PROGRAMMATIC ENVIRONMENTAL ASSESSMENT (PEA)

OF THE
CONSOLIDATED FIBER NETWORK PROJECT

(JO 05-521)

IN COOPERATION WITH

GOVERNMENT OF IRAQ

MINISTRY OF COMMUNICATIONS and MINISTRY OF ELECTRICITY,

PREPARED BY:

United States Army Corps of Engineers
Mississippi Valley Division
New Orleans District
New Orleans, Louisiana

October 4, 2006

EXCECUTIVE SUMMARY

The CFN Project is sponsored by USAID to support the Government of Iraq Ministry of Electricity, through an updated SCADA network. This network will provide a more reliable and efficient management system for the national electric power network, which supplies power to the majority of 27 million people in Iraq. The projects effort involves installation of a new fiber cable communication network for the SCADA network data transfer and voice communication system, linking 42 major national power supply sites. This will allow for effective power supply and communication services delivery between large areas of the country, and also connect smaller towns with major cities in Iraq.

The CFN Project activities fall into the Category of Positive Determination for activities that have a potential to cause major adverse environmental impacts, as determined by the IIR program IEE, approved on February 2, 2004. These activities require a complete PEA study as specified by Regulation 22 CFR 216.2 (d)(1)(ix), for power supply projects, on which the current study efforts are focused. In planning for the implementation of this PEA study, a decision was taken with USAID and the ANE BEO to expand the PEA study as far as possible to address all the pertinent environmental issues, and to include the participation of all the stakeholders in the project, that includes the Government of Iraq Ministry of Communications and Ministry of Electricity.

For project alternatives analysis, the PEA team explored a number of alternatives to the proposed action at the programmatic level to establish the preferred most environmentally sound and appropriate option for achieving the proposed project objectives. The evaluation criteria used involved subjecting the selected project alternatives to active stakeholder participation in identifying the important adverse environmental impacts for the various alternatives that could also effectively meet the proposed project objectives. The comparison of alternatives showed that the proposed action will not cause severe environmental impacts.

The PEA study was carried out in accordance with the requirements of the Scoping Statement, which indicated the main areas of focus for the study that also assisted in the selection of the field study team. The study was conducted by a team of seven professionals that included the USAID Iraq MEO, US Army Corps of Engineers Environmental Team Leader, US Army Corps of Engineers Member, a Biologist, USAID Telecommunications Sector Manager, Telecommunications Sector Manager, and USAID Technical Review Team.

The study methodology mainly relied on a broad analytical approach, based on the list of issues that were identified in the PEA Scoping Statement (Appendix 1). This included a Desk Study for detailed literature review of available general documents on consolidated fiber communications and electric power distribution in Iraq, EIA reports, Iraq references for general country information, discussions with key informants from the Government of Iraq staff and other Iraq organizations, other individuals with working experience in Iraq and the PEA Study Teams' own professional knowledge and experience in consolidated fiber communications systems, electric power distribution and their related environmental issues from previous field visits throughout Iraq. The Scoping Statement identified potential environmental impacts of the CFN Project activities that required more detailed investigation.

During the field work, the PEA Study Team was able to confirm that some of the project activities were indeed of significant environmental concern, requiring further assessment for identification of adverse environmental impacts. These impacts were identified in terms of their contributing factors, whether they are direct or indirect, project development stages in which they occur, whether they are short-term or long-term, and their mitigation and monitoring measures. The study concluded that with appropriate impact mitigation and monitoring measures the project may not have severe adverse impacts on the environment.

The identified potential adverse environmental impacts due to the project are mainly those likely to occur during the project construction stage, and include soil erosion impacts due to ground excavations and leveling; site pollution impacts due to accumulation of construction hazardous waste; biodiversity impacts due to vegetation clearing and ground surface excavations; hydrological and water quality impacts due to hazardous waste and ground excavations across rivers, streams and wetlands; human heath and safety impacts due to operations of heavy construction machinery, presence of live UXO and handling of hazardous waste; air pollution impacts due to dust generated during ground excavations, leveling and movements of vehicles; noise pollution impacts due to operation of heavy machinery; agricultural impact due to ground excavations in agricultural land; traffic obstruction impact due to project construction activities along the roads; and historical and cultural resources impacts due to ground excavations. The socio-economic impacts are likely to occur during the project operation stage, due to developments that could encourage urban sprawl as a result of easy access to electric power supply and communication facilities in the rural areas, causing potential decrease of land area available for agricultural production and resources conservation.

The details for appropriate mitigation and monitoring measures for the identified adverse environmental impacts likely to occur during the various project development stages are explained in Section 6, Table 1 of the main report.

CONSOLIDATED FIBER NETWORK PROJECT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT REPORT

PROJECT INFORMATION

Country Code-SO: 266-001
SO Name: Iraq Infrastructure Reconstruction Program
Country or Region: Iraq
Activity Name: Consolidated Fiber Network Project
Funding Begin: January 15, 2005 Funding End: June 30, 2006 Funding Amount: $ 54,680,000

APPROVAL ISSUE: Programmatic Environmental Assessment Report

_____

Mission Director:
Approval _____ Date: _____
Hilda Arellano

Mission Deputy Director:
Approval _____ Date: _____
Michael Harvey

Infrastructure Advisor:
Approval _____ Date: _____
Christopher Serjak

Mission Legal Advisor:
Approval _____Date: _____
Tanya Nunn

Mission Environmental Officer:
Approval: _____ Date: _____
Ephantus Wahome

CONCURRENCE:
Bureau Environmental Officer:
_____ Date: _____
John Wilson

Approval: _____

Disapproval: _____

Filenames: Iraq Infrastructure Reconstruction Program IEE: Electric Power Systems Project

File No:
Distribution:
Mission Environmental Officer
IEE File:

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

ANE	Asian & Near East
BEO	Bureau Environmental Officer
BMP	Best Management Practices
BOQ	Bill of Quantities
BEP	Best Engineering Practices
IEE	Initial Environmental Examination
CECP	Construction Environmental Control Plan
22 CFR 216	Title 22 of the Code of Federal Regulations Part 216
CFN	Consolidated Fiber Network
dBA	Decibels
PEA	Programmatic Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EA	Environmental Assessment
SRCC	Southern Regional Control Center
NRCC	Northern Regional Control Center
HMMP	Hazardous Material Management Procedures
H&S	human health and safety
IDPs	internally displaced persons
in	inches
IIR	Iraq Infrastructure Reconstruction
ITPC	Ministry of Communications
IUCN	International Union for the Conservation of Nature
NGO	Non-Governmental Organization
km	kilometers
MEO	Mission Environmental Officer
O&M	Operations and Maintenance
mi	miles
mm	millimeters
ha	hectares
NRCC	Northern Regional Control Center
OSHA	Occupational Safety and Health Administration
PIEE	Programmatic Initial Environmental Examination
MEO	Mission Environmental Officer
ROD	Record of Decision
ROI	Republic of Iraq
SRCC	Southern Regional Control Center
T&E	Threatened or Endangered species
FAO	Food and Agriculture Organization
UNESCO	United Nations Educational Scientific Cultural

	Organization
UNICEF	United Nations Children's Fund
U.S.	United States
USAID	United States Agency for International Development
UNICEF	United Nations Children's Fund
UNEP	United Nations Environment Program
IUCN	International Union for the Conservation of Nature
UXO	Live (unexploded) ordinance
VSAT	Microve Satellite Transmitters
SCADA	Supervisory Control and Data Acquisition network,

1 INTRODUCTION

The CFN Project is sponsored by USAID as a part of IIR program to support the Government of Iraq Ministry of Electricity by providing an updated SCADA network, estimated to cost US $ 54,680,000. This network will provide more reliable and efficient management of the national electric power network, which supplies power to the majority of 27 million citizens of Iraq. The project proposed activities involve the installation of new fiber cable communication links for SCADA network data transfer, and a voice communication system among 42 major national electric power supply stations. This includes linking major electric power generation plants and bulk power supply sub-stations to the national communications network, through the nearest telephone exchange of Iraq Ministry of Communications ITPC Group.

The project will also undertake the improvements of physical facilities of the existing ITPC backbone communications network, including repairs and replacement of failed cable, provide operations and maintenance tools, provide technical training and supply of spare parts, and materials to enable the ITPC to maintain reliable service delivery to the citizens of Iraq. The construction of the cable network will take place along existing roads, through urban and peri-urban areas, towns and villages, small settlements and areas with sparse populations, grazing and agricultural areas, and through dry land areas and marshlands. The potential adverse environmental impacts are likely to occur during the ground excavations activities for trench construction for burying of approximately 377 km (233 mi) of fiber optic cable, and the testing and repair of 308 km (190 mi) of fiber optic (conduit and non-armored) on the existing ITPC telecommunications network. The installation of fiber cable will allow for electric power supply system monitoring, and also connect smaller towns with major cities, thus improving the communication efficiency in Iraq.

1.1 PURPOSE AND NEED FOR PROJECT ACTION

1.1.1 Purpose

The CFN Project is being implemented as a part of the IIR program, using existing fiber-optic backbone elements. The USAID will provide funding and design for the construction of this

project to support improved service delivery to the people and Government of Iraq, through reliable communication facilities and electric power supply.

This would benefit the people of Iraq by providing easy access to reliable communication facilities and more reliable electric power supply, using modern high-speed data and voice transmission network. This will include additional upgrades to the existing network with new communication links for connecting individual sites and, or networks to the main fiber-optic network, where necessary. The proposed project alternatives, including their action are discussed, analyzed, and evaluated in detail hereafter as they relate to the purpose of the project, in relation to the issues identified in the PEA study Scoping Statement.

1.1.2 Need

Multiple USG agencies and Iraqi Ministries are supporting an updated SCADA network for the Ministry of Electricity which supplies power to the majority of 27 million citizens of Iraq, but the delivery of services is not always reliable. The CFN Project will provide support for achieving more reliable and efficient management of the national power supply network, through the installation of new fiber cable communication links for SCADA network and voice communication facilities between 42 major national power supply stations. This will include undertaking the necessary improvements to the physical facilities of the existing ITPC communications network, through repairs and replacement of failed cable, providing O&M tools, providing technical training, and supply of spare parts and materials, to enable the ITPC to maintain reliable service delivery to the people of Iraq.

1.2 NEED FOR PEA

A PEA is a study that assesses the potential environmental impacts of multiple project actions in a given country or geographic area in order to determine their additive, synergistic and cumulative effects of discrete activities in a development context; for example, multiple similar donor efforts covering different parts of a particular region, or country. This may also be applied when the potential environmental impacts are generic or common to a class of similar project actions that are being undertaken in many areas within a country, or a region.

The CFN Project activities fall into the Category of Positive Determination (high risk) as determined by the IIR Program IEE, that was approved in February 2, 2004. This indicates that the proposed activity has a potential for causing significant adverse environmental impacts, and that these issues cannot be resolved by the IEE alone. The IEE recommends a full PEA study for the project, as specified by Regulation 22 CFR 216.2 (d)(1)(ix) for power generation projects, so that the potential adverse environmental impacts and their appropriate mitigation and monitoring measures can be identified. A decision was taken with USAID and the ANE BEO to undertake the PEA study to address all the pertinent environmental issues due to the project, and to include the participation of all stakeholders in the project decision-making process, including the Government of Iraq Ministry of Electricity and Ministry of Communications. The PEA addressed the identification of potential adverse environmental impacts due to the project activities and also recommended their appropriate mitigation and monitoring measures.

1.3 PEA APPROACH AND METHODOLOGY

The PEA study for the CFN Project was carried out in accordance with the requirements of the Scoping Statement. The study team consisted of seven professionals that included USAID Iraq MEO, US Army Corps of Engineers Environmental Team Leader, US Army Corps of Engineers Member, Biologist, USAID Telecommunications Sector Manager, US Army Corps of Engineers Telecommunications Sector Manager and USAID Technical Review Team. The study analysis was conducted in the City of Baghdad, through a Desk Study involving individual contributions of the team members, with periodic ad-hoc meetings to coordinate the study of significant issues and also track the progress of the study. The recommendations of the PEA study were that the project activities would be assessed using an Environmental Checklist as a tool for ensuring that all the pertinent environmental issues are fully addressed during the study.
The study anticipated the occurrence of major adverse environmental impacts due to the proposed project activities involving ground clearing, ground excavations leveling, and during the construction of trenches for the installation of fiber cable network. The report was prepared using the literature review of available secondary Iraq field data, reference sources found in professional journals, publications from environmental and public health organizations, UNICEF, IUCN, Federal Research Division of the Library of Congress, and Bird Life International, among others. The public consultation and review was invited during the preparation of the PEA study Scoping Statement, and after the completion of the first draft of the PEA report. The written comments received from USAID Iraq MEO after the review of the draft report were included during the preparation of the final report.

