beneficial” compared to the baseline conditions.

4.5 Sediment Quality

Sediment Baseline

Sediment samples were collected from the Khor Al-Zubair and the only potential source of contamination identified relates to elevated concentrations of lead identified at three locations. All other parameters were recorded at concentrations below the relevant screening criteria at which they are considered to be environmentally “not significant”. Considering the results overall and previous studies, the contamination level of the sediments is considered to be “low” and so is their associated pollution potential.

Sediment Impact Assessment and Mitigation

The Terminal is unlikely to have any impact on sediment quality and specific mitigation measures are not recommended to be required.

4.6 Surface Water Quality

Surface Water Baseline

All ten samples collected from the Khor Al-Zubair were found to have increased concentrations of sulphate and chloride above the relevant guideline values. However, this is effectively a marine environment so such high levels are natural and to be expected.

In terms of potential contamination, elevated concentrations of mercury were noted in all of the samples. These concentrations could be the result of natural accumulations in the environment (of geological origin). However, they may also be related to human activities sources given the proximity of a port, heavy industry and major city, with limited pollution control measures in place.

Overall, whilst some elevated concentrations of certain substances have been observed, the Khor Al-Zubair is not regarded as significantly contaminated and the levels of contaminants observed are not considered to be a problem or to require remediation. Apart from the potential for the high sulphate and chloride levels in the soils and groundwater (and river water) to be aggressive towards construction materials like concrete, the chemical conditions of the groundwater and river water are not likely to cause problems.

Surface Water Quality Impacts and Mitigation

The construction of the development could lead to pollution if surface run-off laden with sediment is allowed to drain uncontrollably to the Khor Al-Zubair, or if spillages occur from construction plant or equipment during use or refuelling. The entire construction operations would, however, operate under a CEMP with environmental protection and pollution prevention measures in place to deal with these eventualities or respond with appropriate clean-up actions if systems fail.

The greater environmental risk would be during the operational life of the facility if there were a major release of petroleum products from the storage tanks, transfer systems of ships using the berth. To mitigate against this there should be a detailed OSERP, which should include measures to reduce the impacts on the Khor Al-Zubair by using clean-up and containment equipment and teams (see *Section 4.10*).

Under normal operating conditions there would be no releases of polluting materials from the facility to surface water and thus the impact would be negligible (neutral).

4.7 Groundwater Quality

Groundwater Baseline

Groundwater samples were obtained from seven boreholes. The locations are presented in *Figure 4.2*.

A number of contaminants were found to be greater than relevant guideline values including sulphate, chloride, nitrate, manganese, mercury and nickel.

The sulphate, chloride and manganese concentrations were not unexpected due to the highly saline environment of the site and such levels are considered natural. The mercury levels may be due to its natural occurrence in the environment, however, there could also be a contribution from nearby industrial emissions. The same could apply to nickel.

Low levels of hydrocarbons were detected in three boreholes. However, as no hydrocarbon contamination was noted in the soil samples (or observed on-site) this suggests that the hydrocarbons may be the remnants of historic contamination on the site. The levels are not considered to be a problem.

There was one VOC and three Semi-Volatile Organic Compounds (SVOC) that were detected in the groundwater samples but these were at levels which are not considered to be a problem. However, it is indicative of low levels of contamination.

Overall it can be concluded that there is not significant contamination of the groundwater on the site.

Groundwater Quality Impact Assessment and Mitigation

The same risk scenarios apply to groundwater as to surface waters. Potential impacts during the construction phase (primarily from fuelling of construction plant and equipment), would be mitigated via the controls applied through the CEMP. There would be no operational phase discharges to the groundwater under normal operating conditions. Under a major accident scenario groundwater could be impacted but the risk is considerably less than that to surface water as the site will be hard surfaced and provided with bulk storage containment systems. Nonetheless, the OSERP would still respond to such a situation.

