



**AL DOUH IRAQI COMPANY FOR
CEMENT INDUSTRIES LLC**

**ENVIRONMENTAL AND
SOCIAL IMPACT
ASSESSMENT (ESIA) FOR
THE EXPANSION OF THE
EXISTING AL DOUH
CEMENT PLANT - IRAQ**

SCOPING REPORT

November 07, 2022

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TABLE OF CONTENTS

Table of Contents.....	1
List of Tables	4
List of Figures	6
1. Introduction	7
1.1 General	7
1.2 Project Background	7
1.3 ESIA Study.....	8
1.4 Scoping Report Objectives	10
1.5 Project Developer (Al Douh Iraqi Company for Cement Industries LLC "the Client")	11
1.6 Current O&M Contactor- China National Building Material Group Co., Ltd. (CNBM)	11
1.7 ESIA Consultants (Earth Link and Advanced Resources Development (ELARD))	12
2. Project Location.....	13
3. Project Characteristics.....	15
3.1 Construction phase of the Expansion Project	15
3.1.1 Construction Activities and timeline	15
3.1.2 Required Machinery during the Construction Phase	17
3.1.3 Labour and Work Staff	17
3.1.4 Facilities and Infrastructure	18
3.1.5 Fuel and Energy Sources	19
3.1.6 Materials Consumed	20
3.1.7 Water Consumption.....	20
3.1.8 Solid and Liquid Wastes Management	20
3.2 Operation Phase of the Expansion Project.....	22
3.2.1 The New Cement Plant.....	22
3.2.2 The New Power Plant	22
3.2.3 The New Water Treatment Plant	22
3.2.4 Labour and Work Staff	23
3.2.5 Facilities and Infrastructure	24
3.2.6 Consumed materials during the operation phase.....	24
3.2.7 Fuel consumption during Operation Phase	24
3.2.8 Water Consumption during the Operation phase	25
3.2.9 Generated Wastewater during the Operation phase	26
3.2.10 Solid and Liquid Wastes Management	26
3.2.11 Air Emissions Management plan	27
3.2.12 Delivery of Finished Products to Customers.....	27
3.3 Quarrying and Raw Materials Extraction	27
3.3.1 Quarries locations.....	27

3.3.2	Life Span of the Quarries	27
3.3.3	Quantity of Extracted Material and Material extraction processes	27
3.3.4	Labour and Work Staff	28
3.3.5	Water requirement	28
3.3.6	Energy.....	28
3.3.7	Solid waste disposal:	28
3.3.8	Vehicle Movement.....	29
3.4	Health, safety and Environment Policies.....	29
4.	Legal, Institutional and Regulatory Framework	31
4.1	Institutional Framework and Sector Organization in Iraq	31
4.1.1	Institutional Framework for the Protection of the Environment	31
4.1.2	Institutional Framework for Cement Industry and Quarries.....	31
4.1.3	Institutional Framework for Occupational Health and Safety in Iraq.....	33
4.2	Regulatory Framework for Environmental Protection in the Iraqi Cement Industry....	33
4.3	Environmental Impact Assessment (EIA) in the Iraqi Legislation	34
4.4	National Policies and Plans	34
4.4.1	The National Development Plan (2018 – 2022)	34
4.4.2	National Environmental Strategy and Action Plan, 2012	34
4.4.3	National Biodiversity Strategy and Action Plan (2015-2020)	35
4.5	Relevant National and International Environmental Regulations and Standards	35
4.5.1	Air Quality.....	35
4.5.2	Noise Levels	44
4.5.3	Surface Water Quality, Wastewater and Storm water Discharges	45
4.5.4	Potable Water	53
4.5.5	Ecology	54
4.5.6	Traffic	55
4.5.7	Archaeology	56
4.5.8	Soil Standards	56
4.5.9	Solid and Hazardous Wastes.....	56
4.5.10	Socio-Economic.....	58
4.5.11	Health and Safety.....	60
4.6	International Conventions, Treaties and Guidelines	63
4.7	Penalties and Enforcement	67
4.8	Relevant International Guidelines.....	68
4.8.1	IFC Performance Standards.....	68
4.8.2	World Bank Group EHS Guidelines	74
4.8.3	Good Practice Guidance	75
4.9	Gap Analysis.....	75
5.	Stakeholder Engagement and Consultation	85

5.1	Scoping Consultations Methodology	85
5.2	Results from the Scoping Consultation Meetings	86
5.3	Next Steps	86
6.	Scoping of the Potential Impacts	87
6.1	General Methodology of Impact Assessment	87
6.1.1	Selection of Environmental and Socio-economic Components.....	87
6.1.2	Identification of ESIA Boundaries	88
6.1.3	Impact Identification, Screening, and Assessment Criteria.....	89
6.1.4	Identification of Mitigation Measures.....	97
6.1.5	Assessment of Residual Effects	98
6.1.6	Assessment of Cumulative Environmental and Socio-economic Impacts	98
6.2	Impact Assessment for The Selected Components	99
6.2.1	Air Quality and GHG Emissions	108
6.2.2	Noise and Vibration.....	116
6.2.3	Geological, Soil, Hydrological, Hydrogeological and Groundwater Conditions..	120
6.2.4	Use of Natural Resources/ Resources Efficiency.....	129
6.2.5	Biodiversity (Flora, Fauna, Habitats & Ecosystem Services).....	132
6.2.6	Cultural Heritage	139
6.2.7	Socio-Economics Conditions	140
6.2.8	Labour and Working Conditions/OHS	145
6.2.9	Community Health, Safety, and Security.....	147
6.2.10	Human Rights	148
6.2.11	Indigenous Peoples.....	151
6.2.12	Land acquisition	154
6.2.13	Traffic	154
6.2.14	Infrastructure	156
6.2.15	Landscape and Visual Amenity	158
7.	Identification of Alternatives to be Assessed	159
8.	References.....	160
9.	Appendices	161
	Appendix A: Stakeholder Engagement Plan.....	161
	Appendix B: Air Quality Baseline Survey Methodology	162
	Appendix C: Methodology for Air Dispersion Modelling.....	172
	Appendix D: Noise Survey Plan Methodology	174
	Appendix E: Methodology for Noise Modelling.....	178
	Appendix F: Soil Sampling Survey Methodology	179
	Appendix G: Groundwater Sampling Methodology	181
	Appendix H: Socio-Economics and Land Ownership Baseline Survey Plan Methodology ..	183
	Appendix I: Layout of Existing Al Doh Cement Plant	184

LIST OF TABLES

Table 3-1	Construction Phase Time Scale	16
Table 3-2	List of Needed Machinery during the Construction Phase	17
Table 3-3	List of Required Labour/Work Staff and their Occupation during the Construction Phase of the Expansion Project	18
Table 3-4	Summary of fuel consumption during Project Construction.....	19
Table 3-5	List of Required Materials and their Sources for the Construction phase of the Cement Plant	20
Table 3-6	List of Wastes Expected to be Generated during the Construction Phase of Expansion Project and the Proposed Disposal Methods.....	21
Table 3-7	Analytical Results of Treated Water	23
Table 3-8	Number of employees in existing and new plants during operation phase.....	23
Table 3-9	Types and Resources of the Raw Materials Required for the Cement Production	24
Table 3-10	Summary of fuel consumption during Operation.....	25
Table 3-11	List of Wastes to be Generated during the Operation Phase and Its Disposal Methods	26
Table 3-12	Number and occupation of employees in the quarry.....	28
Table 4-1	Ambient Air Quality Standards	36
Table 4-2	Point Source Emission Standards for Stationary Emission Sources (excluding Combustion Sources)	40
Table 4-3	Air Emission Levels for Cement Manufacturing.....	42
Table 4-4	IFC Emission Guidelines for Combustion Facilities ($\geq 50\text{MWth}$ to $< 300\text{MWth}$) – (in mg/Nm^3 or as indicated)	43
Table 4-5	Draft Iraqi National Limits of Noise Levels outside Buildings	44
Table 4-6	IFC Noise Level Guidelines	44
Table 4-7	Wastewater and River Quality Standards.....	47
Table 4-8	Effluent levels: Cement Manufacturing	52
Table 4-9	Indicative Values for Treated Sanitary Sewage Discharges ^a	53
Table 4-10	Iraqi Drinking Water Standards	53
Table 4-11	Right of Way of Public Roads.....	55
Table 4-12	Minimum Workers Exposure Hours to Noise Levels to be Eligible for Allowances	61
Table 4-13	Projects' Occupational Health and Safety Responsible Party.....	61
Table 4-14	Vibration Limits in Working Environments	62
Table 4-15	International Conventions Ratified by Iraq.....	63
Table 4-16	ILO conventions signed and ratified by Iraq.....	65
Table 4-17	Penalties for Non-Compliance with Iraqi Environmental Regulation	67
Table 4-18	IFC PSs Applicability to the Proposed Project	69

Table 4-19	Comparison of Ambient Air Quality Standards between Iraqi standards and WHO Air Quality Guidelines.....	76
Table 4-20	Comparison between Iraqi Maximum Allowable Emissions Limits from Stationary Sources and WBG Air Emission Levels for Cement Process Emissions	78
Table 4-21	Comparison of Allowable Noise Level Standards between Iraqi and IFC Standards	80
Table 4-22	Comparison between Iraqi Effluent Discharge Standards and IFC Effluent levels for Cement Manufacturing	80
Table 4-23	Comparison of allowable Values for Treated Wastewater for Irrigation Use between Iraqi and IFC standards	83
Table 6-1	Impact Identification Matrix – Construction of the Expansion Project Phase	90
Table 6-2	Impact Identification Matrix – Quarrying and Raw Material Extraction Phase .	91
Table 6-3	Impact Identification Matrix – Operation of the Expansion Project Phase	92
Table 6-4	Impact Identification Matrix – Decommission and Rehabilitation of the Quarry Phase	93
Table 6-5	Nature of Impact Classification.....	95
Table 6-6	Definitions for Impact Magnitude	96
Table 6-7	Definitions for Receptor Sensitivity and Value.....	96
Table 6-8	Impact Assessment Matrix.....	97
Table 6-9	Findings of the Site Reconnaissance Visit	100
Table 6-10	Annual mean values of air pollutants over the study period ($\mu\text{g}/\text{m}^3$) per number of days exceeding the air quality standard values (Source: Abbas & Abbas, 2021)	108
Table 6-11	Proposed Primary Ambient Air Quality Baseline Data to be Collected.....	112
Table 6-12	Proposed Sampling Locations for Air Quality Baseline Monitoring	112
Table 6-13	CO ₂ eq GHG Emissions Preliminary Estimation during the Construction Phase	114
Table 6-14	CO ₂ eq GHG Emissions Preliminary Estimation during the Operation Phase...	114
Table 6-15	Proposed Locations of Noise Levels Measurements	118
Table 6-16	Proposed Soil Samples Locations	125
Table 6-17	Proposed Groundwater Samples Locations.....	127

LIST OF FIGURES

Figure 2-1	General Project Location	13
Figure 2-2	Project Components and Surrounding Features	14
Figure 6-1	Average Monthly Temperature in Al Muthanna, Iraq (Source: Official Weather Station in Al Muthanna; https://www.worlddata.info/asia/iraq/climate-al-muthanna.php)	109
Figure 6-2	Wind Rose from Modelled Data	109
Figure 6-3	Proposed Sampling Locations for Air Quality Baseline Monitoring	113
Figure 6-4	Proposed Noise Sampling Locations in the Project Area	119
Figure 6-5	Geological Map of the Study Area	120
Figure 6-6	Hydrogeological Map of the Study Area	121
Figure 6-7	Soil Map of the Study area	122
Figure 6-8	Proposed Soil Samples Locations in the Study Area	126
Figure 6-9	Proposed Groundwater Samples Locations in the Study Area	128
Figure 6-10	Snapshots of Observed Habitats	133
Figure 6-11	Snapshots of the Observed Fauna Species	134
Figure 6-12	Proposed Biodiversity Survey Locations	138
Figure 6-13	Iraqi Population Pyramid in 2019 (Source: World Bank, 2020)	141
Figure 6-14	Socio-economic Features Documented during the Site Reconnaissance Visit	142

1. INTRODUCTION

1.1 GENERAL

Earth Link and Advanced Resources development (ELARD), hereafter referred to as the "Consultant", is pleased to submit to Al Douh Iraqi Company for Cement Industries LLC (Al Douh), hereafter referred to as the "Client", this Scoping Report as part of an Environmental and Social Impact Assessment (ESIA) for the expansion of the existing Al Douh Cement Plant study.

1.2 PROJECT BACKGROUND

The Project entails the expansion of the existing Al Douh plant from its current 1.5 million ton (mt) of sulphates resistant cement to 3.5 mt per annum of sulphates resistant cement, normal cement and well cement. The current operational plant is located approximately 40 km southwest of the city of Samawa in the southern Iraqi province of Muthanna.

The existing plant, which started production in 2012, occupies an area of approximately 0.88 km². The plant includes a cement factory, a 33 MW Captive Power Plant (CPP) fuelled by Heavy fuel oil or diesel, sourced from the nearby (about 20 km) Samawah refinery plant. Crude oil is stored onsite in two 3,000 m³ tanks while diesel is stored in a 1,000 m³ tank (all tanks are above ground). The plant also includes a reverse osmosis water treatment plant, two groundwater wells supplying domestic and industrial water, a wastewater treatment plant, storage areas, administrative buildings, a labour camp, and a canteen.

A limestone quarry (located approximately 3.5 km southeast of the plant), a gypsum quarry (located approximately 14 km northeast of the plant) and a clay quarry (located approximately 19 km southwest of the plant) provide the raw material that is transported by trucks. The limestone (calcium and silica containing raw materials) is crushed, grounded, and dried to form a flowable powder (dry process). Iron powder is added to the powder at preheated temperature of 900° C then fed into a rotary kiln at 1, 450° C for the calcination process and production of clinker. The clinker is then passed through coolers to reduce its temperature and grounded up with gypsum and other additives to produce cement. The final product is transferred into silos using an automated system for packaging.

A gas pipeline was constructed by al-Douh with the length of about 4 km to connect the governmental strategic pipeline to Al-Douh Plant. The pipeline has a diameter of 8 inches and the design pressure of the gas is (max. 40 bar, min. 17 bar). The pipeline is solely used and operated by Al-Douh, and Al-Douh pays the cost of the supplied quantities on monthly basis.

The proposed land for the required expansion activities is located adjacent to the existing plant and is under a valid lease for 50 years (expiring in 2058). No physical and/or economic displacement is anticipated to emanate from the expansion of the existing plant.

It shall be noted that CNBM are the current O&M contractor of the existing plant are also one of the proposed EPC contractors, however, the bidding stage is not closed yet.

Al Douh will be required to develop a new limestone quarry site and extend the existing road for 2-3 km to ensure continued supply of raw material to the plant. The site for this quarry, similar in size to the one currently being used, will be allocated by the Government of Iraq to service the expansion. The new quarry, located in Alsalman District, is on currently vacant land and therefore, no physical nor economic displacement is envisioned.

Generally, the Project is divided into the following four phases:

- Contraction phase of the Expansion Project
- Operation phase of the Expansion Project;
- Quarrying and raw materials extraction;
- Decommission and rehabilitation of the quarries.

1.3 ESIA STUDY

The ESIA process is a **decision-making tool** which systematically identifies the environmental and social impacts of development proposals. The ESIA process aims at covering all aspects of the "Client" activities for the expansion of the existing Al Douh plant to ensure responsible operations and environmental safety by its personnel and various sub-contractors that are in line with the prevalent National and international environmental legislation and standards.

The main objectives of the ESIA process are to:

- ❑ Comply with Project Contract Requirements, HSE requirements and national/international legislations, regulations and permit requirements and standards and Guidelines and existing Al Douh E&S policies and procedures (where available). The national and international standards and Guidelines include:
 - National Standards and Guidelines:
 - Applicable local and national Environmental and Social laws, regulations and standards;
 - International Standards and Guidelines:
 - IFC Performance Standards;
 - WBG General EHS Guidelines;
 - WBG EHS guidelines for Construction Materials Extraction;
 - WBG EHS guidelines for Cement and Lime Manufacturing;
 - WBG EHS Guidelines for Electric Power Transmission and Distribution (2007);
 - All ILO conventions signed and ratified by the country, all ILO conventions covering core labour standards and all ILO conventions covering the basic terms and conditions of employment;
 - Good Practice Guidance
 - Good International Industry Practice (GIIP);
 - IFC's Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets;
 - IFC Stakeholder Engagement: A Good Practice Handbook for Companies doing Business in Emerging Markets;
 - IFC's Good Practice Note on Contractors E&S Performance ;
 - IFC's / EBRD Worker Accommodation Guidelines for Construction;

- IFC's Use of Security Forces: Assessing and Managing Risks and Impacts;
 - UN Voluntary Principles on Security and Human Rights;
 - IFC Good Practice Note: Managing Risks Associated with Modern Slavery;
 - IFC Good Practice Note: Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector.
- ☐ Identify the Area of Influence of the Project, as defined in IFC PS 1.
 - ☐ Identify all relevant public and private institutional Stakeholders and develop a Stakeholder Engagement Plan as well as grievance management mechanism.
 - ☐ Provide a detailed description of Project components, construction plan and processes, schedules and management.
 - ☐ Capture a record of the existing socio-economic and environmental conditions in the Project area of Influence. Photographic documentation and geo-referencing of findings (water wells, flora/fauna, environmental contaminated/damaged sites, archaeological sites, religious sites, others...). Development of a GIS platform covering the land use, surface drainage classification, infrastructure, etc. The developed GIS shall be ground trothed and verified by a field survey team.
 - ☐ Identify the nature, extent and significance of any potential environmental, climate, social and health impacts be they positive (beneficial) or negative (adverse), temporary or long term. This shall include routine, non-routine (planned) operations and unplanned (accidental) events.
 - ☐ Identify any significant cumulative impacts related to the Project.
 - ☐ Identify and evaluate appropriate mitigation measures, protocols and procedures to control and minimize these impacts and to ensure compliance with applicable regulations and international standards.
 - ☐ Identify any residual impacts following application of mitigation.
 - ☐ Identify and asses alternatives to avoid and mitigate impacts.
 - ☐ Develop a tailored, practical and cost-effective Environmental and Social Management Plan (ESMP) that assures compliance with national regulations, Contract Terms and HSE requirements and international standards including the IFC Performance Standard, WBG General EHS Guidelines, and Good International Industry Practices (GIIP) and Codes of Best Practices. The ESMP will include a list of mitigation and management measures, monitoring activities, procedures practices and protocols to be adopted by the Client, Contractors, Sub-Contractors and Suppliers during the construction, operation, quarrying and decommissioning phases to avoid, reduce, mitigate or compensate for adverse social impacts and to minimize the risk of contaminating the local and global environment. These will include¹:
 - Project E&S standards based on applicable local and World Bank/IFC requirements;
 - E&S Contractor Management Framework

¹ The list may be expanded based on the results of the ESIA

- Labour Management and Working Conditions;
- Construction Environmental and Social Management Plan ("CESMP");
- Stakeholder Engagement Plan (SEP);
- Occupational Health and Safety Plan and procedures;
- ESHS Training Management Plan;
- Traffic Management Plan;
- Pollution Prevention and Control;
- Hazardous Material Management Plan;
- Waste Minimization and Resource Efficiency and Conservation Management Plan;
- Water Conservation / Minimization Plan;
- Wastewater Management Plan;
- Quarry restoration and revegetation Plan;
- Influx Management Plan;
- Security Risk Assessment and Management Plan;
- Environmental and Social Monitoring Program and Key Performance Indicators (KPI)
- Human rights management plan;
- Gender/Gender Based Violence (GBV) Assessment and Action Plan;
- Emergency Preparedness and Response Plan (EPRP);
- Biodiversity Management Plan and, as needed, Biodiversity Action Plan;
- Cumulative Impact Assessment and Management Program.

1.4 SCOPING REPORT OBJECTIVES

This document is prepared following the European Commission's Guidance on EIA Scoping (2017)². The objectives of the Scoping Report are to:

- ☐ Provide a general overview of the planned Project activities;
- ☐ Identify key issues of concern that should be addressed in the ESIA Study so they are considered in detail in the final ESIA Study Report;
- ☐ Identify secondary sources for baseline information and data gaps that may need to be filled by studies or surveys to underpin the assessment;
- ☐ Outline the main methodologies to be adopted and baseline assessment methods to be used for primary data collection;
- ☐ Identify major baseline sensitivities, and the zone of influence of the Project;
- ☐ Develop and set the baseline survey plans for the surveys to be conducted, and present detailed baseline survey methodologies based on site specific conditions;
- ☐ Identify major impacts and elaborate on impact assessment methodologies and mitigation measures to be addressed during the ESIA process;
- ☐ Identify the sources of potential cumulative impacts;
- ☐ Provide an overview of the initial scoping engagement approach, implementation and feedback.

² European Commission's Guidance on EIA Scoping (Directive 2011/92/EU as amended by 2014/52/EU): https://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf

- ❑ Document issues of concern raised by key stakeholders and local communities during the rapid participatory appraisal meetings and focus group meetings with groups of stakeholders; and
- ❑ Identify alternatives to be assessed during the ESIA.

The ESIA will be focused as a result of considerations described in the scoping phase. Areas that are expected to be sensitive or critical will be identified and given more attention during the ESIA.

1.5 PROJECT DEVELOPER (AL DOUH IRAQI COMPANY FOR CEMENT INDUSTRIES LLC “THE CLIENT”)

Al-Douh is a prominent and financially sound cement manufacturer in Iraq that was established in 2008 in Al-Muthanna Governorate in Iraq. It produces 1,500,000 TPY of high-quality sulphates resistant cement according to the specifications of Iraqi standardization and Iraqi quality control and European specifications. It also owns a captive power plant of 33 MW.

Al Douh was the first cement company in Iraq to use natural gas in cement production and invested in a 4 km gas pipeline designed to provide natural gas for the plant.

Al Douh has a leading market positioning in the SRC segment in the southern part of the country as it worked to support the national economy by providing job opportunities and covering the growing market needs in the region. The Company developed a solid track record over the past 10 years.

Al Douh is in the process of establishing a new 2,000,000 TPY expansion project that entails the expansion of the existing plant from its current 1.5 million TPY of sulphates resistant cement to 3.5 TPY of sulphates resistant cement, normal cement, and well cement.

1.6 CURRENT O&M CONTACTOR- CHINA NATIONAL BUILDING MATERIAL GROUP CO., LTD. (CNBM)

China National Building Material Group Co., Ltd. (CNBM) was founded through the merger of the China National Building Materials Group Corporation and China National Materials Group Corporation. CNBM is the largest manufacturer for building materials and an integrated service provider leading throughout the world. It has been listed in the Fortune Global 500 for eleven consecutive years due to:

- Its total assets are about 600 billion yuan
- It employs 200,000+ workers worldwide
- Its sales are estimated at about 300 billion yuan

CNBM is the largest comprehensive building materials industry group in the world:

1. The Group can yearly produce 400 million tons of cement clinker, 460 million m³ of ready-mix concrete, 2.47 billion m² of plasterboard, 2.5 million tons of fiberglass, 31,500 pieces of GW-capacity wind turbine blades, ranking No.1 in the world.
2. It ranks the first in the international cement engineering market and international cogeneration market.

3. CNBM is the largest ultra-high voltage electrical porcelain producer, fused cast refractory producer, ultra-thin electronic float glass producer, carbon fibre producer in China.
4. CNBM takes possession of 26 national scientific research and design institutes, 38,000 scientific R&D and technical engineering employees, 33 national industrial quality inspection centres, more than 10,000 patents, 3 national key laboratories, 8 national engineering (technology) research centres and 18 national standardization technical committees.

1.7 ESIA CONSULTANTS (EARTH LINK AND ADVANCED RESOURCES DEVELOPMENT (ELARD))

Earth Link and Advanced Resources Development (ELARD) is a leading consultancy firm specialized in the field of environment, water resource management and engineering. Established in 1996 in Beirut, Lebanon, ELARD has rapidly expanded in the region. Currently it has permanent offices in Beirut, Damascus, Abu Dhabi, Dubai, Uganda and Maputo (Mozambique).

ELARD has extensive experience in providing high quality tailored EIA consultancy services for meeting the needs of our clients from international and regional companies with a 100% client satisfaction and compliance rates leading to long-term and regular contracting for our services. ELARD has been preparing EIAs submitted as part of client's documents to obtain loans from internal financing institutions such as the European Investment Bank (EIB) and the International Finance Corporation (IFC) and have been very well received and normally approved by them. All the EIA studies developed by ELARD are supported by high quality GIS based maps covering the EIA Study Areas.

ELARD has exhaustive experience in conducting many specialized environmental and social studies including Environmental, Social and Health Impact Assessment (ESHIA), Environmental Site Assessment (ESA), Strategic Environmental Assessment (SEA) and Environmental, Social and Health Baseline studies (ESHB); and Water quality and water resources management studies for various industrial projects, including cement industry projects

2. PROJECT LOCATION

Al Doh's activities area is located between the two latitudes (31.210351° and 31.224971°) and the two longitudes (44.920075° and 44.935146°). It occupies an estimated area of 1.1 km². The current operational plant is located approximately 40 km south-west of the City of Samawah in the southern Iraqi Governorate of Muthanna. Figure 2-1 shows the general location of the activities area of Al Doh for Cement Industries, while Figure 2-2 shows project components including Al Doh operations area, the quarries, the gas pipeline and the houses and socio-economic features documented during the site reconnaissance visit conducted on 28th May 2022. Further details on the findings of the site reconnaissance visit are provided in Section 6.2.

A layout of the new cement plant was not available at the time of preparing this scoping report and will be provided in the ESIA Study. A layout of existing cement plant is provided in Appendix I.

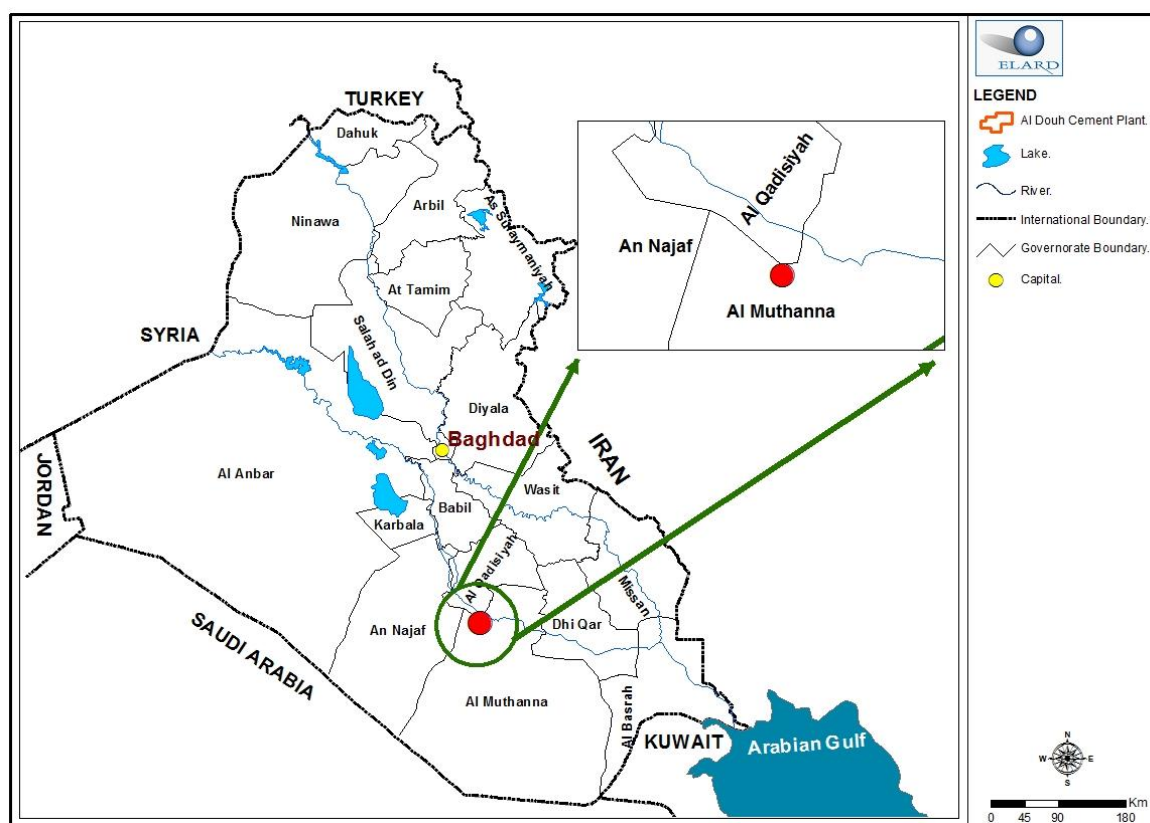


Figure 2-1 General Project Location

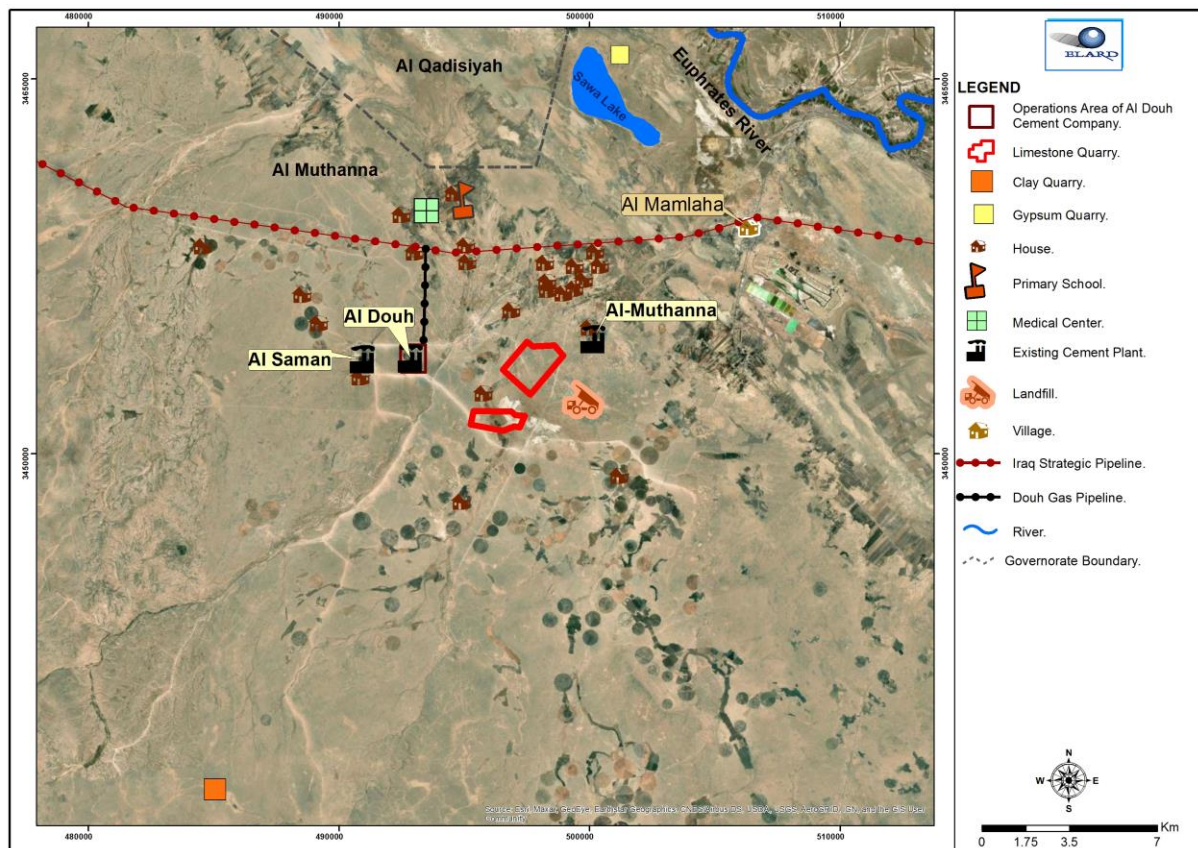


Figure 2-2 Project Components and Surrounding Features³

³ The figure does not include all house in the project area, but those documented during the site reconnaissance visit.

3. PROJECT CHARACTERISTICS

In this section, a preliminary description of the Project is provided as it is currently conceived at this stage of the Project. The salient features of the Project are discussed to the extent that they relate to potential environmental and social impacts.

The scope of the Project includes the following phases:

- Contraction Phase of the expansion Project "Contraction Phase";
- Operation Phase of the expansion Project "Operation Phase";
- Quarrying and raw materials extraction;
- Decommission and rehabilitation of the quarries.

3.1 CONSTRUCTION PHASE OF THE EXPANSION PROJECT

The construction phase of the expansion Project includes the construction of a new cement plant, a new power plant and a new water treatment plant in addition to the construction of a labour camp that will be initially used by the construction workforce and later by the O&M personnel . It shall be noted that the new plants will be placed within the same land plot where the existing plant is located and there will be no additional land take.

Details related to the Construction Phase are provided in the following sections, while quarrying and raw materials extraction activities are described separately in section 0.

It shall be noted that the information provided for Project Construction are tentative since the EPC contractor is yet to be selected.

3.1.1 Construction Activities and timeline

The Construction Phase activities (including design and pre-construction milestones), its durations and time scale are provided in Table 3-1.

It shall be noted that the durations and timescale are tentative and could be subject to change by the awarded EPC Contractor.

Table 3-1 Construction Phase Time Scale																											
Activities	Project Component	Duration	Year 1												Year 2												
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Bids evaluation	New Cement Plant	2	■	■	■	■																					
	New Power Plant	1.5	■	■	■																						
	New Water Treatment Plant	1	■	■																							
Project award and contract signature	New Cement Plant	2			■	■	■	■																			
	New Power Plant	1.5		■	■	■																					
	New Water Treatment Plant	1		■	■																						
Preparing all equipment for excavation and land levelling	New Cement Plant	1						■	■																		
	New Power Plant	1				■	■																				
	New Water Treatment Plant	1			■	■																					
Preparing and approving designs	New Cement Plant	2						■	■	■	■																
	New Power Plant	1.5					■	■	■																		
	New Water Treatment Plant	1			■	■																					
Civil works	New Cement Plant	9								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	New Power Plant	3.5						■	■	■	■	■	■	■													
	New Water Treatment Plant	2.5				■	■	■	■	■																	
Installing machines and equipment	New Cement Plant	6.5											■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	New Power Plant	3										■	■	■	■												
	New Water Treatment Plant	3						■	■	■	■	■	■														
Initial commissioning/ Operation	New Cement Plant	1																	■	■							
	New Power Plant												■	■													
	New Water Treatment Plant																										
Trial takeover	New Cement Plant																										
	New Power Plant	1													■	■											
	New Water Treatment Plant	3										■	■	■	■	■											
Commercial operation	New Cement Plant																					■	■	■	■	■	
	New Power Plant																										
	New Water Treatment Plant																										

3.1.2 Required Machinery during the Construction Phase

The type and number of machinery expected to be required during construction are presented in Table 3-2.

Table 3-2 List of Needed Machinery during the Construction Phase

#	Type of Machinery	Number of Machinery				Total
		New Cement Plant	New Plant	Power	New Water Treatment Plant	
1	50 ton crane	4	2		2	6
2	100 ton crane	2	2		-	4
3	Flatbed truck	4	2		-	6
4	Tank truck (concrete)	6	-		-	6
5	Excavators	4	4		1	5
6	Forklifts	4	2		2	8
7	Roller	4	2		4	10
8	Central mixer	1				1
9	Water tanks	2	1		1	4
10	Welding machines	20	10		20	50
11	Oxygen cutting devices	20	10		5	35
12	Flatbed truck	-	-		4	4

In addition to the above mentioned machineries, 22 dump trucks will be used (15 for the construction of the cement plant, 5 for the construction of the power plant and 2 for the construction of the water treatment plant).

It is worth mentioning that the fuel consumption rate of each truck is about 60 litre/day of LFO.

3.1.3 Labour and Work Staff

The construction phase will require about 342 staff/ employees from different occupational levels (administrators, engineers, technicians and workers). The details are provided in Table 3-3. Local employees/workers will be employed by Al Douh Cement Company, while expat workers will be provided by the awarded EPC Contractor.

Table 3-3 List of Required Labour/Work Staff and their Occupation during the Construction Phase of the Expansion Project

#	Nationality	No. of Employees			Total
		New Cement Plant	New Power Plant	New Water Treatment Plant	
1	Local Employees/Worker	29 ⁴	6 ⁵	7 ⁶	42
2	Expat Workers	200	70	30	300
	Total	229	76	37	342

Local work force constitutes 12.7% of the total Labour requirements during the Construction Phase.

3.1.4 Facilities and Infrastructure

- **Residential and Administrative buildings**

As part of the scope of work of the awarded EPC contractor, new residential camp and administrative buildings will be constructed to be utilized by the EPC personnel during construction of the new cement plant, power plant and water treatment plant and then by the O&M contractor personnel during operation of the new facilities.

The residential and administrative buildings that will be constructed by the EPC contractor shall include:

- An integrated residential camp, containing residential halls, a kitchen, a dining hall, a garden, an entertainment park and health services room. The camp will be used for the construction worker during the construction phase of the new cement plant and the new Power Plant.
- A residential camp of one hall with a kitchen for the local supervision employees and, technicians and administrative staff.
- An administrative building for the company's contracted staff; and
- An adjacent administrative building for the local staff.

It shall be noted that the camp will be a property of Al Douh and the EPC Contractor (and the O&M Contractor during operation) will be required to comply with IFC requirements and standards related to workers accommodation, as this will be stated in their contracts.

During construction, the management of workers is the EPC contractor's responsibility. This would be done under Al-Douh's supervision.

⁴ 3 advanced engineering staff for supervision and follow-up, 4 advanced administrative staff, 2 Stores and warehouses officers, 10 beginners and 10 guards.

⁵ 1 Project Manager and 5 Supervising Engineers.

⁶ Site Manager + Engineer 3 + Junior 3.

- **Fuel and Raw Materials Repositories and Tanks**

The Project will be equipped with a number of covered and isolated tanks to store raw materials and fuel.

- **Fire Suppression System**

The fire suppression system of Al Douh new cement plant is designed in compliance with local standards and requirements, and will cover production buildings, facilities buildings, services buildings and all electrical equipment rooms with adequate fire suppression equipment. In addition, an adequate number of mobile fire extinguishers and a pipeline system equipped with taps and hoses will be installed.

- **Wastewater management system**

Wastewater will be collected by a wastewater network to a dedicated tank, then will either be emptied regularly by an authorised wastewater contractor or treated on site via a wastewater treatment plant. This will be decided at a later stage considering the feasibility and the recommendations of the ESIA study.

- **Noise control management System**

In order to reduce the generated noise during the construction phase of the Project, movable insulators and wooden fences will be installed around the construction site with a height of 4 meters.

3.1.5 Fuel and Energy Sources

During the construction phase, the main source of electrical energy will be the existing power plant serving the existing Al Douh Cement Plant.

Fuel consumption for power generation during the construction of the new cement plant is estimated at 8,700 litre/day of Light Fuel Oil (LFO), 5,000 litre/day of Heavy Fuel Oil (HFO).

Fuel consumption for power generation during the construction of the new power plant is 1000 litre/day of LFO and 7500 litre /day of HFO.

Also, two (2) stand by generators (Perkins) with the capacity of 500 kVA for each generator with a consumption rate of (2 x 80) litre/hour of LFO, will be used to secure energy requirement, when needed.

In addition, 22 dump Truck with a weight of 20 tons will be used during construction, they will use LFO at the rate of 60 litre/day for each truck.

It is worth mentioning that the LFO and HFO will be transported to the plants by trucks from Samawa Refinery.

Table 3-4 Summary of fuel consumption during Project Construction

Activity	LFO	HFO
Construction of cement Plant	8700 litre per day	5,000 litre per day
Construction of power plant	1000 litre per day	7500 litre per day
Trucks movement	60 *22 = 1320 litre per day	NA

Activity	LFO	HFO
22 trucks with a weight of 20 tons during construction phase		

3.1.6 Materials Consumed

The list of the materials to be consumed during plant construction and their sources are presented in Table 3-5.

Table 3-5 List of Required Materials and their Sources for the Construction phase of the Cement Plant

#	Material	Source
1	Cement	Existing Al Douh Cement Plant
2	Sand and gravel (raw materials)	Quarries adjacent to the factory
3	Iron	Local market
4	Water	Existing Al Douh Cement Plant
5	Wood	Local market
6	Tools and Templates/Models	Contracted company

The amounts of material that will be consumed during the construction phase is not available at the time of preparing this report.

3.1.7 Water Consumption

During the construction phase of the expansion Project the total daily water demand is 400 m³. Out of which, 225 m³/day will be consumed by the construction of the new cement plant, 150 m³/day will be consumed by the construction of the new power plant and 25 m³/day will be consumed by the construction of the new water treatment plant. The 400 m³ per day will be over and above the 250 m³ per day currently abstracted and used by the existing cement plant.

The source of water will be the existing water treatment plant in Al Douh existing cement plant. Water will be transferred to the construction area using a temporary water pipeline with a discharge rate of 20 m³/hour.

The main sources of water is two existing water wells located in vicinity of al Douh existing cement plant.

3.1.8 Solid and Liquid Wastes Management

The construction of a new cement plant, new power plant and new water treatment plant will produce large amounts of solid and liquid wastes.

Table 3-6 presents a list of the wastes expected to be generated during the construction phase of the expansion Project as well as the proposed disposal methods.

Table 3-6 List of Wastes Expected to be Generated during the Construction Phase of Expansion Project and the Proposed Disposal Methods

Waste Type		Waste sources	Disposal Methods
Solid Waste	Wood	Construction works	Selling in the local market
	Iron	Construction works	Selling to iron factories
	Stone	Excavation operations	Recycling (if conforms to the specifications as raw materials for the crusher) / land levelling (if not conforms to the specifications as raw materials for the crusher)
	Municipal Waste	Construction camps	A licensed contractor will be responsible for collecting wastes from the plant area and transporting it to licensed landfills. It shall be added that segregation and classification will be conducted for solid wastes before disposal.
Liquid waste	Domestic wastewater	Kitchens and bathroom	The expected rate of generated wastewater during the construction phase is not currently available and the issue will be addressed during execution of the ESIA study, once detailed information on water use and balance are provided by the EPC Contractor. Wastewater will be collected by a wastewater network to a dedicated tank, then will either be emptied regularly by an authorised wastewater contractor or treated on site via a wastewater treatment plant. This will be decided at a later stage considering the feasibility and the recommendations of the ESIA study.
	Industrial Waste	Spent machines oils	A licensed contractor will be responsible for collecting these oils from the plant area and transporting them to specialized locations for treatment/recycling.
Hazardous waste		Construction works	The hazardous waste will be buried in a dedicated location that is assigned for this purpose by the Environment Department and the Geological Survey Department in the Governorate. The location is an old depleted quarry.
		Used Batteries	A licensed contractor will be responsible for collecting these batteries from the plant area and transporting them to specialized locations for treatment/recycling.