2 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION ALTERNATIVE

For the analysis of alternative actions the PEA team explored a number of alternatives to the proposed action at the programmatic level, to establish the most preferred or most environmentally sound and benign option for achieving proposed project objectives. The criteria used was that the selected alternative must meet the desired projects objectives for supporting more reliable and efficient management of the national network for power supply and fiber cable communication links in Iraq. The considered alternatives included multiple USG Agencies and Iraq Ministries providing an updated SCADA network to the Ministry of Electricity.

The CFN Project will support a more reliable and efficient management of the national power network by installing new fiber cable communication links for transport of SCADA data and voice communications from 42 major national power stations. This will include linking major electric power generation plants and bulk power sub-stations, to the nearest telephone exchange of Iraq Ministry of Communications ITPC Group. The project will mainly address the improvement of physical facilities of the existing ITPC communications network by undertaking repairs and replacement of failed cable, providing O&M tools and technical training, and supplying spare parts and materials to enable the ITPC to be better able to maintain the reliability of service delivery to the people of Iraq. The CFN Project alternative was found to be the most

appropriate in effectively meeting the project objectives for the installation of consolidated fiber optic network to a total of 48 sites in Iraq, and is the one assessed in this PEA study.

The proposed project action will extend the existing national fiber optic network of the ITPC to connect the major electric power generation locations, and also repair the existing communications network. This will include 46 sites that are named, numbered, abbreviated, and listed by latitude and longitude (Figure 1). There are two sites that are not in this figure, that include SRCC located in Basrah, and the NRCC located in Kirkuk. Sites 1 and 11 through 15 are located in Southeastern Iraq around the city of Basrah. Sites 2 through 9 and 10, and sites 16 through 20 are located in Southern Iraq along the Tigris and Euphrates Rivers, near the City of Hilla. Sites 21-37 are located in and around the city of Baghdad in Central Iraq. Sites 38 through 46 are located in Northern Iraq around the City of Kirkuk.

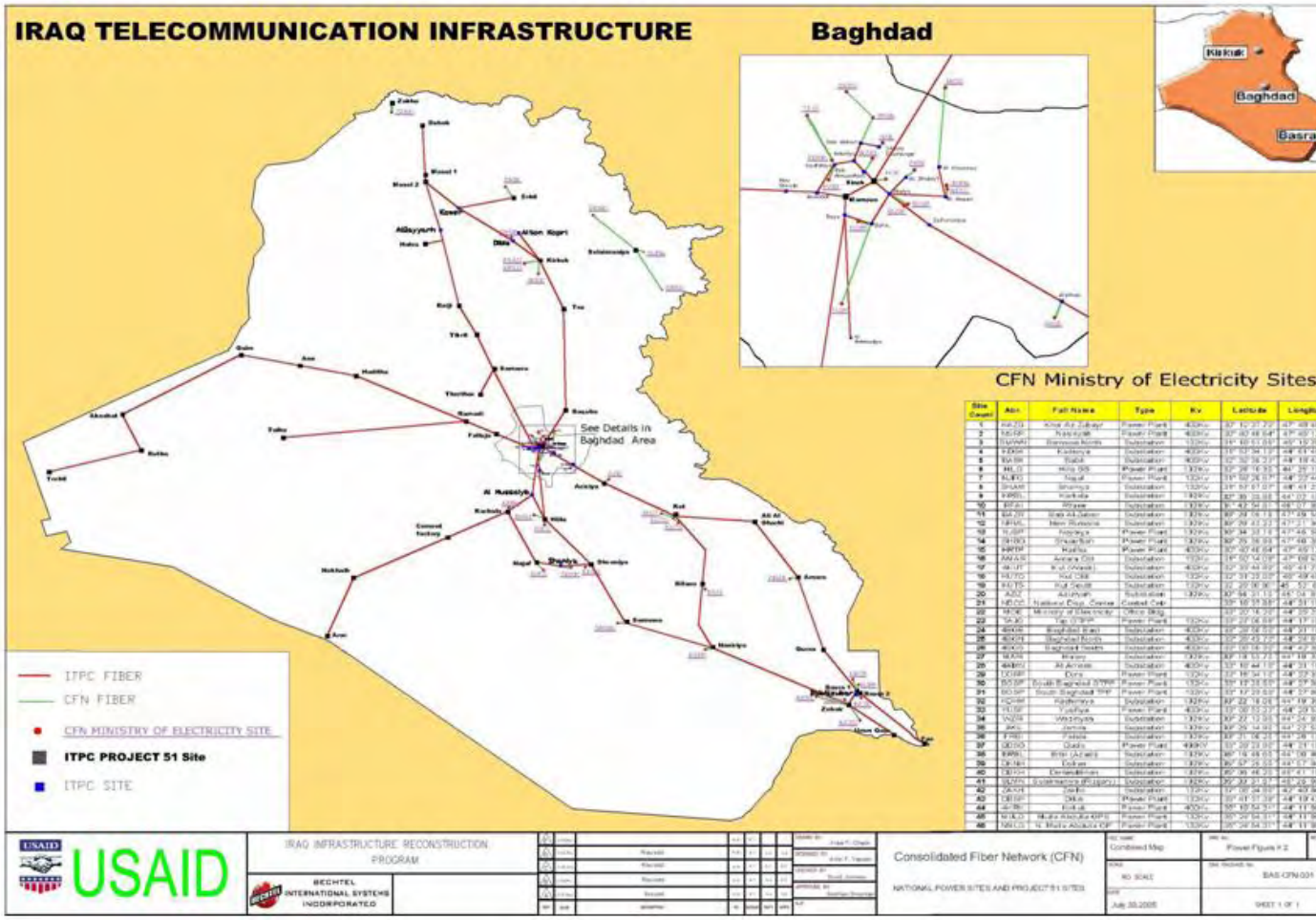

Figure 1. Consolidated Fiber Network in Iraq (The 46 of the 48 sites are displayed on the map with red dots along with latitude longitude coordinates; green lines indicate where the fiber optic cable will be).

It is estimated that a total of 685 km or 422 mi of fiber optic communications cable network will be installed by the CFN Project. This will include 377 km (233 mi) of fiber optic cable which will be directly buried, 266 km (164 mi) of new fiber optic cable to be replaced in the existing ITPC backbone network in conduits, and another 42 km (26 mi) of existing ITPC network fiber cable which will be repaired in the existing ITPC backbone network. The typical dimensions for direct optic fiber cable installation include minimum trench width of 150 mm (5.9 in) and a minimum depth of 1,000 mm (39 in). The excavators and work teams with shovels will dig the trenches. After the single high-density polyethylene armored fiber optic cable with of 13.7 mm (0.54 in) diameter is placed in the trench with a cushion of sand, the trench will be backfilled with the original soil and graded by means of a compactor. Pre-cast concrete hand-holes (1,000mm x 667mm x 667mm) will be installed at specific cable splice locations. In areas where the installation of the fiber optic cable is deemed impractical, a short distance VSAT mounted on existing structures will be installed, and no new support towers will be built.

2.2 NO ACTION ALTERNATIVE

The no action alternative is not to construct the new links extending the existing fiber optic backbone network to the major facilities of the Ministry of Electricity, or repair the existing fiber optic in the backbone network. This alternative would not provide the improved services delivery that are necessary to support the Ministry of Electricity SCADA system, which is required to control and stabilize critical electric power generation operations in Iraq, and also to allow the existing communications network to continue providing reliable communication services to the people of Iraq.

The existing power system suffers from a lack of supervisory information and remote control capability, which is necessary to effectively operate the nationwide electric power supply network. Also, the communication links with Iraq electric power generation plants and the major power distribution sub-stations that are necessary to provide the ability to operate such a system do not exist. The existing ITPC communications network has been damaged in many places, and there are neglected fiber optic cable links, which need to be restored or repaired to ensure reliable communications and electric power supply services delivery.

3 COMPARISON OF ALTERNATIVES

3.1 NO ACTION COMPARED TO PROPOSED ACTION

Iraq has suffered from many years of political unrest, social turmoil, decades of dictator leadership and several devastating wars. The country is recovering slowly and is rebuilding itself, but it will take years before it becomes an economically sustainable country. Under the no action alternative, there will continue to be a limited ability of the Government of Iraq to deliver improved services for communications and electric power supply to the citizens. The proposed

action would speed up the rehabilitation of the present national cable network for ensuring effective services delivery for communications and electric power supply to the people of Iraq. Under the no project action alternative, it is not clear when or if the present electric power supply system and communications network would be improved.

3.2 IDENTIFICATION OF PREFERRED ACTION

The proposed CFN Project will not cause severe adverse environmental impacts, and would greatly benefit the people of Iraq by creating a modern, high-speed data and voice transmission network between communication infrastructure nodes. The project will be constructed using existing fiber-optic backbone elements, providing additions and upgrades to the existing optic fiber cable network where necessary, as well as providing new communications links connecting individual infrastructure sites and, or networks to the main fiber-optic network backbone.

Therefore, the CFN Project is the most preferred alternative, since it will not cause severe adverse environmental impacts, and will also effectively meet all the desired project objectives.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 COUNTRY LOCATION

The Republic of Iraq is located in the Middle East, and is surrounded by six neighboring states (Iran to the east, Turkey to the north, Jordan and Syria to the west, Saudi Arabia to the south, and Kuwait to the south-east. The country is located between 29 and 38-degree latitude and between 39 and 49-degree longitude, and covers a land area of 438,320 square kilometers, with a coastline of 58 km in length (Figure 2).

4.2 CLIMATE

The country is mostly hot and dry, although the mountainous north and north-east, where the highlands rise to over 12,000 feet have cooler temperatures and more rainfall. The extremely hot, dry summer months last from May through October and produce maximum daytime temperatures that reach 40 degrees centigrade, usually varying between 31 – 34 degrees Centigrade. Summer months also feature strong winds and sandstorms. During the winter season, the mean daily maximum temperature is 17 degrees centigrade; but the temperatures are colder in the highlands.

The main rainfall period is November to April, with most of the rainfall falling between December and March. The remaining period of six months, particularly June to August is dry. Precipitation is highest in the north and north-eastern highlands, which receive 760 – 1,000 mm. of rainfall annually, and snow up to three months per year. The mean annual rainfall ranges between 100 – 170 mm in other parts of the country, and the summer months feature two types of wind. The southerly wind occurring from April to June is a dry dusty wind, and the wind occurring from June to September is dry and hot. The country is hot and humid at the coast and dry in the interior, with a desert covering over 40% of the land area.

4.3 AGRO-ECOLOGICAL ZONES

Iraq has four agro-ecological zones which include desert plateau, northeastern highlands, uplands region and the alluvial plain:

- Desert Plateau: Approximately 40% 0f Iraqi territory consists of a broad, stony plain with scattered stretches of sand, lying west and southwest of the Euphrates River and sparsely inhabited by pastoral nomads. A network of seasonal water courses or wadis runs from the country's western borders towards the Euphrates River. The area west of the Euphrates River is part of the Syrian Desert, which is shared by Syria, Jordan, and Saudi Arabia. This area is uninhabited, except for a few pastoral nomads. The landscape is mainly shaped by wind and water erosion (wadis or dry river and stream beds are present). Desert and steppe cover parts of the alluvial plain, but they are locally interrupted by depressions with drainage channels

- North-Eastern Highlands: This region covers approximately 20% of the country, and extends south of a line between Mosul to Kirkuk towards the boarders with Turkey and Iran, where mountain ranges reach up to 3,600 m in latitude. This area is mountainous with valleys that are suitable for cultivation, and are mostly wooded and mainly used for livestock grazing. The Mesopotamian syncline is a deep alluvial valley trough, which is filled with sediments from the mountains deposited by the Tigris and Euphrates Rivers. The City of Baghdad is located within this syncline and occupies both banks of the Tigris River.