4.8 Ecology and Biodiversity

Ecology and Biodiversity Baseline

The habitats identified within the site boundaries have all been significantly affected by human activities. The limited vegetation provides limited support for species of fauna on land

and the intertidal area is also sparsely vegetated and disturbed by debris that has accumulated on the beach or been deposited there as part of the wreck clearance activities. Where vegetation is present, it is primarily dominated by a small range of species. As a result of the significant disturbance throughout the area, the habitats support only limited floristic cover, with those species identified during the September survey comprising common halophytic species. Only four plant species were identified during the baseline survey. All species recorded are considered common throughout the region and across such hyper-saline coastal environments. The species identified are quick to colonise disturbed habitats.

The survey recorded the presence of two mammal species within the proposed development area. However, the species feral dog and camel, are not listed on the IUCN Red List due to populations primarily resulting from escaped, domesticated animals.

A total of three bird species were recorded during the baseline survey. These species are all considered to be common resident, common breeding resident and/or common migratory species in Iraq. Similarly, all species are listed as Birds of Least Concern on the Bird Life International Database.

The marine environment itself if highly dynamic and could support a wide range of fish, mammal and plankton species. However, the existing shipping, dredging and high turbidity levels have limited this compared to the more open waters of the Arabian Gulf and less turbid coastal zones of some of the Gulf states. Nonetheless, this is the most ecologically interesting and sensitive aspect of the project area natural environment. The most abundant species identified were large colonies of mudskippers that are present everywhere along the banks of the Khor Al-Zubair.

The overall conclusion is that the site has a “negligible” to “low” conservation value and ecological sensitivity of the site in terms of species, habitat and regional importance is also “low”.

Ecology and Biodiversity Impact and Mitigation

The main impacts associated with the Terminal would be physical disturbance of the land and intertidal areas and a proportion of the tidal sediments (from piling). Whilst this would directly impact any species in the affected area, the species present (sabkha vegetation and mudskippers) are abundant in the area and the immediate loss of any of those species would be insignificant in terms of total population. Furthermore, the mudskippers are mobile and will move in the early stages of disturbance and re-colonise after construction works are complete.

The impact of the proposed development on the ecology of the area is thus considered to be “negligible”.

4.9 Cumulative and Trans-boundary Impacts

There are a number of other proposed developments in the area that could have impacts on the environment that would be cumulative with other projects. The principal amongst these is the Common Seawater Supply Facility (CSSF) that is due to be developed on an adjacent site. This may have similar impacts to the Terminal project but is similarly in a low quality environment, remote from residential areas and on a site of low ecological value. Consequently, the combined impacts are similarly likely to be of "low" significance.

At the time of writing of this report, the other major project nearby (BIOGH) was not believed to be going ahead.

4.10 Hazard Analysis and Risk Management

The proposed Terminal has been specified to be designed to international industry standards and would use relevant management and technological controls to ensure that under normal operating conditions the facility would not have a significant impact upon the environment. There is always, however, the potential for a major incident or accident that could give rise to major impacts. These are summarised in *Table 4.1*.

The design control, management systems and equipment standards being applied should ensure that the facility and all aspects of it under WTPS control are adequately safeguarded against the incident scenarios described.

Table 4.1: Environmental Risk Scenarios and Mitigation

Incident Scenario	Affected Environment	Mitigation Measures
Fire Explosion	▪ Air, water and soil Quality ▪ Human health impacts ▪ Socio Economic Impacts	The facility would be a modern materials handling and berthing Terminal designed and built to international standards, The design would go through an Engineering design, Procurement and Construction process and will be subjected to HAZOP and HAZID reviews and Construction Quality Assurance programmes. This provides the opportunity to identify and design out many potential incident scenarios and where they cannot be designed out, protection
Large scale Hydrocarbon Release to Land	▪ Air, land and water quality ▪ Socio-economic status	
Large scale Hydrocarbon Release to water	▪ Air, land and water quality ▪ Socio-economic status ▪ Human health ▪ Built environment	