3.2 OPERATION PHASE OF THE EXPANSION PROJECT

The operation phase of the expansion Project comprises the operation of the new cement plant, the new power plant and the new water treatment plant.

Details about Project operation are presented in the following sections.

3.2.1 The New Cement Plant

The production capacity of new cement plant will be 2 MT/year of sulphates resistant cement and ordinary cement; while the production capacity of the existing plant is 1.5 MT/year of sulphates resistant cement.

Cement production stages are as follow:

- Raw materials preparation;
- Initial batch preparation;
- Initial batch burning and clinker production;
- Additional materials preparation;
- Clinker grinding and addition of the additional materials; and
- Cement packaging.

The equipment for the expansion Project will be sourced from different vendors, most of them are from China and some from Europe, according to the vendor list supplied by the EPC contractor.

3.2.2 The New Power Plant

The new power plant will be the main energy source for the Project Operation.

The capacity of the new power plant is 50 MW and will be equipped by either MAN Engines of German origin or Wartsila of Finnish origin, and consists of 6 units.

It shall be noted that the capacity of the existing power plant is 33 MW and it is equipped by MAN Engines of German origin and consists of 6 unites.

The first start-up of the operation process requires starting with the start-up generators (500 KV) (normally supplied with new power plants). It is used to start up the fuel system, water system, and air compressor system. Once the main generating units run, this backup generator automatically stop.

Regarding the fuel combustion of the power plants, the existing plant operates on LFO and HFO, and the new plant (dual fuel) will mainly operate on natural gas and LFO and could operate on HFO and LFO in emergency cases. The fuel consumption rates are provided in Table 3-10.

3.2.3 The New Water Treatment Plant

The water treatment plant will be a Reverse Osmosis plant with the purpose of removing salts from the abstracted groundwater. It will have a capacity of 80 m³/h. Treated water will be used

for industrial purposes within a closed water system and for domestic/service purposes within an open water system.

The quality of treated water by the existing water treatment plant is provided in Table 3-7.

Table 3-7 Analytical Results of Treated Water

#	Parameter	Unit	Concentration
1	pH		7.2
2	Ca	mg/l	1
3	NO ₃	mg/l	0.5
4	Cl	mg/l	1.5
5	Mg	mg/l	15
6	SO ₄	mg/l	11.8
7	F	mg/l	0.2

3.2.4 Labour and Work Staff

New plants operation will require approximately 200 employees, out of which 40 are local staff and 160 are expats (O&M Contractor). It shall be noted that in case the current O&M Contractor (CBMI) is awarded the expansion Project, they are expected to require fewer staff since they can utilise some of the existing staff to work on the expansion Project as well.

Local staff will include financial, administrative and commercial staff in addition to workers on raw materials handling, operation and maintenance of transport and carriage equipment, weighbridge workers, workers on fuel unloading, cement filling and packaging staff, 3 shifts guards, etc.

The number of employees in the new and existing plants are presented in Table 3-8.

Table 3-8 Number of employees in existing and new plants during operation phase

#	Nationality	No. of Employees	
		Total Existing (at the Existing Cement Plant, Power Plant and Water Treatment Plant)	Total New (at the New Cement Plant, Power Plant and Water Treatment Plant)
1	Local Employees/Worker	210	40
2	Expat Workers (O&M Contractor)	120	160
	Total	330	200

3.2.5 Facilities and Infrastructure

- **Residential and Administrative buildings**

Workers/employees of O&M contractor (for the new and existing components) will be using the existing camp and administration building as well the new camp constructed during the construction phase.

- **Fuel and Raw Materials Repositories and Tanks**

The Project will be equipped with a number of covered and isolated tanks to store the raw materials and fuel.

- **Gas pipeline (Ancillary Facility)**

A gas pipeline was constructed by al-Douh with the length of about 4 km to connect the governmental strategic pipeline to Al-Douh Plant. The pipeline has a diameter of 8 inches and the design pressure of the gas is (max. 40 bar, min. 17 bar).

The pipeline is solely used and operated by Al-Douh, and Al-Douh pays the cost of the supplied quantities on monthly basis.

It shall be noted that the gas pipeline is an existing asset and will not be expanded/changed for the extension project.

3.2.6 Consumed materials during the operation phase

The process of cement manufacturing requires using a number of raw materials, which may vary in proportions and types depending on the type of cement to be produced.

Table 3-9 presents the resources and the expected quantities of the raw materials that the existing and new cement plants need for its production process.

Table 3-9 Types and Resources of the Raw Materials Required for the Cement Production

Materials	Quantity (ton/day)		Source
	Existing Cement Plant	New Cement Plant	
Limestone	3800	6400	Local Quarry
Clay	1200	1950	Local Quarry
Iron/bauxite	400	550	Imported
Gypsum	216	300	Local Quarry

3.2.7 Fuel consumption during Operation Phase

During the operation phase of Al Douh new and existing cement plants, natural gas will be consumed to operate the kilns.

The daily total quantity of natural gas to be consumed by both plants is 770,000 m³/day. Out of which 300,000 m³/day will be consumed by the existing cement plant and 470,000 m³/day will be consumed by the new cement plant.

Natural gas is secured from the existing strategic pipeline which transports gas from Basra Gas Field, which is connected to the cement plant through a pipeline that was constructed by Al Douh.

Regarding the fuel combustion of the power plants, the existing plant operates on LFO and HFO, and the new plant (dual fuel) will mainly operate on natural gas and LFO and could operate on HFO in emergency cases. The fuel consumption rates are provided in Table 3-10. In addition, the existing plant consumes 1.5 m³/day of LFO for trucks and loaders, and the new plant is expected to use about 4.5 m³/day of LFO for loaders and trucks.

The LFO and HFO will be transported to the plants by trucks from Samawa Refinery.

Table 3-10 Summary of fuel consumption during Operation

Activity	LFO	HFO	Natural Gas
Operation of Existing Cement Plant	-	-	300,000 m ³ / day
Operation of New Cement plant	-	-	470,000 m ³ / day
Operation of Existing Power Plant	2.5 m ³ / day	100 m ³ / day	-
Operation of New Power Plant (Dual Fuel)			
• Either on NG+LFO	3 m ³ /day	-	240 m ³ / day
• Or on HFO in emergencies in case NG is unavailable		150 m ³ / day	-

3.2.8 Water Consumption during the Operation phase

The main sources of water required during the operation phase of the Project for industrial and domestic purposes is groundwater that is extracted and treated via reverse osmosis water treatment plants (one new and one existing). It is roughly estimated that New Project components will consume about 160 m³/h. Out of which, 80 m³/hour will be provided by the existing water treatment plant and the same quantity will be secured by the new water treatment plant.

Al Douh currently has two (2) water wells, and the abstraction rate from each well is 25 m³/h, which results in total abstraction rate of 50 m³/h. The abstracted raw water is stored in two (2) concrete basins, each has the capacity of 150 m³ resulting in a total storage of 300 m³ of well water.

The existing RO station consists of two (2) units, each has the capacity of 40 m³/h (a total of 80 m³/h). Processed water from the RO station is stored in two (2) concrete basins, each has the capacity of 300 m³ (a total of 600 m³ storage of processed water). This water is used for plant operation and domestic use.

Details on water use and balance are not currently available and the issue will be addressed during execution of the ESIA study after obtaining further details from the EPC Contractor.

3.2.9 Generated Wastewater during the Operation phase

The estimated amount of the daily wastewater resulting during the operation phase of the Expansion Project components is about 140 m³/day.

Wastewater will be collected by a wastewater network to a dedicated tank, then will either be emptied regularly by an authorised wastewater contractor or treated on site via a wastewater treatment plant. This will be decided at a later stage considering the feasibility and the recommendations of the ESIA study.

Rejected water from the water treatment plant estimated at 20 m³/h will be collected in special basins inside the factory. Management process will include evaporation then the use for watering plants and roads leading to the quarries.

3.2.10 Solid and Liquid Wastes Management

Waste streams expected to be generated during the operation phase of the Project and its proposed disposal methods are provided in Table 3-11.

Table 3-11 List of Wastes to be Generated during the Operation Phase and Its Disposal Methods

Waste Type		Waste Origin	Disposal Methods
Solid wastes	Industrial wastes	Machinery' parts and wheels	A licensed contractor will be responsible for collecting wastes from the plant area and transporting it to regular landfills determined by Damascus Countryside Governorate or sell them to contractors.
	Domestic wastes	Wastes from human activities	A licensed contractor will be responsible for collecting wastes from the plant area and transporting it to licensed landfills.
Liquid waste	Domestic waste	Sewage	Sewage will be collected using pipe network and transferred to the treatment plant. After bacterial and chemical treatment, water will be pumped for irrigation purposes and dust subsiding on the roads between the plants and the quarries.
	Industrial waste	Machinery oils	A licensed contractor will be responsible for collecting these oils from the plant area and transporting them to specialized locations for treatment.
	Sludge	Water treatment plants	The sludge resulting from water treatment will be discharged by transferring it by private trucks to locations specified for this purpose.
Medical waste		Labours' camp	A licensed contractor will be responsible for collecting this waste from the plant area and transporting it to landfills specialized by the municipality for the medical waste.

3.2.11 Air Emissions Management plan

The EPC Contractor shall provide the required filters and equipment (filter bags and electrostatic filters) to ensure that air emissions comply with the national emissions and ambient air quality standards in addition to IFC standards.

In addition, and in order to avoid overspread of dust, a green belt of trees will be planted around the plant area, covered conveyors will be used and water will be spread along the roads within the plant area.

3.2.12 Delivery of Finished Products to Customers

At Doh Cement plant, sale takes place at the cement plant and the delivery is the customer's responsibility. 60 % of cement is sold bagged and 40% is sold as bulk.

3.3 QUARRYING AND RAW MATERIALS EXTRACTION

3.3.1 Quarries locations

Al Doh has concessions for three quarries, a limestone quarry, a gypsum quarry and a clay quarry. Their locations are provided in Figure 2-2.

The limestone quarry that will be used to extract raw material (stones) is located in Al-Fadwa area 45 km southwest of the city of Samawah, the capital of Al-Muthanna Governorate. It is about 3.5 km southeast of the existing Al Doh Cement Plant. The limestone quarry will be an open quarry with shallow exploitation and will occupy an area of about 6.86 km² (4,165,750 m² in the first stage and 2,697,660 m² in the second stage).

The gypsum quarry is located approximately 14 km northeast of the plant and the clay quarry is located approximately 19 km southwest of the plant.

The quarrying areas are owned by the state and exploited by Al Doh with annual renewable investment contracts according to the design capacity of each plant. They are allocated by the government according to specific coordinates for each plant.

It shall be noted that subcontractors are responsible for the security inside the quarries.

3.3.2 Life Span of the Quarries

Based on a preliminary study, the quantity of stones within the limestone quarry area is about 120 million tons. Accordingly and based on the production capacity of the cement plants (5500 ton/ day of clinker), the quarry will secure the plants' needs of limestone for 49 years.

By the end of the quarries life span, they will be repossessed by the government. and might be turned into waste disposal landfills, or used for other purposes as proposed by the government.

3.3.3 Quantity of Extracted Material and Material extraction processes

During the operation phase of the cement plant, the extraction rate of limestone in the first phase of quarry operation, will be an average of about 1,199,540 ton/year and will increase to 2,052,000 ton/year in the second phase. The daily extraction rate is 5000 tons.

For the operation of the existing plant, clay is extracted at the rate of 330,000 tons/year and gypsum at the rate of 36,000 tons/year.

The rate of extraction for the new plant from the clay quarry is estimated at 540,000 tons/year, and from the gypsum quarry is estimated at 90,000 tons/year.

The extraction of raw materials is carried out by mechanical extraction by a contractor using rock breakers.

3.3.4 Labour and Work Staff

Quarries operation will require about 236 employees from different occupational levels, out of which, 11 employees are of Al Douh company, where the remaining 225 employees are provided by a subcontractor and they are mainly drivers as presented in Table 3-12.

Table 3-12 Number and occupation of employees in the quarry

#	Occupation	No. of Employees
1	Geological quarry manager	1
2	Chemist	1
3	Surveyor	1
4	Chief Observer	2
5	Monitor	4
6	Guard	2
7	Subcontractor staff	200 truck drivers 8 loader drivers 7 bulldozer drivers 10 excavator truck drivers

3.3.5 Water requirement

In order to secure water demand in the quarry area, water tankers belonging to contractors, will be used to transfer water from the cement plant. It shall be noted that additional water wells will be drilled in the quarry area if needed.

3.3.6 Energy

Securing required energy for the operation of machineries and equipment in the quarry is covered by local contractors.

3.3.7 Solid waste disposal:

The main solid waste that may be observed during the mining activities, is unmanufactured natural materials (soil layers) which cannot be used as a raw material in cement production.

This solid waste is mainly collected in an area with specific dimensions and reused for filling purposes.

3.3.8 Vehicle Movement

Moving vehicles will be performed from the limestone quarry to the cement plant through regular paved road with a length of 4 km. This paved road will be extended (about 2 to 3 Km) and regular maintenance will be scheduled.

Also, existing roads are used for the transport of materials from the gypsum and clay quarries. Trucks avoid roads that pass through residential areas.

3.4 HEALTH, SAFETY AND ENVIRONMENT POLICIES

Al Douh Cement company has 14 health and safety policies, which are:

- 1- First aid policy
- 2- Infectious Disease Prevention Policy
- 3- Safety Committee Policy
- 4- Risk assessment policy
- 5- Emergency Preparedness Policy
- 6- Passage and Corridors and exits policy
- 7- lighting policy
- 8- Cleanliness and arrangement policy
- 9- Electricity Safety Policy
- 10- Hazardous Energy Control Policy
- 11- Noise Control Policy
- 12- Extreme Temperature Policy
- 13- Chemical Storage Policy
- 14- Solid waste management policy
- 15- Personal Protection Equipment policy

Further details about the policies will be provided in the ESIA report.

It shall be noted that The **EPC Contractor** will be responsible for the implementation of the environmental and social management plan (ESMP) and HSE requirements during Project construction. The terms of the contract with the EPC Contractor will include the E&S and H&S conditions that the contractor should comply with, based on IFC requirements and standards, and the EPC Contractor shall report to the EPC Consultant.

An **EPC Consultant** is assigned by Al-Douh in order to inspect the main procures of both the cement line and the captive power plant, and monitor the progress of civil work, installations, commissioning, and erection in order to make sure the work is done accurately, according to international standards, and within the EPC Contractor's design and construction schedule. In addition to supervising the first testing process to approve commissioning test results and then handing over the plant to Al Douh. The **EPC Consultant** will monitor the performance of the EPC

Contractor and the compliance with Environmental, Social, Health and Safety requirements. The EPC Consultant shall report to Al Douh.

Al Douh HSE department will have the overall responsibility to monitor the performance of the EPC Contractor and EPC Consultant.

Further details on roles and responsibilities in ESMP implementation will be provided in the ESIA Study.

4. LEGAL, INSTITUTIONAL AND REGULATORY FRAMEWORK

This section presents an overview of the legal, institutional and regulatory framework of relevance to the Project and to environmental protection. In the context of the Scoping of the ESIA, the objective from this section is to study related legal obligations and regulatory requirements with which the Project should comply in the different phases from construction through operation and decommissioning.

4.1 INSTITUTIONAL FRAMEWORK AND SECTOR ORGANIZATION IN IRAQ

4.1.1 *Institutional Framework for the Protection of the Environment*

The Iraqi Ministry of Environment (MoE) was formally established in November 2003 by means of the Coalition Provisional Authority Order No. 44. The MoE is responsible for the protection and conservation of Iraq's environment and for the protection of the residents of Iraq from environmental risks to human health from pollution.

The MoE, which is entrusted with improving environmental management, began its operations with two under-secretaries, one each for the Technical and Administrative Units. An institutional assessment carried out by UNEP in 2006 (UNEP/MoE, 2006), revealed a well-functioning ministry, with competent staff and functioning legislation. The assessment showed that the core strength of the MoE is in environmental monitoring, due to its historical function as the monitoring arm of the Ministry of Health. The assessment also revealed that the major challenges are in resource limitations, for both undertaking inspections and enforcing legislation.

The main tasks of Iraq's MoE, as set in the Ministry's mandate Law No. 37/2008, are the drafting and revision of legislation related to environmental issues, implementation of environmental monitoring and identification of pollution sites, monitoring of water quality, formulation of national strategies for environmental protection, management of solid and hazardous waste, setting desertification countermeasures, and rehabilitation of the southern marshes among other activities.

The MoE does not undertake its environmental management efforts in isolation. A number of other ministries and bodies also have environmental responsibilities. These institutions and their roles are provided in Appendix A.

4.1.2 *Institutional Framework for Cement Industry and Quarries*

The Ministry of Industry and Minerals (MoIM) is considered the main authority responsible for quarries sector and cement production plants in Iraq.

All governmental cement plants in Iraq were established during the fifties, seventies and eighties of the last century, which is before the environmental legislation being in force.

The most important legislative laws relevant to the cement industry are as follows:

- Approval Statement No. 1562/ 2019 - Standard for "Cement Testing Methods"
- Iraqi standard No. 1569/ 2019 for Portland cement
- Approval Statement - Iraqi standards for Portland cement (1984) and its amendment No 5/ 2016.

Regarding quarries, Law No.66 of 1962 is related to Minerals and Quarries:

This Law consisting of 31 articles represents the basic legislation of Iraq regarding quarries and minerals. In particular, Article 7:

A quarry or mine license shall not be granted in the following locations:

1. The area that includes a holy site or a public cemetery, or within a distance of less than 500 meters from it, except with the approval of the authority responsible for supervising that site.
2. The area that contains a historical site or is within a distance of less than 500 meters from it, except with the approval of the Directorate of Antiquities.
3. Forests except with the approval of the Ministry of Agriculture, taking into account the conditions that are imposed to protect their crops and to compensate for the damages affected its.
4. The land located within the boundaries of the municipality, except with the approval of the municipal council and the approval of the administrative authority.
5. The land located at a distance of 100 meters from the municipal boundaries, except with the approval of the Ministry of Municipalities.
6. The land to be allocated for a railway or at a distance of less than 500 meters from it, except with the approval of the Ministry of Transportation.
7. Land invested by a person according to a license or a law.
8. The locations of reservoir dams, water weight stores, tunnel locations, and the main streams that are connected to them, except with the approval of the Ministry of Agriculture.
9. The land that the Council of Ministers prevents from being invested in by a decision published in the official newspaper.
10. Land that belongs to the Ministry of Defence or has a special military importance, except with the approval of the Ministry of Defence.
11. The land that is less than 500 meters away from a government department and located outside the municipality's boundaries, except with the approval of that department and the competent Ministry.
12. The land that is far from the main public road by a distance of more than 500 meters, except with the approval of the Ministry of Transportation.
13. Oil fields that are producing or capable of production, except with the approval of the Ministry of Oil.
14. Sites of governmental factories, except with the approval of the Ministry of Industry.
15. Roads of electric power transmission lines.

Al Douh had the investment license for the expansion Project which implies a governmental commitment to assign a new quarry, whereby the new quarry is assigned and the mining licence is issued to Al Douh 6 months prior to the operation of the new plant.

4.1.3 Institutional Framework for Occupational Health and Safety in Iraq

The Coalition Provisional Authority Order No. 44/2003 assigned The National Centre for Occupational Health and Safety as the institutional body responsible for health and safety in Iraq under the jurisdiction of the Ministry of Labour and Social Affairs. In 2008 the Centre's structure was promoted into a General Directorate within the same ministry. The divisions and functions of the National Centre for Occupational Health and Safety are stipulated in Instructions No. 3/2009 and Instructions No. 1/2010. The Centre handles the administration, the planning, and the supervision of health and safety matters on the national and international levels to ensure the dissemination of health and safety concepts to protect workers in work places.

The National Commission for Occupational Hygiene and Safety was established through Law No. 6 /1988 under the jurisdiction of the Ministry of Health. The functions of the Commission include general policy formulation, undertaking studies, advising on draft legislation and obtaining data and information. Its membership includes workers' and employers' representatives.

4.2 REGULATORY FRAMEWORK FOR ENVIRONMENTAL PROTECTION IN THE IRAQI CEMENT INDUSTRY

The framework statutory requirement is the national Iraqi legislation for environmental protection, Law No. 27/2009 on the Protection and Improvement of the Environment.

Article 10 of the law mandates operators to undertake an environmental impact assessment that will address methods and means of pollution prevention and treatment. The assessment should address accidental and potential pollution incidents and the preventive procedures to circumvent their occurrence.

Environmental specifications for projects and assurance of their safe establishment are provided in Instructions No. 3/2011 that specify the environmental guidelines for the establishment of projects by category (A, B, C) and type. According to these instructions, the Cement Project falls under Category A that includes projects which have significant negative environmental impacts, affect weak organisms, include resettlement or affect the cultural heritage sites over a wide area beyond the project area. The Project should comply with the specific conditions set by these instructions. The main requirements are:

- The Project should be constructed at a distance of not less than eight (8) kilometres outside the municipal boundaries and five (5) kilometres from the residential areas and in a convenient location;
- The Project should be constructed at a distance of not less than one (1) kilometres from the main road right of way;
- Treatment of water pollutants to ensure that it conforms to the standards for maintaining water resources;
- The air emissions from cement plants should be treated to make sure it conforms to the set national environmental standards;
- Disposing of solid waste generated from production processes by transporting it to sanitary landfills; and
- Surrounding the plant with at least two trees belts of evergreen species.

4.3 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) IN THE IRAQI LEGISLATION

Currently, although the concept of EIA has been formally introduced in Iraqi legislation, there is still no official EIA decree that sets the principles and measures necessary to assess the environmental impacts of development projects.

Law No. 27/2009 recognizes the process of EIA as a decision-making tool for the assessment of impacts that may potentially be generated when developing projects.

Article 10 of Law No. 27/2009 states that a project proponent is required to assess the environmental impact of their project and to submit a report prior to project implementation. This report should include the following:

- An assessment of positive and negative impacts of the Project on the environment and of the environment on the Project;
- Measures to prevent and treat pollution sources in accordance with environmental norms and standards;
- Potential and accidental sources of pollution and prevention means;
- Alternatives of a less polluting technology and better use of resources;
- Reduction of wastes, recycling and reuse when possible; and
- Assessment of the environmental feasibility and the cost of pollution with regards to production.

4.4 NATIONAL POLICIES AND PLANS

4.4.1 *The National Development Plan (2018 – 2022)*

The newest National Development Plan (NDP) for the year 2018 – 2022 addresses, amongst others, a range of social and environmental challenges, and puts forward strategic objectives and instruments for implementation. According to NDP (2018 – 2022), social challenges included, weak ranking of Iraq among the middle-developed countries; weakness of the rule of law and access to justice; raise of multi-dimensional poverty levels caused by successive crises, conflicts, and population displacement and instability; increasing fragility and rate of vulnerability; gender gap and failure to include youth; and continued decline of education and health services indicators.

The NDP highlighted many environmental challenges. These included, amongst others, lack of urban planning; non-integration of environmental management; lack of environmental legislation; desertification; climate change; and exploitation of non-renewable energy resources.

4.4.2 *National Environmental Strategy and Action Plan, 2012*

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

4.4.3 *National Biodiversity Strategy and Action Plan (2015-2020)*

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

4.5 RELEVANT NATIONAL AND INTERNATIONAL ENVIRONMENTAL REGULATIONS AND STANDARDS

In this section, the regulations and standards that are relevant and applicable to the Project are outlined and explained to set the environmental regulatory context within which the Project should be designed.

4.5.1 *Air Quality*

- **Legislations**

- Draft Iraqi Ambient Air Quality Standards;
- Act No. 4/2012 on the protection of ambient air from pollution;
- Act No. 5/2012 on the control of ozone depleting substances; and
- Instructions No. 3/2012 on the national limitations of emissions for activities and works (Annex 1).

- **Provisions**

The Iraqi Ministry of Environment has prepared draft ambient air quality standards that are presented in Table 4-1 along with the USEPA and WHO Air Quality Standards.

Table 4-1 Ambient Air Quality Standards

Pollutant	Time of Average	Draft Ambient Air Quality Limits by Ministry of Environment-Republic of Iraq	USEPA National Ambient Air Quality Standards			WHO Air Quality Guidelines
			Primary/Secondary*	Level	Form	
Sulphur Dioxide (SO ₂)	1-year	0.018 ppm	--	--	--	--
	24-hour	0.04 ppm	--	--	--	125 µg/m ³ (Interim Target 1) 50 µg/m ³ (Interim Target 2) 20 µg/m ³
	1-hour	0.1 ppm	Primary	75 ppb ⁽¹⁾	99 th percentile of 1-hour daily maximum concentrations, averaged over 3 years	--
	3-hours	--	Secondary	0.5 ppm	Not to be exceeded more than once per year	--
	10 minutes	--	--	--	--	500 µg/m ³
Nitrogen Dioxide (NO ₂)	1-year	0.04 ppm	Primary and secondary	53 ppb ⁽²⁾	Annual Mean	40 µg/m ³
	24-hour	0.05 ppm	--	--	--	--
	1-hour	--	Primary	100 ppb	98 th percentile, averaged over 3 years	200 µg/m ³
Falling Dust	30-day	10 tonne/km ² /month in Residential Area	--	--	--	--
		20 tonne/km ² /month in Industrial Area	--	--	--	--
	1-year	--	--	--	--	70 µg/m ³ (Interim Target 1)

Pollutant	Time of Average	Draft Ambient Air Quality Limits by Ministry of Environment-Republic of Iraq	USEPA National Ambient Air Quality Standards			WHO Air Quality Guidelines
			Primary/Secondary*	Level	Form	
Particulate Matter (PM ₁₀)						50 µg/m ³ (Interim Target 2) 30 µg/m ³ (Interim Target 3) 20 µg/m ³
	24-hour	150 µg/m ³	Primary and secondary	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years	150 µg/m ³ (Interim Target 1) 100 µg/m ³ (Interim Target 2) 75 µg/m ³ (Interim Target 3) 50 µg/m ³
Particulate Matter (PM _{2.5})	1-year	--	Primary	12 µg/m ³	Annual mean, averaged over 3 years	--
	1-year	15 µg/m ³	Secondary	15 µg/m ³	Annual mean, averaged over 3 years	35 µg/m ³ (Interim Target 1) 25 µg/m ³ (Interim Target 2) 15 µg/m ³ (Interim Target 3) 10 µg/m ³
	24-hour	65 µg/m ³	Primary and Secondary	35 µg/m ³	98th percentile, averaged over 3 years	75 µg/m ³ (Interim Target 1) 50 µg/m ³ (Interim Target 2) 37.5 µg/m ³ (Interim Target 3) 25 µg/m ³
Total Suspended Particulates	1-year	150 µg/m ³	--	--	--	--
	24-hour	350 µg/m ³	--	--	--	--

Pollutant	Time of Average	Draft Ambient Air Quality Limits by Ministry of Environment-Republic of Iraq	USEPA National Ambient Air Quality Standards			WHO Air Quality Guidelines
			Primary/Secondary*	Level	Form	
Carbon Monoxide (CO)	8-hour	10 ppm	Primary	9 ppm	Not to be exceeded more than once per year	--
	1-hour	35 ppm		35 ppm		--
	30 minutes	--		--	--	--
	15 minutes	--		--	--	--
Ozone (O ₃)	1-hour	0.06 ppm	--	--	--	--
	8-hour	--	Primary and secondary	0.075 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years	100 µg/m ³
Lead (Pb)	1-year	1 µg/m ³	--	--	--	--
	3-month	1.5 µg/m ³	Primary and secondary	0.15 µg/m ³ ⁽⁴⁾	Not to be exceeded	--
	24-hour	2 µg/m ³	--	--	--	--
Benzene	1-year	0.003 mg/m ³	--	--	--	--
Dioxins	1-year	0.6 picog/m ³	--	--	--	--

*Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

(1) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO₂ standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

(2) The official level of the annual NO₂ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

Act No. 4/2012 aims at the protection of ambient air from pollution and improvement of its quality through controlling pollution sources. Article 3 identifies the MoE as the responsible entity for controlling air pollution. Item 10 of this article provides information about the necessity of preparing a program with the responsible parties to control air pollution by checking the compliance with the emissions requirements and air quality control measures set to control the pollution.

The Iraqi National Standards for point source emissions set through Instructions No. 3/2012 are presented in Table 4-2. Article 15 of the Instructions stipulates that the owner of the institution or the activity shall comply with conducting continuous measurement and analysis of the emitted air pollutants and observe the specifications and amount of the emissions of the institution or activity by using a continuous monitoring system of emissions that conform to the applicable specifications in this field.

Table 4-2 Point Source Emission Standards for Stationary Emission Sources (excluding Combustion Sources)

Pollutants	Maximum Allowable Emissions Limits from Stationary Sources by Ministry of Environment-Republic of Iraq	
	Limits	Units
Opacity	20	%
Carbon Monoxide (CO)	500	mg/Nm ³
Nitrogen Oxide (as NO ₂)	1000	mg/Nm ³
SO ₂	500	mg/Nm ³
SO ₃ (Including Sulphuric acid mist)	50	mg/Nm ³
Total Suspended Particles	150	mg/Nm ³
Ammonia and Ammonium compounds expressed as NH ₃	10	mg/Nm ³
Benzene	5	mg/Nm ³
Lead and its compounds	5	mg/Nm ³
Antimony and its compounds	1	mg/Nm ³
Arsenic and its compounds	1	mg/Nm ³
Cadmium and its compounds	1	mg/Nm ³
Mercury and its compounds	0.5	mg/Nm ³
Chrome	5	mg/Nm ³
Vanadium	5	mg/Nm ³
Nickel and its compounds	1	mg/Nm ³
Copper and its compounds	5	mg/Nm ³
Hydrogen Sulphide (H ₂ S)	5	mg/Nm ³
Chloride	10	mg/Nm ³

Pollutants	Maximum Allowable Emissions Limits from Stationary Sources by Ministry of Environment-Republic of Iraq	
	Limits	Units
Hydrogen Chloride	20	mg/Nm ³
Hydrogen Fluoride	2	mg/Nm ³
Silicon Fluoride	10	mg/Nm ³
Fluoride and its compounds including HF and SiF ₄	50	mg/Nm ³
Formaldehyde	2	mg/Nm ³
Carbon	50	mg/Nm ³
Total Volatile Organic Compounds VOCs	20	mg/Nm ³
Dioxins and Furans	1	Ng TEQ/m ³

By virtue of the provisions of Article (38\Second) of the Law of Protecting and Improving the Environment No (27) of 2009 and Article (14) of the Law of the Ministry of Environment No (37) of 2008, these instructions were issued "National Limitations of Emissions for Activities and Works"

Article11: All parties and individuals, when carrying out excavation, excavation, demolition, construction or transporting the resulting waste or dirt, must take the necessary precautions during these works in addition to the necessary precautions for safe storage or transportation to prevent its volatilization, as follows:-

- 1) First: The limits of the work site shall be set in a safe manner, away from obstructing traffic and pedestrians, and taking into account the covering of volatile materials so as not to pollute the surrounding air.
- 2) Second: Residues and dust resulting from these activities shall be transported in special containers or packages using transport vehicles prepared and licensed for this purpose, with the obligation to place a cover on the vehicle's cargo.
- 3) Third: The Ministry of Municipalities and Works and the Municipality of Baghdad, in coordination with the Ministry and other competent authorities, shall identify sanitary landfill sites to which the wastes mentioned above shall be transported and disposed of.
- 4) Fourth: In allocating the sites to which these wastes are transported, a distance of no less than (5,000) five thousand meters from the nearest urban, residential, commercial, or industrial area should be taken into account.

Article12: All parties, according to their work requirements, must take into consideration the factors below when designing chimneys to drain the air pollutants emitted by them.

- First: The chemical and physical properties of the emitted materials.
- Second: - Height above sea level.
- Third: The height level of the facilities in the surrounding area.
- Fourth: The outer diameter of the chimney nozzle.
- Fifth: The inner diameter of the chimney nozzle.

- Sixth: The building material used.
- Seventh: The volume and speed of emissions leakage.
- Eighth: the emission temperature.
- Ninth: The direction of the prevailing wind.
- Tenth: Moisture percentage in the surrounding air.

In addition, IFC guidelines⁷ for Air emission levels for cement manufacturing, which are presented in Table 4-3, will be applied to process emissions.

Table 4-3 Air Emission Levels for Cement Manufacturing

Pollutants	Air Emission Levels For Cement Manufacturing	
	Guideline Value	Units
Particulate Matter (new kiln system)	30 ⁸	mg/Nm ³
Dust (other point sources incl. clinker cooling, cement grinding)	50	mg/Nm ³
NOX	600	mg/Nm ³
SO ₂	400	mg/Nm ³
Total Metals	0.5	mg/Nm ³
Cadmium and its compounds	0.05 ⁹	mg/Nm ³
Mercury	0.05 ^c	mg/Nm ³
Hydrogen Chloride	10 ^c	mg/Nm ³
Hydrogen Fluoride	1 ^c	mg/Nm ³
Dioxins and Furans	0. ^c	mg TEQ/Nm ³

Regarding emissions from power plants, IFC guidelines¹⁰ for Combustion Facilities (≥ 50 MWth to < 300 MWth), will be applied as presented in Table 4-4.

⁷ WBG Environmental, Health, and Safety Guidelines for Cement and Lime Manufacturing (IFC, 2007)

⁸ 10 mg/Nm³ if more than 40 percent of the resulting heat release comes from hazardous waste.

⁹ If more than 40 percent of the resulting heat release comes from hazardous waste, average values over the sample period of a minimum of 30 minutes and a maximum of 8 hours.

Total Metals = Arsenic (As), Lead (Pb), Cobalt (Co), Chromium (Cr), Copper (Cu), Manganese (Mn), Nickel (Ni), Vanadium (V), and Antimony (Sb)

¹⁰ WBG Environmental, Health, and Safety Guidelines for Thermal Power Plants (IFC, 2008).

Table 4-4 IFC Emission Guidelines for Combustion Facilities ($\geq 50\text{MWth}$ to $< 300\text{MWth}$) – (in mg/Nm^3 or as indicated)

Combustion Technology/ Fuel	Particulate Matter (PM)		Sulfur Dioxide (SO2)		Nitrogen Oxides (NOx)		Dry Ggas O2 Content (%)
	NDA	DA	NDA	DA	NDA	DA	
Reciprocating Engine							
Natural Gas	N/A	N/A	N/A	N/A	200 (Spark Ignition) 400 (Dual Fuel)	200 (Spark Ignition) 400 (Dual Fuel)	15
Liquid Fuels (Plant ≥50MWth to <300MWth)	50	30	1,170 or use of 2% or less S fuel	0.5% S	1,460 (Compression Ignition, bore size diameter [mm] < 400) 1,850 (Compression Ignition, bore size diameter [mm] ≥ 400) 2,000 (Dual Fuel)	400	15
Combustion Turbine							
Natural Gas (Unit ≥ 50MWth)	N/A	N/A	N/A	N/A	51 (25 ppm)		15
Distillate/Light Fuel Oil (Unit ≥ 50MWth)	50	30	Use of 1% or less S fuel	Use of 0.5% or less S fuel	152 (74 ppm)		15
Boiler							
Natural Gas	N/A	N/A	N/A	N/A	240	240	3
Liquid Fuels (Plant ≥50MWth to <600MWth)	50	30	400 – 1000	400	400	200	3

Notes:

- N/A = Not applicable.

- NDA = Non-degraded airshed; DA = Degraded airshed

4.5.2 Noise Levels

- **Legislations**

- Draft law on the prevention of noise.
- Noise Protection and Control (Law No. 41/2015)

- **Provisions**

The Iraqi Ministry of Environment prepared a draft law on the Prevention of Noise. The national limitations of noise levels for the outdoor environment evaluated for the Project site (i.e., residential outside cities and industrial places) are presented in Table 4-5. This law identifies the national limitations of noise levels for residential places inside industrial places, which shall be complied with at the labour camp in the Project area.

Table 4-5 Draft Iraqi National Limits of Noise Levels outside Buildings

Receptor	One Hour LA _{eq} (dBA)	
	Day-time	Night-time
Residential places inside cities	60	50
Residential places outside cities	55	45
Schools, universities and educational institutions	55	--
Industrial places and public buildings	70	--
Service places and commercial places	65	--
Cultural and urban preserved places	60	--
Residential places inside industrial places and vice versa	60	45

The IFC guidelines that will be applied by the Project indicate that noise levels at receptors should not exceed the levels presented in Table 4-6 or result in a maximum increase in background levels of 3 dBA at the nearest receptor location off-site (IFC, 2007). The definition of a receptor as introduced by the IFC is "... any point on the premises occupied by persons where extraneous noise and/or vibration are received" (IFC, 2007).

Table 4-6 IFC Noise Level Guidelines

Receptor	One Hour LA _{eq} (dBA)	
	Day-time (07:00-22:00)	Night-time (22:00-07:00)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Noise Prevention Law (Law No. 41/2015) aims to prevent the excessive noise in public places. The regulations prevent broadcasting in public places that may disturb peace between 10 p.m. and 8 a.m. According to Article 16 related to the prevention of high levels of noise above permissible limits in the operation of machinery, equipment, horns and loudspeakers. Power plant should prevent excessive noise (International Labour Organization)

In addition, the noise survey and assessment will be based on the following American Society of Testing and Materials (ASTM) standards:

- Standard Guide for Applying Environmental Noise Measurement Methods and Criteria (ASTM D: E1 686–10)
- Standard Guide for Preparing a Measurement Plan for Conducting Outdoor Sound Measurements (ASTM D: E1779–96a)
- Standard Guide for Measurement of Outdoor A-Weighted Sound Levels (ASTM D:E1014–08).

4.5.3 *Surface Water Quality, Wastewater and Storm water Discharges*

- **Legislations**

- Act No. 25/1967 on the Protection of Rivers and Public Water Bodies from Pollution;
- Instructions No. 2, 3 and 4/1972 that amend Act No. 25/1967;
- Instructions No. 1/1978 on the discharge of industrial wastewater into public sewer networks;
- Instructions No. 80406/1980 on the discharge of wastewater into water bodies and standards of discharge;
- Instructions No. 20973/1980 that amend Instructions No. 80406/1980;
- Articles 5 and 6 of Instructions No. 4/1989 on the safe ways to store and handle chemicals;
- Act No. 2/2001 on the Preservation of Water Resources;
- Article 14 on Protection of Water from Pollution of Law No. 27/2009; and
- Act No. 3/2012 on the use of wastewater for irrigation purposes.

- **Provisions**

Act No. 2/2001 on the Preservation of Water Resources stipulates that:

- An annual discharge permit for wastewater or hydrotesting water should be obtained from the Environmental Protection and Improvement Directorate;
- A discharge permit should be applied for independent of the quality or the quantity of the water to be discharged, and independent of whether the discharge is continuous, intermittent or temporary; and
- The water to be discharged into water bodies or water networks should be treated to meet the discharge standards before its discharge and
- Standards for discharge to water bodies set by Act no. 25/1967 on the Protection of Rivers and Public Water Bodies from Pollution stay in application. Law no. 25/1967 specifies that discharge to water bodies cannot be permitted if:
 - Each of the DO and TSS values in the wastewater to be discharged exceed 60 ppm,
 - The effluents contain H₂S, toxic compounds or bacteria,

- The effluents contain toxic compounds that might interact with existing chemicals in the water stream to produce compounds of even higher toxicity, and
- The pH of the effluents exceeds 10 or is below 6.

Instructions No. 2 and 4/1972 pursuant to Act No. 25/1967 set the maximum acceptable temperature of discharge and prohibit additional discharges in water in the presence of nearby sewage discharge outlets. Instructions No. 3/1972 specify that:

- If the discharge outlet is less than 1 km away from a water intake point for drinking purposes, or swimming, or fish ponds, then no discharge permit shall be granted; and
- The pipe outlet should be beneath the water surface and extend 5 m into the water body, with these conditions to be met even in the periods of low flows.
- Instructions No. 80406/1980 pursuant to Act No. 25/1967 specify:
- The ambient water quality standards; and
- That discharges into the water bodies should not result in an exceedance in the ambient water quality standards.

Instructions No. 1/1979 allow the industries to discharge industrial wastewater to public sewer networks. These standards are presented in Table 2.9.

Instructions No. 20973/1980 (amending and adding to Instructions No. 80406/1980) correct ambient water quality standards for SO₄, PO₄, NO₃ and add standards for other compounds, namely Co, Fe, Mn, Ag, Hydrocarbons, S, NH₃ and H₂S.

The above-mentioned legislative texts pertaining to ambient and discharge standards do not address the following issues:

- The Iraqi legislation does not specify whether a mixing zone after the discharge point is allowed, and does not permit marginal exceedance in the ambient river water quality standards; and
- If the ambient water quality does not meet the ambient standards, the regulation does not specify if discharges that comply with the discharge limits can be made.

The regulations on discharges into water bodies allow some flexibility in the effluent for chloride and sulphate concentrations as per the following:

- a. If the volumetric flow rate ratio of the effluent to the source is equal or less than (1/1000), then it is allowed to raise the concentration with (1%) more than the original concentration in the source.
- b. If the ratio is greater than (1/1000), then the allowable concentration of Chlorides is 600 mg/L, and the allowable concentration of Sulphates is 400 mg/L.
- c. If the Chlorides or Sulphates concentration in the source water is less than 200 mg/L, each case will be studied separately by the entity responsible for carrying out the regulation.

The Iraqi ambient and effluent discharge standards are shown in Table 4-7.