- Uplands Region: About 20% of Iraq comprises a transitional area between the highlands and the desert plateau, located between the Tigris north of Samarra and Euphrates north of Hit, and forming part of a large natural area that extends into Syria and Turkey. Much of this zone may be classified as desert because watercourses flow in deeply cut valleys, making irrigation far more difficult than in the alluvial plain. The upper Mesopotamia portion of this region, the up-tilting part, is represented by what is called in Arabic "Jirah" (the island) and falls between the middle courses of the Euphrates and Tigris Rivers

- Alluvial Plain: Approximately 30% 0f Iraq is composed of the alluvial plain formed by the combined deltas of the Tigris and Euphrates Rivers. This region begins north of Baghdad and extends south to the Gulf Coast bordering Iran. The once extensive wetlands of the region have been decimated by damming and diversions of the Euphrates River in Turkey and Syria, and by large-scale drainage works carried out by the previous Baathist Iraq regime. The plain begins near Samarra and Ramadi, ending near the Gulf Coast after covering a distance of approximately 600 km long and 200 km wide. From Baghdad the basin tilts to the southeast to the City of Hilla, which is situated on the eastern bank of the Euphrates River, in an area that is also a part of the alluvial plain. Southeastern Iraq also has remnants of Mesopotamian marsh low-lying plains and complex interconnected shallow freshwater lakes and canals. The Tigris and Euphrates Rivers flood this area seasonally during month of March through May. The City of Basrah is located in this area.

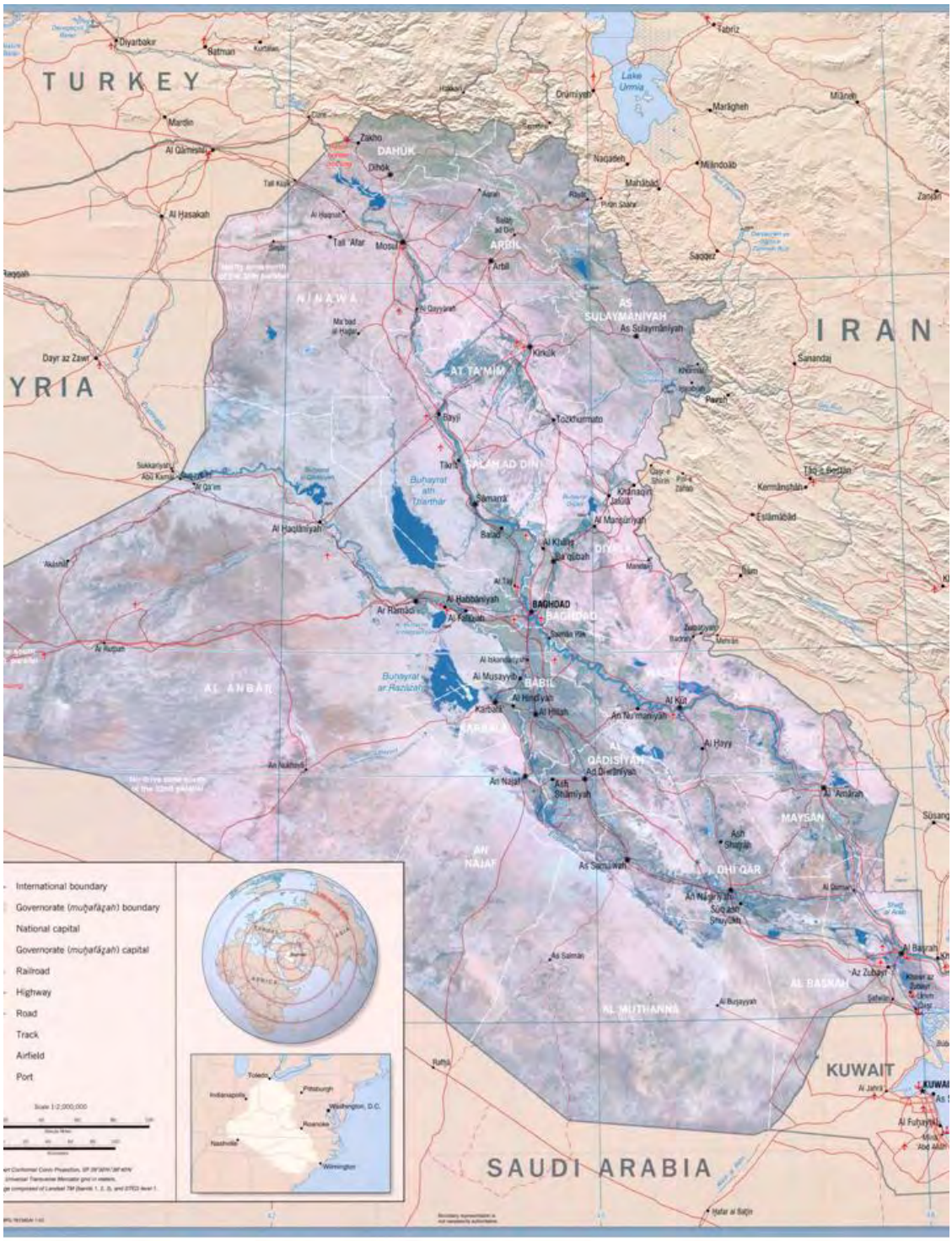

Figure 2: Location Map of Iraq Neighboring Countries, Major Cities, Rivers and Water Bodies)

4.4 POPULATION AND HEALTH

The 1997 national population census recorded a population of 22.3 million people, with an average population density of 51 persons per square kilometer. The current population growth rate is about 3% per year, with a possibility of the national population doubling in about 25 years. Today, roughly about 40% of the population is under the age of 15 years. There is no reliable estimate for the resident population in the country, and demographic statistics indicate that the population is comparatively worse off than that of its neighbors in terms of life expectancy, nutrition and infant mortality (UNEP, 2003).

Many religions are practiced, but Islam (both Sunni and Shiite sects), account for 97% of the population, with the country including some of the holiest shrines of Islam. There are 23 spoken languages with various dialects of Arabic dominating. Kurdish dialects are spoken by about 20% of the population, highlighting the difference between much of Iraq and "Kurdistan" in the north. The Kurds have long been used as political pawns in the struggles among Iraq, Iran and Turkey, who also have Kurdish communities in their population. Although Saddam Hussein's Sunni dominated Ba'ath Party was in power until recently, Kurds and southern Shiite groups are now political players, but have suffered from Saddam Hussein's repressive regime. The country is currently in a serious political crisis, and the interim and transitional governments have been very weak and unable to function effectively for almost three years. The human health situation is a major concern, not only for Iraqi people but also for foreign soldiers and aid workers operating in the country. There is a variety of diseases and human health hazards that pose a serious health risk, (e.g. malaria, typhoid, tuberculosis, cholera, etc.) that are endemic in the country (UNEP, 2003).

4.5 AGRICULTURE, AGRIBUSINESS, LIVESTOCK, AND FISHERIES

Agricultural production in Iraq includes barley, wheat, and rice. Iraqi fruits products include pears, apples, oranges, grapes, figs and pomegranates. The City of Baghdad is known for date palms that are mainly found along residential streets. The date palms trees bear fruit in September and October if there is ample rainfall and a mild summer. There are more than 300 different varieties of dates, which form an intricate part of Iraqi culture, with many traditional uses, such as furniture, baskets (or large containers), and mats made from leaves that can also be used as flotation devices. The fruit is eaten during religious ceremonies, and has historically been a major export. The populations of date palm trees have been decimated by conflicts (wars), salt-water intrusion, and lack of electricity for irrigation, from approximately 30 to around 13 million trees.

Before the United Nations imposed sanctions after the Gulf War in 1991, Iraq's export of dates accounted for a major share in the world market for this product. Livestock production, such as poultry, sheep, buffalo, camels, goats, and cattle are also raised in the upland regions and on farms within the Mesopotamian syncline. There is limited information on commercial fishing in Iraq, but there is some evidence of a small fishing industry that relies mainly on the common carp fish and other freshwater fish. As Iraq rebuilds itself and its economy stabilizes,

opportunities for the expansion of agricultural production and agribusiness activities, and increased livestock and fisheries production will become available.

4.6 ELECTRIC POWER DISTRIBUTION INFRASTRUCTURE

About 20 power generation stations, and up to 90% of Iraq's electricity distribution grid system was damaged or destroyed during the 1991 Gulf War. By 1998, the Iraqi Government authorities estimated that about 45% of the maximum pre-war generation capacity had been restored, with a report in November 1999 indicating that this figure may have increased to around 65%. But all the same, power continued to be rationed everyday throughout the country. Before the 2003 conflict, electricity was available for less than 12 hours per day in parts of the country, resulting in the degradation of public services, ranging from water supply and sanitation systems, to educational and health facilities, as well as a substantial drop in overall living standards.

Iraq has for a long time provided services to its citizens for electric power supply, potable water supply, wastewater treatment, health care and education for "free", mainly using the national revenue generated from sales of oil and gas to support these services. The economy of Iraq, in recent years, relied on oil for its economic well being, since it controls what is estimated to be the second largest oil reserves in the world. Beyond oil and natural gas, Iraq's economy is weak, and even the once fertile agricultural areas have been adversely affected by water diversion schemes, salinization, and rural-to-urban migration.

4.7 TOPOGRAPHY

The terrain of the country includes large flat expanses deeply cut by Euphrates and Tigris Rivers that originate from Syria and Turkey, and wadis (dry river beds) that are dry during most of the year. The delta lowland region of the Tigris and Euphrates Rivers basin extends southerly from the north of Baghdad to Arabian Gulf. The area is flat and encompasses 7,500 square km. of marshland, with scattered lakes in the south-eastern area. The south-western desert region is an extension of the Arabian Peninsula that comprises half of Iraq's total area, but is home to only 1% of the population. The desert region extends into Syria, Jordan, and Saudi Arabia, and is sparsely inhabited by nomads, mainly consisting a wide stony plain that is interspersed with a few sandy stretches. Some wadis are more than 400 kilometers long, and they flood during the winter rainy season.

The north-eastern region borders with Turkey to the north, and the terrain elevation increases towards Iran. This changes from rolling plateau nearest to Turkey to irregular hills, and then to high mountains ridges (the Zagros Mountains), where summits average 2,440 meters above sea level. Except for a few valleys, the mountain area is mainly used for livestock grazing in the foothills and steppes, and the fertile soil in the valleys and high rainfall, however, make cultivation possible. The uplands region between the Tigris and the Euphrates Rivers extends westwards into Syria and Turkey, with water flowing into deep valleys, making irrigated agriculture more difficult than in the lower plain.

4.8 DRAINAGE

The main sources of water in Iraq are the twin Euphrates and Tigris Rivers that originate in Turkey, which are vital to supporting livelihoods in Iraq. The problem of water scarcity is a continuing source of conflict in the region because of the mostly dry and hot climate. Iraq exercises the greatest control over the Tigris, since more than 1,500 km of the river's total length of 1,900 km. (80%) run through Iraq. Also, nearly 60% of the fresh water inflow enters the Tigris through tributaries originating from the Zagros Mountain range that collect most of the runoff within Iraq. After crossing the Turkish border, the Tigris River maintains a fairly constant slope for 36 km, and a stable course through soft bedrock for approximately 500 km. The average flow rate of the Tigris is approximately 1,500 cubic meters.

The Euphrates extends 2,700 km from its headwaters in Turkey, and only 1,000 km of the river lie within Iraqi borders. There is no fresh water inflow into the Euphrates from within Iraq, and approximately 85% of the inflow occurs within Turkey, with the remaining 15% in Syria. The construction of dams within Turkey has greatly reduced the threat of flooding along the Euphrates within Iraq, but this has also reduced the water supply required for supporting irrigated agriculture in Iraq. Although these dams are necessary in ensuring human health and safety through flood control, they also need to be managed in a way that they ensure sufficient downstream water availability for irrigated agriculture development in Iraq to prevent future resource use conflicts (US Department of Defense, 2003).

