
DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (CHAPTER 1 - INTRODUCTION)



JULY 2026

ANKARA



DOWNTOWN SLEMANI PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By				Quality Management By	Checked By	Approved By
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Revision Codes: A: Draft, B: Final Draft, C: Final

Project No: 25 / 026

JULY 2026

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TABLE OF CONTENTS

	<u>Page</u>
1 INTRODUCTION	1
1.1 Project Overview	2
1.2 Project Justification	2
1.3 ESIA Requirements	3
1.4 Key Steps in the ESIA Process	3
1.5 Outline of the ESIA Report	4

LIST OF TABLES

	<u>Page</u>
Table 1-1. ESIA Report Structure	4

LIST OF FIGURES

	<u>Page</u>
Figure 1-1. ESIA Process	4

ABBREVIATIONS

Aol	Area of Influence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
IFC	International Finance Corporation
IFI	International Financial Institution
KRI	Kurdistan Region of Iraq
PS	Performance Standard

1 INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) has been prepared for the Downtown Slemani Mixed-Use Urban Development Project (“the Project”), commissioned by Hiwa Rauf for Investment and Development Ltd (the “Project Owner”). The ESIA aims to assess, in a comprehensive and systematic manner, the potential environmental and social impacts associated with the planning, construction and operation of the Project, in alignment with the International Finance Corporation (IFC) Performance Standards (PS1–PS8), other applicable international good practice, and the regulatory framework of the Kurdistan Region of Iraq (KRI).

The Project will be developed as a major mixed-use complex occupying approximately 100,000 m² within the central urban fabric of Sulaymaniyah. The development comprises five residential towers (39 to 45 storeys each, approximately 1,400 apartments), one office tower, a 5-star hotel (100 keys), an entertainment centre and mall, a performance centre, and substantial landscaped public space. Its location- surrounded by residential areas, industrial uses, civic and institutional buildings, and commercial activity - means that the Project is expected to influence transportation and mobility patterns, the character and use of public realm, community dynamics, and socio-economic activity across a wider urban context.

The purpose of this ESIA is to identify and evaluate the Project’s environmental and social risks and opportunities, ensure that potential adverse impacts are avoided, minimized or mitigated, and maximize potential benefits for affected communities. Where adverse impacts are identified, mitigation measures have been developed following a structured mitigation hierarchy, prioritising impact avoidance, followed by minimisation, mitigation, and, where relevant, compensation.

The assessment has been commissioned in accordance with the International Finance Corporation (IFC) Performance Standards (PS1–PS8), the World Bank Group Environmental, Health and Safety (EHS) Guidelines, and internationally recognized ESIA good practice, alongside applicable national and regional requirements issued by the Kurdistan Regional Government.

The ESIA includes baseline studies to establish existing physical, biological and socio-economic conditions within the Project’s defined Area of Influence (AoI). The AoI reflects both the Project footprint and surrounding zones in which direct, indirect, cumulative, induced or transboundary impacts may be experienced. Data collection includes field studies and desk-based analysis relating to air quality, noise, topography and soil conditions, groundwater, terrestrial ecology, mobility and traffic, visual landscape, cultural heritage, land use, socioeconomics and community health and safety. The findings of these baseline assessments form the evidence base against which impacts are evaluated under the ESIA.

Stakeholder engagement represents an integral component of this ESIA. Consultation activities have been planned to ensure that affected populations, institutional actors and other interested parties are informed about the Project, are able to express views and concerns, and have opportunities to contribute input to decision-making. Engagement activities include institutional meetings, household and community-level interactions, and the establishment of a grievance mechanism to enable ongoing two-way communication throughout the Project lifecycle.

This ESIA Report presents the outcomes of the impact assessment, including significance ratings, mitigation measures and enhancements, and culminates in an Environmental and Social Management Plan (ESMP). The ESMP defines implementation responsibilities, monitoring requirements, timelines and reporting procedures to ensure that the Project is delivered in a manner consistent with international environmental and social standards and respectful of the expectations of the communities of Sulaymaniyah. Collectively, the ESIA and ESMP provide a key input to the Project's Environmental and Social Management System (ESMS), supporting the systematic implementation, monitoring, and continual improvement of environmental and social risk management measures throughout the Project lifecycle.

1.1 Project Background

Hiwa Rauf for Investment and Development is planning to undertake a transformative mixed-use development project titled "Downtown Slemani", located in the city of Sulaymaniyah within the Kurdistan Region of Iraq. The development spans approximately 100,000 m² and is envisioned as a major urban landmark integrating residential, commercial, cultural, hospitality, and office functions in a single complex. Given its scale and anticipated footprint, the Project requires a comprehensive Environmental and Social Impact Assessment (ESIA) to identify, evaluate, and mitigate environmental and social risks in compliance with both national legislation and international best practice.

In response to this requirement, ProDESIGN Engineering Company, LTD, together with 2U1K International Limited, has been requested to prepare the ESIA report in accordance with International Finance Corporation (IFC) Performance Standards (PS1–PS8), World Bank Group EHS Guidelines provisions.

1.2 Project Justification

The Downtown Slemani Mixed-Use Urban Development Project is a landmark urban transformation and investment initiative proposed in the heart of Sulaymaniyah, Kurdistan Region of Iraq. Construction is scheduled to begin following ESIA approval and permitting, with phased development expected over a multi-year period. The Project responds to the city's rapidly growing population, increasing housing pressures, rising demand for high-quality urban services, and the need for modern residential, commercial, and hospitality facilities within a consolidated and well-planned setting.

Sulaymaniyah is undergoing a period of accelerated socio-economic growth, yet the city continues to face challenges including fragmented development, limited public green space, insufficient high-density housing options, and congestion caused by unplanned urban expansion. The Project is strategically positioned to address these gaps by introducing a vertically integrated mixed-use complex that optimizes land efficiency, brings new economic opportunities, and enhances the liveability of the city centre. Through the creation of approximately 1,400 modern residential units, a Grade-A office tower, a 5-star hotel, retail and leisure destinations, and publicly accessible landscaped spaces, the Project aims to elevate urban living standards and support Sulaymaniyah's evolution into a competitive regional hub.

1.3 ESIA Requirements

The Project owner is planning to seek financing from international financial institutions. Accordingly, the Project is committed to complying lender's environmental and social requirements, relevant Iraqi national legislation and regulations, and international environmental and social standards and guidelines, including, but not limited to, the International Finance Corporation (IFC) Performance Standards (PSs) and. On behalf of the Project Owner, 2U1K Engineering and Consultancy prepared this Environmental and Social Impact Assessment (ESIA) report for submission to potential lenders.

The purpose of the ESIA study is to describe the Project, identify potential and actual environmental and social impacts arising from its implementation, and propose appropriate mitigation measures to prevent, reduce, or offset negative effects while enhancing potential benefits. This document constitutes the Draft ESIA Report, prepared in accordance with both the requirements of the Financing Institutions (FIs) and the relevant national regulations, as outlined in Chapter 4: Institutional and Regulatory Framework and *Chapter 5: Scope and Methodology of the ESIA*.

The mitigation measures identified in the ESIA study are detailed in the accompanying Environmental and Social Management Plan (ESMP). The ESMP outlines the procedures for implementing the mitigation actions proposed in the ESIA and is provided in *Annex-A*.

1.4 Key Steps in the ESIA Process

ESIA is a systematic process that predicts and evaluates the impacts of a project on various aspects of the physical, biological, cultural and socioeconomic environment. This is followed by the identification of appropriate mitigation measures to avoid, reduce, remedy, offset or compensate for adverse impacts relevant to the nature and scale of the project. The key steps of the ESIA process are presented in Figure 1-1.

Information about the key steps outlined below is described in *Chapter 5: Scope and Methodology of the ESIA*.

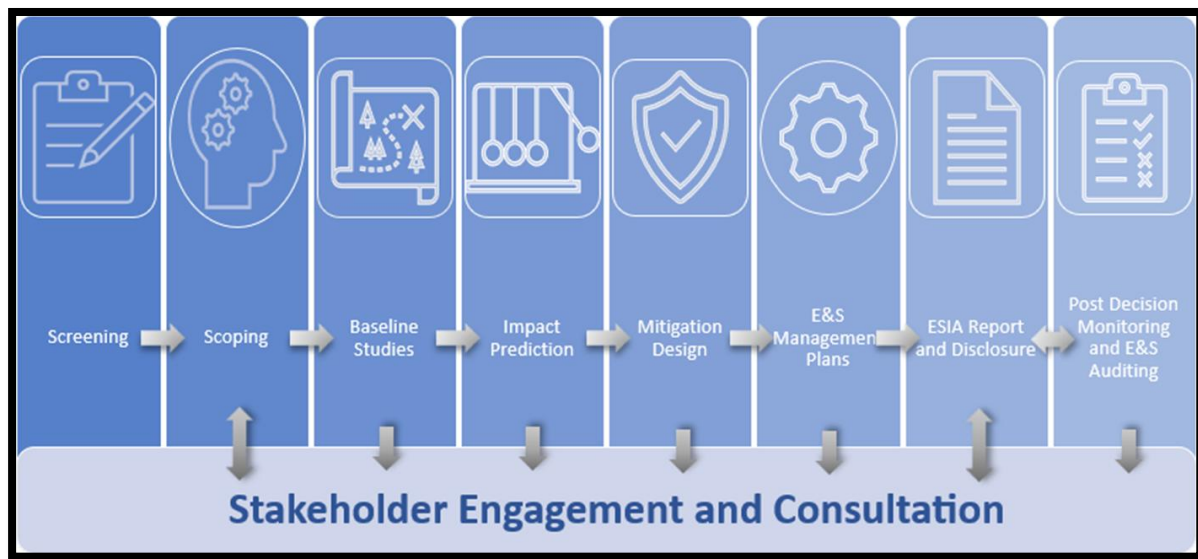


Figure 1-1. ESIA Process

1.5 Outline of the ESIA Report

The structure of the ESIA report is outlined below in Table 1-1.

Table 1-1. ESIA Report Structure

Chapter	Contents
Chapter 1 – Introduction	Presents a brief background to the proposed Project, Project rationale, the national EIA and international ESIA processes and the purpose and structure of the ESIA report
Chapter 2 – Project Description	Describes the proposed Project components, including an overview of ancillary infrastructure / Project activities
Chapter 3 – Project Alternatives	Discusses the Project alternatives that have been considered in the ESIA process
Chapter 4 – Institutional and Regulatory Framework	Describes the legislative, policy and administrative requirements, as well as international good practice requirements applicable to the proposed Project
Chapter 5 – Scope and Methodology	Describes the ESIA Process followed for the proposed Project and the associated impact assessment methodology employed
Chapter 6 – Environmental and Social Baseline	Provides a detailed baseline assessment of environmental and social conditions including hydrology and hydrogeology, geology and soils characteristics, sediment transport, land use and zoning, natural disaster risk, material resources, climate and meteorology, air quality, noise and vibration, waste and wastewater

Chapter	Contents
	management, biodiversity, traffic, cultural heritage and social baseline conditions.
Chapter 7 – Environmental and Social Risks and Impacts and Mitigation Measures	Presents the predicted impacts to environment and socio-economic as a result of the proposed Project Presents the management and mitigation measures
Chapter 8 – Stakeholder Engagement	Summarises the stakeholder engagement activities undertaken for the ESIA Project to date
Chapter 9 – Environmental and Social Management	Introduces the Environmental and Social Management that present the mitigation measures for the identified environmental and social impacts with the proposed monitoring activities and responsible parties
Appendices	Contains a list of appendices within the ESIA Report

The ESIA Report is supported by the following appendices:

- Annex A: Environmental and Social Management Plan
- Annex B: Title Deed Documents
- Annex C: Official Letters
- Annex D: Environmental Baseline Analysis Reports

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (CHAPTER 2 – PROJECT DESCRIPTION)



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TABLE OF CONTENTS

	<u>Page</u>
2 PROJECT DESCRIPTION.....	1
2.1 Project Location	1
2.2 Project Components	4
2.3 Main Phases of the Project	5
2.3.1 Pre-Construction Phase	5
2.3.2 Construction Phase.....	5
2.3.3 Operation	7

LIST OF TABLES

	<u>Page</u>
Table 2-1. Project Site Corner Coordinates (Decimal Degrees).....	1
Table 2-2. Construction Phases and Manpower Numbers for the Project.....	6
Table 2-3. List of Equipment that will be used during the construction Phase.....	6

LIST OF FIGURES

	<u>Page</u>
Figure 2-1. Project Area Location Map	3
Figure 2-2. Layout of the Project Components	4

ABBREVIATIONS

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2 PROJECT DESCRIPTION

The Project is located in the city of Sulaymaniyah in the Kurdistan Region of Iraq, situated within a central urban district approximately 1.2 km southeast of the Governorate complex and in proximity to major municipal services and transportation corridors. The Project site covers an area of approximately 10 ha (100,000 m²), currently vacant and designated for development under local municipal land-use plans.

Vehicle access to the Project will be facilitated through existing city collector roads, with internal circulation designed to ensure separation of pedestrian and vehicular flows. Public mobility will also be supported by the provision of designated taxi drop-off zones, pedestrian-first access routes and integration with public transport nodes planned in coordination with the Municipality.

2.1 Project Location

The Downtown Slemani Project consists of a large-scale mixed-use development located in the urban core of Sulaymaniyah, strategically positioned near key city nodes such as the University of Sulaimani, the Judicial Court, and Malik Mahmoud Ring Road. The project footprint covers approximately 100,000 m², situated within a predominantly residential and industrial matrix, with neighbouring land uses including retail, government facilities, office space and vacant lands.

According to the Master Plan shared by the client, the development will include:

- Five (5) high-rise residential towers, each 39 to 45 floors, totalling approximately 1,400 apartments
- One (1) office tower
- A 5-star hotel with 100 keys
- An Entertainment Centre and Mall
- A performance centre
- Extensive open and landscaped spaces, comprising the project area, prioritizing walkability, public realm use, and community interaction.

The project intends to catalyse urban transformation by enhancing the liveability and commercial attractiveness of central Sulaymaniyah, contributing long-term social and economic value to the region.

The boundary of the site is defined by the corner coordinates presented in Table 2-1.

Table 2-1. Project Site Corner Coordinates (Decimal Degrees)

Point	Latitude	Longitude
1	35.563956246	45.381475245
2	35.561852533	45.379925289

Point	Latitude	Longitude
3	35.561711296	45.379822884
4	35.561575164	45.380846137
5	35.561335899	45.384386973
6	35.563842352	45.386265598
7	35.563811059	45.384349135
8	35.563885105	45.383181228

Location of the project is shown in Figure 2-1.

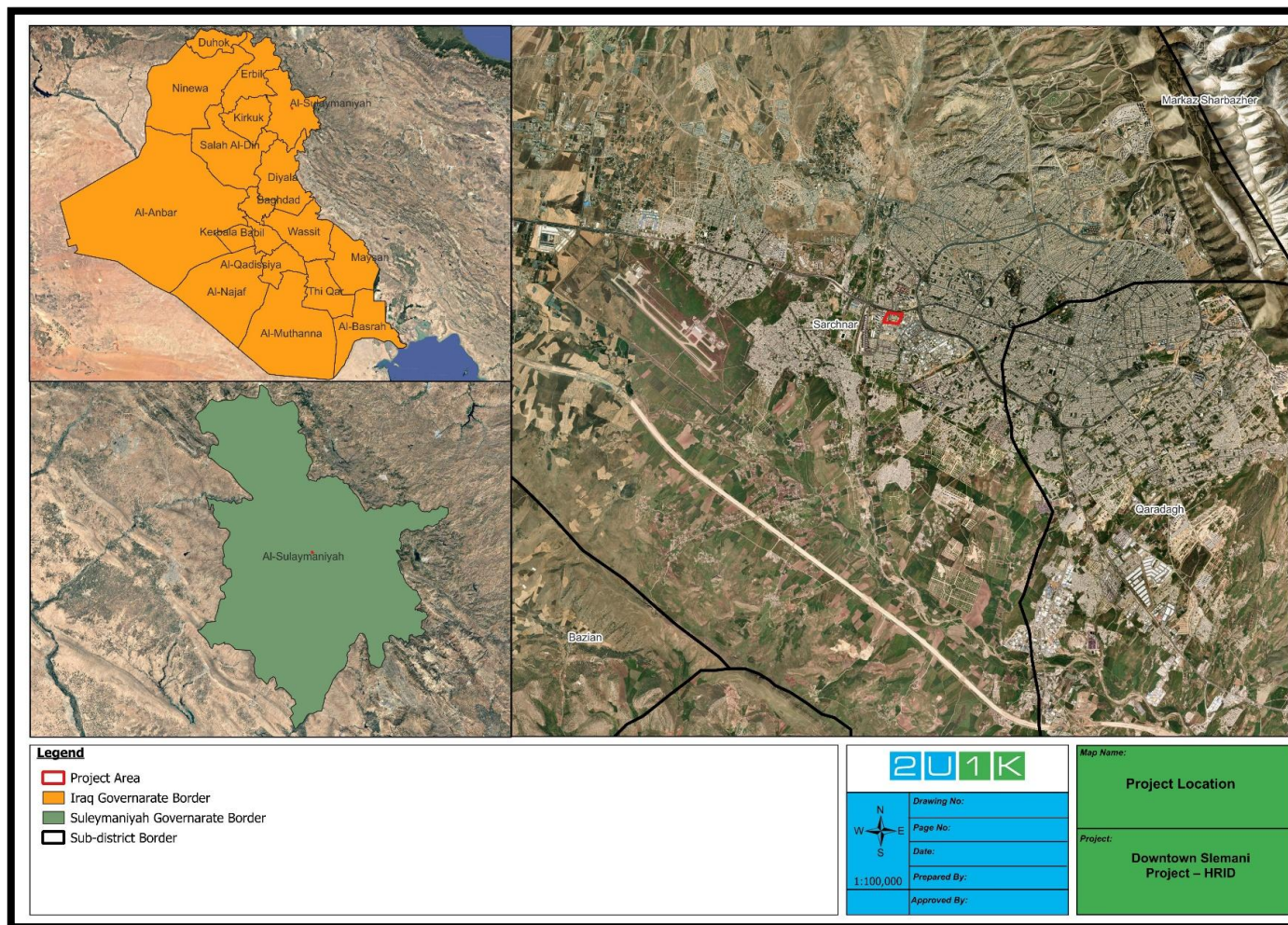


Figure 2-1. Project Area Location Map

2.2 Project Components

The project is composed of residential units, commercial mall, office space, hotel and performance centre. The layout of the final concept design that is selected to be constructed is provided below Figure 2-2. Each component of the project is briefly described below.



Figure 2-2. Layout of the Project Components

Residential Units

Five residential towers (39 to 45 storeys each, approximately 1,400 apartments).

Commercial Mall

An entertainment centre and mall will be constructed in the project area featuring a wide range of facilities, children's play areas, entertainment venues, fashion and cosmetic outlets, and diverse food and beverage options.

Office Spaces

The project introduces the city's first premium-grade office spaces, establishing a new benchmark for commercial real estate by integrating professional work environments with comprehensive lifestyle amenities.

Hotel Building

The project will introduce an upper-upscale hotel comprising approximately 100 rooms.

Performance Centre

A performance centre will be constructed that is planned to host approximately 250 events annually and will serve an estimated population of 90,000 residents within a 15-minute walking radius.

2.3 Main Phases of the Project

Main phases of the Project will include:

- Pre-construction: Site preparation, mobilization of equipment and materials to the Project site, establishment of the camp site.
- Construction: installation of utilities, internal roads, landscaping, and supporting facilities.
- Operation: all routine and non-routine activities associated with the day-to-day functioning, maintenance, and management of the development, including residential living, commercial operations, hospitality services, and office activities.

2.3.1 Pre-Construction Phase

The pre-construction phase includes essential preparatory works to ready the site for construction. Activities will begin with vegetation clearance and topsoil stripping, followed by topsoil storage in a designated area to prevent erosion and degradation.

Subsequently, existing structures within the project footprint will be demolished in compliance with safety and environmental regulations. The phase will conclude with mobilization of machinery, equipment, and materials, along with the establishment of temporary site facilities.

These activities collectively ensure that the site is properly prepared for the start of the construction phase.

2.3.2 Construction Phase

The construction phase comprises all activities associated with the physical development of the Project, commencing after the completion of pre-construction works and continuing until the completion and commissioning of all Project components. This phase involves the construction of residential buildings, the commercial mall, office spaces, hotel facilities, the performance centre, and associated infrastructure in accordance with the approved design and technical specifications.

Construction activities will include earthworks, foundation and structural works, and the erection of reinforced concrete and steel structures. This will be followed by architectural works, façade installation, roofing, and internal finishing. Mechanical, electrical, and plumbing systems, including water supply, wastewater drainage, electrical networks, heating, ventilation and air conditioning, fire protection, and communication systems, will be installed across all Project components.

In parallel, supporting infrastructure such as internal road networks, pedestrian pathways, parking facilities, stormwater drainage systems, and utility connections will be developed. Landscaping works, including the establishment of green areas, irrigation systems, and outdoor public spaces, will be undertaken during the later stages of this phase.

Temporary construction facilities, including site offices, and warehouses will remain in operation throughout this phase. Construction activities will be carried out using heavy machinery, equipment, and vehicles for material transport and on-site works.

The construction of the project is divided into two phases, number of workers for each year is provided as below:

Table 2-2. Construction Phases and Manpower Numbers for the Project

Phases	Duration	Buildings	Direct Manpower
Phase 01	2026 - 2028	Tower 00 + Mall	890
Phase 02	2027 - 2031	Tower 01 to 04 + Office Tower + Hotel + Performance Hall	960

The equipment that is required for the construction of the project are listed below in Table 2-3. The equipment is planned to be provided by the contractors.

Table 2-3. List of Equipment that will be used during the construction Phase

Equipment	Number of Equipment
SUV 4x4	2
Truck Mixer	10
Concrete Pump Truck Mounted	5
Concrete Mixing Plant	1
Crawler Excavator	2
Wheeled Excavator	1
Wheel Loader	1
Skid Steer Loader	1
Backhoe Loader	4
Boom Truck	1
Dump Truck	5
Truck Tractor	2
Water Truck	2
Agricultural Tractor	2
Compactor	1
Forklift	5
Air Compressor	3
Telehandler	5

Equipment	Number of Equipment
Manlift	4
Steel Bar Bending Machine	5
Steel Bar Cutting Machine	5
Drilling Rig	1
Vibratory Hammer with Powerpack	2
Piling Rig	2

2.3.3 Operation

The operation phase commences following the successful completion of construction and commissioning activities and continues throughout the functional life of the Project. During this phase, the residential, commercial, hospitality, office, and performance facilities will become fully operational and occupied by residents, tenants, employees, visitors, and service providers.

Residential units will be occupied by permanent residents, who will utilize common facilities, parking areas, and landscaped spaces. The commercial mall will host retail outlets, entertainment venues, and food and beverage establishments, attract daily visitors and generate regular customer and supplier traffic. Office spaces will accommodate business and administrative activities, supported by information technology and communication systems.

The hotel component will provide accommodation and hospitality services to guests, including reception, housekeeping, catering, and conference services. The performance centre will host cultural, entertainment, and community events, with an estimated frequency of approximately 250 events per year, serving both local residents and visitors.

Operation-phase activities will include routine facility management, building maintenance, security services, cleaning, landscaping, waste management, and utility management. Water and energy consumption, wastewater generation, and solid waste production will occur on a continuous basis and will be managed in accordance with regulatory requirements and best practice standards.

Traffic management, parking control, emergency response, and public safety measures will be implemented to ensure the safe and efficient functioning of the development. Regular inspections and preventive maintenance programs will be undertaken to maintain structural integrity, operational efficiency, and user comfort.

The Project will be operated in compliance with applicable national legislation, local authority requirements, and international environmental and social performance standards, with the aim of minimizing long-term environmental impacts, ensuring public and occupational safety, and maximizing socio-economic benefits to the surrounding community.

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (CHAPTER 3 – PROJECT ALTERNATIVES)



JULY 2026

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TABLE OF CONTENTS

	<u>Page</u>
3 PROJECT ALTERNATIVES	1
3.1 No Project Alternative	1
3.2 Design and Development Alternatives	1
3.3 Project Location Alternatives	2

LIST OF TABLES

	<u>Page</u>
Table 3-1. AHP Summary for the Selected Site	2

ABBREVIATIONS

AHP	Analytic Hierarchy Process
ESIA	Environmental and Social Impact Assessment

3 PROJECT ALTERNATIVES

This chapter summarizes the alternatives considered during Project planning and explains the rationale for selecting the preferred development option for the Downtown Slemani Mixed-Use Urban Development Project. Alternatives were evaluated based on environmental and social considerations, land-use context, feasibility, stakeholder expectations, economic value generation, and alignment with broader municipal and regional development priorities.

3.1 No Project Alternative

The “no-project” scenario refers to a future state in which the proposed development does not proceed. Under this scenario, no construction activities would take place, and therefore no environmental or social disturbances, including temporary construction impacts such as noise, dust, traffic, worker influx or land disturbance, would occur.

However, Sulaymaniyah currently faces several urban challenges, including population growth, increasing residential demand, fragmented land-use patterns, lack of high-quality public green space, and limited availability of modern residential and commercial stock. Without the Project, these gaps would persist or intensify. Economic and social benefits, such as employment generation, increased investment inflow, tourism and hospitality revenues, public space improvements, and expanded commercial activity, would not be realized. Moreover, the area would remain underutilized and would not catalyse improvements in connectivity, urban liveability or socio-economic activity in the central city.

Given Sulaymaniyah’s strategic need for integrated high-density housing, office space, and hospitality-driven development, and the Project’s role in accommodating modern urban demand within a compact footprint, the no-project scenario is not regarded as a viable option from a socio-economic or long-term urban sustainability perspective.

3.2 Design and Development Alternatives

During Project concept development, alternative development models were screened to determine the most suitable typology for the selected site. Design alternatives were reviewed based on land efficiency, transport integration, compatibility with surrounding land uses, ability to provide public-realm benefits, economic viability and stakeholder expectations. Alternatives were limited to design and functional variations within a mixed-use urban development concept, rather than fundamentally different land uses.

The selected option adopts a high-density vertical mixed-use structure consisting of multiple residential towers, an office tower, hotel, retail spaces, performance centre and publicly accessible landscaped areas. This approach maximizes land efficiency, minimizes spatial footprint, consolidates functions to reduce mobility demand, and supports walkability and

transit-integration. It reflects global best practice for compact city development and aligns with regional planning ambitions for Sulaymaniyah.

3.3 Project Location Alternatives

A site selection process was conducted at the conceptual stage to identify suitable locations for a mixed-use landmark development within the Sulaymaniyah metropolitan area. Two potential sites within the central-urban zoning boundaries were compared. The screening considered environmental, social, logistical and administrative factors including:

- land ownership and acquisition requirements
- proximity to residential and institutional uses
- access to public transport and mobility corridors
- physical site constraints, including slope and constructability
- compatibility with existing zoning and future masterplans
- potential social impacts including displacement risk.

The project site has a total land area of 100,000 sqm. 74,840 sqm is registered under the project name and is fully dedicated to the project (not owned by the municipality or governorate). The remaining 26,610 sqm is required to be developed exclusively as a green area and pedestrian area.

Therefore, involuntary resettlement and land acquisition impacts are avoided. The area is also located within a zone designated for high-density development, ensuring alignment with local planning strategy.

Table 3-1. AHP Summary for the Selected Site

Criterion	Result for Selected Site	Rationale
Land ownership / acquisition	Public-owned vacant land	No physical or economic displacement; administrative feasibility
Proximity to communities	Adjacent but not overlapping	Allows walkability and integration without requiring relocation
Access & transport	Near city collector roads	Feasible vehicle access; potential for pedestrian-first design
Physical terrain	Mostly flat	Constructability is high
Environmental sensitivities	No protected areas on or near site	Minimal ecological disturbance expected

The selected location is also strategically positioned between residential areas, institutional buildings (including Governorate & Court), commercial corridors and the industrial zone, enabling the Project to function as a connector and catalyst for urban improvement. Its location

within the natural growth boundary of the city reduces sprawl and supports sustainable land-use intensification.

The AHP¹ confirms that the selected site meets the most critical requirements (land ownership, water, grid, settlement buffer) while maintaining acceptable environmental and seismic conditions. This structured evaluation strengthens the justification for site selection by integrating engineering, environmental, and social criteria into a single transparent decision-making framework, appropriate to the scale and urban context of the Project.

Besides the criteria listed above, elevation, terrain properties, seismic conditions and protected areas around the Project Site have also been considered for site selection. Land use and ownership have been important issues during site selection process. To avoid involuntary resettlement, alternative sites were selected from lands owned by the Governorate with barren features.

¹ Within the AHP (Analytic Hierarchy Process) framework, additional parameters such as elevation, terrain characteristics, seismic conditions, and proximity to protected areas were incorporated into the evaluation matrix. These factors were comparatively weighted and analysed to reflect their potential influence on environmental sensitivity, engineering feasibility, and overall project cost. This ensured that the site selection process remained comprehensive, transparent, and consistent with the multi-criteria decision-making approach of AHP.

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (CHAPTER 4 – INSTITUTIONAL AND REGULATORY FRAMEWORK)



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Revision Codes: A: Draft, B: Final Draft, C: Final

Project No: 25 / 026

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TABLE OF CONTENTS

	<u>Page</u>
4 INSTITUTIONAL AND REGULATORY FRAMEWORK	1
4.1 Governmental Structure	1
4.2 National Legislations	1
4.3 International Requirements	4

LIST OF TABLES

	<u>Page</u>
Table 4-1. Applicable Legislations Relevant to the Project	2

ABBREVIATIONS

EHS	Environment, Health, and Safety
EIA	Environmental Impact Assessment
EPI	Environment Protection and Improvement
ESIA	Environmental and Social Impact Assessment
IFC	International Finance Corporation
KRG	Kurdistan Regional Government
KRI	Kurdistan Region of Iraq
PS	Performance Standard

4 INSTITUTIONAL AND REGULATORY FRAMEWORK

The Chapter outlines the national and international standards that should be met/followed from the construction to the Project's lifetime. In this context, in case of differences between national regulation and international standards, the most stringent requirement will be taken into account.

4.1 Governmental Structure

The Kurdistan Regional Government (KRG) is the official governing authority of the Kurdistan Region of Iraq (KRI), operating within the federal framework of the Republic of Iraq as recognized under the Iraqi Constitution of 2005. The Kurdistan Region has a constitutionally acknowledged degree of administrative, political, and fiscal autonomy, with its own executive, legislative, and judicial institutions.

Legislative power within the Kurdistan Region is vested in the Kurdistan Parliament, a unicameral legislative body elected through a proportional representation system. The Kurdistan Parliament is responsible for enacting regional laws, approving policies, endorsing the regional budget, and exercising oversight over the executive branch. Legislation passed by the Parliament applies within the territorial boundaries of the Kurdistan Region, provided it does not contradict the federal constitution of Iraq.

Executive authority is exercised by the Kurdistan Regional Government, which is headed by the Prime Minister and the Council of Ministers. The Prime Minister is appointed in accordance with parliamentary procedures and is responsible for forming the cabinet, implementing laws, and managing day-to-day governmental affairs. The Council of Ministers comprises various ministries and public authorities responsible for sectoral governance, including but not limited to natural resources, electricity, environment, health, education, municipalities, and infrastructure development.

The judiciary of the Kurdistan Region operates independently and is responsible for the administration of justice in accordance with regional and federal laws. Judicial authority is exercised through courts established within the Region, including courts of first instance, appellate courts, and a regional cassation court. The judiciary ensures the rule of law, the protection of rights and freedoms, and the lawful interpretation and application of legislation.

4.2 National Legislations

This section summarises the primary regional legal framework in the Kurdistan Region of Iraq that governs environmental protection, management of impacts, and social safeguards relevant to the Project. These laws establish requirements to prevent, mitigate, and monitor environmental impacts arising from both construction and operation activities, and provide the legal basis for project-level environmental compliance.

The Law for the Protection and Improvement of the Environment in the Kurdistan Region – No. 8 of 2008 is the foundational environmental law in the KRI, enacted by the Kurdistan Parliament to establish regional environmental policy, principles of environmental protection, environmental planning requirements, and environmental permitting obligations.

Under this law, an Environmental Protection and Improvement Board (or equivalent regulatory authority) has been established to oversee enforcement, compliance monitoring, environmental assessments, and issuance of environmental approvals.

An EIA submitted to the Board must, at a minimum:

- Assess and describes the potential positive and negative effects of the Project on environmental components such as air, water, soil, and biodiversity.
- Propose mitigation measures to prevent, control, and treat pollution in accordance with applicable standards.
- Identify alternatives to reduce environmental harm, including alternative technologies or approaches.
- Include contingency plans to respond to potential accidental pollution events.
- Outline provisions to minimize, reuse, and manage waste appropriately.

The Board establishes specific criteria, categories of projects subject to Environmental Impact Assessment (EIA), and procedural requirements through regulatory instruments and guidelines consistent with Law No. 8.

All relevant national legislations are provided in the [Table 4-1](#) below.

Table 4-1. Applicable Legislations Relevant to the Project

Area	Legislation	Publication Date/Code and Number	Description and Relevance to the Project
Environment (General)	Law for the Protection and Improvement of the Environment in the Kurdistan Region	2008 – Law No. 8	Core environmental legislation in the Kurdistan Region. Establishes principles of environmental protection, pollution prevention, sustainable use of natural resources, environmental permitting, monitoring, and enforcement. Mandates environmental approval for projects with potential environmental impacts and assigns regulatory authority to the regional environmental body.
Environment (Amendment)	Amendment to Environmental Protection and Improvement Law	2022 – Law No. 11	Updates and strengthens provisions of Law No. 8, reflecting continued legislative development of environmental governance within the Kurdistan Region.
Environmental Impact Assessment	Environmental Impact Assessment	2008 – Law No. 8 (Articles on EIA)	Requires projects likely to have environmental impacts to prepare and submit an Environmental Impact Assessment (EIA) as per the local

Area	Legislation	Publication Date/Code and Number	Description and Relevance to the Project
	Requirements under Law No. 8		regulations and requirements. Defines EIA objectives, scope, and obligation to propose mitigation and monitoring measures.
Air, Water, and Pollution Control	Environmental Pollution Control Provisions	Issued under Law No. 8	Regulate emissions to air, discharges to water, soil contamination, and improper handling of hazardous substances. Require pollution prevention measures and compliance with environmental standards set by the regional authority.
Waste Management	Environmental Protection and Improvement Law – Waste Provisions	2008 – Law No. 8	Requires proper management of solid, liquid, and hazardous waste, including minimisation, safe handling, storage, transportation, and disposal to prevent environmental contamination.
Land Use and Site Selection	Regional Urban Planning and Municipal Regulations	Various regional bylaws	Govern zoning, land-use planning, building permits, and site development conditions within municipalities and governorates of the Kurdistan Region. Relevant for site selection and land compatibility with surrounding uses.
Land Acquisition and Land Rights	Regional Land Administration and Allocation Frameworks	Regional land laws and administrative rules	Regulate land ownership, allocation, leasing, and transfer within the Kurdistan Region. Provide the legal basis for land acquisition and use for development projects.
Labour and Working Conditions	KRG Labour and Employment Regulations	Regional labour regulations	Establish basic employment conditions, worker rights, and employer obligations within the Kurdistan Region, including provisions related to occupational safety and working hours, implemented by regional authorities.
Occupational Health and Safety	Workplace Health and Safety Guidelines	Sector-specific regional guidance	Provide health and safety requirements for workplaces, including construction and industrial sites, addressing risks such as noise, vibration, hazardous materials, and accident prevention.
Public Health and Environmental Health	Environmental Health Provisions under Law No. 8	2008 – Law No. 8	Protect public health through regulation of activities affecting air quality, water quality, sanitation, and exposure to environmental hazards. Relevant for both worker and community health protection.
Cultural Heritage	Regional Cultural and Heritage Protection Measures	Regional directives and planning controls	Protect known archaeological sites and cultural heritage areas through land-use controls, development restrictions, and chance-find procedures applied during construction activities.

Area	Legislation	Publication Date/Code and Number	Description and Relevance to the Project
Biodiversity and Wildlife Protection	Biodiversity Protection Provisions under Environmental Law	2008 – Law No. 8	Prohibit activities that harm flora, fauna, and natural habitats. Regulate hunting, tree cutting, land degradation, and destruction of ecosystems.
Forests and Natural Areas	Forest and Pasture Protection Measures	Regional environmental regulations	Provide protection for forested areas, rangelands, and natural landscapes within the Kurdistan Region, restricting clearance and unsustainable land use.

4.3 International Requirements

This report has been prepared in accordance with the relevant IFC Performance Standards and the IFC General Environmental, Health, and Safety Guidelines as applicable international requirements.

IFC Performance Standards

The IFC is an international financial institution which offers investment, advisory, and asset management services to encourage private sector development in projects. To provide a means of managing the social and environmental risks and impacts on projects, the IFC have developed their Performance Standards on Social and Environmental Sustainability (amended in 2012). The Performance Standards are designed to help avoid, mitigate, and manage risks and impacts as a means of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project level activities. In other words, IFC requires the Contractor to carry out an environmental and social assessment of Project-related impacts according to the PSs, which are listed as follows:

PS 1: Assessment and Management of Environmental and Social Risks and Impacts

PS1 sets the foundation for the other standards. It requires clients to identify, assess, and manage environmental and social risks and impacts associated with their projects. This includes engaging stakeholders and integrating environmental and social considerations into decision-making processes.

PS 2: Labor and Working Conditions

PS2 focuses on labour rights, working conditions, and worker safety. It requires clients to uphold worker rights, including fair wages and safe workplaces. It covers issues like child labour, forced labour, and occupational health and safety.