Table 4-7 Wastewater and River Quality Standards

S No	Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Maximum Limits for Treated Wastewater for Irrigation Use ⁽⁸⁾		Ambient Levels for Receiving Environment
			Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾	Iraqi Standard in Case of Secondary Treatment of Wastewater	Iraqi Standard in Case of Tertiary Treatment of Wastewater	Iraqi Standards for River Water Quality (A1) ⁽¹⁾
			Maximum Allowable Concentration				
	Compliance Required						
1	Colour	TCU	--	--	--	--	Natural
2	Temperature	°C	<35	45°C	--	--	--
3	Total Suspended Solids	mg/L	60	750	40	10	--
4	Total Dissolved Solids	mg/L	--	--	2,500	2,500	--
5	pH	S U	6.0-9.5	6.0-9.5	4-6, 8	4-6, 8	6.5-8.5
6	Dissolved oxygen	mg/L	--	--	--	--	>5
7	BOD ₅	mg/L	Less than 40	1000	40	10	<3
8	COD (Cr ₂ O ₇ Method)	mg/L	<100 (Cr ₂ O ₇ Method)	--	100	40	--
9	Cyanide	mg/L	0.05	0.5	--	--	0.02
10	Fluorine	mg/L	5 ⁽⁶⁾	10	1	1	0.2 ⁽⁷⁾
11	Free Chlorine	mg/L	Trace	100	0.5	0.5	Trace
12	Chlorides	mg/L	600 ⁽²⁾	--	--	--	200 ⁽⁷⁾
13	Phenols	mg/L	0.01-0.05	0.5	0.002	0.002	0.005
14	Sulphates	mg/L	400 ⁽³⁾	--	--	--	200 ⁽⁷⁾
15	Nitrates as NO ₃ ⁻	mg/L	50	--	50	50	15
16	Phosphates	mg/L	3	--	25	12	0.4

S No	Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Maximum Limits for Treated Wastewater for Irrigation Use ⁽⁸⁾		Ambient Levels for Receiving Environment
			Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾	Iraqi Standard in Case of Secondary Treatment of Wastewater	Iraqi Standard in Case of Tertiary Treatment of Wastewater	Iraqi Standards for River Water Quality (A1) ⁽¹⁾
			Maximum Allowable Concentration				
17	Total Phosphorous	mg/L	--	--	--	--	--
18	Total Nitrogen ⁽⁴⁾	mg/L	--	--	--	-	--
19	Ammonium (NH ₄ ⁺)	mg/L	--	--	5	5	1
	Ammonia (N as NH ₃)	mg/L	0	10	--		0
	Ammonia gas (N as free NH ₃)	mg/L	--	6	--		0
20	Lead	mg/L	0.1	0.1	0.1	0.1	0.05
21	Arsenic	mg/L	0.05	0.05	0.1	0.1	0.05
22	Copper	mg/L	0.2	--	0.2	0.2	0.05
23	Nickel	mg/L	0.2	0.1	0.2	0.2	0.05
24	Selenium	mg/L	0.05	--	0.02	0.02	0.01
25	Mercury	mg/L	0.005	0.001	0.001	0.001	0.001
26	Cadmium	mg/L	0.01	0.1	0.01	0.01	0.005
27	Lithium	mg/L	--	--	2.5	2.5	--
28	Molybdenum	mg/L	--	--	0.01	0.01	--
29	Vanadium	mg/L	--	--	0.1	0.1	--
30	Sodium	mg/L	--	--	250	230	--
31	Calcium	mg/L	--	--	450	400	--
32	Magnesium	mg/L	--	--	80	60	--
33	Potassium	mg/L	--	--	100	20	--

S No	Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Maximum Limits for Treated Wastewater for Irrigation Use ⁽⁸⁾		Ambient Levels for Receiving Environment
			Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾	Iraqi Standard in Case of Secondary Treatment of Wastewater	Iraqi Standard in Case of Tertiary Treatment of Wastewater	Iraqi Standards for River Water Quality (A1) ⁽¹⁾
			Maximum Allowable Concentration				
34	Beryllium	mg/L	--	--	0.1	0.1	--
35	Zinc	mg/L	2	0.1	2	2	0.5
36	Chromium	mg/L	0.1	0.1	0.1	0.1	0.05
37	Chromium -Hexavalent	mg/L	--	--	--	--	--
38	Aluminium	mg/L	5	20	5	5	0.1
39	Barium	mg/L	40	0.1	--	--	1
40	Boron	mg/L	1	1	0.75	0.75	1
41	Cobalt	mg/L	0.5	0.5	0.05	0.05	0.05
42	Iron	mg/L	2	15	5	5	0.3
43	Manganese	mg/L	0.5	--	0.2	0.2	0.1
44	Silver	mg/L	0.05	0.1	--	--	0.01
45	Total Hydrocarbon & Derivatives	mg/L	<10 ⁽⁵⁾	--	--	--	--
46	Sulphides	mg/L	0	3	--	--	--
47	Sulphur dioxide	mg/L	0	7	--	--	--
48	Calcium Carbide CaC	mg/L	0	0	--	--	--
49	Organic solvents	mg/L	0	0	--	--	--
50	Benzene	mg/L	0	0.5	--	--	--
51	Benzo(a)pyrene	mg/L	--	--	--	--	--

S No	Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Maximum Limits for Treated Wastewater for Irrigation Use ⁽⁸⁾		Ambient Levels for Receiving Environment
			Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾	Iraqi Standard in Case of Secondary Treatment of Wastewater	Iraqi Standard in Case of Tertiary Treatment of Wastewater	Iraqi Standards for River Water Quality (A1) ⁽¹⁾
			Maximum Allowable Concentration				
52	Chlorobenzene	mg/L	0	0.1	--	--	--
53	TNT	mg/L	0	0.5	--	--	--
54	Bromine Br ₂	mg/L	0	1 - 3	--	--	--
55	Pesticides DDT	mg/L	0	--	--	--	0
56	Alcohol-Oil	mg/L	0	0	--	--	0
57	Sodium adsorption ratio	mg/L	--		6-9	<6	--
58	Escherichia coli (Number in 100 mL)		--		1,000	2.2	--

Notes:

1 – Source: Instructions 80406/1980 and 20973/1980.

2- (a) If the volumetric flow rate ratio of the effluent to the source is equal or less than (1/1000), then it is allowed to raise the concentration with (1%) more than the original concentration in the source.

(b) If the ratio is greater than (1/1000), then the allowable concentration of Chloride is 600 mg/L.

[c] If the Chloride concentration in the source water is less than 200 mg/L, each case will be studied apart by entity responsible for carrying out the regulation.

3- (a) If the volumetric flow rate ratio of the effluent to the source is equal or less than (1/1000), then it is allowed to raise the concentration with (1%) more than the original concentration in the source.

(b) If the ratio is greater than (1/1000), then the allowable concentration of Sulphates is 400 mg/L.

(c) If the Sulphates concentration in the source water is less than 200 mg/L, each case will be studied apart by entity responsible for carrying out the regulation.

4- The effluent concentration of Total Nitrogen may be up to 40 mg/L in processes that include hydrogenation.

5-It is allowed to drain hydrocarbons to River bodies according to concentration and limitations listed here under provided these concentrations are to be calculated before getting mixed with waters of River water source.

First- 10 mg/L according to following limitations:

[a] The percentage of drained water amount to source water amount is not less than 1:1000 or less.

[b] The river shall be streaming.

Second - 5 mg/L according to following limitations.

[a] The percentage of drained water amount to source water amount is not less than 1:500 or less.

[b] The river shall be streaming.

Third- 3 mg/L according to following limitations:

[a] The percentage of drained water amount to source water amount is not less than 1:300 or less.

[b] The river shall be streaming.

6- Can be increased focus allowed by certain special cases, depending on the impact of discharge water to the source.

7- Or more depending on how much exists naturally in the source.

8- Source: Act No. 3/2012

No specific legislative text explains the procedure of discharging storm water from an industrial facility; however, in Instructions No. 4/989 which provide guidance on the safe ways to store and handle various types of chemical materials, the following is noted:

- Article 5 specifies the necessity of constructing a network and a special tank for the collection of the water drained from the storage rooms;
- Article 6 (i) specifies that the water network of the storage rooms should not be connected to the public water discharge network.

Therefore storm water that comes in contact with a potentially polluting surface should be collected and treated before the discharge, provided that it meets the discharge standards.

In Article 14 of Law No. 27/2009 which addresses the Protection of Water from Pollution, the regulator forbids the following (among others):

- Discharge of any domestic, industrial, service or agricultural liquid wastes to the internal surface water resources, groundwater or to the Iraqi maritime territories unless after carrying out the necessary treatment thereon as to secure their conformity with the specifications determined in the national environmental legislations and international agreements binding on the Republic of Iraq. It includes all discharges whether they are continuous, discontinuous or temporary. The necessary arrangements shall be made to prevent pollution to be transferred from land to the sea area through water, air or directly from the shore or ships and airplanes.
- Connection or discharge of sewers of houses, factories and other activities to the storm water drains.
- Throwing solid wastes, scraps, corpses or wastes of animals in water sources.
- Discharge of oil wastes, fuels remains or balancing water of oil tankers to the internal surface water or to the Iraqi maritime territories whether this disposal is from immovable stations, mobile sources or from spills resulted from loading operations.
- Any works leading to the pollution of the surface water sources as a result of using their shores unless the approval of the relevant entities has been acquired.
- Regulations No. 3/2012 set the standards for use of wastewater in irrigation purposes as per the values presented in Table 4-7.

Also, IFC guidelines for effluent levels from cement manufacturing and indicative values for treated sanitary sewage discharges, which shall be complied with by the Project are presented in the tables below.

Table 4-8 Effluent levels: Cement Manufacturing

Pollutants	Units	Guideline Value
pH	S.U.	6–9
Total suspended solids	mg/L	50
Temperature increase	°C	<3 ^a

a: At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity

Table 4-9 Indicative Values for Treated Sanitary Sewage Discharges ^a

Pollutants	Units	Guideline Value
pH	pH	6–9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN ^b / 100 ml	400 ^a

Notes:

a: Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.

b: MPN = Most Probable Number

4.5.4 Potable Water

- Legislations**

- Standard No. 417/2001 on drinking water specifications.

- Provisions**

Water used for drinking purposes during the Project phases shall comply with the Iraqi Standard Specification for Drinking Water No. 417/2001, as listed in Table 4-10.

Table 4-10 Iraqi Drinking Water Standards

Parameter	Unit	Maximum Acceptable Concentration
Colour	CTU	10 units
Turbidity	NTU	5 units
Temperature	°C	-
TDS*	mg/L	1,000
pH	S U	6.5–8.5
Cyanide	mg/L	0.02
Fluoride	mg/L	1
Chloride as Cl ⁻	mg/L	250
Sulphate as SO ₄ ²⁻	mg/L	250
Nitrate as NO ₃ ⁻	mg/L	50
Nitrite as NO ₂ ⁻	mg/L	3
Lead	mg/L	0.01
Arsenic	mg/L	0.01
Copper	mg/L	1
Nickel	mg/L	0.02

Parameter	Unit	Maximum Acceptable Concentration
Selenium	mg/L	0.01
Mercury	mg/L	0.001
Cadmium	mg/L	0.003
Zinc	mg/L	3
Chromium (Cr ⁶⁺)	mg/L	0.05
Aluminium	mg/L	0.2
Barium	mg/L	0.7
Calcium	mg/L	50
Iron	mg/L	0.3
Manganese	mg/L	0.1
Magnesium	mg/L	50
Sodium	mg/L	200
Potassium	mg/L	-
Carbonate	mg/L	-
Bicarbonate	mg/L	-
Free Chlorine	mg/L	-
Dissolved Hydrocarbons	mg/L	0.01
Carbon Chloroform extracted	mg/L	0.3
Synthetic Detergents	mg/L	0.3
Phenolic Compounds	mg/L	0.002
Organic chloropesticides (chlorinated)	mg/L	0.07
Organic phosphorous pesticide	mg/L	0.000005
Multi-chloro-diphenolic pesticide	mg/L	0.001
Alpha Radiation	Bq/L	0.1
Beta Radiation	Bq/L	1
Microbiological Parameters		
Coliform (100 mL after 24 h at 35°C)		<1.1
Escherichia coli (100 mL after 24 h at 44°C)		<1.1
Escherichia coli (250 mL after 24 h at 35°C)		Zero
Plate count (1 mL after 24 h at 35°C)		Zero

4.5.5 Ecology

- **Legislations**

- Law No. 84/1976 on the organisation of fishing and aquatic life exploitation;
- Law No. 31/2008 which ratifies the Convention on Biological Diversity;
- Law No. 30/2009 on the Forests and Plantation Forests;

- Article 18 of the Law No. 27/2009 on the Protection and Improvement of the Environment on the conservation of biodiversity;
- Law No. 17/2010 on the Protection of Wildlife; and
- Act No.2/2014 on protected areas.

• Provisions

Act No.2/2014 on natural reserves which sets the conditions and considerations for selecting a site as a natural reserve, it also sets the measures that shall be adopted to protect the natural reserves.

Law No. 17/2010 sets a range of fauna species that are protected in Iraq and provides instruction to organise hunting activities.

Law No. 30/2009 aims at regulating activities carried out in forested areas in order to protect the existing green areas.

Law No. 31/2008, namely Article 14, stresses the importance of conducting environmental impact assessments for proposed projects to minimize the adverse impacts on biological diversity to the lowest possible level.

Law No. 84/1976 provides instructions aiming at protecting aquatic life especially from wastes discharge and water abstraction. Article 2 instructs to apply necessary arrangements in order to maintain small fish life when extracting water by means of pumps.

4.5.6 Traffic

• Legislations

- Bulletin No. 1/1986 on the right of way of public roads;
- Highway Code No. 35/2002 on the rules for the design, construction, maintenance and operation of public road infrastructure, and for conducting feasibility studies for new road infrastructure;
- Traffic Law No. 86/2004 which specifies different road types; and
- Bulletin No. 9/2008 on speed limits.

• Provisions

Bulletin No. 1/1986 provides the right of way of the different types of public roads as per Table 4-11.

Table 4-11 Right of Way of Public Roads

Road Type	Right of Way (m) ¹¹
Highway	260
Main	100
Secondary	60

¹¹ The right of way is measured from the centre of the road at an equal distance representing half of the right of way from each side of the road

The Highway Code No. 35/2002 sets in Article 8 the restrictions and allowances for use of the right of way of existing roads and establishment of new intersections, roads and bridges, where any modifications or additions to the rights of way should be approved by the State Corporation for Roads and Bridges prior to commencement of works. In Item 10 of Article 8, it is stated that no facilities that cause nuisance or danger or effect on the roads and its users due to emissions or odours should be erected at a distance less than 500 m from the right of way of expressways and main roads. Item 10 of Article 8 also states that there should not be a direct link from facilities to the expressways, but rather the links should be made to the service roads running parallel to the expressways and main roads.

4.5.7 Archaeology

- **Legislations**

- Law No. 55/2002 on Antiquities and Heritage.

- **Provisions**

Iraqi Law No. 55/2002 on Antiquities and Heritage has specified in Article 15, Item 5, an exclusion zone of 3 Km for the establishment of environmental polluting industry. Article 9, Item 4, specifies that in case there is a conflict between the implementation of a highly important development project and the presence of an archaeological site, the Project Proponent shall pay for the archaeological authorities to conduct investigations in a period of time sufficient for scientific excavations considering the project implementation period. Item 5 the law stipulates that the project proponent should seek prior approval from the archaeological authorities for construction of facilities located within 1 km from an archaeological site.

4.5.8 Soil Standards

In the absence of Iraqi standards, the Dutch Intervention Values set for soil quality, and which are based on the serious risk contamination for ecotoxicological effects (SRCeco) (VROM, 2000), shall be used for evaluating the background soil results.

4.5.9 Solid and Hazardous Wastes

- **Legislations**

- Presidential Letter No. 5637/1980 on the specification of sanitary landfill of wastes;
- Law No. 67/1986 on the disposal of debris;
- Instructions No. 4/1989 on the safe ways to store and handle chemicals;
- Instructions No. 6/1997 on the implementation of Decision No. 133/1996;
- Articles 14, 17, 20 and 21 of Law No. 27/2009 on the Protection and Improvement of the Environment;
- Law No. 3/2009 that ratifies the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal; and
- Law No. 29/2009 amending Law No. 67/1986.

- **Provisions**

Law No. 67/1986 and its amendment in 2009 specify that the entity responsible of the debris shall collect and transport the debris to a temporary disposal area set by municipalities within a timeframe determined by the official in charge, or the debris can be collected and transported by the municipality to the temporary disposal sites. In the latter event, the entity responsible of the debris shall pay three times as much the cost for the collection and transportation. The law also sets penalties for non-compliance and leaving the debris on streets or sidewalks.

Article 18 of Instructions No. 4/1989 provides instructions for the disposal of containers of toxic chemicals, as it states that all economic activities shall adopt the following procedures:

- a. Destroy all containers and barrels that contain toxic chemicals, pesticides and carcinogenic materials after washing them well with water and in a way that ensures that they are not re-used. This can be done by using sharp instruments to scribe or crack the containers before final destruction. The radiant materials shall be disposed after consulting with the Centre for the Prevention of Radiation.
- b. It is prohibited to sell containers and the barrels which contained toxic material, pesticides or carcinogenic materials and they should be disposed after washing them as stipulated in Clause (a) above.

Instructions No. 6/1997 explain the procedures for waste collection, and the responsibilities of municipalities. The instructions state that municipalities are responsible for the collection and transportation of wastes produced from residences at their expense, while the users of the non-residential places are responsible for the collection and transportation of their wastes at their expense, by:

- Commissioning a waste company or a contractor, which shall be done through the municipality and under its supervision, or
- Other methods to be approved by the Ministry of Interior, or by the Baghdad Municipality in Baghdad City.

Where the above is not applied, the municipalities shall lift the wastes and charge the property users for the costs.

Instructions No. 6/1997 exclude debris and hazardous waste from the provisions. It is stated that debris shall be collected and transported at the expense of their producer as per Law No. 67/1986, and hazardous wastes shall be treated and transported by their producer in a way that does not cause health and hygiene problems, environmental pollution, and nuisance to citizens.

In Article 17 "Protection of Earth," the regulator forbids carrying out the following activities (among others):

- Random disposal of solid wastes in unauthorized spaces.
- In Article 20 "Management of Hazardous Materials and Wastes," the regulator forbids the following:
 - Transportation, utilization, admission, burying, soaking, storage or discharge of the hazardous or radioactive wastes unless by using safe, environment-friendly methods and

after acquiring formal approvals according to instructions issued by the Minister of Environment in coordination with the relevant entities.

- Production, transportation, utilization, export or storage of the hazardous materials unless after taking the precautions stipulated in the applicable laws, regulations and instructions to protect the environment from any damage. The owner of any institutions or activity shall inform the Ministry of Environment about any discharge of hazardous materials or products to the environment due to force majeure and take the necessary precautions to avoid the damages that may result.
- Admission and passage of the hazardous and radioactive wastes from other countries to the Iraqi territories, air or sea unless after a prior notice and acquiring the official approvals.
- Establishment of any activity of treatment of hazardous wastes unless with a permission from the authorized entities after consulting with the Ministry of Environment. The discharge of the wastes shall be according to the terms and standards that are determined by instructions issued for this purpose to protect the environment from damage.

Law No. 3/2009 ratifies the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and its Disposal. The Basel Convention regulates the transfer of hazardous wastes across international boundaries.

4.5.10 Socio-Economic

- **Legislations**

1. Labour Law No. 37/ 2015
2. Social Protection Law No. 11/ 2014

- **Provisions**

Labour Law No.37/2015, including Instruction No.12 of 2016 for Occupational Health and Safety, differentiates between jobs depending on the circumstances and duties that the employees are conducting. The Law organizes the relationship between the employer and employees, with the aim of protecting their rights and realizing sustainable improvement based on social justice, equality and providing suitable work for everybody without discrimination. The Law prohibits all types of compulsory labour and child labour and determines minimum working age (15 years) and to prevent any discrimination or harassment, whether direct or indirect.

Article 63 of Chapter 7, gives the MOLSA's minister the authority to formulate a committee of 8 members to determine minimum levels of national wages. However, decision is made in light of several factors, including needs of workers and families, level of wages, cost of living, and economic factors (development, market, productivity, employment, etc.).

The Law regulates the work of female employees by granting additional rights. Furthermore, it regulates the work of subcontractors regarding the employees' rights.

Workers must follow orders and instructions regarding measures of protection and occupational safety and must carefully use the protective devices entrusted to them.

Articles of Chapter 12 explain the Protection of Workers in quarries, mines and minerals extraction, in particular, the following:

Article 106:

- 1) The provisions of this Chapter apply to work in construction materials quarries, mines and minerals extraction works, in particular, the following:
 - a. Prospection, excavation and exploration works for minerals and stones, including jewellery and their extraction and manufacturing.
 - b. Extraction, concentration or manufacturing of mineral deposits, whether on the surface or underground.
 - c. All works associated to the abovementioned works specified in subparagraphs (a) and (b) of this paragraph such as building and constructions of plants and the installation of equipment.
- 2) It shall be prohibited to employ a worker in the industries and works unless following the medical examination of the worker in order to ascertain his physical fitness for the work he will be assigned with.
- 3) Before the termination of the worker's employment contract, for any reason whatsoever, the medical exam must be repeated, to check if the worker contracted any occupational disease.
- 4) The workers covered by the provisions of this chapter shall undergo the medical test during the working hours without bearing any fees in this respect.

Article 110: The employer shall:

- 1) Draw up instructions on occupational safety and health in accordance with the instructions and statements issued by the Ministry;
- 2) Take the following measures:
 - a- Issue instructions and orders regarding occupational safety whenever necessary;
 - b- Avoid having workers present at the site of explosions unless all danger has passed;
 - c- Provide workers with devices and clothing for protecting them against occupational hazards;
 - d- Put a mark on potential hazardous locations;
 - d- Provide emergency rescue and first aid requirements;
 - e- Periodically inspect workplaces in order to verify the appropriate application of the measures specified in this subsection

The Social Protection Law No.11/ 2014 has emerged from reforming the old Social Welfare Act no. 126 of 1980, which had been effective for 35 years. The new Law is influenced by successful social protection systems in developed countries, and aims to avoid the errors of previous social protection experiences in Iraq. It targets Iraqi families and individuals as well as foreign nationals residing in Iraq, who live below the poverty line.

Under Article 6 of this Law, the Social Protection Council was established, which is associated with Ministry of Labour and Social Affairs (MOLSA) with enough authority to alter the organizational structure of the Social Protection Network and taking over its function. The Article also ties the amount of aid provided through the Social Protection Council to the poverty line.

4.5.11 *Health and Safety*

- **Legislations**

- Instructions No. 12/2016 on Occupational Health and Safety Requirements.
- Act No. 74/1968 on Hygienic Control of Factories;
- Article 3 of Public Health Law No. 89/1981;
- Instructions No. 2/1984 on chemical carcinogens;
- Instructions No. 3/1985 on occupational safety;
- Instructions No. 22/1987 on occupational health and safety;
- Law No. 99/1985 on ratification of the International Labour Convention 94 on working conditions under public contracts;
- Bulletin No. 6/1986 including the recommendation 112 on occupational health services in workplaces;
- Labour Law No. 71/1987 and its amendments in 1991 and 2000;
- Amendment No. 1/1988 to the Decision No. 9/1980 on industrial safety and occupational health;
- Instructions No. 4/1989 on the safety in storing and handling chemicals;
- Decision No. 9/1992 on the industrial security service;
- Instructions No. 4/1993 on the protection of workers from vibrations;
- Instructions No. 7/1993 on lighting in the work environment; and
- Instructions No. 8/1993 amending Instructions No. 22/1987

- **Provisions**

Instructions No. 12/2016 sets out the procedures that the employer must comply with to ensure the safety of machines and equipment in the projects, and the procedures necessary to meet the requirements of occupational health and safety in the projects.

Act No. 74/1968 regulates occupational health and safety in factories, establishes safety and health provisions with respect to overcrowding, lighting, ventilation, sewage, cleanliness and the storage of dangerous substances. It also establishes the obligations of employers in these regards, regulates the medical examination of workers, and provides information for keeping of records by authorities.

Instructions No. 6/1979 provide the minimum hours of exposure to high noise levels (above 85 dB) based on which the workers are entitled for special allowances as per Table 4-12 below.

Table 4-12 Minimum Workers Exposure Hours to Noise Levels to be Eligible for Allowances

Noise Level (dB)	Exposure Hours	Noise Level (dB)	Exposure Hours
85 - 90	8	103	1.20
91	6.55	104	1.10
92	6	105	1
93	5.15	106	0.50
94	4.35	107	0.45
95	4	108	0.40
96	3.30	109	0.35
97	3	110	0.3
98	2.5	111	0.25
99	2.15	112	0.23
100	2	113	0.20
101	1.45	114	0.17
102	1.30	115	0.15

Article 3 of the Public Health Law No. 89/1981 provides instructions on the protection of workers from occupational risks and diseases.

Instructions No. 2/1984 classify chemical carcinogens and regulate their utilization.

Article 3 of Instructions No. 3/1985 specifies the responsible party about occupational health and safety in the projects according to the numbers of workers as per the Table 4-13.

Table 4-13 Projects' Occupational Health and Safety Responsible Party

Number of Workers	Responsible Party
<50	One occupational health specialist, part-time
50 - 100	One occupational health specialist, full time, must undertake a training session, cannot be replaced before notifying the responsible party and providing a replacement
100 - 500	Occupational health committee, including one occupational health specialist
>500	Occupational health committee, including two occupational health specialists

Instructions No. 22/1987 concerning Occupational Safety and Health govern the enforcement of occupational health and safety regulations, provide information for inspections of places of employment and inspections reports, establish the duties and responsibilities of employers vis-a-vis occupational health and safety, establish the functions of safety commissions at places of work and regulate the responsibilities and duties of workers with respect to occupational health and safety.

Article 3 of the Law No. 99/1985 urges the relevant authorities to guarantee the necessary safety and health conditions for workers under public contracts.

Article 8, clause 8-1, of Bulletin No. 6/1986 on occupational health services in workplaces, refers to the necessity of monitoring the factors that affect the workers' health and providing advice regarding this issue.

The Iraqi Labour Law No. 71/1987 regulates labour issues and rights. This law and its two amendments in 1991 and 2000 guarantee the right to work, under equal conditions and with equal opportunity, to all citizens who are able to work, without any discrimination on the basis of sex, race, language or religion. Thus, every citizen shall have the possibility of pursuing vocational training within the limits established by the State in relation to the amount of work and the nature of the work in each occupational branch.

The Iraqi Labour Code sets the maximum number of working hours at 8 hours per day, with rest periods totalling between 30 minutes and 1 hour. Night working hours are limited to 7 hours. At least one paid day of rest per week must be given by the employer. In performing preparatory or complementary work in industry, or in handling extraordinary work, no more than 4 hours per day shall be worked as overtime, with wages increased by 50% when overtime work is performed during the day. The Labour Code also addresses the rights and obligations of workers and employers towards occupational safety. In workplaces where the number of workers exceeds 500, employers should engage a doctor full time on the premises.

The Labour Code prohibits the employment of foreign (defined as non-Iraqi and non-Arab) workers without obtaining a work permit prior to employment. This is in accordance with the instructions and decrees issued by the Ministry of Labour and Social Affairs.

Amendment No. 1/1988 to the Decision No. 9/1980 provides instructions on the procedures that aim at protecting human resources and properties and reducing the losses in lives and assets, in addition to the sustainability of production for the premises and productive projects during periods of peace, war and general disasters.

The Iraqi Ministry of Health has set Occupational Vibration Standards to protect workers who are exposed to constant vibrations in their workplace. The standards are set in Instructions No. 4/1993 pursuant to Article 3 of the Public Health Law No. 89/1981, and are shown in Table 4-14.

Table 4-14 Vibration Limits in Working Environments

Total Daily Exposure Duration	Maximum Allowable Levels of Vibration
Between 4 and 8 hours	4 m/s ² or 0.40 units of gravity
Between 2 and 4 hours	6 m/s ² or 0.61 units of gravity
Between 1 and 2 hours	8 m/s ² or 0.81 units of gravity
Less than one hour	12 m/s ² or 1.22 units of gravity

Instructions No. 7/1993 stipulate that the employer is to provide natural and artificial lighting in the workplace taking into consideration eye protection for the workers.

4.6 INTERNATIONAL CONVENTIONS, TREATIES AND GUIDELINES

The international conventions and agreements related to environmental protection and that are signed or ratified by Iraq are presented in Table 4-15.

Table 4-15 International Conventions Ratified by Iraq

Agreement	Objective(s)	Relevance to Project
(Law No. 29/2012) Accession to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington 1973)	To ensure that international trade in specimens of wild animals and plants does not threaten their survival.	Regulates the interaction between the Project personnel and wild species in the area of the Project.
(Law No. 3/2009) Accession to Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and its Disposal	To control the transportation of dangerous non-radiant materials and its disposal across the border.	Regulates the transfer of potentially hazardous wastes across national boundaries.
(Law No. 7/2009) Accession to the United Nations Convention to Combat Desertification (UNCCD) dated 1997	To combat desertification and mitigate the effects of drought.	Controls land clearance, excavation, drilling, off-road driving and base footprint size.
(Law No. 7/2008) Accession to the United Nations Framework Convention on Climate Change (UNFCCC) and related Kyoto Protocol dated 1994	To achieve stabilisation of greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with climate system.	Reduce greenhouse gas (GHG) emissions (mainly CO ₂ , N ₂ O, and CH ₄)
(Law No. 12/2008) Accession to the UNESCO World Heritage Convention dated 1975	To promote cooperation among nations to protect heritage around the world that is of such outstanding universal value that its conservation is important for current and future generations.	Areas of cultural and archaeological importance are located in the vicinity of the Project
(Law No. 31/2008) Accession to the Convention on Biological Diversity dated 1992	To protect biodiversity. Sustainable use of components. Fair and equitable sharing.	The Project is located in the vicinity of sensitive areas.
(Law No. 42/2007) Accession to Vienna Convention dated 1985 and Montreal Protocol on Ozone-Depleting Substances dated 1987	To protect human health and environment from any activity that modifies the ozone layer. Adopt measures to control human activities found to have adverse impact on ozone layer.	Regulates the use of ozone depleting substances like methane and ammonia.
(Law No. 154/1979) Accession to ILO Convention No. 148 concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration Agents (Geneva 1977)	To protect workers against occupational hazards in the working environment.	Occupational health during the Project phases.

Agreement	Objective(s)	Relevance to Project
(Law No. 47/1977 and Law No. 137/1977) Accession to Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	To establish an effective system of collective protection of the cultural and natural heritage of outstanding universal value, organized on a permanent basis and in accordance with modern scientific methods.	The Project is located near some areas of possible universal importance.
(Law No. 87/1972) Accession to Convention concerning Protection against Hazards of Poisoning Arising from Benzene (Geneva 1971)	Aims at the protection of workers from hazards arising from the production, handling or use of benzene.	Occupational health during the Project phases
Stockholm Convention on Persistent Organic Pollutants POPs ²	It aims at protecting human health and the environment from POPs, which bio-accumulate through the food web, and pose a risk of causing adverse effects to human health and the environment.	Control POPs emissions from waste incineration.
Protocol for the Protection of the Marine Environment Against Pollution from Land-Based Sources, 1990 ³	To prevent, abate and combat pollution by discharges from land reaching the sea area whether water-borne, air-borne, or directly from the coast including outfalls and pipelines	Addresses regional guidelines, regulations and permits for the release of wastes

¹ Iraq is still in the process of considering its accession to the convention whereby the relevant sub-committee – entrusted with studying the relevance of the convention to Iraq – is preparing its final report and recommendations for submittal to the Cabinet.

² The relevant sub-Committee is still to reach a final verdict regarding the accession to this Convention since some Ministries have expressed inability to implement the requirements of accession, with respect to the present situation in Iraq.

³ Law No. 203/1978 on the accession to Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution and its Protocol concerning regional co-operation in combating pollution by oil and other harmful substances in case of emergency was issued by Iraq; however, no laws were issued on the accession to this protocol although Iraq is a member of the convention.

➤ In addition, The Project shall comply with **ILO conventions**, which are:

- All ILO conventions signed and ratified by Iraq (Table 4-16),
- All ILO conventions covering core labour standards:

The core labour standards are a set of four fundamental, universal and indivisible human rights:

- Freedom from forced labour
- Freedom from child labour
- Freedom from discrimination at work
- Freedom to form and join a union, and to bargain collectively.
- All ILO conventions covering the basic terms and conditions of employment;

Table 4-16 ILO conventions signed and ratified by Iraq

Fundamental Conventions:	Governance (Priority) Conventions:
- Forced Labour Convention, 1930 (No. 29) - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) - Right to Organise and Collective Bargaining Convention, 1949 (No. 98) - Equal Remuneration Convention, 1951 (No. 100) - Abolition of Forced Labour Convention, 1957 (No. 105) - Discrimination (Employment and Occupation) Convention, 1958 (No. 111) - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 15 years - Worst Forms of Child Labour Convention, 1999 (No. 182)	- Labour Inspection Convention, 1947 (No. 81) - Employment Policy Convention, 1964 (No. 122) - Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144)
Technical Conventions:	
- Hours of Work (Industry) Convention, 1919 (No. 1) - Right of Association (Agriculture) Convention, 1921 (No. 11) - White Lead (Painting) Convention, 1921 (No. 13) - Weekly Rest (Industry) Convention, 1921 (No. 14) - Workmen's Compensation (Accidents) Convention, 1925 (No. 17) - Workmen's Compensation (Occupational Diseases) Convention, 1925 (No. 18) - Equality of Treatment (Accident Compensation) Convention, 1925 (No. 19) - Seamen's Articles of Agreement Convention, 1926 (No. 22)	- Wages, Hours of Work and Manning (Sea) Convention (Revised), 1958 (No. 109) - Radiation Protection Convention, 1960 (No. 115) - Final Articles Revision Convention, 1961 (No. 116) - Equality of Treatment (Social Security) Convention, 1962 (No. 118) - Guarding of Machinery Convention, 1963 (No. 119) - Hygiene (Commerce and Offices) Convention, 1964 (No. 120) - Minimum Wage Fixing Convention, 1970 (No. 131) - Holidays with Pay Convention (Revised), 1970 (No. 132) - Workers' Representatives Convention, 1971

- Repatriation of Seamen Convention, 1926 (No. 23) - Minimum Wage-Fixing Machinery Convention, 1928 (No. 26) - Marking of Weight (Packages Transported by Vessels) Convention, 1929 (No. 27) - Hours of Work (Commerce and Offices) Convention, 1930 (No. 30) - Workmen's Compensation (Occupational Diseases) Convention (Revised), 1934 (No. 42) - C077 - Medical Examination of Young Persons (Industry) Convention, 1946 (No. 77) - Medical Examination of Young Persons (Non-Industrial Occupations) Convention, 1946 (No. 78) - Final Articles Revision Convention, 1946 (No. 80) - Employment Service Convention, 1948 (No. 88) - Night Work (Women) Convention (Revised), 1948 (No. 89) - Accommodation of Crews Convention (Revised), 1949 (No. 92) - Labour Clauses (Public Contracts) Convention, 1949 (No. 94) - Protection of Wages Convention, 1949 (No. 95) - Weekly Rest (Commerce and Offices) Convention, 1957 (No. 106) - Indigenous and Tribal Populations Convention, 1957 (No. 107) - Seafarers' Identity Documents Convention, 1958 (No. 108)	- (No. 135) - Benzene Convention, 1971 (No. 136) - Dock Work Convention, 1973 (No. 137) - Occupational Cancer Convention, 1974 (No. 139) - Paid Educational Leave Convention, 1974 (No. 140) - Human Resources Development Convention, 1975 (No. 142) - Seafarers' Annual Leave with Pay Convention, 1976 (No. 146) - Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147) - Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148) - Nursing Personnel Convention, 1977 (No. 149) - Labour Administration Convention, 1978 (No. 150) - Occupational Safety and Health (Dock Work) Convention, 1979 (No. 152) - Hours of Work and Rest Periods (Road Transport) Convention, 1979 (No. 153) - Safety and Health in Construction Convention, 1988 (No. 167) - Working Conditions (Hotels and Restaurants) Convention, 1991 (No. 172) - Safety and Health in Agriculture Convention, 2001 (No. 184) - Seafarers' Identity Documents Convention (Revised), 2003, as amended (No. 185) - Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)
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4.7 PENALTIES AND ENFORCEMENT

Environmental legislation in Iraq is enforced by the relevant ministries including the Ministry of Environment and the Ministry of Industry and Minerals. To date, however, no clear mechanism for enforcement is in place. The legislative text defines all matters of enforcement including fines, punishments and penalties specific to multiple levels of violations of regulations and standards. The most relevant environmental penalties under Iraqi legislation are summarised in Table 4-17.

Table 4-17 Penalties for Non-Compliance with Iraqi Environmental Regulation

Law	Penalty
Law No. 27/2009 on the Protection and Improvement of the Environment ¹²	Article 33 First: The Minister of Environment or his appointee can warn any plant or facility or any other source of contamination to remove the polluting source within 10 days from the date of the notification. In case of non-compliance, the Minister may stop operations or temporarily close the entity for a maximum period of 30 days which can be extended until removal of the violation. Second: Subject to the provisions set forth in the first paragraph of this Article, the Minister or his appointee can impose a fine of 1,000,000 to 10,000,000 IQD. This fine can be imposed every month until the removal of the violation to the provisions of this Law as well as related regulations and instructions issued thereunder.
	Article 34 First: Without prejudice to more severe penalties provided for by law, the offender to this Law can be sentenced to three months of jail or to a fine of 1,000,000 to 20,000,000 IQD or both sentences. Second: This penalty is doubled each time the offence is repeated.
	Article 35 One who commits any violations to the provisions of paragraphs /2/, /3/ and /4/ of Article (20) of the Law can be sentenced to imprisonment and is required to return hazardous and radiation wastes and material to their source of origin or to safely dispose of them and compensate for the damage.

¹² Environmental violations listed in Article 14 are the following:

- The discharge of any industrial, agricultural, household or domestic waste to the rivers or water bodies or ground water or air or ground without the necessary treatment to ensure compliance with regulations, instructions, and environmental determinants including all discharges, whether the flow was continuous or intermittent or temporary.
- The discharge of oil or fuel waste or balancing water for oil carriers to the surface water or internal waters, whether the discharges were from fixed stations or mobile sources.
- The dumping of waste and animal waste and carcasses and its residues in the water resources including drainage canals
- Fishing, killing of birds and other animals using poisonous substances or explosives.
- Discharge of any wastes containing, toxic substances such as pesticides, heavy metals and other toxic compounds to sewage networks and surfaces that do not comply with the permissions and environmental conditions.
- Connecting and discharging of industrial and other facilities wastewater to the storm water drainage.
- Own or use or manufacture or storage, loan, transfer or sell, buy, or import or export, possess or carry out any action related to the radiation sources without permission from the relevant authorities.
- Operation of all economic activities without obtaining approvals for securing the safety requirements of the work environment and the health and safety of workers.

4.8 RELEVANT INTERNATIONAL GUIDELINES

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

Investment Banks use the IFC Performance Standards (PSs) to benchmark the Project and assess the Project against.

4.8.1 IFC Performance Standards

To manage the social and environmental risks and impacts of IFC projects, the IFC has developed a number of environmental and social PSs. The IFC PS, updated in 2012, and the accompanying Guidance Notes have been adopted for this Project.

IFC PSs indicate that the party responsible for implementing and operating the Project must comply with the applicable national laws, including those laws implementing host country obligations under international law. The Project operator is also required to meet the requirements of the standards throughout the life of an investment by IFC or other relevant financial institution. These are as follows:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labour and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

In addition to the IFC PSs, the related Guidance Notes, which are companion documents to the Performance Standards providing guidance in meeting the standards, have been adopted for this Project.

4.8.1.1 IFC PSs Applicability to the Project

Table 4-18 presents the IFC PSs with their relevance to the proposed Project.

Table 4-18 IFC PSs Applicability to the Proposed Project

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts	
Objectives	- To identify and evaluate environmental and social risks and impacts of the project. - To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. - To promote improved environmental and social performance of clients through the effective use of management systems. - To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately. - To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.
IFC PS1 Applicability to the Project	<u>PS1 applies to this Project because it has activities with environmental and social risks and impacts.</u> <u>This scoping report is the initial step for the full Environmental and Social Impact Assessment (EIA) and for the design of an Environmental and Social Management System for the project that will function throughout the entire life cycle of the project.</u> The ESIA report will cover the requirements of PS1 as the following: a) Policy: The existing scoping report addresses the legal, institutional and regulatory framework (as presented in Section 4) that the client will comply with. Such as, relevant national and international environmental regulations and standards, etc. b) Identification of Risks and Impacts: The existing scoping report addresses the methodology of impact assessment including: - o Selection of environmental and socio-economic components, which are Air Quality, Noise, Soil, Water, Biodiversity, Archaeology, Socio-economics, Health and Safety and Indigenous People. - o Identification of ESIA Spatial & Temporal Boundaries - o Potential Impacts Identification during each phase, Screening, and Assessment Criteria - o Identification of Mitigation Measures - o Assessment of Residual Effects - o Assessment of Cumulative Environmental and Socio-economic Impacts c) Management Programs: The ESIA report will identify planned control measures and proposed mitigation measures in order to ensure the Project will operate in compliance with applicable laws and regulations, and meet the requirements of applicable IFC Performance Standards. Also, Environmental and Social

	Management Plan will be prepared showing the mitigation measures that were identified in the assessment. Each management plan is identified by the following fields: Objective, Target, Actions, Overall Responsibility, Environmental Monitoring, & Reporting. d) Organizational Capacity and Competency: The ESIA report will include Institutional set-up for ESMMP implementation during each phase of the Project, which will present roles and responsibilities of the different entities involved in the ESMMP implementation. e) Monitoring and Review: The ESIA will include environmental and social monitoring programme for each component in each phase of the project, which will be organised as follows: Effect, Parameter, Sampling and Analytical Method Applied, Frequency and Location, Acceptability/Compliance with the Project HSE Requirements, Responsibility & Reporting. f) Stakeholder Engagement: To meet the requirements of PS1, this scoping report develop a Stakeholder Engagement Plan including: - o Regulations and requirements for the development of the plan; - o The identified potential stakeholders (including Indigenous Peoples), their role in particular relevance to the Project and communication methods; - o Stakeholder engagement programme; - o Grievance mechanism, monitoring and reporting to the affected communities.
Performance Standard 2: Labour and Working Conditions	
Objectives	- To promote the fair treatment, non-discrimination, and equal opportunity of workers. - To establish, maintain, and improve the worker-management relationship. - To promote compliance with national employment and labour laws. - To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. - To promote safe and healthy working conditions, and the health of workers. - To avoid the use of forced labour.
IFC PS2 Applicability to the Project	The proposed Project will have impacts that relate to the employment of labours. The need to protect the fundamental rights of workers triggers PS2. This scoping report addressed initially the Project-related social impacts during each phase of the Project in Section - and related human resources policies and procedures. Compliance with this performance standard will be further considered in the ESIA report regarding the following requirements: a) Working Conditions and Terms of Employment.

	b) Non-Discrimination and Equal Opportunity: The ESIA report will propose measures to prevent and address harassment, intimidation, and/or exploitation, especially in regard to women. c) Retrenchment. d) Grievance Mechanism: as mentioned in the PS1, this scoping report develop a Stakeholder Engagement Plan that address the Grievance Mechanism. e) Protecting the Work Force: including Child Labour & Forced Labour. f) Occupational Health and Safety: The ESIA report will address the OHS impacts and will propose mitigation measures to minimize the causes of potential hazards. In addition, an emergency preparedness and response plan will be developed.
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Performance Standard 3: Resource Efficiency and Pollution Prevention

Objectives	- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. - To promote more sustainable use of resources, including energy and water. - To reduce project-related GHG emissions.
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IFC PS3 Applicability to the Project	Compliance with this PS is considered as a result of the information gathered during this scoping report (review of the project description) and identification of potential impacts that will cause pollution to the environment and human, and consumption of energy and water from Project activities. Compliance with this performance standard will be further considered in the ESIA report, as the followings: a) The Environmental and Social Management Plans in the ESIA report will address: - o Technically and financially feasible and cost effective measures for improving efficiency in consumption of energy, water & raw materials, - o Technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. - o Mitigation measures to avoid or reduce water usage. b) Develop an Emergency Preparedness and Response Plan c) Develop a Waste Management Plan d) Develop a Materials Management Plan (including Hazardous Materials)
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Performance Standard 4: Community Health, Safety, and Security

Objectives	- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
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	- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.
IFC PS4 Applicability to the Project	Compliance with this PS is considered as a result of identification of potential impacts on the affected communities in the scoping report. The Environmental Impact Assessment report will address health and safety issues. Also, The Emergency Preparedness and Response Plan will respond to the measures that need to be undertaken to comply with the PS4 requirements as the followings: a) The ESIA report will evaluate the risks and impacts to the health and safety of the Affected Communities during each phase of the project, and will propose preventive and control measures consistent with good international industry practice (GIIP). These measures will include infrastructure and equipment design and safety. b) The Materials Management Plan (including Hazardous Materials) will address measures to avoid or minimize community exposure to hazardous materials and substances. c) Community exposure to disease: The ESIA report will propose measures to prevent or mitigate the risks of the potential diseases. In addition, specific procedures will be propose implement regarding COVID 19 pandemic. d) Security Personnel: The ESIA report will assess and document risks to the affected community arising from the project's use of security personnel deployed to provide security services.
Performance Standard 5: Land Acquisition and Involuntary Resettlement	
Objectives	- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs. - To avoid forced eviction. - To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost⁴ and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. - To improve, or restore, the livelihoods and standards of living of displaced persons. - To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure⁵ at resettlement sites.
IFC PS5 Applicability to the Project	The proposed Project is unlikely to result in involuntary physical and/or economic displacement emanating from land acquisition.