4.9 GEOLOGY AND SOILS

The desert plateau which covers approximately 40% of Iraq territory consists of a broad, stony plain with scattered stretches of sand, lying west and south-west of the Euphrates River. The Mesopotamian syncline, on which Baghdad sits, is a deep trough, filled with sediments derived from the mountains and transported by the rivers. The lower plains between the Euphrates and Tigris Rivers have been formed by the sedimentation of fluvial material resulting from historic floods.

Most of the soils are arid-alluvium soils that are some of the most important soils in Iraq because they support irrigated agriculture, which is a major land use type in the area. These soils are highly susceptible to salinization (accumulation of harmful salts in the crop root zone, due to poor drainage), and soil erosion by water and wind. The soils need to be managed in a way that the occurrence of salinization and accelerated soil erosion caused by wind and water are effectively controlled. Approximately 30% of Iraq is composed of the alluvial plain, formed by the combined deltas of the Tigris and Euphrates Rivers. This region extends from north of Baghdad to the south, and includes the Gulf coast bordering Iran (UNEP, 2003).

4.10 BIODIVERSITY RESOURCES

4.10.1 Vegetation (Herbaceous Cover)

Natural herbaceous vegetation (ground surface cover) in Iraq is extremely sparse, except in the northern mountains and the marshlands (wetlands) areas in the south. The once extensive wetlands of the region have been decimated by damming and diversion of the Euphrates in

Turkey and Syria, and by large-scale drainage works carried out by the previous Iraq Baathist regime. The desert ecosystems that are found in a large part of the country are particularly vulnerable to physical damage from vehicle movements, which result in loss of vegetation ground surface cover and desegregations of soil particles. Iraq's deserts have therefore been at risk of widespread degradation during the military conflicts of recent decades (UNEP, 2003). The desert crust is a layer of algae, mosses, lichens, fungi, bacteria and cyanobacteria that occupy the top one millimeter of the desert soil. These organisms are dormant when dry, but they become active when wet. The crust has major ecological value in the desert ecosystem as a protector of the thin desert soil organisms against wind erosion, and as a suitable bed for seed germination. The crust is known to be highly fragile, and is easily damaged by vehicles, and takes a long time to repair itself. Extensive desert crust damage caused by vehicle movements was detected by Birdlife International in Iraq and Kuwait following the 1991 Gulf War (UNEP, 2003).

4.10.2 Forest Cover

Forest cover in Iraq (including both natural forests and plantations) has been estimated to be 799,400 hectares (FAO - Global Forest Resources Assessment, 2000). An earlier FAO study from 1970 included a figure of 1.8 million hectares, which shows a clear suggestion of extensive deforestation during the 1980s and 1990s. A UNEP, 2001 study for assessment of the world's closed forests (where tree cover is greater than 40% of the land surface) gives a figure of 1,100 hectares for Iraq, showing that most of the country's forest cover consists of scattered trees. The only major areas of natural forest cover occur on the slopes of the north east mountain ranges, with a few remnant patches of riverbank scrub along the Euphrates and Tigris Rivers, and their main tributaries. In its undisturbed state, this forest forms dense stands of poplar (mainly *Populus euphratica*) and tamarisk (*Tamarix* spp.), with an under-story of species such as the Barbary Boxthorn. The remainder of the country is treeless, except for areas where tree plantations have been established, including tree crops such as date palms. Most of the original riverine forests that existed along the Tigris and Euphrates River courses have been cleared and converted to agricultural lands (UNEP, 2003).

4.10.3 Wildlife

There is scant information on the numbers and distribution of wildlife in Iraq. The endangered mammals such as the gray wolf, the smooth-coated otter, and the honey badger are believed to range in the south of Iraq in the marshlands. The database listed 33 threatened species that could be found in Iraq: Cheetah (*Acinonyx jubatus*), Euphrates jerboa (*Allactaga euphratica*), Wild goat (*Capra aegagrus*), Grey Dwarf Hamster (*Cricetulus migratorius*), Forest Dormouse (*Dryomys nitedula*), Asian Garden Dormouse (*Eliomys melanurus*), Cinereous Bunting (*Emberiza cineracea*), European Pond Turtle (*Emys Orbicularis*), Sind Bat (*Eptesicus nasutus*), Sand Cat (*Felis margarita*), Saudi Gazelle (*Gazella saudiya*), Goitered Gazelle (*Gazella subgutturosa*), Striped Hyaena (*Hyaena hyaena*), European Common Tree Frog (*Hyla arborea*), Common Otter (*Lutra lutra*), Indian Smooth-coated Otter (*Lutrogale perspicillata*), Eurasian Lynx (*Lynx lynx*), Common Bentwing Bat (*Miniopterus schreibersi*), Long-fingered Bat (*Myotis capaccinii*), and Bunn's Short-tailed Bandicoot Rat (*Nesokia bunnii*).
The International Union for Conservation of Nature (IUCN) wildlife species list for Iraq includes reptiles and amphibians, such as toads (*Bufo viridis*), tree frogs (*Hyla arborea*), the marsh frogs

(*Rana ridibunda)* and the edible frogs, *R. esculenta* (may be a hybrid of marsh frog and pool frog, *R. lessonae).* The common reptiles found in the marshes include the Caspian terrapin (*Clemmys caspia*), a soft-shell turtle (*Trionyx euphraticus*), geckos of the genus *Hemidactylus*, two species of skinks (*Mabuya aurata* and *M. vittata*), and a variety of snakes including the spotted sand boa (*Eryx jaculus*), tessellated water snake (*Natrix tessellata*) and gray's desert racer (*Coluber ventromaculatus*). The desert monitor (*Varanus griseus*) can sometimes be found in the areas adjacent to the rivers and marshes.
The IUCN database lists 404 species of birds that are believed to exist in Iraq, of which 14 are included in the global list of threatened species. For Iraq, the global list of threatened bird species includes: White-headed duck (*Oxyura leucocephala*), Lesser White-fronted Goose (*Anser erythropus*), Red-breasted Goose (*Branta ruficollis*), Marbled Teal (*Marmaronetta angustirostris*), Ferruginous Pochard (*Aythya nyroca*), Corn Crake (*Crex crex*), Slender-Billed Curlew (*Numenius tenuirostris*), Sociable Lapwing (*Vanellus gregarious*), Pallas's Sea-Eagle (*Haliaeetus leucoryphus*), Greater Spotted Eagle (*Aquila clanga*), Lesser Kestrel (*Falco naumanni*), Waldrapp (*Geronticus eremite*), and Dalmatian Pelican (*Pelecanus crispus*) while the Great Bustard (*Otis tarda*) is considered to be Extirpated globally. Bird species considered to be endangered in Iraq include: Imperial Eagle (*Aquila heliaca*), Houbara Bustard (*Chlamydotis undulate*), Pale Harrier (*Circus macrourus*), Lesser Kestrel (*Falco Naumanni*), Black-winged Pratincole (*Galreola nordmanni*), Grey Sea Eagle (*Haliaeetus albicilla*), Basra reed warbler (*Acrocephalus griseldis*), Long-billed Curlew (*Numenius tenuirostris*), and the Band-Tailed Fish-Eagle (*Haliaeetus leucoryphus*). The Long-Billed Curlew is considered critically endangered because all the remaining individuals are believed to live in a single sub-population of less than 50 mature individuals. The three endemic birds of Iraq - the Basra reed warbler, the Iraq babbler (*Turdoides altirostris*), and the Grey hypocolius – are marshland birds and are found primarily in the marshlands of the south. Two of these species, the Iraq Babbler and Basra Reed Warbler, are known to breed only in the marshes.

The Iraq region is especially important as part of the intercontinental flyways used by large populations of birds migrating between Africa and Eurasia. The majority of sites that are important for biodiversity conservation have no protected area status; although many have been recommended for designation (e.g. BirdLife International recognized a total of 42 sites in Iraq as important bird conservation areas, which cover about 35,000 square km, or 8% of the country surface area.). None of these areas have legal protection for biodiversity conservation, and many of the wetlands are critically threatened by flood control, irrigation, and drainage projects being carried out in the country and neighboring countries.

5 BIODIVERSITY AND ENVIRONMENTAL THREATS IN IRAQ

The main biodiversity and environmental threats that are contributing to ecosystem and biodiversity degradation in Iraq are: (1) Destruction of the Mesopotamian marshes and degradation of the Shatt Al-Arab region; (2) Destruction of forest cover; (3) Desertification and drought; (4) Pollution and contamination; (5) Military Conflict; and, (6) Irrigation and Soil Salinization.

5.1 Destruction of Mesopotamian Marshes

The Iraq Mesopotamia marshlands (wetlands) are in a generally arid and semi-arid region and are of great importance for the conservation of biodiversity and support of community livelihoods. The destruction of the marshlands, which were of global conservation value, has been well documented (UNEP Reports: The Mesopotamia Marshlands: Demise of an Ecosystem, 2001; and, Desk Study on the Environment in Iraq, 2003). These studies have revealed that wetlands in the middle and lower parts of the Tigris and Euphrates Rivers were, until recently, the most extensive wetland ecosystems in the Middle East. The marshes covered an area of 20,000 square km, comprised of tall reeds, seasonal marshes dominated by desert shrub and grasses, shallow and deep-water lakes, slightly brackish seasonal lagoons, and regularly inundated mudflats. The wetlands extended from Basra in the south to within 150 km of Baghdad, but the core of the wetland system was located around the confluence of the Tigris and Euphrates Rivers (UNEP, 2003).

Previous government water control projects have drained most of the inhabited marsh areas east of An Nasiriyah by drying up or diverting the feeder streams and rivers. A once sizable population of Marsh Arabs, who inhabited these areas for thousands of years, has been displaced and furthermore, the destruction of the natural habitat poses serious threats to the area's wildlife populations, and inadequate supplies of potable water. The development of the Tigris and Euphrates rivers system is contingent upon agreements with upstream riparian Turkey, air and water pollution; soil degradation (salinization) and erosion, and desertification. Massive drainage works in southern Iraq in the late 1980s and early 1990s, together with the effects of major upstream damming along the Tigris and Euphrates Rivers devastated the wetlands through desiccation. This has caused a total loss of 90% of the area originally covered by wetlands, such that only minor and fragmented parcels remain today. As a result this has put an end to the water filtering role of the marshlands for water purification, causing the remaining drainage canals to transport polluted irrigation waste water directly to the waters of the Persian Gulf, with potentially harmful impacts on local fish resources. The entire Marsh Arab community has suffered huge socio-economic upheaval as a result of the marshlands destruction, with about 40,000 people being forced to flee to the southwest of neighboring Iran, and hundreds of thousands of IDPs within Iraq (AMAR/ICF, 2001). Also, most of the natural freshwater lakes and marshes in central and northern Iraq have been drained for agricultural purposes, although significant remnants of the marshes still remain.

5.2 Destruction of Forest Cover

There does not appear to be any readily available data on Iraq’s natural forest cover and risks due to threats caused by resource utilization, but the combination of conflict and sanctions have caused increased pressure on the utilization and mismanagement of forests and their resources. During the 1980s and 1990s, about 80% of the approximately 17 to 18 million date palms tree crops lining the Shatt Al-Arab estuary, which was once the largest stand of date palms in the world, yielding an economically important crop of dates, were destroyed. This was mainly due to the consequence of the Iraq and Iran war, increased water salinity in the estuary, and large-scale upstream development of dams and irrigation schemes. There is a need for an up to date assessment of the forest resources in Iraq (UNEP, 2003).

The remaining weakened palms have been highly susceptible to pest infestations and disease that have further degraded the quality of the environment (Partow - UNEP, 2003). Most of the riverine forests which once lined the banks of Tigris and Euphrates have been replaced by orchards and other cultivated land, but significant stands of natural forest still exist, especially on small islands (UNEP, 2003). The surviving natural forest cover provides important breeding habitat for a wide variety of birds, such as grey *Hypocolius ampelinus*, Iraq babbler, *Turdoides altirostris*, and Dead Sea sparrow *Passer moabiliticus.* These forests are also used as staging areas by large populations of migrating birds, between Africa and Asia.