PS 3: Resource Efficiency and Pollution Prevention

PS3 emphasizes the efficient use of resources and the minimization of pollution. It encourages clients to adopt practices that reduce waste, energy, and water consumption and limit emissions, including greenhouse gases.

PS 4: Community Health, Safety, and Security

PS4 addresses the protection of communities around project sites. It requires clients to identify and mitigate potential risks to community health and safety. This includes the development of emergency response plans and procedures.

PS 5: Land Acquisition and Involuntary Resettlement

PS5 focuses on land rights and resettlement issues. It calls for clients to obtain the free, prior, and informed consent (FPIC) of affected communities when land acquisition is required. It also outlines requirements for compensation and livelihood restoration.

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

PS6 deals with the protection of biodiversity and ecosystems. Clients must assess and manage impacts on biodiversity, avoid harm to critical habitats, and promote the sustainable management of natural resources.

PS 7: Indigenous Peoples (Not Applicable to Project)

PS7 focuses on Indigenous Peoples and aims to mitigate potential negative impacts of development projects on these communities. PS7 emphasizes minimizing adverse effects, respecting human rights and cultural identities, and promoting development benefits in culturally appropriate ways.

PS 8: Cultural Heritage

PS8 is focused on the protection of cultural heritage, including archaeological and historic sites. Clients must safeguard cultural resources and avoid or mitigate damage to cultural heritage. This includes supporting archaeological research and preserving cultural artifacts.

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER 5 – SCOPE AND METHODOLOGY)



JULY 2026

ANKARA



DOWNTOWN SLEMANI PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By				Quality Management By	Checked By	Approved By
Draft	A.0	April 2026	Celal Denizli	Tuğba Özcan	Halim Göksu	Gizem Yücel	Esra Okumuşoğlu	D. Emre Kaya	Günel Özenirler
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TABLE OF CONTENTS

	<u>Page</u>
5 SCOPE AND METHODOLOGY	1
5.1 Overview	1
5.2 Scoping of the Impacts	1
5.3 Key Steps of the ESIA Process.....	5
5.3.1 Screening	5
5.3.2 Scoping	6
5.3.3 Project's Area of Influence	6
5.3.3.1 Aol for Environmental Impacts	7
5.3.3.2 Aol for Social Impacts	8
5.3.4 Baseline Data Collection	10
5.3.5 Method to Assess Environmental and Social Impacts	10
5.3.6 Cumulative Impacts.....	22
5.3.7 Potential Changes in the Project Design	22
5.3.8 Environmental and Social Management Plan	23

LIST OF TABLES

	<u>Page</u>
Table 5-1. Potential Impacts Considered for Environmental and Social Impacts	3
Table 5-2. Impact Types and Definitions	11
Table 5-3. Criteria for Determining Impact Significance	14
Table 5-4. Receptor Sensitivity	17
Table 5-5. Description of the Impact Significance	19
Table 5-6. Hierarchy of Options for Mitigation.....	20

LIST OF FIGURES

	<u>Page</u>
Figure 5-1. ESIA Methodology.....	5

ABBREVIATIONS

Aol	Area of Influence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
GHG	Greenhouse Gas
IFC	International Finance Corporation
IFI	International Financial Institution
OHS	Occupational Health and Safety
PS	Performance Standard

5 SCOPE AND METHODOLOGY

5.1 Overview

This chapter provides the environmental and social impact assessment (ESIA) methodology developed for the Project. The ESIA assists in ensuring environmentally and socially sound management of the Project during its entire lifetime. The ESIA process conducted for the Project aims to be in line with the requirements of applicable national legislation and international standards.

The basic approach for the ESIA is adopted for conducting the environmental and social impact study for the proposed project to assess the existing baseline in the Area of Influence (AoI), where the components and activities of the project have potential environmental and social impacts. Environmental and Social impact assessments are framed with the prevailing institutional and legislative setup provided in *Chapter 4 Institutional and Regulatory Framework*.

The main approaches for the assessment covers:

1. Identification and analysis of potential positive and negative impacts, direct and indirect impacts, and short-term and long-term impacts likely to result from project implementation.
2. Identification of feasible and cost-effective mitigation measures to avoid or to minimize negative impacts, and to provide technical guidance to the engineering design for the implementation of proposed mitigations.
3. Identification of potential opportunities for environmental and social enhancement. Preparation of Environmental and Social Management Plan (ESMP) for effective implementation of environmental and social mitigation measures at different stages of the project.

5.2 Scoping of the Impacts

The potential environmental and social impacts associated with the Project are summarized below, covering all phases of the Project life cycle.

- Pre-construction: Site preparation, mobilization of equipment and materials to the Project site, establishment of the camp site.
- Construction: installation of utilities, internal roads, landscaping, and supporting facilities.
- Operation: all routine and non-routine activities associated with the day-to-day functioning, maintenance, and management of the development, including residential living, commercial operations, hospitality services, and office activities.

Across all project phases, both adverse and beneficial impacts have been identified, and the interactions between project activities and the natural, physical, and socio-economic environment have been evaluated. Appropriate mitigation, monitoring, and management measures will be implemented to ensure that residual impacts remain within acceptable levels and that the Project aligns with both national regulatory requirements and international best practice standards.

The scoping study has identified potential impacts which are discussed in relation to the topics listed in [Table 5-1](#) below. This study has defined the scope of the ESIA process and indicated issues to be considered, including those described below:

Table 5-1. Potential Impacts Considered for Environmental and Social Impacts

Aspect	Potential Impact	
	Construction Phase	Operation Phase
Air quality	Dust from excavation, earthworks, material handling, stockpiles, and construction traffic. Emissions from construction machinery, generators, and delivery vehicles.	Emissions from increased traffic, heating/cooling systems, standby generators, and commercial activities. Minor emissions from maintenance activities.
Noise and Vibration	Noise and vibration from heavy machinery, piling, demolition, concrete works, and transport activities.	Noise from traffic, HVAC systems, commercial activities, loading/unloading, and public events.
Geology and Soil Quality	Disturbance of soil due to excavation, grading, and foundation works; risk of contamination from fuel, oils, and chemicals.	Potential soil contamination from parking areas, fuel storage, and accidental spills.
Erosion and Landslides	Increased risk of erosion and sediment runoff due to site clearance, excavation, and exposed surfaces.	Localized erosion from drainage systems and landscaping if poorly maintained.
Water Resources and Water Quality	Potential contamination from spills, sediment runoff, concrete washout, and improper wastewater management.	Increased water consumption; wastewater discharge; risk of contamination from commercial activities and maintenance operations.
Waste and wastewater management	Generation of construction waste, packaging, surplus materials, and hazardous waste (oils, solvents, paints).	Generation of municipal, commercial, recyclable, and hazardous waste; increased wastewater generation from residential and commercial uses.
Biodiversity	Removal of vegetation and disturbance to urban fauna due to site clearance, noise, dust, and lighting.	Reduced habitat availability; disturbance from lighting, noise, and human activity; potential enhancement through landscaping and green spaces.
Cultural Heritage	Risk of disturbance to unknown archaeological or cultural remains during excavation; Chance Find Procedure applied.	No significant direct impacts; increased visitation may place indirect pressure on nearby heritage sites.
Traffic and transport	Increased traffic from workforce commuting, material delivery, and waste transport; temporary road disruptions.	Increased daily traffic from residents, employees, visitors, service vehicles, and deliveries; parking demand.
Visual Impacts	Temporary visual intrusion from cranes, scaffolding, equipment, and material stockpiles.	Permanent changes to skyline, streetscape, lighting, and urban character due to buildings and signage.
Socio-economic impacts	Positive: job creation, local procurement, and skills development. Negative: temporary disruption to businesses, congestion, and pressure on services.	Positive: long-term employment, economic activity, increased property values, and service provision. Negative: potential gentrification and affordability concerns.
Labour and Working Conditions	Risks related to subcontractor management, working hours, worker accommodation, and labour relations.	Ongoing risks related to fair employment practices, contractor management, and grievance mechanisms.

Aspect	Potential Impact	
	Construction Phase	Operation Phase
Occupational Health and Safety	Risks from heavy machinery, working at height, excavation, electrical works, confined spaces, and extreme weather.	Risks from building maintenance, electrical systems, fire safety, public access management, and routine operations.
Community health, safety and security	Nuisance from dust, noise, vibration, traffic, and restricted access; safety risks near construction zones.	Risks related to traffic, crowd management, emergency incidents, fire safety, and public security.
Cumulative Impacts	Combined dust, noise, traffic, emissions, and infrastructure pressure from simultaneous construction activities and nearby developments.	Additive effects from traffic, energy and water demand, waste generation, noise, and urban density, potentially affecting air quality, services capacity, community well-being, and environmental quality.

5.3 Key Steps of the ESIA Process

This subsection presents the methodology used to conduct the impact assessment. The overall ESIA approach is illustrated in Figure 5-1. The ESIA Process consists of a multi-stage iterative approach in order to predict and evaluate the potential effects the Project could have on the physical, biological, social and cultural environment. Measures are then identified that the Project will take to avoid, minimize or reduce, mitigate, compensate for any adverse impacts; and to enhance positive impacts where possible. Results continue to be revisited and modified as the assessment progresses and as Project effects are monitored.

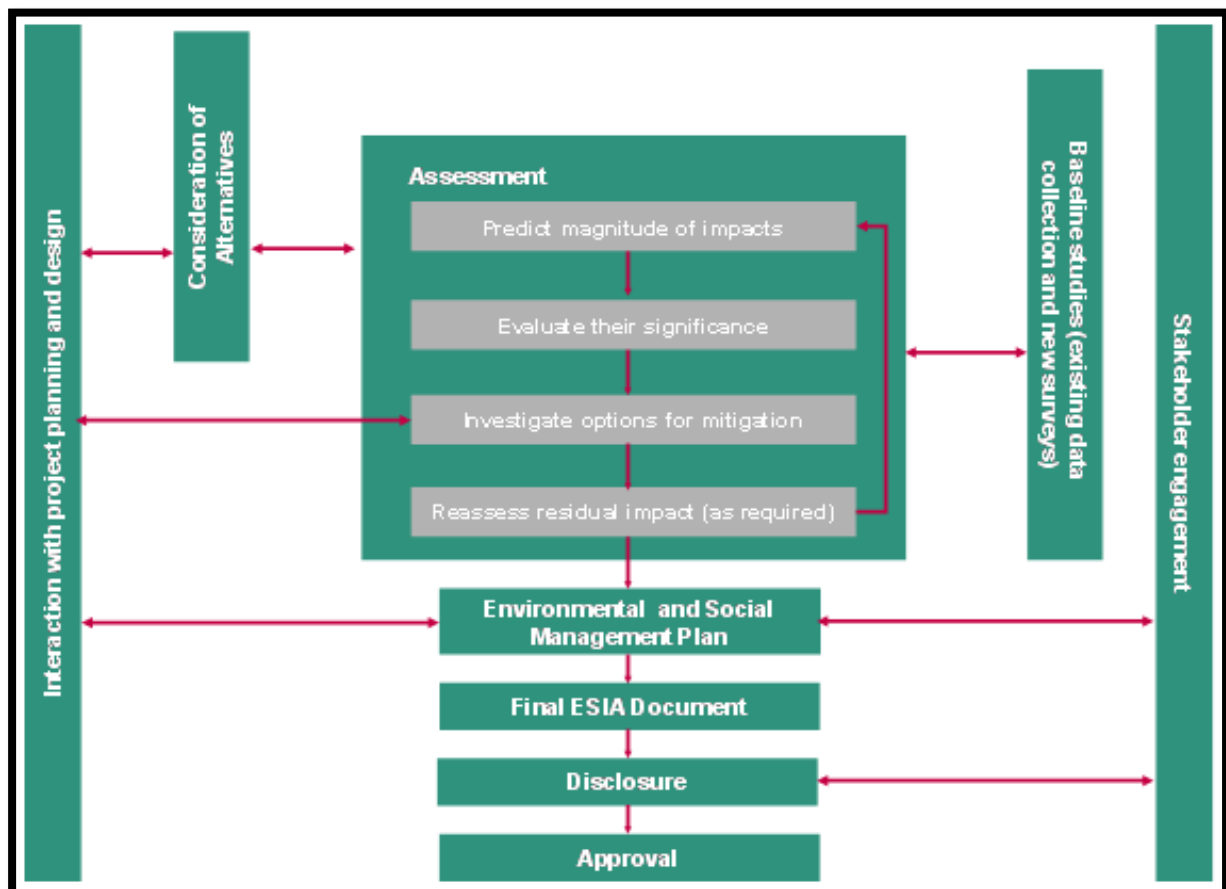


Figure 5-1. ESIA Methodology

5.3.1 Screening

During the review of environmental and social risks and impacts by International Financial Institutions (IFIs), a screening process is undertaken to determine the level of environmental and social assessment required for a proposed project. This screening is conducted with reference to the Lender's environmental and social categorization criteria, which classify projects based on their scale, nature, and potential environmental and social risks and impacts.

Based on the project's scale, nature, and the sensitivity of its location, the project is classified as Category B project under the IFC Environmental and Social Risk Categorization framework. The development is non-industrial in nature and primarily comprises mixed-use, commercial, and public-oriented components, which are typically associated with moderate, manageable, and largely reversible environmental and social impacts during the construction and operational phases.

5.3.2 Scoping

Scoping is a crucial step in an ESIA process that:

- defines the limits of what is included in the ESIA and what it is not necessary to include
- gives a clear focus which environmental and social issues will be addressed in the ESIA
- starts the process of understanding regulations and standards and their context for the ESIA
- provides provisional identification of the impacts
- provides an indication of what additional baseline information is required and how to get it
- provisionally describes the assessment methods to be used
- includes a preliminary identification of alternatives which should be investigated

Scoping is the stage at which consultations with stakeholders are initiated, which is an important part of the ESIA process.

5.3.3 Project's Area of Influence

The potential environmental and social impacts of the Downtown Slemani Project will be assessed within the context of the Project's defined Area of Influence (AoI). As described under IFC Performance Standard 1 (PS1), the AoI encompasses the full spatial extent where Project-related activities may generate direct, indirect, or cumulative impacts. For this Project, the AoI is defined in accordance with the following components:

- **Areas likely to be affected by the Project footprint and activities**, including those directly owned or operated by the Project Owner or by contractors working on their behalf (e.g., temporary construction areas, material lay-down zones, truck access points, internal circulation roads, and public-realm interface areas within and immediately surrounding the development).
- **Unplanned but predictable developments** triggered by the Project, which may occur at later stages or in different locations (such as increased commercial activity, informal vending near site boundaries, changes in pedestrian circulation patterns, or increased demand for municipal services).

- **Indirect impacts on ecosystem services, community well-being, mobility, and land-use systems**, including effects on public spaces, access routes, surrounding residential and commercial blocks, and vulnerable user groups that rely on the urban environment for daily economic, social, or cultural activities.
- **Associated facilities**, which are facilities not financed as part of this development but without which the Project would not be viable—such as municipal road access, public utilities (water, wastewater, electricity), solid-waste collection systems, fire and emergency response networks, and existing public transport stops that enable access to the development.
- **Cumulative impacts**, resulting from the incremental interaction of this Project with other ongoing or planned developments in the downtown core of Sulaymaniyah—for example, road rehabilitation works, new commercial complexes, or urban renewal initiatives that collectively may influence traffic, noise, air quality, community access, or socio-economic dynamics.

5.3.3.1 Aol for Environmental Impacts

For the purposes of this Report, the Environmental Aol is divided into three levels: Immediate Aol, Regional Aol, and National Aol, each reflecting different spatial and thematic dimensions of potential influence.

Immediate Environmental Aol: The Immediate Environmental Aol comprises the Project footprint and directly adjacent urban blocks, where on-site construction and excavation works, land transformation, and immediate operational activities will occur. This area includes:

- The construction zone of the five residential towers, office tower, hotel block, commercial mall, performance centre, underground parking, internal road network, and utility connections
- The boundaries of excavation and material lay-down/storage areas
- Immediate neighbouring plots where potential temporary impacts—dust generation, noise, vibration, air emissions, waste accumulation, traffic disturbances, and stormwater runoff—may be experienced
- The directly adjacent public realm including pedestrian paths, internal landscaped spaces, and edges, where private development interfaces with public streets

Environmental impacts within this zone are anticipated to include: temporary soil disturbance due to excavation, dust and particulate emissions during earthworks, construction-related noise and vibration, increased waste generation, short-term vegetation removal within the site boundary, and temporary alteration of local drainage patterns during site grading.

Regional Environmental Aol: The District-Level Aol refers to the urban catchment area that may experience secondary or cumulative environmental effects, primarily driven by increased traffic, changes in mobility patterns, and public space use. This generally covers:

- The main streets surrounding the Project (Tasluja Street, Malik Mahmoud Ring Road, and adjacent feeder roads) where construction vehicle access and future operational traffic will concentrate
- Neighbouring land uses including residential neighbourhoods, commercial services, educational facilities, and public institutions that may be indirectly sensitive to air quality, noise, or visual impacts
- Existing municipal drainage and stormwater networks that may be affected by altered runoff volumes once large impermeable surfaces (towers, mall, plazas) are introduced
- Urban green spaces and landscaped corridors potentially influenced by microclimatic changes such as wind channelling or shadowing from high-rise structures

Within this wider zone, environmental considerations include traffic-related air emissions and congestion during peak construction periods, cumulative noise and waste pressures on municipal systems, and localized changes in microclimate and thermal comfort once high-rise buildings are operational.

National Environmental Aol: The City-Level Aol encompasses broader environmental implications linked to Sulaymaniyah's urban development trajectory. While physical impacts are limited to the immediate project vicinity, the Downtown Slemani Project contributes to:

- City-wide urban density distribution and future land-use change patterns within the central business district
- Increased pressure on municipal utilities (solid waste, water supply, energy demand) and the need for long-term sustainable resource management
- Micro-scale climate considerations such as heat island effects and the need for integration of green infrastructure
- Improvements in public realm accessibility, pedestrian connectivity, and potential economic revitalization of the downtown area

The Project's alignment with municipal sustainability objectives—including green construction standards, improved walkability, and energy-efficient building design—indirectly supports Sulaymaniyah's environmental and climate-resilience pathways.

5.3.3.2 Aol for Social Impacts

The Social Area of Influence defines the spatial and demographic boundaries within which people, communities, public services, and socio-economic dynamics may experience impacts or benefits as a result of the Downtown Slemani Project. It considers both direct and indirect changes related to mobility, livelihoods, urban services, housing, cultural use of space, safety, and overall community well-being.

Immediate Social Aol: The Immediate Social Aol covers the Project footprint and adjacent residential and commercial blocks within the downtown core. This is the area expected to experience the most direct social effects due to activities such as:

- Construction-phase disturbances, including temporary noise, dust, restricted pedestrian movement, and localized traffic congestion
- Potential temporary access limitations to nearby streets, shops, parking spaces, or community facilities
- Occupational and community health and safety risks associated with heavy machinery, increased truck traffic, and excavation works
- Local employment and procurement opportunities for labourers, service providers, and small businesses
- Changes in neighbourhood character, land value, and the use of public realm areas

Primary receptors include local residents, shop owners, office users, informal vendors, taxi drivers, students, elderly or low-income households, and pedestrians who use the immediate streetscape surrounding the development site.

Regional Social Aol: The District-Level Aol refers to the wider urban catchment within central Sulaymaniyah that may experience indirect or secondary socio-economic changes from the Project. This area includes multiple neighbourhoods connected through Tasluja Street, Malik Mahmoud Ring Road, and the central business/commercial zone where:

- Population influx may occur as construction workers, service contractors, and new residents relocate or commute to the area
- Demand may increase on public services such as waste management, traffic management, security, parking, water supply, and emergency response
- New commercial activity, retail services, hotel use, and tourism-related spending may stimulate job creation and business growth
- Local housing markets may experience price shifts or demand pressure due to the project's residential and commercial offering
- Community mobility patterns – walking routes, access to schools, hospitals, public squares, or markets – may change as the new development reshapes the urban layout

Cumulative socio-economic effects may emerge where the Project overlaps with other planned developments or public-realm upgrades within the downtown strategic planning zone.

National Social Aol: Although physical impacts are localized, the Project has wider city-wide social implications due to its strategic role in Sulaymaniyah's urban development vision. At this scale, the Project contributes to:

- Strengthening Sulaymaniyah's position as a regional commercial, cultural, and service hub
- Creating long-term employment and capacity-building opportunities in tourism, retail, facility management, hospitality, and construction
- Introducing modern high-rise housing stock that may influence future architectural trends and urban planning decisions
- Enhancing public realm use by incorporating pedestrian-friendly open spaces, landscaped areas, and cultural venues
- Supporting municipal revenue, public-private cooperation, and long-term economic diversification

The Project is therefore expected to contribute to the socio-economic evolution of Downtown Sulaymaniyah, reinforce mixed-use urban density, and generate sustained benefits that extend beyond the immediate surroundings.

5.3.4 Baseline Data Collection

The next step of the ESIA process is the collection of data to establish the existing baseline conditions (i.e., conditions in the absence of the proposed development), which the impacts of construction and operation of the Project can be assessed against. In undertaking the ESIA study, information on the current environmental and social baseline conditions was gathered using, among others, the following sources:

- Primary data resources - technical reports prepared by the Project Company and its consultants
- Secondary data sources (published materials and documents, maps by government agencies, research organizations and other relevant organizations)
- Review of aerial photographs of the Project site and its surroundings
- Field study results

Baseline data collection started during the scoping phase and continued to support the assessment process. Baseline studies and findings are described in the relevant chapters of the ESIA Report.

5.3.5 Method to Assess Environmental and Social Impacts

Human rights risks were identified and assessed at scoping stage and further considered as an integral part of the ESIA process using a risk and rights-based approach consistent with international good practice. Rather than being assessed as standalone impacts, the human rights risks identified during scoping were addressed within the assessment of relevant environmental and social topics, including socio-economic conditions, labour and working conditions, occupational health and safety, and community health, safety and security.

Accordingly, mitigation measures proposed under these topics also contribute to the prevention, minimisation and management of associated human rights risks.

Impact Types and Definitions

Impacts may occur as positive, negative, direct, indirect and cumulative. Determination of the type of impact is the important step of the assessment process. The determination of the impact type is based on geographical size, sensitivity of receptor, duration, significance and likelihood of the impact. Impact types are provided in Table 5-2.

Table 5-2. Impact Types and Definitions

Impact Type	Definition
Positive	Impacts that make positive changes over the current conditions.
Negative	Impacts that lead to new and undesirable changes over the current conditions.
Direct	Direct impacts occur through direct interaction of an activity with an environmental, social, or economic component.
Indirect	Impacts which are not a direct result of the project, often produced away from or as a result of a complex impact pathway.
Cumulative	Impacts that consist of an impact that is created as a result of the combination of the project evaluated in the current project together with other projects causing related impacts.

Assessment

The impact assessment process predicts and describes impacts that are expected to occur for different phases of the Project. Where possible, impacts are quantified to the extent practicable, which may include size of land affected; increase in noise or air pollution levels above acceptable standards; volume of waste or water discharged, number of households affected, etc. For each impact, its significance is evaluated by defining and evaluating two key aspects:

- The magnitude of the impact
- The sensitivity of the feature or receptor that will be impacted.

Impact Magnitude

Impact magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. Magnitude rating tends to reflect a combination of the size of an area that may be affected, the duration over which the aspect may be altered, and the size, degree or scale of that change. In essence, magnitude is a descriptor for the degree of change that is predicted to occur in the resource or receptor.

For positive impacts (which are mostly socio-economic impacts) magnitude is generally categorised as 'Positive' unless sufficient information is available to support a more robust characterisation. For instance, if the number of jobs to be assigned to local community

members is confirmed or if the size or value of the contribution to the national, regional or district economy is known then a magnitude rating can be assigned. If not, then the significance rating is assigned based on the sensitivity of the feature impacted by a specific activity or change.

The term 'magnitude' therefore encompasses all the characteristics of the predicted impact including:

- Geographic Extent
- Duration
- Intensity
- Frequency
- Likelihood (only for unplanned events)

The definitions for characteristics of magnitude used during the impact assessment are summarized in Table 5-3.

In the case of intensity and frequency, these characteristics are not assigned fixed designations, as they are typically numerical measurements (e.g., number of acres affected, number of times per day, etc.).

The terminology and designations are provided to ensure consistency when these characteristics are described in an impact assessment deliverable. However, it is not a requirement that each of these characteristics be discussed for every impact identified.

For unplanned events (e.g., accidental release of hazardous materials) the likelihood of the impact occurring is taken into consideration in deriving the magnitude rating. The likelihood of an impact occurring as a result of an unplanned event is expressed as a probability and is designated using a qualitative scale (or semi-quantitative, where appropriate data are available), according to the attributes described in Table 5-3.

Likelihood is estimated on the basis of experience and/or evidence that such an outcome has previously occurred. It is important to note that likelihood is a measure of the degree to which the unplanned event is expected to occur, not the degree to which an impact or effect is expected to occur as a result of the unplanned event.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised, but the 'likelihood' factor is considered, together with the other impact characteristics, when assigning a magnitude designation. There is an inherent challenge in discussing impacts resulting from (planned) Project activities and those resulting from unplanned events. To avoid the need to fully elaborate on an impact resulting from an unplanned event prior to discussing what could be a very low likelihood of occurrence for the unplanned event, this methodology incorporates likelihood into the magnitude designation (i.e., in parallel with consideration of the other impact

characteristics), so that the “likelihood- factored” magnitude can then be considered with the resource/receptor sensitivity/vulnerability/importance in order to assign impact significance. Rather than taking a prescriptive (e.g., matrix) approach to factoring likelihood into the magnitude designation process, it is recommended that this be done based on professional judgment, and assisted by quantitative data (e.g., modelling, frequency charts) where available.

Once the impact characteristics are understood, these characteristics are used (in a manner specific to the resource/receptor in question) to assign each impact a magnitude. In summary, magnitude is a function of the following impact characteristics:

- I. Geographical Extent (G)
- II. Duration (D)
- III. Intensity (I)
- IV. Frequency or Likelihood (F or L)
- V. Reversibility (R)

$$\text{Impact Magnitude} = (G+D+I+F \text{ (or L)}) \times R$$

The magnitude can also be defined as the severity of the potential impact. It indicates whether such an impact is irreversible or reversible. If the adverse effect of a project can be mitigated, then the magnitude of the impact cannot be considered as very high.

The magnitude essentially describes the degree of change that the impact is likely to impart upon the resource/receptor. As in the case of extent and duration, the magnitude designations themselves (i.e., negligible, low, medium, high and very high) are universally used and across resources/receptors, but the definitions for these designations will vary on a resource/receptor basis, as is discussed further below. The universal magnitude designations are:

- Negligible
- Low
- Medium
- High
- Very High

The magnitude of impacts takes into account all the various dimensions of a particular impact in order to make a determination as to where the impact falls on the spectrum (in the case of adverse impacts) from negligible to very high. Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact and should be characterised as having a negligible magnitude.

Table 5-3. Criteria for Determining Impact Significance

Aspect	Score	Definition
Geographic Extent (G) is the area within which the impact occurs.	1	Project Site: (i.e. the impact is confined within the facilities owned or exclusively controlled by the project)
	2	Local (i.e. the impact extends to areas or communities around the project site)
	3	Regional (i.e. the impact extends to an area beyond the surroundings of the project site and to regional physical (airshed, watershed, etc) or administrative boundaries)
	4	National: (i.e. the impact extends throughout several regions or to the entire country)
	5	International: (i.e. the impact is transboundary)
Duration (D) is the duration of the impact and can vary from short to long terms.	1	Very Short (<1 Month)
	2	Short (1 Month - 1 year)
	3	Medium (1-2 years)
	4	Long (2-5 years - the impact will cease after the operational life span of the project)
	5	Very Long (over 5 Years - no mitigation measure of natural process will reduce the impact after construction)
Intensity (I) is a measure of the physical, economic or social severity of the impact.	1	Negligible: the impact cannot be easily detected or perceived and is unlikely to cause detectable change in environmental or social components.
	2	Low: the impact can be detected or perceived, but the effects are unlikely to cause tangible changes in environmental or social components
	3	Medium: the impact is well within legal standards or accepted practices and/or are likely to cause tangible changes in environmental or social components.
	4	High: the impact is near the limit of legal standards or accepted practices and/or are likely to cause serious impairment of environmental or social components.
	5	Very high: the impact may result in exceedances of legal standards or accepted practices and/or is likely to cause very serious to catastrophic damage to environmental or social components.
	1	Single event

Aspect	Score	Definition
Frequency (F): is the frequency of the impact (not the activity causing the impact).	2	Infrequent: a few events evenly or randomly distributed over time
	3	Recurrent: numerous events evenly or randomly distributed over time
	4	Frequent: a high number of events evenly or randomly distributed over time
	5	Continuous: no interruption over time.
Likelihood (L) (unplanned events)	0	Improbable: The event is extremely unlikely to occur during implementation (construction and operation) of the Project. (Probability; less than 1%).
	1	Unlikely: The event is unlikely but may occur at some time during implementation (construction and operation) of the Project. (Probability; less than 5%, greater than 1%)
	3	Likely: The event is likely to occur at some time during implementation (construction and operation) of the Project. (Probability; less than 50%, greater than 5%)
	5	Probable: The event will occur during implementation (construction and operation) of the Project (i.e., it is essentially inevitable). (Probability; greater than 50%)
Reversibility (R)	1	short term: if the initial condition of the component can be restored within weeks or months after the cessation of the impact source and/or with restoration activities.
	2	short/mid-term: if the initial condition of the component can be restored within a few months to one year after cessation of the impact source and/or with restoration activities.
	3	mid-term: if the initial condition of the component can be restored within one to five years after cessation of the impact source and/or with restoration activities.
	4	long term: if the initial condition of the component can be restored within five to 25 years after cessation of the impact source and/or the restoration activities.
	5	Irreversible: if it is not possible to achieve restoration of the initial conditions.

Sensitivity

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity/vulnerability/importance of the impacted resource/receptor to the type of activity proposed (e.g., habitat clearance, topsoil removal, etc.) or the impact of a Project activity (e.g., dust, noise, water pollution, or induced population influx). This requires a range of physical, biological, cultural or human factors to be taken into account and may also need to include other factors such as legal protection, government policy, stakeholder views and economic value.

Characterisation of sensitivity for a physical or biological resource or receptor (e.g., a water feature or parameter, cliff, vegetation type) will take into account its conservation status and importance (on a local, national and international scale), its vulnerability to disturbance, and its resilience to recover or withstand a specific impact or type of impact. Where the receptor is human or cultural, the value of that social and cultural heritage receptor/s and its vulnerability to the impact is considered, taking into account the receptor's resilience, including ability to adapt to change or use alternatives where available.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low,
- Medium and
- High.

Receptor sensitivity definitions are provided in Table 5-4.

Table 5-4. Receptor Sensitivity

Receptor Sensitivity (S)¹ describes the ability of the receptor to withstand adverse impacts. It takes into consideration not only activity-impact-receptor pathways, but also social and environmental characteristics of the receptor that might make it more or less resilient to change.	1	Low: Local community and/or environment is fully equipped/has the tools to manage changes of life quality: • Species and/or population has high capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), and is potentially unaffected or marginally affected • People being least vulnerable to change or disturbance (i.e. ambient conditions such as air quality are well below applicable legislation and international guidance,) • Individuals who are able to quickly adapt to temporary disruption in their living conditions, livelihood status or a change in the status of public infrastructure
	3	Medium: Local community and/or environment is partially equipped/has the tools to manage changes of life quality. For example: • Internationally threatened species /protected area within the area impacted by the project activities outside of period of high sensitivity or during routine or reliably predictable peak presence • Species and/or population which has moderate capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), leading to potential temporary but sustainable effect which does not substantially alter character or result in significant loss of ecological functionality • People being vulnerable to change or disturbance (i.e. ambient conditions such as air quality are below adopted standards • Negative change in livelihood status, household assets/income or living conditions. Temporary disruption to businesses resulting in a small drop in business revenue • Increased risk to public health that can be controlled using detailed mitigation measures • Disruption to public infrastructure that results in an inconvenience to other users

¹ Receptors may be humans, ecological and physical components of the environment. Receptor sensitivity considers how a particular receptor may be more or less susceptible to a given impact. More sensitive receptors may experience a greater degree of change, or have less ability to deal with the change, compared with less sensitive receptors that may be more resilient or adaptable.

	5	High: Sensitive local community and/or environment not equipped or prepared to cope with social and environmental impacts such as changes of life quality. For example: • Internationally threatened species/protected area within the area impacted by the project activities during period of high sensitivity (e.g. during breeding, spawning or nesting) and during routine or reliably predictable peak presence • Species and/or population which has little or no capacity to absorb or adapt to change (i.e. little or no capacity to move away from or adapt to the project impact), leading to potential for substantial change of character and/or loss of ecological functionality • Most vulnerable groups (i.e. ambient conditions such as air quality are at or above adopted standards • Individuals with a marginal livelihood, low socio-economic income or poor quality living conditions • Individuals who are vulnerable due to their age, disability or other reason and who may require special assistance during engagement activities • Businesses with a marginal economic existence which are not able to easily adapt to change

Determination of the Overall Impact

For impacts resulting from unplanned events (typically accidents, such as a major oil spill or other event that cannot be reasonably foreseen), the above methodology is applied but likelihood is also considered when assigning the magnitude designation.

The Impact significance is calculated by multiplying the Impact magnitude by the Sensitivity Score:

$$\text{Impact Significance} = \text{Impact magnitude} \times S$$

Table 5-5. Description of the Impact Significance

Score of the Impacts		
Value	Score	Definition
4-25	Negligible	An impact of “ Negligible ” significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be ‘imperceptible’ or is indistinguishable from natural background variations.
26 - 75	Low	An impact of “ Low ” significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
75 - 150	Medium	An impact of “ Medium ” significance has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
150 - 250	High	An impact of “ High ” significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of impact assessment is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.
250 - 500	Very High	An impact of “ Very High ” significance after all feasible mitigation measures have been identified and assessed warrants the highest level of attention and concern. As with residual impacts of major significance, the regulators and stakeholders will need to closely evaluate whether the positive impacts of the project outweigh residual negative impacts of very high significance. In many cases residual critical impacts can be considered as a potential fatal flaw of the project.

Development of Mitigation Measures and Enhancement Plans

One of the aims of an Environmental and Social Impact Assessment consists of suggesting mitigation measures in order to limit any potential negative impacts affecting all physical, biological and socioeconomic resources as well as receptors due to Project activities. Mitigation measures are defined against each significant adverse impact by making use of avoidance, minimization, reduction and mitigation as appropriate. Mitigation measures provided in each impact assessment table are also grouped under each project phase such as design, construction and operation. In general, mitigations suggested for operation phase are directly related to the Project design, in this respect these mitigations are also grouped under design phase.

A hierarchy of mitigation options is considered, with avoidance at the source of the impact as a priority and compensatory measures or offsets to reduce the impact significance as a last resort. The mitigation hierarchy that is utilised in identification of mitigation measures are presented in Table 5-6 below.

Table 5-6. Hierarchy of Options for Mitigation

Options	Explanation
Avoid	Anticipate and avoid risks and impacts
Minimize or Reduce	Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels
Mitigate	Once risks and impacts have been minimized or reduced, mitigate
Compensate	Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible

The aim of the mitigation measures is to minimize or reduce the importance of negative impacts whilst optimizing the feasibility and potential benefits of the Project. Impact mitigation objectives are often established based on legal standards or by referring to best practice. In the absence of any existing benchmarks, objectives specific to the project are established. Mitigation activities are supported with management plans linked to potential impacts, and they include monitoring requirements detailing what will be monitored, the method of monitoring, frequency, and measurable targets. Steps for determination of mitigations in line with “Mitigation Hierarchy” provided below:

- Avoid: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- Minimize or Reduce: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping); if an impact cannot be abated on-site then control measures can be implemented off-site (e.g.,

noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).

- Mitigate: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- Compensate: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Taking into account how mitigation will reduce a predicted impact, receptor sensitivity and significance of the after-mitigation impacts, residual impacts are identified. Some mitigation measures may directly address the impact on the predicted receptors, in which, the overall impact after applying the mitigation measures will result in reducing the impact on the sensitive receptors.

Where significant residual impacts or risks remain, further options for mitigation are evaluated and impacts are re-assessed until they are considered to be low and technically and financially feasible for the Project and would be deemed to be within acceptable levels.

The effectiveness of the mitigation measures defined in the ESIA are assessed using expert judgement and the findings from the previous application of the measures to similar projects. The definitions of the mitigation effectiveness are:

- Low: the measures can reduce the impacts by less than 20% of the expected magnitude
- Medium low: the measures can reduce the impacts by 20% - 40% of the expected magnitude
- Medium: the measures can reduce the impacts by 40% - 60% of the expected magnitude
- Medium high: the measures can reduce the impacts by 60% - 80% of the expected magnitude
- High: the measures can reduce the impacts by more than 80% of the expected magnitude

The Mitigation effectiveness is measured on a scale 1 – 0.2 (1=minimum effectiveness; 0.2=maximum effectiveness). Residual impacts will be identified by taking into account the mitigation effectiveness.

Residual Impact Assessment

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

5.3.6 Cumulative Impacts

A cumulative impact assessment (CIA) was undertaken to identify potential combined effects arising from the proposed project in conjunction with other existing, planned, or reasonably foreseeable developments within the Area of Influence. The assessment followed international good practice and relevant regulatory guidance.

An initial project screening was conducted through a review of available planning documents, zoning plans, development permits, and consultations with relevant local authorities. In addition, site reconnaissance and desk-based research were carried out to identify ongoing or approved developments in the vicinity of the project area.

Based on this review, no other existing, under-construction, approved, or publicly announced projects with the potential to interact cumulatively with the proposed development were identified within the Aol at the time of assessment. Accordingly, cumulative impacts are expected to be limited, and project-related impacts are anticipated to occur primarily on an individual basis.