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Objectives	- To protect and conserve biodiversity. - To maintain the benefits from ecosystem services. - To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.
IFC PS6 Applicability to the Project	Compliance with this PS is considered because the proposed Project is located in natural habitats, and it has potential impact on ecosystem services over which the client has direct management control or significant influence. In addition, the gypsum quarry is located near Sawa Lake, which is a protected area, as it was declared a Ramsar site in 2014.

Performance Standard 7: Indigenous Peoples

Objectives	- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. - To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. - To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. - To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. - To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. - To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.
IFC PS7 Applicability to the Project	Socio-economic baseline surveys will be conducted as part of the ESIA study which should confirm the presence (or not) of indigenous peoples. Based on preliminary findings of the site reconnaissance visit during the scoping stage, nomadic Bedouins live around the Project area; and the definition of "Indigenous Peoples" as provided in PS 7 could be applicable to them. This will be further investigated during the socio-economic baseline surveys, consultations and impact assessment, and will be duly considered as applicable. This scoping report identifies the possible potential impacts on the affected communities of indigenous peoples. The ESIA report will further address and comply with the requirements of this PS, as applicable, as follows: a) The ESIA report will minimize, restore, and/or compensate for impacts in a culturally appropriate manner commensurate with the nature and scale of such impacts and the vulnerability of the Affected Communities of Indigenous Peoples.

	b) Develop if required, a plan for participation and consent of the Affected Communities of Indigenous Peoples, and contained in a time-bound plan. c) The affected communities of indigenous peoples, if any, will participate in the stakeholder engagement process, including: Indigenous Peoples' representative bodies. d) The ESIA will document: (i) the mutually accepted process between the client and Affected Communities of Indigenous Peoples, and (ii) evidence of agreement between the parties as the outcome of the negotiations. e) The Management Plan will address the mitigation measures to prevent or minimize the impacts on lands and natural resources subject to traditional ownership or under customary use. In addition, propose mitigation measures in case of relocation of indigenous peoples from lands and natural resources subject to traditional ownership or under customary use. f) The Management Plan will identify mitigation measures as well as determine how these communities should benefit from the Project.
Performance Standard 8: Cultural Heritage	
Objectives	- To protect cultural heritage from the adverse impacts of project activities and support its preservation. - To promote the equitable sharing of benefits from the use of cultural heritage.
IFC PS8 Applicability to the Project	According to this scoping report, no archaeological sites are documented in the Project area. However, the consultants will coordinate closely with the directorate of antiquities and will involve members of these directorates in field surveys to document and confirm potential archaeologically sensitive areas. Compliance with this PS is considered due to the chance finds of archaeological features or artefacts. Complying with applicable law on the protection of cultural heritage, which are presented in this scoping report.

4.8.2 World Bank Group EHS Guidelines

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They contain the performance levels and measures that are normally acceptable to the WB Group. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. The relevant EHS guidelines are listed below:

- WBG General EHS Guidelines;
- WBG EHS guidelines for Cement and Lime Manufacturing (2007);
- WBG EHS Guidelines for Thermal Power Plants (2008);

- WBG EHS guidelines for Construction Materials Extraction (2007).

4.8.3 Good Practice Guidance

- Good International Industry Practice (GIIP);
- IFC's Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets;
- Stakeholder Engagement: A Good Practice Handbook for Companies doing Business in Emerging Markets;
- IFC's Good Practice Note on Contractors E&S Performance ;
- IFC's / EBRD Worker Accommodation Guidelines for Construction;
- IFC's Use of Security Forces: Assessing and Managing Risks and Impacts;
- UN Voluntary Principles on Security and Human Rights;
- IFC Good Practice Note: Managing Risks Associated with Modern Slavery;
- IFC Good Practice Note: Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector;
- International Finance Corporation (IFC). (2009). Addressing Grievances from Project-Affected Communities: Guidance for Projects and Companies on Designing Grievance Mechanisms. Good Practice Note, September 2009, Number 7. Washington, D.C.: IFC.
- International Finance Corporation (IFC). (2007). Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. Washington, D.C.: IFC.
- International Finance Corporation (IFC). (2003). Addressing the Social Dimensions of Private Sector Projects. Good Practice Note, December 2003, Number 3. Washington, D.C.: IFC.
- International Finance Corporation (IFC). (2002). Handbook for Preparing a Resettlement Action Plan. Washington, D.C.: IFC (If involuntary physical and/or economic displacement is triggered)
- Office of the Compliance Advisor/Ombudsman (CAO). (2008). A Guide to Designing and Implementing Grievance Mechanisms for Development Projects. Advisory Note, prepared for the International Finance Corporation (IFC) Multilateral Investment Guarantee Agency (MIGA) Members of the World Bank Group. Washington, D.C.: CAO.

4.9 GAP ANALYSIS

The national environmental standards were compared to their corresponding standards in the WHO Air Quality Guidelines and IFC WBG EHS guidelines for Cement and Lime Manufacturing. Comparison. The most stringent standard will be used. These comparisons are presented in the Tables below.

Table 4-19 Comparison of Ambient Air Quality Standards between Iraqi standards and WHO Air Quality Guidelines

Pollutant	Time of Average	Iraqi Ambient Air Quality Limits			WHO Air Quality Guidelines	Applicable Ambient Air Quality Limits to Project
		ppm	mg/m ³	µg/m ³		
Sulphur Dioxide (SO ₂)	1-year	0.018	0.047	47	--	47 µg/m ³
	24-hour	0.04	0.105	105	125 µg/m ³ (Interim Target 1) 50 µg/m ³ (Interim Target 2) 20 µg/m ³	20 µg/m ³
	1-hour	0.1	0.262	262	--	262 µg/m ³
	10 minutes	--	--	--	500 µg/m ³	500 µg/m ³
Nitrogen Dioxide (NO ₂)	1-year	0.04	0.075	75	40 µg/m ³	40 µg/m ³
	24-hour	0.05	0.094	94	--	94 µg/m ³
	1-hour	--	--	--	200 µg/m ³	200 µg/m ³
Falling Dust	30-day	10 tonne/km ² /month in Residential Area	--	--	--	10 tonne/km ² /month in Residential Area
		20 tonne/km ² /month in Industrial Area	--	--	--	20 tonne/km ² /month in Industrial Area
Particulate Matter (PM ₁₀)	1-year	--	--	--	70 µg/m ³ (Interim Target 1) 50 µg/m ³ (Interim Target 2) 30 µg/m ³ (Interim Target 3) 20 µg/m ³	20 µg/m ³
	24-hour	--	--	150	150 µg/m ³ (Interim Target 1) 100 µg/m ³ (Interim Target 2) 75 µg/m ³ (Interim Target 3) 50 µg/m ³	50 µg/m ³
	1-year	--	--	15 µg/m ³	35 µg/m ³ (Interim Target 1)	10 µg/m ³

Pollutant	Time of Average	Iraqi Ambient Air Quality Limits			WHO Air Quality Guidelines	Applicable Ambient Air Quality Limits to Project
		ppm	mg/m ³	µg/m ³		
Particulate Matter (PM _{2.5})					25 µg/m ³ (Interim Target 2) 15 µg/m ³ (Interim Target 3) 10 µg/m ³	
	24-hour	--	--	65 µg/m ³	75 µg/m ³ (Interim Target 1) 50 µg/m ³ (Interim Target 2) 37.5 µg/m ³ (Interim Target 3) 25 µg/m ³	25 µg/m ³
Total Suspended Particulates	1-year	--	--	150 µg/m ³	--	150 µg/m ³
	24-hour	--	--	350 µg/m ³	--	350 µg/m ³
Carbon Monoxide (CO)	8-hour	10 ppm	--	--	--	10 ppm
	1-hour	35 ppm	--	--	--	35 ppm
	30 minutes	--	--	--	--	--
	15 minutes	--	--	--	--	--
Ozone (O ₃)	1-hour	0.06 ppm	0.118 mg/m ³	118 µg/m ³	--	118 µg/m ³
	8-hour	--	--	--	100 µg/m ³	100 µg/m ³
Lead (Pb)	1-year	--	--	1 µg/m ³	--	1 µg/m ³
	3-month	--	--	1.5 µg/m ³	--	1.5 µg/m ³
	24-hour	--	--	2 µg/m ³	--	2 µg/m ³
Benzene	1-year	--	0.003 mg/m ³	--	--	0.003 mg/m ³

Table 4-20 Comparison between Iraqi Maximum Allowable Emissions Limits from Stationary Sources and WBG Air Emission Levels for Cement Process Emissions

Pollutants	Iraqi Maximum Allowable Emissions Limits from Stationary Sources		Air Emission Levels For Cement Manufacturing (IFC WBG Guidelines)		Applicable Air Emission Levels for cement process emissions to Project
	Limits	Units	Limits	Units	
Opacity	20	%	-	-	20
Particulate Matter (new kiln system)	-	-	30 ^a	mg/Nm ³	30 ^a
Dust (other point sources incl. clinker cooling, cement grinding)	-	-	50	mg/Nm ³	50
Carbon Monoxide (CO)	500	mg/Nm ³	-	-	500
Nitrogen Oxide (as NO ₂)	1000	mg/Nm ³	600	mg/Nm ³	600
SO ₂	500	mg/Nm ³	400	mg/Nm ³	400
Total Metals	-	-	0.5	mg/Nm ³	0.5
SO ₃ (Including Sulphuric acid mist)	50	mg/Nm ³	-	-	50
Total Suspended Particles	100	mg/Nm ³	-	-	100
Ammonia and Ammonium compounds expressed as NH ₃	10	mg/Nm ³	-	-	10
Benzene	5	mg/Nm ³	-	-	5
Lead and its compounds	5	mg/Nm ³	-	-	5
Antimony and its compounds	1	mg/Nm ³	-	-	1
Arsenic and its compounds	1	mg/Nm ³	-	-	1
Cadmium and its compounds	1	mg/Nm ³	0.05 ^b	mg/Nm ³	0.05
Mercury and its compounds	0.5	mg/Nm ³	0.05 ^b	mg/Nm ³	0.05
Chrome	5	mg/Nm ³	-	-	5
Vanadium	5	mg/Nm ³	-	-	5
Nickel and its compounds	1	mg/Nm ³	-	-	1

Pollutants	Iraqi Maximum Allowable Emissions Limits from Stationary Sources		Air Emission Levels For Cement Manufacturing (IFC WBG Guidelines)		Applicable Air Emission Levels for cement process emissions to Project
	Limits	Units	Limits	Units	
Copper and its compounds	5	mg/Nm ³	-	-	5
Hydrogen Sulphide (H ₂ S)	5	mg/Nm ³	-	-	5
Chloride	10	mg/Nm ³	-	-	10
Hydrogen Chloride	20	mg/Nm ³	10b	mg/Nm ³	10
Hydrogen Fluoride	2	mg/Nm ³	1b	mg/Nm ³	1
Silicon Fluoride	10	mg/Nm ³	-	-	10
Fluoride and its compounds including HF and SiF ₄	50	mg/Nm ³	-	-	50
Formaldehyde	2	mg/Nm ³	-	-	2
Carbon	50	mg/Nm ³	-	-	50
Total Volatile Organic Compounds VOCs	20	mg/Nm ³	-	-	20
Dioxins and Furans	1	Ng TEQ/m ³	0.1b	mg TEQ/Nm ³	0.1

Table 4-21 Comparison of Allowable Noise Level Standards between Iraqi and IFC Standards

	Iraqi National Limits		IFC Noise Level Guidelines ¹³		Applicable Noise Level Guidelines to the Project	
Receptor	One Hour LA _{eq} (dBA)					
	Day-time	Night-time	Day-time	Night-time	Day-time	Night-time
Residential places inside cities	60	50	55	45	55	45
Residential places outside cities	55	45	55	45	55	45
Schools, universities and educational institutions	55	45	55	45	55	45
Industrial places and public buildings	70	65	70	70	70	65
Service places and commercial places	65	60	70	70	65	60
Cultural and urban preserved places	60	50	-	-	60	50
Residential places inside industrial places and vice versa	60	45	-	-	60	45

Table 4-22 Comparison between Iraqi Effluent Discharge Standards and IFC Effluent levels for Cement Manufacturing

Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Effluent levels: Cement Manufacturing (IFC WBG Guidelines)	Applicable Effluent Levels to the Project
		Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾		
Compliance Required		Maximum Allowable Concentration		Guideline Value	
Colour	TCU	--	--	--	--
Temperature	°C	<35	45°C	--	--

¹³ Noise impacts should not exceed these levels, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Effluent levels: Cement Manufacturing (IFC WBG Guidelines)	Applicable Effluent Levels to the Project
		Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾		
Compliance Required		Maximum Allowable Concentration		Guideline Value	
Total Suspended Solids	mg/L	60	750	50	50
Total Dissolved Solids	mg/L	--	--	--	
pH	S U	6.0-9.5	6.0-9.5	6–9	6–9
Dissolved oxygen	mg/L	--	--	--	--
BOD ₅	mg/L	Less than 40	1000	--	Less than 40 or 1000
COD (Cr ₂ O ₇ Method)	mg/L	<100 (Cr ₂ O ₇ Method)	--	--	<100 (Cr ₂ O ₇ Method)
Cyanide	mg/L	0.05	0.5	--	0.05 or 0.5
Fluorine	mg/L	5 ⁽⁶⁾	10	--	5 ⁽⁶⁾ or 10
Free Chlorine	mg/L	Trace	100	--	Trace or 100
Chlorides	mg/L	600 ⁽²⁾	--	--	600 ⁽²⁾
Phenols	mg/L	0.01-0.05	0.5	--	0.01-0.05 or 0.5
Sulphates	mg/L	400 ⁽³⁾	--	--	400 ⁽³⁾
Nitrates as NO ₃ ⁻	mg/L	50	--	--	50
Phosphates	mg/L	3	--	--	3
Total Phosphorous	mg/L	--	--	--	--
Total Nitrogen ⁽⁴⁾	mg/L	--	--	--	--
Ammonium (NH ₄ ⁺)	mg/L	--	--	--	--
Ammonia (N as NH ₃)	mg/L	0	10	--	0 or 10
Ammonia gas (N as free NH ₃)	mg/L	--	6	--	6
Lead	mg/L	0.1	0.1	--	0.1
Arsenic	mg/L	0.05	0.05	--	0.05
Copper	mg/L	0.2	--	--	0.2
Nickel	mg/L	0.2	0.1	--	0.2 or 0.1
Selenium	mg/L	0.05	--	--	0.05
Mercury	mg/L	0.005	0.001	--	0.005 or 0.001
Cadmium	mg/L	0.01	0.1	--	0.01 or 0.1
Lithium	mg/L	--	--	--	--
Molybdenum	mg/L	--	--	--	--

Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Effluent levels: Cement Manufacturing (IFC WBG Guidelines)	Applicable Effluent Levels to the Project
		Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾		
Compliance Required		Maximum Allowable Concentration		Guideline Value	
Vanadium	mg/L	--	--	--	--
Sodium	mg/L	--	--	--	--
Calcium	mg/L	--	--	--	--
Magnesium	mg/L	--	--	--	--
Potassium	mg/L	--	--	--	--
Beryllium	mg/L	--	--	--	--
Zinc	mg/L	2	0.1	--	2 or 0.1
Chromium	mg/L	0.1	0.1	--	0.1
Chromium - Hexavalent	mg/L	--	--	--	--
Aluminium	mg/L	5	20	--	5 or 20
Barium	mg/L	40	0.1	--	40 or 0.1
Boron	mg/L	1	1	--	1
Cobalt	mg/L	0.5	0.5	--	0.5
Iron	mg/L	2	15	--	2 or 15
Manganese	mg/L	0.5	--	--	0.5
Silver	mg/L	0.05	0.1	--	0.05 or 0.1
Total Hydrocarbon & Derivatives	mg/L	<10 ⁽⁵⁾	--	--	<10 ⁽⁵⁾
Sulphides	mg/L	0	3	--	0 or 3
Sulphur dioxide	mg/L	0	7	--	0 or 7
Calcium Carbide CaC	mg/L	0	0	--	0
Organic solvents	mg/L	0	0	--	0
Benzene	mg/L	0	0.5	--	0 or 0.5
Benzo(a)pyrene	mg/L	--	--	--	--
Chlorobenzene	mg/L	0	0.1	--	0 or 0.1
TNT	mg/L	0	0.5	--	0 or 0.5
Bromine Br ₂	mg/L	0	1 - 3	--	0 or 1 - 3
Pesticides DDT	mg/L	0	--	--	0
Alcohol-Oil	mg/L	0	0	--	0
Sodium adsorption ratio	mg/L	--		--	--

Parameter	Unit	Effluent Discharge Standards at Point of Discharge		Effluent levels: Cement Manufacturing (IFC WBG Guidelines)	Applicable Effluent Levels to the Project
		Iraqi Standard for Residual Water Drained to Water Source (B1) ⁽¹⁾	Iraqi Standard for Residual Water Drained to Public Sewer Network (B2) ⁽¹⁾		
Compliance Required		Maximum Allowable Concentration		Guideline Value	
Escherichia coli (Number in 100 mL)		--		--	--

Table 4-23 Comparison of allowable Values for Treated Wastewater for Irrigation Use between Iraqi and IFC standards

S No	Parameter	Unit	Maximum Limits for Treated Wastewater for Irrigation Use ⁽⁸⁾		Indicative Guideline Values for Treated Sanitary Wastewater Discharges (IFC WBG Guidelines)	Applicable Values for Treated Wastewater for Irrigation Use to Project
			Iraqi Standard in Case of Secondary Treatment of Wastewater	Iraqi Standard in Case of Tertiary Treatment of Wastewater		
	Compliance Required		Maximum Allowable Concentration			
1.	Total Suspended Solids	mg/L	40	10	50	40 or 10
2.	Total Dissolved Solids	mg/L	2,500	2,500	-	2,500
3.	pH	S U	4-6, 8	4-6, 8	6 – 9	4-6, 8
4.	BOD ₅	mg/L	40	10	30	10 or 30
5.	COD (Cr ₂ O ₇ Method)	mg/L	100	40	125	100 or 40
6.	Fluorine	mg/L	1	1	-	1
7.	Free Chlorine	mg/L	0.5	-	-	0.5
8.	Chlorides	mg/L	--	--	-	
9.	Phenols	mg/L	0.002	0.002	-	0.002
10.	Sulphates	mg/L	--	--	-	
11.	Nitrates as NO ₃ ⁻	mg/L	50	50	-	50
12.	Phosphates	mg/L	25	12	-	25 or 12
13.	Total Phosphorous	mg/L	--	--	2	2
14.	Total Nitrogen ⁽⁴⁾	mg/L	--	-	10	10

S No	Parameter	Unit	Maximum Limits for Treated Wastewater for Irrigation Use ⁽⁸⁾		Indicative Guideline Values for Treated Sanitary Wastewater Discharges (IFC WBG Guidelines)	Applicable Values for Treated Wastewater for Irrigation Use to Project
			Iraqi Standard in Case of Secondary Treatment of Wastewater	Iraqi Standard in Case of Tertiary Treatment of Wastewater		
	Compliance Required		Maximum Allowable Concentration			
15.	Ammonium (NH ₄ ⁺)	mg/L	5	5	-	5
16.	Lead	mg/L	0.1	0.1	-	0.1
17.	Arsenic	mg/L	0.1	0.1	-	0.1
18.	Copper	mg/L	0.2	0.2	-	0.2
19.	Nickel	mg/L	0.2	0.2	-	0.2
20.	Selenium	mg/L	0.02	0.02	-	0.02
21.	Mercury	mg/L	0.001	0.001	0.01	0.001
22.	Cadmium	mg/L	0.01	0.01	-	0.01
23.	Lithium	mg/L	2.5	2.5	-	2.5
24.	Molybdenum	mg/L	0.01	0.01	-	0.01
25.	Vanadium	mg/L	0.1	0.1	-	0.1
26.	Sodium	mg/L	250	230	-	230 or 250
27.	Calcium	mg/L	450	400	-	400 or 450
28.	Magnesium	mg/L	80	60	-	80 or 60
29.	Potassium	mg/L	100	20	-	100 or 20
30.	Beryllium	mg/L	0.1	0.1	-	0.1
31.	Zinc	mg/L	2	2	-	2
32.	Chromium	mg/L	0.1	0.1	-	0.1
33.	Aluminium	mg/L	5	5	-	5
34.	Boron	mg/L	0.75	0.75	-	0.75
35.	Cobalt	mg/L	0.05	0.05	-	0.05
36.	Iron	mg/L	5	5	-	5
37.	Manganese	mg/L	0.2	0.2	-	0.2
38.	Sodium adsorption ratio	mg/L	6-9	<6	-	6-9 or <6
39.	Escherichia coli (Number in 100 mL)		1,000	2.2	-	1,000 or 2.2
40.	Oil and grease	mg/L	-	-	10	10
41.	Total coliform bacteria	MPNb / 100 ml	-	-	400	400

5. STAKEHOLDER ENGAGEMENT AND CONSULTATION

A Stakeholder Engagement Plan (SEP) is provided in Appendix A. The SEP was prepared to ensure that relevant stakeholders are identified and engaged in the ESIA process in compliance with the IFC Performance Standards. Several stakeholders, from both the public and private sectors shall be informed and consulted about the Project, with a particular focus on those potentially affected by it. Identified stakeholders shall include representatives of all community groups: men, women, indigenous people, elderly, youth, displaced persons, and vulnerable and disadvantaged persons or groups.

5.1 SCOPING CONSULTATIONS METHODOLOGY

The main goal of the stakeholders consultations and engagements is to ensure stakeholders, and particularly local communities in the targeted geographical areas are aware of the planned Project activities, and understand the possible environmental and social implications of such activities. The Stakeholder Engagement Plan (SEP) includes a strategy for stakeholder engagement and information disclosure. Inputs and propositions from all stakeholders will be taken into account and further consultations will help improve the successful implementation of the Project.

Consultations will enable both verification of the information reviewed from existing sources about the Project's social and environmental context, an initial screening of likely environmental and social impacts and sensitivities, and for all relevant stakeholders to be informed about the Project. The inputs and comments of the stakeholders provided during the consultation will also be taken into consideration during the ESIA process.

The SEP provides detailed information on the stakeholders to be engaged, proposed methods, frequency and timing, and reporting mechanisms. Most importantly, inputs from participatory processes shall be fed back into the design process in a timely manner. These will be adequately documented in the ESIA report. The SEP is prepared in line with the requirements of IFC PS1. The stakeholder engagement plan also includes a grievance management mechanism.

The scoping public consultation is planned to be organized in December 2022 after client's approval of the scoping report and the stakeholder engagement plan. Other meetings with main stakeholders will also be held as necessary to document issues of concern raised by stakeholders and local communities. During the public participation meeting, the proposed Project shall be introduced in terms of geographical and temporal scope, its associated potential impacts on the different environmental receptors (groundwater resources, land use, flora, fauna...) in addition to the control measures proposed to be implemented by the Client to mitigate these impacts. The public participation meeting shall highlight the positive impacts anticipated from the proposed Project as follows:

- The Project shall contribute to the local and national economy by increasing the production capacity and the exportation potential of cement by expanding the existing plant; and
- At the local scale, potential direct and in-direct creation of job opportunities within the Project affected population is anticipated.

In addition, the grievance mechanism will also be communicated during these meetings.

The findings from the public participation meeting will be clearly reflected in the final Scoping Report.

5.2 RESULTS FROM THE SCOPING CONSULTATION MEETINGS

Scoping Phase consultation meeting will be conducted after approval and disclosure of the scoping report and SEP Plan by the Client. And the findings/results will be included in the final Scoping Report.

It shall be noted that a Comments and Response Register (CRR) will be established and maintained throughout the ESIA process.

5.3 NEXT STEPS

Following the scoping phase, the Environmental and Social Impact Assessment (ESIA) report will be prepared. Should it be needed, the ESIA will include an updated version of the Stakeholder Engagement Plan (SEP) with an updated stakeholder engagement strategy, in order to ensure timely and transparent information disclosure with all concerned parties. Stakeholder consultation meetings will be scheduled during the scoping phase after receiving the approval of the Client for the SEP report.

6. SCOPING OF THE POTENTIAL IMPACTS

6.1 GENERAL METHODOLOGY OF IMPACT ASSESSMENT

Environmental aspects are defined as the elements of a Project that can interact with the environment (ISO 14001:2004). The interactions and their environmental effects may be continuous in nature, periodic or associated with specific events such as emergencies and upset conditions. Matters that should be considered when identifying environmental and socio-economic aspects of a Project are the following:

- Operations and activities that interact with the environment and could result in environmental and socio-economic impacts;
- Materials, energy sources and other resources;
- Waste generation, treatment and disposal methods;
- Products or services that could result in environmental and socio-economic impacts;
- Land or infrastructure interaction with the environment; and
- Activities which might lead to accidental releases.

6.1.1 Selection of Environmental and Socio-economic Components

Environmental and socio-economic components are defined as broad components of the biophysical and human environments that, if altered by the Project, would be of concern to regulatory agencies, local communities, resource managers, scientists and/or the general public. Environmental and socio-economic components are selected for study and assess against the Project activities by the ESIA Study Team.

The components to be studied as part of this assessment are:

- Air Quality and GHG Emissions
- Noise and Vibration
- Soil
- Groundwater
- Surface Water
- Use of Natural Resources/ Resources Efficiency
- Biodiversity: Flora, Fauna, Habitats & Ecosystem Services
- Archaeological and Cultural Heritage
- Socio-Economic Conditions
- Labour and Working Conditions/OHS
- Community Health, Safety, and Security
- Human Rights
- Indigenous Peoples

- Land Acquisition
- Infrastructure
- Traffic
- Visual and Landscape Amenity

6.1.2 Identification of ESIA Boundaries

The scoping study identifies spatial and temporal boundaries of the environmental and socio-economic assessment for the Project.

The likely spatial or geographic and temporal influences of the different phases of the Project for the various environmental factors under consideration are variable. Factors such as air emissions, or noise propagation, will require a wider spatial influence to be defined. These would include, but not be limited to, travel-related noise and pollution effects, power generation, as well as hydrology impacts and waste disposal considerations.

Spatial boundaries (Area of Influence) are established for the assessment of potential Project-related environmental and socio-economic effects, and cumulative effects associated with each component. Spatial boundaries represent the geographic extent of the component, as they pertain to potential Project-environment interactions. These geographic boundaries reflect the spatial extent likely to be directly or indirectly affected by the Project's physical footprint and/or activities, and as such, they may differ from one component to another depending on the characteristics of the component.

According to IFC PS 1, the area of influence (AoA) encompasses, as appropriate:

- The area likely to be affected by: (i) the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project; (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.
- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.
- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

The spatial scope of the proposed Project will take into account the following factors:

- The physical extent of the proposed works: project structures, quarries, right-of-way, access roads, temporary camps, storage yards, etc.;
- The nature of the different environmental and socio-economic components' baseline;
- Cumulative impacts; and
- The manner in which the ESIA Study Team expects the environmental impacts to likely propagate and interact with the environment.

It shall be noted that none of the project facilities shall be considered as associated facilities.

Generally, the spatial boundaries of the Project include:

- The proposed locations for the new cement plant, new power plant and the new water treatment plant;
- The quarries locations;
- The haul roads between the new cement plant and the quarries;
- A wider area of 1 km around Douh Operations Area.

The social boundaries selected for each environmental and socio-economic component and possible cumulative impacts are presented in the following sub-sections. Detailed maps showing the area of influence (Aoi) of each component will be developed as part of the baseline assessment.

The temporal boundaries for the assessment are defined on the basis of the timing and duration of Project phases and activities and the nature of their interactions with each component. The purpose of a temporal boundary is to identify when an effect may occur in relation to specific Project phases and activities.

Temporal boundaries include the following Project phases:

- Construction of the Expansion Project.
- Quarrying and Raw Material Extraction.
- Operation of the Expansion Project.
- Decommission and Rehabilitation of the Quarry.

6.1.3 Impact Identification, Screening, and Assessment Criteria

Potential impacts shall be identified, screened and assessed for their significance during each phase using the procedure identified in the following sub-sections.

6.1.3.1 Impact Identification

Environmental impacts are any change to the environment, whether adverse or beneficial, wholly or partially resulting from a Project's environmental aspects (ISO 14001:2004). The relation between aspects and impacts is one of cause and effect.

The environmental and socio-economic impact identification matrices were prepared based on the Project activities during Construction Phase, Quarrying Phase, Operation Phase and Decommissioning Phase, and the environmental and socio-economic components selected for the study.

Table 6-1 Impact Identification Matrix – Construction of the Expansion Project Phase

Component Activity	Air Quality & GHG Emissions	Noise & Vibrations	Soil	Groundwater	Surface Water	Use of Natural Resources/Resources Efficiency	Biodiversity				Cultural Heritage	Socio-Economic Conditions	Labour & Working Conditions/OHS	Community Health, Safety & Security	Human Rights	Indigenous People	Land Acquisition	Traffic	Infrastructure	Landscape & Visual Amenity
							Flora	Fauna	Habitats	Ecosystem Services										
Construction of the cement plant, power plant, water treatment plant, labours' camp and other facilities (Equipment operation)	+++	+++	+++	+++		++	+++	+++	+++	+	+	++ & P	++	++				++	++	++
Civil and earthworks: clearing, grading, excavation and levelling	+++	++	+++	+++		+	+++	+++	+++	+	+	++ & P	++	++				++	++	+
Haulage (transportation of construction materials, personnel and equipment by road to the construction area)	++	++	+++	+++		++		++				+	++	+		+		++	++	+
Accidental spills or leakages (fuel, oil, etc.)	++		+++	+++	+	++	++	++	++	+			++	++		+			++	
Uncontrolled wastes disposal (air emissions, solid and liquid wastes)	++		+++	+++	+		++	++	++	+		+	++	++		++			++	+
Water consumption				++		+++				+		+	+	+	+	+				
Runoff of contaminated stormwater			++	++	+		++	++	++	+		+	+	++	+	+				
Illegal activities (such as hunting)								+++												
Labours' camp operation	+	+				++				+		+& P	++	+	+	+		++	++	

key:
P : Positive impact
+++ : High negative impact
++ : Moderate negative impact
+ : Low negative impact

Table 6-2 Impact Identification Matrix – Quarrying and Raw Material Extraction Phase

Component Activity	Air Quality & GHG Emissions	Noise & Vibrations	Soil	Groundwater	Surface Water	Use of Natural Resources/Resources Efficiency	Biodiversity				Cultural Heritage	Socio-economic Conditions	Labour & Working Conditions/OHS	Community Health, Safety & Security	Human Rights	Indigenous People	Land Acquisition	Traffic	Infrastructure	Landscape & Visual Amenity
							Flora	Fauna	Habitats	Ecosystem Services										
Removal of surface soil	+	+	+++	+++			++	++	++	+	+		+						++	
Drilling activities	+++	+++	+++	+++		++	+++	+++	+++	++	++	+ & P	++	++		+	++	+	++	
Stockpiling of excavated material	+++					+						+	+							+
Haulage (transportation of construction materials, personnel and equipment by road to the quarry)	++	++				+		++				++	++	++				++	++	++
Extension of existing access paved roads	+	++	++	++		++	+	+	+	++	+	+	+	+		+		++	++	+
Water consumption				++		++	+	+	+	+		+		++						
Runoff of contaminated stormwater			++	++	++		++	++	++	+		+	+	++	+	+				
Uncontrolled wastes storage and disposal (mainly unmanufactured natural materials (soil Layers), in addition to air emissions, solid and liquid wastes)	++		+++	+++	++		++	++	++	+		++	+	++	+	+			++	+
Accidental spills or leakages (fuel, oil, etc.)	++		+++	+++	++	+	++	++	++	+		+	+	++	+	+			++	
Labours' camp operation	+	+				++						++ & P	++	++	+			++	++	
Illegal activities (such as hunting)								++												

key:
P : Positive impact
+++ : High negative impact
++ : Moderate negative impact
+ : Low negative impact

Table 6-3 Impact Identification Matrix – Operation of the Expansion Project Phase

Component Activity	Air Quality & GHG Emissions	Noise& Vibrations	Soil	Groundwater	Surface Water	Use of Natural Resources/Resources Efficiency	Biodiversity				Cultural Heritage	Socio-economic Conditions	Labour & Working Conditions/OHS	Community Health, Safety & Security	Human Rights	Indigenous People	Land Acquisition	Traffic	Infrastructure	Landscape and Visual Amenity
							Flora	Fauna	Habitats	Ecosystem Services										
Physical presence of the cement plant, its facilities, the power station and the water treatment plant												++ & P								+
Operation of the cement production equipment (cement manufacturing process)	+++	+++				+++		+				++ & P	++	++					++	
Operation of the power plant	+++	+++				+++		+				++ & P	++	++					++	
Operation of the water treatment plant	++	++				++		+				++ & P	++	++					++	
Haulage (transportation of raw materials & cement, personnel and equipment by road from and to the plant)	++	++	+	+		++		+				++	++	++				++	++	+
Influx of workers												++	P	++		+		+	++	
Uncontrolled wastes storage and disposal (air emissions, solid and liquid wastes)	++		+++	+++	++		++	++	++	+			+	++		+			++	+
Accidental spills or leakages (chemicals, fuel, oil, etc.)	++		+++	+++	++	+	++	++	++	+		+	+	++	++	+			++	
Water consumption				++		++				+				++	++	+				
Runoff of contaminated stormwater	+		++	++	++		++	++	++	+				+	+					
Illegal activities (such as hunting, excavation)								++			+									
Labour camp operation		+	+	+		++						++ & P	P	++	+			++	++	

key:
P : Positive impact
+++ : High negative impact
++ : Moderate negative impact
+ : Low negative impact

Table 6-4 Impact Identification Matrix – Decommission and Rehabilitation of the Quarry Phase

Component Activity	Air Quality & GHG Emissions	Noise & Vibrations	Soil	Groundwater	Surface Water	Use of Natural Resources/Resources Efficiency	Biodiversity				Cultural Heritage	Socio-economic Conditions	Labour & Working Conditions/OHS	Community Health, Safety & Security	Human Rights	Indigenous People	Land Acquisition	Traffic	Infrastructure	Landscape and Visual Amenity
							Flora	Fauna	Habitats	Ecosystem Services										
Demolition of the buildings and the equipment	++	++	++	++			+	+	+				++	+						++
Haulage (transportation of personnel and equipment by road from the quarry)	++	++	++	++		+		++				++	++	++		+		++	++	+
Accidental spills or leakages (chemicals, fuel, oil, etc.)	++		++	++	+	+	++	++	++	+		+	++	+		+			+	
Uncontrolled wastes storage and disposal (air emissions, solid and liquid wastes)	+		++	++	+		++	++	++	+		+	++	+		+			+	+
Workers leaving						P						++	++	+				+	P	
Restoration of the removal surface soil & Re-vegetation							P		+	P										P
Illegal activities (such as hunting)								+												

key:
P : Positive impact
+++ : High negative impact
++ : Moderate negative impact
+ : Low negative impact

6.1.3.2 Environmental and Social Impact Screening

Once the Project activities are delineated, and baseline conditions are established, a systematic process of evaluating the significance of environmental and social impacts can be initiated. The scoring of impact severity will be conducted by different methods: (1) round table scoring exercise by all team experts, (2) results from analysis, modelling and calculations, (3) stakeholder consultation meetings outcomes, and (4) scientific predictions based on experience in the field and from similar projects conducted abroad.

Impacts will be screened for later assessment of their significance through an examination of the interaction between the following:

- Environmental and social receptor or resources known to be in proximity of the Project;
- Value and importance of those resources to the country (for example archaeological sites, public institutions);
- Vulnerability or sensitivity of the identified resources to potential impacts;
- Number of affected receptors;
- Environmental impacts resulting from the construction, quarrying, operation and decommissioning of the Project;
- Ability of the identified resources/receptors to absorb the induced impacts or their adaptive capacity;
- Effectiveness of proposed mitigation measures; and
- Sources of cumulative and indirect impacts.

6.1.3.3 Overview of the Impacts Assessment Approach

The assessment methods will be based on a structured approach such that the evaluation:

- Focuses on the specific, identified components, and environmental and socio-economic impacts of greatest concern or high and moderate interaction with the Project activities;
- Assesses compliance with the legal and regulatory framework (national and international) governing the Project and its related activities;
- Considers the issues raised by the Project-affected communities and other stakeholders during the public consultation meetings;
- Rates the consequence of an impact AND receptors sensitivity and value while taking into account the planned control measures and programmes for mitigation and monitoring;
- Proposes additional mitigation measures where needed, and assigns the phase during which the control and mitigation measures should be applied, and by whom; and
- Rates the significance of the residual impacts that remain after the planned control and mitigation measures are applied.
- The evaluation process will address both Project-related and cumulative environmental and socio-economic impacts. The assessment of Project-related and cumulative environmental and socio-economic impacts for each component will be done following a

standardized methodology. Standard tables and matrices are employed to facilitate the evaluation of impacts.

The impacts assessment considers the impacts during all the Project phases.

6.1.3.4 Impact Assessment Criteria

The environmental impact assessment classification shall focus on various types of impacts as outlined in Table 6-5.

Table 6-5 Nature of Impact Classification

Direct impacts	Those that arise from activities that form an integral part of the project (e.g. new infrastructure)
Indirect/ secondary impacts	Those that arise from activities not explicitly forming part of the Project (e.g. noise changes due to changes in road traffic flows on existing roads resulting from the construction or operation of Project)
Cumulative impacts	Those that result from the incremental impact of an action added to other actions
Short term impacts	Those that last over a relatively brief period
Long term impacts	Those that occur over a fairly prolonged period
Residual impacts	Those that will continue to occur even after the implementation of suitable mitigation measures (e.g., land scarring)
Temporary impacts	Those that persist for a limited period only (reversible), due for example to particular construction activities (e.g. noise from excavation works)
Permanent impacts	Those that result from an irreversible change to the baseline environment (e.g. land-take for facility operation) or which persist for the foreseeable future (e.g. air emissions from process units operation)
Positive impacts	Those that have a beneficial influence
Negative impacts	Those that have a minor, moderate or major negative influence

6.1.3.5 Project-related Environmental Impacts Assessment Criteria

The evaluation of impacts are based on the judgment of the ESIA team, supported by reference to legal standards, IFC standards, current international best practice, and the views of stakeholders. The magnitude of the impact and quality/importance or sensitivity of the receptor are also looked at in combination, to evaluate whether an impact is significant and if so its degree of significance.

The Project's positive and negative impacts are assessed with reference to baseline conditions and take the following into consideration:

- The type of the impact, including whether the impact is direct or indirect, and/or reversible and irreversible
- The duration (i.e. temporal dimension) of the impact, including whether the impact is short, medium, or long-term, and/or temporary or permanent
- The extent (i.e. spatial dimension) of the impact to reflect the expected change that may take place at a national, regional, or local (affected community or household) level
- The magnitude of the impact which reflects the extent of change that is predicted from baseline conditions, and

- The sensitivity of the receptor, taking into consideration stakeholder value that reflects the importance of changing a receptor's current status.

Impact magnitude is defined below.

Table 6-6 Definitions for Impact Magnitude

Definitions for Impact Magnitude	
Impact Magnitude	Definition
• High	• Very significant, permanent / irreversible change to key characteristics, livelihoods or features of the receptor's character or distinctiveness.
• Medium	• Significant, potentially permanent change, over the majority of the Project's site and potentially beyond, to key characteristics or features of the receptor's status, character or distinctiveness.
• Low	• Noticeable, temporary (during the project duration) change, over a part of the Project's site, to key characteristics or features of the receptor's character or distinctiveness.
• Negligible	• Noticeable, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small part of the Project's site, to key characteristics or features of the receptor's character or distinctiveness.

Receptor sensitivity is defined below.

Table 6-7 Definitions for Receptor Sensitivity and Value

Definitions for Receptor Sensitivity and Value	
Receptor Sensitivity and Value	Definition
• High	○ Sensitivity: Receptor has a very low capacity to accommodate the impact. ○ Value: Receptor has key characteristics which contribute significantly to the distinctiveness, and character of the socio-economic receptor (e.g. community health, physical security, social cohesion, living standards, livelihood condition, mental well-being, etc.).
• Medium	○ Sensitivity: Receptor has a low capacity to accommodate the impact. ○ Value: Receptor has key characteristics which contribute significantly to the distinctiveness and character of the receptor (e.g. very important to some households in an affected community, but not all).
• Low	○ Sensitivity: Receptor has some tolerance to accommodate the impact. ○ Value: Receptor only has characteristics which are important to few people or households.
• Negligible	○ Sensitivity: Receptor is generally tolerant and can accommodate the impact. ○ Value: Receptor characteristics do not make a significant contribution to local socio-economic conditions, living standards or mental well-being.