Table 4.1: Environmental Risk Scenarios and Mitigation		
Incident Scenario	**Affected Environment**	**Mitigation Measures**
	▪ Habitats, species and ecological productivity	measures would be employed which include: ▪ Total Site Security (controlled access) ▪ Fire Detection and Alarm System ▪ Fire-fighting Capability ▪ Preventive Maintenance Programme ▪ Modern Equipment ▪ Trained and Experienced Operatives ▪ Certified Management Systems ▪ Monitoring and Audit Programmes ▪ Emergency Response Plan
Dumping of Waste on Land	▪ Water and soil quality ▪ Human health impact ▪ Habitat impact	
Dumping of Waste in Water	▪ Water quality impact ▪ Habitat impact	
Plant and Equipment Failure	▪ Air quality impact ▪ Species impact ▪ Ecological productivity impact	
Facility Debris from Large scale Damage	▪ Water and soil quality ▪ Socio-economic impact ▪ Built environment impact	

On any industrial facility such as this where oils and petroleum products are being handled in bulk and transferred to and from ships via pipelines between storage vessels, there is a possibility of leakage or loss from these systems either in terms of liquid spills or a fire/explosion related incident. Furthermore, if environmental management and operational procedures are not followed correctly, there could be unauthorised discharges and disposals that could impact the environment. The mitigation of such events is based upon a 3-part approach:

1. Design out potential problems where possible before constructing and operating the facility;

2. Operate high quality well maintained equipment under formal audited management programmes and standard operating procedures using trained competent personnel; and

3. Provide alarms, monitoring and emergency response teams and equipment to respond rapidly and comprehensively to any incident.

Consequently, whilst such impacts are still possible, they are highly improbable and robust intervention measures should limit the consequences of such incidents if they occur.

The worst case scenario is a major oil release to the water that is not adequately mitigated by the implementation of an OSERP. However, one advantage of a long linear channel is that booms can be deployed upstream and downstream of the spill to contain it and prevent tidal spread of the slick, and both shores can be accessed by personnel and equipment to clean up. The eco-system here is highly dynamic (tides and mixing), has a high environmental temperature (water temps of 35^{o}C+ and air temps of 50^{o}C+), biologically active bacteria and has strong persistent winds. So in the unfortunately but unlikely event of such a spill, these conditions would promote breakdown and degradation of the oil products and assist the recovery of the natural environment. Finally, with the exception of wading birds in the intertidal area (which are in very low numbers around the project site), the receiving environment is of low ecological quality and less sensitive to impact than a highly productive ecologically diverse area.

5 Social Impact Assessment

5.1 Social and Political Environments

Demographics

According to the Ministry of Planning's 2013 data, the population of the Basrah Governorate was 2,672,425. According data from 2010, the ethno-religious identity of the Governorate is classified as 99.8% Arab-Shia Muslim.

Economy and Livelihoods

The average monthly household income for Basrah Governorate is ID 898,400 which is just above the Iraqi national monthly average of ID 858,800.

The survey data indicates agricultural activity is of only limited importance in the Al-Zubair District. There is a heavy reliance on state employment, with around a half of the workforce being employed as public servants.

Employment

Iraq's economy is very vulnerable to oil price fluctuations because of a weak private sector and a reliance on the state to provide employment. The need to create employment since 2003 has led Iraq to double its public sector. However, ultimately Iraq's Gross Domestic Product (GDP) is still 95% derived from oil revenues.

Unemployment statistics for 2013 record the national unemployment rate in Iraq as 14.7%. Thus the unemployment in the Basrah Governorate (based on 2009 figures) appear to be slightly above the national average, however, the actual rate is likely much higher, considering underemployment and discouraged job seekers. The main reasons for unemployment cited within households in the survey were no opportunities for work and illness/ old age.

In addition, female employment is generally low throughout the governorate especially within Al-Zubair and Fao. Female participation in the labour force is low in Iraq, generally, compared to most of Iraq's neighbours. Employment rates amongst women in the labour force are also relatively low.