Nevertheless, cumulative effects will be periodically reviewed during the construction and operation phases. Should new developments emerge in the future, the assessment will be updated, and additional mitigation measures will be implemented as necessary to ensure continued environmental and social performance.

5.3.7 Potential Changes in the Project Design

This ESIA has been prepared based on the most up-to-date information provided by the Consortium regarding the design, layout, and operational parameters of the Project.

At this stage, potential changes in the detailed design are not expected to significantly alter the nature, magnitude, or extent of the environmental and social impacts identified in this ESIA. Nevertheless, recognizing that certain design parameters may evolve during detailed engineering or construction planning, the Project Owner will implement a structured

environmental and social monitoring program to verify the adequacy of proposed mitigation measures.

If monitoring results or design modifications indicate that the initially defined mitigation measures are insufficient or require adjustment, the Project Owner will ensure that appropriate refinements and adaptive management actions are incorporated into the Environmental and Social Management Plan (ESMP) to maintain compliance with national regulations and international standards (e.g. IFC Performance Standards and World Bank Group EHS Guidelines).

5.3.8 Environmental and Social Management Plan

An ESMP has been developed as part of the ESIA study including the description of the mitigation measures for each impact during construction and operation phases of the Project, responsible parties for the implementation of the mitigation measures, the timing, monitoring and audit requirements. The ESMP focuses on the avoidance of impacts, and where this is not possible, presents technically and financially feasible and cost-effective mitigation measures to minimize or reduce potential impacts to acceptable levels. The ESMP of the Project is presented in Annex A of this ESIA report. The ESMP should be kept up to date with any required additional mitigation throughout the Project lifecycle.

Implementation of the ESMP will be accomplished within the framework of a Project specific Environmental and Social Management System (ESMS) to be developed by the Project Company. in accordance with the requirements of international standards (i.e., for environment: ISO 14001, IFC PS1).

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (CHAPTER 6 – ENVIRONMENTAL AND SOCIAL BASELINE)





JULY 2026

ANKARA



DOWNTOWN SLEMANI PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

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Revision Codes: A: Draft, B: Final Draft, C: Final

Project No: 25 / 026

JULY 2026

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TABLE OF CONTENTS

	<u>Page</u>
6 ENVIRONMENTAL AND SOCIAL BASELINE	1
6.1 Geology and Soils Characteristics	1
6.1.1 General Geology	1
6.1.2 Soil Quality	2
6.2 Hydrology and Hydrogeology	5
6.2.1 Hydrological Properties	5
6.2.2 Hydrogeological Properties	6
6.2.3 Water Quality	7
6.3 Land Use and Zoning	11
6.4 Natural Disaster Risk	14
6.5 Climate and Meteorology	15
6.6 Air Quality	17
6.7 Noise	22
6.8 Waste Management	24
6.9 Biodiversity	24
6.9.1 Ecological and Habitat Characteristics of the Project Area	26
6.9.2 Flora and Fauna	33
6.9.3 Nationally Protected and Internationally Recognized Areas	37
6.9.4 Critical Habitat Assessment	39
6.10 Traffic and Transportation	46
6.11 Cultural Heritage	47
6.12 Socio-economy	49
6.12.1 Population and Demographics	49
6.12.2 Economy and Employment	50
6.12.3 Infrastructure Services	52
6.12.4 Land Ownership	53
6.12.5 Vulnerable Groups	53
6.12.6 Information Disclosure	54

LIST OF TABLES

	<u>Page</u>
Table 6-1. Limit Values for Soil Quality Parameters from Canadian Legislations	3
Table 6-2. Results of Soil Sample Analysis	4
Table 6-3. Limit Values for Drinking Water Quality	7
Table 6-4. Analysed Parameters of Water Samples in Sulaymaniyah City	8
Table 6-5. IFC Guideline Values for Sanitary Sewage Discharges	11
Table 6-6. Land Use Status	14
Table 6-7. Climate Data for Sulaymaniyah	16
Table 6-8. WHO Global Air Quality Guideline Values (2021)	17
Table 6-9. Air Quality Measurements in the Monitoring Station	18
Table 6-10. Passive Sampling Results	20
Table 6-11. Particulate Matter Measurement Results	21
Table 6-12. Noise Level Guidelines, One Hour LAeq (dBA)	22
Table 6-13. Baseline Noise Measurement Results (dB).....	23
Table 6-14. Flora Species Identified in the Project Area	34
Table 6-15. Reptile Species Identified in the Project Area	35
Table 6-16. Bird Species Identified in the Project Area	36
Table 6-17. Mammal Species Identified in the Project Area.....	37
Table 6-18. PS6 Habitat Classification	39

LIST OF FIGURES

	<u>Page</u>
Figure 6-1. Land Use Map of Project Area.....	13
Figure 6-2. Average Temperature and Precipitation data between 1991-2020	16
Figure 6-3. Air Quality Monitoring Station	18
Figure 6-4. Noise Measurement Locations	23
Figure 6-5. Habitat Types of the Project Area and Surroundings	28
Figure 6-6. Nationally Protected and Internationally Recognized Areas.....	38
Figure 6-7. Transportation Route.....	47

ABBREVIATIONS

EHS	Environmental, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
IFC	International Finance Corporation
KBA	Key Biodiversity Area
PS	Performance Standard
WHO	World Health Organization

6 ENVIRONMENTAL AND SOCIAL BASELINE

This chapter serves as a comprehensive assessment of the current conditions of the project area and its surroundings, including the physical, biological, and social aspects that may be affected by the Project's activities.

This assessment offers essential insights into the current environmental and social conditions surrounding the project, allowing decision-makers to evaluate potential impacts and determine suitable mitigation measures. It is based on a thorough and transparent methodology, incorporating field assessments, stakeholder engagement, and secondary data analysis. As a crucial part of the Environmental and Social Impact Assessment (ESIA) process, the environmental and social baseline will guide the development of the project's environmental and social management plans.

6.1 Geology and Soils Characteristics

Geological conditions play a fundamental role in defining the structural behaviour, excavation feasibility, subsurface stability and foundation design of the Project site. Understanding the underlying geology is essential for evaluating bearing capacity, settlement potential, seismic response, and long-term performance of underground infrastructure and utilities.

6.1.1 General Geology

Sulaymaniyah is located in the northeastern part of Iraq, within the Kurdistan Region, and lies along the western margin of the Zagros Fold–Thrust Belt, one of the most prominent tectonic and structural domains of the Middle East. Unlike the southern Mesopotamian Plain, which is characterized by flat alluvial floodplains and deep Quaternary deposits, the Sulaymaniyah region is dominated by folded sedimentary formations, mountain foothill morphology, and tectonically deformed units associated with the collision zone between the Arabian Plate and the Eurasian (Iranian) Plate.

Iraq is divided into two major tectono-stratigraphic domains:

- (1) the Stable Platform (Stable Shelf) encompassing central and southern Iraq, and
- (2) the Unstable Shelf / Folded Belt, covering the northeast — including the Sulaymaniyah Governate. Sulaymaniyah lies fully within the Unstable Shelf – High Folded Zone, where compressional tectonics have produced anticlines, synclines, thrust faults and imbricate structures since the Late Cretaceous and Paleogene (Jassim & Goff, 2006; Fouad, 2010).

The stratigraphic sequence of the region is composed largely of Mesozoic and Cenozoic marine–sedimentary formations, including limestones, dolomites, marls and sandstones belonging to key geological units such as the Kometan, Shiranish, Tanjero, Kolosh and Gercus Formations. These bedrock units are overlain in urbanized areas by colluvial–alluvial deposits, slope debris and wadi–fill sediments of variable thickness.

The topography of Sulaymaniyah sharply contrasts with the low-relief Mesopotamian Plain. The land rises steeply toward the northeast, forming distinct ridges and folded mountain chains, while the southwest gently transitions into urban basins and valley floors. The Tanjaro River valley, located west of the Project site, represents a key geomorphological feature — shaping both sediment deposition patterns and drainage pathways across the central city basin.

Seismicity and Tectonic Context

Unlike southern Iraq, which lie within low–moderate seismic zones, Sulaymaniyah is situated in one of the most seismically active regions of Iraq, linked to the Main Zagros Reverse Fault system. Historical earthquakes recorded within the Kurdistan region demonstrate magnitude events exceeding Mw 6.0, with epicenters concentrated along structural hinges and anticline axes (IGEES, 2022; Alsinawi, 2002). Focal depths commonly range between 5–30 km, indicating shallow crustal seismicity capable of producing strong ground shaking. Urban development in such settings requires strict application of earthquake-resistant building design, ductile detailing, and ground–shaking response evaluation for tall structures — particularly relevant for the Project's planned 39–storey towers.

Soil and Subsurface Characteristics

Urban soils in Sulaymaniyah typically derive from weathered limestone, shale fragments, gravelly colluvium and silty–clayey alluvium. The Project site itself is located within a valley-floor urban land parcel, characterized by reworked fill soil and alluvial sediment of low to moderate stiffness. Based on typical regional geotechnical profiles, near-surface soil layers may include:

- Silty–sandy alluvial deposits (1–3 m)
- Clayey fill with gravel fragments (up to 2 m)
- Weathered shale/limestone bedrock (variable depth, typically 10–30 m below surface)

These deposits may exhibit moderate compressibility and differential settlement potential, especially where underlying clay lenses or anthropogenic fill layers exist. Groundwater is present at variable depths depending on seasonal recharge and proximity to the Tanjaro river corridor. To better characterize these conditions, the Project has undertaken advanced geophysical testing, including Multichannel Analysis of Surface Waves (MASW). Groundwater is present at variable depths depending on seasonal recharge and proximity to the Tanjaro River corridor.

6.1.2 Soil Quality

There are no applicable national standards regarding the soil quality. Therefore, for the assessment of the soil quality for the Project; the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health were considered for soil quality assessment.

Table 6-1. Limit Values for Soil Quality Parameters from Canadian Legislations

Parameters	Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (mg/kg)			
	Agricultural	Residential/Parkland	Commercial	Industrial
Antimony	20	20	40	40
Arsenic	12	12	12	12
Barium	750	500	2000	2000
Cadmium	1.4	10	22	22
Chromium	64	64	87	87
Cobalt	40	50	300	300
Copper	63	63	91	91
Lead	61	61	82	600
Mercury	6.6	6.6	24	50
Molybdenum	5	10	40	40
Nickel	45	45	89	89
Selenium	1	1	2.9	2.9
Thallium	1	1	1	1
Tin	5	50	300	300
Uranium	23	23	33	300
Vanadium	130	130	130	130
Zinc	250	250	410	410

The Project is planned as a mixed-use development incorporating commercial, residential, and public components. Limit values for the soil quality will be selected as residential/parkland and commercial values from the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.

In a study published in March 2026, 10 samples from different areas of the Sulaymaniyah Province is collected. Locations for soil samples are given in Figure 6-1.

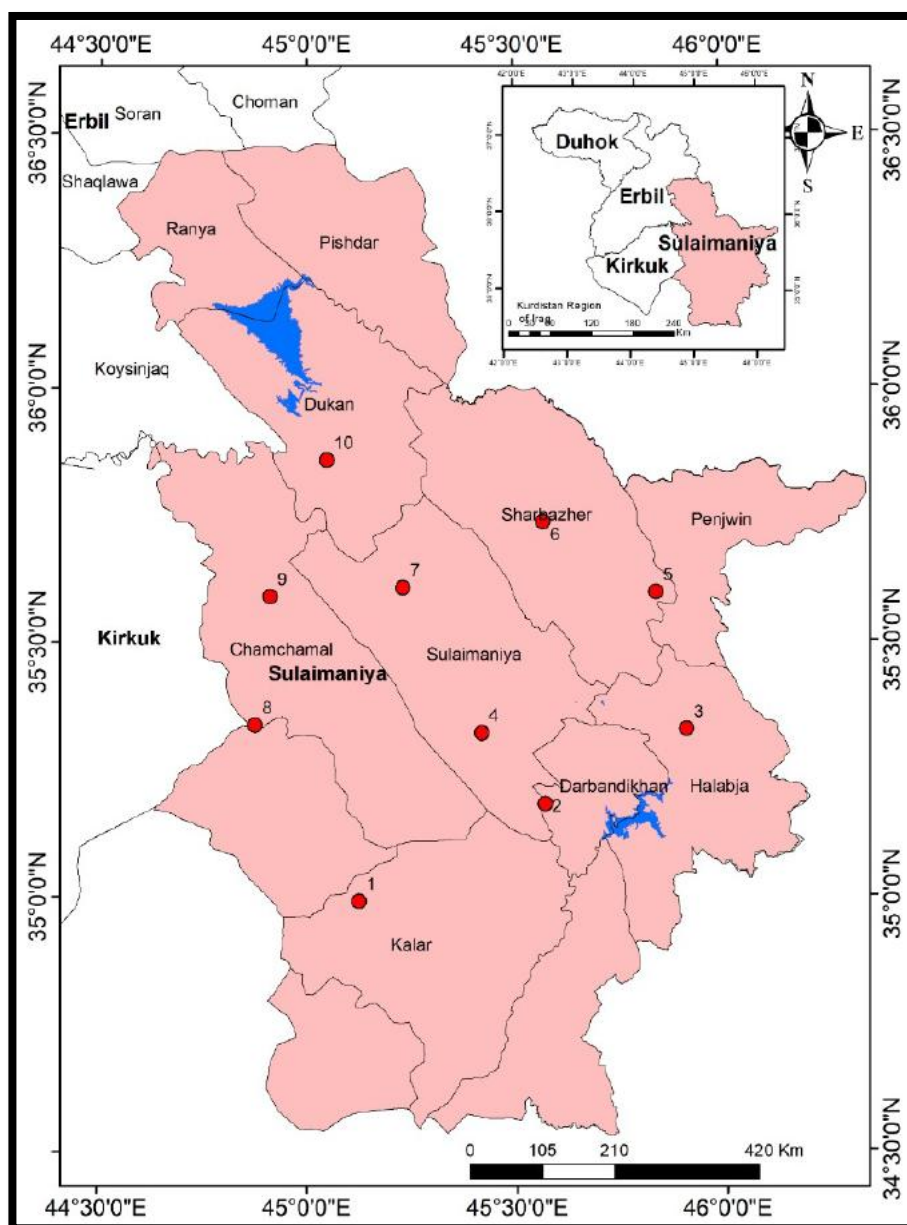


Figure 6-1. Soil Sample Locations

Results of the soil samples from the study is provided in [Table 6-2](#) below.

Table 6-2. Results of Soil Sample Analysis¹

Location	K (mg/kg)	Mg (mg/kg)	Mn (mg/kg)	Ca (mg/kg)	Mo (mg/kg)	Zn (mg/kg)	Pb (mg/kg)	Cd (mg/kg)	Cu (mg/kg)	Co (mg/kg)
S1	132.82	214.07	35.2	3945.63	0.365	56.35	2.26	1.45	26.6	10.59
S2	107.71	195.8	29.53	4467.43	0.27	53.74	3.31	1.25	51.32	14.14
S3	101.45	197.4	35.2	4291.97	0.363	64.7	3.2	1.76	32.39	17.37
S4	45.8	201.67	22.33	3770	0.145	54.13	2.84	1.04	62.42	17.41

¹ Rasool, S. S., Ismail, S. B., Abdullah, R. M., & Hamed, M. H. (2026). Assessment of soil fertility and heavy metal contamination: Nutrient analysis and health risk evaluation in Sulaymaniyah Governorate, Northern Iraq. *Kirkuk Journal of Science*, 21(1), 58–70

Location	K (mg/kg)	Mg (mg/kg)	Mn (mg/kg)	Ca (mg/kg)	Mo (mg/kg)	Zn (mg/kg)	Pb (mg/kg)	Cd (mg/kg)	Cu (mg/kg)	Co (mg/kg)
S5	144.33	177.66	30.03	5413.33	0.265	69.97	2.86	0.97	52.88	17.28
S6	179	253.67	33.2	8183.33	0.331	84.87	3.18	0.98	85.09	32.67
S7	158	232.67	26.87	8246.67	0.281	83.85	3.25	2.27	185.96	15.48
S8	47.81	235.4	32.97	3868.97	0.306	59.81	27.72	1.89	31.25	18.25
S9	99.9	217.07	31.47	3688.97	0.296	102.88	114.02	3.26	26.59	12.21
S10	119.75	225.73	43.41	6308.97	0.469	77.29	29.77	1.6	40.38	18.48

The results indicate that concentrations of Co, Cu, and Zn are within the applicable Canadian soil quality guidelines across all sampling locations. Exceedances were identified for Cd at several sampling points and for Pb at one location. Despite these localized exceedances, the majority of the analysed soil samples exhibited heavy metal concentrations consistent with guideline values, suggesting that the soils in the study area are generally of acceptable quality with respect to the assessed metals.

6.2 Hydrology and Hydrogeology

This section presents baseline information on the hydrological and hydrogeological conditions of the Project area, based on desktop literature review, regional datasets, academic resources, and field reconnaissance undertaken within Sulaymaniyah in December 2025. These baseline conditions are critical to understanding potential impacts associated with water abstraction, stormwater runoff, wastewater generation, and construction-phase earthworks that may affect groundwater or surface-water bodies.

6.2.1 Hydrological Properties

Sulaymaniyah is situated within an upland, semi-arid basin environment in the northeast of Iraq, characterized by mountain runoff systems, seasonal precipitation, and flash-flood-susceptible wadi channels rather than permanent high-volume rivers typical of the Mesopotamian Plain.

The closest surface-water body to the Project site is the Tanjaro River, located approximately 350–400 m west of the proposed development footprint. The Project site is separated from the river by existing developed land and associated infrastructure. The Tanjaro River originates from the Zagros Mountains and flows south–southwest, passing through the city before eventually merging into lower-elevation wetland and irrigation networks. Flow in the river is highly seasonal, peaking during winter–spring rainfall (typically November–March) and decreasing significantly during late summer, where sections may experience low or intermittent base flow influenced by local wastewater discharge, stormwater outfalls, and upstream agricultural use.

Surface water in Sulaymaniyah is generally not used directly as potable supply; instead, the city relies on a combination of treated municipal network water and groundwater wells in peri-urban zones. The absence of a major perennial river within immediate proximity means that hydrological impacts of the Project relate primarily to:

- stormwater management
- prevention of runoff contamination
- avoiding sediment loading to the Tanjaro River
- preventing construction-related spill pathways along roadside drainage and wadi channels

Urbanization in central Sulaymaniyah has altered natural drainage patterns, replacing pervious ground surfaces with impervious built-up areas, increasing stormwater runoff velocity and volume during heavy rainfall events. Consequently, the city experiences localized urban flooding, particularly near natural depressions and old stream paths during extreme rainfall. Given that the Project consists of large-scale built structures, podiums, pavements, underground parking levels, and a commercial mall, stormwater retention, controlled discharge, and infiltration design will be critical requirements. The integration of stormwater retention, controlled discharge, and infiltration measures will be an important component of the overall site design to support effective surface water management. This process will be informed by input from specialist consultants, including EHAF and its subconsultants responsible for the Flood Risk Assessment and stormwater strategy, hydrologist specialists, as well as data provided by universities in Erbil and Sulaymaniyah and relevant local authorities.

6.2.2 Hydrogeological Properties

Hydro-geologically, Sulaymaniyah is located within the High Folded Zone aquifer system of Iraqi Kurdistan, where shallow urban groundwater systems are supported by precipitation-fed recharge from mountain slopes and infiltration from the Tanjaro River in valley areas. Geotechnical studies and academic references for the central Sulaymaniyah basin indicate that groundwater is present at variable depths, typically ranging:

- 5–15 m below ground level in low-lying zones near the Tanjaro floodplain
- >15–25 m in elevated and urban-filled land parcels

Groundwater behaviour in the Project area reflects seasonal fluctuations driven by:

- winter precipitation recharge
- indirect infiltration from leaking urban water supply networks
- evapotranspiration losses during prolonged summer drought

Unlike southern Iraq, where groundwater is often unconfined and hydraulically connected to Euphrates marshlands, the Sulaymaniyah subsurface consists of interlayered alluvial material

and weathered limestone, forming heterogeneous aquifer conditions. Local borehole studies from similar valley-floor developments in the city indicate moderate to low transmissivity, with hydraulic conductivity values generally falling within 10^{-6} – 10^{-4} m/s, depending on the presence of sandy/gravelly lenses.

Deeper aquifer units, occurring within fractured Cretaceous–Paleogene limestones, are regionally important for municipal supply, though the water quality becomes increasingly mineralized / hard with depth and distance from mountain recharge zones. Urban groundwater quality in central Sulaymaniyah may be locally affected by wastewater infiltration, informal septic systems in unplanned districts, and historical municipal landfill areas.

6.2.3 Water Quality

For drinking water quality, IFC General EHS Guidelines state that drinking water sources, whether public or private, should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of World Health Organization (WHO) Guidelines for Drinking-Water Quality. Drinking water quality values of Iraqi national standards and the WHO guidelines are provided below in Table 6-3.

Table 6-3. Limit Values for Drinking Water Quality

Parameter	Iraqi Drinking Water Standards	WHO Guideline Values
Acrylamide (mg/L)	0.0005	0.0005
Arsenic (mg/L)	0.01	0.01*
Barium (mg/L)	0.7	0.7
Cadmium (mg/L)	0.003	0.003
Chromium (mg/L)	0.05	0.05*
Copper (mg/L)	1.0	2.0
Cyanide (mg/L)	0.02	0.07
Fluoride (mg/L)	1.0	1.5
Lead (mg/L)	0.01	0.01
Mercury (mg/L)	0.001	0.001
Nitrate (as NO ₃ ⁻) (mg/L)	50	50
Nitrite (as NO ₂ ⁻) (mg/L)	3.0	3.0 0.2**
Selenium (mg/L)	0.01	0.01
E. Coli (number per mL)	-	0
Colour (TCU)	10	15
Turbidity (NTU)	5	<5 acceptable to consumers <0.1 for effective disinfection
Aluminium (mg/L)	0.2	0.1-0.2
Chloride (mg/L)	250	250**
Copper (mg/L)	1	2 (of health significance)
Hardness (mg/L)	500	100-300**

Parameter	Iraqi Drinking Water Standards	WHO Guideline Values
Iron (mg/L)	0.3	0.3
Manganese (mg/L)	0.1	0.4 (of health significance)
pH		6.5-8.5
Sodium (mg/L)	200	200**
Sulphate (mg/L)	250	500**
TDS (mg/L)	1000	600**
Zinc (mg/L)	3.0	3**
Calcium (mg/L)	50	-
Magnesium (mg/L)	50	-
*Provisional guideline value, as there is evidence of a hazard, but the available information on health effects is limited.		
**No health-based guideline value has been proposed, however may affect acceptability of drinking-water		

Groundwater quality in all districts of the Sulaymaniyah City was conducted, samples from all districts of the city were collected and parameters such as pH, conductivity, total dissolved solids (TDS), total hardness (TH) etc were measured. Results of the measurements are provided in Table 6-4.

Table 6-4. Analysed Parameters of Water Samples in Sulaymaniyah City

District	pH	Ec (µS/cm)	TDS (ppm)	TH (ppm)	Alkalinity (ppm)	Cl (ppm)	NO ₃ (ppm)
Zerinok	6.94	537	N/A	380	169	128	56
Wluba	7.01	550	N/A	220	205	107	51.6
Khabat	7.98	1155	N/A	20	211	290	53
Saiwan	7.1	670	428.8	300	180	77	57
MamaYara	7.3	497	N/A	160	125	78	57.8
Eislah	7.06	566	362.2	350	153	58	53.6
Qirga	7.19	1921	1229	620	171	518	60
Chwarbakh2	7	765	489.6	340	165	64	59
Sharawani	6.42	573	N/A	460	263	121	57
ShekhMuhedin	7.2	575	N/A	280	205	106	50
E.Ahmad-1	6.67	848	542.7	185	175	78	57
E.Ahmad-2	7.31	260	N/A	80	154	68	6.8
Azadi-1	7.2	450	N/A	340	154	62	54.5
Azadi-2	7.1	511	327	120	156	35	51.1
Azadi-3	7.29	406	260	290	145	43	43.5
Azadi-4	7.14	560	358	310	126	60	55.4
Darogha-1	6.97	416		180	173	68	55
Darogha-2	7.22	548	350.7	320	129	64	57
E.Pasha	7.4	430	N/A	290	135	56	57.5

District	pH	Ec (μS/cm)	TDS (ppm)	TH (ppm)	Alkalinity (ppm)	Cl (ppm)	NO ₃ (ppm)
Sh.Azadi	7	455	N/A	300	137	81	56
Goizha	6.82	538	344	100	N/A	57	5.9
Alikamal	7.02	454	291	250	147	29	40.8
Ha.Barza	7.43	351	224.6	150	131	23	32.5
Twimalik	7.16	379	242	150	143	30	18.2
Eiskan	7.13	890	569.6	210	126	69	53.8
Shekhan	7.34	327	209	200	200	40	41.7
SlemaniTaza	7.3	614	392.9	195	166	50	50.6
KaniAskan	6.6	890		350	368	120	44.6
QaziMuhamad	7.08	50	420	340	187	68	47.1
MajidBag1	7.29	488	312	160	125	71	55
MajidBag2	6.08	507	325	230	138	36	52.6
Mamostayan	7.37	543	347.5	200	153	46	55.2
ParkiAzadi	365		104	150	43	28	N/A
Aaqari	6.92	510	N/A	330	199	73	46.2
Ali-Naji	7.38	315	201.6	340	274	141	50.4
Mushirawa	7.28	283	181	214	220	36	0.7
Ashti-1	7.02	586	375	210	170	50	52.2
Ashti-2	7.18	530	339.2	130	148	28	52
HawariTaza	7.12	561	359	200	147	18	54.2
Dabashan	7.41	370	N/A	160	179	76	47.3
MajidBag3	6.36	513	N/A	290	147	82	55
Karezawshk	7.41	469	300	150	135	36	32.3
Zargata-1	6.89	624	399	210	191	55	10
Zargata-2	7.02	418	267.5	132	179	30	35.8
Rizgary-1	6.83	802	513	390	284	43	0.85
Rizgary-2	7.34	657	420	16.3	44	51.6	N/A
RizgaryTaza	7.14	658	N/A	278	304	85	55
Kargakan	7.2	504	N/A	300	216	42	30.35
Lalazar	6.96	729	466.5	410	296	59	17.28
Chwarchra	6.72	725	464	300	225	62	54
Shakraka	7.5	450	N/A	90	171	44	0
Qiliansan	6.71	1426	912.6	340	253	774	35.6
Zarga.Kon	6.47	733	469	204	174	70	57
Sardaw	7.06	535	N/A	15	216	60	11.9
HajiAwa	7.07	754	482.5	360	167	88	58.8
Rozhhalat	6.7	511	N/A	220	225	156	57

District	pH	Ec (μS/cm)	TDS (ppm)	TH (ppm)	Alkalinity (ppm)	Cl (ppm)	NO ₃ (ppm)
Ablakh	7.24	886	567	270	132	220	54
Qalawa	6.95	759	N/A	420	193	81	50
Sarbarzi	7.15	512	N/A	450	232	104	57
Baranan	6.26	312	N/A	286	243	57	44
Andaziaran	7.04	512	N/A	220	240	71	33.1
Bakhtia.Taza	7.36	523	334.7	230	214	41	2
Sarchnar1	6.85	710	454	280	189	51	54
Sarchnar2	7.32	532	340	300	170	57	54.6
KaniSpika	6.96	866	554.2	380	194	139	58
Sarshaqam	6.97	790	505	360	241	67	53.5
Chwarbakh1	6.78	1365	874	510	250	256	57
Sabunkaran	6.65	850	544	251	63	54.6	
Bakhtiary Karez	7.27	671	429.4	310	196	41	44.8
Jwlakan Karez	6.96	690	N/A	290	268		38

(Source: Mustafa, O. M., & Ahmad, H. S. (2008). *Nitrate pollution in groundwater of Sulaymaniyah City, Kurdistan Region, NE Iraq. Iraqi Bulletin of Geology and Mining*, 4(2), 73–82.)

The findings indicate that nitrate concentrations in groundwater within Sulaymaniyah City are generally elevated, with a significant number of sampled wells exceeding the maximum permissible limit of 50 ppm established by the World Health Organization and national standards. Approximately 63% of the analysed samples showed moderate to high levels of nitrate contamination, while only a limited number met acceptable quality criteria. This widespread occurrence is primarily associated with sewage leakage, inadequate wastewater management, and uncontrolled discharge of domestic effluents, as supported by the observed correlation between nitrate and chloride concentrations. The distribution of contamination across different locations and depths suggests that local geological conditions, soil permeability, fractures, and poorly constructed wells facilitate the migration of pollutants within the subsurface environment. These conditions increase the vulnerability of groundwater resources to anthropogenic pollution. In this context, appropriate mitigation and management measures, including improved sanitation infrastructure, regular groundwater monitoring, and targeted remediation techniques such as chemical nitrate reduction, should be considered to protect water quality and minimize potential risks to public health and the environment. (Mustafa & Ahmad, 2008).

The City of Sulaymaniyah currently does not have a municipal wastewater treatment plant that is in operation for the treatment of domestic wastewater.

Domestic wastewater generated during the construction phase will be managed through an appropriate temporary wastewater management system designed to accommodate the wastewater volumes, in accordance with applicable regulatory requirements and the WBG EHS Guidelines.

For the operational phase, the Project will discharge domestic wastewater to the municipal sewer network if a municipal wastewater treatment plant is commissioned and operational by the end of the construction phase. However, if municipal wastewater treatment services are not available at that time, domestic wastewater will be managed through an appropriate wastewater treatment and disposal solution that complies with applicable regulatory requirements and the WBG EHS Guidelines. Wastewater generation rates are presented in *Chapter 7*.

Installed wastewater treatment plants require to be in line with determined IFC values. The guideline values for sanitary sewage discharges that are given in IFC General EHS Guidelines are provided in [Table 6-5](#) below.

Table 6-5. IFC Guideline Values for Sanitary Sewage Discharges

Pollutants	Units	Guideline Value
pH	-	6-9
Biochemical Oxygen Demand (BOD)	mg/l	30
Chemical Oxygen Demand (COD)	mg/l	125
Total Nitrogen	mg/l	10
Total Phosphorus	mg/l	2
Oil and Grease	mg/l	10
Total Suspended Solids (TSS)	mg/l	50
Total Coliform Bacteria	Most Probable Number/100 ml	400

6.3 Land Use and Zoning

The Downtown Slemani Project is located within the central urban fabric of Sulaymaniyah, positioned between significant city-scale mobility corridors including the Sulaimani–Kirkuk Road to the north and Malik Mahmoud Ring Road to the south, and immediately west of the Governorate Complex and Judicial Court. Based on the Sulaymaniyah City land-use zoning layers presented in [Figure 6-2](#), the site lies within an area designated for urban development and surrounded by a combination of residential, commercial, institutional, and industrial land uses.

The Project area itself is currently classified as vacant urban land, with no permanent structures, residential units, or active economic uses occupying the footprint. To the east and southeast, the area transitions into an Industrial Zone, characterized by light–medium manufacturing, warehouses, repair workshops, and associated logistics activities. To the north, the land is bounded by institutional functions, including the Sulaymaniyah Governorate administration complex and the Judicial Court, representing a major civic and employment hub. The northeastern quadrant also includes office-type functions, providing administrative

and service activities. These uses are separated from the Project site by a major six-lane highway.

To the west of the Project area, a large tract of vacant land extends towards the Sulaimani–Kirkuk corridor. This zone has been preliminarily marked for commercial redevelopment under the long-term municipal planning vision and already includes a significant retail cluster. Beyond these zones, large-scale residential neighbourhoods occupy both western (~1 km) and eastern sectors, characterised by high-density built form and mixed socio-economic population groups. In addition, the University of Sulaimani campus is located farther northwest along the corridor, forming an important academic anchor influencing mobility, commercial demand, and public-realm usage in the wider urban catchment.

The Tanjaro River, which runs north–south to the west of the Project site, creates an ecological and landscape corridor in the wider area. A separate residential development is located between the river and the Project site, while vacant commercial land lies further west.

Although highly urbanized at its edges, this watercourse continues to shape drainage, micro-climate, and visual openness within the valley corridor. Its presence functions as a natural physical separator between the western commercial expansion zone and the eastern administrative-industrial plateau. No riparian-dependent habitats or sensitive ecosystems are located within the Project footprint; however, the river valley remains an important urban natural element and will require consideration in terms of storm-water drainage, landscape design, and potential future public-realm connectivity.

Overall, the land-use configuration of the area, a combination of vacant land, industrial activity, civic institutions, and dense residential zones, makes the selected location a strategic point for a mixed-use vertical development. The site is appropriately positioned in an area where redevelopment is anticipated, presenting minimal physical or economic displacement risks while offering optimal accessibility, economic integration potential, and alignment with municipal land-use direction.

According to Land Cover map the Project area is seen below in Figure 6-2.

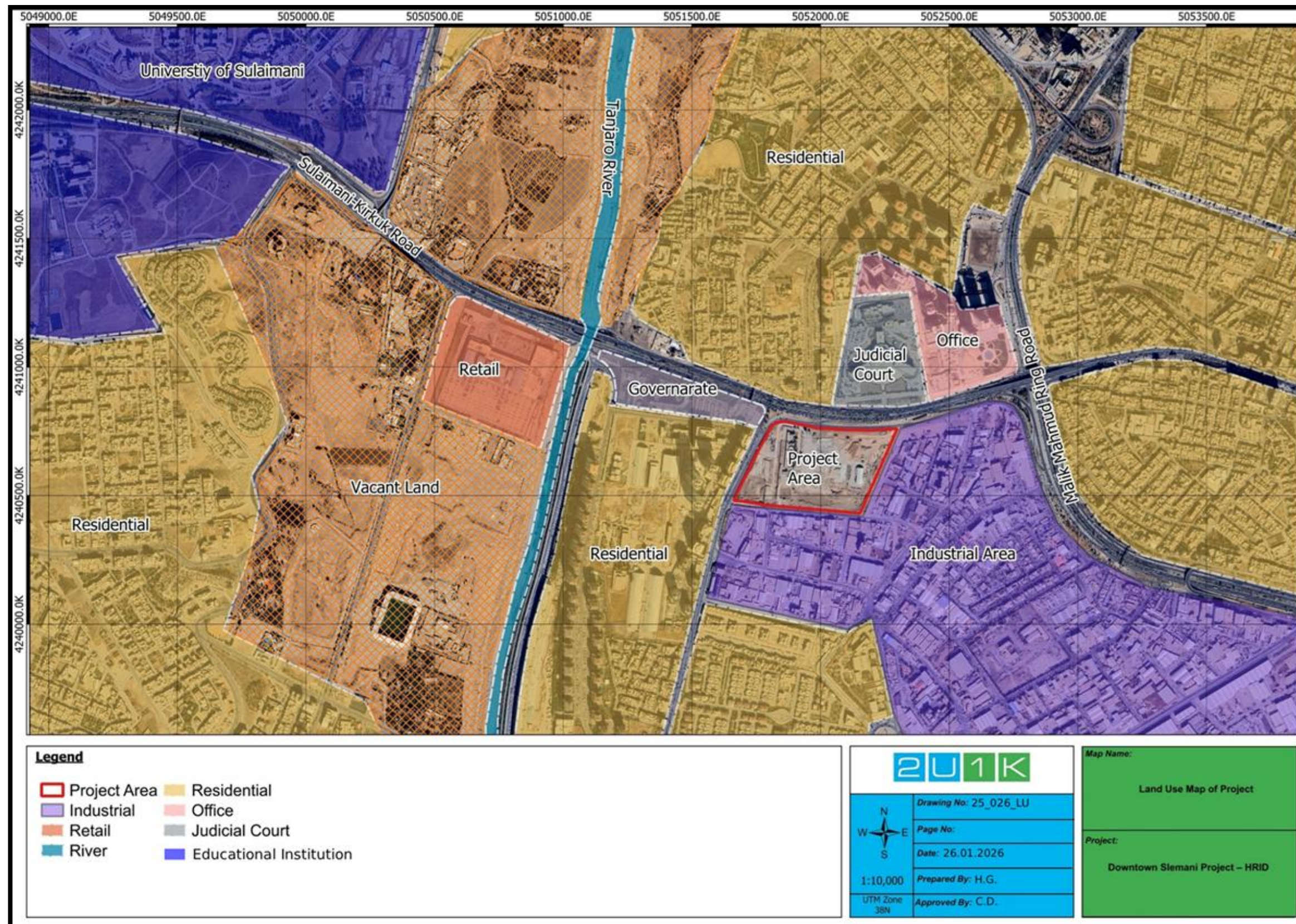


Figure 6-2. Land Use Map of Project Area

Land use distribution is provided below in Table 6-6.

Table 6-6. Land Use Status

Name	According to Land Use Map		Description / Notes
	Area (ha)	Percentage (%)	
Residential Areas	2,450	39	Yellow-shaded dense residential neighbourhoods surrounding the project area on the north, west and south sides
Vacant / Undeveloped Land	1,850	30	Orange-hatched and light brown areas consisting of vacant or partially developed land, mainly west of the river
Industrial Area	1,000	16	Purple-shaded industrial zone located to the southeast of the project area
Retail / Commercial Area	450	7	Red-shaded retail and commercial zone located near the main road intersection
Office Area	300	5	Office-designated area east of the project site
Public / Institutional Areas	180	3	Judicial Court and Governorate buildings shown in grey
River / Water Body	120	2	The Tanjaro River runs through the wider area that surrounds the project site.