Impact significance has been assessed based upon the impact magnitude and the receptor sensitivity as illustrated below.

Table 6-8 Impact Assessment Matrix

Impact Assessment Matrix				
Impact Magnitude	Receptor Sensitivity / Value			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Moderate	Minor	Negligible
Negligible	Moderate	Minor	Negligible	Negligible

6.1.4 Identification of Mitigation Measures

Planned Control Measures

It should be noted that the Company has integrated measures at the Project design stage to prevent and minimise the potential adverse Project-related effects. The Project-related environmental and socio-economic effects are discussed while taking into account these measures, referred to as 'Planned Control Measures', within the Project's design.

The planned control measures are differentiated from the 'proposed mitigation measures' which are a result of the ESIA process.

Proposed Mitigation Measures

Mitigation measures that would further reduce or eliminate any adverse environmental and socio-economic effects will be described. Additional mitigation is defined as the change or alteration in the temporal, spatial or design aspects of the Project and/or the means in which the Project is constructed and operated over and above the Planned Control Measures which are accounted for by the Company. The ESIA Study Team's approach to mitigation gives priority to avoidance and reduction of effects, prior to considering compensation.

When developing the Mitigation Plan the consultant shall seek compliance with all the identified national Iraqi laws, HSE requirements stated in the Project contract and relevant international guidelines and codes of practice to achieve a proper mitigation as follows:

- The reduction of the significance and likelihood of the source of impact and the pathway is done in compliance with environmentally sound standards practices and standard guidelines.
- The provision of a preventive protection for the receptor and the decrease of its sensitivity (e.g. provide protection/buffering for existing water resources where no adverse activities can take place) is carried out following local laws for receptors protections (wells, archaeological sites, protected areas, forest, endemic species provided in the legislative review).
- The source of emissions and quality of emissions is reduced to standards values (air, effluent, soil).

- Promote use of alternative environmental methods recommended in international standard guidelines.

6.1.5 Assessment of Residual Effects

The residual impacts are those resulting after the integration of the mitigation measures which the Company has included in their design of the Project as well as those mitigation measures recommended by the ESIA Study Team.

The final output of the Impact Mitigation Plan is to draw a correlation between **impacts before and after proposed mitigation measures** in terms of significance, duration and likelihood.

6.1.6 Assessment of Cumulative Environmental and Socio-economic Impacts

Cumulative impacts are those that result from incremental changes caused by other past, present or reasonably foreseeable actions or projects together with the Project, such as incremental impacts from separate developments, combined impact of individual impacts from one development on a particular receptor, or several developments with insignificant impacts individually but which together have a cumulative impacts (EC, 1999).

A screening process is conducted for the identified impact(s) to determine if there is potential for cumulative environmental and socio-economic impacts to occur. On the basis of this screening, it is determined if those cumulative impacts could be significant. It should be noted that only the reasonably foreseeable projects and activities – which include those that are highly likely to be implemented, those identified in approved development plans and/or those that are in advanced stages of planning – are considered in the assessment of cumulative impacts. Hypothetical and speculative projects and activities are not considered as part of the assessment of cumulative impacts.

The screening and assessment of cumulative impacts is conducted based on the *EC Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (1999)* and the checklist of criteria for evaluating the significance of impacts from the EC “*Guidance on EIA scoping*” (2001). The methods that are used in the identification and evaluation of cumulative impacts include: (1) Expert Opinion, (2) Consultations, (3) Checklists and (4) Spatial analysis using GIS. The series of questions used in the screening process are as follows:

- Is there a Project-related environmental or socio-economic impact?
- Does the Project-related environmental or socio-economic impact overlap with those of other past, present and future projects and activities that have been or will be carried out?
- Is the Project's contribution to existing impacts substantive and measurable or discernible such that there is some potential for substantive cumulative environmental or socio-economic impacts that are attributable to the Project?

As the assessment focuses on environmental and socio-economic impacts after Planned Control Measures are accounted for, cumulative environmental and socio-economic impacts before planned control measures are implemented are not characterised.

6.2 IMPACT ASSESSMENT FOR THE SELECTED COMPONENTS

An initial description of the environmental baseline conditions is provided in the following sub-sections based on Secondary Data; documents review of the existing information about the Project area, and the results of a site reconnaissance visit.

This Scoping study aims to provide a preliminary explanation of the environmental and social conditions in the study area and highlight the sensitive environmental elements that may be affected by the Project such as residential communities, biodiversity, soil, air quality, water, archaeological sites and others.

- **The Site Reconnaissance Visit**

A local team composed of an environmental specialist, ecologist and socio-economist undertook a site reconnaissance visit on 28th May to conduct a preliminary assessment of baseline conditions at the Project site and area of impact, identify any contaminated lands and sources of pollution, confirm sensitivities on the ground, identify potential monitoring and sampling locations for soil, groundwater, noise and air quality, and initiate communication with local communities and stakeholders, including tribe leaders mayors, and land users (such as farmers).

The existing cement plant was also visited to assess the current environmental conditions.

Key findings of the site reconnaissance visit are presented in Table 6-9.

- **Documents Review**

An initial review of existing data records, consisting of the analysis of satellite imagery and review of previous studies and publications was performed to support the determination of the environmental conditions in and around the Project area.

Table 6-9 Findings of the Site Reconnaissance Visit

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Existing Al Douh Cement Plant					
Management Unit	31.221841°	44.924937°	Cluster of small buildings and units occupied by the management staff where our team had the opportunity to meet with the plant's manager and staff.		
Fuel Tanks	31.222057°	44.923377°	Cluster of tanks surrounded by fence and linked by pipelines		
Power Station	31.221019°	44.923286°	Unit to generate electricity for the plant, located at the upper-western parts of the pant.		
Water treatment plant (RO)	31.220033°	44.923591°	To provide clean water for the different purposes of the plant	0.3198 km Northwest of the proposed plant location	

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Additive crusher	31.219728°	44.925247°	Unit to crush the lime-stone and other materials		
Primary raw material warehouse	31.218753°	44.923263°	Unit to store the raw materials		
Cement mill	31.219779°	44.925241°	Unit to provide the mixture as powder.		
Maintenance workshop	31.219041°	44.924463°	Large workshop for repairing and maintaining the broken parts of the plant.		

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Clinker storage	31.217630°	44.924754°	Large construction at the middle of the plant to store the clinker (mixed raw material of cement) before it goes to the mill.		
Pre-heat and treatment units	31.215978°	44.924703°	A cluster of different units that dries and burns the mixture and delivers it to the storage silo		
Main storage warehouse	31.217150°	44.923911°	Large construction to store the raw materials		

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Product (cement) packing unit	31.220789°	44.925278°	Unit where the packed cement is loaded onto the heavy trucks.		
Gas regulating station	31.223151°	44.925874°	The unit where the imported gas being filtered and regulated to be used by the plant.		
Workers' camps	31.214404°	44.929302°	Camps where the foreign workers live, located at the south-east corner of the plant.		

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Dough Expansion plant area					
The land of the extension	31.218556°	44.927924°	The piece of the land dedicated for the expansion at the eastern part of the present plant.		
Potential water well site	31.218575°	44.929249°	In order to meet new requirements of the extension, a new water-well is planned to be drilled at the eastern parts of the area-however, this location might be subject to change according to the results of the sampling tests on-ground.		
Fence around the area	31.218552°	44.930309°	A concrete and wire fences surrounding the land planned for the extension from north, east, and south sides.		
Water wells					
Water well (1)	31.218363°	44.922495°	Small, closed water well linked to pipelines.	0.37 km West of the proposed plant location	

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Water well (2)	31.215113°	44.922006°	Small, closed water well linked to a pipelines.	0.55 km Southwest of the proposed plant location	
Potential water well	31.219183°	44.929649°	The tentative location of the potential water well inside the new plant area.	0.32 km Northeast of the proposed plant location	
Additional groundwater sampling sites	-	-	Two more sites were chosen for the water sampling outside the plant during the survey.		
Nearby Residential communities					
Individual houses and houses cluster			Some of the houses within the area of Al-Douh cement plant have been spotted during the survey. More visits and meetings with the local community will be held by the socio team to collect the data.	Refer to Figure 2-2	
					

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Industrial Features					
Quarry	31.198358°	44.951749°	Used by Al Douh Cement Plant	6.96 km Southeast of the proposed plant location	
Gas intake of the plant from the main pipelines	31.258638°	44.931326°	The joint of the Gas intake that feeds Douh cement plant from the key pipelines, 4 km to the north of the plant.	4.48 km North of the proposed plant location	
Al-Muthanna old Cement Factory	31.225443°	45.001436°	Governmental Factory.	7.19 km East of the proposed plant location	
Al Saman Cement Plant	31.218236°	44.904971°	Private operational cement plant		
Other features					
Landfill	31.203698°	44.997551°	The formal landfill used by the plant, located 6.5 km southeast to the plant. It is mostly used to dispose the by-pass waste/dust.	6.97 km Southeast of the proposed plant location	

Features	Coordinates		Briefing	Distance and direction from the proposed plant location	Picture
	Lat	Long			
Wadi Kharaz Medical Centre	31.271807°	44.931535°	Small medical centre 4.5 km to the north of the plant.	5.94 km North of the proposed plant location	
Centre-pivot spraying irrigation system	31.230870°	44.879273°	One of the centre-pivot spraying irrigation system in the area.	4.69 km Northwest of the proposed plant location	
Primary school in the survey area	31.275736°	44.947122°	One of the primary schools within the study area. The rest of the nearby schools will be visited during the survey.	6.65 km North of the proposed plant location	

6.2.1 Air Quality and GHG Emissions

Air quality baseline provided in the following section is mainly based on secondary data, since primary data within the area of interest is not available.

6.2.1.1 Existing Information

Al Doh Cement Plant is located in a desert area in Al-Muthanna governorate, where air quality is mainly affected by dust storms (Abbas & Abbas, 2021).

Table 6-10 Annual mean values of air pollutants over the study period (µg/m³) per number of days exceeding the air quality standard values (Source: Abbas & Abbas, 2021)

Parameter	Value (µg/m ³)
AQI	154.96
PM _{2.5}	33.25/120 ¹⁴
PM ₁₀	219.70/202
SO ₂	13.09/3
NO ₂	4.47/0
O ₃	75.19/16
CO	126.12/0

The study of Abbas & Abbas (2021) has shown that PM₁₀ and PM_{2.5} are the main factors governing the air quality index in the study area, including Al Muthanna city. In Al-Muthanna city, the AQI has been categorized as "unhealthy" due to the high concentrations of PM₁₀ during 53 days out of 365. Additionally, AQI was categorized as "hazardous" for 53 other days in Al-Muthanna. Industrial, transportation, and electric generation activities contribute to the high concentrations of air pollutants in the city.

6.2.1.1.1 Meteorology

Al Muthanna Governorate is characterized by the relatively cold weather compared to other governorates and areas in Iraq. Figure 6-1 reflects the average monthly temperature collected from the official weather station in Al Muthanna over the course of twenty (20) years¹⁵.

The maximum ambient temperature recorded is 51 degrees Celsius (°C). The maximum daily average temperature is 37.9°C, and the lowest maximum yearly average recorded is 25.7°C.

The average relative humidity is 38.8 percent (%), with the maximum relative humidity ever reached 100%, and the minimum relative humidity recording 6%.

The average wind velocity is 4.2 m/s, with the maximum velocity recorded being approximately 42 m/s¹⁶.

The average precipitation level is 100.4 mm per year. Al Muthanna has 21.5 days per year of dust storm, and 15 days per year of thunderstorm.

¹⁴ The number of days exceeding the air quality standards

¹⁵ ; <https://www.worlddata.info/asia/iraq/climate-al-muthanna.php>

¹⁶ Data provided by the client

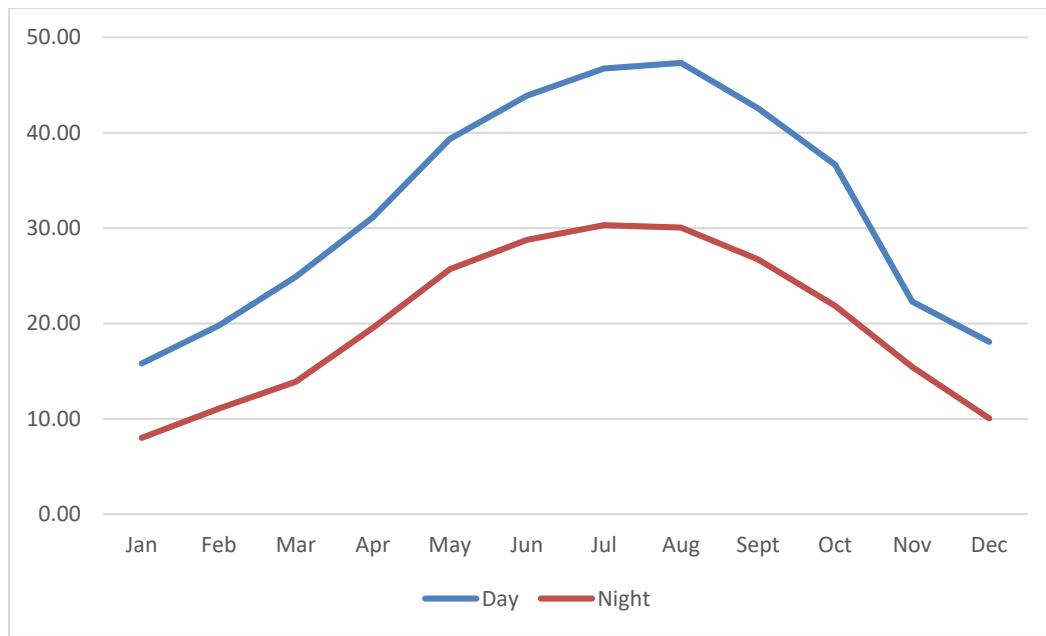


Figure 6-1 Average Monthly Temperature in Al Muthanna, Iraq (Source: Official Weather Station in Al Muthanna; <https://www.worlddata.info/asia/iraq/climate-al-muthanna.php>)

The wind rose from modelled data (Figure 6-2) over 30 years in the area of Samawah in al Muthanna area showed a dominance of winds originating from both North/North West and South/South East directions¹⁷.

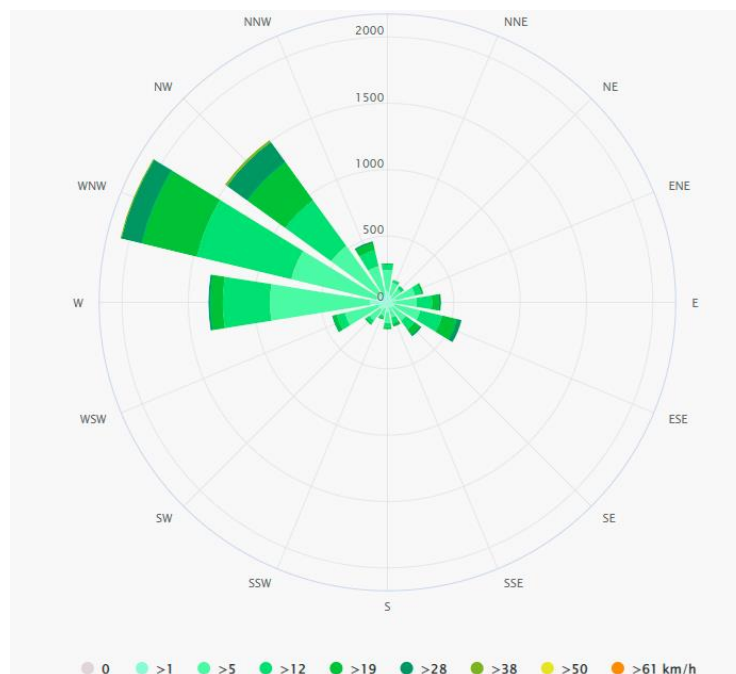


Figure 6-2 Wind Rose from Modelled Data

¹⁷https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/as-samawah_iraq_98530

6.2.1.2 Key Issues of Concern (Project - Component Interactions)

6.2.1.2.1 Project-related environmental effects

Potential interactions between the Project and the Atmospheric Environment (Air) are highlighted in this section. Those aspects of the Project that may cause potential environmental effects, either positive or adverse, are identified.

During the construction of the expansion Project phase, the main potential impact is reduction of ambient air quality due to:

- Exhaust emissions of air contaminants including NO_x, SO_x, PM, and CO.
- Dust emissions.

The main sources of the potential impacts on air quality include the following activities:

- o Construction of the cement plant, power plant, water treatment plant, labours' camp (Equipment operation),
- o Civil and earthworks: clearing, grading, excavation and levelling,
- o Haulage (transportation of construction materials, personnel and equipment by road to the construction area)Accidental spills or leakages (fuel, oil, etc.); and
- o Uncontrolled wastes disposal (air emissions, solid and liquid wastes).

During quarrying and raw material extraction phase, a number of air contaminants and dust are released mainly from the following activities:

- o Removal part of the surface soil,
- o Drilling activities,
- o Stockpiling of raw materials and excavated material,
- o Haulage (transportation of construction materials, personnel and equipment by road to the quarry),
- o Extension of existing access paved roads,
- o Uncontrolled wastes storage and disposal (mainly unmanufactured natural materials (soil Layers), in addition to air emissions, solid and liquid wastes); and
- o Accidental spills or leakages (fuel, oil, etc.)

During the operation phase, a wide variety of air pollutants and gaseous emissions are emitted from different sources during this phase. The majority of pollutants and emissions are associated with fuel consumption and cement production processes. The main sources of the potential impacts are the following activities:

- o Operation of the cement production equipment (cement manufacturing process),
- o Operation of the power plant and the water treatment plant
- o Haulage (transportation of raw materials & cement, personnel and equipment by road from and to the plant),
- o Uncontrolled wastes storage and disposal (air emissions, solid and liquid wastes); and
- o Accidental spills or leakages (chemicals, fuel, oil, etc.).

During decommission and rehabilitation of the quarry phase, the main sources of air pollutants are the following activities:

- o Demolition of the buildings and dismantling of the equipment,

- Haulage (transportation of personnel and equipment by road from the quarry),
- Accidental spills or leakages (chemicals, fuel, oil, etc.); and
- Uncontrolled wastes disposal (air emissions, solid and liquid wastes).

6.2.1.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing sources of air emissions in the Project area are as follows:

- Industrial facilities such as cement plants, quarries and other industries in addition to Al Doh cement plant.
- Residential/commercial areas inclusive of a medical centre and a school.
- Vehicular related emissions

6.2.1.3 Boundaries (Spatial and Temporal)

The spatial boundary for the air quality assessment would change according to the type of the contaminants, as air pollutants move away from their place of formation and at varying distances depending on the existing local climatic conditions during each phase of the Project.

The boundary for the air quality assessment would extend out to about few kilometres from the expansion Project components that is considered to be the area of influence of the Project on air quality. The AOI of the Project on air quality will be confirmed during the impact assessment study based on the outcomes of the air quality modelling.

The temporal boundaries shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases.

6.2.1.4 Baseline Survey & Primary Data Collection

The objectives of the proposed air quality monitoring program are to develop a picture of representative concentrations at the Project site and its surrounding prior to Project initiation and understand whether air quality parameters are within the Iraqi ambient air quality standards.

It is suggested to monitor sulphur dioxide (SO₂), nitrogen dioxide (NO₂), BTEX, ozone (O₃), hydrogen sulphide (H₂S) and ammonia (NH₃) for two (2) continuous weeks using the passive diffusion tubes method as presented in Table 6. A total of four (4) locations are suggested to be monitored. The samples are to be located at the Project site, upwind and downwind to the Project site. A QA/QC duplicate will also be collected.

It is also proposed to monitor Particulate Matter for particles < 10 µm size (PM₁₀) and <2.5 µm size (PM_{2.5}) for 7 days using the Met One Instruments AEROCET-531 Aerocet 531 Mass Particle Counter Dust Monitor (Table 6-11) and at the 4 suggested sampling locations. It should be noted as well that for meteorological parameters and in the absence of equipment's for meteorological data measurements, WRF modelled data for 5 years shall be purchased and used for both the assessment as part of the ESIA and the air dispersion modelling study.

Table 6-11 Proposed Primary Ambient Air Quality Baseline Data to be Collected

Environmental Feature & Parameters	Methodology and Instruments	Project Area	Duration
Particulate Matter for particles < 10 µm size (PM ₁₀) and <2.5 µm size (PM _{2.5})	Osiris Turnkey Dust Meter Dust Monitor (or equivalent) will be used for PM monitoring which meets the equivalence criteria as described within the recent "UK Particulate Monitoring Equipment Study". The time interval of the recorded data is 10 minutes and data can show interval over time	4 Sampling Locations	Continuous monitoring for 7 days at each of the 4 locations
Sulphur Dioxide (SO ₂)	Passive tube exposure method using the following tubes:	4 Sampling Locations	One month (30 days)
Nitrogen Dioxide (NO ₂),	- DIF600RTU-RA - Sulphur Dioxide Tube and Analysis UKAS Method – GLM 1		
BTEX	- DIF100-20WA – NO ₂ Tube 20% Tea/Water and Analysis UKAS Method – GLM 7		
Ozone, O ₃ ,	- DIFCG1TD-BTEX – VOC Carbograph 1 TD BTEX Hire and Analysis – UKAS Method – GLM 4		
NH ₃ and H ₂ S	- DIF300RTU-RA – Ozone Diffusion Tube and Analysis UKAS Method – GLM 2 - DIF200RTU-RA – Hydrogen Sulphide DIF tube and Analysis UKAS Method – GLM 5 - DIF400RTU-RA – Ammonia Diffusion Tube and Analysis UKAS method – GLM 8		

Table 6-12 presents the coordinates of the proposed sampling locations for the air quality baseline monitoring. A map for the proposed sampling locations is shown in Figure 6-3.

Table 6-12 Proposed Sampling Locations for Air Quality Baseline Monitoring

Sample ID	Justification ¹⁸	Coordinates System (WGS 84)	
		Latitude	Longitude
A1	Downwind the limestone quarries	31°11'29.60"N	44°58'33.71"E

¹⁸ It should be noted that sample A2 is distant by 1.8 km from the existing plant and sample A1 is distant by ~3 km south of the plant near the quarries. Considering the dominant wind direction over 30 years in the area of Samwah Al Muthanna area see figure 6-2, sample A4 location is now distant by around ~ 6 km from the existing plant and around 2-3 km of Al khinaq and Al Muthana areas and few kilometres from the nearest residential area/city to represent the general AAQ in the area. Nevertheless, It is to be noted that based on our experience, dust measurements in arid and dusty environments like the one in Iraq, while important to have to establish baseline, they typically show relatively high levels given the nature of the environment, and most often represent natural contributions more than anthropogenic sources. Most of the time measurements would exceed standards due to natural sources. Our approach is to generally propose strict measures to minimize dust generation from the plant's operations. Our modelling will also determine the contribution of dust originating from the plant's source.

Sample ID	Justification ¹⁸	Coordinates System (WGS 84)	
		Latitude	Longitude
A2	Up Wind North West Dominant Wind Direction	31°13'17.67"N	44°54'16.43"E
A3	In the Area Where the New Plant Shall be Constructed	31°12'54.52"N	44°55'10.83"E
A4	East of the Existing Old Plant	31°13'49.89"N	44°59'12.12"E

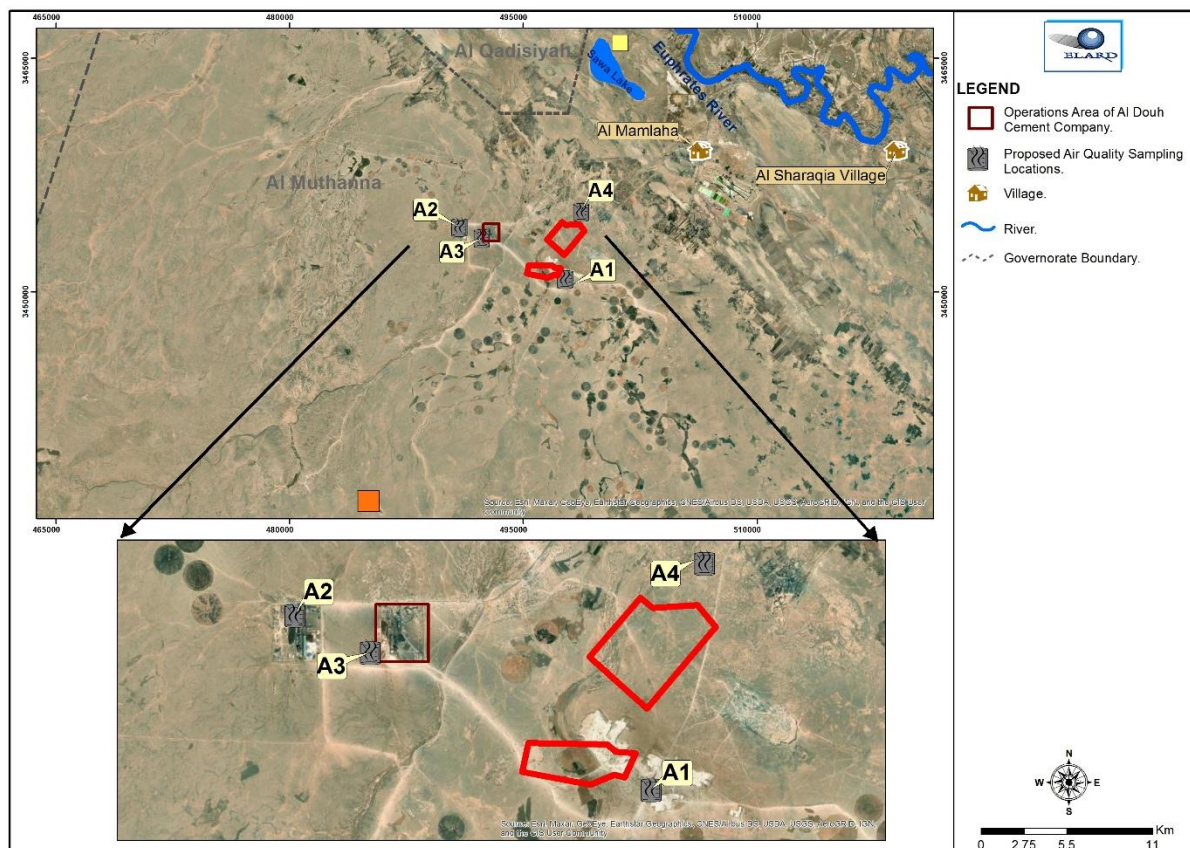


Figure 6-3 Proposed Sampling Locations for Air Quality Baseline Monitoring

More details about air quality baseline survey methodology are provided in Appendix B. As detailed in Appendix C of the report, an air dispersion modelling study shall be conducted for the new cement and power plant. To take into account baseline levels of the current emission sources, measurements will be conducted at 4 locations from A1 to A4 and the justification for the choice of the 4 locations can be found above in Table 6-12 and its related footnote. On the other hand and in order to assess the GHG emissions from the existing and new sources during both construction and operation phases, the fuel consumption related data as detailed in both tables 3-4 and 3-10 were collected and GHG emissions were estimated using the Tier 1 methodology of the IPCC guideline of 2006 as at this stage the design related data are not yet available. It should be noted that a Global Warming Potential of 1 was used for CO₂, 21 for CH₄ and 310 for N₂O.

Table 6-13 CO₂eq GHG Emissions Preliminary Estimation during the Construction Phase

Activity	LFO	HFO	CO ₂ eq in Gg
Construction of cement Plant	8700 litre per day	5,000 litre per day	18.17 ¹⁹
Construction of power plant	1000 litre per day	7500 litre per day	4.96 ²⁰
Trucks movement 22 trucks with a weight of 20 tons during construction phase	60 *22 = 1320 litre per day	NA	1.69 ²¹

During the construction, the results obtained showed a total GHG emissions of CO₂eq of 24.82 Gg for the 15.5 months construction phase for the cement plant and 6.5 construction phase of the power plant (Table 6-13). As for the operation phase, the total CO₂eq emissions for the new cement and power plant is estimated at 339.14 Gg/year in comparison to the existing cement and power plant with a total of 324.35 Gg/year. According to IFC performance standard 3, GHG emissions of 25,000 tonnes of CO₂eq are exceeded from this Project during the operation phase and therefore appropriate mitigation measures shall be suggested as part of the ESIA study.

Table 6-14 CO₂eq GHG Emissions Preliminary Estimation during the Operation Phase

Activity	LFO	HFO	Natural Gas	CO ₂ eq in Gg/Year
Operation of Existing Cement Plant	-	-	300,000 m ³ / day	211.61
Operation of New Cement plant	-	-	470,000 m ³ / day	331.53
Operation of Existing Power Plant	4 m ³ / day for power plant and loaders and trucks	100 m ³ / day	0	112.74
Operation of New Power Plant (Dual Fuel)	3000 litre/day + 4500 litre/day for loaders and trucks		240 m ³ / day	7.61

Nevertheless, when comparing the results to the official reports, CO₂ emissions from electricity generation of 58,000 Gg in 2017 are significantly higher when compared to the emissions generated from this Project which do not exceed ~0.6% of total CO₂ emissions generated from the energy industry.²²

6.2.1.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor

¹⁹ Assuming a 15.5 months construction phase

²⁰ Assuming a 6.5 months construction phase

²¹ Assuming a 15.5 months construction phase

²² Hashim, Bassim M., Maitham A. Sultan, Ali Al Maliki, and Nadhir Al-Ansari. "Estimation of Greenhouse Gases Emitted from Energy Industry (Oil Refining and Electricity Generation) in Iraq Using IPCC Methodology." *Atmosphere* 11, no. 6 (2020). <https://doi.org/10.3390/atmos11060662>.

Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

For the Operation phase, air dispersion modelling of NO₂, SO₂, TSP, PM₁₀ and PM_{2.5} will be conducted assuming a full capacity plant operation for the new plant. The methodology is presented in Appendix C.

Impacts will be assessed based on compliance with both national and IFC emission standards and national and IFC/WHO ambient air quality guidelines. The impacts should not exceed 25% of the applicable AAQS for non-degraded airsheds and should be as low as possible for degraded airsheds.

6.2.1.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national and international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

It should be mentioned that the engineering measures planned to control air emissions (including emissions control technologies) are not currently available and the issue will be addressed during execution of the ESIA study, since the EPC Contractor is yet to be awarded.

✓ **Proposed Mitigation Measures:** during the Project phases:

- *Construction of the Cement Plant Phase:*
 - Covering the stockpiles of fines in windy days.
 - Preparing a comprehensive dust control programme for all dust emission sources.
 - Implementing dust suppression techniques.
 - Turning off any machines, which is intermittent in use, in periods of non-use.
 - Covering vehicles transporting earth and raw materials all time during transportation.
 - Adopting proper maintenance and monitoring programme for all onsite machines, equipment and storage tanks.
- *Quarrying and Raw Material Extraction Phase:*
 - Stockpiling earth materials to limit fugitive dust.
 - Using fixed and mobile conveyors in internal roads.
 - Preparing a comprehensive dust control programme for all dust emission sources.
- *Operation of the Cement Plant Phase:*
 - Reducing the emission of pollutants from the plant machines operation.
- *Decommission and Rehabilitation of the Quarry Phase:*
 - Avoiding open combustion of solid waste materials.

- Decommissioning all structures and conducting a proper site cleaning campaign for any littered waste generated from the prior activities.

6.2.2 Noise and Vibration

6.2.2.1 Existing Information

To date, no existing information related to noise levels and vibration in the area of interest are available. However, during the ESIA phase, noise measurements shall be collected.

6.2.2.2 Key Issues of Concern (Project - Component Interactions)

6.2.2.2.1 Project-related environmental effects

The main potential impacts are increasing the noise levels in the study area and causing temporary disturbances for the local residents and animals.

During the construction phase, the main sources of the potential impacts on the noise levels are the following activities:

- o Construction of the cement plant, power plant, water treatment plant, labours' camp and facilities (Equipment operation);
- o Civil and earthworks: clearing, grading, excavation and levelling; and
- o Haulage (transportation of construction materials, personnel and equipment by road to the construction area).

During quarrying and raw material extraction phase, the main sources of the potential impacts on the noise levels are the following activities:

- o Drilling activities;
- o Haulage (transportation of construction materials, personnel and equipment by road to the quarry); and
- o Extension of existing access paved roads.

During the operation phase, it is not expected to exceed the allowed noise levels outside the cement plant, but the potential impacts on noise levels are likely due to the following activities:

- o Operation of the cement production equipment (cement manufacturing process);
- o Operation of the power plant;
- o Operation of the water treatment plant ; and
- o Haulage (transportation of raw materials & cement, personnel and equipment by road from and to the plant).

During decommission and rehabilitation of the quarries phase, the main sources of the potential impacts on the noise levels are the following activities:

- o Demolition of the buildings and the equipment; and
- o Haulage (transportation of personnel and equipment by road from the quarries).

6.2.2.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing sources of the noise levels in the Project area are the activities of the existing cement plants in the study area such as (crusher, cement mills, raw mills, generators and source of energy production) and traffic.

6.2.2.3 Boundaries (Spatial and Temporal)

The spatial boundary for the noise levels shall extend to distant areas due to the rural nature and the flat topography of the study area.

The boundary for the noise assessment would extend out to about 2 km from the expansion Project components. This will be confirmed based on the findings of the noise propagation modelling study.

The temporal boundaries for the noise levels shall include the periods estimated for Construction, Quarrying, and Operation and Decommissioning phases of the Project.

6.2.2.4 Baseline Survey & Primary Data Collection

Six (6) Noise baseline samples will be monitored within and in vicinity of the Project site and associated limestone quarry. Baseline noise levels will be documented using an Integrated Sound Level meter to monitor 30-min measurements over 24 hrs representing day time and night time, at 6 locations carefully selected. These locations will be based on main sources of Project noise and proximity to sensitive receptors. The exact locations of noise monitoring will be agreed upon during the scoping phase.

The noise survey and assessment will be based on the following American Society of Testing and Materials (ASTM) standards:

- Standard Guide for Applying Environmental Noise Measurement Methods and Criteria (ASTM D: E1686–10)
- Standard Guide for Preparing a Measurement Plan for Conducting Outdoor Sound Measurements (ASTM D: E1779–96a)
- Standard Guide for Measurement of Outdoor A-Weighted Sound Levels (ASTM D: E1014–08).

In carrying out the noise monitoring campaign, the following standard procedures will be applied:

- All noise measurements will be taken by mounting the Sound Level Meter (SLM) approximately 2 m above the ground. Measurement positions will be located at least 3 – 4 m away from potentially reflective surfaces such as buildings (residential units, industries, etc.) in order to provide a representative free field outdoor measurement at the given receptor location;
- During measurement periods, natural events and site conditions will be noted.
- Standard calibration procedures will be followed at the start and end of each monitoring period.

Table 6-15 presents the coordinates of the proposed locations of noise levels measurements. A map for the proposed locations is shown in Figure 6-4.

Table 6-15 Proposed Locations of Noise Levels Measurements

Sample ID	Justification	Coordinates according to the World Geographic Coordinates System (WGS 84)	
		Latitude	Longitude
N1	Near existing sensitive receptors (residential areas)	31°13'21.87"N	44°54'9.52"E
N2	Near existing receptors (residential areas) 	31°14'29.07"N	44°52'46.39"E
N3	East of the existing plant	31°13'11.85"N	44°55'40.26"E
N4	The Area Where the New Plant Shall be Constructed	31°13'10.75"N	44°55'5.56"E
N5	Near residential houses and green houses	31°15'42.09"N	44°58'1.86"E
N6	South east of the existing power plant, near the limestone quarry	31°12'48.59"N	44°55'48.78"E

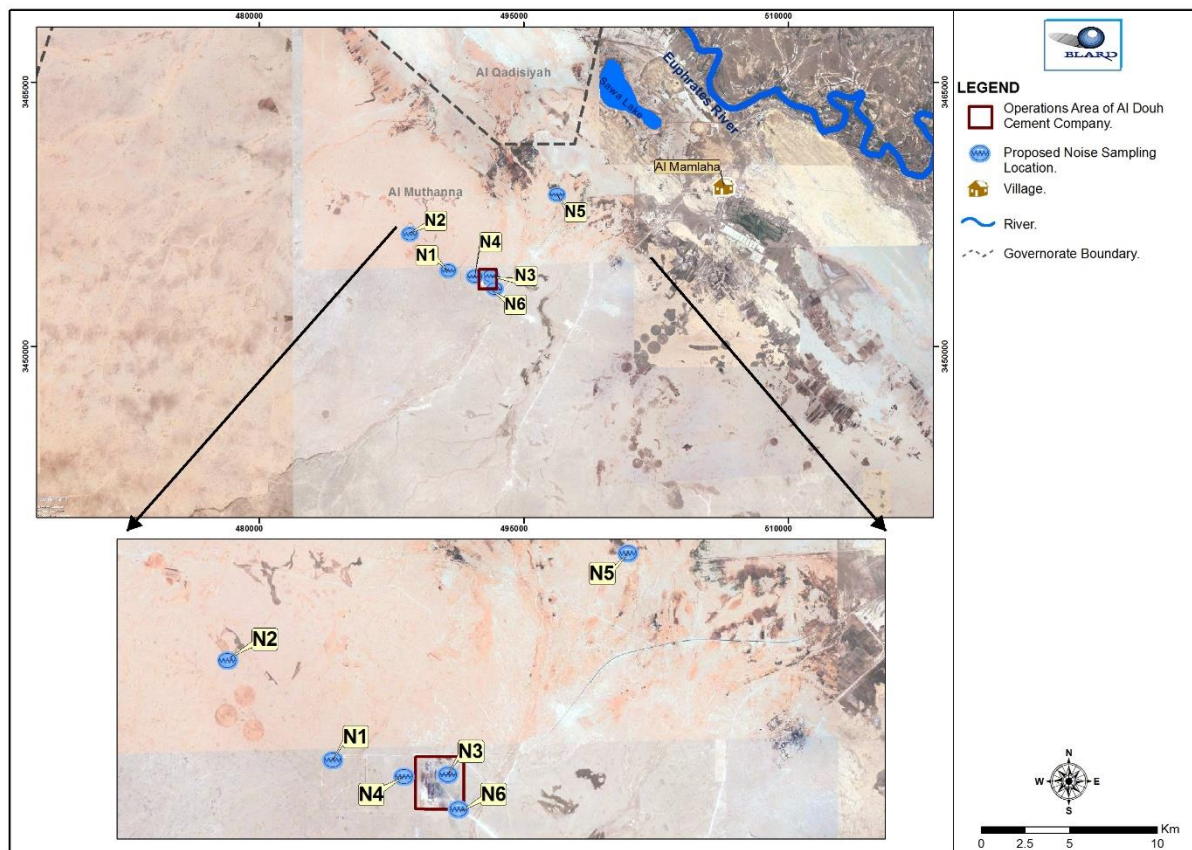


Figure 6-4 Proposed Noise Sampling Locations in the Project Area

More details about noise survey plan methodology are provided in Appendix D.

6.2.2.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

For the assessment of impacts during operation phase noise modelling study will be conducted according to the methodology presented in Appendix E.

6.2.2.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

It should be mentioned that the engineering measures planned to control noise emissions are not currently available and the issue will be addressed during execution of the ESIA study.

✓ **Proposed Mitigation Measures:** during the Project phases:

- *Construction of the Cement Plant Phase:*

- Planning activities in consultation with local residents so that activities with the significant potential to generate noise are planned during periods of the day that will result in the least disturbance.
- *Quarrying and Raw Material Extraction Phase:*
 - Providing workers with earplugs or dampers and make sure they wear them.
- *Operation of the Cement Plant Phase:*
 - Implementation of enclosure and cladding of processing units at or near the noise source equipment (e.g. crushers, grinders, and screens).
- *Decommission and Rehabilitation of the Quarries Phase:*
 - Avoiding or minimising Project transportation near residential settlements.
 - Decommissioning all structures and conducting a proper site cleaning campaign for any littered waste generated from the prior activities.

6.2.3 Geological, Soil, Hydrological, Hydrogeological and Groundwater Conditions

6.2.3.1 Existing Information

Based on the geological map (Figure 6-5), Quaternary and Tertiary formations are outcropping within of the study area. Quaternary formations are mainly composed of silt sand and clay, where Tertiary formation are mainly composed of limestone, dolostone and conglomerates.

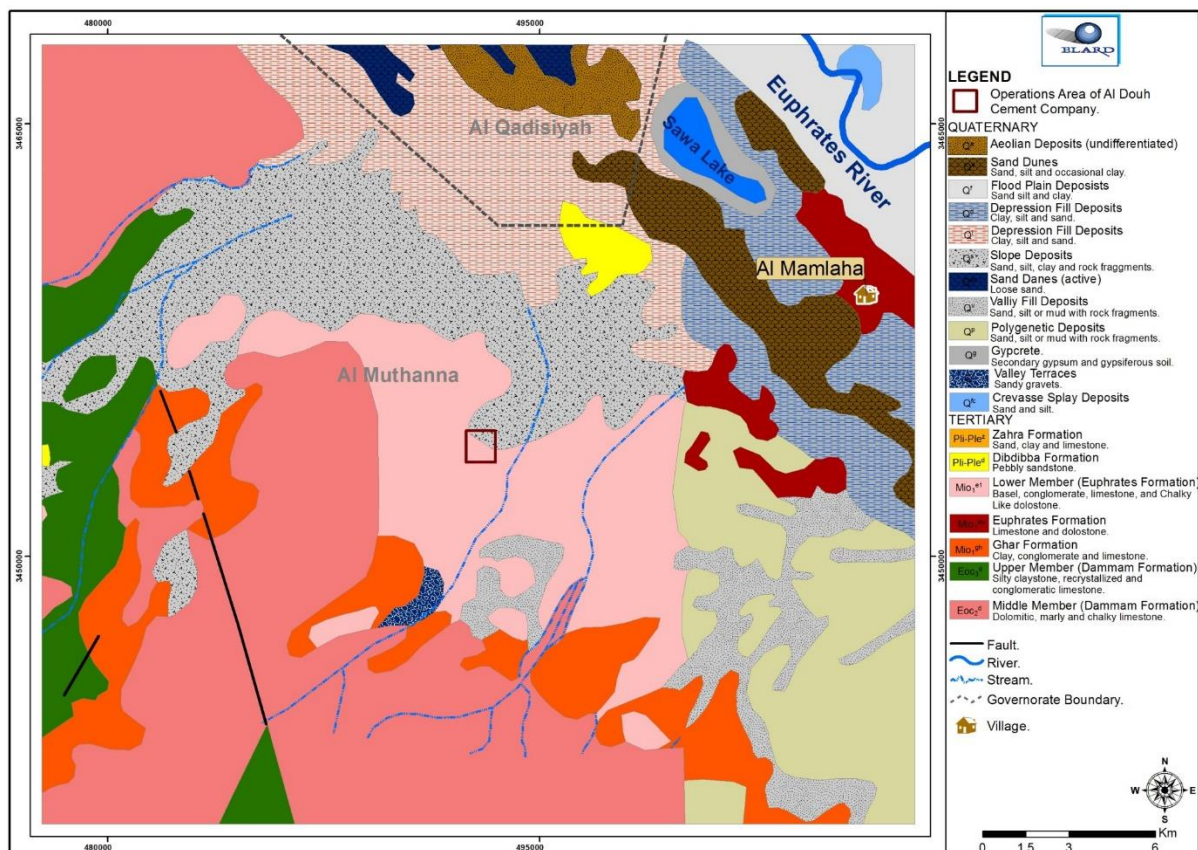


Figure 6-5 Geological Map of the Study Area

Hydrogeologically, and as presented in Figure 6-6, ground water of chloride and sulphate types with salinity ranging between 3000 to 5000 mg/l can be observed. Generally, ground water tend to flow in the northeast direction.