5.3 DESERTIFICATION AND DROUGHT

Desertification is the process of land degradation that is mainly caused by poorly regulated land use practices and climatic factors in arid, semi–arid and dry sub-humid areas. This occurs because dry ecosystems are highly fragile and extremely vulnerable to over-exploitation and inappropriate land use practices, causing the loss of life support capacity of the land. In Iraq the combination of impacts of military conflicts, internal policies and external sanctions have contributed to a high risk of desertification occurrence. This has been exacerbated by drought, and the destruction of the Mesopotamian Marshes (UNEP, 2003). Also, the degradation of grazing areas in the arid and semi-arid areas (rangelands) will have particularly adverse effects on the nomadic pastoralists. Desert ecosystems are particularly highly vulnerable to physical damage from vehicle movements, which result in loss of vegetation cover and desegregation of soil particles. During the military conflict of recent decades, Iraq nomadic grazing areas and deserts have been highly susceptible to the risk of widespread land degradation. The extensive desert crust damage from increased vehicle movements was detected by Birdlife International in Iraq and Kuwait, following the 1991 Gulf War (Greenpeace, 1999).

The problems of uncontrolled resource use due to internal conflicts and poorly regulated irrigated agriculture practices that cause soil salinization, including soil erosion due to overgrazing, vehicle movements causing loss of vegetation cover and desegregation of soil particles, will have major implications on Iraq's ability to sustain agricultural production and to conserve the natural resource base (UNEP, 2003). In addition to unsustainable land management practices, there are also a number of institutional constraints which are reducing the effectiveness of biodiversity and forestry protection in Iraq. For example, there is poor coordination among various non-governmental and international organizations) that are involved in natural resources management, due to the present conflict and political instability.

5.4 ENVIRONMENTAL POLLUTION AND CONTAMINATION

There are specific environmental pollution concerns in Iraq, caused by conflict damaged water and sanitation facilities in urban and industrial areas, oil wells, pipelines, refineries and petroleum storage sites. This stresses the need for identification, assessment and clean up of possible environmental pollution "hot spots" that pose immediate risks to human health, and damage to biodiversity resources and the environment, that require immediate attention. Some of the worst pollution "hot spots" include damaged industrial and military sites, sewage treatment facilities and places where municipal or medical (clinical waste) has accumulated in the urban areas.

Potential health risks due to air pollution caused by burning oil wells and pipelines, and fires at targeted industrial and military sites, also need to be assessed and remedial measures effected accordingly. To address these environmental concerns effectively, the environment should be fully integrated into all Iraq reconstruction and development plans and management operations (UNEP, 2003).

5.5 MILITARY CONFLICTS

Iraqis' industrial infrastructure was heavily damaged during the 1991 Gulf War. The damaged industrial and military sites included armaments and oil production installations, and petrochemical industries that make up the most important sector, with products including agricultural chemicals, pharmaceuticals and fibers. The other manufacturing industries include textiles and paper mills, furniture factories, electronic plants, and iron and steel production. All these industries use raw materials and also generate waste that has a potential to cause high risks to the environment, where oil is the major sources of hazardous polluting waste.

Past experience has shown that every conflict generates risk to human health and the environment (UNEP, 2003). The H&S and environmental threats due to most recent military activities in Iraq include air pollution, abandoned life ordinance, drinking water contamination and the presence of hazardous substances including heavy metals and depleted uranium. The post-conflict situation in Iraq compounds a range of chronic environmental issues, and presents immediate challenges in the fields of humanitarian assistance, reconstruction and administration. There is a need, after the end of the major military operations to address the military post-conflict risk to the environment and to human health, and to promote long-term environmental management. Lessons learnt from earlier conflicts show that the immediate environmental consequences must be addressed as soon as possible to avoid further deterioration of human health and safety, and environmental conditions. This requires that environmental considerations be integrated across all sectoral development activities in all post-conflict situations.

5.6 IRRIGATION AND SOIL SALINIZATION

Irrigated agriculture has been practiced in Iraq for over 7,500 years, dating back to the time when the Sumerians built canals to irrigate wheat and barley on the land between the Tigris and Euphrates Rivers. It was estimated in 1990 that over 5.5 million hectares of Iraqi territory are potentially suitable for irrigation, with 63% of this land occurring in the Tigris basin, 35% in the Euphrates basin and 2% in the Shatt al-Arab basin (UNEP, 2003).

The risk of increased soil salinity and water logging as a result of poor irrigation and drainage practices has long been a priority concern in the country, and was already recorded as a serious cause of reduction of crop yields some 3,800 years ago. In 1970 it was estimated that half the irrigated areas in central and southern Iraq were degraded due to increased soil salinity (UNEP, 2003). A land rehabilitation program was initiated in 1978, comprising concrete lining for irrigation canals and the installation of field drains and water collector drains. By 1970, a total of 700,000 hectares had been rehabilitated. But the continuing use of unsustainable management practices, damage to irrigation and drainage infrastructure during the 1991 Gulf War, and poor

irrigation system maintenance practices exacerbated by sanctions, have caused a further soil deterioration due to salinity.

5.7 AIR POLLUTION

Although the Ministry of Environment does not possess the apparatus to effectively monitor the level of pollutants in the air, the air quality in Baghdad and other major cities is generally considered to be not very good.

This has mainly been due to gaseous emissions from burning oil installations (wells, pipelines, refineries, storage tanks, etc.), power plants, brick factories, natural dust storms, and open burning of trash in urban areas and villages. The gaseous emission control methods for air quality standards have also not been consistently enforced in the country.

5.8 NOISE POLLUTION

Ambient sound levels in Iraq are consistent with similar areas elsewhere in the Middle East. Areas in the mountains and areas outside the cities generally have lower ambient sound levels.

But frequent military operations and insurgent activities have contributed greatly to noise pollution in recent years.

6 ENVIRONMENTAL CONSEQUENCES OF CFN PROJECT

6.1 IMPACT ANALYSIS METHODOLOGY

The Scoping Statement identified the main areas of focus for the PEA study concerning the identification of potential adverse environmental impacts due to the proposed CFN Project. During the field work, the PEA Team confirmed that the indicated environmental issues were indeed significant, stressing the need for identification of adverse environmental impacts and their appropriate mitigation and monitoring measures. This section of the report identifies the various adverse impacts, and also notes the project development stages in which they occur (design, construction and operation stages).

Section 7 of this report provides a list of the various adverse impacts as they relate to the project development stages, including their recommended mitigation and monitoring measures (Table 1).

The following are the most pertinent references that were used by the PEA Study Team during the Desk Study.

- Arab.net, part of the Saudi Research and Marketing Group, (http://www.arab.net/iraq/iq_agriculture.htm ; http://www.arab.net/iraq/iq_florafauna.htm, and http://www.arab.net/iraq/iq_road.htm).

- Bird Checklists of the World, (http://www.bsc-eoc.org/links/links.jsp?page=l_mid_iq#spcount)

- Bird Life International, (http://www.birdlife.org/datazone/ebas/index.html)

- Bechtel. 2003. Construction Environmental Control Plan for the Iraq Infrastructure Reconstruction Project (CECP). Contract Number EEE-C-00-01-00018-00, Document Number 249-2HP-H01-00003.

- Evans, M.I. 1994, Important Bird Areas of the Middle East. Cambridge, UK: Birdlife International.

- Federal Research Division of the Library of Congress as part of the Country Studies/Area Handbook Series sponsored by the U.S. Department of the Army between 1986 and 1998, (http://countrystudies.us/iraq/58.htm)

- First Scientific Conference on the Rehabilitation of the Southern Iraq Marshes Basrah, Iraq 11 - 12 April 2005, (http://www.public.iastate.edu/~mariposa/MarinaMesopotamica/abstracts1.htm)

- Fish base (http://www.fishbase.org/TrophicEco/FishEcoList)
- Green, A.J. (1993). The status and conservation of the Marbled Teal Marmaronetta angustirostris**.** International Waterfowl and Wetlands Research Bureau Special Publication No. 23. IWRB, Slimbridge, UK. 107pp.
- International Union for the Conservation of Nature (http://www.redlist.org)

- United Nations Development Program, "Iraq Living Conditions Survey 2004" Tabulation Report (http://www.iq.undp.org)

- USAID (http://www.usaid.gov/iraq/accomplishments/telecom.html)
- USA Today (http://www.usatoday.com/printedition/news/20050401/a_iraqweektext01.art.htm)

6.2 POTENTIAL ENVIRONMENTAL IMPACTS IDENTIFIED DURING THE PEA STUDY

The following are the potential adverse environmental impacts due to the proposed CFN Project that were identified during the study, including their suggested mitigation measures:

6.2.1 Soil Erosion Impact

This impact would only occur during the project construction stage, due to ground clearing, excavations and leveling activities for the installation of the fiber cable network. Also, the movement of heavy trucks and equipment during construction could disturb the topsoil stability and cause increased soil erosion occurrence, and generation of dust that could cause air pollution problems to the workers and nearby residents. The occurrence of increased soil erosion is known to cause environmental degradation due to loss of fertile top soil and transport of eroded soil sediment by surface runoff to surface waters. The transported soil sediment could end up in nearby road drains and sewer pipes, causing clogging problems. It is anticipated that the proposed project will not have a significant soil erosion impact if preventive measures are addressed during the project design and construction stages.

Mitigation Measures: Soil Erosion issues are best dealt with during the project design and construction stages when the necessary control measures could be considered and included in the project design. The measures taken to control soil erosion need to include clearing and grading only within approved work area limits, stripping the top soil layer from the subsoil and stockpiling the removed soil in approved areas to be used later during site restoration with replanting of original vegetation after construction is completed. The soil erosion occurrence will mainly be influenced by topography and soil surface alterations during the project construction stage. The restoration of affected sites to the original environmental conditions using the local flora will return the landscape to its original natural condition and also prevent further soil erosion occurrence.

6.2.2 Site Pollution Impact

The accumulation of solid waste generated during the project construction stage will mainly be composed of debris from bits of wood, bricks, stone and metal; defective equipment parts; different types of plastics, broken glass, and ceramics; and, other non-noxious materials. The waste could also contain paint residuals, heavy metals, and other products that could be considered as hazardous waste.

Also, the hazardous waste material from the site backup generator (leakages of fuel and oil required for the operation of the generator) could end up in the groundwater, causing long-term health problems if the contaminated water is used in meeting domestic and livestock needs. Also, the handling of soil contaminated by oil could be hazardous to the project personnel, through direct contact.

Mitigation Measures: The contractor will safely manage hazardous materials, in accordance with the recommended HMMP, CECP Section 5.2.8. The procedures for handling hazardous waste will include identifying, labeling, keeping data sheets, knowing the exact location, proper storage, and using recommended safe work practices to handle hazardous material. Also, all fuel system and fuel storage systems will be placed within concrete containment areas so that any oil spills would be contained according to safe environmental BMP. A lined containment basin will be constructed for the generator to sit in, so that the released oil material does not leak into the ground to pollute underground water resources. In addition, any waste material generated will be stored until a proper disposal facility is constructed.

For handling and disposal of various types of waste generated at the construction sites, the contractors will follow the recommended measures provided in the CECP Sub-Section 5.2.9 for safe waste management and disposal, and CECP Sub-Section 5.2.9 for safe hazardous waste material management procedures." The hazardous waste will be stored, and eventually disposed of in a safe manner to prevent potential harm to the local communities.

6.2.3 Hydrology and Water Pollution Impacts

The hydrology and water quality impacts are likely to occur during the activities for ground excavations and burying of approximately 377 km (233 mi) of fiber optic cable, and the testing and repair of 308 km (190 mi) of fiber optic (conduit and non-armored) on the existing Ministry of Communications ITPC backbone network. The hazardous waste material from the site backup generator (fuel and oil required for the operation of the generator), could affect the underground water resources, which could cause long-term human health problems if the contaminated water is used for drinking. The impacts are likely to be minimal because the routes for the consolidated fiber network will follow paved or gravel roads and existing power lines throughout most of the country.

The impacts could mainly occur in areas where the installation of the cable passes through rivers, streams, lakes and wetlands, due the release of hazardous waste into the water. The proposed CFN Project will not significantly impact the hydrology or water quality of the project affected areas.

Mitigation Measures: The trenches dug to install the cable network will not cutoff drainage flow, and a typical trench width of 150 mm (5.9 in) and a minimum depth of 1,000 mm (39 in) for each of the 48 sites throughout northeast, central, and southeast Iraq will be used. The trench containing the cushioned fiber optic cable will be backfilled and leveled to the original soil surface conditions. And the storm water will be managed well to prevent groundwater contamination, with controls tied into existing storm water controls structures, so as to allow for cross drainage. Any necessary diversion structures for water coming from the disturbed soil surface area will be constructed as per CECP 5.2.3 Guidelines. Any hazardous waste material generated during the project construction activities that could impact water quality will be stored until a proper disposal facility is constructed. The waste will be handled in accordance with the recommended HMMP CECP Section 5.2.8 to minimize or prevent the occurrence of water pollution impacts.