In general terms, the land-use pattern reflects a region where agriculture forms the core economic and spatial structure, complemented by natural areas that contribute ecological stability. Expansion of energy and settlement areas should be managed carefully to avoid encroachment on high-value farming lands and ecologically sensitive river corridors. In the case of the Project site, no high-value farming lands are present in the surrounding area, and the nearest river corridor is seasonal in nature and separated from the site by existing urban developments, which limit direct interaction.

6.4 Natural Disaster Risk

Sulaymaniyah, located in the northeastern region of Iraq within the Kurdistan Region (KRG), is exposed to a variety of nature and environmental hazards that present potential risks to infrastructure, public health, and socio-economic systems. Unlike southern Iraq, Sulaymaniyah lies within a moderate-to-high seismic hazard zone, due to its proximity to the Zagros Mountain Fold-and-Thrust Belt, where active fault lines such as the Main Zagros Reverse Fault and various local splays can generate significant shaking. Historically, the Sulaymaniyah region has experienced multiple felt earthquakes, including events exceeding Mw 6.0 in the broader region, indicating the need for earthquake-resilient building standards, proper structural detailing, and emergency response preparedness (IGEES, 2022; KRG MoP Seismic Atlas, 2019).

Climatic and hydro-meteorological hazards represent additional layers of risk. Sulaymaniyah experiences cold winters, where snow and freezing temperatures can cause ice formation on roads, power disruptions, pipe damage, and increased vulnerability for low-income households. The city also faces intense heat events in summer, with maximum monthly temperatures exceeding 40 °C, creating heat-stress risks for vulnerable populations and elevating energy demand for cooling. Heavy precipitation episodes—particularly during March

and April—can result in localised urban flash flooding in parts of Sulaymaniyah. These events may lead to temporary ponding of roads and low-lying areas, with localized disruption to transport and commercial activities.

Geotechnical concerns must also be considered. Much of Sulaymaniyah is underlain by compacted alluvial and colluvial deposits, while surrounding slopes near the foothills of the Zagros range are prone to landslides and slope failures, particularly after prolonged rainfall or snowmelt. In some peri-urban zones, expansive clay soils may undergo volume change during saturation and drying cycles, potentially affecting foundations and underground infrastructure. Areas close to the Tanjaro River valley are subject to seasonal erosion, especially along unstable banks where vegetation cover has degraded due to grazing and informal land use.

Secondary environmental risks further compound natural hazard exposure. Dust storms, although less frequent compared to central and southern Iraq, periodically occur when regional shamal winds or dry-season soil denudation mobilize fine particulate matter. These events reduce visibility, disrupt transportation, and intensify respiratory health issues, especially among individuals with asthma or cardiovascular disease. In addition, localized water scarcity during dry seasons—driven by decreasing rainfall and rising demand—can increase reliance on groundwater extraction, which over time may contribute to subsurface settlement in informal development areas where soil composition is sensitive.

Taken together, these seismic, climatic, hydrological, and geotechnical hazards underscore the importance of integrating risk-sensitive planning, seismic-compliant building codes, stormwater and slope management engineering, emergency preparedness, and climate adaptation measures into development planning for the Downtown Slemani Project. By incorporating these considerations into design and operations, the Project can enhance resilience, reduce exposure of occupants and infrastructure to natural hazard risks, and align with regional adaptation objectives for safe and sustainable urban growth.

6.5 Climate and Meteorology

The Project will be established in the city of Sulaymaniyah, located in the northeast of Iraq within the Kurdistan Region. Sulaymaniyah has a continental semi-arid climate, characterized by hot and dry summers, mild spring and autumn seasons, and cold winters. According to the World Bank Climate Change Knowledge Portal and regional meteorological datasets, the average mean temperature in Sulaymaniyah typically ranges from 3–5°C in winter months to 32–35°C during the summer period. During peak summer, average maximum temperatures can exceed 40°C, while minimum winter temperatures may fall below freezing (0°C to –1°C), often accompanied by frost.

The region's precipitation regime follows a strongly seasonal pattern, with rainfall concentrated between November and April, while precipitation is almost entirely absent between June and September. Snowfall occasionally occurs in elevated areas surrounding Sulaymaniyah, particularly in mountainous zones, but typically does not accumulate within the central urban basin where the Project site is located.

Meteorological summary data sourced from the World Bank Group for Sulaymaniyah (1991–2020) is presented in Table 6-7 below.

Table 6-7. Climate Data for Sulaymaniyah

Month	Average Minimum Temperature (°C)	Average Mean Temperature (°C)	Average Maximum Temperature (°C)	Precipitation (mm)
January	1.19	5.69	10.22	49.60
February	3.25	8.15	13.10	53.51
March	6.15	11.62	17.13	69.84
April	10.52	16.62	22.77	56.26
May	15.91	22.74	29.63	25.81
June	20.86	28.28	35.76	2.75
July	24.39	31.98	39.62	0.89
August	23.95	31.72	39.54	0.34
September	19.66	27.39	35.16	1.04
October	14.42	21.13	27.88	19.21
November	6.85	12.50	18.19	46.85
December	2.65	7.28	11.94	50.67

(Source: World Bank Group – Climate Change Knowledge Portal)

Visual representation of the climate data for Sulaymaniyah (1991–2020) is provided in Figure 6-3, including average minimum surface air temperature, average mean surface air temperature, average maximum surface air temperature, and total precipitation.

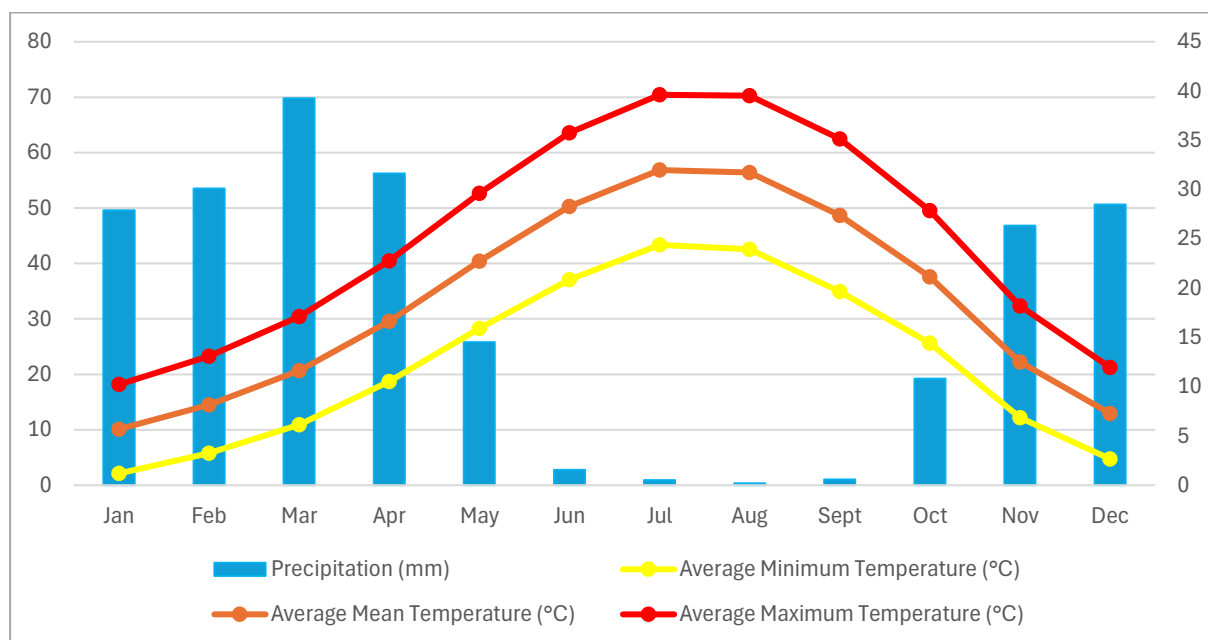


Figure 6-3. Average Temperature and Precipitation data between 1991-2020

The presented climatic data indicate a clear seasonal pattern characterized by hot, dry summers and mild to cool, relatively wet winters, reflecting a typical continental–semi-arid climate regime.

Average minimum temperatures range from approximately 1.2 °C in January to 24.4 °C in July, demonstrating significant seasonal variation. Winter months (December to February) are characterized by low minimum temperatures (1.2–3.3 °C), which may result in occasional frost conditions. In contrast, summer months (June to August) exhibit elevated minimum temperatures (20.9–24.4 °C), indicating persistently warm nights.

Average mean temperatures increase steadily from 5.7 °C in January to a peak of 32.0 °C in July, before declining toward winter values. The warmest period occurs between June and August, with mean temperatures exceeding 28 °C, while the coldest period is observed between December and February, with mean temperatures below 8.2 °C. This pronounced thermal contrast reflects strong continental climatic influences.

Average maximum temperatures show a marked increase from winter to summer, rising from approximately 10.2 °C in January to nearly 39.6 °C in July and August. Maximum temperatures above 35 °C during the summer months indicate frequent heat stress conditions, which may affect human comfort, construction activities, and operational performance of infrastructure.

Precipitation exhibits a strong seasonal distribution. The majority of rainfall occurs during the cooler months, with peak values recorded in March (69.8 mm), February (53.5 mm), December (50.7 mm), and January (49.6 mm). In contrast, the summer period (June to September) is characterized by extremely low rainfall, with monthly totals generally below 3 mm. This indicates a pronounced dry season lasting approximately four months.

The transition seasons (spring and autumn) represent intermediate climatic conditions. Spring (March–April) shows increasing temperatures accompanied by relatively high precipitation, supporting vegetation growth and groundwater recharge. Autumn (October–November) is characterized by declining temperatures and a gradual increase in rainfall following the dry summer period.

6.6 Air Quality

The Project adopts the World Health Organization (WHO) Global Air Quality Guidelines (2021) as the primary reference for the assessment and management of ambient air quality impacts. The WHO guidelines are internationally recognized and are based on extensive scientific evidence regarding the adverse effects of air pollutants on human health. They provide health-based concentration thresholds intended to protect public health, including sensitive groups such as children, the elderly, and individuals with pre-existing respiratory or cardiovascular conditions.

The Project's ambient air quality assessment, impact evaluation, and monitoring framework will therefore be benchmarked against the WHO Global Air Quality Guidelines (2021), as presented in [Table 6-8](#).

Table 6-8. WHO Global Air Quality Guideline Values (2021)

Pollutant	Averaging Time	Interim Target				AQG Level
		1	2	3	4	
PM _{2.5} (µg/m ³)	Annual	35	32	15	10	5

Pollutant	Averaging Time	Interim Target				AQG Level
		1	2	3	4	
	24-hour	75	50	37.5	25	15
PM ₁₀ (µg/m ³)	Annual	70	50	30	20	15
	24-hour	150	100	75	50	45
O ₃ (µg/m ³)	Peak Season	100	70	-	-	60
	8-hour	160	120	-	-	100
NO ₂ (µg/m ³)	Annual	40	30	20	-	10
	24-hour	120	50	-	-	25
SO ₂ (µg/m ³)	24-hour	125	50	-	-	40
CO (µg/m ³)	24-hour	7	-	-	-	4

Air quality in Sulaymaniyah is being monitored in several points and data analysis is being conducted in partnership with the University of Sulaimani's Collage of Environmental Sciences (Meed Foundation,2026)

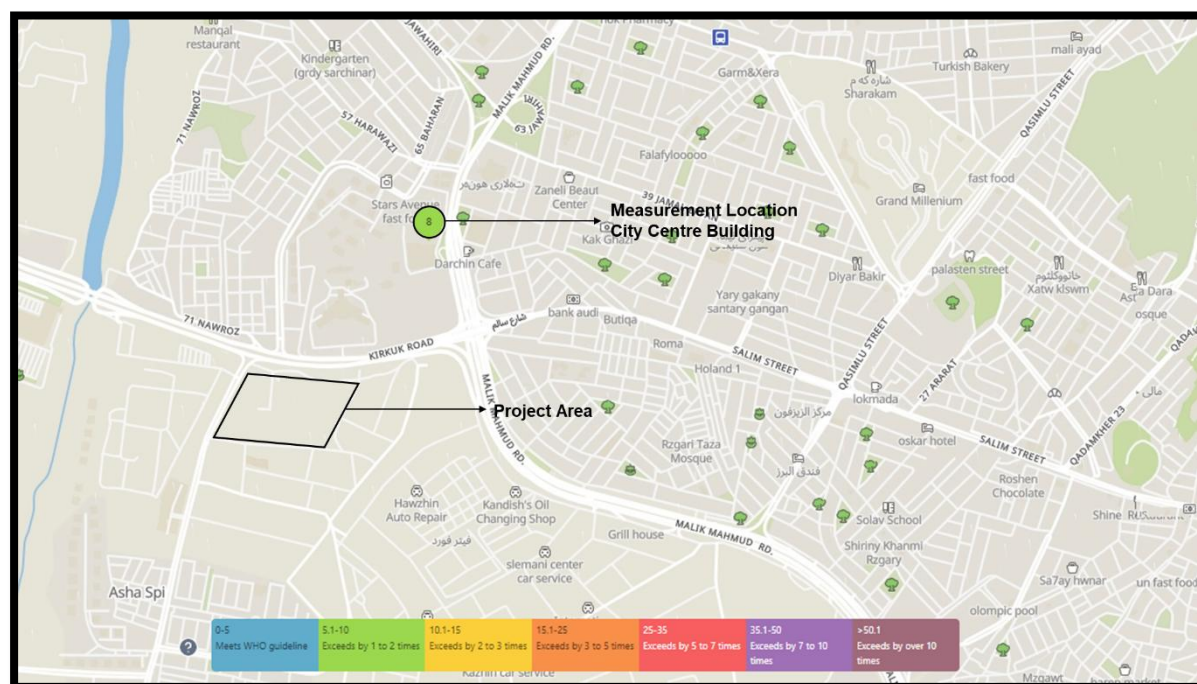


Figure 6-4. Air Quality Monitoring Station

Closest air quality station to the project area, which is located in the City Centre Building, as seen in Figure 6-4. PM_{2.5} measurements from the station for the dates between 24.12.2025 and 23.01.2026 are provided below in Table 6-9.

Table 6-9. Air Quality Measurements in the Monitoring Station

Date	PM _{2.5} (µg/m ³)
24.12.2025	10.5

Date	PM _{2.5} (µg/m ³)
25.12.2025	23.2
26.12.2025	21.4
27.12.2025	26.1
28.12.2025	7.9
29.12.2025	9.6
30.12.2025	11.2
31.12.2025	16.4
01.01.2026	15.6
02.01.2026	9.6
03.01.2026	10.3
04.01.2026	18.0
05.01.2026	18.7
06.01.2026	19.3
07.01.2026	22.4
08.01.2026	33.2
09.01.2026	25.3
10.01.2026	11.4
11.01.2026	20.3
12.01.2026	27.5
13.01.2026	15.8
14.01.2026	18.3
15.01.2026	11.2
16.01.2026	14.3
17.01.2026	20.8
18.01.2026	22.3
19.01.2026	11.5
20.01.2026	11.0
21.01.2026	12.4
22.01.2026	19.5
23.01.2026	9.0
24.01.2026	17.9
25.01.2026	20.4
26.01.2026	19.4

The PM_{2.5} concentrations measured at the monitoring station between 24 December 2025, and 26 January 2026 ranged from 7.9 µg/m³ to 33.2 µg/m³, with an average concentration of approximately 17.4 µg/m³. This indicates moderate temporal variability in fine particulate matter levels during the winter monitoring period.

When compared with the World Health Organization (WHO, 2021) Air Quality Guidelines, which recommend a 24-hour mean limit of $15 \mu\text{g}/\text{m}^3$, the recorded values exceeded this threshold on a considerable number of days. Approximately 20 out of 34 monitoring days (about 59%) were above the WHO guideline, indicating frequent short-term exceedances.

The highest concentration ($33.2 \mu\text{g}/\text{m}^3$) was recorded on 8 January 2026, exceeding the WHO guideline by more than twofold and suggesting the occurrence of episodic pollution events. Elevated concentrations were particularly evident in early and mid-January, likely reflecting increased emissions associated with domestic heating, traffic activity, and reduced atmospheric dispersion under cold and stable weather conditions. Lower $\text{PM}_{2.5}$ levels (below $12 \mu\text{g}/\text{m}^3$) were mainly observed in late December and sporadically throughout January, which may be attributed to improved meteorological conditions such as stronger winds or precipitation that facilitated pollutant dispersion.

In order to determine the baseline concentrations of the project area, diffusion tubes were located in two points inside the project area. Results of the samples are given in below Table 6-10.

Table 6-10. Passive Sampling Results

Sample Point	NO_2 (μg)	SO_2 (μg)
Sample Point 1	<0.02	<0.03
Sample Point 2	<0.02	<0.03

The passive sampling results presented indicate that nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) concentrations at all sampling locations are below the analytical detection limits (<0.02 μg for NO_2 and <0.03 μg for SO_2), reflecting very low ambient levels of these pollutants.

In line with the International Finance Corporation Environmental, Health, and Safety (EHS) Guidelines for Air Quality, ambient pollutant concentrations should be evaluated against internationally recognized reference values, including those established by the World Health Organization Air Quality Guidelines. These guidelines define threshold values for the protection of human health, including both annual and short-term exposure limits (e.g., NO_2 : 10–40 $\mu\text{g}/\text{m}^3$ depending on the averaging period; SO_2 : 20–125 $\mu\text{g}/\text{m}^3$ for short-term exposure).

Considering that all measured concentrations are below detection limits and significantly lower than the applicable guideline values, the baseline air quality conditions for NO_2 and SO_2 in the Project area can be assessed as very good, with no indication of existing air quality concerns related to these parameters.

For determination of baseline dust levels in the project area, measurement is conducted on 17.02.2026, for PM_{10} and $\text{PM}_{2.5}$. Results of the measurements are provided in Table 6-11 and complete report is given in Annex D.

Table 6-11. Particulate Matter Measurement Results

Location	Sampling Hour	Air Quality Results ($\mu\text{g}/\text{m}^3$)		Ambient Conditions	
		PM ₁₀	PM _{2.5}	Humidity (%)	Temperature (°C)
S-1	1	25,17	14,26	44,44	18,61
	2	17,53	10,00	43,65	18,12
	3	16,08	9,52	38,53	20,51
	4	20,05	11,81	38,78	21,40
	5	22,76	13,19	41,63	20,89
	6	13,01	7,83	36,33	20,50
	7	10,41	6,10	39,64	18,97
	8	15,95	9,00	45,22	17,22
	9	20,33	11,01	51,39	15,97
	10	30,08	15,67	57,17	14,61
	11	29,29	15,07	59,25	13,85
	12	73,19	37,89	56,62	13,74
	13	23,96	12,67	55,14	13,89
	14	16,78	8,93	54,03	14,14
	15	17,88	9,65	51,84	14,01
	16	29,33	14,92	60,59	12,94
	17	31,19	15,41	65,76	12,06
	18	38,13	18,50	68,21	11,78
	19	33,20	16,29	65,87	11,59
	20	25,33	12,69	63,57	12,15
	21	26,62	13,13	66,27	11,84
	22	23,35	12,04	58,89	13,95
	23	32,53	17,33	53,18	16,86
	24	29,14	16,06	48,47	18,92
	25	27,51	15,13	49,13	18,47
	26	20,92	11,73	45,76	19,27
	27	11,85	6,96	39,54	20,83
	28	10,95	6,59	36,07	22,30
	29	13,66	8,08	38,13	25,52
	24h Average	24,35	13,02	50,80	16,72
Project Standards		45	15	-	-

The 24-hour average concentrations measured at Location S1 are 24.35 $\mu\text{g}/\text{m}^3$ for PM₁₀ and 13.02 $\mu\text{g}/\text{m}^3$ for PM_{2.5}. These values are below the Project Standards of 45 $\mu\text{g}/\text{m}^3$ (PM₁₀) and 15 $\mu\text{g}/\text{m}^3$ (PM_{2.5}), indicating compliance with the adopted criteria. Furthermore, the results are also below the EU limit value for PM₁₀ (50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times per year), demonstrating consistency with European regulatory benchmarks.

When evaluated against WHO guideline values, the measured concentrations remain within acceptable limits. The PM_{2.5} 24-hour average (13.02 $\mu\text{g}/\text{m}^3$) is below the WHO guideline value of 15 $\mu\text{g}/\text{m}^3$, while the PM₁₀ 24-hour average (24.35 $\mu\text{g}/\text{m}^3$) is well below the WHO guideline value of 45 $\mu\text{g}/\text{m}^3$. This indicates that short-term exposure levels at the monitoring location are unlikely to pose significant health risks.

However, it is noted that short-term peak concentrations were observed, particularly at hour 12 (PM₁₀: 73.19 µg/m³; PM_{2.5}: 37.89 µg/m³), which exceed both WHO guideline values and Project Standards on an hourly basis. While these standards are defined for 24-hour averaging periods and not for hourly limits, such peaks may indicate temporary influences such as local activities, meteorological conditions, or intermittent emission sources.

Overall, the monitoring results suggest that ambient air quality at Location S1 is generally good and compliant with IFC-aligned Project Standards and international guidelines for particulate matter. Nevertheless, the occurrence of short-term elevated concentrations highlights the importance of continued monitoring and the implementation of appropriate dust control measures during Project activities to prevent potential exceedances.

6.7 Noise

Environmental noise that is sourced from the project must be in line with IFC General EHS Guidelines/WHO Noise Guidelines. According to the Guidelines, noise generated by the project should not exceed the levels presented in [Table 6-12](#), or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 6-12. Noise Level Guidelines, One Hour LAeq (dBA)

Receptor	Daytime (07:00-22:00)	Nighttime (22:00-07:00)
Residential Areas	55	45
Commercial/Industrial Areas	70	70

A study by Rauf et al. (2015) assessed urban noise pollution in Sulaimani City (Kurdistan Region, Iraq) by comparing measurements taken in June 2014 with those from June 2009 at three centrally located, high-activity streets: Goran, Peramerd, and Mawlawi. Field measurements were conducted using a calibrated sound level meter across each street during daytime hours. The results indicate that daytime noise levels remain elevated relative to typical guideline values but have shown substantial reduction over the five-year period.

In 2014, average measured noise levels ranged as follows:

- Goran Street: approximately 55–65 dB, compared with 60–75 dB in 2009 (~10 dB reduction).
- Peramerd Street: approximately 55–60 dB in 2014 versus 65–80 dB in 2009 (~15–20 dB reduction).
- Mawlawi Street: approximately 55–65 dB in 2014, with ~15 dB lower levels than in 2009.

These observed decreases (~10–15 dB across sites) are attributed to improvements in traffic management and access controls in the city centre, reduced reliance on loud local electrical generators, decentralisation of commercial activity, and increased public awareness of noise impacts. Despite the reductions, noise levels measured during the day in 2014 still exceeded

typical urban environmental noise guidelines, indicating ongoing exposure for residents, workers, and pedestrians in these areas.

In order to determine the baseline noise conditions within the project area, measurements were conducted at three points prior to commencement of Project construction activities. Measurements conducted between dates 18.12.2024 and 24.12.2024 and measurements continued in morning, afternoon and evening. Measurement locations are shown in the map provided in Figure 6-5.

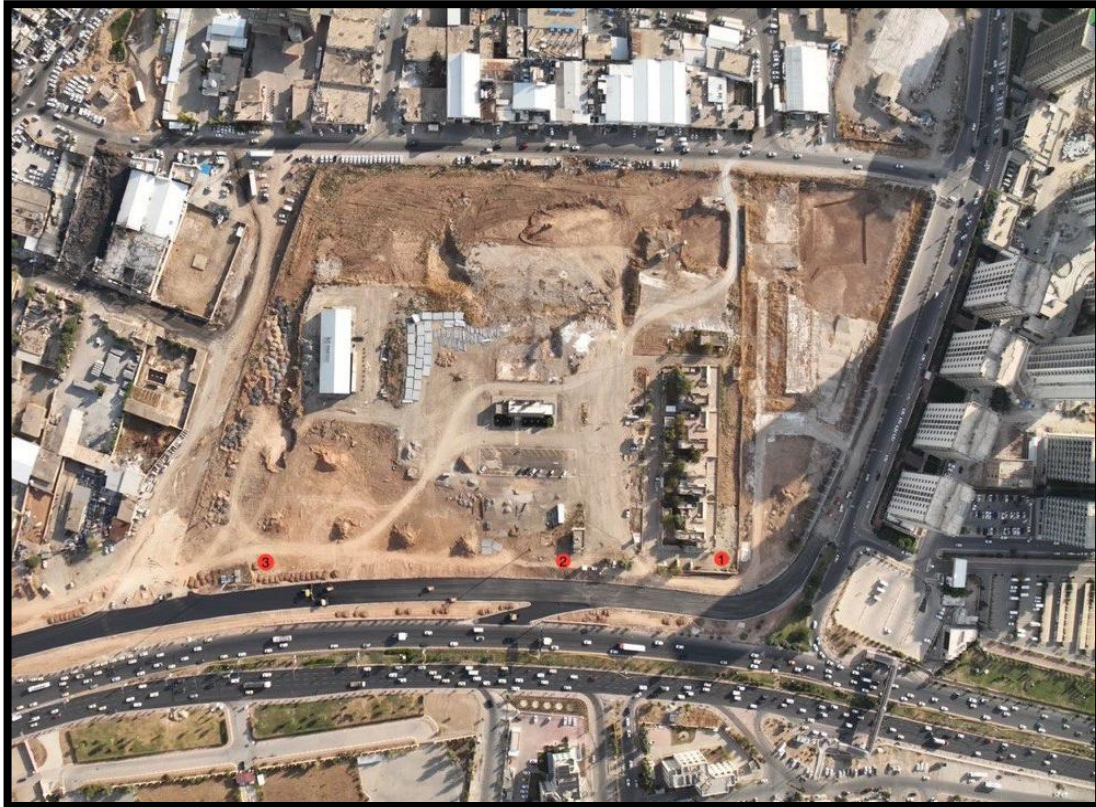


Figure 6-5. Noise Measurement Locations

The measurement results are provided in Table 6-13 with respect to the limit values.

Table 6-13. Baseline Noise Measurement Results (dB)

Date	Measurement Location	Morning	Afternoon	Evening
18.12.2024	1	59-60	60-62	65
	2	63-68	64-66	70
	3	57	55	60
19.12.2024	1	60	65	64-67
	2	65-70	66-68	70-74
	3	55	55	60-65
21.12.2024	1	64	66	68
	2	68-70	65	74

Date	Measurement Location	Morning	Afternoon	Evening
	3	53-55	56	60
22.12.2024	1	64	63	64
	2	68-70	65	67
	3	53-55	52	60-62
23.12.2024	1	60	64-66	67
	2	62-65	61-65	71
	3	55	56	66
24.12.2024	1	60	61-63	70
	2	62-65	65-68	74
	3	55	55-60	65

Baseline noise measurements conducted between 18–24 December 2024 at three monitoring locations indicate ambient sound levels ranging between 52 dB(A) and 74 dB(A) during morning, afternoon, and evening periods. In comparison with the guideline values presented in Table 6-12, the measured baseline levels at most locations exceed the daytime guideline value. The highest noise levels were recorded at Location 2, indicating influence from nearby traffic or other urban activities, while Location 3 generally exhibited relatively lower levels. Overall, the results indicate that the Project area is characterized by a moderate to relatively elevated urban noise environment. Consequently, Project activities should be designed and managed to ensure that noise contributions do not result in an increase of more than 3 dB(A) above the existing baseline levels at sensitive receptors, in accordance with IFC noise management requirements.

6.8 Waste Management

The primary municipal solid waste disposal site serving Sulaymaniyah City is the Tanjaro landfill, located about 10 km south of the city. It has historically been the main dumping ground for the city's waste, but it is nearing capacity and has environmental challenges such as groundwater and air pollution due to uncontrolled dumping. Much of Sulaymaniyah's solid waste is collected and delivered to private companies under municipal contracts; some of this waste is processed through recycling or waste-to-energy arrangements with industrial partners (such as supplying waste to a cement plant) rather than traditional landfill burial.

The Project's solid waste will be managed exclusively through government-approved and licensed collection, treatment, and disposal facilities. Accordingly, the discussion of landfill capacity and environmental challenges reflects broader municipal waste management conditions and should not be interpreted as indicating inappropriate or non-compliant disposal practices associated with the Project.

6.9 Biodiversity

Biodiversity components are included within the environmental impacts of this project. Accordingly, surveys have been conducted in the proposed project site and its vicinity. Terrestrial surveys were conducted between 13–14 January 2026 by biologist Celal Denizli. Field surveys are supported by literature, biodiversity reports have been prepared in accordance with IFC Performance Standard 6 guidelines

General aspects of the baseline studies are provided below:

- I. Within the scope of the field studies, a review of the existing information was undertaken and ecological composition of the Project area in terms of terrestrial flora and fauna elements; potential sensitive areas and sensitive species were identified.
- II. Distribution, population, ecology and reproductive biology of the threatened and endemic plant species that are likely to occur within study area of interest were studied. The literature surveys were intended to give information on identification of endemic, endangered, and rare species and species defined under the national and international conservation status. Accordingly, species that are under the risk of being affected due to the Project and therefore, require special attention and protection measures were determined.
- III. A species inventory for the baseline conditions is established as well as description of the habitats, having been recorded in a systematic way. Also, Endemic, restricted range, CR, EN and VU category flora and fauna species were determined as the target species within the scope of the study.
- IV. The Critical Habitat assessment is carried out to determine whether any areas within or adjacent to the project site meet the criteria defined under IFC Performance Standard 6 (PS6) for Critical Habitat. The assessment evaluates the presence of threatened species, endemic or restricted-range species, key biodiversity features, unique or highly threatened ecosystems, and areas of significant biodiversity value that are vital for species' life-cycle requirements. It also examines the potential impacts of the project on these features and identifies necessary avoidance, mitigation, and management measures.

Characteristics of the Study Area

Definition of the Study Area

Iraq is characterized by diverse ecological and biogeographical features shaped by arid to semi-arid climatic conditions, complex topography, and long-term anthropogenic pressures. Vegetation and wildlife distribution across the country are closely associated with variations in altitude, precipitation, and land use. Natural ecosystems have been progressively modified by agriculture, grazing, urbanization, and infrastructure development.

The Project will be located in the city of Sulaymaniyah, situated in the northeastern part of Iraq within the Kurdistan Region. The broader region represents a transition zone between the Zagros Mountains and surrounding plains, where natural steppe and shrubland habitats have

historically occurred but are now largely altered by urban expansion and associated human activities.

Within the urban and peri-urban context of Sulaymaniyah, biodiversity patterns are primarily influenced by land transformation, habitat fragmentation, and the presence of managed green spaces rather than intact natural ecosystems.

The study area includes the project footprint and its immediate surroundings. The Area of Influence (Aoi) has been preliminarily defined to encompass areas that may be subject to direct or indirect impacts during the construction and operational phases of the Project.

The project area is located within a predominantly urban environment characterized by dense built-up areas, transportation corridors, and modified open spaces. As a result, the ecological baseline reflects long-standing anthropogenic land use, with limited habitat continuity and low naturalness.

6.9.1 Ecological and Habitat Characteristics of the Project Area

The project area is entirely surrounded by dense urban development and has been integrated into the city fabric for an extended period. As a result of long-term urbanization, the original natural characteristics of the site have been substantially degraded and largely eliminated (Figure 6-6 and Figure 6-7).

The site was originally developed as a grain silo facility that was never commissioned. Over time, continuous human intervention, land preparation activities, and infrastructure development have transformed the area into a highly modified environment. These processes have resulted in the near-complete loss of the site's original ecological features.

Natural vegetation within the Project Area is extremely limited and is confined to sparse, low-growing grasses and scattered shrubs. Accordingly, the intrinsic ecological value of the Project Area itself is considered low at the scoping stage. Vegetation present on-site consists primarily of ruderal and disturbance-tolerant species, with no evidence of natural or semi-natural habitat development.

Soil conditions within the Project Area are highly altered, characterized by elevated compaction levels and the absence of topsoil, which significantly limit natural soil structure, seed bank functionality, and ecological recovery potential. These factors constrain the site's capacity for natural regeneration and habitat reinstatement.

No natural or semi-natural habitats are present within the Project Area. The existing vegetation is dominated by sparse ruderal species belonging mainly to Asteraceae, Brassicaceae, and Poaceae families, which are typical of degraded urban environments subject to continuous disturbance.

The site provides unfavourable conditions for wildlife, primarily due to intensive human activity, vehicular traffic, frequent presence of dogs, and the fact that the area is completely surrounded by urban development. As a result, the project area does not function as suitable habitat for

sensitive or specialist fauna species, and only occasional use by highly disturbance-tolerant species may occur.

The Project site is located within a highly urbanized setting, and no urban green spaces are present adjacent to the site. The nearest river corridor is in nature and is physically separated from the Project by existing large-scale urban developments. As a result, these features do not function as sensitive ecological receptors within the Project's Area of Influence.

Based on the habitat assessment undertaken during the field surveys and in accordance with the definitions provided in IFC Performance Standard 6 (PS6), the Project Area is classified as Modified Habitat. This classification is based on the predominance of disturbed ground, compacted soils, abandoned infrastructure, ruderal vegetation, intensive surrounding urban development, and the absence of natural ecological processes and habitat functionality. No habitats meeting the definition of Natural Habitat or Critical Habitat under IFC PS6 were identified within the Project Area or its immediate Area of Influence.



Figure 6-6. General View of the Project Area

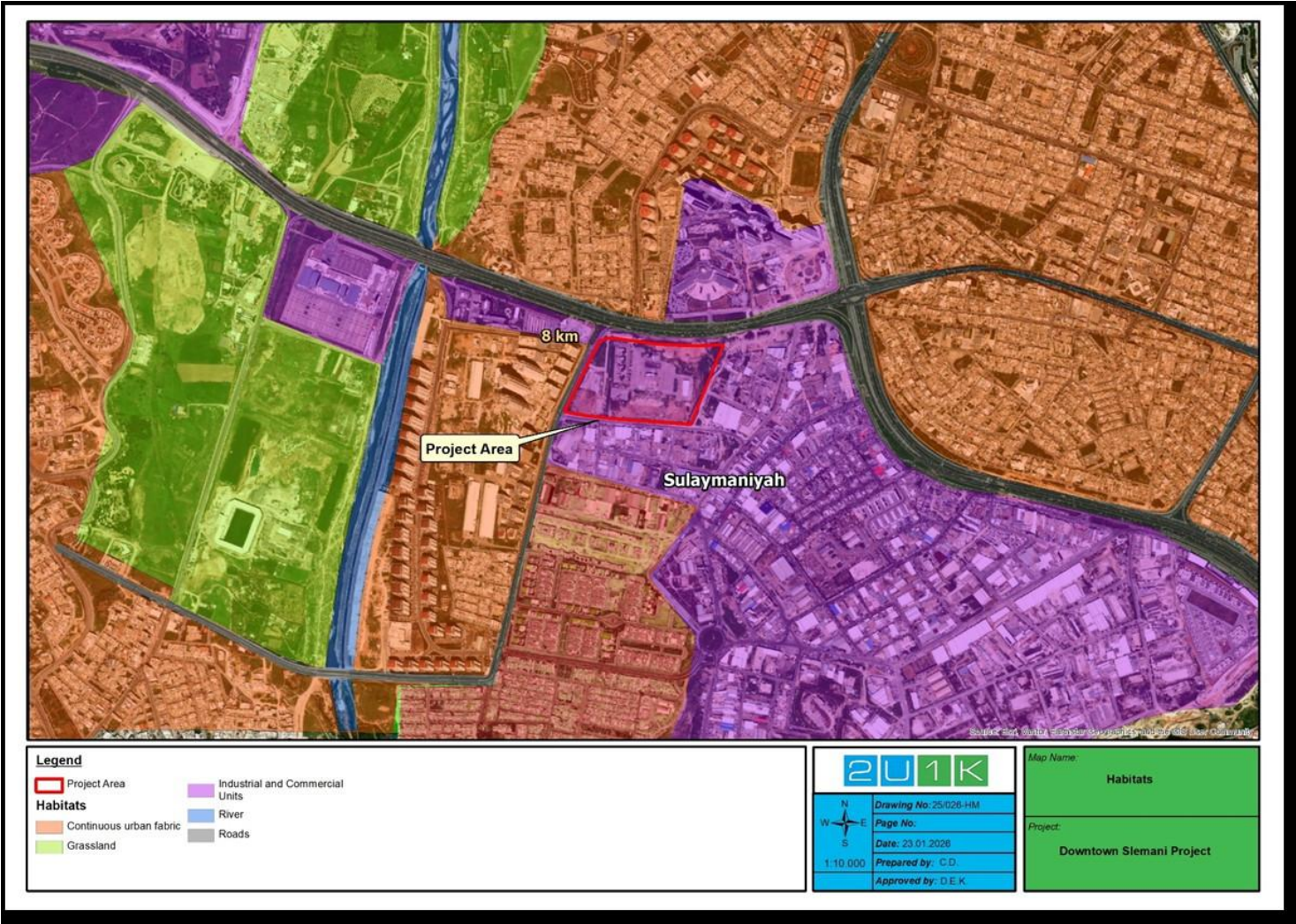


Figure 6-7. Habitat Types of the Project Area and Surroundings

METHODOLOGY

Baseline biodiversity surveys were undertaken within the Project Area and its Area of Influence (Aoi) through field investigations, habitat assessments, literature review, species distribution analyses, and the evaluation of available biodiversity datasets. Surveys were conducted by biologist Celal Denizli between 13–14 January 2026. These data sources were integrated to account for seasonal limitations and establish a representative biodiversity baseline. The Project Area covers approximately 10 ha and was surveyed through approximately 2.4 km of systematic walkover transects, providing full coverage of all accessible habitats and ecological features present within the site (Figure 6-8).