And as presented in Figure 6-6, the nearest permanent water body to the study area (Sawa lake and Euphrates river) are located 14 km to the north east of the study area.

It is worth mentioning that two seasonal water course are observed in vicinity of the Project area.

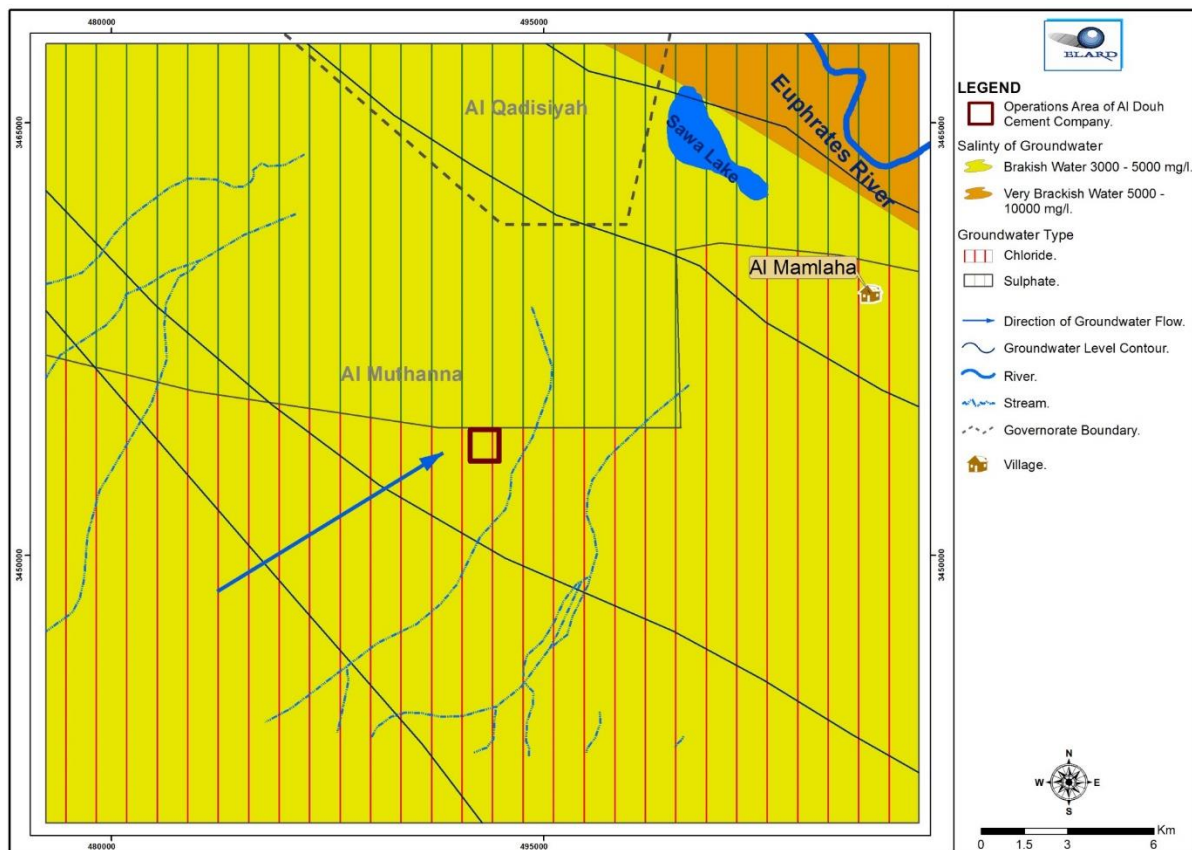


Figure 6-6 Hydrogeological Map of the Study Area

Regarding the soil condition within the study area, and as presented in Figure 6-7, the study area is mainly covered by one soil unit (Mixed, gypsiferous Desert Land).

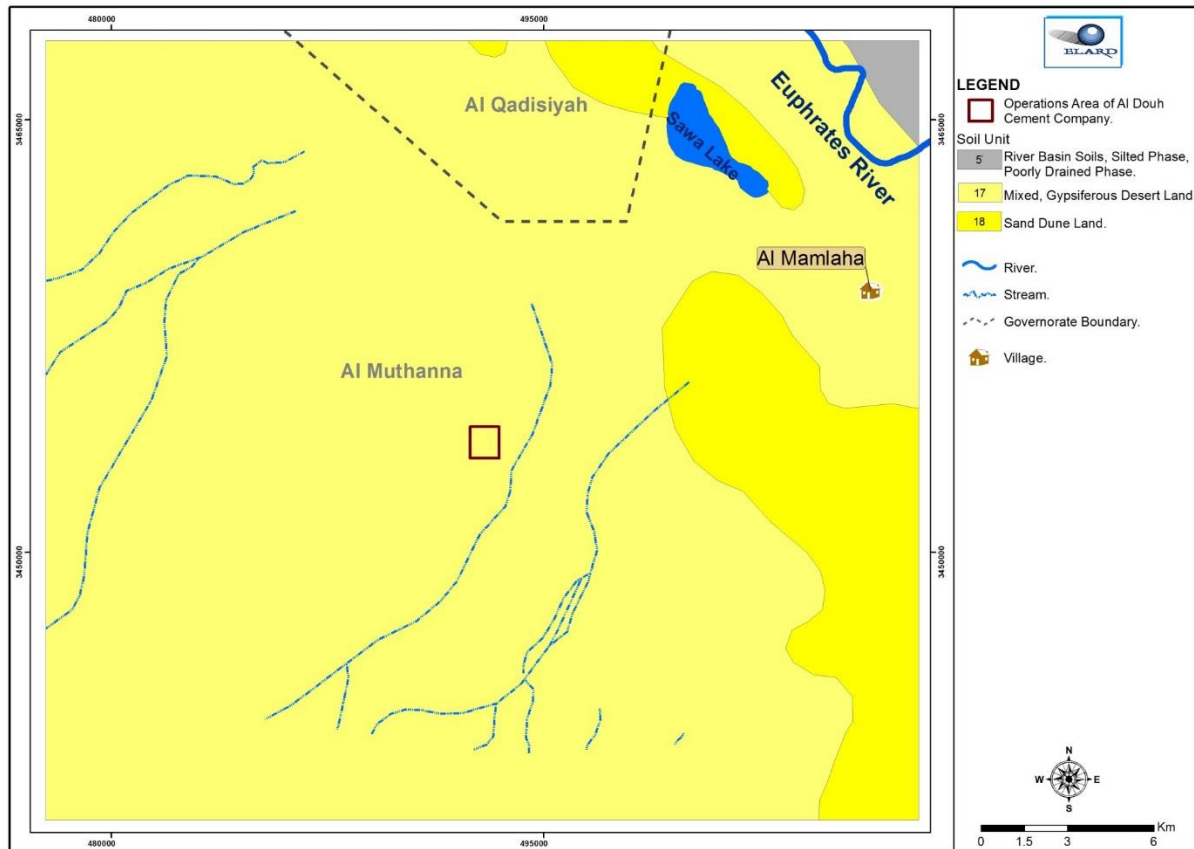


Figure 6-7 Soil Map of the Study area

6.2.3.2 Key Issues of Concern (Project - Component Interactions)

6.2.3.2.1 Project-related environmental effects

The main potential impacts on soil and groundwater include the following:

- Soil erosion, which can also affect the groundwater,
- Soil and groundwater sources contamination with hazardous materials; and
- Excessive use of the shallow aquifers to meet the Project's water needs.

During the construction phase, the main sources of the potential impacts on the soil and groundwater include the following activities:

- Construction of the cement plant, power plant, water treatment plant, labours' camp and other facilities (Equipment operation);
- Civil and earthworks: clearing, grading, excavation and levelling;
- Haulage (transportation of construction materials, personnel and equipment by road to the construction area);
- Accidental spills or leakages (fuel, oil, etc.);
- Uncontrolled Wastes disposal (air emissions, solid and liquid wastes);
- Groundwater abstractions; and
- Runoff of contaminated stormwater.

During quarrying and raw material extraction phase, the main sources of the potential impacts on soil and groundwater include the following activities:

- Removal part of the surface soil;
- Drilling activities;
- Haulage (transportation of construction materials, personnel and equipment by road to the quarries);
- Extension of existing access paved roads;
- Groundwater abstractions;
- Runoff of contaminated stormwater;
- Uncontrolled wastes storage and disposal (mainly unmanufactured natural materials (soil Layers), in addition to air emissions, solid and liquid wastes); and
- Accidental spills or leakages (fuel, oil, etc.).

During the operation phase, the main sources of the potential impacts on soil and groundwater include the following activities:

- Haulage (transportation of raw materials & cement, personnel and equipment by road from and to the plant);
- Uncontrolled wastes storage and disposal (air emissions, solid and liquid wastes);
- Accidental spills or leakages (chemicals, fuel, oil, etc.);
- Groundwater abstractions; and
- Runoff of contaminated stormwater.

During decommission and rehabilitation of the quarries phase, the positive potential impact on soil and groundwater is rehabilitation and reuse of land after restoration of the removal surface soil. Also, the demand on water consumption would be decreased as a result of Workers leaving.

However, the negative potential impacts during the prior phases could affect because of the following activities:

- Demolition of the buildings and the equipment,
- Haulage (transportation of personnel and equipment by road from and to the quarries),
- Accidental spills or leakages (chemicals, fuel, oil, etc.),
- Runoff of contaminated stormwater; and
- Uncontrolled wastes storage and disposal (air emissions, solid and liquid wastes).

6.2.3.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing sources of the cumulative impacts on the soil and groundwater in the Project area are the activities of the existing cement plants, including: accidental fuel leakage and uncontrolled disposal of solid or liquid wastes.

6.2.3.3 Boundaries (Spatial and Temporal)

The spatial boundary for the soil quality assessment are limited to the contaminated area if mitigation measures are applied quickly. However, if the spill is not treated, it may spread and affect a wider area over time according to the soil composition of the area. The spatial boundary of impact assessment on soil shall be confined to a 100 m buffer from the expansion Project area.

As for the groundwater, the spatial boundary for the groundwater quality assessment is limited to the aquifer in the area, however, the spatial boundary could extend to deeper aquifers as well when related to groundwater availability based on the hydrogeological conditions in the study area, this will be confirmed during the ESIA Stage of the Project.

Possible impacts on groundwater can be associated mainly with the accidental and non-accidental releases of effluents or liquid waste from the Project activities (such as subsurface dispersion of effluent from the toilets, laundries etc.) that could contaminate the aquifer and form a plume that migrates down gradient of the contaminant source, if these are not prevented, or, if accidental, detected and contained as soon as they occur. Furthermore, if no rapid mitigation is adopted or the mitigation measures do not properly work, then deeper aquifers might be at risk with time depending on the infiltration and transmissivity of the aquifer and the interconnection between aquifers. The spatial boundary to be used in the impact assessment is confined to a 2 km - wide buffer zone running parallel to the expansion Project location. In addition, the availability of groundwater could be affected due to the possible excessive use of the shallow aquifers to meet the Project's water needs.

Assessment of impacts on groundwater quantity and availability will be assessed qualitatively considering the aquifers in the area. Please refer to Figure 6-5 and Figure 6-6 that present the geological and hydrogeological maps of the study area.

Regarding the spatial boundaries (Assessment/Study Area) for the hydrology and surface water component shall be limited to the sections of the seasonal water courses within 500 m from the waterway crossing, and sensitive receptors downstream of the crossing point, since no surface water bodies are located in the vicinity of the Project area.

The temporal boundaries for the soil and groundwater shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.3.4 Baseline Survey & Primary Data Collection

Geology, hydrogeology and aquifer characteristics , and geohazards baseline will be primarily established based on secondary data review and ground truthing (particularly for geology) during the field surveys. Baseline maps will be developed to document these attributes within and in vicinity of the Project area to establish possible related constraints.

In addition to the desk review of groundwater levels in the Project area, the socio-economic survey that will be conducted during the ESIA stage includes questions related to water sources that are used by the residents in nearby settlements in order to identify groundwater consumers, characteristics of the wells they drilled, quantities of abstraction, and groundwater uses.

Establishment of soil and groundwater baseline quality will be performed through a sampling campaign. A detailed sampling plan will be included in the detailed survey plan to be prepared upon completion of the field reconnaissance survey and will be submitted to for review and approval, prior to its implementation, as part of the scoping report. The final baseline plan will include the agreed sampling site locations, sampling media, the number of samples, and the sampling methodology. The preliminary scope of work for the sampling survey is provided below.

The presence of contaminated lands will be established based on visual inspection and the soil sampling campaign. If any contaminated land is identified and confirmed, management plans related to the handling of contaminated lands will be developed as part of the ESIA.

6.2.3.4.1 Soil Quality

Based on the reconnaissance field visit to the study area, no contaminated lands were observed in the Project area.

In order to document the soil quality within the Project area, six (6) soil samples will be collected from six (6) locations. Four (4) soil samples will be collected within the new cement plant area, one sample will be collected to the east of the cement plants and one sample will be collected at the limestone quarry area.

It is worth mentioning that during sampling campaign, if contaminated lands were claimed or observed, the location of some samples will be changed to cover the observed contaminated areas.

Table 6-16 illustrates the coordinates of the proposed soil samples locations. A map for the proposed soil samples locations is provided in Figure 6-8.

Table 6-16 Proposed Soil Samples Locations

ID	Coordinates according to the World Geographic Coordinates System (WGS 84)	
	Latitude	Longitude
SS1	31.215631	44.926363
SS2	31.215533	44.928536
SS3	31.220350	44.926737
SS4	31.221236	44.929036
SS5	31.217956	44.937038
SS6	31.197547	44.964102

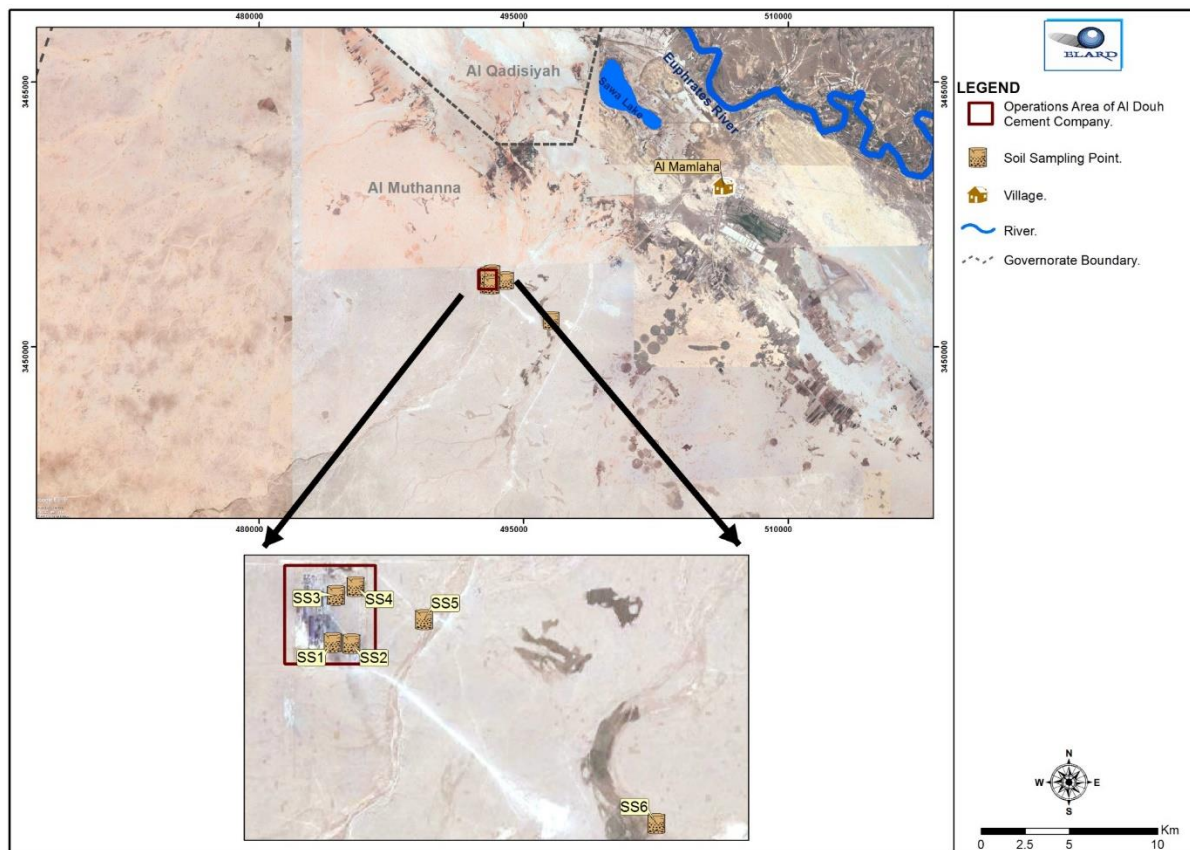


Figure 6-8 Proposed Soil Samples Locations in the Study Area

For further details on soil sampling methodology, refer to Appendix F.

6.2.3.4.2 Groundwater Quality

Based on the reconnaissance field visit to the study area, two water wells were observed within the plant area.

In order to document the groundwater quality within the Project area, two water samples will be collected from these two wells. Additional two (2) groundwater will be collected from nearby wells drilled by nearby residential settlements, the wells will be selected during baseline surveys.

One round of groundwater samples shall be collected from all the wells. The wells shall be purged by withdrawing a volume that is equal to 3 times the volume of the water column in the wells. The samples shall be analysed for the TerrAttest® list of pollutants. TerrAttest®²³ is a comprehensive list of over 200 pollutants, developed by Eurofins Analytico Laboratory of The Netherlands that includes poly aromatic hydrocarbons (PAH), volatile organic carbons (VOCs), pesticides, PCBs, and metals.

During sampling, field measurements of water temperature, conductivity, and dissolved oxygen will be taken using a multi-parameter water quality monitoring probe. Proper calibration procedures shall be followed prior to measurements. Also, water level in the sampling wells will be measured, and flow rate will be determined, if pumps are installed.

²³ <https://www.eurofins.com/environment-testing/lab-services/soil-testing/soil-groundwater-terratteest/>

All the collected samples should follow the:

- International Standard ISO 5667-11:2009 on Water quality–Sampling–Guidance on sampling of groundwater;
- International Standard ISO 5667-22: 2010 on Water quality–Sampling–Guidance on the design and installation of groundwater monitoring points; and
- Relevant ASTM Standard Guides and Practices for sampling of groundwater wells and reporting results of analysis of water.

For further details on groundwater sampling methodology, refer to Appendix G.

Table 6-17 illustrates the coordinates of the proposed groundwater samples locations. A map for the proposed groundwater samples locations is provided in Figure 6-9.

Table 6-17 Proposed Groundwater Samples Locations

Sample ID	Well ID	Stakeholder	Coordinates according to the World Geographic Coordinates System (WGS 84)	
			Latitude	Longitude
WS1	Water well 1	Al Douh Cement Company	31.218363	44.922495
WS2	Water Well 2	Al Douh Cement Company	31.215113	44.922006
WS3	The locations of these wells will be confirmed during the sampling campaign			
WS4				

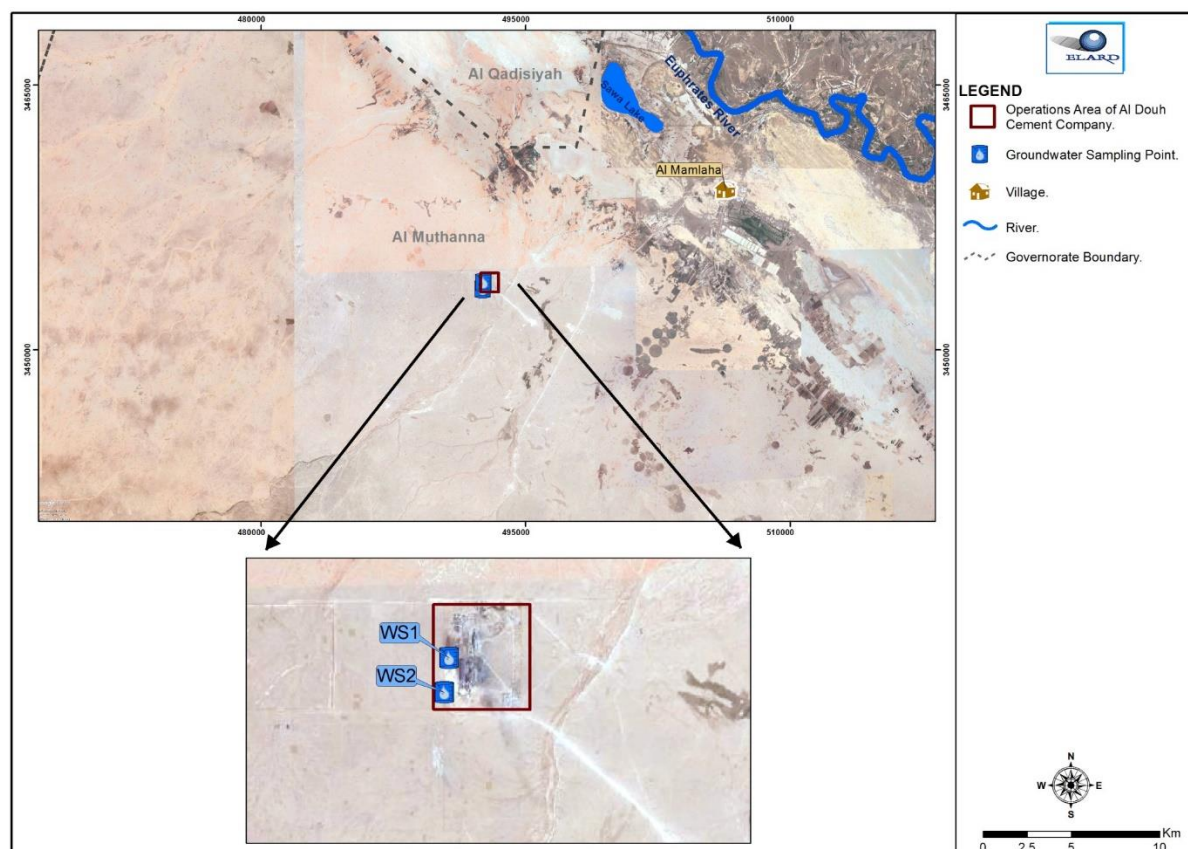


Figure 6-9 Proposed Groundwater Samples Locations in the Study Area

6.2.3.4.3 Measures for Quality Control / Quality Assurance

ELARD intends to use Eurofins of Netherland, one of the leading Environmental Laboratories in Europe for sampling analyses (soil and water). Based on the consultant's previous experience in Iraq, there are no qualified local laboratories that have a capacity for sampling analysis following international standards. Sampling jars will be provided directly from Eurofins to reduce the risk of cross contamination.

Sampling activities will be conducted in accordance with the New Jersey Department of Environment (NJDEP) Field Sampling Procedures Manual of 2005, which provides detailed sampling procedures (including sampling collection, sampling handling and preservation, and QA/QC (Chain of Custody, field equipment calibration, etc.). Based on the NJDEP Manual, duplicate sampling is to be taken at a rate of 1 every twenty samples, and sent to the laboratory for quality control. Field Blanks shall also be collected at a rate of about one for every 20 samples. The Consultant will collect one field blank and one duplicate samples.

6.2.3.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.3.6 Possible Mitigation Measures

✓ Planned Control Measures:

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ Proposed Mitigation Measures: during the Project phases:

• Construction of the Cement Plant Phase:

- Avoiding the excessive removal of the surface soil.
- Collecting and treating contaminated soil resulting from spills.
- Treatment of wastewater prior to discharge/reuse.

• Quarrying and Raw Material Extraction Phase:

- Preserving the surface soil and rootstocks for quarries rehabilitation during decommissioning.
- Preventing stormwater from contacting piles of waste materials by covering or enclosing these piles and by installing control units.

• Operation of the Cement Plant Phase:

- Adopting proper maintenance and monitoring programme for all onsite machines, equipment and storage tanks.

- Treatment of wastewater prior to discharge/reuse.
- *Decommission and Rehabilitation of the Quarries Phase:*
 - Reducing or preventing soil erosion.

6.2.4 Use of Natural Resources/ Resources Efficiency

6.2.4.1 Existing Information

The cement industry is a heavy consumer of resources namely water, energy and raw materials. Energy consumption typically accounts for 30 to 40 percent of the production cost of cement, depending on the raw materials and the production process adopted (CEMBUREAU, 1997).

Energy consumption in cement production is in the form of electric, natural gas and fuel energy. Fuel consumption is estimated to range between 2,900 and 5,100 MJ/ton of clinker produced (EA, 2001; IPPC, 2001; Hendriks et al., 1998; USEPA, 1994b; CEMBUREAU, 1999). Concerning electricity consumption, cement production is known to consume anywhere between 90 and 130 kWhr per ton of cement produced (CEMBUREAU, 1997; Canpolat et al., 2001). The main electricity consuming sections in a cement plant are the mills (finish grinding and raw grinding) and the exhaust fans (kiln/raw mill and cement mill) which together account for more than 80 percent of the total electrical energy usage (IPPC, 2001).

Al Douh has reported that the main source of securing the electrical energy during the construction phase will be the existing power plant in the existing Al Douh Cement Plant. In addition, two (2) stand by generators (Perkins) with the capacity of 500 kVA for each generator with a consumption rate of 160 litre/hour of LFO.

The new power plant will be the main energy sources for the operation phase of the Project expansion. The capacity of the new power plant is 50 MW/h while the capacity of the existing power plant which secure the energy demand is 33 MW/h.

In addition, during the operation phase of Al Douh new and existing cement plants, natural gas will be consumed to operate the kiln.

The amounts of fuel to be consumed during Project construction and operation are provided in Table 3-4 and Table 3-10 respectively.

Regarding raw materials that will be used during the construction phase are cement, wood, sand and gravel. Also, cement production is a high consumer of raw materials (limestone, clay and gypsum), the expected quantities of the raw materials that the existing and new cement plants need for its production process are provided in Table 3-9.

In addition, the extraction rate of limestone in the first phase of quarry operation, will be an average of about 1,199,540 ton/year and will increase to 2,052,000 ton/year in the second phase.

For the operation of the existing plant, clay is extracted at the rate of 330,000 tons/year and gypsum at the rate of 36,000 tons/year.

The rate of extraction for the new plant from the clay quarry is estimated at 540,000 tons/year, and from the gypsum quarry is estimated at 90,000 tons/year.

Regarding water consumption, the total daily water demand is 400 m³ during the construction phase. The source of water will be the existing water treatment plant in Al Douh existing cement that treats water from two groundwater wells drilled in the plant area. Water will be transferred to the construction area using a temporary water pipeline with a discharge rate of 20 m³/hour. The 400 m³ per day will be over and above the 250 m³ per day currently abstracted and used by the existing cement plant.

The main sources of water required during the operation phase of the Project for industrial and domestic purposes is groundwater that is extracted and treated via reverse osmosis water treatment plants (one new and one existing). It is roughly estimated that New Project components will consume about 160 m³/h. Out of which, 80 m³/hour will be provided by the existing water treatment plant and the same quantity will be secured by the new water treatment plant.

Al Douh currently has two (2) water wells, and the abstraction rate from each well is 25 m³/h, which results in total abstraction rate of 50 m³/h. The abstracted raw water is stored in two (2) concrete basins, each has the capacity of 150 m³ resulting in a total storage of 300 m³ of well water.

The existing RO station consists of two (2) units, each has the capacity of 40 m³/h (a total of 80 m³/h). Processed water from the RO station is stored in two (2) concrete basins, each has the capacity of 300 m³ (a total of 600 m³ storage of processed water). This water is used for plant operation and domestic use.

In addition, in order to secure water demand in the quarries areas, water tankers belonging to contractors, will be used to transfer water from the cement plant. It is worth mentioning that (if needed) water wells will be drilled.

Details on water use and balance is not currently available and the issue will be addressed during execution of the ESIA study after obtaining further details from the awarded EPC Contractor.

6.2.4.2 Key Issues of Concern (Project - Component Interactions)

6.2.4.2.1 Project-related environmental effects

Resources Efficiency could be affected during the Project phases as the following:

During the construction phase, the main sources of the potential impacts on the resources efficiency are the following activities:

- Construction of the cement plant, power plant, water treatment plant, labours camp and facilities (Equipment operation);
- Handling and processing of raw materials;
- Haulage (transportation of construction materials, personnel and equipment by road to the construction area);
- Accidental spills or leakages (fuel, oil, etc.);
- Water consumption; and
- Labours' camp operation.

During quarrying and raw material extraction phase, the main sources of the potential impacts on the resources efficiency are the following activities:

- Drilling activities;
- Stockpiling of raw materials and excavated material;
- Haulage (transportation of construction materials, personnel and equipment by road to the quarries);
- Extension of existing access paved roads;
- Water consumption;
- Accidental spills or leakages (fuel, oil, etc.); and
- Labours' camp operation.

During the operation phase, the main sources of the potential impacts on the resources efficiency are the following activities:

- Operation of the cement plant, power plant and water treatment plant;
- Haulage (transportation of raw materials & cement, personnel and equipment by road from and to the plant);
- Accidental spills or leakages (chemicals, fuel, oil, etc.);
- Labours' camp operation; and
- Water consumption.

During decommission and rehabilitation of the quarries phase, the main sources of the potential impacts on the resources efficiency are the following activities:

- Haulage (transportation of personnel and equipment by road from the quarries); and
- Accidental spills or leakages (chemicals, fuel, oil, etc.).

However, workers leaving is considered to have positive impacts on the resources efficiency.

6.2.4.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing sources of the cumulative impacts on the resources efficiency in the Project area are other resources users including existing cement plants.

6.2.4.3 Boundaries (Spatial and Temporal)

The spatial boundaries for the assessment of impacts on resources efficiency can't be confined as they shall include locations of the main sources of raw materials, water, and fuel and energy in both of the existing and the new cement plants.

The temporal boundaries for the resources efficiency shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.4.4 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.4.5 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ **Proposed Mitigation Measures:** during the Project phases:

- Using of energy-efficient equipment that should be properly operated, maintained, and turned off whenever not in use.
- Storm/Rainwater harvesting and use, as applicable
- Wastewater treatment and reuse
- Using of dry process technologies e.g. dry quenching
- Process water system pressure management
- Project design to have measures for adequate water collection, spill control and leakage control system.

6.2.5 *Biodiversity (Flora, Fauna, Habitats & Ecosystem Services)*

6.2.5.1 Existing Information

• **Habitats:**

Based on the findings of the site reconnaissance visit, the following habitats were identified in and around the Project area:

- Desert watercourses
- Desert plateaus
- Crops farms
- Artificial depressions and cliffs
- Orchards



Desert Watercourses

	
Crops Farms	Desert Plateaus
	
Orchards	Artificial Depressions And Cliffs

Figure 6-10 Snapshots of Observed Habitats

- Sawa Lake:

The gypsum quarry that will supply the Project is located near Sawa Lake that was declared a Ramsar site in 2014.

Sawa Lake is located in south-western Iraq, in its north-western part of Muthanna Governorate, at the border with Diwaniyah Governorate. The area is bounded mainly by desert areas with few urban settlements except for the presence of the capital city of Muthanna Governorate. It is unique for the biogeographic region because it is a closed water body in an area of sabkha with no inlet or outlet and is only fed by groundwater that originates from the higher western desert areas. Sawa Lake can be distinguished for its hydrological values and the surrounding zone is characterized by a groundwater karst system and by its unique water chemistry. The lake is formed over limestone rock and it is isolated with gypsum barriers surrounding the lake. Gypsum appears to be dominant and the major mineral forming the lake bottom wall. Sawa Lake features two main types of landscapes/environments: the water body and the surrounding area, characterized by desert shrub vegetation and by the sabkha ecosystem.

The Lake was declared a Ramsar site in 2014. The land within the Ramsar site and the surrounding areas are owned by the State. Center for Restoration of Iraqi Marshes and Wetlands is responsible for managing the Ramsar Site while the provincial government of

Muthanna Governorate is responsible for managing the area outside of the Ramsar Site's boundaries.

- **Flora & Fauna:**

Despite the short time of the visit, relatively considerable diversity of birds were found (and reported by the local staff) inside the existing plant due to the presence of trees and other plant cover.

Figure 6-11 shows the fauna species observed during the site reconnaissance visit.



Figure 6-11 **Snapshots of the Observed Fauna Species**

- **Ecosystem Services:**

The main ecosystem services that could be affected by Project activities are the sources of raw materials, surface water and groundwater and the plant cover that can be used seasonally for livestock grazing.

6.2.5.2 Key Issues of Concern (Project - Component Interactions)

6.2.5.2.1 Project-related environmental effects

Potential interactions between the Project and the biodiversity are highlighted in this section.

The main potential impacts on the biodiversity are loss of natural habitats and flora, animal poisoning, and plants removal/death.

During the construction phase, the main sources of the potential impacts on the biodiversity are mainly the following activities:

- Construction of the cement plant, power plant, water treatment plant, labours' camp and facilities (Equipment operation);
- Civil and earthworks: clearing, grading, excavation and levelling;
- Replacement of top soil;
- Haulage (transportation of construction materials, personnel and equipment by road to the construction area);
- Accidental spills or leakages (fuel, oil, etc.);
- Uncontrolled wastes disposal (air emissions, solid and liquid wastes);
- Runoff of contaminated stormwater; and
- Hunting.

During quarrying and raw material extraction phase, the main sources of the potential impacts on the biodiversity are mainly the following activities:

- Removal part of the surface soil;
- Drilling activities;
- Haulage (transportation of construction materials, personnel and equipment by road to the quarries);
- Extension of existing access paved roads;
- Runoff of contaminated stormwater;
- Uncontrolled wastes storage and disposal (mainly unmanufactured natural materials (soil Layers), in addition to air emissions, solid and liquid wastes);
- Accidental spills or leakages (fuel, oil, etc.); and
- Illegal activities (hunting).

During the operation phase, the main sources of the potential impacts on the biodiversity are mainly the following activities:

- Emissions from the operation of the cement plant, the power plant, and water treatment plant;
- Haulage (transportation of raw materials & cement, personnel and equipment by road from and to the plant);
- Operation of the labour camp;
- Uncontrolled wastes storage and disposal (air emissions, solid and liquid wastes);

- Accidental spills or leakages (chemicals, fuel, oil, etc.);
- Runoff of contaminated stormwater;
- Water consumption; and
- Illegal activities (hunting).

During decommission and rehabilitation of the quarries phase, the main sources of the potential impacts on the biodiversity are mainly the following activities:

- Demolition activities and haulage;
- Accidental spills or leakages (chemicals, fuel, oil, etc.);
- Uncontrolled wastes disposal (solid and liquid wastes);
- Restoration of the removal surface soil; and
- Illegal activities (hunting).

6.2.5.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing sources of cumulative impacts on the biodiversity in the Project area are the activities of the existing cement plants in the study area and the potential illegal human activities (hunting).

6.2.5.3 Boundaries (Spatial and Temporal)

The spatial boundaries for flora and fauna biodiversity shall extend to cover the habitats in the Project area that will be identified based on the baseline survey, and the presence of the potential environmental sensitivities should be emphasized.

The spatial boundaries for the assessment of ecological effects were defined with a buffer zone of 1 km from the expansion Project components. The study area represents an area where:

- Potential direct effects from the Project's physical footprint could arise;
- Temporarily direct and indirect effects could be expected; and
- Habitats and species in areas adjacent to the Project area or in its direct vicinity could be directly or indirectly affected.

The temporal boundaries for the biodiversity shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

Temporal boundaries for the biological component also take into consideration the seasonal timing since the baseline and significance of effects may change depending on the time of the year.

6.2.5.4 Baseline Survey & Primary Data Collection

The ecological study represents a major part of the field survey. The aims of this investigation is to conduct the faunal and floral biodiversity assessment and identify the endemic, endangered or protected species (if any) and their significance to the Study Area, to Iraq and at an international scale according to the IUCN Red List of Threatened Species. In addition, an ecosystems based approach shall be undertaken to evaluate whether an ecosystems services shall be affected by the Project, and accordingly to propose mitigation measures. An ecological assessment of terrestrial biodiversity will be conducted within the premises of the

Project site and its surrounding. The consultants will provide evidence of the presence or not of critical habitats which could trigger ESS 6 on biodiversity.

During the scoping phase, the consultants determined important hot spots with respect to ecology, and these will be defined as key baseline monitoring sites. Generally, the ecology baseline will be established according to the following steps:

- ✓ Thorough GIS analysis (based on satellite imagery and photos) followed by the reconnaissance survey to target the areas and prepare a preliminary physiognomic map (map of habitats).
- ✓ Survey for habitats/flora, ornithology, invertebrates, amphibians, reptiles, and mammals in the targeted areas.

Ecological surveys shall be conducted during one season. It is important to note that the best time to conduct ecological surveys is during spring time.

14 sites were selected to be visited during the baseline survey (Refer to Figure 6-12). These sites will cover the different types of habitats within the study area. Other factors considered in survey sites selection are:

1. Distribution - sites are distributed as fairly as possible to cover possible Project Area of Influence;
2. Red-List species - the selected sites should cover the areas with potential of having any of the threatened or conservation-concern species;
3. The dominant wind direction - in order to assess the current and future impacts of the existing cement and power plant and new planned plants on biodiversity downstream;
4. Existing noise sources;
5. Distances from current settlements – to consider disturbance originated from human activities within the study area.

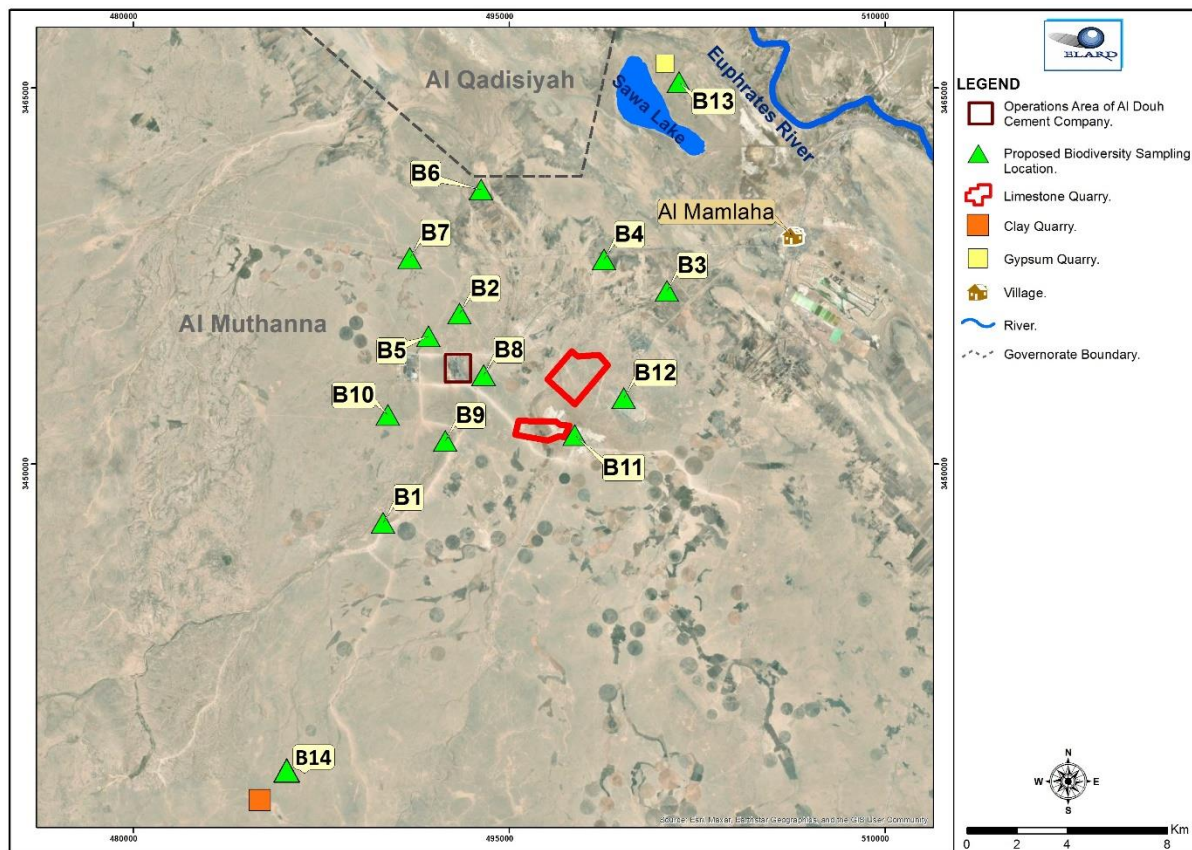


Figure 6-12 Proposed Biodiversity Survey Locations

6.2.5.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.5.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions

✓ **Proposed Mitigation Measures:** during the Project phases:

- *Construction of the Cement Plant Phase:*
 - Preventing illegal human activities.
 - Proper management of waste and wastewater.
- *Quarrying and Raw Material Extraction Phase:*
 - Avoiding removal excess surface soil and vegetative cover.
- *Operation of the Cement Plant Phase:*

- Compliance with the proposed mitigation measures for air quality, noise levels, soil and groundwater and waste and wastewater management during the Operation Phase.
- *Decommission and Rehabilitation of the Quarries Phase:*
 - Proper disposal of waste and avoiding open combustion.
 - Decommissioning all structures and conducting a proper site cleaning campaign for any littered waste generated from the prior activities.

6.2.6 Cultural Heritage

6.2.6.1 Existing Information

According to the desk review, no archaeological sites were recorded in the vicinity of the Project area.