6.2.4 Biodiversity (Flora and Fauna) Impact

It may become necessary to clear the vegetation cover in some of the sites before the ground excavations for the installation of the cable fiber network are started. Any bush clearing, ground excavations and leveling, and digging of trenches will cause limited impacts on biodiversity along the project construction route passing through forests, grazing areas and wetlands. Most of the vegetation impacted would mainly comprise weedy species (grasses, scrubs and shrubs) that grows along the unpaved shoulders of roads and highways, and will include insects, worms,

microorganisms, etc. The proposed CFN project will not significantly impact the biodiversity of the area along the cable network route.

Mitigation Measures: The soil removed from the trenches will be returned after completion of cable layout and replanted with original vegetation to enable the natural vegetation to regenerate in the affected areas, particularly in the national parks, nature reserves and other nature protected areas. The Government of Iraq will be encouraged to monitor the recovery of the planted natural vegetation to ensure full recovery.

6.2.5 Agricultural Impact

The construction of cable network will take place along existing roads, causing minimal and temporarily impacts on agricultural land, grazing land and the marshlands. The footprint of the consolidated fiber optic network will be within the right of way of existing roads and highways, and power lines throughout Iraq.

But in case of situations where power lines pass through agricultural lands, appropriate measures will be undertaken to minimize or prevent the occurrence of adverse agricultural impacts, due to soil erosion occurrence caused by ground excavations and leveling.

Mitigation Measures: The soil removed from the trenches excavated for burying cables, passing through agricultural lands will be returned after completion of cable layout, so that the original soil condition of the ground surface in the affected agricultural lands can be restored.

6.2.6 Socio-Economic (Population and Settlements) Impacts

The implementation of the CFN Project throughout Iraq will cause positive impacts by easing the problem of communications between rural and urban areas. This will provide greater education availability, create employment opportunities, and also promote economic development as a result of the reliability of delivery of services for electric power supply and access to communication facilities.

In the long-term adverse environmental impacts could occur in the rural areas as a result of developments that could encourage urban sprawl, causing the decrease of land area available for agricultural production and resources conservation. Also, possible damage of the fiber network could occur, due to urban sprawl, unplanned land-use change along the roads and during the rural road rehabilitation activities. This could cause fiber network services disruption impact due to poorly regulated development along the roads, especially in urbanized areas.

Mitigation Measures: The problem of urban sprawl can be prevented through an effective national land use policy for discouraging the occurrence of unplanned settlements after the improvement of services delivery for communications and electric power supply by the CFN Project. Ensure that signs are installed along the network routes, showing the location of the fiber network along the roads to avoid possible damage during road rehabilitation. Encourage cross-sectoral planning to link the local communities where this is a concern with fiber project for sustainable use of the cable network. The local Government Authorities will be encouraged to monitor the trends of land use change in the rural areas so that the occurrence of urban sprawl can be properly regulated to minimized or prevent the occurrence of adverse environmental impacts.

6.2.7 Traffic Obstruction Impact

The activities for construction and installation of the consolidated fiber network will involve digging trenches along the main roads and feeder roads in Iraq. This activity will temporarily impede traffic movements and also require the use of one lane in two-lane streets during the use of heavy trenching equipment and vehicle storage, causing traffic to be directed to alternate lanes or routes.

Traffic obstruction problems caused by the project construction activities will be temporary, and the traffic conditions will return to normal after the project construction stage is completed.

Mitigation Measures: The Ministry of Transportation will be asked to inform the members of the public about the temporary traffic movement inconvenience caused by the project construction activities involving road closure and detour signs. This will be achieved through announcements on radio, television, and notices in the local newspapers, enabling commuters to utilize alternate routes to avoid delays likely to be caused by the project construction activities.

The arrangements for alternate routes will rely on the guidelines provided in the CECP Section 5.2.11, which states that, “At construction site entry, or exit points, public roads will be maintained, such that the roads are clear of debris, that street markings are visible, and that any damage to public roads, markings, or signs caused by project construction activities will be restored to pre-existing conditions or better” after the completion of the project construction stage.

6.2.8 Air Pollution Impact

The project construction activities involving ground excavations and filling up of trenches will generate plenty of dust that will cause temporary air pollution impact. The population density around the project area ranges from rural to moderate, but the residential areas are located at least several dozen meters away from the actual project work areas. There will be a temporary increase of dust from heavy equipment operation and general project construction activities.

The air polluting particulates, notably elemental carbon dust, silica dust, oil hydrocarbons, and other noxious fumes and gases could potentially be generated during the implementation of project construction activities using heavy machinery. It is anticipated that there will be no significant lasting adverse effects to air quality resulting from the project construction activities.

Mitigation Measures: Appropriate dust reduction measures will be used, such as minimizing the amount of soil surface disturbance, and handling and using water for dust suppression to limit the amount of dust and particulate matter generated by project construction activities. The fugitive dust created during the project construction stage will be minimized using the "BMP" guidelines provided in the CECP Section 5.2.2.

The project construction activities will be conducted during normal daylight hours, and the "BMP" guidelines will be used during the handling of construction material to reduce the generation of fugitive dust to the greatest extent practicable. The present air quality levels will be expected to continue at present levels, with the existing status of poor air quality in Iraq cities.

6.2.9 Noise Pollution Impact

The project activities involving ground excavations and filling up of trenches will generate plenty of noise during the operation of heavy machinery for project construction. Also, there will be a temporary increase of noise levels from the operation of heavy equipment during the project construction activities.

It is anticipated that there will be no significant lasting adverse effects to air quality or noise resulting from the construction activities of the proposed project.

Mitigation Measures: The machinery operators will wear personal hearing protection equipment, and the noise levels outside the project site boundary will not exceed 70 dBAs according to CECP Section 5.2.1 Guidelines. Noise levels will be monitored on weekly basis during the project construction stage, especially in residential areas so as to ensure that the levels do not to exceed 55 dBA. Also, training will be provided on "BMP" and appropriate protective equipment will be provided to the project construction personnel.

The noise level monitoring activities will include regular employee health checks, keeping records of employee health, occurrence of safety events (accidents), weekly safety meetings, and regular safety-training. The noise levels in the industrial environment will be controlled with barriers and beams to keep the levels below Iraqi Government, or OSHA permissible exposure limits measured, on a time weighted scale. Where local equipment noise levels exceed 85 dBA on the A scale, the project construction personnel will be provided with hearing protective devices.

6.2.10 Worker Health and Safety Impacts

The handling of hazardous waste materials during the project construction stage, and the possibility that the ground excavations for cable installation could lead to the discovery of UXOs

have a potential for human health and safety concerns. The hazardous waste material from the site backup generator (fuel and oil required for the operation of the generator), could affect the quality of underground water resources, that may cause long-term human health problems if the contaminated water is used for drinking. Also, the handling of oil contaminated soil could be a health hazard through human contact.

The discovery of UXO's could pose a serious risk to project construction personnel and project construction equipment if not properly identified and safely removed from the site before the commencement of project construction activities. Due to the nature of the work being preformed, worker safety could be a significant issue if appropriate safety measures are not followed. Noise, dust, and exposure to hazardous chemicals could be elevated during the project construction activities, through use of a variety of large pieces of construction equipment that could be injurious to the project personnel.

Mitigation Measures: Any hazardous waste material generated during the project construction activities will be stored until a proper disposal facility is constructed, and will be handled in accordance with the recommended HMMP, CECP Section 5.2.8 measures to ensure human health and safety. These procedures include identifying, labeling, keeping data sheets, knowing the exact location for waste storage, and using safe work practices during the handling of hazardous waste materials. The waste materials will be safely stored, and eventually disposed of in an appropriate manner to prevent potential harm to the project personnel and local communities. First Aid Kits will be provided in every office and in every vehicle for emergency treatment of personal injuries. Personal safety equipment will be provided to the workers (steel toed boots, impermeable overalls, impermeable gloves, safety hats, dust masks, gas masks, methane detection equipment, and radiation exposure badges, if radiation exposure becomes an issue). The safety harness will be used when working in trenches where methane might accumulate and displace air.

Field surveys will be performed at each work site, at least twice for each site – before commencement of project site measurements, and before project construction activities, due to the time lapse between measurements and construction activities. The site will be cleared of any UXO's before the project construction begins. The CECP Section 5.2.6 Guidelines state "If an unanticipated discovery is made during construction, the contractor will immediately stop work in the site, secure the area and report the findings to USAID. Construction activities will not resume until the unknown structures, artifacts or objects of historical value are identified, the UXO's cleared, and until the contractor receives word from USAID to resume work.

6.2.11 Historical and Cultural Resources Impact

Iraq is a country that is rich in historic and cultural resources, being one of the cradles of ancient civilizations. There is a possibility that these resources could be impacted by the CFN Project during the construction activities, where the presence of these historic and cultural resources may not be unknown.

Mitigation Measures: Field surveys will be performed at each work site to identify the presence of any historical and cultural resource before commencement of project site measurements, and before the commencement of the project construction activities. This will be done during the

time of field surveys for detection of any presence of live UXOs. At the moment know no cultural resources are known to exist at any of the selected sites. If any cultural resources are found at any site, all work will cease and the appropriate USAID and Iraqi governmental agency notified. Work will not recommence until USAID indicates that the project activities can continue.

7 RECOMMENDED ADVERSE ENVIRONMENTAL IMPACT MITIGATION AND MONITORING MEASURES

The basic premise for this PEA study is that reliable cable network design engineering and sound environmental management practices can and must go hand in hand, and when they do the benefits are bound to be mutual for all concerned. The identified adverse environmental impact minimization and prevention, using the recommended mitigation and monitoring measures (Table 1) starts from the assumption that "BEP" have in general been carried out in a technically sound way throughout the project development stages (design, construction, operation and management, etc.), with close reference to the available construction control standards and guidelines.

This report limits its recommendations to the adverse environmental impact mitigation and monitoring measures, which address adverse impacts seen or confirmed on the ground, as likely consequences of the cable network construction and rehabilitation activities. This assumes a reasonable degree of due diligence on the part of the project contractors and the consulting engineers who supervise the project design and construction activities in Iraq. The other very important recommendation concerning adverse impact mitigation, which also includes avoidance, is the importance of considering the occurrence of adverse impacts early in the fiber project planning and design, construction and rehabilitation process, especially during the project planning phase and the fiber network field segment assessment, which should be included as a part of the process for selecting and contracting the CFN Project construction company.

Past experience has shown, and this PEA study has corroborated the fact, that avoidance and minimization of the occurrence of adverse environmental impacts can effectively start during the early stages of project planning. Clearly, there are choices that can affect the occurrence of potential adverse environmental impacts, for example, finding the correct fiber network road alignment or location to cross a watercourse or a wetland at the narrowest place to minimize the impact, being aware of the location of boundaries of protected areas so that they can be avoided where possible, considering the possibility of fiber installation route diversion around a densely populated urbanized area to minimize the potential for traffic movement disruption, carrying out the project construction activities during the wet season to minimize the dust generation problem, and considering pertinent changes in project network design to minimize the levels of adverse impacts on wetlands and densely populated urbanized areas.

Another important point is the recognition that the implementation of recommended adverse environmental impact mitigation and monitoring measures is not the exclusive responsibility of the CFN Project contractor, or the fiber network management agency. This is because a wide variety of governmental authorities (stakeholders) at various levels may also play an important

role in dealing with the implementation of recommended mitigation and monitoring of potential adverse environmental impacts. The mitigation and monitoring measures recommended by this PEA also require that the adverse impacts affecting human health and safety, and the protection of the environment are proactively and responsibly addressed during the CFN Project design, construction and operation stages. The following Table 1 shows the occurrence of various potential adverse environmental impacts associated with different project development stages, and their suggested appropriate mitigation and monitoring measures, as outlined in Section 6.