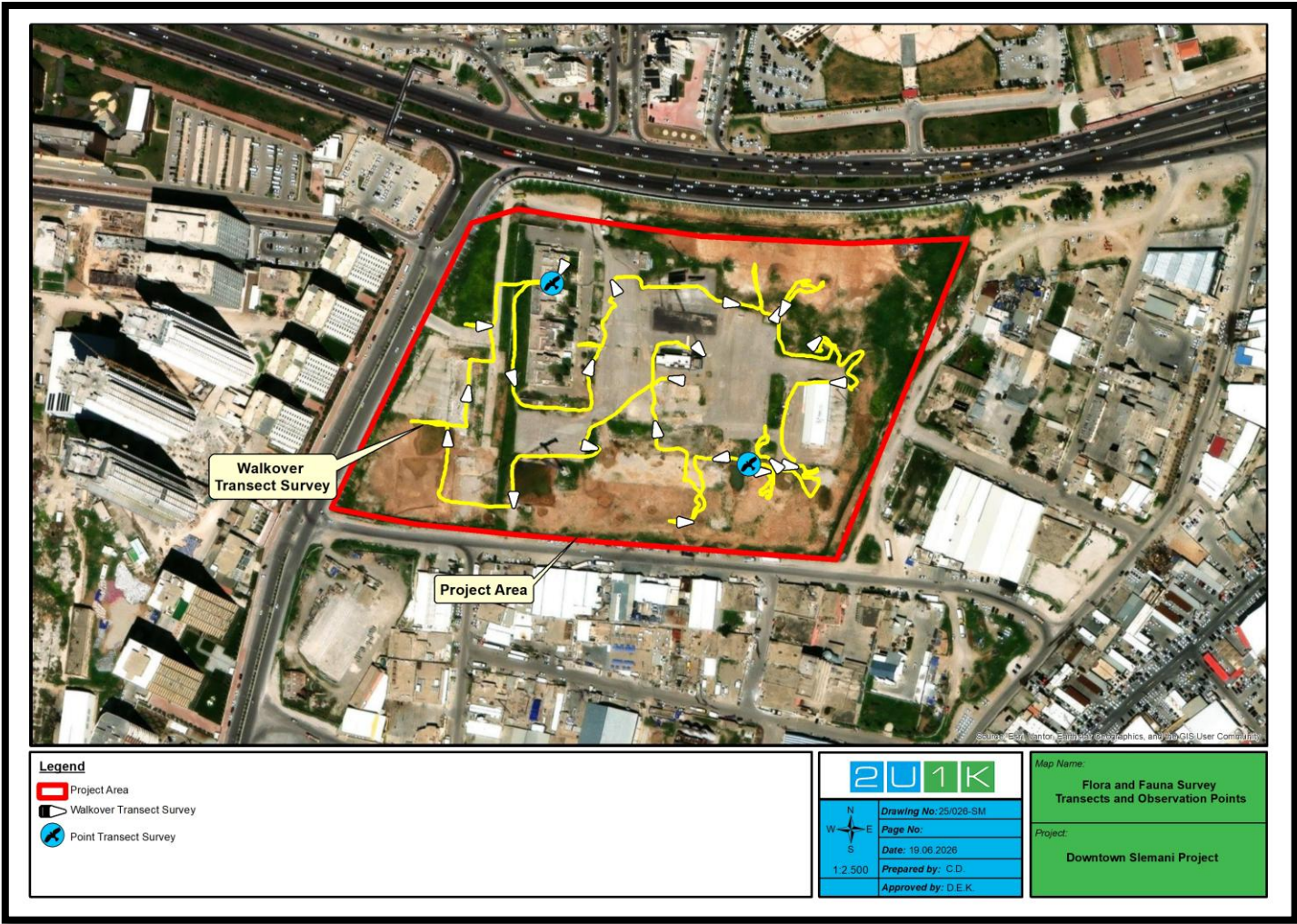


Figure 6-8. Walkover Transects and Observation Points

Terrestrial Flora Sampling Methodology

The flora assessment included systematic walkover surveys covering all accessible habitats within the Project Area and immediate surroundings. Particular attention was given to vegetation composition, habitat structure, ecological condition, and the potential occurrence of species of conservation concern. Survey coverage included disturbed open ground, ruderal vegetation patches, abandoned infrastructure areas, stockpiles, road verges, and urban edge habitats. The survey focused on recording vascular plant species through visual identification, photographic documentation, and examination of diagnostic morphological characteristics.

In addition to species identification, habitat suitability for endemic, threatened, and restricted-range plant species was assessed based on habitat characteristics, ecological requirements, altitude, substrate conditions, and regional distribution patterns. Species identifications were verified and cross-checked using the Flora of Iraq (Townsend & Guest, 1966–1985), Plants of the World Online (Royal Botanic Gardens, Kew), World Flora Online, Global Biodiversity Information Facility (GBIF), the Annotated Checklist of the Flowering Plants of Kurdistan-Iraq (Al-Khayat, 2014), the Kurdistan Botanical Foundation Plant Database, and the Iraq National Biodiversity Strategy and Action Plan (NBSAP). These sources were used to verify taxonomic nomenclature, assess species distribution patterns at national and regional scales, and evaluate the potential occurrence of endemic, threatened, and restricted-range plant species. Only records with reliable taxonomic certainty were included in the final species inventory.

Terrestrial Fauna Sampling Methodology

The terrestrial fauna assessment covered mammals, birds, reptiles, and amphibians and was designed to establish a baseline understanding of species occurrence and habitat suitability within the Project Area and its surroundings. Surveys consisted of direct observations, searches for indirect field evidence, habitat suitability assessments, literature review, and consultation of available biodiversity records. Secondary data sources included the IUCN Red List of Threatened Species, Global Biodiversity Information Facility (GBIF), Nature Iraq Key Biodiversity Area (KBA) Assessments, Birds of Iraq (Porter et al., 2010), Important Bird Areas in Iraq (Evans, 2004), Rapid Assessment of Birds in Kurdistan, Northern Iraq, Mammals of Iraq (Hatt, 1959; Harrison & Bates, 1991), Checklist and Distribution of the Amphibians and Reptiles of Iraq, and other relevant peer-reviewed scientific publications.

Field investigations included approximately 2.4 km of systematic walkover transects throughout the Project Area and surrounding habitats potentially affected by Project activities. Survey effort was designed to achieve complete spatial coverage of the approximately 10 ha Project Area and to assess all habitat types present within the site. Particular attention was given to identifying ecological features that could support species of conservation concern, including breeding, feeding, sheltering, dispersal, and resting habitats. Evidence used to confirm species presence included direct sightings, nests, footprints, burrows, droppings, feathers, food remains, carcasses, skins, and other diagnostic field signs. No trapping, collection, or hunting activities were undertaken.

Given the highly modified and urbanized character of the Project Area, habitat suitability assessments formed an important component of the baseline evaluation. The surveys specifically considered the potential presence of habitats relevant to threatened species, restricted-range species, migratory species, and other biodiversity features associated with IFC PS6 Critical Habitat criteria.

Amphibians: Given the absence of suitable aquatic breeding habitats within the Project Area, amphibian assessment focused primarily on habitat suitability evaluation and visual observations of potential refuge areas. The availability of temporary water accumulation zones, drainage features, moisture-retaining microhabitats, and other habitat features potentially supporting amphibians was assessed. No suitable breeding habitats were identified within the Project footprint.

Reptiles: Reptile surveys consisted of visual encounter surveys and targeted searches of suitable microhabitats. Particular attention was given to sun-exposed surfaces, stone accumulations, wall bases, rubble piles, road verges, and other potential sheltering locations. Habitat suitability for reptile species of conservation concern was also evaluated based on the availability of suitable refuge, basking, and foraging habitats.

Birds: Bird surveys were conducted using a combination of point counts and walkover observations at representative locations throughout the Project Area and its immediate surroundings. Observation periods of approximately 10–15 minutes were undertaken at representative locations within and around the Project Area. The survey recorded species presence, behaviour, habitat use, and evidence of breeding activity where applicable. The survey also assessed the suitability of the Project Area for migratory, congregatory, nesting, and foraging bird species relevant to IFC Performance Standard 6 (PS6) Critical Habitat criteria.

Mammals: Mammal surveys relied on direct observations and searches for indirect evidence including tracks, burrows, droppings, feeding signs, resting sites, and other field indicators. Habitat suitability assessments were undertaken for both small and medium-sized mammals. Particular attention was given to identifying potential roosting, breeding, sheltering, foraging, and movement corridor features that could support species of conservation concern. Bat occurrence was evaluated through habitat assessment and literature review, with specific consideration given to the availability of suitable roosting, commuting, and foraging habitats.

Given the relatively small size of the Project Area and the systematic survey coverage achieved, the survey effort was considered sufficient to characterize the biodiversity baseline and evaluate the likelihood of species and habitats relevant to IFC PS6 occurring within the Project Area.

Survey timing and seasonality were considered during the interpretation of baseline findings. Although field surveys were undertaken during January 2026, the Project Area is located within a highly modified urban environment characterized by disturbed ground, abandoned infrastructure, ruderal vegetation, and limited ecological functionality. Consequently, the assessment relied not only on field observations but also on habitat suitability evaluation,

literature review, species distribution data, and available biodiversity records to identify any potential biodiversity features of conservation concern.

The absence of suitable habitats for threatened, restricted-range, migratory, congregatory, or habitat-specialist species, together with the highly modified urban character of the Project Area, provides a high level of confidence that biodiversity features relevant to IFC PS6 are unlikely to occur within the Project Area. Furthermore, no habitat features were identified during the survey that would indicate the potential presence of species or ecosystems meeting IFC PS6 Critical Habitat thresholds.

Overall, the baseline assessment incorporated both species occurrence data and habitat suitability evaluations to determine the likelihood of species of conservation concern being present within the Project Area. Particular emphasis was placed on identifying habitat features relevant to threatened, restricted-range, migratory, and congregatory species in accordance with IFC Performance Standard 6. The combined assessment of field observations, habitat suitability, literature review, species distribution information, and systematic walkover surveys covering the approximately 10 ha Project Area through 2.4 km of transects provided a robust basis for the Critical Habitat Assessment.

6.9.2 Flora and Fauna

Flora and fauna within the project area are expected to be composed mainly of widespread and common species adapted to urban and peri-urban conditions. Vegetation is anticipated to consist predominantly of ruderal species, planted or ornamental taxa, and naturally colonizing species tolerant of disturbance.

Faunal presence is preliminarily considered to be limited to species commonly associated with urban environments, including birds, small mammals, and other synanthropic fauna. Species diversity and abundance are expected to be relatively low compared to less disturbed habitats in the wider region.

Based on the results of field surveys and literature review, a total of 64 terrestrial species were identified within the project area, comprising 23 plant, 1 amphibian, 6 reptile, 29 bird, and 5 mammal species.

The recorded biodiversity is dominated by widespread, disturbance-tolerant and synanthropic species typical of highly modified and urbanized environments. No endemic or globally threatened species were identified, with the exception of one Near Threatened (NT) bird species (*Lanius senator*) and one Data Deficient (DD) reptile species (*Eublepharis angramainyu*).

The conservation status of the identified species was evaluated based on IUCN Red List categories, while none of the recorded species are listed under CITES.

Terrestrial Flora

The project area is characterized by a simplified floristic structure shaped by semi-arid conditions, soil salinity, and long-term anthropogenic disturbance. Vegetation shows a mosaic pattern, primarily represented by disturbed habitats and ruderal species. The dominant habitat types within the site are disturbed/urban edges and previously modified areas, with no well-developed natural steppe or riparian systems observed.

Recorded flora mainly consists of widespread, disturbance-tolerant species, including members of Poaceae (e.g. *Aegilops* spp., *Triticum* spp.) and Fabaceae (*Medicago* spp.), along with common ruderal taxa such as *Notobasis syriaca*, *Salsola kali*, and *Xanthium strumarium*. Additionally, ornamental and planted species (e.g. *Pittosporum tobira*, *Alcea rosea*, and *Eucalyptus* sp.) were identified, reflecting urban influence on vegetation composition.

No endemic, rare, or globally threatened plant species were recorded within the project area. The overall floristic composition is typical of degraded and anthropogenically influenced habitats in the Mesopotamian region. Consequently, the ecological value of the flora within the site is considered low.

A total of 23 terrestrial flora species were identified during the survey (see Table 6-14).

Table 6-14. Flora Species Identified in the Project Area

Family	Scientific Name	Common Name	IUCN	CITES	Endemism
Amaranthaceae	<i>Salsola kali</i>	Russian thistle	-	-	-
Anacardiaceae	<i>Pistacia khinjuk</i>	Wild pistachio	LC	-	-
Asteraceae	<i>Centaurea hyalolepis</i>	Knapweed	-	-	-
	<i>Notobasis syriaca</i>	Syrian thistle	-	-	-
	<i>Onopordum acanthium</i>	Scotch thistle	-	-	-
	<i>Xanthium strumarium</i>	Cocklebur	-	-	-
Fabaceae	<i>Medicago constricta</i>	Barrel clover	LC	-	-
	<i>Medicago sativa</i>	Alfalfa	LC	-	-
	<i>Medicago turbinata</i>	Medick	LC	-	-
Malvaceae	<i>Alcea rosea</i>	Hollyhock	-	-	-
Myrtaceae	<i>Eucalyptus camaldulensis</i>	Eucalyptus	NT	-	-
Pittosporaceae	<i>Pittosporum tobira</i>	Japanese mock orange	-	-	-
Poaceae	<i>Aegilops biuncialis</i>	Goatgrass	LC	-	-
	<i>Aegilops caudata</i>	Goatgrass	LC	-	-
	<i>Aegilops cylindrica</i>	Jointed goatgrass	LC	-	-
	<i>Aegilops geniculata</i>	Ovate goatgrass	LC	-	-
	<i>Aegilops triuncialis</i>	Barbed goatgrass	LC	-	-
	<i>Aegilops umbellulata</i>	Goatgrass	LC	-	-
	<i>Triticum monococcum</i>	Einkorn wheat (wild)	LC	-	-
	<i>Triticum urartu</i>	Wild wheat	DD	-	-

Terrestrial Fauna

The fauna assessment indicates that the project area supports a limited assemblage of species adapted to highly modified, urban and disturbed environments rather than natural semi-arid steppe systems. The absence of natural or semi-natural habitats, combined with intensive anthropogenic pressures, restricts the site's ecological functionality and habitat suitability.

The project area does not provide suitable conditions for sensitive or water-dependent fauna, and no ecological connectivity with natural systems (e.g. riverine or riparian habitats) is present. Consequently, the site supports only a small number of widespread, disturbance-tolerant species.

Given its isolation within a dense urban matrix and the lack of functional ecological corridors, the overall ecological sensitivity of the project area is considered low, with no features of elevated conservation importance identified within the Aol.

Amphibians: A single amphibian species, *Bufo tatus*, classified as Least Concern (LC), was recorded within the project area. The species is known for its high ecological adaptability, occurring across a wide range of natural habitats as well as anthropogenically modified environments. In the region, it typically utilizes temporary water bodies, irrigation channels, drainage lines, and other artificial or semi-natural water sources for breeding and shelter under semi-arid conditions.

Reptiles: A total of six reptile species were recorded within the project area (Table 6-15), predominantly composed of widespread and disturbance-tolerant taxa typical of arid and semi-arid environments. The assemblage includes species from Colubridae, Gekkonidae, Phyllodactylidae, and Typhlopidae, reflecting adaptation to dry, rocky, and anthropogenically influenced habitats.

All recorded species are classified as Least Concern (LC), with the exception of *Eublepharis angramainyu*, which is listed as Data Deficient (DD). No endemic or globally threatened reptile species were identified within the project area. Overall, the reptile community is considered to have low conservation sensitivity and is characteristic of common regional fauna.

Table 6-15. Reptile Species Identified in the Project Area

Family	Scientific Name	Common Name	IUCN	CITES	Endemism
Colubridae	<i>Hemorrhois nummifer</i>	Coin-marked snake	LC	-	-
Colubridae	<i>Platycephalus rhodochis</i>	Jan's desert racer	LC	-	-
Eublepharidae	<i>Eublepharis angramainyu</i>	Iranian fat-tailed gecko	DD	-	-
Gekkonidae	<i>Cyrtopodion scabrum</i>	Rough bent-toed gecko	LC	-	-
Phyllodactylidae	<i>Asaccus elisae</i>	Leaf-toed gecko	LC	-	-
Typhlopidae	<i>Indotyphlops braminus</i>	Brahminy blind snake	LC	-	-

Birds: A total of 29 bird species were recorded within the project area (Table 6-16), primarily composed of widespread and habitat-generalist species typical of disturbed and semi-natural

environments. The avifauna is dominated by passerines and common terrestrial species, along with a limited number of raptors and synanthropic taxa.

Most recorded species are classified as Least Concern (LC), with the exception of *Lanius senator*, which is listed as Near Threatened (NT). No species belonging to higher IUCN threat categories were identified.

Overall, the bird community reflects low to moderate ecological sensitivity. Nevertheless, general good practice measures—such as minimizing noise and light disturbance during breeding and migration periods—would support local avifauna.

Table 6-16. Bird Species Identified in the Project Area

Family	Scientific Name	Common Name	IUCN	CITES	Endemism
Acrocephalidae	<i>Iduna pallida</i>	Eastern olivaceous warbler	LC	-	-
Alaudidae	<i>Lullula arborea</i>	Woodlark	LC	-	-
Columbidae	<i>Columba livia</i>	Rock dove	LC	-	-
	<i>Columba palumbus</i>	Common wood pigeon	LC	-	-
	<i>Streptopelia decaocto</i>	Eurasian collared dove	LC	-	-
Corvidae	<i>Garrulus glandarius</i>	Eurasian jay	LC	-	-
	<i>Pica pica</i>	Eurasian magpie	LC	-	-
Emberizidae	<i>Emberiza calandra</i>	Corn bunting	LC	-	-
	<i>Emberiza citrinella</i>	Yellowhammer	LC	-	-
Falconidae	<i>Falco tinnunculus</i>	Common kestrel	LC	-	-
Fringillidae	<i>Chloris chloris</i>	European greenfinch	LC	-	-
	<i>Coccothraustes coccothraustes</i>	Hawfinch	LC	-	-
	<i>Fringilla coelebs</i>	Common chaffinch	LC	-	-
Laniidae	<i>Lanius minor</i>	Lesser grey shrike	LC	-	-
	<i>Lanius nubicus</i>	Masked shrike	LC	-	-
	<i>Lanius senator</i>	Woodchat shrike	NT	-	-
Muscicapidae	<i>Erithacus rubecula</i>	European robin	LC	-	-
	<i>Ficedula albicollis</i>	Collared flycatcher	LC	-	-
	<i>Ficedula semitorquata</i>	Semi-collared flycatcher	LC	-	-
Oriolidae	<i>Oriolus oriolus</i>	Eurasian golden oriole	LC	-	-
Paridae	<i>Parus major</i>	Great tit	LC	-	-
Passeridae	<i>Gymnoris xanthocollis</i>	Yellow-throated sparrow	LC	-	-
Phylloscopidae	<i>Phylloscopus collybita</i>	Common chiffchaff	LC	-	-
Sittidae	<i>Sitta neumayer</i>	Western rock nuthatch	LC	-	-
Strigidae	<i>Athene noctua</i>	Little owl	LC	-	-
Troglodytidae	<i>Troglodytes troglodytes</i>	Eurasian wren	LC	-	-
Turdidae	<i>Turdus merula</i>	Common blackbird	LC	-	-
	<i>Turdus philomelos</i>	Song thrush	LC	-	-
Upupidae	<i>Upupa epops</i>	Eurasian hoopoe	LC	-	-

Mammals: A total of five mammal species were recorded within the project area (see Table 6-17), primarily consisting of widespread, disturbance-tolerant and synanthropic species typical of modified habitats. The assemblage includes small mammals.

All recorded species are classified as Least Concern (LC), and no globally threatened or endemic mammal species were identified. The presence of *Pipistrellus kuhlii* indicates that the area may provide limited foraging opportunities for bats, particularly within urban and semi-natural features; however, no key roosting or critical habitats were identified.

Overall, the mammal community reflects low ecological sensitivity and is characteristic of anthropogenically influenced environments.

Table 6-17. Mammal Species Identified in the Project Area

Family	Scientific Name	Common Name	IUCN	CITES	Endemism
Cricetidae	<i>Nothocricetulus migratorius</i>	Grey hamster	LC	-	Non-endemic
Erinaceidae	<i>Erinaceus concolor</i>	Southern white-breasted hedgehog	LC	-	Non-endemic
Muridae	<i>Mus musculus</i>	House mouse	LC	-	Non-endemic
	<i>Rattus rattus</i>	Black rat	LC	-	Non-endemic
Vespertilionidae	<i>Pipistrellus kuhlii</i>	Kuhl's pipistrelle	LC	-	Non-endemic

6.9.3 Nationally Protected and Internationally Recognized Areas

The project area is located within the urban boundaries of Sulaymaniyah, in the northeastern part of Iraq. There are no nationally or internationally designated protected areas located within the project area or its immediate surroundings.

Based on a review of internationally and nationally recognized conservation designations, including national parks, nature reserves, Ramsar Sites, and Important Bird Areas (IBAs), no legally protected or officially designated biodiversity areas are present within or adjacent to the project site.

While certain ecologically sensitive areas may occur at a broader regional scale, such areas are spatially separated from the project area. The nearest designated protected area is the Peramagroon Mountain Nature Reserve, located approximately 8 km from the project site. Given this separation distance and the fully urbanized character of the project area, no direct impacts on protected landscapes, wetlands, or other key biodiversity designations are anticipated as a result of project activities (Figure 6-9).

The identification of internationally and nationally designated protected areas within and around the Project Area was carried out using the World Database on Protected Areas (WDPA).

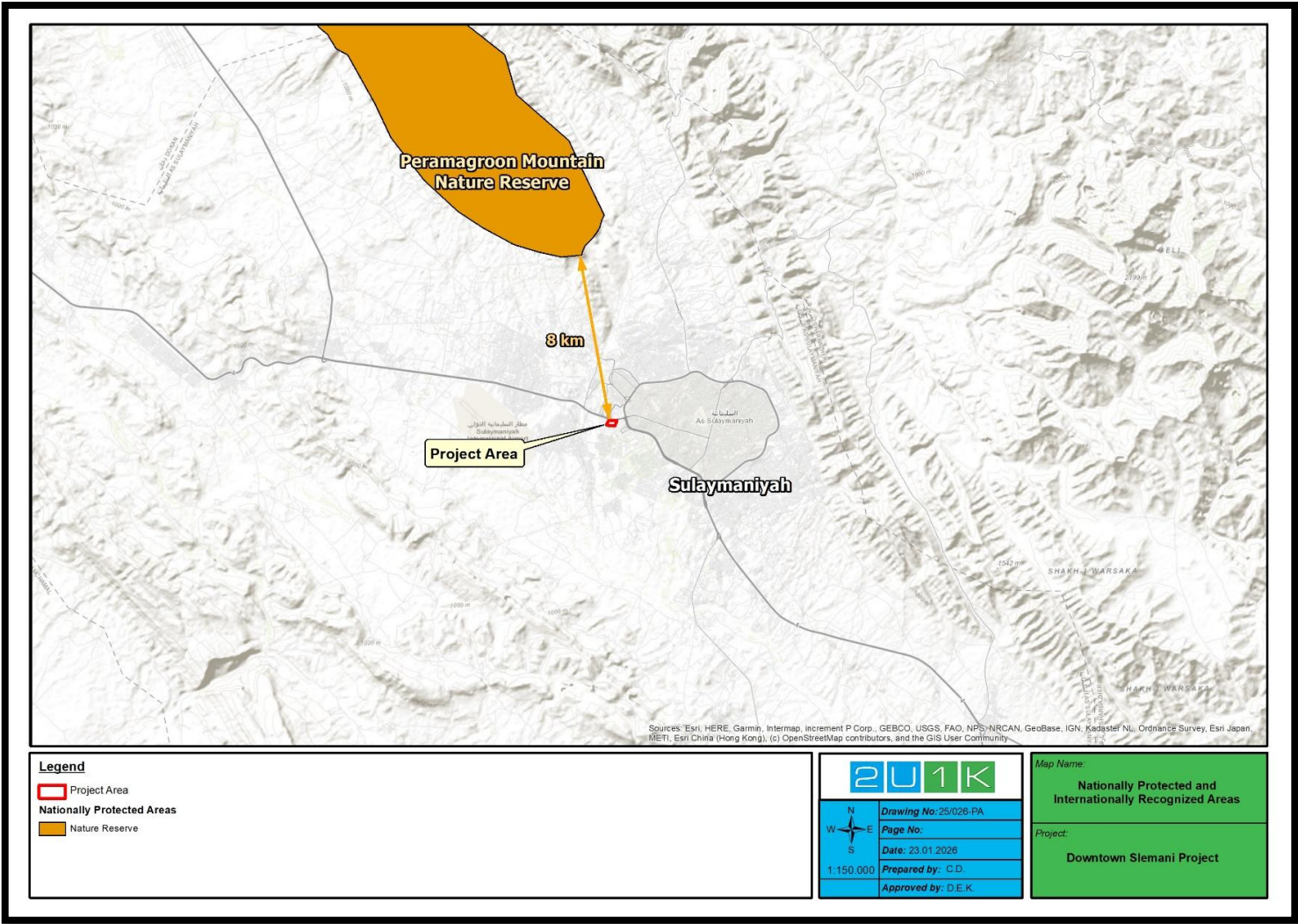


Figure 6-9. Nationally Protected and Internationally Recognized Areas

6.9.4 Critical Habitat Assessment

This section includes the Critical Habitat Assessment (CHA) conducted for the Project to identify areas considered critical habitat in line with IFC Performance Standard (PS) 6 and the associated Guidance Note (GN).

PS6 makes several stipulations for Critical Habitat, including achievement of a net gain for Critical Habitat-qualifying biodiversity. A net gain is required for all Critical Habitat features potentially affected by the Project. Where significant residual adverse effects are not predicted, additional conservation actions supported by qualitative evidence and expert opinion may be sufficient to substantiate a net gain. If, however, after the application of feasible preventive and restorative actions in the first steps of the mitigation hierarchy (avoid, mitigate, restore), there is a potentially significant residual impact on a Critical Habitat qualifying feature then ecological compensation (offset) is required with measurable conservation outcomes at an appropriate geographical scale. In Natural Habitat, no net loss, where possible, is required. A robust project-specific ESIA baseline is vital, followed by an iterative and thorough application of the mitigation hierarchy to ensure that impacts are avoided, minimized and restored as far as feasible, reducing the significance of any residual impacts and the requirement for offsetting.

Critical Habitats will be identified using the critical habitat assessment criteria defined in IFC PS6. Critical habitats are defined as areas of high importance or value for biodiversity:

- Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species
- Criterion 2: Endemic or restricted-range species
- Criterion 3: Migratory or congregatory species
- Criterion 4: Highly threatened and/or unique ecosystems
- Criterion 5: Key evolutionary processes

PS6 guides how to best identify three classes of area based on vegetation condition ('quality' or 'state'), and significance for biodiversity. PS6 uses the term 'habitat' to refer to these areas, rather than the actual vegetation within them. These three-area classes are

- (i) Modified Habitat
- (ii) Natural Habitat;
- (iii) Critical Habitat (with Critical Habitat a subset of Modified and Natural Habitat).

Habitat condition is classified as either Natural or Modified based on the extent of human modification of the ecosystem. Monoculture plantations, agricultural areas and urban areas are usually classed as Modified. Both Natural and Modified Habitats may contain globally important biodiversity values, thereby qualifying as Critical Habitat.

Table 6-18. PS6 Habitat Classification

Areas Identified in PS6		Condition of the Area	
		Natural	Modified
High Biodiversity Values	Present	Critical Habitat	Critical Habitat
	Absent	Natural Habitat	Modified Habitat

Since habitat destruction is recognized as a major threat to the maintenance of biodiversity and to assess likely significance of impacts, IFC PS6 requires the following depending on habitat status:

Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.

Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.

Performance Standard 6 applies to those areas of modified habitat that include significant biodiversity value, as determined by the risks and impacts identification process required in Performance Standard 1. The impacts on such biodiversity should be minimized and implement mitigation measures as appropriate.

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including affected Communities, with respect to the extent of conversion and degradation;
- Any conversion or degradation is mitigated according to the mitigation hierarchy.

In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides,
- Implementing measures to minimize habitat fragmentation, such as biological corridors,
- Restoring habitats during operations and/or after operations, and
- Implementing biodiversity offsets.

Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

In areas of critical habitat, the client will not implement any project activities unless all the following are demonstrated.

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

Determination of Critical Habitat

Criterion 1: Critically Endangered and Endangered Species

Species threatened with global extinction and listed as CR and EN on the IUCN *Red List of Threatened Species* shall be considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction in the wild. Endangered species face a very high risk of extinction in the wild.

Thresholds for Criterion 1 are the following:

- (a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species ($\geq 0.5\%$ of the global population and ≥ 5 reproductive units of a CR or EN species).
- (b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
- (c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.

Criterion 2: Endemic and Restricted-range Species

For purposes of Criterion 2, the term endemic is defined as restricted-range. Restricted range refers to a limited extent of occurrence (EOO).

- For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometers (km²).

- For marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100,000 km².
- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

The threshold for Criterion 2 is the following:

- a) Areas that regularly hold $\geq 10\%$ of the global population size and ≥ 10 reproductive units of a species.

Criterion 3: Migratory and Congregatory Species

Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem). Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis. Examples include the following:

- Species that form colonies.
- Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (for example, foraging and roosting).
- Species that utilize a bottleneck site where significant numbers of individuals of a species occur in a concentrated period of time (for example, for migration).
- Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (for example, wildebeest distributions).
- Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species).

Thresholds for Criterion 3 are the following:

- (a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.
- (b) Areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.

Criterion 4: Highly Threatened or Unique Ecosystems

The IUCN is developing a Red List of Ecosystems, following an approach similar to the Red List for Threatened Species. The client should use the Red List of Ecosystems where formal IUCN assessments have been performed. Where formal IUCN assessments have not been performed, the client may use assessments using systematic methods at the national/regional level, carried out by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized NGOs).

The thresholds for Criterion 4 are the following:

- a) Areas representing $\geq 5\%$ of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
- b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.

Criterion 5: Key Evolutionary Processes

The structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. Maintaining these key evolutionary processes inherent in a landscape as well as the resulting species (or subpopulations of species) has become a major focus of biodiversity conservation in recent decades, particularly the conservation of genetic diversity. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate.

For illustrative purposes, some potential examples of spatial features associated with evolutionary processes are as follows:

- Landscapes with high spatial heterogeneity are a driving force in speciation, as species are naturally selected based on their ability to adapt and diversify.
- Environmental gradients, also known as ecotones, produce transitional habitat, which has been associated with the process of speciation and high species and genetic diversity.
- Edaphic interfaces are specific juxtapositions of soil types (for example, serpentine outcrops, limestone, and gypsum deposits), which have led to the formation of unique plant communities characterized by both rarity and endemism.

- Connectivity between habitats (for example, biological corridors) ensures species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from “crest to coast.”
- Sites of demonstrated importance to climate change adaptation for either species or ecosystems are also included within this criterion.

The significance of structural attributes in a landscape that may influence evolutionary processes will be determined on a case-by-case basis, and the determination of critical habitat will be heavily reliant on scientific knowledge. In the majority of cases, this criterion will apply in areas that have been previously investigated and that are already known or suspected to be associated with unique evolutionary processes. While systematic methods to measure and prioritize evolutionary processes in a landscape do exist, they are typically beyond a reasonable expectation of assessments conducted by the private sector.

Critical Habitat Assessment Findings

Criterion 1: Critically Endangered and Endangered Species

Potential Critically Endangered (CR), Endangered (EN), and Vulnerable (VU) species within the Area of Analysis (AoA) were screened based on IUCN Red List data and relevant literature.

Baseline findings indicate that the project area supports predominantly widespread, disturbance-tolerant and synanthropic species typical of highly modified and urbanized environments. No CR, EN, or VU species were recorded within the project area during field surveys. The only species of conservation note include one Near Threatened (NT) bird (*Lanius senator*) and one Data Deficient (DD) reptile (*Eublepharis angramainyu*), which do not meet IFC PS6 thresholds for Critical Habitat. Therefore, Criterion 1 is not triggered.

Criterion 2: Endemic and Restricted-range Species

The project area does not trigger IFC PS6 Criterion 2, as it does not support any endemic or restricted-range species. Furthermore, all recorded species have broad regional to continental distributions, with Extents of Occurrence (EOO) well above 50,000 km² for terrestrial species and exceeds the applicable threshold values for terrestrial species. Consequently, the project area does not qualify as Critical Habitat under Criterion 2.

Criterion 3: Migratory and Congregatory Species

The Project Area is located within a highly urbanized and modified environment and does not provide suitable feeding, breeding, or resting habitats for migratory or congregatory species. Baseline surveys indicate that the avifauna is dominated by widespread and habitat-generalist species typical of disturbed and semi-natural environments.

Although occasional migratory movements may occur over the Project Area, the site does not function as a migration corridor or congregation area. Birds primarily use the airspace above the site during migration, and no significant use of the site itself has been observed.

The absence of natural or semi-natural habitats, together with the lack of ecological connectivity to functional habitats such as wetlands or riparian systems, further limits the ecological importance of the area for migratory species.

In line with IFC PS6 Criterion 3, a site must regularly support $\geq 1\%$ of the global population of a migratory or congregatory species to qualify as Critical Habitat. Based on available data and the ecological characteristics of the site, no such concentrations are present or expected.

Therefore, Criterion 3 is not triggered.

Criterion 4: Highly Threatened or Unique Ecosystems

The Project Area is located within the urban boundaries of Sulaymaniyah, in the northeastern part of Iraq, and is characterized by a highly modified and fully urbanized environment. No natural or semi-natural habitats are present within the project site.

A review of internationally and nationally recognized conservation designations, including national parks, nature reserves, Ramsar Sites, and Important Bird Areas (IBAs), indicates that no legally protected or officially designated biodiversity areas are located within or adjacent to the Project Area. The identification of protected areas was carried out using the World Database on Protected Areas (WDPA).

The nearest designated site is the Peramagroon Mountain Nature Reserve, located approximately 8 km from the Project Area. Due to this separation distance and the absence of ecological connectivity, no direct or indirect impacts on protected areas or sensitive ecosystems are anticipated.

Furthermore, none of the habitats identified within or around the Project Area qualify as highly threatened or unique ecosystems.

Therefore, Criterion 4 is not triggered.

Criterion 5: Key Evolutionary Processes

The Project Area does not differ substantially from the surrounding urban landscape in terms of elevation, moisture gradients, or other geological and ecological characteristics that would indicate the presence of unique or distinctive evolutionary processes. The area lacks isolation, spatial heterogeneity, and environmental gradients typically associated with the maintenance of such processes.

In addition, habitats within the Project Area are highly modified and degraded due to long-term anthropogenic disturbance, resulting in low ecological value and limited habitat functionality.

The absence of natural or semi-natural habitats further restricts the potential for ecological or evolutionary processes to occur.

The Project Area is not functionally connected to any natural ecosystems and does not introduce barriers that would affect species movement or ecological processes at a landscape scale. Therefore, Criterion 5 is not triggered.

Based on the findings of field surveys, secondary data sources, and the conducted assessments, the Project does not trigger any Critical Habitat criteria under IFC PS6.

The project area is classified as a Modified Habitat, supporting predominantly widespread, disturbance-tolerant and synanthropic species. No species or habitats meeting the thresholds for Critical Habitat designation were identified.

6.10 Traffic and Transportation

During the construction phase of the Project, a temporary increase in traffic volumes is anticipated along the primary access roads connecting the Project area to the wider Sulaymaniyah urban network, particularly Sulaimani–Kirkuk Road to the north and Malik Mahmoud Ring Road to the south. These corridors will serve as the principal routes for transporting construction materials, labour, and equipment to and from the site. Construction-related vehicle movements will largely consist of light-to-medium duty trucks, concrete mixers, delivery vans and occasional machinery transport. Deliveries will be scheduled to avoid peak traffic periods in order to minimize congestion, noise disturbance, and conflict with residential and institutional mobility patterns surrounding the Governorate, Judicial Court and nearby neighbourhoods. Temporary signage, traffic marshals and safety barriers will be deployed at the Project access gate to ensure safe vehicle circulation and pedestrian protection throughout construction.

Baseline traffic conditions were established using the calibrated 2023 traffic model and by incorporating traffic demand from committed and planned developments within the study area. The developments considered include Darwaza City, Park 77, Nova City, Baran & Chawi Slemani Residential Project, and Grand Boulevard. For each development, internal capture and pass-by trips were deducted from the gross trip generation estimates to obtain net new trips. These net trips were subsequently assigned to the road network as background development traffic.

The surrounding developments are expected to generate a total of 1,365 vehicle trips during the AM peak hour and 2,590 vehicle trips during the PM peak hour. These additional traffic volumes were incorporated into the future year traffic model to represent baseline conditions without the proposed Project and to assess future network performance under background growth conditions.

In contrast, during the operation phase of the Project, traffic levels are expected to decrease significantly. Once the development becomes fully functional, vehicular activity will mainly be associated with routine daily commuting of residents, workers and hotel guests, as well as periodic deliveries for retail and commercial services. No regular heavy truck movement or

industrial-supply transport will be required. Accordingly, traffic impacts in the operational stage are expected to be moderate and manageable, consisting primarily of private cars, taxis, shared-ride vehicles and occasional service-maintenance vans accessing the site. Operational traffic will be further mitigated through on-site parking allocation, controlled drop-off zones, and internal circulation planning that separates pedestrian and vehicular flows.

This transportation route is shown below in Figure 6-10.