6.2.6.2 Key Issues of Concern (Project - Component Interactions)

6.2.6.2.1 Project-related environmental effects

Archaeological and cultural heritage sites could be affected during the Project phases, as the following:

The main sources of the potential impacts on the archaeology are excavation and earthworks in addition to quarrying activities that might unearth buried materials with archaeological importance.

6.2.6.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing sources of the cumulative impacts on the archaeology in the Project area are the activities of the existing cement plants in the study area, mainly the quarrying activities.

6.2.6.3 Boundaries (Spatial and Temporal)

The spatial boundary for the archaeology will include the areas where the Project has a physical presence (Project physical footprint).

The temporal boundaries for the archaeology shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project; with more emphasis on the Construction Phase and quarrying when archaeological resources might be unearthed.

6.2.6.4 Baseline Survey & Primary Data Collection

The consultants will coordinate closely with the directorate of antiquities and will involve members of these directorates in field surveys to document and confirm potential archaeologically sensitive areas. This approach has proven to be successful in previous projects conducted by ELARD in Iraq.

6.2.6.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.6.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ **Proposed Mitigation Measures:** during the Project phases:

- Raising labour awareness about the archaeological importance of the area and requesting them to notify the Project management in case any artifacts are found during the works, which will, in turn, inform the competent authorities to take the necessary procedures.
- Chance Find Procedure shall be prepared and employees shall be trained on implementing it.

6.2.7 Socio-Economics Conditions

6.2.7.1 Existing Information

Secondary data have been collected to have an overview about the current socio-economic situation in Iraq, and Al Muthanna Governorate specifically. Below are sections developed for each topic of the socio-economic component relevant to the Project.

6.2.7.1.1 Demographics

Iraqi population has the highest shares of youth in the world, with 49 percent (%) of the total population being below the age of 19, and 58% is below the age of 25. (Figure 6-13).

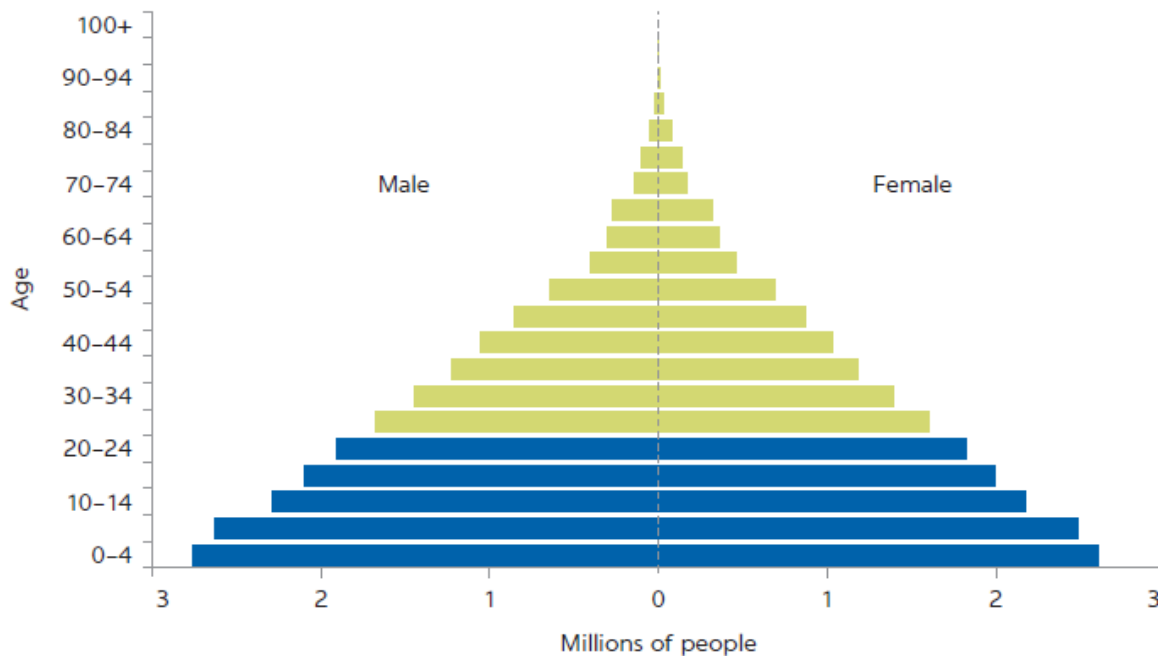


Figure 6-13 Iraqi Population Pyramid in 2019 (Source: World Bank, 2020)

Muthanna Governorate has an estimated population of 835 797, mostly settling in the northern part of the governorate, near Euphrates river.

6.2.7.1.2 Employment

Iraq has been struggling with high unemployment rates especially among vulnerable groups (women, youths, and internally displaced populations). In a 2016 assessment, it was estimated that Iraq needs 5 to 7 million jobs by 2030 in order to accommodate the population that belongs to the working-age group. In 2016, the rate of unemployment was 2.5 million individuals, divided as follows: 1.5 million of unemployed adults, 1 million unemployed internally displaced populations (IDPs). Youths aged between 15 and 24 years old are the main group that faces challenges in landing a job, with 36% of the total Iraq youth being unemployed as of 2018. Female youths, being amongst the most vulnerable in Iraq, have a rate of 65% of unemployment (Bandiera et al., 2018).

The Iraqi population has a rate of 16% of unemployment, out of which 27% account to each of females and IDPs.

Furthermore, it is estimated that by 2030, Iraq's youth population will grow by 72% compared to 2015, which will result in a higher demand for youth employment.

6.2.7.1.3 Poverty

Poverty rates in Iraq have been highly influenced by the Syrian War that erupted since 2011. By 2017, the total poverty rate was estimated at 20% (Iraq SWIFT Survey, 2017).

6.2.7.1.4 Services and Institutions

Following the site reconnaissance conducted in May 2022, a primary school and a medical centre have been identified within the vicinity of the area of influence of the Project. Additionally, residential units have been recorded (Figure 6-14). Further assessment and

surveying of the area of influence will be carried out during another site visit in order to have accurate and precise data about the establishments located within the vicinity of the Project site.

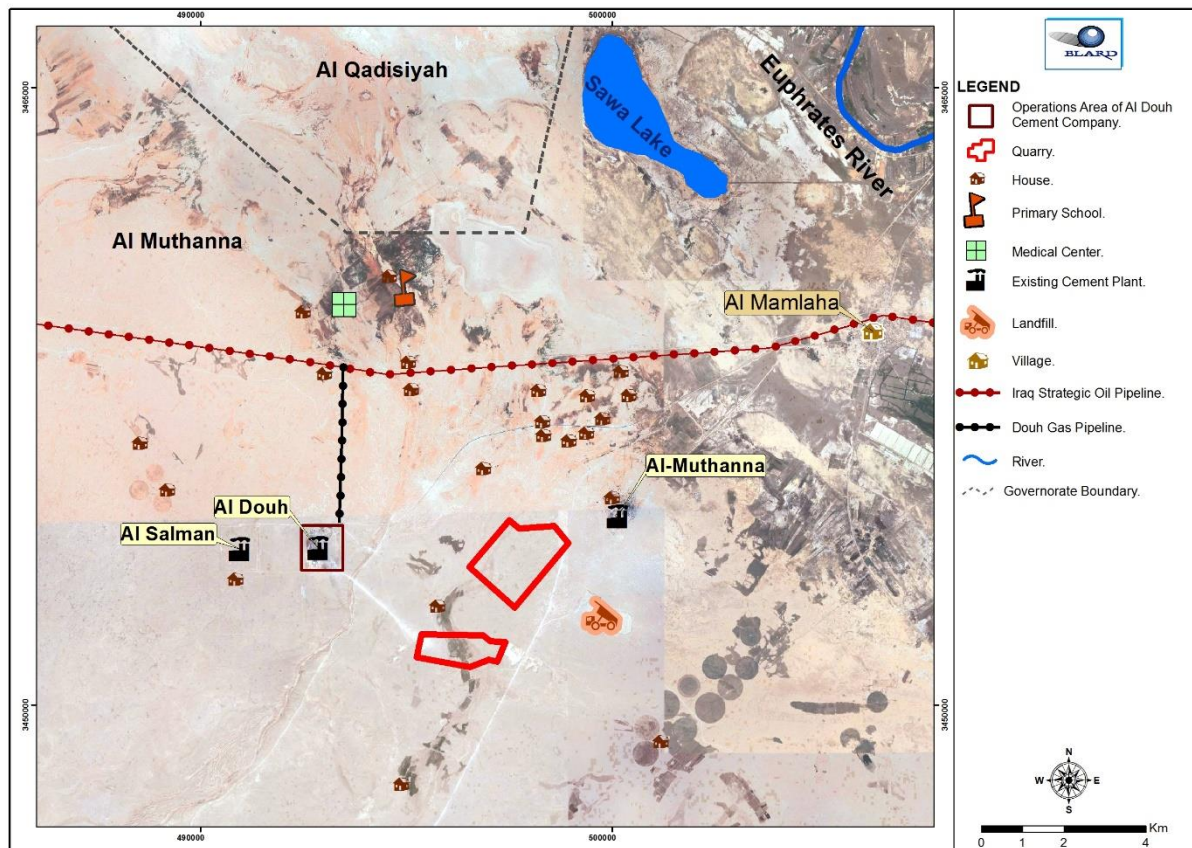


Figure 6-14 Socio-economic Features Documented during the Site Reconnaissance Visit²⁴

6.2.7.2 Key Issues of Concern (Project - Component Interactions)

6.2.7.2.1 Project-related social effects

On the local scale, the following potential negative effects could be identified:

- Influx of labour force to the residential areas, disrupting community structures and affecting community values, family values and religions (especially among Bedouins);
- Increased demand on local services (e.g. fuel demand, water sources, electricity supply, construction materials and goods, etc.),
- Potential conflicts on land use rights and access; and
- Trucks and automobiles traffic that may induce movement disturbance on access roads from and to the residential areas.

Meanwhile, some positive effects from the Project on the local scale could be:

- Creation of job opportunities;
- Local skills development;

²⁴ The figure does not include all house in the project area, but those documented during the site reconnaissance visit.

- Improvement in the local livelihood conditions;
- Increase in expenditure within local economies (purchase of commodities, services, etc.); and
- Possible development and improvement of local physical and socio-economic infrastructure with the possibility of attracting governmental funding to support infrastructure projects (e.g. roads, water networks, municipal landfills, etc.) and municipal services (e.g. communication, public transport services, etc.) in the area.

6.2.7.2.2 Cumulative environmental effects

The social and economic effects from the proposed Project that are secondary or cumulative in nature could include the activities of the existing cement plants in the study area as follows:

- Increasing in the demand on water both drinking and process related and fuel for operation;
- Increasing in the traffic in the area of operation of the new plant and transportation of materials; and
- Increasing in employment for the Project.

6.2.7.3 Boundaries (Spatial and Temporal)

The spatial boundary for the socio-economic data shall extend to include the nearest residential area to the Project area.

The temporal boundaries for the social and economic effects shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.7.4 Baseline Survey & Primary Data Collection

A socio-economic baseline survey is proposed to be conducted in several stages:

1. Use of satellite imagery to identify the areas with high, middle and low population density, and identification of the nearest resident human settlements;
2. Gathering of secondary data from published sources, namely data from international agencies and from the Iraqi Central Organization for Statistics on demographic and socio-economic conditions of the closest rural and urban communities, if available;
3. Review of the land ownership laws and expropriation law of Iraq;
4. A walk-over field survey to verify data from literature;
5. Consultation with the local authorities, local figureheads, tribal sheikhs and community leaders in the Project area to enquire about land ownership, land use rights and land uses;
6. Engaging and interviewing key personnel from governmental departments (land registration and local municipalities) to enquire about land ownership along the right of way;
7. Engaging and interviewing local figureheads, tribal sheikhs, community leaders, farmers, land owners and land users to gather information on land tenure;

8. Engaging vulnerable individuals and groups living, working, etc. at proximity of the Project site that may be affected by Project activities during the construction and operation phase; and
9. Conducting face to face interviews with representative sample of households to collect information on land ownership patterns and overall socio-economic and health conditions.

The socio-economic baseline survey, Stakeholder Engagement and Communication Plan, Grievance Mechanism, Social Impact Assessment are proposed to be conducted and prepared following international guidance, namely:

- International Finance Corporation (IFC). (2009). Addressing Grievances from Project-Affected Communities: Guidance for Projects and Companies on Designing Grievance Mechanisms. Good Practice Note, September 2009, Number 7. Washington, D.C.: IFC;
- International Finance Corporation (IFC). (2007). Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. Washington, D.C.: IFC;
- International Finance Corporation (IFC). (2003). Addressing the Social Dimensions of Private Sector Projects. Good Practice Note, December 2003, Number 3. Washington, D.C.: IFC;
- International Finance Corporation (IFC). (2002). Handbook for Preparing a Resettlement Action Plan. Washington, D.C.: IFC (If involuntary physical and/or economic displacement is triggered); and
- Office of the Compliance Advisor/Ombudsman (CAO). (2008). A Guide to Designing and Implementing Grievance Mechanisms for Development Projects. Advisory Note, prepared for the International Finance Corporation (IFC) Multilateral Investment Guarantee Agency (MIGA) Members of the World Bank Group. Washington, D.C.: CAO.

The methodology for the socio-economics baseline survey is provided in Appendix H.

6.2.7.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.7.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental & social regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ **Proposed Mitigation Measures:** during the Project phases:

- *Construction of the Cement Plant Phase & Decommission Phase:*
 - Prompt workers and staff to buy local products

- Construction camps should accommodate workers and provide the necessary healthcare facilities without overloading the healthcare services provision at nearby facilities, especially rural facilities
- Develop communication campaigns to keep the population informed about the progress of the work.
- *Quarrying & Operation of the Cement Plant Phase:*
 - Provide proper training of Quarrying & Operation crew members on the local cultural behaviour and on responsible community interactions to avoid cultural misunderstanding with indigenous and local people;
 - Employing local workers as much as possible; and
 - Supplying goods and materials from local markets as much as possible.

6.2.8 Labour and Working Conditions/OHS

6.2.8.1 Existing Information

Operation and maintenance personnel of the existing Project are provided with a labour camp within the vicinity of the facility, and as part of the scope of work of the new EPC contractor (to be awarded), new residential camp and administrative buildings will be constructed to be utilized by the EPC personnel during construction of the new cement plant, power plant and water treatment plant and then by the O&M contractor personnel during operation of the new facilities.

The new camp will include residential halls, a kitchen, a dining hall, a garden, an entertainment park and health services room.

It shall be noted that the camp will be a property of Al Douh; and the EPC Contractor (and the O&M Contractor during operation) will be required to comply with IFC requirements and standards related to workers accommodation, as this will be stated in their contracts.

During construction, the management of workers is the EPC contractor's responsibility. This would be done under Al-Douh's supervision through the EPC Consultant.

Al Douh Cement Plant has developed a Health and Safety Management Plan in which basic measures and actions are considered to reduce the risk of occupational hazards, to be prepared for any emergencies, and respond properly and quickly.

6.2.8.2 Key Issues of Concern (Project - Component Interactions)

The main concern in terms of labour and working conditions is the quality of the labour camp, and the occupational health and safety conditions for the workers throughout the Project lifecycle. Further details are elaborated below.

6.2.8.2.1 Project-related social effects

Two different categories of risks can be identified for the Project as follows:

1. Occupational Health and Safety: The Project may increase the occupational health and safety (OHS) risks for the workforce, which may be induced by:

- Working at elevated heights;
- Exposure to sources of fire;
- Regular construction works that may result in injuries;
- Exposure to high levels of noise;
- Exposure to high concentrations of air pollutants;
- Lack of protective measures relating to hygiene and diseases; and
- Exposure to other public health risks.

2. Labour Camp Conditions:

- Exposure to water-vector diseases;
- Exposure to bad accommodation conditions (including but not limited to: humidity, improper aeration, improper lighting);
- Limited access to sanitary services;
- Exposure to high levels of dust and other air emissions;
- Access to the accommodation site by unauthorized individuals; and
- Terrorist attacks and illegal access to the labour camp site.

6.2.8.2.2 Cumulative environmental and social effects

The influx of labour force is expected. However, the number of workers is not likely to have a negative cumulative social effect on the region. The Project is expected to create job opportunities and vacancies throughout its lifecycle.

Following the influx of workers, pressure on the infrastructure is likely to occur, notably pressure on electricity supply, water supply, and roads and transportation. The significance of the cumulative impacts can only be determined based on the pre-determined number of workers that will be engaged throughout the lifecycle of the Project.

6.2.8.3 Boundaries (Spatial and Temporal)

The spatial boundaries shall extend to cover the existing facility, construction site, and both labour camp sites (existing and anticipated) during the construction phase. Throughout the operation and maintenance phase, the spatial boundaries will include the locations of the facility with the expansion, and the permanent labour camps.

The temporal boundaries for the social and economic effects shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.8.4 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.8.5 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international OHS regulations, laws and standards related to the Project and the related international agreements and conventions, namely ILO Convention, and standards for workers' accommodation.

✓ **Proposed Mitigation Measures:** during the Project phases:

- Develop and implement an Environmental and Social Management System (ESMS) to govern the construction and operational activities.
- Develop and implement a comprehensive OHS plan; and
- Develop and implement an Accommodation Code of Conduct.
- Develop and implement Workers' Accommodation Plan specific to the Project
- Develop and implement Emergency Preparedness and Response Plan

6.2.9 *Community Health, Safety, and Security*

6.2.9.1 Existing Information

Al Douh Cement Plant has developed a Health and Safety Management Plan in which basic measures and actions are considered to reduce the risk of occupational hazards, to be prepared for any emergencies, and respond properly and quickly.

6.2.9.2 Key Issues of Concern (Project - Component Interactions)

6.2.9.2.1 Project-related social effects

The effects that are likely to be induced by the Project can affect the accommodation of the workforce, and other civilians who live within the vicinity of the Project site:

- Lack of preventive measures to reduce the spread of diseases;
- Increased demand on resources (i.e. water and electricity) which may lead to the scarcity of those resources, leading to conflicts between the community and the Project proponent;
- Exposure to high levels of air emissions and pollutants;
- Access to the worksite by unauthorized individuals which may put them at risk; and
- Public health hazards and risks caused by improper management of the waste (solid waste and liquid waste).

Additionally, emergencies may occur during the implementation of the Project, and consideration to the following shall be given:

- Fire, smoke, and explosion;
- Accidental spills and release;
- Terrorist attacks and illegal access to the worksite; and
- Extreme events (dust storms, heat waves, natural hazards, etc).

6.2.9.2.2 Cumulative environmental and social effects

Sources of commutative effects on community health and safety include other cement plants and quarries in the Project area.

6.2.9.3 Boundaries (Spatial and Temporal)

The spatial boundaries of community health and safety shall extend to cover nearby residential areas to the Project area.

The temporal boundaries for health and safety shall include the periods estimated for construction, quarrying, operation and decommissioning phases of the Project.

6.2.9.4 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.9.5 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international OHS regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ **Proposed Mitigation Measures:** during the Project phases:

- Develop a comprehensive HSE plan.
- Have in a place a grievance mechanism accessible to all possible stakeholders and communities that might be affected by Project activities.

6.2.10 Human Rights

6.2.10.1 Existing Information

6.2.10.1.1 Indigenous People

There are no indigenous groups and people in Iraq that are officially declared under the United Nations Declaration for the Rights of Indigenous Peoples. However, many ethno-religious and minority groups identify themselves as indigenous in Iraq. A total of fourteen (14) groups are identified as minorities. Further information is elaborated in Section 6.2.11.

6.2.10.1.2 Security Incidents

Despite having been signatory of ten (10) International Human Rights Treaties out of eighteen (18), Iraq has been witnessing security and protection unsteadiness over the past decades. Between 2019 and 2020, protests and demonstrations were taking place in southern governorates. In Al Muthanna, one protester was reported dead and 324 injured in 2019 (Euro-Mediterranean Monitor for Human Rights, 2019).

Tribal and intra-tribal disputes are the main reason of security incidents in Al Muthanna, similarly to other southern Governorates (The Netherlands Ministry of Foreign Affairs, 2019), in addition to protests and militia violence. Existing violence in Al Muthanna has a relatively low risk of affecting civilian population which is mainly due to the aforementioned conflicts that occur in this Governorate (Swedish Migration Agency, 2019).

The presence of Iraqi Security Forces (ISF), Popular Mobilisation Units (PMU) Brigades and of Shia armed groups was reported in Al Muthanna Governorate. Additionally, problems of criminality, drug abuse, and violence between Shia armed groups and tribal groups occurred. Violence was mostly related to control of land, oil revenues and water scarcity, and predominantly affected those who were actively involved in a militia or tribal group. In 2019 and 2020, ISF and PMU reportedly used excessive or disproportionate violence in order to repress protests, causing numerous deaths and injuries.

6.2.10.1.3 Internally Displaced Persons (IDPs)

As of June 30, 2022, 846 Internally Displaced Persons (IDPs) were registered in Al Muthanna. No IDPs originating from Al Muthanna were registered elsewhere in the country.

6.2.10.2 Key Issues of Concern (Project - Component Interactions)

6.2.10.2.1 Project-related social effects

The risk of exposure to improper labour conditions at work should be considered. These conditions include, but are not limited to: wage disparity, unpaid overtime hours, and camp site in bad conditions.

On the local scale, the following potential negative effects could be identified:

- Influx of labour force to the residential areas, disrupting community structures and affecting community values, family values and religions (especially among Bedouins);
- Exposure to improper conditions such as contaminated water, disturbances (air and noise emissions);
- Increased demand on local services (e.g. fuel demand, water sources, electricity supply, construction materials and goods, etc.), which may lead to conflicts between Bedouins or tribes and others; and
- Potential conflicts on land use rights and access.

It is worth mentioning that the improvement of the living conditions following the development of the Project may reduce the tension between locals.

6.2.10.2.2 Cumulative social effects

An increase in security incidents within the area of influence may occur. However, the significance of the effect is minor, as the influx of laborers is limited, and previous records of security incidents are very low in Al Muthanna.

6.2.10.3 Boundaries (Spatial and Temporal)

The area of influence is limited to the Project site, and the labour camp site. The need to extend the spatial boundaries may occur, following a thorough assessment of the baseline to identify nearby receptors.

The temporal boundaries for human rights extend over the lifecycle of the Project, as the need of resources is permanent, and the labour force is likely to stay for a long-term during all phases of the Project.

6.2.10.4 Baseline Survey & Primary Data Collection

The socio-economics and land ownership baseline survey that is elaborated in Section 6.2.7.4 will serve for the identification of potential conflicts and human rights violation as well.

6.2.10.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.10.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international social regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ **Proposed Mitigation Measures:** during the Project phases:

• *Construction of the Cement Plant Phase & Decommission Phase:*

- Construction camps should accommodate workers and provide the necessary healthcare facilities without overloading the healthcare services provision at nearby facilities, especially rural facilities;
- Coordinate with the local authorities to ensure that the additional resources supply would not cause a conflict with local residents and Bedouins.
- Develop communication campaigns to keep the population informed about the progress of the work;
- Comply with IFC Performance Standards when developing an individual code of conduct, and employment contract.

• *Quarrying & Operation of the Cement Plant Phase:*

- Provide proper training of Quarrying & Operation crew members on the local cultural behaviour and on responsible community interactions to avoid cultural misunderstanding with indigenous and local people;
- Employing local workers as much as possible;
- Comply with IFC Performance Standards when developing an individual code of conduct, and employment contract

6.2.11 Indigenous Peoples

6.2.11.1 Existing Information

Based on preliminary findings of the site reconnaissance visit, nomadic Bedouins live around the Project area; and the definition of "Indigenous Peoples" as provided in PS 7 could be applicable to them. This will be further investigated during the socio-economic baseline surveys, consultations and impact assessment, and will be duly considered as applicable.

It shall be noted that there are no indigenous groups and people in Iraq that are officially declared under the United Nations Declaration for the Rights of Indigenous Peoples. However, many ethno-religious and minority groups identify themselves as indigenous in Iraq. A total of fourteen (14) groups are identified as minorities, and below is a brief description of each group.

6.2.11.1.1 Groups that are identified as minorities in Iraq

Bahá'í: Bahá'í group was first founded in 1863, Baghdad, Iraq by Baha'u'llah after his exile from Iran. In 1970, following the rise of Ba'ath Party, the community has been facing repression. The suppression of Bahá'í peoples was manifested through Law No. 105 of 1970 prohibiting the Bahá'í faith, and Rule No. 358 of 1975 issued by the Directorate of Civil Affairs proscribing the recording of Bahá'í as a religion in civil registers. Therefore, Bahá'í peoples could not acquire official documentation of their identity including ID card, passport, birth and death certificates. In 2007, the Ministry of Interior revoked Rule No. 358, after which some Bahá'í were able to obtain ID cards. Estimations of the Bahá'í population are not available as the peoples do not reveal their religious beliefs.

Black Iraqis: Black Iraqis are mainly descendants of East African migrants and slaves who moved to Iraq in the ninth century. The community is mostly located in southern Iraq, with the largest agglomeration being in Basra. The total community is estimated at 1.5 to 2 million Black Iraqis. Most of them are Shi'a Muslims, with a minority who follows African traditions and spiritual beliefs and practices. Black Iraqis began their political involvements in 2007 with the foundation of Free Iraqi Movement, the first political association to defend the rights of black Iraqis. Despite the fact that black Iraqis are mostly Muslims, the community is underrepresented in politics, and a parliamentary quota that protects their right of being represented does not exist yet.

Black Iraqis are a group of interest for the Project as they are likely to be found within the vicinity of the Project area.

Roma: Roma community is also referred to as Kawliyah, is a minority group residing mainly in southern Iraq, specifically in Al-Qadisiya governorate, and the suburbs of each of Baghdad, Basra, and Mosul governorates. The total population belonging to Roma is estimated between 50,000 and 200,000 people who live in remote villages.

Roma community are a group of interest for the Project as they are likely to be found within the vicinity of the Project area.

Kaka'i: Kaka'i are a population ranging between 110,000 and 200,000 who are also known as Ahl-e Haqq or Yarsan. Kaka'i religion is not recorded in governmental register which forces the community to be registered as Muslims. Kaka'i peoples are facing discrimination and harassment. The community is mainly based in south-east Kirkuk and in the Ninewa plains near Daquq and Hamdaniya, with others also based in Diyala, Erbil and Sulaymaniyah.

Faili Kurds: Faili Kurds population is estimated at 1.5 million people who live mainly in Baghdad, as well as the eastern parts of Diyala, Wasit, Missan and Basra governorates. Faili Kurds are also residents of Kurdistan region. The group is facing discrimination due to the duality of their identity, being Kurds and Shia.

Faili Kurds community is a group of interest for the Project as they are likely to be found within the vicinity of the Project area.

Armenians: Armenians in Iraq are mostly based in Baghdad, with a minor population that was in Mosul prior to ISIS advance in the city. Armenians that used to reside in Kirkur and Basra have been displaced to Iraqi Kurdistan cities following the attacks and invasion of ISIS of the aforementioned cities.

Assyrians: Assyrians are a minority ethnic group who has been targeted and went through several conflicts mainly related to religion. Being religiously Christians, Assyrians were forced to flee Mosul in 2014 after ISIS took over the city, in addition to the Ninewa plains including Tel Isqof, Bartalla, Karamles, Batnaya, Tel Keyf, and Qaradosh town. The groups settled in Iraqi Kurdistan region, where they have been suppressed by the Kurdish authorities.

Chaldeans: Chaldean Christians are based in Mosul, and in 2014 they were displaced to Basra and Iraqi Kurdistan following the takeover of ISIS to the city of Mosul. Due to their displacement and the fact that they are a minority group, Chaldeans struggle to find decent jobs, and face restriction on their political activities.

Kurds: Kurds were granted an autonomy agreement in the now-known Iraqi-Kurdistan region by Saddam Hussein in 1970. Kurdish groups are also found in Syria, Turkey, and Iran.

Kurds have been in conflict with Muslim Iraqis who want a unified Iraq, whilst Kurds are seeking to have an autonomous and independent government in Kurdistan.

The situation in northern Kurdish area is relatively stable, compared to the rest of Iraq. Hence, many Iraqis including minorities, seek refuge in Kurdistan.

Sabean Mandaean: With estimates of less than 5,000 people belonging to Sabean-Mandaean group, the peoples are mainly found in southern Iraq, with a smaller community in Baghdad. The group is targeted for kidnapping, attacks, discrimination, and negative stereotyping. Sabean-Mandaeans have been either killed or fleeing the country since 2003 following the outbreak of violence. UNESCO listed Sabean-Mandaean language in the Atlas of the World's Languages in Danger of Disappearing. During the ISIS invasions, at least 50 Sabean-Mandaean families were displaced mostly from Ramadi town in Anbar governorate.

Shabak: Shabak are an ethnic minority based eastern of Mosul, Ninewa plains, with a small community in Mosul city. They are also considered as a linguistic minority group, as they speak Shabaki which draws on Turkish, Persian, and Kurdish, and Arabic. Shabak peoples are estimated at 250,000 with almost 70% of them who identify as Shia, and the rest Sunni.

Being residents of the disputed territories of Ninewa plains, Shabak people have divergent opinions about the situation: some of them support the Kurdistan Regional Government, while others consider themselves Iraqis.

Despite the parliamentary quote that reserves one seat in the Iraqi Council of Representatives for Shabak group, the Iraqi government has not yet declared Shabak as an ethnic group.

Similarly, Kurdish constitutions do not recognize them as an ethnic group, and hence, Shabaki is not taught at schools in Kurdish regions.

Turkmen: Turkmen are the third largest ethnic group in Iraq. They are residents of northern Iraq, with an estimation of 2 million people before the American-led occupation in 2003. Turkmen have been oppressed by Arabs and Kurds, and displaced from their villages during conflicts and wars, with the latest recorded being the ISIS takeover in Iraq. In 2014, Shia Turkmen from Tal Afar have been displaced to south Iraq.

Turkmen leaders have previously expressed their concerns about the oppressions they are facing, as this may put their cultural and political assimilations at risk. Additionally, the access to Turkmen language is restricted, despite the protection of the right to education in the Turkmen language by the Iraqi Constitution.

Twelver (Ithna'ashari) Shia: Shia Muslims make 60 to 65 percent of the total population in Iraq. Conflicts between Shia and Sunni have been exacerbated after 2003. Shia live as minorities in Baghdad and large cities. However, they are a major religious group in south Iraq.

Yezidis: Yezidi is a religious minority that was organized in tribes. Prior to the ISIS invasion, Yezidis were estimated at 500,000 mainly based in Sinjar, with a smaller group located in Shaikhan, the Kurdistan foothills east of Mosul.

Yezidi community is a group of interest as for the Project as they are likely to be found within the vicinity of the Project area.

6.2.11.2 Key Issues of Concern (Project - Component Interactions)

6.2.11.2.1 Project-related social effects

Potential impacts from the Project include conflicts between the labour force, the contracting company or other party with local communities (i.e. tribes and Bedouins). Additionally, the exposure of indigenous people to improper conditions such as mismanagement of the solid waste, contaminated water, and disturbances are all Project related effects. The scarcity of resources such as water due to the water needs of the Project may also be of concern.

6.2.11.2.2 Cumulative social effects

Sources of commutative effects could include other industrial activities in the vicinity of the Project including cement plants and quarries.

6.2.11.3 Boundaries (Spatial and Temporal)

Spatial boundaries are set based on the identification of indigenous people. The final delineation can be determined during the EIA phase following the socio-economic survey that will be conducted.

The temporal boundaries would include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.11.4 Baseline Survey & Primary Data Collection

The identification of indigenous people and minorities will be accomplished through the proposed socio-economic methodology of Section 6.2.7.4. Interviews with indigenous groups

(if any) will be carried out to have a better understanding of their current situation, and to identify their main concerns.

6.2.11.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.11.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international social regulations, laws and standards related to the Project and the related international agreements and conventions.

Throughout all Project phases, engagement with relevant communities will be carried out, especially prior to the initiation of the commissioning phase. Additional mitigation measures are elaborated below.

✓ **Proposed Mitigation Measures:** during the Project phases:

- *Construction of the Cement Plant Phase & Decommission Phase:*
 - Coordinate with the local authorities to ensure that the additional resources supply would not cause a conflict with local residents and Bedouins;
 - Develop communication campaigns to keep the population informed about the progress of the work; and
 - Comply with IFC Performance Standards when engaging with indigenous people.
- *Quarrying & Operation of the Cement Plant Phase:*
 - Employing local workers as much as possible; and
 - Comply with IFC Performance Standards when engaging with indigenous people.
 - Have in a place a grievance mechanism accessible to all possible stakeholders and communities that might be affected by Project activities.

6.2.12 *Land acquisition*

The proposed Project is unlikely to result in involuntary physical and/or economic displacement emanating from land acquisition.

6.2.13 *Traffic*

6.2.13.1 Existing Information

Information on projects that will be established in the Project area shall be collected from relevant authorities and published data in order to assess the cumulative impacts on future traffic volumes. In addition, information on new infrastructures, roads provisions and traffic

regulation measures that the Iraqi Government intends to implement shall be collected in order to evaluate the future networks' performance.

6.2.13.2 Key Issues of Concern (Project - Component Interactions)

6.2.13.2.1 Project-related social effects

During Construction, quarrying and raw material extraction phase, and Decommissioning Phases, a large increase in traffic (to and from the work sites) is predicted from the movement of construction trucks, machineries, and vehicles to transport equipment, raw materials, logistic supplies, personnel, and to transfer wastes off the work sites.

During Operation, the vehicular traffic will be mainly concentrated around the Project area due to the movement of trucks, and vehicles to transport cement, personnel and to transfer wastes off the work sites, in addition to the influx of workers.

6.2.13.2.2 Cumulative environmental effects

It is expected that the traffic resulting from the Project will interact with the traffic brought about by the existing and future structures over access roads leading to and from the proposed sites.

6.2.13.3 Boundaries (Spatial and Temporal)

The spatial boundaries for the assessment of impacts on traffic shall extend to cover the access roads to Project components in and around the Project area.

The temporal boundaries for the landscape and visual amenity shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.13.4 Baseline Survey & Primary Data Collection

Traffic baseline will be established qualitatively particularly in the Project area access routes. These are likely to be the areas mostly affected by potential increase in traffic.

The objective of the traffic baseline survey is to review the existing traffic conditions of the road networks in the Project area, in order to help appraise the potential traffic impacts of the Project on the surrounding road networks, and the need for the closure or diversion of existing transport routes or the construction of new transport routes.

6.2.13.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.13.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

- ✓ **Proposed Mitigation Measures:** during the Project phases:
 - *Construction of the Cement Plant Phase, Quarrying and Raw Material Extraction Phase & Decommission and Rehabilitation of the Quarry Phase:*
 - Schedule deliveries and transportation during off-peak hours of traffic circulation.
 - *Operation of the Cement Plant Phase:*
 - Proper and continual maintenance of transportation vehicles should be provided.

6.2.14 Infrastructure

6.2.14.1 Existing Information

Based on the findings of the site reconnaissance visit, the existing infrastructure in the Project area includes the following:

- Infrastructure of Douh existing cement plant.
- Landfill
- Wadi Kharaz Medical Centre

In addition to the above mentioned components, detailed information will be obtained about the health care facilities and security providers in the area of the Project to check the possibility of using their services when needed.

6.2.14.2 Key Issues of Concern (Project - Component Interactions)

6.2.14.2.1 Project-related social effects

The predicted Project-related environmental effects that may provoke an over-burden to existing infrastructure components during Construction, Quarrying, Operation and Decommissioning phases of the Project are stated below. It is to be noted that the information provided hereafter is likely to be expanded and will be finalised upon further site investigation and Project study in the ESIA report.

During different Project phases, the main potential impact is increased pressure on solid wastes infrastructure, increase in pressure on roads, and potential damage to existing oil, water, electricity, and communication infrastructure.

6.2.14.2.2 Cumulative environmental effects

The following sources will add to the Project-related effects on infrastructure:

- Solid wastes discharge from nearby communities; and
- The activities of the existing cement plants in the study area

6.2.14.3 Boundaries (Spatial and Temporal)

The spatial boundaries for the assessment of impacts on infrastructure shall include locations of the cement plant, the power plant and the water treatment plant, with existing and planned infrastructure, in addition to waste disposal locations.

The temporal boundaries for the infrastructure shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.14.4 Baseline Survey & Primary Data Collection

In order to assess the Project interactions with the existing and planned infrastructure during the Project phases, an infrastructure baseline survey will be conducted. The survey will identify existing and planned infrastructure in the vicinity of the Project area, in addition to the solid waste and wastewater disposal locations, and will assess the existing status and capacity of the infrastructure components in order to anticipate the potential Project impacts on infrastructure.

The survey will consider the quality and capacity of the existing and potential solid wastes and wastewater disposal locations, water supply sources and infrastructure. The survey will also consider the capacity of the existing roads and health care facilities.

The infrastructure baseline survey will consist of reviewing existing data records from previous surveys in the Project area and the analysis of satellite imagery,

The survey will also consist of a site walk-over survey to assess the condition and capacity of the identified infrastructure.

6.2.14.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.14.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.

✓ **Proposed Mitigation Measures:** during the Project phases:

• *Construction, Quarrying & Decommission Phases:*

- Avoiding/minimizing waste.
- Segregating waste on-site.
- Sending recyclable materials such as paper, glass, aluminium, metal, steel and plastic to licensed recycling industries.
- Keeping all traffic to designated roads.

• *Operation of the Cement Plant Phase:*

- Preparation of Operation Waste Management Plan.
- Keeping all traffic to designated roads,

- Limiting speed on the route and adopting careful logistical and route planning to combine trips,

6.2.15 Landscape and Visual Amenity

6.2.15.1 Existing Information

Based on the findings of the site reconnaissance visit, the following were observed:

- The landscape in and around the Project area is mostly desert like.
- Regarding the industrial features, in addition to the existing Al Douh cement plant and its quarries, there are several industrial facilities is observed such Al Saman Cement Plant, Al-Muthanna Old Cement Plant, and a landfill.

6.2.15.2 Key Issues of Concern (Project - Component Interactions)

6.2.15.2.1 Project-related environmental effects

Potential interactions between the Project and the landscape and visual amenity are highlighted in this section.

Given the remote desert nature of the Project area, no significant impacts are expected on landscape and visual amenity, however, possible impacts could arise from construction activities and civil and earth works, quarrying, uncontrolled wastes disposal in addition to the unsightly view of cement and power plants.

6.2.15.2.2 Cumulative environmental effects

Based on the findings of the site reconnaissance visit, the main existing source of cumulative impacts on the landscape and the visual amenity in the Project area is the physical presence of the existing cement plants in addition to the industrial facilities.

6.2.15.3 Boundaries (Spatial and Temporal)

The spatial boundary for the landscape and the visual amenity shall extend to include 1 km from the Project components.

The temporal boundaries for the landscape and visual amenity shall include the periods estimated for Construction, Quarrying, Operation and Decommissioning phases of the Project.

6.2.15.4 Baseline Survey & Primary Data Collection

The consultant will document during the field surveys the overall landscape value at the Project site, and will identify sensitive viewpoints, if any, that could be affected by the Project. The consultant will identify any key visual receptors which could be impacted (touristic sites, villages, key archaeological/cultural sites, etc.).

A photographic record will be maintained for this purpose. This is particularly important at the new quarries sites.

6.2.15.5 Impact Assessment Methodology

The impact assessment shall be conducted in accordance with the methodology presented in Section 6.1. Based on the impact magnitude criteria presented in Table 6-6 and the Receptor Sensitivity Criteria presented in Table 6-7, the impact significance will be assessed as per Table 6-8.

6.2.15.6 Possible Mitigation Measures

✓ **Planned Control Measures:**

- Compliance with all national & international environmental regulations, laws and standards related to the Project and the related international agreements and conventions.
- Having a tree built around the Project site.

✓ **Proposed Mitigation Measures:** during the Project phases:

- Using existing licensed quarries to secure building materials for construction of the proposed cement plant.
- Arrangements for parking and storage of materials shall be made on-site as feasible for efficient operations.

7. IDENTIFICATION OF ALTERNATIVES TO BE ASSESSED

The following alternatives are considered to be assessed or at least addressed in the ESIA report:

- No Project Option: Best practice in ESIA requires analysis of the No Project Scenario and its comparison with the Project alternative. The Consultants shall provide a comparison including key environmental and socio-economic indicators to compare the do nothing and the Project alternatives.
- Site selection options: (if it is possible).
- Pollution abatement methods and technologies
- Project design and layout and impact on natural resources;
- Solid waste and wastewater management;
- Project interface with associated facilities and other projects;
- Alternative fuel types.

8. REFERENCES

- CEMBUREAU (The European Cement Association) 1997. Alternative fuels in cement manufacture. Technical and environmental review. CEMBUREAU, Brussels, Belgium.
- CEMBUREAU (The European Cement Association). 1999. Best Available Techniques for the Cement Industry. Brussels, Belgium.
- Canpolat, B.R., Atımtay, A.T., Munlafalıoğlu, I., Kalafatoglu, E., and Ekinçi, E. 2002. Emission Factors of Cement Industry in Turkey. Water, Air, and Soil Pollution. 138: 235- 252.
- EA (Environment Agency). 2001. Integrated Pollution Prevention and Control. Guidance for the Cement and Lime Sector. Sector Guidance Note IPPC S3.01. Bristol, UK.
- ESIA for the Iraq EPLI Crude Oil PS1A/PS5A, Oil Projects Company, 2015 (SCOP) (Prepared by ELARD).
- Hendriks, C.A., Worrell, E., Price, L., Martin, N., Ozawa Meida, L., De Jager, D. and Riemer, P. 1998. Emission reduction of greenhouse gases from the cement industry. Paper presented at The Fourth International Conference on Greenhouse Gas Control Technologies, August 30 - September 2, Interlaken, Switzerland.
- IPPC (Integrated Pollution Prevention and Control). 2001. Reference document on best available techniques in the cement and lime manufacturing industries, European Union.
- Luca Bandiera, Vandana Chandra, Jasmine Fosque, Jan von der Goltz , Teresa Maria Peterburs, Nadia Piffaretti, Joseph Saba, and Collette Wheeler. 2018. "Jobs in Iraq: A Primer on Job Creation in the Short-Term." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.
- Noumedem Temgoua, Claudia; Sharma, Dhiraj; Wai-Poi, Matthew. 2020. Multidimensional Poverty Assessment of Internally Displaced Persons in Iraq. Policy Research Working Paper;No. 9203. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/33577> License: CC BY 3.0 IGO.
- USEPA (United States Environmental Protection Agency). 1994b. Alternatives control techniques documents-NOx emissions from cement manufacturing. Office of Air Quality Planning and Standards, Emission Inventory Branch. Washington, D.C.
- World Bank. 2020. *Iraq Rapid Welfare Monitoring Survey* 2017. <https://microdata.worldbank.org/index.php/catalog/3461>
- World Bank. 2020. Breaking Out of Fragility: A Country Economic Memorandum for Diversification and Growth in Iraq. International Development in Focus. Washington, DC: World Bank. doi:10.1596/978-1-4648-1637-6. License: Creative Commons Attribution CC BY 3.0 IGO.