Table 1. Mitigation and Monitoring Measures Associated with Iraq Consolidated Fiber Project Construction

Activity	Impact	Mitigation Measures	Monitoring Requirements
1. Planning and Design Phase			
Design and assessment of priority fiber route installation segments by the network engineering design consultants.	Environmental sensitivities may not be considered at this stage, but it is important to ensure that the adverse impact **mitigation and monitoring measures** are budgeted for**.**	• Ensure good collaboration among ministries so that activities can be coordinated • Encourage understanding of the affected areas of ecological sensitivity. • Fiber network rehabilitation and new construction may require having an "Environmental Checklist": for use by those assessing construction needs for chosen network segments. • Costs of environmental protection and management becomes an explicit part of the BOQ.	• Government of Iraq Ministries of Communications and Electricity review completed checklist and verify that it has been adequately completed • Possible field visit by MEO to network construction segments in question to assess status of environmental parameters, and mitigation and monitoring plans.
	Human health and safety impacts during the field survey for removal of live UXO and safe handling of hazardous waste. .	• Ensure that field surveys are carried out for removal of UXO, before network construction starts. • Ensure that the personnel doing the survey and removal of UXO are well trained and fully equipped for detection, removal and safe handling of UXO and storage, including proper storage for hazardous waste.	• Carry out regular checks to ensure that field equipment for removal of UXO is working well, and that the removed UXO is safely stored, including safe storage facilities for hazardous waste.

2. Construction Phase			
Soil surface disturbance from bush clearing, ground excavations and leveling for fiber installation, requiring operation of heavy construction machinery.	**Soil erosion impact** leading to soil displacement, slope failures, gullying, clogging of drainage ways and sedimentation in watercourses or surface water bodies.	• Plant grass or other ground cover local plants to anchor and stabilize the soil. • Avoid building using roads in very steep terrain (>60% slope). • Spreading and, or compaction of disturbed soils incorporated into BOQ. • Ensure adequate maintenance of affected water drainage ways to prevent blockages and failure	• Monitor sediment and debris buildup in road ditches or culverts along the network route. • Measure stream flow, local hydrology so as to increase the understanding of local conditions, and impact cause and effect.
	Air pollution impact due to generation of dust during ground surface excavations and leveling.	• Ensure that the field crew has breathing equipment to prevent health hazards due to dust.	• Check breathing equipment to ensure that it is working well.
	Noise pollution impact during the operation of heavy machinery.	• Ensure that machinery operators have personal hearing protection equipment	• Ensure that the personal hearing protection equipment is working well.
	Historical and cultural resources impact, causing possible damage to the present resources.	• Ensure that field surveys are carried out for detection of presence of historical and cultural resources of importance before network construction starts.	• Carry out regular field checks to ensure that the necessary field surveys are done in every site before construction activities are started.

Fiber network construction crossing watercourses or wetlands.	**Hydrology and water pollution impact** due to impeded stream flow or drainage patterns or effects on the stability and functions of wetlands aquatic ecosystems.	• Identify suitable river or stream crossing points and re-align the network if necessary.	• Careful routine inspection of the fiber network, ideally after heavy rainfall events to check possible damages for repair.
	Human health and safety impacts during the handling of hazardous waste.	• Ensure that the personnel involved in project construction are well trained and fully equipped for safe detection, removal and safe handling of UXO and storage, including safe handling of hazardous waste	• Carry out regular checks to ensure that the field equipment for removal of UXO is working well, and that the removed UXO is safely stored, including safe handling and storage of hazardous waste.
Construction and filling of trenches for fiber installation.	Clearing of bushes and ground excavations for construction of trenches could cause **Biodiversity impacts,** leading to possible loss of local flora and fauna species	• Avoid areas sensitive for nature conservation, e.g. wetlands. • Ensure that removed soil is well kept and returned after the fiber installation is completed. • Ensure that the field crew has breathing equipment to prevent health hazards due to dust. • Replant original vegetation in affected areas so that the original environmental condition can be restored. • Engage local community and authorities to take responsibility for long-term maintenance of affected areas to ensure proper re-growth of planted vegetation.	• Verify that subsequent use of affected areas, whether for maintenance or other needs meets the mitigation standards. • Verify natural plant regeneration on restored areas and if necessary, replant. • Verify conformance with affected areas recommended management plan.

Management and disposal of accumulated solid and liquid waste in field crew camps and along the route during fiber network construction.	**Site Pollution Impact** due to generation of hazardous waste from garbage or fuel, used oil and other lubricants from motorized equipment.	• Ensure project personnel training on specified site pollution safeguards. • Provide equipment for storage of used oil and other lubricants. • Incorporated full field cleanup costs well into BOQ. • Ensure that the field crew is well trained in safe handling and disposal of hazardous waste.	• Ensure that the hazardous waste is properly stored and regularly disposed off in a safe manner.
Construction vehicle and traffic use of the road during fiber installation.	**Traffic Obstruction impact** during use of heavy construction machinery along the roads, could create heavy traffic jams along the roads, especially in urban areas.	• Transmit messages on affected roads through radio, TV and newspapers to warn the members of the public to avoid affected roads during project construction. • Need for regulation of traffic movement during project construction along affected roads. • Road signs to slow down traffic and enforcement of speed limits during project construction. • Road signals alerting drivers to the dangers of passing on affected roads during project construction.	• Traffic laws need to be enforced during the project construction period. • Roads liaison officer will maintain continuous log of community enquiries and complaints on road use inconveniences.
	Agricultural impacts due to temporary loss of agricultural land during project construction activities.	• Ensure that removed soil is well kept and returned after the fiber installation is completed to minimize loss of agricultural land.	• Carry out regular field checks to ensure that the necessary site restoration is properly done after the completion of the project construction activities.

3. Operations Phase			
Improved access to communication facilities and electric power supply in rural areas.	**Increased sprawling of urban areas** and establishment of small-scale industries in the rural areas could cause **Agricultural impacts** due to loss of agricultural lands caused by unplanned settlements and mismanagement of waste.	• Initiate community-based natural resources management training programs in the affected areas. • Sensitize and train the communities on proper handling and disposal of waste. • Formulate and enforce effective land-use management policies.	• Monitoring routine reports of network maintenance and protection efforts by staff charged with managing the network in different areas in question.
Possible damage of the fiber network due to unplanned land-use change along the roads and during rural road rehabilitation activities.	Fiber network services disruption due to poorly regulated development along the roads, especially in urbanized areas.	• Ensure that signs are installed along the network routes, showing the location of the fiber network along the roads to avoid possible damage during road rehabilitation. • Encourage cross-sectoral planning to link the local communities where this is a concern with fiber project for sustainable use of the cable network.	Monitor presence and condition of the fiber network locations along the roads and ensure proper maintenance.

8 CONCLUSION

The CFN Project proposes to rehabilitate and construct a cable optic fiber network backbone for providing a more reliable and efficient service delivery for national electric power supply and communications network in Iraq. This will enable the Iraqi people to benefit from a modern high-speed data and voice transmission network and efficient supply of electricity. By carrying out the construction and rehabilitation of the CFN project the new system, which is being installed by Multiple USG agencies and Iraqi Ministries will make it possible to provide an updated SCADA network for the Ministry of Electricity. This system will support more reliable and efficient management of the national electric power supply network, for supplying power to the majority of the people of Iraqi. The citizens of Iraq will also benefit from the improvements to the physical facilities of the existing ITPC Group communications system.

The CFN project construction captivities have been shown to have a potential to cause adverse environmental impacts, some of which are temporary impacts. The occurrence of the adverse impacts will be considered early in the project design and construction stages, so that the recommended adverse impact mitigation and monitoring measures can be fully incorporated in the project design, including the award and contracting process for the project Construction Company. Also, the local governmental authorities at various levels and local communities will be encouraged to play an active role in dealing with the mitigation and monitoring of potential adverse impacts due to the project to ensure sustainable delivery of improved services to the people of Iraq for reliable electric power supply and high-speed communication facilities.

9 REFERENCES CITED

Arab.net, part of the Saudi Research and Marketing Group, (http://www.arab.net/iraq/iq_agriculture.htm, http://www.arab.net/iraq/iq_florafauna.htm, and http://www.arab.net/iraq/iq_road.htm).

Bird Checklists of the World, (http://www.bsc-eoc.org/links/links.jsp?page=l_mid_iq#spcount).

Bird Life International, (http://www.birdlife.org/datazone/ebas/index.html).

Bechtel. 2003. Construction Environmental Control Plan for the Iraq Infrastructure Reconstruction Project (CECP). Contract Number EEE-C-00-01-00018-00, Document Number 249-2HP-H01-00003.

Evans, M.I. 1994, *Important Bird Areas of the Middle East*. Cambridge, UK: Birdlife International.

Federal Research Division of the Library of Congress as part of the Country Studies/Area Handbook Series sponsored by the U.S. Department of the Army between 1986 and 1998, (http://countrystudies.us/iraq/58.htm).

First Scientific Conference on the Rehabilitation of the Southern Iraq Marshes
Basrah, Iraq 11 - 12 April 2005,
(http://www.public.iastate.edu/~mariposa/MarinaMesopotamica/abstracts1.htm).

Fishbase (http://www.fishbase.org/TrophicEco/FishEcoList).
Green, A.J. (1993). The status and conservation of the Marbled Teal *Marmaronetta angustirostris*. International Waterfowl and Wetlands Research Bureau Special Publication No. 23. IWRB, Slimbridge, UK. 107pp.
International Union for the Conservation of Nature (http://www.redlist.org).

United Nations Development Program, “Iraq Living Conditions Survey 2004” Tabulation Report (http://www.iq.undp.org).

USAID (http://www.usaid.gov/iraq/accomplishments/telecom.html).

USA Today (http://www.usatoday.com/printedition/news/20050401/a_iraqweektext01.art.htm).

AMRFamar (ICF), 2001. Iraq Marshlands: Prospects (Draft Report) UNHCR. 1996; Background Paper on Iraq refugees.

Population Reference Bureau, Iraq, Demographic and Health Highlights, Mid – 2005.

Greenpeace, 1991. Modern Warfare and the Environment – A Case Study of the Gulf War.

UNEP, 2003. Desk Study on the Environment in Iraq. UNEP, Nairobi, Kenya.

UNEP, 2001. Partow, H. The Mesopotamian Marshlands: Demise of an Ecosystem. Division of Early Warning and Assessment, UNEP, Nairobi, Kenya.

Moore, P.D. 1998. Desert Ecology: Life in the Upper Crust. Nature 393: 419-420.

UNEP, 2001. An Assessment of the Status of World's Remaining Closed Forests. UNEP Division of Early Warning and Assessment (DEWA), UNEP, Nairobi, Kenya.

USAID, September 2005. Guidelines for Tropical Forestry and Biodiversity (FAA 118 and 119) Analysis: Lessons Learned and Best Practices from Recent USAID Experience. Prepared by IRD, Incorporated.

USAID, September 2005. Biodiversity Conservation; A guide for USAID Staff and Partners.

State Department Country Handbook: Iraq Transitional Handbook

10 REPORT PREPARERS

1. Gib Owen, U.S. Army Corps of Engineer and Team Leader

2. Laura Lee Wilkinson; Biologist

3. Simeon Francis; Engineer

11 POTENTIAL REVIEWERS

Government of Iraq:

1. Ministry of Environment

2. Ministry of Health

3. Ministry of Transportation

4. Ministry of Municipalities and Public Works

5. Mayoralty of Baghdad

SCOPING STATEMENT

of the

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
for the
CONSOLIDATED FIBER NETWORK PROJECT

(JO 05-521)

in Cooperation with

THE GOVERNMENT OF IRAQ, MINISTERY OF COMMUNICATIONS
and
MINISTRY OF ELECTRICITY

INTRODUCTION

In order to support the people and the Government of the Republic of Iraq, and to improve the communications system in Iraq, the United States Agency for International Development (USAID) proposes to finance a project to construct a Consolidated Fiber Network (CFN) linking components of the electrical and communication sectors across the country of Iraq.

The proposed CFN Project would benefit Iraq by creating a modern, high-speed data and voice transmission network between infrastructure nodes. The CFN Project would be constructed using existing fiber-optic backbone elements, providing additions and upgrades to the backbone where required, as well as providing new communications links connecting individual infrastructure sites and/or networks to the main fiber-optic backbone.