Infrastructure and Services

The supply of water and energy and the provision of education and healthcare facilities are key elements of social infrastructure and services.

The electricity infrastructure was severely damaged during the Gulf War, suffered from lack of investment and lack of available equipment under sanctions, and suffered again following the US-led occupation in 2003. While the supply of electricity is increasing, it is unable to keep pace with rising demand. Problems in the electricity sector are widespread. Power generation is hampered by issues such as aging power plants and shortages in fuel and water. To meet the electricity demands of Basra, three power station ships, producing 450MW of electricity, have been installed on the Shatt Al-Arab Waterway and Khor Al-Zubair.

Water salinity due to the high salt content of local water sources is a major issue affecting the public network in the Basrah Governorate. It is estimated that only 1% percent of households in the governorate use the public network. Households rely on bottled or tanker-delivered water. Rehabilitation of the water treatment and distribution systems is urgently needed.

The Government of Iraq has identified education as one of its main priorities. Between 1990 and 2007 there was a national drop in net primary school enrolment rates from 91% to 85%. The quality of education is hampered by poor learning environments caused by poor quality infrastructure and overcrowding. Nationally, one in five Iraqis aged over 15 years is illiterate and in the Al-Zubair District 15.1% of people aged over 10 are illiterate.

The health system in Iraq is over-burdened and suffers from a shortage of infrastructure, equipment and professional staff.

The closest major road to the site is Highway 26, which is an asphalted dual carriageway with no central reservation. The highway has been undergoing subject to improvements since 2012, and, sections of the dual carriageway are closed. As such, these closures and the lack of central reservations mean that in many places, traffic from both ways use one side of the dual carriageway.

5.2 Socio-economic Survey Findings

The proposed project area is unoccupied and effectively unused. The land is owned by the Ministry of Finance (MoF) (*i.e.* state owned) and under the control of GCPI. The nearest residential premises are over 5km from the project site and the land in between the project site and nearest residential properties is also unused and unoccupied. Consequently, there are no residential communities likely to directly interact with the project activities and site development. At present, the site provides no employment opportunities and is not a purchaser of goods and services so there is no net contribution to the local economy or employment status.

The main activity that takes place in the vicinity of the project site and which could potentially be affected by it is small-scale fishing.

All fishermen have official letters issued from central Government which entitle them to fish inside any Iraqi territorial waters (except military exclusion zones) and the river police and GCPI cannot prevent the fishermen using the river. Small catches are sold locally, either on the water to Kuwaiti fishermen (who cannot enter Iraqi waters), or at small roadside stalls in Umm Qasr and Zubair. If they land a large catch they call a fishing agent in Basra who sells them in the markets in Basra.

The proposed project site was not a concern to the interviewed fishermen as they say that the area is seldom used and they can work outside of that area from their small boats or from land further south. They are more concerned about planned development works in the small ad-hoc port they use for accessing their vessels and the waterway. Concerns have been raised by the local fishermen about plans for a new berth there which they fear will prevent them accessing this area in the future. They have said that they will insist on compensation or will demonstrate and protest if the proposed development affects their access. This site is close to Umm Qasr north and is well outside the project area.

Demographics, Employment and Livelihoods

The proposed Terminal would generate employment in an areas that has high levels of unemployment and poverty. The construction would offer temporary employment, while operation of the Terminal would require a much smaller workforce of skilled technical personnel and security staff.

It is likely that some of the workers for the Terminal would be sourced from local communities which would help to strengthen the local economy and improve the standard of living for households with members employed at the Terminal.

Land Ownership and Use

WTPS have leased the land for the Terminal from GCPI for 25 years and will lease land from MoF needed for the construction period.

Infrastructure and Services

The key sensitivity and potential impact of the Terminal on infrastructure and services is likely to be on the existing roads in the vicinity of the Terminal which may affect road condition and traffic flow. However, Highway 26 is in the process of refurbishment and likely to be in good condition during the construction. The volume of petrol tankers visiting the facility will to a large extent simply be the same vehicles that access the KZP facilities at present.