9. APPENDICES

APPENDIX A: STAKEHOLDER ENGAGEMENT PLAN

APPENDIX B: AIR QUALITY BASELINE SURVEY METHODOLOGY

Monitoring surveys of air quality will be conducted to collect primary baseline air quality data using the passive diffusion tube sampling method. Following each observation period, the passive diffusion tubes will be sent to a certified laboratory for analysis. After analysis, each tube gives a unique value which represents the average concentration of the pollutant during the period in which the tube was exposed. For instance, Al Douh will be asked to provide the records on the operation capacity of the existing plant during the background measurements to be conducted for this exercise. Moreover, Al Douh will be asked to operate the existing plant at or near capacity, as much as feasible, during the measurement of background concentrations.

It is also proposed to monitor Particulate Matter for particles < 10 µm size (PM₁₀) and <2.5 µm size (PM_{2.5}) for 7 days using the Osiris Turnkey Dust Meter

Baseline monitoring of ambient concentrations of air pollutants allows the ESIA Project Team to gather quantitative data on the concentrations of criteria pollutants in the vicinity of the Project area.

Proposed Primary Ambient Air Quality Baseline Data to be Collected

Environmental Feature & Parameters	Methodology and Instruments	Project Area	Duration
Particulate Matter for particles < 10 µm size (PM ₁₀) and <2.5 µm size (PM _{2.5})	Osiris Turnkey Dust Meter Dust Monitor (or equivalent) will be used for PM monitoring which meets the equivalence criteria as described within the recent "UK Particulate Monitoring Equipment Study". The time interval of the recorded data is 10 minutes and data can show interval over time	4 Sampling Locations	Continuous monitoring for 7 days at each of the 4 locations
Sulphur Dioxide (SO ₂)	Passive tube exposure method using the following tubes: - DIF600RTU-RA - Sulphur Dioxide Tube and Analysis UKAS Method – GLM 1 - DIF100-20WA – NO ₂ Tube 20% Tea/Water and Analysis UKAS Method – GLM 7 - DIFCG1TD-BTEX – VOC Carbograph 1 TD BTEX Hire and Analysis – UKAS Method – GLM 4 - DIF300RTU-RA – Ozone Diffusion Tube and Analysis UKAS Method – GLM 2 - DIF200RTU-RA – Hydrogen Sulphide DIF tube and Analysis UKAS Method – GLM 5 - DIF400RTU-RA – Ammonia Diffusion Tube and Analysis UKAS method – GLM 8	4 Sampling Locations	One month (30 days)
Nitrogen Dioxide (NO ₂),			
BTEX			
Ozone, O ₃ ,			
NH ₃ and H ₂ S			

The prevailing wind direction in Iraq is from the north and northwest. This is mainly attributed to the low pressure zone in northern India and Pakistan and its extension above the Arabian Gulf region during the summer season.

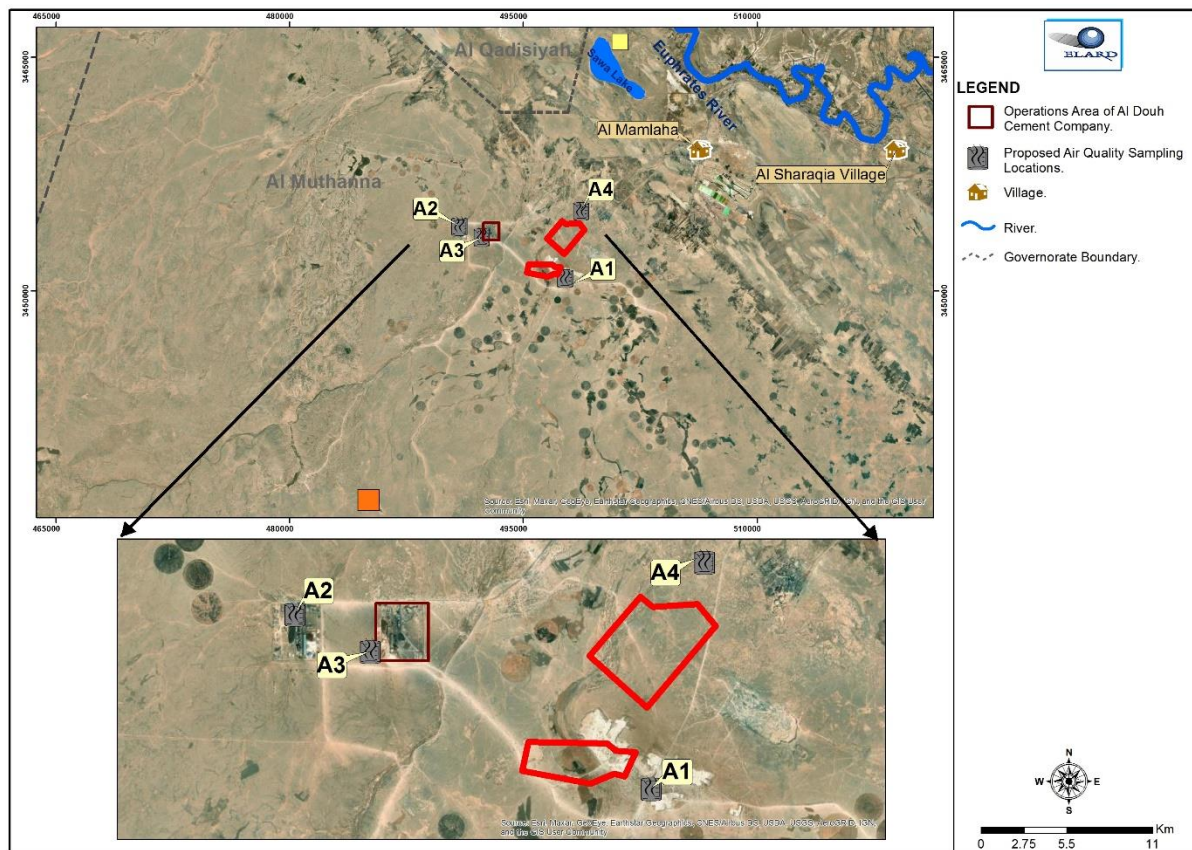
The proposed locations of the passive tubes for the baseline monitoring are chosen according to the prevailing wind direction, and sited in relevance to the Project components that are potential emitters of air contaminants and in relevance to pollution hotspots and sensitive receptors.

The next table presents the coordinates of the proposed sampling locations for the air quality baseline monitoring. A map for the proposed sampling locations is shown below.

Proposed Sampling Locations for Air Quality Baseline Monitoring

Sample ID	Justification ²⁵	Coordinates System (WGS 84)	
		Latitude	Longitude
A1	Downwind the limestone quarries	31°11'29.60"N	44°58'33.71"E
A2	Up Wind North West Dominant Wind Direction	31°13'17.67"N	44°54'16.43"E
A3	In the Area Where the New Plant Shall be Constructed	31°12'54.52"N	44°55'10.83"E
A4	East of the Existing Old Plant	31°13'49.89"N	44°59'12.12"E

²⁵ It should be noted that sample A2 is distant by 1.8 km from the existing plant and sample A1 is distant by ~3 km south of the plant near the quarries. Considering the dominant wind direction over 30 years in the area of Samwah Al Muthanna area see figure 6-2, sample A4 location is now distant by around ~ 6 km from the existing plant and around 2-3 km of Al khinaq and Al Muthana areas and few kilometres from the nearest residential area/city to represent the general AAQ in the area. Nevertheless, It is to be noted that based on our experience, dust measurements in arid and dusty environments like the one in Iraq, while important to have to establish baseline, they typically show relatively high levels given the nature of the environment, and most often represent natural contributions more than anthropogenic sources. Most of the time measurements would exceed standards due to natural sources. Our approach is to generally propose strict measures to minimize dust generation from the plant's operations. Our modelling will also determine the contribution of dust originating from the plant's source.



Proposed Sampling Locations for Air Quality Baseline Monitoring

The passive tubes siting is performed according to WHO Guidelines for Air Quality, Ambient air quality monitoring and assessment, Geneva, 2000.

Overall monitoring objectives, sources and emissions, meteorology and topography, existing air quality data and other information such as demographic, health, and land-use information are to be considered when selecting a site location (WHO, 2000).

Passive sampling of air quality using diffusion tubes is used to present a quantitative indication of air contaminant loading at the site of monitoring throughout the sampling duration.

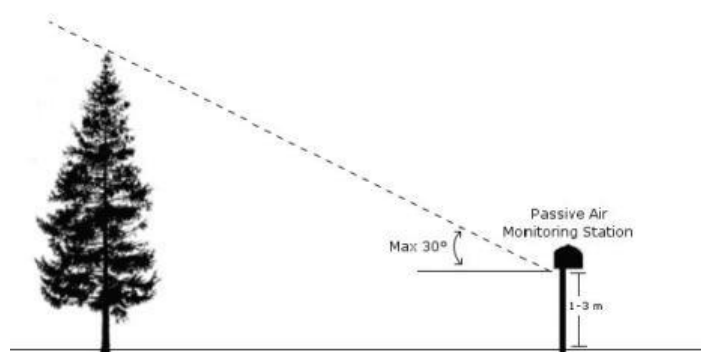
Ideally, samplers should be placed at breathing height. However, in order to reduce the risk of loss of tubes due to theft and avoid dust contamination, it is recommended that the tubes are placed at **a height of 2-4 m**, in all cases not higher than 5 m. As far as is practical, all tubes should be placed at similar heights.

All measurements are to be made at selected locations near sensitive receptors to be identified during the reconnaissance visit. The following considerations need to be observed:

- At boundary locations around facilities, such as industrial complexes or individual factories, care must be taken to avoid any localized sources or sinks of air pollutant and/or disturbances to the air flow. It is recommended that passive tubes are placed at least 10 m away from the following potential obstructions:
 - o Heater flues (particularly low level balanced flues)
 - o Trees and other vegetation
 - o Air conditioning outlets
 - o Extractor vents

- Underground ventilation shafts

To the extent possible, diffusion tubes need to be placed at angles less than 30° to the top of any obstacle, as shown in the figure below.



Passive Tube Ideal Siting

The passive diffusion tubes will be mounted at different locations. The different types of tubes to be mounted along with the required accessories are described in the Table below.

Passive Tubes to be Mounted

Product Code	Description	Picture
DIF300RTU-RA	Ozone Diffusion Tube	
DIFCHR-106	VOC (Chromasorb 106)	
DIF150RTU-RA	NO + NO ₂ Diffusion Tube	

Product Code	Description	Picture
DIF600RTU-RA	SO ₂ Diffusion Tube	
DIF 1000	Clips with adhesive tape	
DIF 8000	VOC clip and spacer	
DIF 2001	Strap 762 mm long	
DIF TUBELOCK	VOC hand tool	

The following precautions need to be taken when handling the diffusion tubes:

- Tubes need to be kept in a cool environment until use;
- Potential areas of cross contamination should be avoided (tobacco smoke, fertiliser storage, livestock houses...);
- Rubber gloves should be employed when handling the tubes;
- During installation, diffusion barriers should never be touched and passive tubes should not fall to the ground; and
- Tubes that are damaged or have splits in the end-caps should not be used.

Travel blanks shall be provided in the same packet as the sampling tubes. The following should be observed when handling blanks:

- The blanks should be kept away from areas of high concentrations of pollutants and should be kept out of direct sunlight;
- Blank tubes should be kept refrigerated if possible, except VOC tubes which should NOT be refrigerated;
- Ozone, Nitric Oxide and Sulphur Dioxide tubes should be sent in plastic containers. Tubes that are designated as blanks should not be removed from their containers;
- The Nitrogen Dioxide tubes have a sealed white cap on the end. The white cap from the blank NO₂ sampler should not be removed; and
- The VOC tubes have brass sealing caps. The caps should not be removed from the blank VOC sampler.

The following steps should be followed during deployment, exposure, and collection of passive tube samplers:

- Take the tubes to the site in a sealable plastic bag or container. Travel blanks should be identified and their code numbers noted on the Diffusion Tube Monitoring Record Sheet
- At each site, label the tubes to be used and record their identification numbers and the site at which they are to be exposed, on the Diffusion Tube Monitoring Record Sheet.
- Mount the tube following instructions given
- Record the date and time of the start of the exposure period and make a note of any site irregularities.
- Keep the end caps/screw top containers and the record sheets in the bag/container for use when removing the passive tubes at the end of the sampling period.

On the appropriate sampling end date, the samplers need to be removed according to the following procedures:

- Transport the following to the site:
 - o The end caps/screw top containers of the mounted passive tubes; and
 - o Diffusion Tube Monitoring Record Sheet.
- At each site, remove the exposed tube from the sample holder and replace the tube into the screw top container.
- After recapping, place each tube into the self-seal polyethylene bag and package for return to the analytical laboratory.
- Record the time and date of the end of the exposure period against the appropriate tube number. Make a note of any irregularities (tube found on the ground, insects, dirt, or liquid inside the tube). Add the monitoring record sheet to the self-seal polyethylene bag for return to the laboratory.
- Keep the tubes in a sealed container in a cool place until they reach the laboratory for analysis.

When visiting the site, it is recommended that the operator takes some spare tube end caps, spare mounting clips, and spacer blocks to replace any missing or damaged equipment.

Diffusion tubes must be held vertically with the open end downwards during sampling. The end of the tube should be in an area with a free circulation of air, preferably 5 cm from any adjacent surface, as certain surfaces may act as absorbers leading to reduced atmospheric concentrations immediately adjacent to the tube. Ideally a spacer should be used between the surface and the tube.

The spacer should not be placed in any form of recess (to avoid the possibility of sampling stagnant air). To avoid sampling in an area of higher than usual turbulence, tubes should not be located on the corner of a building.

Mounting clips and adhesive tape are provided with the tubes. The clip may be mounted directly onto a wall if required. The clip may also be mounted with a cable tie if the tube requires to be positioned on a post or similar structure.

Specific instructions for each sampler are specified below.

NO₂

- Both tubes (NO and NO₂) should be exposed in the same location simultaneously.
- Remove the tubes from the screw top container. Remove the WHITE cap from both tubes. Keep the caps and container in a safe place.
- Position each tube vertically with the open end facing downwards during required sampling period
- After sampling, replace the WHITE caps on both tubes. Put the tube with the BLACK cap back into the screw top container. Label the tube clearly with a small sticky label. Do not cover the barcode.



Nitrogen Oxides and Nitrogen Dioxide Diffusion Tubes

SO₂

- Remove the tube from the screw top container.
- Position tube vertically with the WHITE CAP containing the filter facing downwards during sampling. Ideally, clips such as a terry clip or plastic clip are mounted so that the tubes can be changed easily but alternative methods of fixing may be used =



Sulphur Dioxide Diffusion Tube



Ozone Diffusion Tube

Mounted Diffusion Tubes (SO₂, O₃)

VOC:

- Identify the end of the tube with the groove (usually the end with the coloured spot on the cap)
- Use Tubelock tool to remove the cap nearest to the GROOVED end of the tube (B) (*Tubelock spanner instructions are provided*).
- Push the diffuser cap on the open end of the tube (C).
- Position the tube vertically with the diffuser cap end (coloured spot) facing downwards during sampling. Leave in place for the required period (D).
- After exposing the tube for the required period of time, remove the diffuser cap. Use the Tubelock tool to place the brass end cap on to the tube. DO NOT OVERTIGHTEN, DO NOT USE SPANNERS. Test the tightness of the caps by gently pulling them (E and F)
- Label the tube with the labels provided. Stick the smallest area to the tube as possible. Do not cover the whole tube with a label.



A B C D E F

VOC Diffusion Tube Assembly



VOC Tube Label



VOC Tubes and Diffuser Caps



Mounted VOC Diffusion Tube

Record sheets need to be filled before and after the installation of every passive tube. In addition to the date, time, location and tube number; it is important to record anything unusual which may have occurred at the site during the period of exposure (tube found on the ground or upside down, insects inside the tube, major activity around the site, etc.).

At the end of the tube's exposure, record sheets should be placed with exposed tubes into self-seal polyethylene bag and returned to analytical laboratory.

All exposed tubes should be returned to the analytical laboratory for analysis within a few days of retrieval, ideally within 48 hours. If samplers are not shipped right away, they should be kept

in a cool place or a refrigerator. Diffusion Tube Monitoring Record Sheets need to be photocopied and then included in the shipping package.

Each batch of passive diffusion tubes should be accompanied by a copy of the exposure sheet and a strip of barcodes.

The following steps should be followed during barcoding of passive tube samplers

1. Take the first of the duplicate labels and stick it to the appropriate location on the exposure sheet.
2. Take the second matching label and stick it to the tube exposed at the same location.
3. Make sure that the label is securely fixed to the tube. These labels are treated to deal with the weather conditions.

APPENDIX C: METHODOLOGY FOR AIR DISPERSION MODELLING

The proposed methodology focuses specifically on the dispersion modelling of NO₂, SO₂, TSP, PM₁₀ and PM_{2.5} assuming a full capacity plant operation for the new plant. For instance, Al Douh will be asked to provide the records on the operation capacity of the existing plant during the background measurements to be conducted for this exercise. Moreover, Al Douh will be asked to operate the existing plant at or near capacity, as much as feasible, during the measurement of background concentrations.

The dispersion of NO₂, SO₂, TSP, PM₁₀ and PM_{2.5} emissions shall be modelled using AERMOD for a 5 full year meteorological dataset considering the effect of variations in parameters that could affect the dispersion of pollutants. The main elements of the air dispersion modelling study are described below:

The preferred USEPA model AERMOD will be used and is a steady-state straight line Gaussian plume model. AERMOD is designed to consider the effects of night-time planetary boundary layer and daytime convective activities for distances less than 50 km for flat and complex terrain. Considerations in choosing the appropriate model are based upon the steady-state assumptions on which the AERMOD model is based and whether they are valid. AERMOD consists of three separate components: AERMOD (AERMIC Dispersion Model), AERMAP (AERMOD Terrain Preprocessor), and AERMET (AERMOD Meteorological Preprocessor). The AERMOD model includes a wide range of options for modelling air quality impacts of pollution sources, making it a popular choice among the modelling community for a variety of applications. Some of the modelling capabilities of AERMOD include the following: (i) Source emission rates can be treated as constant or may be varied by month, season, hour-of-day, or other optional periods of variation, (ii) Building downwash is accounted for in the model and (iii) Receptor locations are variable and terrain elevations are considered.

Emissions of pollutants shall be modelled using emission data (in g.s⁻¹ for all the pollutants) and sources parameters (i.e. Stack height, stack exit temperature, velocity, etc..) shall be provided by Al Douh Cement. It should be noted that building downwash will be considered in the exercise as per the USEPA regulations. The GIIP stack height will be determined by plotting the sources, the buildings and the topography and the GIIP formula shall be applied to determine appropriate stack heights and the model will then be run using these values. In the absence of data on emissions, emissions shall be estimated using manufacturer guaranteed emissions and values. For volume sources such as fugitive emissions from cement production and traffic sources, the USEPA or EMEP/EEA guidelines can be used provided that fuel consumption and activity data such as clinker production in tons/year and operating hours of the facility is provided. Emissions scenarios will consider 2 scenarios with the "Normal full capacity operation for the new plant and another one if backup fuel is used". The modelled domain will be centred on the plant with at least 6-km extension in each direction. Baseline air quality data shall be collected from measurements performed as part of the Project for a period of 1 month.

The AERMAP program will be run with Digitized Elevation Model (DEM) data after their conversion from SRTM1 (30 m resolution) to determine the hill height scales and base elevation for each receptor, source, and structure used in the analysis. Receptor grid resolution will be variable (25 m – 500 m) in order to accurately determine the most impacted locations. Receptors will also be implemented at sensitive receptors locations.

AERMOD pre-processor called AERMET will be used to generate the meteorological data sets for use in the dispersion modelling. Since observed meteorological data are not available from any adequate near station, WRF ready data for 5 years shall be used for both surface and upper air data. Building downwash effect shall be considered as well as per the USEPA regulations.

In summary, data required is as follows;

- Stack and area sources data (i.e. Stack Height, coordinates of the stack, Stack diameter, emission rate, actual humidity, actual temperature at exit, actual exhaust gas flow rate, measured oxygen at stack, pollution control system and its efficiency and coordinates, fuel consumption and activity data for volume sources).
- The sensitive receptors list and nearest receptors too, along with their coordinates in WGS84
- Buildings dimensions in WGS84 format for the new and old plant. In the absence of data, buildings Heights and coordinates of each corner, and for circular buildings the coordinate of the centre and the radius to take into account the building downwash effect

APPENDIX D: NOISE SURVEY PLAN METHODOLOGY

The noise primary baseline study will consist of determining and quantifying the existing baseline sound environment and noise sources. The purpose is to characterize the existing acoustic environment and to identify any cumulative sources of noise. Measurements will include L_{10} , L_{90} , L_{Aeq} , L_{max} , L_{min} and will be continuously recorded to represent overall day-time and night-time conditions.

The noise survey and assessment will be based on the following American Society of Testing and Materials (ASTM) standards:

- Standard Guide for Applying Environmental Noise Measurement Methods and Criteria (ASTM D: E1686 – 10)
- Standard Guide for Preparing a Measurement Plan for Conducting Outdoor Sound Measurements (ASTM D: E1779 – 96a)
- Standard Guide for Measurement of Outdoor A-Weighted Sound Levels (ASTM D: E1014 – 08).

These standards are relied on for guidance on the design, implementation and interpretation of noise surveys for conducting the baseline outdoor sound measurements at the Project site and sensitive receptors within the proposed Project's zone of influence.

The following basic strategies will be applied to complete the noise survey:

- Taking note of the equipment used (manufacturer, type), date, start time and end time;
- Calibrating the sound meter and microphone according to the manufacturer's guidelines;
- Setting up the microphone at the appropriate site and height: noise levels are measured **at approximately 2 m above the ground**. The microphone shall be fixed on a sturdy tripod or mast. The microphone of the noise meter should be away from any non-normal acoustically reflective surface and locating it under power poles or lines should be avoided.
- Locating measurement positions at least 3-4 m away from potentially reflective surfaces such as buildings (residential units, industries, etc.) in order to provide a representative free field outdoor measurement at the given receptor location;
- Following standard calibration procedures at the start of each monitoring period to have the following SLM settings:
 - Run Duration: 15 min - i.e. readings will be taken at 15-minute time interval for continuous 24 hours; and
 - Measurement Range: The selection of the range depends on the expected minimum and expected maximum at each location. Given the predominantly rural setting of the Project sites, the measurement range of 30 dB to 100 dB will be set.
- Obtaining and recording the meteorological and site conditions such as wind speed and direction, relative humidity, temperature, sky and ground condition at each sampling location; and

- Documenting the equipment setup and surroundings during each measurement with photographs.



Noise Meter Siting at Appropriate Height

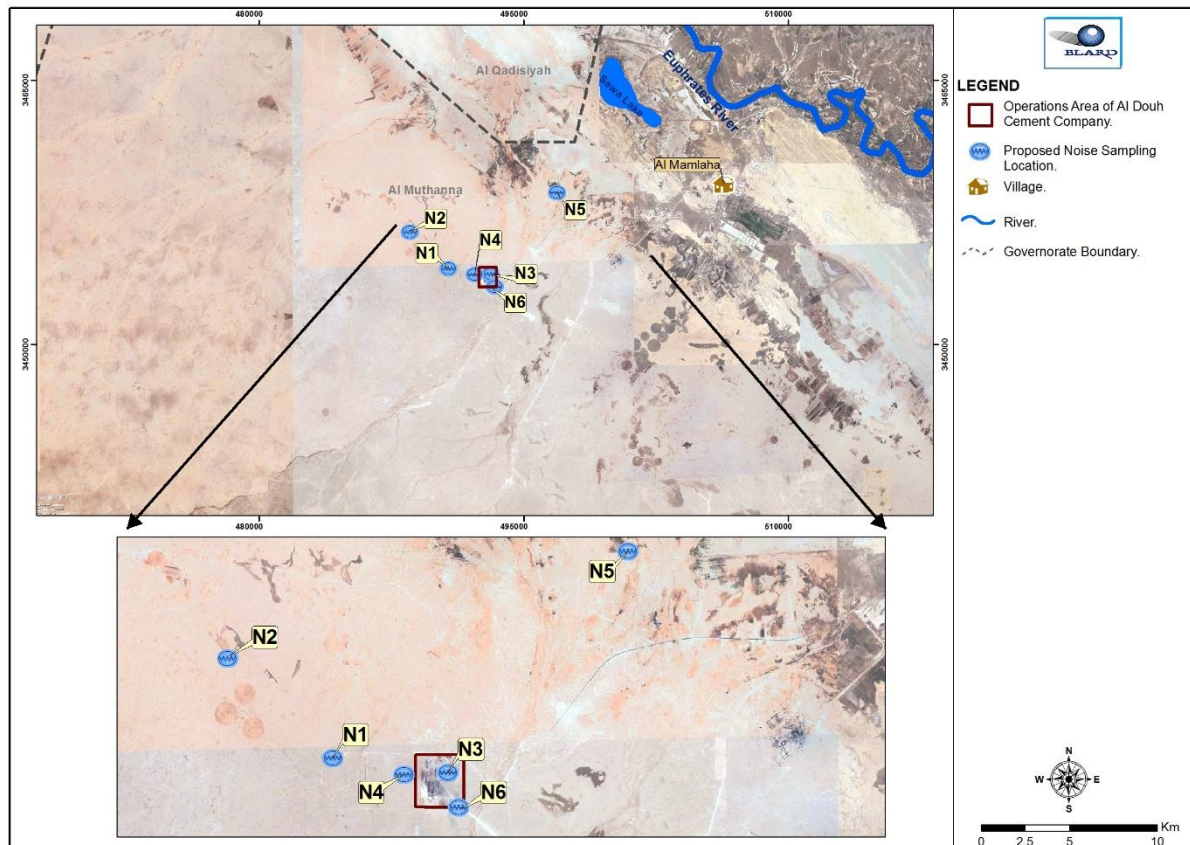
Six (6) Noise baseline samples will be monitored within and in vicinity of the Project site and the limestone Quarry area. Baseline noise levels will be documented using an Integrated Sound Level meter to monitor 30-mn measurements over 24 hrs representing day time and night time, at 6 locations carefully selected. These locations will be based on main sources of Project noise and proximity to sensitive receptors. The exact locations of noise monitoring will be agreed upon during the scoping phase.

The next table presents the coordinates of the proposed locations of noise levels measurements. A map for the proposed locations is shown below.

Proposed Locations of Noise Levels Measurements

Sample ID	Justification	Coordinates according to the World Geographic Coordinates System (WGS 84)	
		Latitude	Longitude
N1	Near existing sensitive receptors (residential areas)	31°13'21.87"N	44°54'9.52"E
N2	Near existing receptors (residential areas) 	31°14'29.07"N	44°52'46.39"E
N3	East of the existing plant	31°13'11.85"N	44°55'40.26"E

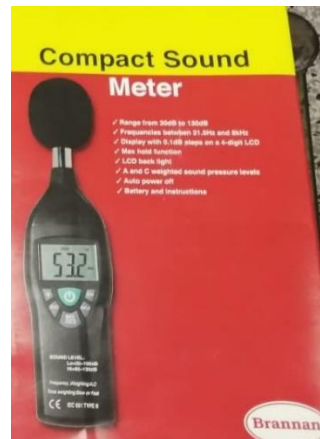
Sample ID	Justification	Coordinates according to the World Geographic Coordinates System (WGS 84)	
		Latitude	Longitude
N4	The Area Where the New Plant Shall be Constructed	31°13'10.75"N	44°55'5.56"E
N5	Near residential houses and green houses	31°15'42.09"N	44°58'1.86"E
N6	South east of the existing power plant, near the limestone quarry	31°12'48.59"N	44°55'48.78"E



Proposed Noise Sampling Locations in the Project Area

The monitoring locations for the noise measurements are selected to be representative of the studied area and away from being influenced by interferences such as wind, impulsive sounds and electromagnetic radiation from high-voltage transmission lines. Activities affecting existing sound levels in the area include noise sources such as:

- Road traffic
- Operation of existing industrial facilities
- Operation of existing military facilities
- Operation of existing transportation and infrastructure facilities
- Other human-related activities and ambient noise such as occasional wind noise and birds chirping.



Sound Level Meter to be Used in Noise Monitoring

APPENDIX E: METHODOLOGY FOR NOISE MODELLING

Noise modeling shall be performed using SoundPLAN for one scenario and by applying standard ISO 9613 which is a standard for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favourable to propagation from sources of known sound emission. These conditions are for downwind propagation, as specified in 5.4.3.3 of ISO 1996-2:1987 or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night. The method also predicts a long-term average A weighted sound pressure level as specified in ISO 1996-1 and ISO 1996-2. The long-term average A weighted sound pressure level encompasses levels for a wide variety of meteorological conditions. The method specified in this part of ISO 9613 consists specifically of octave-band algorithms (with nominal midband frequencies from 63 Hz to 8 kHz) for calculating the attenuation of sound which originates from a point sound source, or an assembly of point sources. The source (or sources) may be moving or stationary. The algorithms cover the following physical effects:

- geometrical divergence;
- atmospheric absorption;
- ground effect;
- reflection from surfaces;
- screening by obstacles.

Using SoundPLAN the output of the model will be displayed in Noise Contours where areas that exceed 85 dB(A) will be highlighted, and if any mitigations are required, they will be shown in the report.

Noise Modelling Requirements:

- Drawings with Equipment Labelled (DWGs)
- List of Normal Operation and Emergency Operation Noise Equipment and their Noise Emission or their Emission Limit Provided to the Vendor
- PIDs and PFDs showing Valves
- List of Normal Operation Valves and Emergency Valves and their Noise Emission or their Emission Limit Provided to the Vendor
- Navis Works 3D Model with Equipment and Valves Searchable In Model
- Company Limits or Requirements
- Legal Limits or Requirements

In the absence of Data, noise levels of machinery shall be estimated depending on their characteristics, catalogues specs and datasheets as provided by the client (ie. RPM , Size) etc.

APPENDIX F: SOIL SAMPLING SURVEY METHODOLOGY

The baseline survey of soil quality will consist of reviewing available previous studies on the Project area and performing on-site soil analysis for physical parameters, and soil sampling for laboratory analysis.

A comprehensive site walkthrough for visual observation shall be undertaken to identify locations where contamination might be present.

Samples shall be taken where evidence of contamination exist and at locations of possible contamination sources from the proposed Project activities in order to document baseline soil quality at the Project site. A total number of six (6) shallow samples will be collected however, the exact number of samples shall be confirmed after the visual observation, and if more samples are required, this will be discussed with the client as it will require additional cost. Samples will be analysed for Total Petroleum Hydrocarbons (TPHCs) and TerrAttesT® list of pollutants. TerrAttesT® is a comprehensive list of 250 pollutants, developed by Eurofins Analytico Laboratory of The Netherlands that includes poly aromatic hydrocarbons (PAH), volatile organic carbons (VOCs), pesticides, PCBs, and metals.

Additionally, field measurements of soil pH, salinity and temperature will be made for all the samples to be collected, using portable using portable pH, Salinity, and Temperature soil meters. All equipment will be calibrated as per manufacturers' recommendations.

All samples shall be collected following the Soil Sampling Procedures explained below, and which follow the:

- International Standard ISO 10381-1: 2002 on Soil quality – Sampling – Guidance on the design of sampling programmes,
- International Standard ISO 10381-2:2002 on Soil quality – Sampling – Guidance on sampling techniques, and
- New Jersey Department of Environmental Protection (NJDEP) Field Sampling Procedures Manual 2005.

Soil samples shall be collected at each sampling location using an backhoe/Soil Sampling Kit. These shall be cleaned and decontaminated before sampling and between different locations.

The collection of samples will follow a set procedure that will ensure cross-contamination does not occur and that the samples taken reflect the soil quality at the time of sampling, as follows:

- a. Use a decontaminated stainless steel scoop²⁶ to fill the sampling jar provided by Eurofins Analytico laboratory;
- b. Put the remaining soil in an aluminium foil;

²⁶ The stainless steel scoops will be decontaminated before going to field using the following eight steps' procedure:

1. Wash using laboratory grade glassware detergent plus tap water wash; 2. Rinse with tap water;
3. Rinse with distilled and de-ionised water ; 4. Rinse with a solution of 10% nitric acid;
5. Rinse with distilled and deionized water; 6. Rinse with acetone;
7. Leave it to dry completely; 8. Rinse with distilled and de-ionised water

Each scoop will be wrapped and/or sealed after decontamination, and dedicated to a particular sampling point.

- c. Measure pH, salinity and temperature;
- d. Take a photograph of sample location, the soil samples in the aluminium foil, and the sample jar with a label showing the Soil Bore ID, Sample ID. A small graduated ruler should be placed on the aluminium foil when the pictures of the soil sample are taken.
- e. Close the sample Jar and label it to include Date, Time, Sample ID, Borehole ID, and Project Reference. Label should be written using waterproof marker pen.

Site decontamination procedures for sampling equipment shall be clearly communicated to the samplers. If site decontamination is needed, the sampler will use the same decontamination steps outlined in Footnote 1 above for the stainless steel scoops.

All field activities shall be recorded in the Soil Field Sampling Sheet. Every sampling location shall have a completed sheet and samples' collection shall be documented by photographs.

In the absence of Iraqi soil standards, soil analysis results will be compared to the Dutch Intervention Values²⁷ (DIV) for soil quality.

²⁷The soil remediation intervention values indicate when the functional properties of the soil for humans, plants and animals is seriously impaired or threatened. They are representative of the level of contamination above which a serious case of soil contamination is deemed to exist. The intervention values for metals and arsenic, with the exception of antimony, molybdenum, selenium, tellurium, thallium and silver depend on the clay content and/or the organic matter content. In assessing the quality of the soil, the values for a standard soil are converted to values applying to the actual soil concerned on the basis of the measured organic material (measured by percentage weight lost by volatilisation, on the total dry weight of the soil) and clay content (the percentage by weight of the total dry material comprising mineral particle matter with a diameter of less than 2 µm). The converted values can then be compared with the measured concentrations in the soil (VROM, 2000).

APPENDIX G: GROUNDWATER SAMPLING METHODOLOGY

Four (4) Groundwater samples will be collected from existing water points (water wells).

One round of groundwater samples shall be collected from all the wells. The samples will be analysed for TerrAttesT® list of pollutants. TerrAttesT® is a comprehensive list of 250 pollutants, developed by Eurofins Analytico Laboratory of The Netherlands that includes poly aromatic hydrocarbons (PAH), volatile organic carbons (VOCs), pesticides, PCBs, and metals.

During sampling, field measurements of water temperature, conductivity, and dissolved oxygen will be taken using a multi-parameter water quality monitoring probe. Proper calibration procedures shall be followed prior to measurements.

All samples shall be collected following the groundwater Sampling procedures explained below, and which follow the:

- International Standard ISO 5667-11:2009 on Water quality – Sampling – Guidance on sampling of groundwater;
- New Jersey Department of Environmental Protection (NJDEP) Field Sampling Procedures Manual 2005;
- International Standard ISO 5667-22: 2010 on Water quality - Sampling – Guidance on the design and installation of groundwater monitoring points; and
- Relevant ASTM Standard Guides and Practices for sampling of groundwater wells and reporting results of analysis of water.

The groundwater samples shall be collected as per the following procedure:

Turn on well pump, or lower a dedicated pump into the well.

Turn the pump on, to start purging the well. Pump at least three (3) times the volume of water in the well before collecting the sample:

A. Calculate Purge volume, $V_p = 3 (\pi / 4) d_B^2 L$ where,

- D_B : diameter of the borehole
- L : length of water column in the well

B. Measure the discharge rate of the well

C. Calculate the time needed to discharge the required purge volume

Start taking measurements of temperature, conductivity and DO with In-situ tests as soon as the pump is turned on at a frequency of 2 to 3 minutes. The temperature, conductivity and DO readings shall be recorded at a frequency of 2 to 3 minutes.

Measure the average discharge flow using a small container and a stop watch.

After purging three (3) well volumes, observe closely the measurements to ensure that measurements have stabilized for at least 5 readings. If stabilization is not met, purging time should be extended.

Once the temperature, conductivity and DO readings have stabilised, collect the water samples using the dedicated bottles provided by Eurofins Analytico Laboratory.

Appropriately label and store the samples:

- The label should include Date, Time, Sample ID, Well ID, and Project Reference
- The label should be written with waterproof marker pen.
- Storage should follow Eurofins Analytico's instructions for storage and shipment.

Collection of Duplicate Samples

Duplicate samples help in the evaluation of the laboratory's and field sampling team's performance by comparing analytical results of two samples from the same location and are collected as follows:

- Choose the well from where to collect the duplicate sample.
- Fill the vials for duplicate sample using the same procedure as the original sample.
- Submit the duplicate sample to the laboratory as a "blind" sample, i.e. the sample will not be labelled for its location but a record should be kept with the sampler as for where the sample was collected.

Field Blanks

All sampling equipment, which comes in contact with the sample, must also come into contact with the field blank water. The field blank sample is collected as follows:

- Choose the well to be tested for field blank.
- Pour de-ionised water supplied by the laboratory through the bailer used for collecting the original sample into a clean vial provided by the laboratory as well.
- Label and store the field blank in the same way as collected samples.

The Field blank will be analysed for the same parameters as the collected samples.

All field activities will be recorded in the Groundwater Field Sampling Sheet. Every sample shall have a completed sheet and the collection process shall be documented by photographs.

APPENDIX H: SOCIO-ECONOMICS AND LAND OWNERSHIP BASELINE SURVEY PLAN METHODOLOGY

1. DESK REVIEW AND SECONDARY DATA COLLECTION

In a first phase, an extensive desk review of existing data records, studies, and publications on the study area shall be performed. A listing of all the existing data shall be compiled and the accuracy of the gathered data shall be judged.

Examples of the data that characterise the lands and the socio-economic conditions of the area are demographics, social structure, local economy and income, employment levels by sector, education and literacy levels, migration patterns, land use and land ownership, as well as related legislations (e.g. Land ownership, expropriation, and labour laws). The main sources of data would be the reports and census data compiled by the Iraq Central Statistical Organization (CSO), reports published by international agencies, in addition to articles published in Iraqi peer-reviewed journals.

As part of the desk study as well, an analysis of satellite imagery will be used to identify the human settlements near the Project site and the density of the populated areas (high, middle and low).

2. FIELD SURVEYS AND PRIMARY DATA COLLECTION

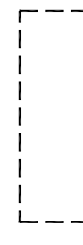
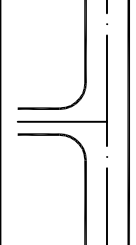
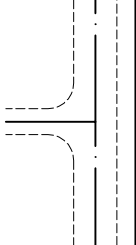
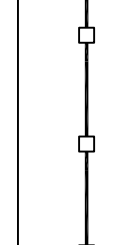
Surveys and field studies will be carried out in order to collect qualitative and quantitative information to be analysed by the local team. At first, a drive-through/walk-over survey will be conducted as part of the site reconnaissance and will cover the area in order to identify settlements, populated areas, residential areas, etc. Then a detailed survey will be conducted at the identified settlements in the Project area of influence.

The socio-economics survey will allow to:

- Collect more accurate data about the number of households, and identify others (if any);
- Document the living conditions of the populations living within the identified settlements **using a structured questionnaire**, which will be provided in the scoping report;
- Identify existing facilities (mainly industrial) in the study area and inquire about planned facilities;
- Carry out informal communication with the local communities and key stakeholders (local figureheads, tribal sheikhs, community leaders, land owners and land users ,etc.) to better define the specificities and characteristics of the prevailing socio-economic situation as well as enquire about land ownership, along the right of way;
- Interview key personnel from governmental departments (land registration and local municipalities) to enquire about socio-economic conditions as well as land ownership along the right of way; and
- Engaging and interviewing vulnerable individuals and groups living, working, etc. at proximity of the Project site that may be affected by Project activities during the construction and operation phase.

APPENDIX I: LAYOUT OF EXISTING AL DOUH CEMENT PLANT

No.	编号	NAME	材料
①	211	Limestone/Cray Crushing & Conveying	石灰石、粘土破碎及输送
②	212	Limestone and Clay Pre-heating & conveying	石灰石、粘土干燥及输送
③	232	Concrete and Additive Pre-blending & Conveying	校正剂、辅助剂及输送
④	331	Raw Mill Feed System	原料喂料系统
⑤	331	Raw Mill Grinding	生料磨
⑥	421	Destacking of Raw Mill & Preheater	窑前熟料冷却
⑦	331	Raw Mill Homogenizing & Silica Feeding	生料均化及石英粉系统
⑧	451	Preheating and Precalcining	窑尾
⑨	461	Rotary Kiln & Tertiary Air Duct	窑中
⑩	471	Clinker Cooling	熟料冷却机
⑪	423	Clinker Cooler Destacking	熟料冷却机喂料
⑫	002	compressed Air station	压缩空气罐
⑬	422	Bypass system	旁路系统
⑭	001	Burning Boiler Room	重油燃烧炉
⑮	001	Electrical Room for Limestone and Clay Crushing System	石灰石及粘土破碎机电室
⑯	001	HFO tank	重油储存
⑰	001	Refractory Storage	耐火材料库
⑱	001	Water Purifier Plant (Owner self-dependence)	废水处理厂 (业主自理)
⑲	001	Fire Pump for FPD	油罐区消防泵房
⑳	001	Pump Station for HFO	重油罐区水泵房
㉑	001	Weight Bridge	地磅
㉒	001	Weight Bridge	窑尾熟料冷却带秤机
㉓	001	Electrical Room for Raw Mill Grinding System	生料磨机电室
㉔	001	Electrical Room for Preheater	窑尾机电室
㉕	001	Electrical Room for Clinker Cooling System	熟料冷却机电室
㉖	001	Raw Mill Grinding	生料磨水泵房
㉗	001	Power Plant	电站

SHAPE	NAME
	THE BUILDINGS IN THIS STAGE DEFERABLE CONSTRUCTION
	EXISTING BUILDINGS
	DEVELOPMENT OF BUILDING
	SELF-BUILDING OWNERS
	THE BELT CONNECTING CHANNEL
	THE ROADS IN THIS STAGE
	EXISTING ROAD
	THE ENCLOSURE
	elevation of floor level elevation of leveled ground

[illegible]