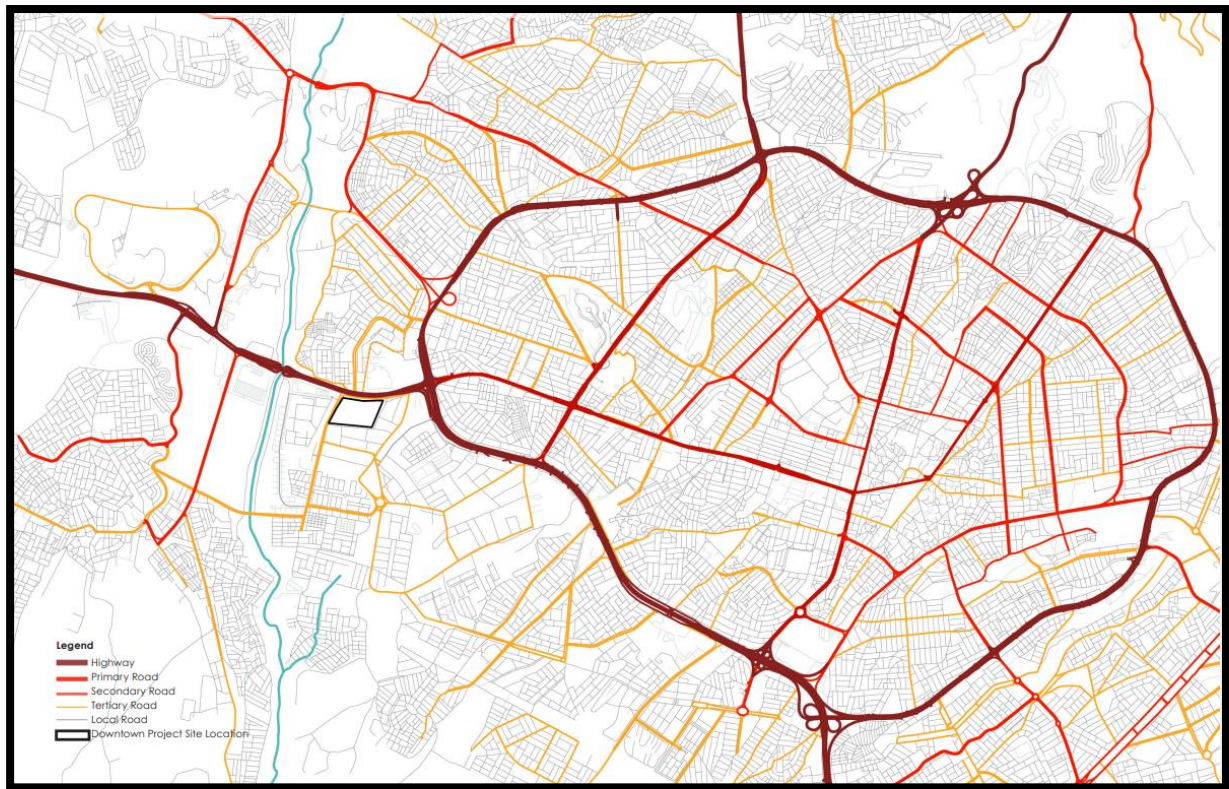


Figure 6-10. Transportation Route

6.11 Cultural Heritage

The Downtown Slemani project site is located within Slemani Governorate in the Kurdistan Region of Iraq and comprises a former municipal grain storage facility and associated ancillary industrial structures. The main structure was constructed in the 1980s as part of a state-led initiative to strengthen provincial food-storage capacity but was never completed or commissioned and remained non-operational throughout its existence. The site functioned solely as an unfinished industrial facility and did not acquire cultural, architectural, or social value associated with active use or historical events of recognised significance.

Cultural heritage protection in Iraq is regulated primarily under Antiquities and Heritage Law No. 55 of 2002, which provides statutory protection to antiquities (generally assets older than 200 years) and to other heritage sites or items of cultural, historical, national, or local importance once they have been formally designated and registered by the competent authority. Designation under the law is a prerequisite for the application of statutory controls,

including restrictions on demolition or alteration, mandatory conservation measures, and heritage permitting requirements. The former grain storage facility is not designated or registered under Law No. 55 (2002) or under any regional heritage legislation of the Kurdistan Regional Government and therefore carries no formal or statutory heritage status.

Although not a designated heritage asset, the site was assessed in terms of its contextual and historical associations. The unfinished structure reflects late-20th-century state-led industrial and agricultural planning during a period marked by conflict and economic constraints, and its non-completion illustrates historical challenges related to resource allocation and food-security infrastructure. However, these associations do not meet the criteria for cultural heritage designation, and the structures were not identified as having architectural, archaeological, or cultural value requiring conservation or adaptive reuse.

Specialist structural, environmental, and feasibility assessments undertaken prior to redevelopment concluded that the existing structures were technically compromised, environmentally degraded, and not suitable for safe or viable retention. Based on these findings, the facility was cleared through a controlled and documented demolition process implemented in accordance with applicable safety, environmental, and municipal requirements. The demolition process was supported by appropriate risk management, remediation measures, and community communication, enabling the site to be prepared responsibly for redevelopment.

The Downtown Slemani project is therefore governed by standard planning, building-control, environmental, and health and safety legislation rather than heritage-specific regulatory frameworks. Heritage instruments such as a Heritage Impact Assessment, Conservation Management Plan, statutory heritage registration, or formal public-access requirements are not required for the project. Nevertheless, in line with good international practice and precautionary principles, a Chance Finds Procedure will be implemented during construction works to ensure that any unexpected archaeological or cultural materials encountered are managed appropriately in coordination with the relevant authorities.

Overall, the redevelopment of the site represents a positive urban transformation of a long-derelict and non-operational industrial area into a sustainable mixed-use neighbourhood. The project improves urban connectivity, public realm quality, and local economic opportunities while avoiding adverse impacts on designated or known cultural heritage resources and remaining compliant with applicable national and regional regulatory frameworks.

6.12 Socio-economy

The socio-economic baseline assessment provides the analytical foundation for identifying potential social risks and opportunities associated with the Project, including those related to community well-being, livelihoods, access and mobility, labour conditions, and human rights considerations. The assessment has been undertaken to support the development of appropriate mitigation and management measures consistent with the requirements of the IFC Performance Standards and good international practice.

The objective of the socio-economic baseline study is to describe the social and economic characteristics of the urban environment potentially affected by the Project, at both the city and neighbourhood levels, with a primary focus on the immediate urban context of the Project Aol in order to understand how Project activities may interact with existing conditions during construction and operation. The baseline also establishes a set of qualitative and quantitative indicators that can be used to monitor social changes in the Project area over time.

The following subsections present the socio-economic context of the Project Aol, focusing on the immediate and surrounding urban neighbourhoods, key land uses, population groups, economic activities, and community services relevant to the Downtown Sulaymaniyah Project, as defined in Chapter 2.

6.12.1 Population and Demographics

National and Regional Overview

Iraq's population is approximately 38.1 million. The country is ethnically diverse, including Arabs, Kurds, and minority communities (e.g., Turkmen, Assyrian, Chaldean). Population distribution is shaped by major river corridors and key urban centres, and Iraq has a relatively high urbanization rate with significant internal migration dynamics linked to employment, services, and security conditions.

Within the KRI, major cities function as economic and administrative hubs and have experienced sustained urban expansion in recent decades, driven by in-migration, private sector development, and growing demand for housing and services.

Governorate / City Context (Sulaymaniyah)

Sulaymaniyah is a principal city in the east of the Kurdistan Region of Iraq and the administrative centre of Sulaymaniyah Governorate. The city is located in a mountainous setting, surrounded by the Azmar, Goizha and Qaiwan Mountains to the northeast, Baranan Mountain to the south, and the Tasluja Hills to the west. The city is situated at an elevation of approximately 882 m and has a semi-arid climate, with hot, dry summers and cold, wet winters, which is relevant for understanding seasonal patterns affecting outdoor activities, dust dynamics, and construction-phase working conditions.

Sulaymaniyah's total municipal area is reported to be approximately 266 km², and the city population is estimated at around 847,000 (2025 estimate), implying a relatively dense urban setting (approx. 3,200 people/km²). This broader city-level context is provided for background

purposes only, while the assessment of potential impacts is focused on the Project's defined AoI. The city has historically functioned as a major cultural and administrative center and continues to attract inward mobility due to education, services, and employment opportunities.

Local Administrative Context (Project Area of Influence)

The Downtown Slemani Project is in Kirkuk-Slemani Road, Sulaymaniyah City, within a dense urban fabric characterized by mixed residential and commercial land uses and strong connectivity to key city transport corridors. The social Area of Influence (AoI) for the Project includes adjacent neighbourhoods that may experience direct or limited indirect impacts during construction and operation—primarily related to traffic, access, noise, dust, community safety, and changes in local service demand.

Based on initial stakeholder engagement and key informant consultation (Mukhtar interview), the following settlement(s) were identified as part of the initial social AoI:

According to the Mukhtar of Awbara (interviews dated 14.01.2026 and 27.01.2026), the neighbourhood population has increased in the last five years, mainly due to the expansion of the nearby city and development of new residential projects. Improved access to services, employment opportunities, and infrastructure were noted as key factors encouraging relocation to this area. This trend is consistent with the Project's location in an urbanizing corridor where housing demand and land-use intensification are salient.

Detailed age distribution data was not available from the key informant at the time of consultation. Given the urban context, the ESIA baseline will further characterize age structure and household composition through additional stakeholder engagement and/or targeted community-level data collection, as feasible.

Vulnerability and Inclusion Considerations (indicative)

The Mukhtar reported the presence of groups that may face vulnerability, including female-headed households, persons with disabilities, refugees, and individuals who may not speak local/official languages. While these figures are indicative and require verification through further baseline work, they signal the need for inclusive stakeholder engagement and information disclosure measures (e.g., simple language, multilingual communication where relevant, and accessible formats).

6.12.2 Economy and Employment

Regional Economic Context

Iraq's economy relies overwhelmingly on oil revenues (≈ 93 % of state income). While agriculture continues to play a role at the national level, particularly in rural areas, urban economies are increasingly driven by services, construction, trade, and public-sector employment. In the KRI, major cities such as Sulaymaniyah function as regional economic hubs with diversified urban labour markets and higher participation in private-sector activities compared to predominantly rural governorates.

Sulaymaniyah has experienced sustained economic and urban growth over the past two decades, supported by investment in housing, education, commercial services, and tourism. Employment opportunities are concentrated in public administration, private office-based work, retail and trade, construction, transport services, and hospitality, reflecting the city's role as a regional centre for administration, education, and culture.

Local Livelihood Patterns

The Project Aol is located within a fully urbanised context, and livelihoods are not based on agriculture or livestock activities. According to the Mukhtar of Awbara neighbourhood (Derwaza District) and field-level observations, the primary sources of livelihood for residents are paid employment and service-based activities, supplemented by construction-related work and rental income.

Key livelihood characteristics in the Aol include:

- **Paid employment in office-based and white-collar occupations**, including private companies, retail businesses, and service providers;
- **Public-sector employment**, including municipal services and administrative roles;
- **Construction and daily wage labour**, particularly linked to ongoing urban development projects in Sulaymaniyah;
- **Transport-related activities**, including driving and logistics services;
- **Rental and real-estate income**, reflecting the high proportion of tenants and demand for housing in the area.

Based on the Mukhtar interview, approximately 60% of households are tenants, while 40% are homeowners, indicating a relatively mobile population and a strong dependence on the local housing market. Average housing plot sizes are reported to be approximately 200 m², consistent with dense urban residential development.

Employment Trends and Income Conditions

The Mukhtar reported that employment opportunities in the neighbourhood have decreased over the last five years, primarily due to broader economic pressures, fluctuations in the construction sector, and rising competition in the urban labour market. Despite this, the neighbourhood has continued to attract new residents due to its proximity to the city centre, access to services, and availability of housing.

Available regional socio-economic indicators suggest that household income and expenditure levels in urban areas of the Kurdistan Region of Iraq, including Sulaymaniyah, are generally above basic subsistence thresholds. However, neighbourhood-level income data are limited, and variations may exist within different urban districts depending on housing type, tenure status, and employment characteristics.

Daily wage earners and construction workers are more exposed to income volatility, while public-sector and office-based employees generally have more stable earnings. Given the absence of statistically representative, site-specific income data at this stage, the income-related information presented in this section should be considered indicative. A more detailed and disaggregated assessment of income conditions will be undertaken, where feasible, during subsequent stages of the ESIA through additional primary data collection and/or relevant administrative and statistical sources, taking into account the mixed residential and commercial character of the neighbourhood.

Vulnerability and Workforce Characteristics

The neighbourhood hosts a socially diverse population, including:

- Female-headed households
- Persons with disabilities
- Refugees and migrant populations, including individuals from Syria and Turkey, some of whom are engaged in temporary or seasonal employment
- Residents who may not speak Kurdish or Arabic fluently, which may affect access to employment opportunities and information

Seasonal and short-term workers were reported to stay in hotels or work-related accommodation and are primarily engaged in paid employment rather than informal activities. No significant social integration problems were reported; however, these groups may be more vulnerable to economic shocks and construction-related disruptions.

6.12.3 Infrastructure Services

This section presents baseline information on existing infrastructure and public services within the Project Impact Area in central Sulaymaniyah, including housing conditions, water supply, wastewater and sanitation systems, electricity supply, heating sources, solid waste management, fire and emergency services, police and security services, telecommunications, transportation networks, and public and recreational spaces. These infrastructure components are essential for understanding current service levels, accessibility, and living conditions within the Area of Influence.

Housing in the project area is predominantly composed of permanent concrete structures, with most dwellings connected to basic urban services. Access to water supply is generally provided through the municipal network; however, intermittent supply and seasonal shortages remain common. As a result, a proportion of households rely on water storage tanks, private tanker deliveries, or bottled water to supplement municipal supply. Although Sulaymaniyah has relatively higher water service coverage compared to rural areas, concerns remain regarding water pressure, continuity, and water quality during peak demand periods.

Wastewater and sanitation services in central Sulaymaniyah are mainly served by the municipal sewerage network. Most residential and commercial properties are connected to the

centralized system, while a limited number of peripheral areas still rely on septic tanks. Periodic overflows, aging infrastructure, and inadequate stormwater drainage during heavy rainfall events pose localized public health and environmental risks, particularly in low-lying neighbourhoods.

Electricity supply in the project area is provided through the national and regional power grid. Grid connectivity is widespread, and the operation of the Project is expected to contribute to improved grid stability and enhanced reliability of electricity supply in the region.

Solid waste management services are provided by the Sulaymaniyah Municipality through regular household collection and disposal at designated landfill sites. However, collection efficiency varies between neighbourhoods, and illegal dumping and occasional open burning are still observed in some areas. Strengthening waste segregation, recycling practices, and environmentally sound disposal methods remains a key priority for improving urban environmental quality.

6.12.4 Land Ownership

The project site was originally developed in the 1980s as part of a national programme aimed at strengthening provincial food-security and grain-storage capacity in Iraq. Designed as a large-scale municipal wheat storage facility, the complex comprised a central reinforced-concrete storage structure with multiple vertical silos and a series of supporting industrial buildings. Construction progressed during a period marked by regional conflict and economic uncertainty and shifting national priorities during the Iran–Iraq War (1980–1988) resulted in the project remaining incomplete and never being commissioned for operational use. Consequently, the facility did not enter active service, and was never completed remaining unused for several decades, gradually deteriorating and becoming functionally obsolete. By the 2010s, the site was formally identified by local authorities as unsuitable for continued industrial use, leading to its allocation for redevelopment and its eventual transition toward the Downtown Slemani mixed-use urban regeneration project.

Supporting documentation confirming the site's ownership status and redevelopment allocation has been provided in the attached land title records and the official letter obtained from the Directorate of Investment.

6.12.5 Vulnerable Groups

Within the scope of the socio-economic survey conducted in Awbara Neighborhood of Sulaymaniyah, vulnerable groups living in the Aol were identified. The survey findings indicate that the most prevalent vulnerable groups in the area are unemployed individuals, elderly people requiring assistance, and widowed or divorced women. In addition, a limited number of persons with disabilities, chronically ill individuals, and school-age children not attending school were also identified.

The survey results show that approximately three female-headed households were recorded in the neighbourhood. In addition, six elderly individuals were identified as requiring regular

support, while two persons with disabilities and four chronically ill or homebound individuals were reported. The number of unemployed individuals actively seeking work was estimated at around nineteen, indicating limited employment opportunities in the area. Furthermore, seven widowed or divorced women and two school-age children not attending school were identified during the survey. In total, approximately forty-three vulnerable individuals were recorded within the Aol.

The identification of vulnerable groups provides an important input for assessing potential social and human rights risks associated with the Project and supports the development of appropriate mitigation and management measures. Considering the constraints faced by these groups in accessing basic services and livelihood opportunities, targeted support measures are recommended. These include facilitating access to employment opportunities, strengthening social assistance for elderly and chronically ill individuals, supporting female-headed households, and promoting school attendance among children.

6.12.6 Information Disclosure

Information disclosure and stakeholder communication are key components of the stakeholder engagement strategy for the Project in Sulaymaniyah. During the scoping phase, an initial stakeholder consultation meeting will be organized to introduce the Project design, proposed implementation schedule, potential environmental and social impacts, and the grievance redress mechanism. A follow-up meeting will be conducted at a later stage to present the findings of the ESIA and the proposed mitigation and management measures.

This engagement process aims to ensure the early disclosure of information, alignment of stakeholder expectations, and the provision of meaningful opportunities for community feedback to support informed project planning, in line with IFC Performance Standards and international lender requirements.

The results of the household survey indicate clear community preferences regarding communication methods. Communication through local leaders was identified as the most preferred channel for receiving project-related information, online platforms, and the use of posters and printed materials. Limited reliance was observed on brochures and local newspapers, indicating that direct and community-based communication methods are more effective in the local context.

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER 7 – ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES)



JULY 2026

ANKARA



DOWNTOWN SLEMANI PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

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Revision Codes: A: Draft, B: Final Draft, C: Final

Project No: 25 / 026

JULY 2026

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TABLE OF CONTENTS

	<u>Page</u>
7 ENVIRONMENTAL AND SOCIAL RISKS, IMPACTS AND MITIGATION MEASURES ..	1
7.1 Air Quality	1
7.1.1 Introduction	1
7.1.2 Impact Analysis	1
7.1.2.1 Construction Phase	1
7.1.2.2 Operation Phase	4
7.1.2.3 Impact Summary	5
7.1.3 Mitigation Measures	7
7.1.3.1 Construction Phase	7
7.1.3.2 Operation Phase	8
7.1.4 Residual Impacts	9
7.2 Noise	12
7.2.1 Introduction	12
7.2.2 Impact Analysis	12
7.2.2.1 Construction Phase	12
7.2.2.2 Operation Phase	15
7.2.2.3 Impact Summary	18
7.2.3 Mitigation Measures	20
7.2.4 Residual Impacts	21
7.3 Geology, Soil and Contaminated Land	24
7.3.1 Introduction	24
7.3.2 Impact Analysis	24
7.3.2.1 Construction Phase	24
7.3.2.2 Operation Phase	25
7.3.2.3 Impact Summary	27
7.3.3 Mitigation Measures	31
7.3.4 Residual Impacts	33
7.4 Water and Wastewater Management	38
7.4.1 Introduction	38
7.4.2 Impact Analysis	38
7.4.2.1 Construction Phase	38
7.4.2.2 Operation Phase	39
7.4.2.3 Impact Summary	41
7.4.3 Mitigation Measures	43
7.4.4 Residual Impacts	44
7.5 Waste Management	47
7.5.1 Introduction	47
7.5.2 Impact Analysis	47
7.5.2.1 Construction Phase	47
7.5.2.2 Operation Phase	49
7.5.2.3 Impact Summary	52

7.5.3	Mitigation Measures	54
7.5.4	Residual Impacts.....	55
7.6	Biodiversity.....	58
7.6.1	Introduction	58
7.6.2	Impact Analysis	58
7.6.2.1	Construction Phase	58
7.6.2.2	Operation Phase.....	59
7.6.2.3	Impact Summary	61
7.6.3	Mitigation Measures	66
7.6.3.1	Construction Phase.....	66
7.6.3.2	Operation Phase	67
7.6.4	Residual Impacts.....	68
7.7	Cultural Heritage	71
7.7.1	Introduction	71
7.7.2	Impact Analysis	71
7.7.3	Mitigation Measures	73
7.7.4	Residual Impacts.....	73
7.8	Traffic and Transport.....	75
7.8.1	Introduction	75
7.8.2	Impact Analysis	75
7.8.2.1	Construction Phase.....	75
7.8.2.2	Operation Phase	75
7.8.2.3	Impact Summary	76
7.8.3	Mitigation Measures	80
7.8.4	Residual Impacts.....	81
7.9	Socio-Economic Impacts.....	83
7.9.1	Introduction	83
7.9.2	Impacts during Construction Phase.....	83
7.9.2.1	Vulnerable Groups	83
7.9.2.2	Economy, Employment and Local Economic Opportunities.....	84
7.9.2.3	Social Dynamics and Community-Project Relations	85
7.9.2.4	Local Procurement and Economic Linkages.....	85
7.9.3	Impacts during Operation Phase	89
7.9.3.1	Operational Employment and Skills.....	89
7.9.3.2	Long-Term Socio-Economic Benefits	89
7.9.4	Mitigation Measures	92
7.9.4.1	Construction and Operation Phase.....	92
7.9.5	Residual Impacts.....	94
7.10	Labour and Working Conditions.....	97
7.10.1	Introduction	97
7.10.2	Impacts during Construction and Operation	97
7.10.2.1	Workforce Characteristics, Labour Influx and Community Interaction.....	97
7.10.2.2	Employment Practices, Working Conditions and Contractor Management ..	98

7.10.2.3	Occupational Health and Safety (OHS)	98
7.10.2.4	Worker Grievance Mechanism	98
7.10.3	Impact Summary	100
7.10.4	Mitigation Measures	105
7.10.4.1	Employment Practices and Labour Management	105
7.10.4.2	Working Conditions, Worker Welfare and OHS Aligned	105
7.10.4.3	Worker Accommodation and Mobility Management.....	108
7.10.4.4	Contractor and Subcontractor Oversight	108
7.10.4.5	Worker Grievance Mechanism	109
7.10.4.6	Gender, Inclusion and Prevention of Workplace Harassment.....	109
7.10.5	Residual Impacts.....	109
7.11	Community Health, Safety, and Security.....	112
7.11.1	Introduction	112
7.11.2	Impacts during Construction.....	112
7.11.2.1	Construction Activities and Community Nuisance.....	112
7.11.2.2	Traffic and Road Safety.....	112
7.11.2.3	Workforce Presence.....	113
7.11.2.4	Security Personnel	113
7.11.2.5	Emergency Risks	114
7.11.3	Impacts during Operation	118
7.11.3.1	Operational Activities and Community Nuisance	118
7.11.3.2	Traffic and Transport Safety	118
7.11.3.3	Security Personnel	118
7.11.3.4	Emergency Risks	118
7.11.4	Mitigation Measures	122
7.11.4.1	Construction and Operation Phase.....	122
7.11.5	Residual Impacts.....	125
7.12	Cumulative Impacts	128
7.12.1	Introduction	128
7.12.2	Methodology	128
7.12.3	Cumulative Impacts.....	130
7.12.3.1	Cumulative Impacts During Construction	130
7.12.3.2	Cumulative Impacts During Operation.....	131

LIST OF TABLES

	<u>Page</u>
Table 7-1. Calculation of Dust Emission Flowrate Regarding Excavation Material.....	2
Table 7-2. Mass Flowrate of Dust Emissions from Excavation.....	2
Table 7-3. IFC General EHG Guidelines, Emission Limits for Boilers (3 MW - 50MW)	4
Table 7-4. IFC General EHS Guidelines, Emission Limits for Engines (3 MW - 50MW).....	4
Table 7-5. Impact Significances during the Construction Phase - Air Quality	5
Table 7-6. Impact Significances during the Operation Phase - Air Quality	6
Table 7-7. Residual Impact Significances during the Construction Phase - Air Quality	10
Table 7-8. Residual Impact Significances during the Operation Phase - Air Quality	11
Table 7-9. Equipment Used in the Construction Phase with Noise Levels	12
Table 7-10. Sound Levels on Different Distances from the Project Location.....	14
Table 7-11. Construction Phase Impact Significance - Noise	18
Table 7-12. Operation Phase Impact Significance - Noise.....	19
Table 7-13. Construction Phase Residual Impact - Noise.....	22
Table 7-14. Operation Phase Residual Impact - Noise	23
Table 7-15. Impact Significances during the Construction Phase - Geology, Soil and Contaminated Lands	27
Table 7-16. Impact Significances during the Operation Phase - Geology, Soil and Contaminated Lands	29
Table 7-17. Residual Impact Significances for Construction Phase - Geology, Soil and Contaminated Lands	34
Table 7-18. Residual Impact Significances for Operation Phase - Geology, Soil and Contaminated Lands	36
Table 7-19. Construction Phases and Manpower Numbers for the Project.....	38
Table 7-20. Operation Phase Population Estimate	39
Table 7-21. Impact Significances during the Construction Phase-Water and Wastewater Management	41
Table 7-22. Impact Significances during the Operation Phase-Water and Wastewater Management	42
Table 7-23. Construction Phase Residual Impact Significances-Water and Wastewater Management	45
Table 7-24. Operation Phase Residual Impact Significances-Water and Wastewater Management	46

Table 7-25. Waste Disposal/Recycle Facilities that to be used in the Lifetime of the Project	47
Table 7-26. Impact Significances during the Construction Phase-Waste Management	52
Table 7-27. Impact Significances during the Operation Phase-Waste Management.....	53
Table 7-28. Waste Management KPIs	54
Table 7-29. Construction Phase Residual Impact Significance-Waste Management	56
Table 7-30. Operation Phase Residual Impact Significance-Waste Management.....	57
Table 7-31. Impact Significances for the Construction Phase	59
Table 7-32. Impact Significances for the Construction Phase	61
Table 7-33. Impact Significances for the Operation Phase	64
Table 7-34. Residual Impact Significances for Construction Phase	69
Table 7-35. Residual Impact Significances for Operation Phase	70
Table 7-36. Impact Significances during the Construction Phase – Cultural Heritage.....	72
Table 7-37. Residual Impact Significance during the Construction Phase – Cultural Heritage	74
Table 7-38. Impact Significances during the Construction Phase – Traffic and Transport....	77
Table 7-39. Impact Significances during the Operation Phase – Traffic and Transport.....	79
Table 7-40. Residual Impact Significance during the Construction Phase – Traffic and Transport.....	82
Table 7-41. Residual Impact Significance during the Operation Phase – Traffic and Transport	82
Table 7-42. Summary of Impact Significances of the Receptors for the Construction Phase – Socio-economic Impacts	87
Table 7-43. Summary of Impact Significances of the Receptors for the Operation Phase – Socio-Economic Impacts	90
Table 7-44. Residual Impact Significance during the Construction Phase – Vulnerable Groups	95
Table 7-45. Residual Impact Significance during the Operational Phase – Operational Socio-Economic Impacts	96
Table 7-46. Summary of Impact Significances of the Receptors for the Construction Phase – Labour and Working Conditions	100
Table 7-47. Summary of Impact Significances of the Receptors for the Operation Phase – Labour and Working Conditions	103
Table 7-48. Residual Impact Significance during the Construction Phase – Labour and Working Conditions	110

Table 7-49. Residual Impact Significance during the Operation Phase – Labour and Working Conditions	111
Table 7-50. Summary of Impact Significances of the Receptors for the Construction Phase – Community Health, Safety and Security	115
Table 7-51. Summary of Impact Significances of the Receptors for the Operation Phase – Community Health, Safety and Security	120
Table 7-52. Residual Impact Significance during the Construction Phase – Community Health, Safety and Security	126
Table 7-53. Residual Impact Significance during the Operation Phase – Community Health, Safety and Security	127

LIST OF FIGURES

	<u>Page</u>
Figure 7-1. Dust Concentration Change with respect to Distance	3
Figure 7-2. Change of Noise with respect to Distance	14
Figure 7-3. Steps of CIA	129

ABBREVIATIONS

AHRI	Air-Conditioning, Heating, and Refrigeration Institute
AoI	Area of Influence
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers
CIA	Cumulative Impact Assessment
CIBSE	Chartered Institution of Building Services Engineers
EHS	Environment, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FCU	Fan Coil Unit
GHG	Greenhouse Gas
HVAC	Heating, Ventilation and Air Conditioning
IFC	International Finance Corporation
KPI	Key Performance Indicator
RDF	Refuse Derived Fuel
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PS	Performance Standard
MBT	Mechanical-Biological Treatment
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
SEP	Stakeholder Engagement Plan
VECs	Valued Environmental and Social Components
WHO	World Health Organization

7 ENVIRONMENTAL AND SOCIAL RISKS, IMPACTS AND MITIGATION MEASURES

In this chapter all relevant environmental and social (E&S) risks and impacts of Downtown Slemani Project are provided. E&S risks and impacts are elaborated separately for construction and operational phases.

Mitigation measures have been identified, along with any significant residual impacts that cannot be mitigated. The acceptability of these remaining impacts is assessed to the fullest extent possible.

Tailored measures are implemented to ensure that adverse impacts do not disproportionately affect disadvantaged or vulnerable groups.

The proposed mitigation measures are assessed for their applicability in environmental and social contexts, taking into account capital and operational costs, alignment with local conditions, and requirements for institutional support, training, and monitoring.

Considerations that do not require further attention have been identified, and justifications for excluding these from additional review are provided, ensuring clarity on the basis of their exclusion.

7.1 Air Quality

7.1.1 Introduction

Air emissions arising during both the construction and operation phases of the Downtown Slemani Project are expected to contribute to regional pollutant concentrations and may potentially affect the health of nearby communities, workers, and other sensitive receptors. This section presents an evaluation of the anticipated impacts associated with Project-related air emissions and describes the mitigation measures proposed to prevent or reduce these risks, together with the residual impacts that may persist following implementation of such measures.

Criteria for assessing the significance of air quality impacts were developed by evaluating both the magnitude of the impact and the sensitivity of the receptors. Details on these magnitude and sensitivity criteria, as well as the overall impact assessment methodology, are provided in *Chapter 5: Scope and Methodology*.

7.1.2 Impact Analysis

7.1.2.1 Construction Phase

The construction-phase emissions of the project, primarily dust, will be a key focus due to their short-term impact. Emissions from construction machinery and vehicles, as well as particulate matter generated from activities like earthworks and storage of dusty materials pose potential risks.

If not properly managed, dust may cause nuisance and localized impacts on nearby receptors, underscoring the need for effective dust management measures.

Dust emission calculations for the excavation works is provided below:

While Land Preparation Phase

Excavation Volume = $1,000,000 \text{ m}^3$

Excavation Material Density = 1.6 tonnes/m^3 (assumed as soft soil)

Excavation Material Quantity = $1,000,000 \text{ m}^3 \times 1.6 \text{ tonne/m}^3 = 1,600,000 \text{ tonnes}$

Daily Excavation = $1,600,000 \text{ tonnes} \div 365 \text{ days} \cong 4,380 \text{ tonnes/day}$

Hourly Excavation = $4,380 \text{ tonnes/day} \div 12 \text{ hour/day} = 365 \text{ tonnes/hour}$

Table 7-1. Calculation of Dust Emission Flowrate Regarding Excavation Material

Operation Time			Quantity of	
			Time	Excavation
Excavation Period	365	days	Total	1,600,000 tonnes
Daily	8	hours	Daily	4,380 tonnes
Shift	1		Hourly	365 tonnes
1. Removal of Excavation Material				
Generation quantity (tonne/hour) x Emission factor (kg/tonne)				
1.a Uncontrolled			365 tonnes/hour x 0.025 kg/tonne = 9.12 kg/hour	
1.b Controlled			365 tonnes/hour x 0.00625 kg/tonne = 2.28 kg/hour	
2. Loading of Excavation Material				
Generation quantity (tonne/hour) x Emission factor (kg/tonne)				
2.a Uncontrolled			547.5 tonnes/hour x 0.010 kg/tonne = 5.48 kg/hour	
2.b Controlled			547.5 tonnes/hour x 0.0025 kg/tonne = 1.37 kg/hour	

Table 7-2. Mass Flowrate of Dust Emissions from Excavation

Stage	No	Process	Uncontrolled (kg/hour)	Controlled (kg/hour)
Quantity of dust that may occur for excavation material	1	Removal of Excavation Material	9.12	2.28
	2	Loading the Excavation Material on Trucks	5.48	1.37
Total			14.6	3.65

A modelling study was conducted for the dust emissions that is due to the planned excavation activities during the construction period via SCREEN View software. Output of this study is provided as a graph below in Figure 7-1, dust concentration with respect to distance for both uncontrolled case and controlled cases.

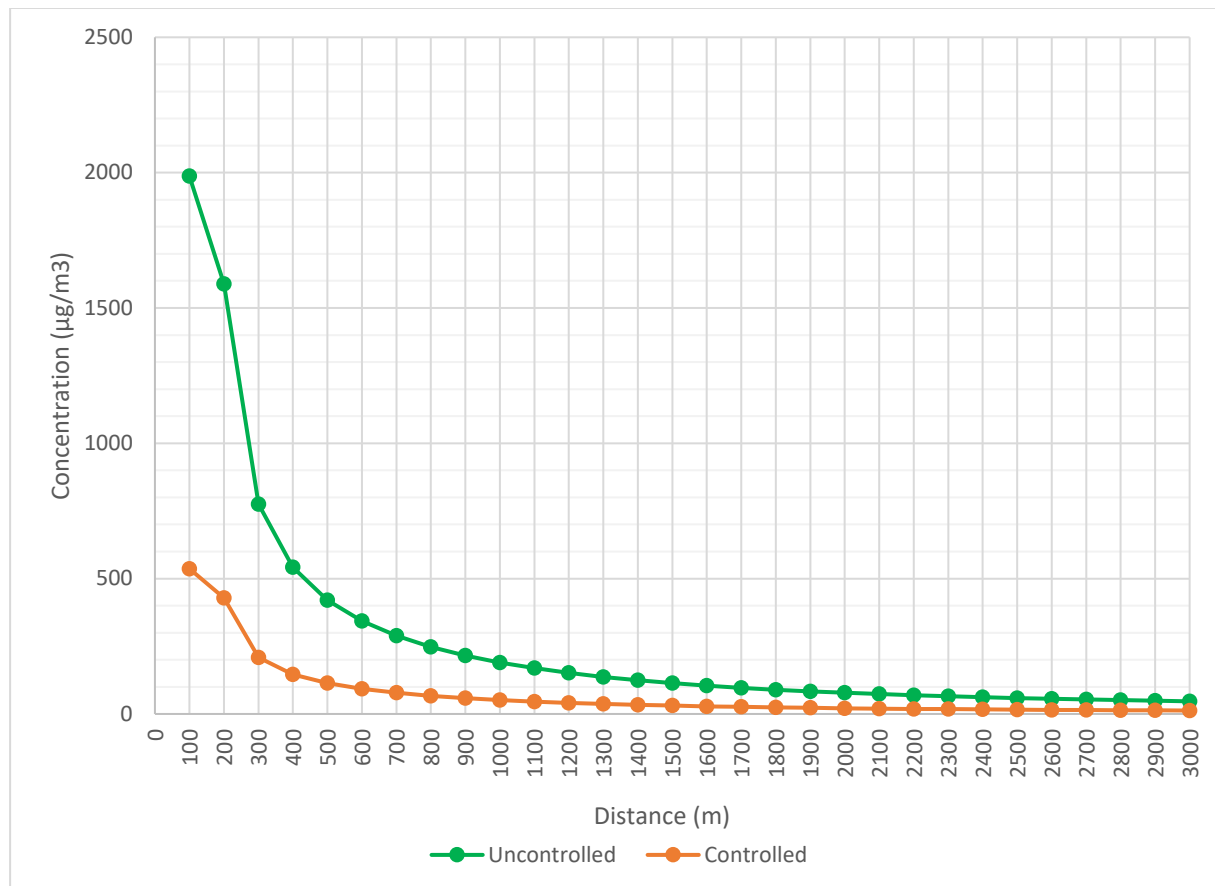


Figure 7-1. Dust Concentration Change with respect to Distance

The dispersion modelling results for PM₁₀ demonstrate a clear decrease in ground-level concentrations with increasing distance from the source under both uncontrolled and controlled scenarios, which is consistent with expected atmospheric dispersion behaviour.

In the uncontrolled scenario, PM₁₀ concentrations are elevated in the immediate vicinity of the source, reaching 1,987 µg/m³ at 100 m, and remaining elevated over several kilometres. These values exceed the 24-hour guideline value established by the World Health Organization (45 µg/m³) and the reference limits adopted under the International Finance Corporation EHS Guidelines, limit values are provided as a table in *Chapter 6* Air Quality section. Even at a distance of 3,000 m, concentrations (≈46.6 µg/m³) remain at or slightly above the WHO guideline value, indicating the potential for impact in the absence of mitigation measures.

In contrast, the controlled scenario demonstrates a substantial reduction in PM₁₀ concentrations, highlighting the effectiveness of the proposed mitigation measures (e.g., water spraying, traffic management, material handling controls). Predicted concentrations decrease from 536.6 µg/m³ at 100 m to approximately 12.6 µg/m³ at 3,000 m. Although PM₁₀ levels within the first 1,000–1,200 m exceed the WHO guideline value, the modelling indicates that the proposed mitigation measures substantially reduce predicted concentrations, with impacts largely confined to the area surrounding the construction site.

Impact significances of the construction phase are provided in Table 7-5.

7.1.2.2 Operation Phase

During the operation phase, expected emission sources are as provided below:

- **Traffic Related Emissions:** Increased vehicle movements from residents, visitors, service vehicles, and logistics operations will generate pollutants such as particulate matter (PM₁₀, PM_{2.5}), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs).
- **Energy Generation and Fuel Combustion:** Emissions may result from on-site heating systems, boilers, and emergency diesel generators, contributing to NO_x, SO₂, PM, and CO emissions.
- **Commercial Activities:** Restaurants within the mall and hotel may generate localized emissions (e.g., PM and VOCs) from cooking operations.
- **Fugitive Emissions:** Minor dust emissions may occur from internal road use, parking areas, and maintenance activities.