Community Health and Safety

The following should all be implemented to ensure that project-related activities do not significantly affect community health and safety:

- To reduce the risk of traffic accidents, the construction contractor should be required to use only the agreed access routes and to comply with the relevant speed limits;
- The construction areas should be clearly demarcated and safety fencing should be erected; and
- The Terminal should be built and operated to international industry safety standards.

6 Environmental and Social Impact Summary

6.1 Impact Assessment Criteria

This section of NTS provides a tabulated overview of the key aspects of the baseline environmental conditions and the mitigated environmental impacts of the project proposals. Importantly, this section identifies the relative magnitude and significance of the predicted impacts and an overall concluding statement of the impact assessment of the proposed development. It is important to note that impacts can be positive as well as negative.

The criteria and symbols used in this assessment are as follows:

- ***Major Positive +++*** or ***Major Negative effect*** **- - -** where the development would cause a significant improvement (or deterioration) to the existing environment;
- ***Moderate Positive ++ or Moderate Negative effect*** **- -** where the development would cause a noticeable improvement (or deterioration) to the existing environment;
- ***Minor Positive + or Minor Negative effect –*** where the development would cause a barely perceptible improvement (or deterioration) to the existing environment; and
- ***Insignificant*** **O** no discernible improvement or deterioration to the existing environment.

The impact assessment also includes consideration of whether or not the impacts are permanent, temporary, direct or indirect. Furthermore, where there are other potential sources of similar impacts that could affect the local environment then cumulative impacts have been considered also. Consequently, this chapter of the NTS provides an overview of the overall potential effect of the development proposals on the environment.

6.2 Project Impacts Matrix

Table 6.1 presents each of the aspects of the development where potential impacts were predicted during the Scoping Exercise and subsequently assessed during this ESIA. The table provides an overview of the following aspects of each technical area assessed:

- Baseline environmental conditions;
- Predicted environmental impacts for both the construction phase and operational phase;
- Identification of the relative magnitude of the impact for both the construction and operational phases; and

- Identification of whether the predicted impact is positive or negative or whether there is no predicted impact.

The predictions are all based upon a comparison of the conditions that would prevail if the development does not proceed (i.e. the ongoing status of the baseline conditions) against those that will prevail if the development does proceed as described.

Table 6.1: Project Impacts Matrix				
Environmental or Socio-economic Issue	**Baseline Conditions**	**Description of Impact (After Mitigation)**	**Relative Size and Nature of Impact**	
			Construction Phase	**Operational Phase**
Socio-economic Issues	There is presently no employment associated with the site or activity on the site and there are no residential communities or cultural sensitivities associated with the land or surrounding areas. There are occasional visitors to the site, for example, local fishermen use the land to access the Khor Al-Zubair and deploy fishing nets. Adjacent to the site is the Freezone (logistics and SKA Terminal) and KZP.	The Terminal would provide jobs during the construction and operational both directly and in terms of benefits to local businesses. The traffic impact is unlikely to be significant as the volume of required products will be driven by demand and there are no alternative locations for the import of such products so even if this development did not proceed, there would probably be a similar amount of marine and road traffic in the local area and at the same junctions. The fishermen that presently access the shore from the site will no longer be able to do so once it is developed, but there are numerous other locations where this practice can continue unaffected. The local fishermen were interviewed as part of the stakeholder engagement exercise and did not see the development as affecting their activities.	+	+++