Twenty-two CFR 216.2.(a) (Scope), states that except as provided in Sec. 216.2(b), USAID's environmental procedures apply to all new projects, programs or activities authorized or approved by USAID and to substantive amendments or extensions of ongoing projects, programs, or activities.

Twenty-two CFR 216.2(d)(1)(vii, ix, and x) of the USAID Environmental Procedures identifies penetration road building or road improvements, power plants, and industrial plants as classes of actions that have been determined generally to have a significant effect on the environment. Constructing a consolidated fiber network throughout Iraq along roads with connections to power plants and industrial plants would require road improvements. This provision further provides that an Environmental Assessment (EA) or Environmental Impact Statement, as appropriate, is required. An EA is a detailed study of a proposed action to determine if there are any reasonably foreseeable significant impacts, beneficial or adverse. As outlined in 22 CFR 216.6(a), EAs provide USAID and the host country decision makers with a full discussion of significant environmental effects of a proposed action. It includes alternatives that would avoid or minimize adverse effects or alternatives that would enhance the quality of the environment so that the expected benefits of development objectives can be weighed against any adverse impacts upon the human environment or any irreversible or irretrievable commitment or resources.

The first step in this process is the preparation of a Scoping Statement which is a document used to anticipate potentially significant issues, issues that are potentially not significant, and to determine how and by whom the study will be conducted. The purpose of this Scoping Statement is to set forth clear understandings among USAID, the Ministry of Communication, the Ministry of Electricity, and the Government of the Republic of Iraq with respect to these issues for this project.

BACKGROUND

The Bureau Environmental Officer (BEO) for USAID's Asia Near East (ANE) bureau concurred with the recommendations contained in a Programmatic Initial Environmental Examination (PIEE) of the Iraq Infrastructure Reconstruction Program in February 2004. The recommendations of the PIEE were that all projects would be assessed using an environmental checklist. This PIEE anticipated a finding of a positive determination for activities that involve

major construction activities or new water management projects, and suggested the need for an EA for such activities.

The CFN Project could alter significant portions of existing and/or currently under construction fiber-optic backbone network with additional sections being added as necessary to complete the backbone connectivity to those regions initially selected for service implementation. The regions identified are as follows: the Southern Euphrates; the Southern Tigris; Central (Baghdad); and North Iraq (around Zakho, Kirkuk, and Sulalmanlya). Connectivity from individual infrastructure sites to the CFN backbone would be provided and would utilize a combination of communication technologies. Existing infrastructure resources, such as, power lines and communications towers would be utilized to the extent practical for the installation of new fiber, in lieu of new below ground work. The estimated cost of this project is approximately $51.9 million.

The scope of work for this project would include a site security assessment, operation/maintenance training, and fiber optic network management training. The proposed project is expected to employ approximately 1,000 Iraqi people through the use of local subcontractors.

DIRECT, INDIRECT AND CUMULATIVE POTENTIALLY SIGNIFICANT EFFECTS

1) Noise

Scope – Heavy equipment used for excavation would be the major source for noise. This is a concern for local residents and construction workers in the immediate vicinity of work being performed and members of the local community. Strict silencer standards are needed and silencers must be used on all equipment and kept in a well-maintained state.
Significance – Population density around the proposed work sites is considered to moderate. Noise levels should not exceed 55 dBA for residential and 70 dBA for industrial areas during daylight hours. Best Management Practices (BMP) and appropriate Personal Protective Equipment will be required to protect site personnel.

2) Air Quality and Dust Control

Scope – Degraded air quality (notably elemental carbon, silica dust, hydrocarbons, smoke, other carcinogens, and other noxious fumes and gases) is likely to occur during construction from heavy equipment emissions and fugitive dust generation. Dust can easily be transported by strong winds, especially during the summer months. Construction workers could contract respiratory illnesses from exposure to heavy amounts of dust.
Significance - This would be a high priority of management during construction but would cease to be an issue once construction is complete. Wet dust control methods should be used during construction and dusk masks should be worn to by site personnel as warranted by site conditions. Fugitive dust will be minimized to the greatest extent practicable by the contractor.

3) Erosion Control

Scope – Some soil erosion will occur during excavations, which disturb vegetative or other cover (e.g. asphalt or road bases). Stockpiled soils are more susceptible to erosion from wind and rainfall and would require special handling. It is not anticipated that soils would be stockpiled for extended period of time.
Significance – Significant erosion of surface soils is not anticipated. Working within site limits, utilizing approved waste removal, temporary/permanent stripping and stockpiling methods, maintaining drainage patterns, and following BMP will minimize erosion.

4) Environmentally Sensitive Areas

Scope – Final CFN routes have not been determined so crossing environmentally sensitive areas is a possibility. Environmentally sensitive areas are areas that provide a significant function (e.g. riparian areas, wetlands including marsh, or endangered species habitats) or contain cultural artifacts or ruins. Construction could also be in close proximity to culturally sensitive areas (e.g. mosques, shrines, or other holy sites).
Significance – Encountering environmentally sensitive areas is not anticipated. Site assessments and proper planning will avoid these areas to the maximum extent practicable. Methods used to avoid impacts include working only in the minimum area required or creating buffers; repair/prevention of significant rutting by vehicles; and immediately responding to hazardous material spills. Project personnel would be frequently reminded to be culturally sensitive and aware of potential environmental conflicts while completing construction activities.
.

5) Hazardous Materials

Scope - Proper management of the various types of potentially hazardous materials and/or waste (i.e. chemicals, lubricating oils, fuel oil, and diesel fuel) generated during construction activities is a serious concern. Hydrocarbon spills from heavy equipment, during refueling operations, or due to general mishandling of potential hazardous material is likely to occur considering the practices of the work force and the overall low concern regarding contamination in Iraq.
Significance - Hazardous Material Management Procedures (HMMP) will be implemented according to BMP. Subcontractors will provide a Hazardous Material Inventory list onsite and will be responsible for proper management (e.g., transportation, storage, handling, use, and disposal) of their hazardous materials in accordance with the HMMP.

6) Debris Cleanup & Restoration

Scope - This construction project is expected to generate significant amounts of non-hazardous debris in the form of sediment, concrete, building debris, and miscellaneous construction related materials. A site-specific authorization should be obtained from the Government of the Republic of Iraq to allow disposal in a sanitary landfill or other appropriate location following material recognition and hazard identification.
Significance - If not properly managed, waste and debris could cause negative environmental and aesthetic impacts. The contractor would clean up and remove construction materials and debris, and restore surfaces and sub surfaces to pre-existing conditions utilizing BMPs.

7) Worker Health, Safety, and Training

Scope – Workers must be provided with the knowledge of the materials they are handling, an active safety program, and appropriate safety equipment including gloves, steel-toed boots, non-permeable coveralls, safety helmets, protective masks, and hearing protection devices.
Significance – This is extremely significant and must be the first priority of site management.

8) Transportation

Scope – The use of public roadways and railways would be necessary for the transportation of construction personnel, materials, and equipment. Material transportation routes would be selected based upon; equipment accessibility, existing traffic patterns, noise restrictions, logistics, distance, cost, and safety.
Significance – Routes would be avoided that could adversely affect sensitive areas to the maximum extent practicable. Movements in these areas would be restricted to the extent practicable to completing the job.

ISSUES THAT ARE POTENTIALLY NOT SIGNIFICANT

1) Threatened and Endangered Species

Scope – The CFN sites are around towns and cities with moderate populations. The sites should not pose any impacts to any habitat for any species listed on the International Union for the Conservation of Nature database that are critically threatened, threatened, vulnerable, or endangered.
Significance – This issue is not significant for the proposed construction sites, since many are near developed communities or are near disturbed areas, such as roads or power line right of ways.

2) Geology, soils and slope stability

Scope – The geology of the site would be investigated prior to site acceptance. The soil type could be significant if it contains silica dust, which can cause silicosis if absorbed into the lungs.
Significance – These issues are primarily design issues, and if effectively treated in the plan and design, are believed to be not significant.

3) Unexploded Ordnances

Scope – All sites must be cleared of unexploded ordnances (UXO) before any other work can begin.
Significance – This item is not significant once any UXOs are cleared at the beginning of the project.

TIMING OF PREPARATION OF ENVIRONMENTAL ANALYSIS

It is anticipated that the Scoping Statement document will be completed in Baghdad by August 26 and forwarded to the ANE BEO for circulation. The Scoping Statement document will be circulated by the Mission Environmental Officer (MEO) to the Ministry of the Environment, Ministry of Communication, Ministry of Electricity, Ministry of Transportation, and interested in-country NGOs concurrently with circulation to other federal agencies as deemed appropriate by the ANE BEO. The comment period provided by REG 16 is 30 days. EA preparation can commence and the work progress pending BEO approval of the Scoping Statement document. Comments received following circulation can be incorporated in the final Scoping Statement document. Following the receipt in September of comments on the Scoping Statement, the EA team can perform any additional studies necessary and prepare the final project design and the design of the monitoring and mitigation plan. The EA can be submitted by October 2005 to the BEO and final approval can be obtained before the end of October 2005.

VARIATIONS IN THE FORMAT OF PEA

No variations in the format of this PEA are needed at this time nor is it anticipated that any variations will be needed at a later time.

SCHEDULE OF PLANNING AND DECISION MAKING

August 26 – Draft Scoping Statement sent to BEO and is circulated in country for comment.
August 27 – BEO sets up Washington based EA review team.
August 26 – Draft EA preparations begin.
September 28 – Final Scoping Statement prepared and forwarded to BEO with a ROD for execution.
October 1 – Draft EA prepared and sent to BEO and circulated in country for comment.
October 16 – final EA prepared and sent to BEO with a ROD for execution

DESCRIPTION OF HOW ANALYSIS WILL BE CONDUCTED

The analysis will be conducted in Baghdad through individual contributions of the team members with periodic ad-hoc meetings to coordinate the study of significant issues and track the progress of the work.

DISCIPLINES THAT WILL PARTICIPATE IN THE ANALYSIS

1) Core Team

1. USAID Mission Environmental Officer – John Pennell, USAID
2. Environmental Team Leader – Gib Owen, US Army Corps of Engineers
3. Biologist – Laura Lee Wilkinson, US Army Corps of Engineers
4. Biologist - Fadiya Fahim – USAID
5. Telecommunications Sector Manager – Rod Whitinger, US Army Corps of Engineers
6. Telecommunications Sector Manager – Dick Dumford, USAID
7. Technical Review – Bob Martinson, US Army Corps of Engineers

2) Potential Agency Reviewers

1. Government of Iraq, Ministry of Environment
2. Government of Iraq, Ministry of Communications
3. Government of Iraq, Ministry of Electricity
4. Government of Iraq, Ministry of Transportation

13 APPENDIX 2: COMMENT LETTER RECEIVED FROM MINISTRY OF THE ENVIRONMENT

Comment letter received from Ministry of the Environment, 2 October 2005. No response required.

بسم الله الرحمن الرحيم

Republic Of Iraq
Ministry Of Environment
Office Of The Senior Deputy For
Technical Affairs
NO: 2558
DATE: 12/04/ 200

جمهورية العراق
وزارة البيئة
مكتب الوكيل الفني
العدد: ٢٥٥٨
التاريخ: ١٢/١٠/٢٠٠٥

Dear Mr. Owen,

With reference to your letter dated 26th August, 2005 , requesting the Ministry's comments regarding the Draft Environmental Scoping Statement (ESS) for the Consolodated Fiber Network Project, we would like to state the following:-

The Ministry of Environment has no objection to implement the project, provided the concerned parties adhere to the requirements stated in the statement in addition to the following requirements:

1- the noise levels should not exceed 55 dBA in the residential areas and 70 dBA in the industrial areas, if the levels exceed these levels workers must be provided with the necessary safety equipment.
2- Provision of gas masks for the workers for protection against air pollutants.
3- Disposal of the solid waste generated from the excavation in the landfills.
4- Maintaning areas with certain speciality such as marshlands, green areas, mosques…etc.
5- Cleaning the site of any chemical and solid materials after implemetation.

Please accept the assurances of my highest consideration.

Yours sincerely,

Tuama A. Helou
Acting Deputy Minister
October, 12 2005

Mr. Gib Owen
Environmental Compliance Manager
U.S. Army Corps of Engineers
USAID Project Office, Baghdad