Any boiler that will be used must be in line with the IFC General EHS Guidelines as provided in Table 7-3.

Table 7-3. IFC General EHG Guidelines, Emission Limits for Boilers (3 MW - 50MW)

Boiler Fuel	PM (mg/Nm ³)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	Dry Gas, Excess O ₂ Content (%)
Gas	N/A	N/A	320	3
Liquid	50	2000	460	3
Solid	50	2000	650	6

Diesel Generators are expected to be used less than 500 hours a year since the project energy supply will be from the national electricity grid. For the diesel generators, following emission limit values determined by IFC Guidelines as in Table 7-4.

Table 7-4. IFC General EHS Guidelines, Emission Limits for Engines (3 MW - 50MW)

Combustion Fuel	PM (mg/Nm ³)	SO ₂ (%)	NO _x (mg/Nm ³)	Dry Gas, Excess O ₂ Content (%)
Liquid	50	1.5	1460	15

Impact significances for the operation phase in Table 7-6.

7.1.2.3 Impact Summary

Table 7-5. Impact Significances during the Construction Phase - Air Quality

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Air Emissions	Negative Direct	Definition	The spatial scale over which air emissions are expected to occur is primarily limited to the site and immediate surroundings, with localized dust impacts during construction activities.	The time period over which air emissions will occur, limited to the construction phase and ceasing upon completion of construction activities.	The relative concentration and strength of air pollutant emissions generated by construction activities, assessed as high due to the nature of short-term but emission-intensive works.	The regularity with which air emissions are expected to occur, corresponding to frequent construction activities undertaken during the active construction period.	The extent to which the impact can be reversed once the source of emissions ceases, with air quality expected to return to baseline conditions in the a few months.	High	Medium
		Score	Local	Long	Very High	Frequent	Short/Mid-term		
		Value	2	4	5	4	2		
	Impact Magnitude (G+D+I+F (or L)) x R		15					5	150

Table 7-6. Impact Significances during the Operation Phase - Air Quality

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Air Emissions	Negative Direct	Definition	The spatial area over which air emissions generated during the operational phase are expected to occur, limited to the project site and its immediate surroundings, with concentrations decreasing with distance due to atmospheric dispersion.	The time period over which air emissions will be generated, corresponding to the full operational lifetime of the Project and therefore considered long to very long term.	The relative level of air pollutant emissions during normal operations, assessed as medium due to the application of emission control measures and compliance with applicable regulatory standards.	The regularity of air emissions during the operational phase, expected to occur on a continuous basis under normal operating conditions.	The extent to which the impact can be reversed once the source of emissions ceases, with air quality expected to return to baseline conditions in the a few months.	Medium	Medium
		Score	Local	Very Long	Medium	Continuous	Short/Mid-term		
		Value	2	5	3	5	2		
	Impact Magnitude (G+D+I+F (or L)) x R		15						3

7.1.3 Mitigation Measures

7.1.3.1 Construction Phase

Air quality impacts during the construction phase will primarily arise from dust (PM₁₀) emissions and exhaust emissions from construction equipment and vehicles. Mitigation will be implemented in accordance with the mitigation hierarchy (avoidance, minimization, control, and monitoring) to ensure compliance with applicable standards.

Avoidance

- Construction planning will be optimized to minimize unnecessary vehicle movements and avoid sensitive receptors where practicable.
- Construction methods will be selected to reduce the extent and duration of exposed soil surfaces.

Minimization

- Material handling operations will be conducted to minimize dust generation, including limiting drop heights during loading and unloading.
- Earthworks will be scheduled to avoid high wind conditions where practicable.
- Low-sulphur fuels will be used for construction equipment and vehicles where available.

Control

For dust control:

- Water spraying will be implemented on active work areas, haul roads, and other dust-generating surfaces, particularly during dry and windy conditions.
- Excavated materials will be stored in designated areas located away from sensitive receptors where practicable and will be covered or kept moist as required.
- Windbreaks or physical barriers will be installed around stockpiles where dust dispersion risk exists.
- Haul roads will be paved, stabilized, or regularly maintained.
- Trucks transporting loose materials will be covered prior to leaving the site.
- Regular visual inspections will be conducted to identify and address dust sources.

For exhaust emissions control:

- All construction equipment and vehicles will be subject to routine maintenance and servicing.
- A no-idling policy will be implemented for all vehicles and equipment.
- The Traffic Management Plan will be implemented to optimize traffic flow and reduce congestion-related emissions.

Monitoring

- PM₁₀ monitoring will be conducted monthly during the initial earthworks phase (first three months).

- If monitoring results remain within applicable limits (WHO limit value for 24-hour measurements $45 \mu\text{g}/\text{m}^3$), frequency will be reduced to quarterly.
- In the event of exceedances, monthly monitoring will continue until compliance is restored.
- Routine site inspections will be conducted to verify implementation of dust control measures.

Trigger and Action Levels for Monitoring

Level 1 (Compliance / Normal Conditions): $\text{PM}_{10} \leq 45 \mu\text{g}/\text{m}^3$

- Continue monthly monitoring during initial phase; if consistently compliant for three consecutive months, monitoring frequency may be reduced to quarterly.

Level 2 (Early Warning / Action Trigger): $\text{PM}_{10} > 45 \mu\text{g}/\text{m}^3$ but $\leq 75 \mu\text{g}/\text{m}^3$

- Maintain monthly monitoring and implement enhanced dust suppression measures (e.g., increased watering frequency, restriction of dusty activities during high wind conditions, review of haul road conditions).

Level 3 (Exceedance / Non-Compliance): $\text{PM}_{10} > 75 \mu\text{g}/\text{m}^3$ or repeated exceedances of $45 \mu\text{g}/\text{m}^3$

- Initiate corrective action plan, including:
 - immediate review and strengthening of dust control measures,
 - investigation of emission sources and operational practices,
 - suspension or modification of high-dust activities if required,
 - notification to project management and environmental supervision team,
 - continuation of monthly monitoring until sustained compliance is demonstrated.

7.1.3.2 Operation Phase

Air quality impacts during operation will primarily be associated with combustion emissions from boilers and diesel generators. Mitigation measures will be implemented through design controls, operational management, and monitoring within the ESMS framework, in line with the mitigation hierarchy.

Avoidance

- High-efficiency, low-emission boilers and diesel generators will be selected during the design stage.
- Cleaner fuel options (e.g., natural gas for boilers) will be prioritized where available.

Minimization

- Energy efficiency measures, including system insulation and operational optimization, will be implemented to reduce fuel consumption.
- Equipment loading will be optimized to improve combustion efficiency.

Control

- Modern diesel generators with high combustion efficiency will be used.
- Emission control technologies (e.g., oxidation catalysts and/or particulate filters) will be installed.
- Ultra-low sulphur diesel will be used, subject to availability, with fuel quality verified through supplier specifications.
- Diesel generators will be restricted to emergency use and routine testing, with total operating time limited to <500 hours/year.
- Low-NO_x burners and optimized air-to-fuel ratios will be applied for boilers where applicable.
- Simultaneous operation of multiple generators will be minimized unless operationally required.
- A no-idling policy will be applied to operational equipment.

Monitoring and Reporting

- Maintenance records, operating logs, and inspection reports will be maintained for all combustion sources.
- Emission performance will be verified through manufacturer specifications and/or periodic testing in line with IFC EHS Guidelines.
- Greenhouse gas (GHG) emissions will be quantified and reported annually in accordance with international best practice.

7.1.4 Residual Impacts

The residual impact significances for the construction and operation phase are given in Table 7-7 and Table 7-8, respectively.

Table 7-7. Residual Impact Significances during the Construction Phase - Air Quality

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Air Emissions	Negative Direct	Definition	The spatial extent of residual air emissions following the implementation of mitigation measures, confined to the project site and its immediate vicinity.	The period over which residual air emissions may occur, limited to short-term construction activities and ceasing upon completion of the relevant works.	The remaining level of air pollutant emissions after mitigation, assessed as low due to effective dust suppression, good housekeeping practices, and equipment controls.	The occurrence of residual air emissions, expected to be infrequent as a result of controlled construction practices and the intermittent nature of dust-generating activities.	The ability of the receiving environment to recover once the source of emissions is removed, with air quality expected to return to baseline conditions in the short/mid term.	Medium	Low
		Score	Local	Short	Low	Infrequent	Short/Mid-term		
		Value	2	2	2	2	2		
	Impact Magnitude (G+D+I+F (or L)) x R		8					3	48

Table 7-8. Residual Impact Significances during the Operation Phase - Air Quality

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Air Emissions	Negative Direct	Definition	The spatial extent of residual operational air emissions following the implementation of mitigation measures, limited to the project site and its immediate surroundings, with concentrations reducing rapidly with distance due to atmospheric dispersion.	The period over which residual air emissions may occur, extending throughout the operational lifetime of the Project and therefore considered very long term.	The remaining level of emissions after the application of mitigation measures, assessed as negligible due to compliance with applicable emission limits, effective pollution control systems, and routine operational monitoring.	The regularity of residual air emissions during the operational phase, expected to occur on a continuous basis under normal operating conditions, albeit at very low concentrations.	The extent to which the impact on air quality can be reversed, with emissions expected to cease and ambient air quality to return to baseline conditions in the short term.	Medium	Low
		Score	Local	Very Long	Negligible	Continuous	Short-term		
		Value	2	5	1	5	1		
	Impact Magnitude (G+D+I+F (or L)) x R		13					3	39

7.2 Noise

7.2.1 Introduction

This section provides an assessment of the noise and vibration impacts anticipated during the construction and operation phases of the Project.

Baseline in-situ noise measurements were conducted the project area establish background noise levels prior to the commencement of construction. The results of the modelling study were compared with IFC standards.

7.2.2 Impact Analysis

7.2.2.1 Construction Phase

Project activities that will generate noise will be including but not limited to earth works, movement of construction vehicles, building works, mechanical and electrical works.

Noise generation will be caused by vehicles, machinery, and equipment to be used during the land preparation and construction phase within the scope of the activities of the Project. Equivalent noise levels (L_{eq}) of the machinery and equipment to be used during the construction period was provided, noise levels of the equipment were provided in Table 7-9 below.

Table 7-9. Equipment Used in the Construction Phase with Noise Levels

Equipment/Machinery	Number of Equipment	Noise Level (dBA)*
SUV 4x4	2	75
Truck Mixer	10	79
Concrete Pump Truck Mounted	5	81
Concrete Mixing Plant	1	83
Crawler Excavator	2	81
Wheeled Excavator	1	81
Wheel Loader	1	79
Skid Steer Loader	1	79
Backhoe Loader	4	79
Boom Truck	1	76
Dump Truck	5	76
Truck Tractor	2	84
Water Truck	2	76
Agricultural Tractor	2	84
Compactor	1	83
Forklift	5	75
Air Compressor	3	78
Telehandler	4	79
Manlift	4	75
Steel Bar Bending Machine	5	80
Steel Bar Cutting Machine	5	80
Drilling Rig	1	84
Piling Rig	2	101

Equipment/Machinery	Number of Equipment	Noise Level (dBA)*
Vibratory Hammer with Powerpack	2	113

*Data from the Construction Noise Handbook prepared for the U.S. Department of Transportation. Federal Highway Administration (https://www.fhwa.dot.gov/ENVIRONMENT/noise/construction_noise/handbook/handbook09.cfm)

Noise levels were calculated using specific formulas, considering a worst-case scenario in which all vehicles operate simultaneously at the same location.

Atmospheric absorption was not factored into the calculations, meaning that in actual conditions, the noise levels are expected to be significantly lower than the calculated values. This conservative approach ensures that potential impacts are not underestimated.

The total equivalent noise level generated by the noise sources was calculated with the help of the formula given below¹. In this formula, it is assumed that the noise sources are in the same plane.

$$L_{eq} = 10x \log \sum_{i=1}^n 10^{L_i/10}$$

In this formula:

- n : Number of noise sources
- L_i : Sound power level of each source (dBA)
- L_{wt} : Total equivalent noise level
- $L_{eq} = 116.34$ dBA

The sound power level (L_p) arising from the machinery/equipment and travelling a certain distance is calculated by means of the formula given below.

$$L_p = L_{eq} + 10x \log \left(\frac{Q}{4\pi r^2} \right)$$

In this formula:

- L_p : Sound power (noise) level (dBA)
- Q : Reduction factor selected according to whether the terrain is flat or hilly, which is taken as 2
- r : Distance (m)

In this assessment, atmospheric absorption as well as natural and artificial barriers (such as buildings) have been excluded in order to represent a worst-case scenario. It is also assumed that all machinery operates simultaneously at the same location. The equivalent sound level

¹ Environmental Noise Assessment and Management, Certificate Programme Seminar Notes- METU Continuing Education Centre, ANKARA, 2007

generated by the construction area as a function of distance is presented in Figure 7-2 and Table 7-10.

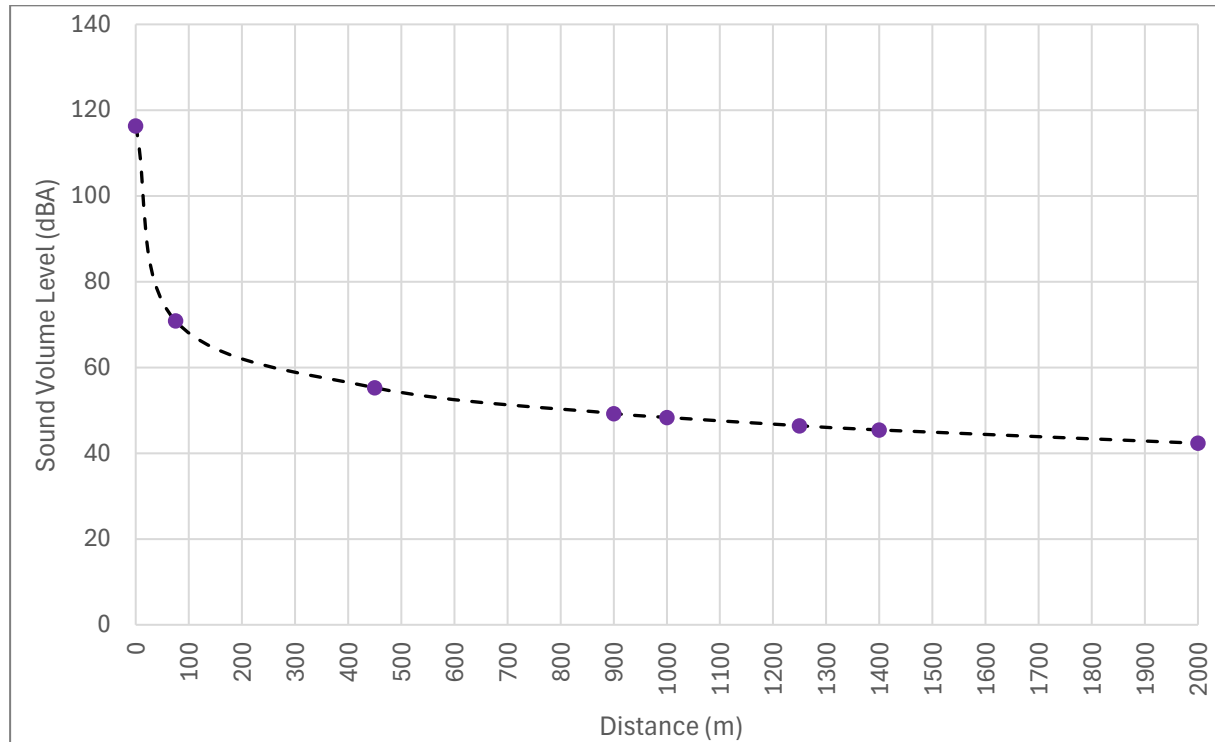


Figure 7-2. Change of Noise with respect to Distance

Table 7-10. Sound Levels on Different Distances from the Project Location

Distance (m)	Sound Level (dBA)
0	116.34
75	70.86
450	55.29
900	49.27
1000	48.36
1400	45.43
2000	42.36

As given in *Chapter 6*, the applicable noise limits for the Project area are 55 dBA during the daytime period (07:00–22:00) and 45 dBA during the nighttime period (22:00–07:00) at residential receptors. For commercial and industrial areas, the applicable noise limit is 70 dBA during both the daytime and nighttime periods.

The modelling data shows that, during construction period noise levels will be in line with IFC Guidelines for the industrial receptors after a distance of approximately 75 m, for residential and institutional receptor after a distance of 450 m in daytime and 1400 m in nighttime. It should be noted that these calculations are based on the worst-case scenario, where all equipment and machinery used at the same time.

Impact significances of the construction phase noise are provided in Table 7-13.

7.2.2.2 Operation Phase

During the operational phase, the Project will generate continuous and intermittent noise emissions associated with residential, commercial, hospitality, cultural, and building service activities. Given the scale and mixed-use nature of the development, including high-rise residential towers, an office tower, a hotel, an entertainment centre and mall, and a performance centre, operational noise sources will vary in intensity and temporal distribution. Although operational noise levels are typically lower than those experienced during construction, they are long-term in nature and may result in cumulative impacts if not appropriately controlled through design and management measures.

During operation, expected noise sources are heating, ventilation and air conditioning (HVAC) systems of the buildings, generators and performance centre. The performance centre has been designed as an enclosed facility with a building envelope incorporating external walls, roof and glazed façades that provide substantial sound insulation. Consequently, amplified sound generated during performances is expected to remain largely contained within the building, with only limited breakout noise transmitted through the façade, entrances and ventilation openings. In addition, standby generators will operate only during temporary interruptions to the municipal electricity supply. As such power outages are expected to occur infrequently and generator operation will be limited to these emergency circumstances, noise emissions associated with generator use are anticipated to be infrequent and of short duration.

Preliminary designs for the HVAC systems serving the residential units have been completed and were used as the basis for the operational noise assessment. At the current stage of design, the HVAC layouts indicate that the building will comprise:

- Ceiling-mounted fan coil units (FCUs) serving residential apartments and common areas
- Small in-line toilet exhaust fans with ventilation capacities ranging from 25 to 65 L/s
- Fresh air fans with capacities ranging from 30 to 55 L/s
- Supply and return air distribution through relatively large grilles and diffusers (typically 450 × 200 mm to 675 × 200 mm), resulting in relatively low air velocities
- No large air handling units, cooling towers, rooftop ventilation equipment or other major mechanical plant associated with the residential apartments

As the project is currently at the schematic design stage, detailed manufacturer acoustic data, including sound power spectra, fan operating curves and insertion losses for duct components, are not yet available. Consequently, the assessment has been undertaken using representative acoustic performance data from recognised international guidance and industry references, including:

- American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE) HVAC Applications Handbook
- Chartered Institution of Building Services Engineers (CIBSE) Guide B5 – Noise and Vibration Control

- Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 885
- IFC General EHS Guidelines

To ensure a conservative assessment, upper-range sound power levels representative of comparable residential HVAC equipment were adopted. The assumed equipment sound power levels used in the assessment are presented in Table 7-11.

Table 7-11. Assumed Equipment Noise Levels

Equipment	Airflow	Assumed Sound Power (LwA)	Typical Room Level
FCU (Bedroom)	300-500 m ³ /h	52 dB(A)	30-33 dB(A)
FCU (Living room)	600-900 m ³ /h	57 dB(A)	34-38 dB(A)
Toilet Exhaust Fan	25 L/s	45 dB(A)	22-25 dB(A)
Toilet Exhaust Fan	50 L/s	50 dB(A)	24-28 dB(A)
Toilet Exhaust Fan	65 L/s	53 dB(A)	26-30 dB(A)
Fresh Air Fan	30-55 L/s	50 dB(A)	24-28 dB(A)

Indoor Noise Prediction

Indoor operational noise levels were estimated considering the attenuation provided by the HVAC system configuration, including the acoustic performance of FCU casings, flexible duct connections, ceiling voids, supply and return air diffusers, and distance attenuation within occupied spaces.

The predicted operational noise levels for representative room types are presented in Table 7-12.

Table 7-12. Predicted Indoor HVAC Noise Levels

Room	Main Source	Predicted LAeq
Master Bedroom	FCU	31-34 dB(A)
Bedrooms	FCU	30-33 dB(A)
Living/Dining Room	FCU	35-38 dB(A)
Kitchen	FCU + Fresh Air	35-39 dB(A)
Bathroom	Exhaust Fan	28-32 dB(A)
Laundry Room	Exhaust Fan	28-31dB(A)
Corridor	Air Movement	30-34 dB(A)

The predicted indoor operational noise levels are consistent with the recommended indoor environmental noise criteria presented in the World Health Organization (WHO) Environmental Noise Guidelines and are also generally consistent with good international industry practice for residential developments. Accordingly, significant adverse indoor noise impacts associated with operation of the HVAC system are not anticipated.

External Noise

The preliminary HVAC design indicates that the exhaust fans serving toilets and service areas are relatively small units with ventilation capacities ranging from 25 to 65 L/s. Consequently, their contribution to external operational noise emissions is expected to be limited.

Assuming simultaneous operation of all exhaust fans serving a single apartment façade, the predicted external noise levels are estimated as follows:

- Combined façade sound power level: approximately 58–62 dB(A)
- Noise level at 1 m from façade: approximately 48–52 dB(A)
- Noise level at 10 m: approximately 30–35 dB(A)

These predicted noise levels indicate that HVAC operation is unlikely to represent a dominant operational noise source at nearby noise-sensitive receptors or contribute materially to cumulative environmental noise levels.

As the assessment has been undertaken during the schematic design stage, detailed manufacturer acoustic data, including octave-band sound power spectra, fan operating duty points, equipment selection schedules and duct insertion losses, were unavailable. The assessment therefore relies on conservative engineering assumptions and representative acoustic performance data obtained from internationally recognised design guidance.

During the detailed design stage, the selected HVAC equipment should be reviewed against the project's indoor acoustic design criteria. Where necessary, additional noise control measures, such as acoustically lined ductwork, silencers, vibration isolation mounts or low-noise equipment specifications, should be incorporated to verify compliance with the applicable indoor acoustic performance requirements.

During the operational phase, the Project will generate additional traffic associated with residential, commercial, retail, office and leisure uses, including the performance centre. Traffic-related noise will primarily originate from passenger vehicles, taxis, service vehicles and occasional buses accessing and exiting the development. The principal noise sources will include engine operation, tyre-road interaction, braking and vehicle acceleration, as well as intermittent use of vehicle horns.

Given the urban setting of the Project, where existing traffic already represents the dominant source of environmental noise, the additional traffic generated by the development is not anticipated to substantially alter the prevailing ambient noise environment. Furthermore, the internal road network has been designed to distribute vehicle movements across multiple access points, thereby avoiding excessive traffic concentration at any single location.

Impact significances for the operation phase are provided in Table 7-14.

7.2.2.3 Impact Summary

Table 7-13. Construction Phase Impact Significance - Noise

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Noise	Negative Direct	Definition	Construction-related noise impacts are expected to be local, primarily affecting the project site and nearby sensitive receptors within the immediate surroundings.	Noise impacts are expected to persist over a long duration relative to the construction phase, as noise-generating activities will occur throughout most construction works.	The intensity of construction noise is assessed as very high, resulting from the operation of heavy machinery, equipment, and construction vehicles.	Noise-generating activities are expected to occur frequently during construction, corresponding to regular daytime working hours.	Noise impacts are considered reversible in the short/mid-term, as noise levels are expected to return to baseline conditions after a while, once the construction activities cease.	Medium	Medium
		Score	Local	Long	Very High	Frequent	Short/Mid-Term		
		Value	2	4	5	4	2		
	Impact Magnitude (G+D+I+F (or L)) x R			30					3

Table 7-14. Operation Phase Impact Significance - Noise

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)	
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)			
Noise	Negative Direct	Definition	The impact will be limited to the Project site and its immediate surroundings, as noise levels will attenuate with distance and will not extend beyond the local area.	The impact will persist throughout the operational lifetime of the project, as building service systems will operate on a permanent basis to support residential occupancy, hotel operations, commercial activities, office functions, and performance hall use.	The impact will result in a perceptible increase in ambient noise levels within and immediately surrounding the Project site due to the operation of mechanical systems and increased human activity.	The impact will occur on a continuous basis, as essential building service equipment such as HVAC systems, ventilation units, and auxiliary mechanical systems will operate regularly, including daytime and nighttime periods.	The impact is reversible in the short term, as operational noise sources can be reduced or cease entirely upon shutdown of mechanical equipment or discontinuation of specific activities, allowing ambient noise levels to return to prevailing background conditions.	Medium	Low	
		Score	Local	Very Long	Medium	Continuous	Short-Term			
		Value	2	5	3	5	1			
	Impact Magnitude (G+D+I+F (or L)) x R			15						3

7.2.3 Mitigation Measures

The following mitigation measures will be implemented during the construction phase in order to ensure that noise limit values set in the standards are met and the noise impacts are minimised as much as possible:

- Low-noise equipment will be utilized during the construction phase to the greatest extent practicable. Where equipment is fitted with acoustic enclosures or soundproof covers, these will remain closed while the machinery is in operation.
- Equipment will be switched off or operated at minimum power levels when not actively in use.
- Regular maintenance procedures will be implemented to ensure that all machinery remains in good working condition and to prevent excessive noise resulting from poor equipment performance.
- All necessary permits and approvals will be obtained from the relevant authorities for construction activities, including pile-driving works, if such activities are planned during evening or night-time hours, even though no noisy works are currently anticipated during these periods.
- Noisy construction activities will be located as far as practicable from residential areas, and their duration will be minimized. Such activities will be restricted to daytime hours only.
- Noise associated with construction-related traffic will be effectively managed through the implementation of a Construction Traffic Management Plan.
- Construction traffic shall be routed away from settlements by using alternative routes and/or designated service roads.
- Unnecessary idling of construction vehicles will be strictly avoided.
- On-site structures such as containers, offices, hoardings will be used to screen sensitive receptors from noise sources as far as possible. Where necessary movable noise barriers (2-2.5 m high) will be used to ensure receptor noise levels are less than the limit values adjacent to noisy activities.
- Awareness will be increased among construction workers regarding noise mitigation.
- Noise monitoring measurements are conducted within the first 3 months of construction to identify the need for noise barriers. If levels at receptors exceed the standards, the noise monitoring measurements will continue to be conducted monthly, and measures will be taken to reduce noise levels so that the limit values are met during all phases of construction. If the results of noise monitoring in the first 3 months of construction are observed to be below limit values, measurements will only be conducted every 6 months. It is important to note that noise monitoring may be undertaken more frequently if there are significant number of complaints from stakeholders.

The following mitigation measures will be taken during the operation phase in order to ensure that noise limit values set in the standards are met:

- All mechanical and electrical equipment shall be procured based on certified low sound power level specifications in accordance with recognized international standards, where applicable.
- Emergency diesel generators shall be housed within acoustically insulated enclosures designed to achieve compliance with applicable daytime and night-time noise limits at the nearest sensitive receptors.
- Anti-vibration mounts, inertia bases, and flexible connections shall be installed for all major mechanical equipment to prevent structure-borne noise transmission.
- Acoustic louvers and internally lined ductwork shall be incorporated into ventilation and exhaust systems to minimize breakout noise.
- Mechanical plant rooms shall be strategically located away from noise-sensitive façades, particularly residential units and hotel rooms.
- Delivery operations for retail, hotel, and commercial tenants shall be managed through a designated scheduling system to prevent early morning or late-night noise impacts.
- Internal traffic circulation routes shall be designed and managed to minimize vehicle congestion and unnecessary idling within the project site.
- Traffic Management Plan will be implemented in order to minimize the traffic noise impact from the project.
- Preventive maintenance programs shall be established for all mechanical and electrical equipment to ensure continued acoustic performance and to prevent tonal or irregular noise emissions.
- A formal grievance mechanism shall be established to receive, document, and address noise-related complaints from surrounding receptors in a timely manner.
- Post-commissioning environmental noise monitoring shall be conducted to verify compliance with applicable standards and to identify any need for corrective action.

7.2.4 Residual Impacts

Residual impact significances for construction and operation phases are provided in Table 7-15 and Table 7-16, respectively.

Table 7-15. Construction Phase Residual Impact - Noise

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Noise	Negative Direct	Definition	Residual construction-related noise impacts are expected to be confined to the project site, with limited propagation beyond site boundaries following the implementation of noise control measures.	Residual noise impacts may persist over a long duration relative to the construction phase, as certain noise-generating activities will continue throughout construction, albeit at reduced levels.	The intensity of residual noise impacts is assessed as low due to the application of mitigation measures such as equipment maintenance, use of silencers, and controlled working practices.	Residual noise events are expected to occur on a recurrent basis during construction, corresponding to periodic operation of machinery and construction activities.	Residual noise impacts are considered fully reversible in the short term, with noise levels returning to baseline conditions upon completion of construction activities.	Medium	Low
		Score	Project Site	Long	Low	Long	Short-term		
		Value	1	4	2	4	1		
	Impact Magnitude (G+D+I+F (or L)) x R		11						3

Table 7-16. Operation Phase Residual Impact - Noise

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Noise	Negative Direct	Definition	The operation phase impact will be limited to the project site only after the implementation of mitigation measures.	The impact will persist throughout the operational lifetime of the project, as building service systems will operate on a permanent basis to support residential occupancy, hotel operations, commercial activities, office functions, and performance hall use.	The magnitude of the noise impact is expected to be negligible following the implementation of the proposed mitigation measures.	The impact will occur on a continuous basis, as essential building service equipment such as HVAC systems, ventilation units, and auxiliary mechanical systems will operate regularly, including daytime and nighttime periods.	The impact is reversible in the short term, as operational noise sources can be reduced or cease entirely upon shutdown of mechanical equipment or discontinuation of specific activities, allowing ambient noise levels to return to prevailing background conditions.	Medium	Low
		Score	Project Site	Very Long	Negligible	Continuous	Short-term		
		Value	1	5	1	5	1		
	Impact Magnitude (G+D+I+F (or L)) x R		12					3	36

7.3 Geology, Soil and Contaminated Land

7.3.1 Introduction

The potential impacts of Downtown Slemani Project regarding geology, soils, and contaminated land are presented in this section. The following issues were assessed:

- Seismic activity risks
- Ground subsidence risks
- Landslide risks
- Contaminated land risks

This Section provides a summary of the baseline conditions that was presented in detail in *Chapter 6* followed by an impact assessment and related mitigation measures.

7.3.2 Impact Analysis

7.3.2.1 Construction Phase

Impacts Related to Seismic Risk and Other Natural Hazards

According to World Bank database “Think Hazard” in terms of earthquake and water scarcity Sulaymaniyah hazard level is defined as “Medium”. This indicates that there is a 10% probability of experiencing potentially damaging earthquake shaking within the project area over the next 50 years. Accordingly, seismic risk must be considered throughout all phases of the Project, particularly during the design and construction stages. Project planning, engineering design, and construction methodologies should be developed with full consideration of the identified earthquake hazard level.

Landslide susceptibility is identified as “High” at a regional level; however, this classification is primarily associated with mountainous and sloped terrain within the wider Sulaymaniyah region. Given the urbanized and likely flat nature of the project site, the conditions required for landslide occurrence are not present. In addition, geotechnical investigations undertaken for the project have not indicated any such risk.

The river flood hazard in Sulaymaniyah is classified as “Very Low” based on the currently available flood modelling data. This means that there is a chance of less than 1% that potentially damaging and life-threatening river floods occur in the coming 10 years (return period of c. 1 in 1000 years).

The urban flood hazard in Sulaymaniyah is classified as “Low” based on currently available flood modelling information. This means that there is a chance of about 1% that potentially damaging and life-threatening river floods occur in the coming 10 years (return period of c. 1 in 1000 years).

The extreme heat hazard in Sulaymaniyah is classified as “Medium” based on the currently available heat information. This means that there is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years.

Impacts on Soil

During the construction phase, soil contamination may occur as a result of accidental spills and leakages of fuels, lubricants, hydraulic oils, paints, solvents, and other hazardous materials associated with construction machinery, material storage, and on-site maintenance activities. Improper storage of chemicals and temporary stockpiling of construction materials may also introduce pollutants into surface soils. Additionally, uncontrolled disposal of construction waste and wastewater may contribute to localized soil degradation.

Given that construction activities are temporary and largely confined to the project footprint, the spatial extent of potential contamination is expected to remain site-specific. However, in the absence of appropriate control measures, contaminants may infiltrate subsurface soils and potentially affect groundwater quality. Sensitive receptors include on-site workers, surrounding land uses, and underlying soil resources that support future landscaping and urban functions.

Table 7-17 shows the summary the impact magnitudes and impact significance during construction phase of Project.

7.3.2.2 Operation Phase

Impacts Related to Seismic Risk and Other Natural Hazards

Since the city of Sulaymaniyah is classified as having medium hazard levels for earthquakes and water scarcity. This indicates an estimated 10% probability of experiencing potentially damaging earthquake shaking within the project area over a 50-year period. During the operation phase, seismic risk remains a relevant consideration for the structural integrity of buildings, safety of occupants, and continuity of essential services. Accordingly, building management systems, maintenance programs, and emergency preparedness procedures must be implemented to ensure that operational safety and functionality are preserved in the event of seismic activity.

Landslide susceptibility within Sulaymaniyah is classified as high, reflecting local rainfall patterns, terrain slope, geological conditions, soil characteristics, land cover, and potential seismic triggers that may contribute to localized slope instability. During operation, landslide risk may affect access roads, underground utilities, and external infrastructure associated with the residential, hotel, commercial, and office components. Continuous monitoring of surrounding slopes, drainage management, and routine inspection of retaining structures are therefore necessary to maintain operational safety and accessibility.

River flood hazard in Sulaymaniyah is assessed as very low based on available flood modelling data, indicating a probability of less than 1% for potentially damaging river flooding within a 10-year period. Consequently, significant operational disruption related to river flooding is unlikely; however, periodic inspection of drainage infrastructure and emergency preparedness measures should be maintained as part of standard facility management practices.

Urban flood hazard is classified as low, suggesting a limited but present risk of localized flooding associated with intense rainfall events and urban drainage limitations. During operation, this hazard may influence basement areas, underground parking facilities, and ground-floor commercial spaces. Proper maintenance of stormwater systems, pumping

equipment, and surface drainage networks is therefore required to ensure operational resilience.

Extreme heat hazard in Sulaymaniyah is categorized as medium, indicating a greater than 25% likelihood of at least one period of prolonged exposure to extreme heat within the next five years. In the operational phase, extreme heat may affect occupant comfort, building energy demand, and mechanical system performance. Consequently, facility management strategies should incorporate climate-responsive building operation practices, including efficient HVAC management, shading systems, water resource optimization, and heat-related emergency preparedness measures to safeguard occupant health and maintain service continuity.

Impacts on Soil

During the operation phase, soil contamination risks are associated with routine facility management and maintenance activities within the residential, hotel, office, and commercial components. Potential sources include accidental leaks and spills from emergency generators, vehicle parking and loading zones, HVAC systems, cleaning chemical storage, and waste handling areas. Improper management of municipal solid waste, hazardous waste, or wastewater infrastructure failures may also contribute to soil pollution.

The impact is expected to be localized within operational service areas such as parking facilities, mechanical rooms, waste storage areas, and loading docks. Compared with the construction phase, contamination risk is typically lower in intensity due to reduced handling of hazardous materials; however, the duration may be long-term given the continuous nature of project operation. Without adequate preventive measures, repeated minor spills may lead to gradual soil quality degradation.

Table 7-18 shows the summary of the respective impact magnitudes and impact significance during operation phase of Project.