Table 6.1: Project Impacts Matrix

Environmental or Socio-economic Issue	Baseline Conditions	Description of Impact (After Mitigation)	Relative Size and Nature of Impact	
			Construction Phase	Operational Phase
		Overall the impacts on the socio-economic conditions would be positive in terms of job creation and support to the general economy of southern Iraq.		
Archaeology and Cultural Heritage	The site does not contain any archaeological or religious relicts and is not culturally significant and there are no dwellings or residential communities in close proximity to the site. The surface of the site has been heavily disturbed in the past by earth moving plant (and possibly dredgings disposal).	As there is effectively no baseline to be affected for this parameter the impact would be neutral.	**o**	**o**
Air Quality	Air quality in the area is generally good with no noted benchmark values exceeded. The main issue with respect to air quality is the increase in breathable dust caused by dust and sand storms, but this affects the whole region and is not a site specific phenomenon.	Impacts of the construction on both nuisance dust and local air quality have been assessed with regards to the location of locally sensitive receptors. Whilst the construction activities (especially earth moving) have the potential to cause local nuisance, this can be controlled and minimised by effective environmental management on the site. The works would be carried out in accordance with a CEMP. The impacts during the construction phase	**o**	**o**

Table 6.1: Project Impacts Matrix				
Environmental or Socio-economic Issue	**Baseline Conditions**	**Description of Impact (After Mitigation)**	**Relative Size and Nature of Impact**	
			Construction Phase	**Operational Phase**
		are thus predicted to be moderate to minor at all receptors if not adequately controlled but insignificant with the implementation of a CEMP and the associated. Impacts during the operational phase are predicted to be insignificant.		
Noise	The site presently does not contain any activities so in that regard there are no noise sources resulting from human activities on the site. Furthermore, there are no noise sensitive receptors in close proximity to the site.	Noise levels from the construction of the development could arise, although there are no sensitive receptors close by. Nonetheless there will be noise sources on the site that do not exist presently. Impacts are predicted to be of local significance, however with the implementation of mitigation measures and a CEMP, noise and vibration impacts, which will be for short durations only and will not be continuous. They could be noticeable however and are considered to represent a minor negative impact. The noise impacts from road traffic during the construction are not considered to be significant, with the estimated levels of noise from construction haulage at the nearest noise receptor being well below the	-	o

Table 6.1: Project Impacts Matrix

Environmental or Socio-economic Issue	Baseline Conditions	Description of Impact (After Mitigation)	Relative Size and Nature of Impact	
			Construction Phase	Operational Phase
		respective noise criteria at the nearest residential properties. The impacts from road traffic during the operational phase are considered to be insignificant given that there is very little difference between the vehicle traffic accessing KZP and that accessing the new facilities instead. The road traffic noise that prevails at present will continue to be the road traffic noise that dominates in the future at the closest residential receptor. Once operational, the predicted noise emissions generated within the proposed development from mechanical services, plant and day to day operations is predicted to be insignificant to the nearest residential receptors.		
Ecology and Nature Conservation	The development site does not support a wide variety of ecological species and is not so important from a nature conservation perspective. The majority of the site is occupied by disturbed ground and patches of sabkha vegetation. The Inter-tidal area houses mudskipper	There will be a loss of habitat such as it is on the areas where new infrastructure will be developed, but the species affected (sabkha vegetation and mudskippers) are abundant and will rapidly recolonize in adjacent areas so the overall impact will be neutral.	**o**	**o**

Table 6.1: Project Impacts Matrix

Environmental or Socio-economic Issue	Baseline Conditions	Description of Impact (After Mitigation)	Relative Size and Nature of Impact	
			Construction Phase	Operational Phase
	colonies (which are ubiquitous along the banks of the Khor Al-Zubair). The most interesting feature of the site is its potential as a site for wading birds, although only a handful of birds have been observed on the site during any of the survey visits. The waters of the marine environment are highly turbid are likely to have low biological productivity and species diversity. Overall the project site is considered to be of low ecological value.			
Water Quality and Hydrology	The water quality in both the surface water and groundwater is relatively un-impacted by human activities (other than coliforms in the surface water). The groundwater is highly saline due to the marine nature of the environment and land forming processes there and the Khor Al-Zubair is a tidal estuary.	The site construction activities would be managed under a CEMP and pollution of waters is not anticipated. Furthermore, water required for the operational activities will be brought in by tanker and not abstracted locally. Under normal operating conditions, all polluting materials will be within managed and monitored	**o**	**o**

Table 6.1: Project Impacts Matrix

Environmental or Socio-economic Issue	Baseline Conditions	Description of Impact (After Mitigation)	Relative Size and Nature of Impact	
			Construction Phase	Operational Phase
	Although the area has been a site of armed conflict, there was no development and infrastructure here to be damaged and release pollutants so the set presently does not pose a pollution threat to surface and groundwater resources.	containment systems so pollution from site activities is not anticipated.		
Soils, Geology and Contamination	The site investigation has not identified any significant contamination on the site in either the soils or sediments (although there are some elevated metal species present). This is not unexpected as there have been no polluting activities on the site to date (other than localised storage of vessel scrap which may have led to some localised surface contamination). The geology of the area is relatively consistent comprising sands, silts and clays.	Based on the site investigation findings, specific remedial measures will not be required on the site and the development overall will have a minor positive impact by removing the few contaminants and waste materials that are present to an appropriately authorised facility. Following redevelopment, the site will be under predominantly hard-standing with controlled drainage such that any spillages or releases should be contained and pollution of the soils avoided.	**o**	**+**
Waste Management	The site does not presently generate any wastes from activities per se, but there are large quantities of scrap metal on the site from shipwrecks and debris on the foreshore that has been deposited by tides. There is also	The project would generate wastes. The site works will be covered by a CEMP which, amongst other things, will	**-**	**-**

Table 6.1: Project Impacts Matrix				
Environmental or Socio-economic Issue	**Baseline Conditions**	**Description of Impact (After Mitigation)**	**Relative Size and Nature of Impact**	
			Construction Phase	**Operational Phase**
	evidence of asbestos cement sheet (isolated fragments) amongst the scrap metal waste.	seek to identify all wastes generated by the construction activities and set out management measures for these. To ensure adequate standards of waste management during the operations, a facility Waste Management Plan would be developed and implemented which will set out the appropriate measures to be employed for the management and disposal of wastes and pollution prevention. Although significant impacts are not expected from waste generating and management activities on the site, the fact that the site does not presently generate any waste but would in the future is a minor negative impact.		
KEY: - Negative Impact, + Positive Impact -/+ Minor Impact - -/++ Moderate Impact - - -/+++ Major Impact o Insignificant Impact				

The Terminal development proposals have been assessed in relation to their potential to impact upon the environmental conditions that currently prevail on the site and in the surrounding area. This assessment has understood the environmental sensitivity of the area around the proposal site.

The environmental impacts of the construction of the project are typically minor and negative and are largely a function of the inevitable disruption caused by a major redevelopment project and especially the initial earthworks phases which are unavoidably intrusive. The long lasting/permanent impacts associated with the development are, on the whole, either neutral (environmentally insignificant) or, more frequently positive.

The most notable impact is the major positive impact related to job creation and contribution to the Iraqi economy. In overall terms then, the principal conclusion of the ESIA is that despite some localised, temporary negative impacts, the overall effect of the development will be positive on terms of socio-economic benefits.

7 Environmental and Social Management and Monitoring Plan

Another key output of the ESIA process is the development of an Environmental and Social Management and Monitoring Plan (ESMMP), which sets out various commitments by the developer and his contractor. This is presented as a standalone document but will include such commitments as:

- Development and enforcement of a CEMP during any of the construction activities of the project;
- Appointment of a local stakeholder liaison officer to act as a point of contact between the development team and the local community (especially fishermen);
- Development and implementation of an Environmental Management Plan for operational activities that sets out environmental protection and pollution prevention activities that will be engaged;
- Provision of adequate containment systems, monitoring and surveillance systems and development, implementation and maintenance (including drills) of an OSERP;
- Development and implementation of a Waste Management Plan to ensure adequate management and disposal of all wastes generated by the site activities; and
- Preparation of a Demolition Environmental Management Plan, setting out how the facilities will eventually be de-polluted, decontaminated and de-commissioned to ensure that no residual environmental risks remain.