7.3.2.3 Impact Summary

Table 7-17. Impact Significances during the Construction Phase - Geology, Soil and Contaminated Lands

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Potential Natural Disasters (Earthquake, Landslide, Flood)	Negative Direct	Definition	The spatial extent of potential impacts associated with natural hazards, which may extend beyond the project site to the surrounding region, depending on the scale and nature of the event.	The time period over which impacts from a natural disaster may persist, potentially extending beyond the construction phase and therefore considered long term.	The severity of potential impacts on geological stability and soils in the event of an earthquake, landslide, or flood, assessed as high due to the potential for substantial physical damage and disturbance.	The probability of occurrence of natural disaster events during the construction phase, assessed as unlikely based on regional geological and climatic conditions.	The extent to which impacts on geology and soils may be reversed following a natural disaster, with recovery expected to occur over the medium term depending on the severity of the event and the effectiveness of remedial measures.	Medium	Medium
		Score	Regional	Long	High	Unlikely	Mid-term		
		Value	3	4	4	2	3		
	Impact Magnitude (G+D+I+F (or L)) x R		39					3	117

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Impacts on soil contamination	Negative Direct	Definition	The spatial extent of potential soil contamination during construction activities, limited to the project site and areas directly affected by excavation, material storage, and the handling of fuels or hazardous substances.	The period over which soil contamination may occur, generally short term and limited to active construction works.	The level of potential contamination prior to the implementation of mitigation measures, assessed as medium due to the possible release of pollutants from construction equipment, accidental spills, or disturbed contaminated soils.	The likelihood of soil contamination occurring during construction, considered likely due to routine construction activities involving machinery, fuels, and materials.	The extent to which soil quality can be restored, with impacts expected to be reversible in the short to medium term through appropriate remediation and soil management measures.	Medium	Low
		Score	Project Site	Short	Medium	Likely	Short/mid- term		
		Value	1	2	3	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		18					3	54

Table 7-18. Impact Significances during the Operation Phase - Geology, Soil and Contaminated Lands

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Potential Natural Disasters (Earthquake, Landslide, Flood)	Negative Direct	Definition	The potential impacts associated with natural disasters during the operational phase, which may extend to a regional scale beyond the project site depending on the magnitude of the event.	The period over which impacts may persist following a natural disaster, considered long term due to the potential for lasting effects on geological stability, infrastructure, and surrounding environments.	The severity of potential impacts, assessed as high, as such events may result in significant damage to environmental and social receptors, including structural failure, soil instability, and disruption to services.	The likelihood of occurrence of natural disaster events during the operational phase, assessed as likely based on regional seismicity, geomorphological conditions, and historical records, with a probability exceeding 5%.	The extent to which impacts can be reversed, with restoration and recovery expected to occur over the medium term, ranging from several months to approximately one year depending on the severity of the event and effectiveness of response measures.	Medium	Medium
		Score	Regional	Long	High	Unlikely	Mid-term		
		Value	3	4	4	2	3		
	Impact Magnitude (G+D+I+F (or L)) x R		39					3	117

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Impacts on soil contamination	Negative Direct	Definition	The spatial extent of potential soil contamination during the operational phase, limited to the project site and areas where operational activities, material handling, or storage of hazardous substances may occur.	The period over which soil contamination impacts may occur, generally short term and associated with isolated operational incidents.	The severity of potential soil contamination, assessed as medium, with contaminant concentrations not expected to exceed applicable legislative limit values under normal operating conditions.	The likelihood of soil contamination occurring, considered likely due to the potential for accidental releases during routine operations, despite the presence of management and control measures.	The extent to which soil quality can be restored, with a return to baseline conditions expected within a short to medium timeframe (weeks to months) through appropriate containment and remediation actions.	Medium.	Low
		Score	Project Site	Short	Medium	Likely	Short/mid- term		
		Value	1	2	3	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		18					3	54

7.3.3 Mitigation Measures

Mitigation measures to avoid and/or mitigate the potential impacts and risks regarding site stability, earthquake and other natural disaster hazards are listed below:

- Number of floors in the campsite should not exceed 3, so no possibility of overturns will be prevented in case of an earthquake.
- For both construction and operation phases Health and Safety Management Plan, Risk Assessment and Emergency Preparedness and Response Plan to be developed and implemented.
- Engineering controls (e.g., application of appropriate cut-and-fill slope designs that consider shrink-swell characteristics of excavated materials, provision of adequate surface and subsurface drainage, and implementation of erosion and instability prevention measures such as riprap placement, engineered slope treatments) shall be applied to address potential ground stability issues. Where deep excavations are required for foundations, utilities, or ancillary structures, the excavation slopes shall be stabilized through suitable temporary or permanent support systems, such as retaining walls, shoring, or other engineered structures, to ensure safe and stable working conditions.
- Construction and decommissioning (camp site and excavated material deposition Areas) works shall be conducted in line with the IFC's General EHS Guideline 4.0 Construction and Decommissioning regarding the measures on structural (slope) stability issues as well as the environmental and health and safety measures.
- In line with the IFC's General EHS Guideline 3.0 Community Health and Safety hazardous material inventories on site will be reduced through inventory management in order to reduce or eliminate the potential off-site consequences of releases during an earthquake or other emergency incidents.
- Periodic evacuation drills shall be conducted for residents, employees, and tenants to improve preparedness and response capacity.

Specific measures for the protection of soil during the construction and operation phases will include the following:

- Land stripped and excavated from the Project site during pre-construction and construction phase of the Project will be temporarily stored in the temporary storage area, where unnecessary Project traffic and handling, or deposition of any contaminants such as oils, chemicals, wastes will be prevented.
- All contractors will be required to adopt good construction practices at the site for the protection of soils and follow International Finance Corporation (IFC) General Environmental, Health and Safety (EHS) Guidelines.
- Hazardous materials in drums totalling 1,000 litres or more will be stored on impervious surfaces, sloped or equipped with berms to contain at least 25% of the total storage volume. Drip trays will be used when refuelling mobile equipment.

- Contaminated soils (if generated any) will be disposed of in an appropriately licensed disposal site.
- Regarding the prevention, impact minimisation and response to contaminated land the requirements by IFC's General EHS Guideline 1.8 Contaminated Land will be followed.
- In line with the preferred strategy of the reduction of the contamination level (EHS Guideline 1.8 Contaminated Land), the storage of chemicals, hazardous materials, and other potential contaminants will be kept at a minimum for construction and operation works.
- The use of cement and wet concrete in or close to any exposed soil surfaces will be carefully managed.
- Hazardous and non-hazardous materials and waste will be handled according to the Environmental and Social Management System to be prepared by Project Owner and where needed, further site-specific management plans will be developed (e.g., Waste Management Plan).
- Any spillage from handling fuel and liquids will be immediately contained on site and the contaminated soil will be removed from the site for suitable treatment and disposal.
- A Spill Response Plan as a part of Emergency Preparedness and Response Plan should be prepared which include:
 - The locations of spill response equipment and procedures to be used and ensure that procedures are clear and concise
 - Step-by-step instructions for the response to spills at a facility
 - Individuals responsible for implementing the plan
 - Safety measures to be taken with each kind of waste/chemical
 - How to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities for assistance
 - Procedures for containing, diverting, isolating, and cleaning up the spill
 - Spill response equipment to be used, including safety and clean-up equipment.
- The spill response plan should be announced to all employees. EHS personnel should offer training for employees who work directly with chemicals.
- Emergency Preparedness and Response Plan, for both operation and construction phases, should be prepared which include:
 - Risk Assessment: A comprehensive risk assessment should be undertaken to identify potential hazards and risks associated with the construction and the operation of the project. This assessment should consider natural disasters, hazardous material spills, and other potential emergency scenarios.

- **Emergency Procedures:** Clear and detailed emergency procedures must be established and documented within the plan. These should include evacuation protocols, first aid procedures, fire safety measures, and procedures for managing hazardous material spills.
- **Equipment and Supplies:** The emergency preparedness and response plan should specify all essential equipment and supplies required during an emergency, such as personal protective equipment, spill control materials, emergency communication devices, and first aid kits.
- **Contingency Planning:** A contingency plan should be prepared to address potential emergency situations that cannot be fully prevented. This plan should consider relevant risks associated with the mixed-use development and outline appropriate response measures to ensure safety and continuity of operations.

7.3.4 Residual Impacts

With the implementation of above-mentioned mitigation measures and use of good site practices, the magnitudes and significances of the residual impacts can be estimated to be low and negligible. The assessment of the residual impacts after mitigation measures for construction and operation phases, are shown in Table 7-19 and Table 7-20, respectively.

Table 7-19. Residual Impact Significances for Construction Phase - Geology, Soil and Contaminated Lands

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Potential Natural Disasters (Earthquake, Landslide)	Negative Direct	Definition	The spatial extent of residual impacts associated with natural hazards, which may extend to a regional scale beyond the project site.	The period over which residual impacts may persist in the event of a natural disaster, assessed as medium term, reflecting the expected timeframe for stabilization and recovery.	The severity of residual impacts on geological stability and soils after the application of mitigation and design measures, assessed as low due to compliance with relevant engineering standards and hazard-resilient construction practices.	The probability of occurrence of natural disaster events during the construction phase, assessed as unlikely based on regional conditions, but with reduced consequences as a result of mitigation measures.	The extent to which impacts can be reversed, with restoration and recovery expected within the short to medium term following the remediation measures.	Medium	Low
		Score	Regional	Medium	Low	Unlikely	Short/Mid-term		
		Value	3	3	2	2	2		
	Impact Magnitude (G+D+I+F (or L)) x R		20						3

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Soil Contamination	Negative Direct	Definition	The spatial extent of residual soil contamination impacts, limited to the project site and specific work areas following the implementation of soil management and pollution prevention measures.	The period over which residual soil contamination impacts may occur, considered short term and associated with isolated and controllable incidents.	The severity of residual soil contamination, assessed as low due to effective implementation of spill prevention, storage controls, and good construction practices.	The probability of residual soil contamination occurring, considered likely due to routine construction activities, but with limited magnitude and controlled consequences.	The extent to which soil quality can be restored, with impacts expected to be fully reversible in the short term through prompt clean-up and remediation measures.	Medium	Negligible
		Score	Project Site	Short	Low	Likely	Short-term		
		Value	1	2	2	3	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8					3	24

Table 7-20. Residual Impact Significances for Operation Phase - Geology, Soil and Contaminated Lands

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Potential Natural Disasters (Earthquake, Landslide, Flood)	Negative Direct	Definition	The spatial extent of residual impacts associated with natural disasters during the operational phase, which may extend to a regional scale	The period over which residual impacts may persist following a natural disaster, assessed as medium term, reflecting the expected timeframe required for stabilization, repair, and recovery.	The severity of residual impacts on geology and soils, assessed as low due to the implementation of structural design standards, emergency preparedness, and operational controls that reduce potential damage.	The probability of occurrence of natural disaster events during the operational phase, considered unlikely based on regional geological and climatic conditions.	The extent to which impacts can be reversed, with recovery and restoration expected to occur within a short to medium timeframe through implementation of emergency response and remedial measures.	Medium	Low
		Score	Regional	Medium	Low	Unlikely	Short/Mid-term		
		Value	3	3	2	2	2		
	Impact Magnitude (G+D+I+F (or L)) x R		20					3	60

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Soil Contamination	Negative Direct	Definition	The spatial extent of residual soil contamination impacts during operation, limited to the project site and specific operational areas where hazardous materials are handled or stored.	The period over which residual soil contamination impacts may occur, considered short term and associated with isolated and controllable operational incidents.	The severity of residual soil contamination, assessed as low due to the implementation of spill prevention measures, secondary containment, and routine monitoring.	The probability of residual soil contamination occurring, considered likely due to ongoing operational activities, but with limited magnitude and effective control measures in place.	The extent to which soil quality can be restored, with impacts expected to be fully reversible in the short term through prompt containment, clean-up, and remediation actions.	Medium	Negligible
		Score	Project Site	Short	Low	Likely	Short-term		
		Value	1	2	2	3	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8					3	24

7.4 Water and Wastewater Management

7.4.1 Introduction

This section emphasizes the critical importance of effective water and wastewater management throughout both the construction and operation phases of the Project. It identifies key control points and mitigation requirements, highlighting the necessity of adopting a comprehensive and responsible approach to water management across the entire Project lifecycle.

To support the sustainable use of water resources during construction and operation, specific control measures and mitigation actions have been defined. This section presents an overview of these measures, which are essential for minimizing potential adverse impacts and ensuring the implementation of sound and sustainable water management practices.

The significance of these impacts is assessed based on the magnitude of the impact and the sensitivity of the resources, as detailed in the impact assessment methodology in *Chapter 5*.

7.4.2 Impact Analysis

7.4.2.1 Construction Phase

There will be drinking and utility water consumption by construction workers during the construction activities. The average daily water consumption per person is expected to be 150 L/capita.day. The construction of the project is divided into two phases, number of workers for each year is provided as below:

Table 7-21. Construction Phases and Manpower Numbers for the Project

Phases	Duration	Direct Manpower
Phase 01	2026 - 2028	890
Phase 02	2027 - 2031	960

According to the peak worker number, water need for the construction phases is calculated.

Domestic Water Consumption Amount for Phase 01

$$= (150 \text{ L/capita.day} \div 1000 \text{ L/m}^3) \times 890 \text{ people}$$

$$\text{Domestic Water Consumption Amount for Phase 01} = 133.5 \text{ m}^3/\text{day}$$

Domestic Water Consumption Amount for Phase 02

$$= (150 \text{ L/capita.day} \div 1000 \text{ L/m}^3) \times 960 \text{ people}$$

$$\text{Domestic Water Consumption Amount for Phase 02} = 144 \text{ m}^3/\text{day}$$

For dust suppression purposes during the construction phase, approximately 20 m³/day (1 tanker/day) will be used. Water used for dust suppression will be absorbed by the soil, no wastewater generation will be present.

Daily water requirement in total during the construction phases will vary between 244.5 to 264 m³/day in depending on the phase. Water need during the construction phase will be provided via water trucks.

For wastewater generation, general assumption of 80% of the water used is generated as wastewater is used. Using this ratio, wastewater generation for two phases of construction is calculated as follows:

$$\text{Domestic Wastewater Generation for Phase 01} = 133.5 \times 0.8 = 106.8 \text{ m}^3/\text{day}$$

$$\text{Domestic Wastewater Generation for Phase 02} = 144 \times 0.8 = 115.2 \text{ m}^3/\text{day}$$

Domestic wastewater that will be generating during the construction phase of the of the project will be treated by a package wastewater that will be installed in the project area. Any treated effluent discharged from the site will comply with the applicable IFC General EHS Guidelines provided in Chapter 6. Location and the units of the treatment plant is not yet decided by the project owner.

Impacts regarding the water consumption and wastewater generation for the construction phase are summarized in Table 7-23.

7.4.2.2 Operation Phase

For the operation phase of the project, personnel and resident numbers were calculated using assumptions. When the number of people for operation phase is calculated with more accurate numbers, the section will be revised. In below Table 7-22, numbers were provided that was used for the water consumption.

Table 7-22. Operation Phase Population Estimate

Category	Basis of Calculation	Low Estimate	High Estimate
Residential (Apartments)	1,400 units × 3–3.5 people/unit	4,200	4,900
Residential (Villas)	38 units × 4–5 people/unit	150	190
Total Residents		4,350	5,100
Mall Employees	~83,000 m ² % 30-50 m ² /person	1,700	2,800
Office Employees	~39,000 m ² % 12-20 m ² /person	2,000	3,200
Hotel Employees	~120 keys x staff ratio	150	200
Performance Staff	Estimated	150	200
Facility Management	Estimated	300	500
Total Employees		4,300	7,000
Visitors (Parking-Based)	2,000 spaces x 1.8-2.2 people/car + walk-ins	4,000	4,800
Hotel Guests	Estimated Occupancy	200	250
Total Visitors		4,200	5,000
Total Population		12,800	17,100

Domestic Water Consumption Amount for Low Estimate

$$= (150 \text{ L/capita.day} \div 1000 \text{ L/m}^3) \times 12,800 \text{ people}$$

$$\text{Domestic Water Consumption Amount for Low Estimate} = 1,920 \text{ m}^3/\text{day}$$

Domestic Water Consumption Amount for High Estimate

$$= (150 \text{ L/capita.day} \div 1000 \text{ L/m}^3) \times 17,100 \text{ people}$$

$$\text{Domestic Water Consumption Amount for High Estimate} = 2,565 \text{ m}^3/\text{day}$$

Depending on the population estimates, water demand of the project for operation phase is calculated to be variable between 1,920 to 2,565 m³/day. It should be noted that numbers will be revised when more accurate calculations are provided. Portable water demand in the operation phase will be supplied from the water supply network of Sulaymaniyah.

$$\text{Domestic Wastewater Generation for Low Estimate} = 1,920 \times 0.8 = 1,536 \text{ m}^3/\text{day}$$

$$\text{Domestic Wastewater Generation for High Estimate} = 2,565 \times 0.8 = 2,052 \text{ m}^3/\text{day}$$

The Project will discharge domestic wastewater to the municipal sewer network if a municipal wastewater treatment plant is commissioned and operational by the end of the construction phase. However, if a municipal wastewater treatment plant is not available at that time, If this is not available, domestic wastewater generated during operation will be managed in accordance with the applicable IFC General EHS Guidelines provided in Chapter 6, and effluent concentrations of the potential treatment plant will be in line with the IFC General EHS Guidelines that are given in *Chapter 6*.

Impacts regarding the water consumption and wastewater generation for the operation phase are summarized in Table 7-24.

7.4.2.3 Impact Summary

Table 7-23. Impact Significances during the Construction Phase-Water and Wastewater Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Water Quality Degradation	Negative Direct	Definition	Potential water quality degradation is expected to be local, primarily affecting surface water in the immediate vicinity of the project area.	Contamination and combined water quality impacts may occur over a short-term period during construction activities, depending on the type and persistence of potential pollutants.	The severity of potential water quality impacts is assessed as low; however, in the absence of proper controls, contaminant concentrations may temporarily exceed applicable legislative limit values.	In cases of improper handling, storage, transport, or disposal of wastes and hazardous materials, accidental releases are considered likely during the construction phase.	Potential impacts are considered reversible in the short to medium term through the implementation of appropriate treatment, clean-up, and rehabilitation measures.	Medium	Low
		Score	Local	Short	Low	Likely	Short/Mid-term		
		Value	2	2	2	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		18					3	54

Table 7-24. Impact Significances during the Operation Phase-Water and Wastewater Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Water Quality Degradation	Negative Direct	Definition	Potential water quality degradation during the operational phase is expected to be local, primarily affecting surface water in the immediate vicinity of the Project.	Water quality impacts may occur over a short-term period and are dependent on the nature, volume, and persistence of potential pollutants released during operational activities.	The severity of potential water quality impacts is assessed as low; however, in the absence of proper operational controls, contaminant concentrations may temporarily exceed applicable legislative limit values.	In cases of improper handling, storage, transport, or disposal of wastes and hazardous materials during operation, accidental releases are considered likely.	Potential impacts on water quality are considered reversible in the short to medium term through the application of appropriate treatment, clean-up, and rehabilitation measures.	Medium	Low
		Score	Local	Short	Low	Likely	Short/Mid-term		
		Value	2	2	2	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		18					3	54

7.4.3 Mitigation Measures

To prevent adverse impacts on surface water and groundwater resources during both the construction and operation phases, the Project will implement a comprehensive set of mitigation measures in line with applicable national legislation and international good practice, including the IFC General EHS Guidelines. Waste and wastewater management practices will be designed to ensure that no untreated wastewater is discharged to the environment at any stage of the Project lifecycle.

The following measures will apply throughout the Project lifecycle:

- All incidents and spills will be reported, recorded, and investigated, with corrective and preventive actions implemented.
- Spill response procedures will ensure rapid containment and clean-up, and contaminated materials will be managed through licensed disposal routes.
- Wastewater will not be discharged to soil or water bodies without appropriate treatment and compliance with applicable standards.
- All liquid wastes and hazardous materials will be stored in appropriate containment systems with impermeable flooring and secondary containment until final disposal.

During the construction phase, potable water will be supplied from licensed external providers (e.g., bottled water or tanker supply), and no groundwater abstraction is planned. Construction activities will be managed to minimize the risk of water contamination through proper site planning and control measures.

Key measures will include:

- Establishment of designated areas for the storage of construction materials, fuels, and wastes to prevent uncontrolled releases.
- Installation of drainage control systems (e.g., bunds, interception channels, and sediment traps) to manage site runoff and prevent sediment or contaminants from reaching surrounding environments.
- Storage of hazardous materials in dedicated areas with secondary containment and impermeable surfaces.
- Restriction of refuelling and maintenance activities to designated areas located away from drainage pathways and sensitive receptors.
- Provision of spill kits in relevant areas and immediate containment and clean-up of any accidental spills, with contaminated materials disposed of at licensed facilities.

In addition, the following good practice measures will be implemented:

- Personnel handling hazardous materials will receive training on safe handling, spill prevention, and emergency response.
- Regular site inspections and environmental monitoring will be carried out to ensure compliance and identify potential risks.
- Hazardous materials will not be stored within excavated areas, and all such activities will be conducted under controlled conditions.

Wastewater generated from workforce facilities will be collected and treated using temporary or permanent sanitation systems, ensuring compliance with applicable discharge standards.

During operation, water and wastewater management will be integrated into the Project's Environmental and Social Management System (ESMS). The Project will incorporate permanent infrastructure to ensure effective and compliant handling of wastewater and potential contaminants.

Key operational measures include:

- Management of domestic and commercial wastewater in accordance with applicable IFC General EHS Guidelines prior to discharge or reuse.
- Implementation of a wastewater monitoring program to verify compliance with national regulations and international guidelines.
- Installation of oil-water separators in parking areas, maintenance zones, and service areas to prevent hydrocarbon contamination.
- Application of preventive maintenance and inspection programs for all water and wastewater infrastructure to ensure system integrity and performance.

Hazardous materials management during operation will follow a risk-based approach, including:

- Storage of fuels and chemicals in impermeable, bunded areas with appropriate containment capacity.
- Regular inspection and integrity testing of storage tanks and pipelines, supported by leak detection systems where necessary.
- Maintenance of minimum on-site inventories of hazardous materials to reduce spill risks.

7.4.4 Residual Impacts

The assessment of the magnitudes and significances of the residual impacts after mitigation measures are shown in Table 7-25 and Table 7-26 for construction and operation phases, respectively.

Table 7-25. Construction Phase Residual Impact Significances-Water and Wastewater Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Water Quality Degradation	Negative Direct	Definition	Residual water quality impacts are expected to be local after the implementation of mitigation measures.	Any residual impacts on water quality are expected to be short term and limited to isolated construction activities.	The severity of residual water quality impacts is assessed as negligible, as mitigation measures are expected to prevent contaminant concentrations from exceeding applicable legislative limit values.	Residual water quality impacts are considered unlikely due to the application of appropriate wastewater management, spill prevention, and monitoring measures.	Any minor residual impacts are expected to be fully reversible in the short term through routine treatment and clean-up actions.	Medium	Negligible
		Score	Local	Short	Negligible	Unlikely	Short-term		
		Value	2	2	1	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		6					3	18

Table 7-26. Operation Phase Residual Impact Significances-Water and Wastewater Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Water Quality Degradation	Negative Direct	Definition	Residual impacts during the operational phase are expected local after the implementation of mitigation measures.	Any residual impacts on water quality are expected to be short term and associated with isolated operational incidents.	The severity of residual impacts is assessed as negligible, as treated effluents and operational controls are expected to ensure compliance with applicable discharge standards.	The residual impacts are considered unlikely due to robust operational procedures, monitoring, and emergency response measures.	Any minor residual impacts are expected to be fully reversible in the short term through prompt corrective and treatment actions.	Medium	Negligible
		Score	Local	Short	Negligible	Unlikely	Short-term		
		Value	2	2	1	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		6					3	18

7.5 Waste Management

7.5.1 Introduction

This section describes the types of waste expected to be generated during the construction and operation phases of the Project and evaluates the potential impacts associated with their generation.

A range of waste streams will arise throughout the Project lifecycle. Inadequate handling, storage, transportation, or disposal of these wastes may result in the degradation of soil and water quality. To prevent adverse effects on the physical and biological environment, as well as on community health and safety, waste management practices will be implemented in compliance with applicable national regulations and relevant IFC Guidelines.

Potential waste disposal sites/facilities, that can be used in both construction and the operation phases of the project, are provided in Table 7-27, below.

Table 7-27. Waste Disposal/Recycle Facilities that to be used in the Lifetime of the Project

Facility Name	City	Location	Type	Capacity
Asia Al-Taqa Al-Mutajadida MBT Plant	Sulaymaniyah	Tanjaro area, ~5 km south of Sulaymaniyah City, Kurdistan Region, Iraq	Mechanical-Biological Treatment (MBT) + Refuse Derived Fuel (RDF) + sanitary landfill	400,000 t/year (~1,100 t/day) MSW treatment capacity
Bazian & Gasin Cement Plants (RDF users)	Sulaymaniyah	Tanjaro, ~5 km south of Sulaymaniyah City, Kurdistan Region, Iraq	Industrial co-processing	Not publicly disclosed
Harem Company Waste System	Sulaymaniyah	Chwar Chra Industrial Zone 1, Sulaymaniyah, Iraq	Collection & transport system	Approximately 390 t/day collection and transport capacity
Tanjaro Dumpsite/Landfill	Sulaymaniyah	Tanjaro, ~5 km south of Sulaymaniyah City, Kurdistan Region, Iraq	Anaerobic landfill / dumping	No publicly available landfill design capacity
Kani Qirzhala Landfill	Erbil	Kani Qirzhala Sub-district, Erbil–Mosul Road, ~15 km west of Erbil city centre, Erbil Governorate, Iraq	Sanitary / semi-engineered landfill	60,000 t/month (~2,000 t/day) disposed at the site
Planned Recycling Facility (Municipality project)	Erbil	Erbil Municipality area (exact site not finalized; planning stage)	Material recovery facility (planned)	Capacity not yet publicly disclosed

7.5.2 Impact Analysis

7.5.2.1 Construction Phase

The types of wastes that will be generated during the construction phase are domestic wastes, excavation wastes, hazardous wastes and non-hazardous wastes.

Domestic Wastes: In an article published on December 2022, it was stated that municipal waste production rate in Sulaymaniyah City is 1.2 kg/person/day². Worker number during the construction period varies between 890 and 960 between phases, as provided in Table 7-21, the total municipal waste amount is calculated as follows:

$$\begin{aligned} \text{Total Domestic Waste Generation Phase 01} &= 1.2 \text{ kg/capita.day} \times 890 \text{ people} \\ &= 1,068 \text{ kg/day} \end{aligned}$$

$$\begin{aligned} \text{Total Domestic Waste Generation Phase 02} \\ &= 1.2 \text{ kg/capita.day} \times 960 \text{ people} = 1,152 \text{ kg/day} \end{aligned}$$

Domestic waste generation during the construction phases will be 1,068 and 1,152 kg/day in two phases. The generated domestic wastes will be left in closed garbage bins or durable garbage bags, then will be stored in the garbage containers in order to be collected by the municipality.

Excavation Wastes: The total volume of excavation to be generated during the construction phase is estimated at approximately 1,000,000 m³. These materials will primarily consist of soil, rock, and other inert geological materials arising from site preparation, foundation works, and infrastructure development activities. Excavated materials will be reused on-site for backfilling, grading, and landscaping purposes in order to minimize the volume of waste requiring off-site disposal. Any surplus material that cannot be beneficially reused will be transported to a designated and approved disposal area located within a radius of approximately 22.6 km from the Project site.

Hazardous Wastes: Several type of hazardous wastes will be produced during the construction of the Project. These hazardous wastes can be listed as, but not limited to, following:

- Chemical and Liquid Wastes (i.e. paints, varnishes, adhesives, sealants and solvents)
- Fuels and Oils
- Batteries and Electrical Components
- Waste filters, grease cartridges and coolant fluids.
- Contaminates Packaging Waste
- Welding and Metal Treatment Residues
- Fluorescent Lamps and Lighting Equipment
- Electrical Wastes

All hazardous wastes will be segregated at source and collected separately in designated, clearly labelled containers according to their waste characteristics and compatibility.

² Hamza, A.A., & Mizzouri, N.S., & Aziz, S.Q., & Hawez, D.M., & Manguri, S.B.H, & Ahmed, K.O., & Ali, S.M. (2022). GIS Visualization of Solid Waste Disposal Sites and Environmental Impacts in Kurdistan Region-Iraq. Eurasian Journal of Science and Engineering, 8(3), 169-187.

Incompatible waste streams (e.g. acids and alkalis, oxidising agents and flammable materials) will be stored separately to prevent adverse chemical reactions and environmental risks.

Hazardous wastes will be stored in a dedicated hazardous waste storage area constructed on an impermeable concrete surface and equipped with secondary containment and appropriate drainage collection systems. Storage areas will be protected from weather conditions and unauthorized access. Hazardous wastes will not be stored on-site beyond the maximum storage periods specified in the applicable national legislation and facility permit requirements, and will be transferred regularly to licensed recycling, recovery, or disposal facilities.

A waste tracking system will be implemented to record waste generation, storage, transfer, and final treatment or disposal. Waste inventory records, transfer notes, and disposal certificates will be maintained to ensure traceability and compliance with applicable regulatory requirements.

Non-Hazardous Wastes: Metal and wood scrap materials will be produced during the construction phase of the Project. All non-hazardous waste materials will be segregated at source to the extent practicable, with clearly designated and labelled collection points established across the construction site. Temporary storage areas will be organized to prevent cross-contamination with hazardous wastes and to facilitate efficient handling, collection, and transportation. Recyclable materials such as metals, plastics, paper, and certain types of wood will be prioritized for recovery and sent to licensed recycling facilities, thereby reducing the overall volume of waste requiring final disposal.

Impacts regarding the waste generation for the construction phase are summarized in Table 7-28.

7.5.2.2 Operation Phase

For the operation phase of the Project, waste types, estimated waste volumes and potential disposal methods and locations are assessed in this section. The waste categories that will be generated during the operation phase include domestic (municipal) wastes, non-hazardous wastes and hazardous wastes.

Domestic Wastes: In an article published on December 2022, it was stated that municipal waste production rate in Sulaymaniyah City is 1.2 kg/person/day³. Using the estimated population values for the project as provided in Table 7-22, domestic waste generation amounts are calculated as following.

Domestic Waste Generation Amount for Low Estimate

$$= 1.2 \text{ kg/capita.day} \times 12,800 \text{ people} = 15,360 \text{ kg/day}$$

Domestic Waste Generation Amount for High Estimate

$$= 1.2 \text{ kg/capita.day} \times 17,100 \text{ people} = 20,520 \text{ kg/day}$$

³ Hamza, A.A., & Mizzouri, N.S., & Aziz, S.Q., & Hawez, D.M., & Manguri, S.B.H, & Ahmed, K.O., & Ali, S.M. (2022). GIS Visualization of Solid Waste Disposal Sites and Environmental Impacts in Kurdistan Region-Iraq. Eurasian Journal of Science and Engineering, 8(3), 169-187.

Domestic waste generation during the construction phase will be variable between 15,360 and 20,520 kg/day. It should be noted that numbers will be revised when more accurate calculations are provided. Domestic wastes will be left in closed garbage bins or durable garbage bags, then will be stored in the garbage containers in order to be collected by the municipality.

Hazardous Wastes: Hazardous waste types which are expected to be generated in the operation phase are listed below:

- Waste oils, lubricants, hydraulic fluids, grease, used filters, and contaminated rags from HVAC systems, generators, elevators, and other mechanical equipment
- Cleaning and disinfection activities across residential units, hotel rooms, mall areas, and offices (i.e. detergents, solvents, and disinfectants)
- Leftover paints, thinners, varnishes, and adhesives, as well as contaminated brushes, rollers, and containers generated from periodic repair, repainting works
- Waste batteries from UPS units, emergency lighting, generators
- Waste electrical and electronical equipment from offices, retail units and hotel operations
- Fluorescent lamps and lighting equipment
- Contaminated packages of hazardous materials

All hazardous wastes will be segregated at source and collected separately in designated, clearly labelled containers according to their waste characteristics and compatibility. Incompatible waste streams (e.g. acids and alkalis, oxidising agents and flammable materials) will be stored separately to prevent adverse chemical reactions and environmental risks.

Hazardous wastes will be stored in a dedicated hazardous waste storage area constructed on an impermeable concrete surface and equipped with secondary containment and appropriate drainage collection systems. Storage areas will be protected from weather conditions and unauthorized access. Hazardous wastes will not be stored on-site beyond the maximum storage periods specified in the applicable national legislation and facility permit requirements, and will be transferred regularly to licensed recycling, recovery, or disposal facilities.

A waste tracking system will be implemented to record waste generation, storage, transfer, and final treatment or disposal. Waste inventory records, transfer notes, and disposal certificates will be maintained to ensure traceability and compliance with applicable regulatory requirements.

Non-Hazardous Wastes: Recyclable and other non-hazardous waste streams—particularly packaging waste—are expected to be generated in significant quantities throughout the operation phase of the Project due to residential use, retail activities, hotel operations, office functions, and events held at the performance hall. These wastes will mainly include paper and cardboard, plastics, glass and metals.

To ensure effective management, non-hazardous waste materials will be segregated at source using clearly labelled and color-coded collection bins placed across the Project areas, including residential zones, commercial units, back-of-house service areas, and public spaces. Dedicated waste storage areas will be established within the Project site to allow for the safe

and organized temporary storage of different waste streams, preventing cross-contamination and facilitating efficient collection.

Recyclable materials such as paper, cardboard, plastics, glass, and metals will be separately collected and transferred to licensed recycling facilities to promote resource recovery and reduce the volume of waste sent to landfill. Organic waste generated from food courts, restaurants, and hotel kitchens may also be separately collected and managed through composting or other appropriate treatment methods.

Record keeping will be maintained for different types of waste quantities and the third-party facilities where handling and recycling/disposal of the waste is undertaken.

Impacts regarding the waste generation for the operation phase are summarized in Table 7-29.

7.5.2.3 Impact Summary

Table 7-28. Impact Significances during the Construction Phase-Waste Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Waste generation and inadequate waste management	Negative Direct	Definition	Impacts associated with waste generation and inadequate waste management are expected to be local.	The duration of waste-related impacts is expected to be short term and limited to the construction phase.	The severity of impacts is assessed as medium, as improper handling, storage, or disposal of construction wastes may result in tangible adverse effects.	Waste generation and related management activities are expected to occur frequently during construction, resulting in a high number of events.	Potential impacts are considered reversible in the medium term through the implementation of appropriate waste management practices, collection, and disposal measures.	Medium	Medium
		Score	Local	Short	Medium	Frequent	Mid-term		
		Value	2	2	3	4	3		
	Impact Magnitude (G+D+I+F (or L)) x R		33						3

Table 7-29. Impact Significances during the Operation Phase-Waste Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Reversibility (R)		
Waste generation and inadequate waste management	Negative Direct	Definition	Impacts associated with waste generation and inadequate waste management during the operational phase are expected to be local.	The duration of waste-related impacts is expected to be short term, associated with routine operational activities and periodic waste handling.	The severity of impacts is assessed as medium, as improper handling, storage, or disposal of operational wastes may result in tangible adverse effects on receptors.	Waste generation and related management activities are expected to occur frequently during the operational phase, resulting in a high number of events distributed over time.	Potential impacts are considered reversible in the medium term through the implementation of appropriate waste management procedures, segregation, collection, and disposal practices.	Medium	Medium
		Score	Local	Short	Medium	Frequent	Mid-term		
		Value	2	2	3	4	3		
	Impact Magnitude (G+D+I+F (or L)) x R		33						3

7.5.3 Mitigation Measures

The following mitigation measures will be implemented for waste management during both the construction and operation phases of the Project.

- Before the construction activities, Project owner/contractor will prepare a site-specific Waste Management Plan (WMP) for the construction phase in line with the provisions IFC General EHS Guidelines. Later on, this plan should be adapted for the operation phase of the Project. All wastes during the construction and operation phases will be managed in line with this WMP and the regulatory framework.
- Personnel will be assigned for waste handling, and only authorized personnel will be allowed to enter the temporary storage area.
- A temporary waste storage area will be established and maintained within the Project area for both construction and operation phases.
- Hazardous or non-hazardous inscription, waste code, stored waste amount and storage date will be indicated/labelled on wastes temporary stored at the Project area. Hazardous waste will be stored provided impermeable base, drainage, top cover, secondary containment at the designated temporary storage area.
- Incineration, burying of wastes or dumping of wastes to nearby roads or water resources will be prohibited.
- Whenever possible, priority shall be given to minimise the waste generation by the application of recovery and re-use as much as possible.
- Record keeping on waste generation, storage, and transportation to third-party waste management facilities will be maintained.
- Waste transport, recycling and disposal will be carried out by licensed companies.
- Domestic waste will be stored in closed containers or tear resilient bags to prevent leakage and odour and will be disposed by the Governorate/Municipality.
- A Spill Prevention and Response Plan will be developed and implemented.
- Spill kits and PPEs will be available for emergency response.
- Maintenance and repair of vehicles will be conducted at authorised service.

Key performance indicators (KPIs) as given in the *Annex A - Environmental and Social Management Plan (ESMP)* are provided in the Table 7-30 below for monitoring purposes.

Table 7-30. Waste Management KPIs

KPI	Target
Waste Generation	Minimization of total waste generated Minimization of the ratio of hazardous waste generated to total waste
Waste Disposal	Increase in the ratio of recovered/reused/recycled waste to total waste generated

7.5.4 Residual Impacts

With the fully implementation of above-mentioned mitigation measures and Project specific waste management plan, the magnitudes and significances of the residual impacts can be estimated to be minor for both the construction and operation phases of the project. Residual significances of the impacts are given in Table 7-31 and Table 7-32 for construction and operation phase, respectively.

Table 7-31. Construction Phase Residual Impact Significance-Waste Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency(F)	Reversibility (R)		
Waste generation and inadequate waste management	Negative Direct	Definition	Residual impacts associated with waste generation, and management are expected to be limited to the project site and its immediate surroundings.	Following the implementation of mitigation measures, any residual waste-related impacts are expected to be short term and not persist beyond the active construction period.	The severity of residual impacts is assessed as low, as remaining effects are unlikely to result in tangible or measurable changes to environmental conditions.	Residual waste-related events are expected to occur infrequently, with a limited number of events evenly distributed over the construction phase.	Any minor residual impacts are considered fully reversible in the short term through routine waste management, collection, and corrective actions.	Medium	Negligible
		Score	Local	Short	Low	Infrequent	Short-term		
		Value	2	2	2	2	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8						3

Table 7-32. Operation Phase Residual Impact Significance-Waste Management

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency(F)	Reversibility (R)		
Waste generation and inadequate waste management	Negative Direct	Definition	Residual impacts associated with waste generation and management during the operational phase are expected to be local, limited to the project site and its immediate surroundings.	Following the implementation of mitigation and management measures, any residual waste-related impacts are expected to be short term and not persistent over time.	The severity of residual impacts is assessed as low, as remaining effects are unlikely to result in tangible or measurable adverse changes to environmental conditions.	Residual waste-related events are expected to occur infrequently, with a limited number of events evenly distributed over the operational period.	Any minor residual impacts are considered fully reversible in the short term through routine operational controls, waste segregation, collection, and corrective actions.	Medium	Negligible
		Score	Local	Short	Low	Infrequent	Short-term		
		Value	2	2	2	2	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8					3	24

7.6 Biodiversity

7.6.1 Introduction

Based on the baseline conditions, the Project Area is located within a highly modified and urbanized environment, where ecological characteristics have been substantially altered due to long-term anthropogenic activities. Vegetation is sparse and primarily composed of ruderal and disturbance-tolerant species, while habitat diversity is limited.

The ecological conditions within the Project Area are characterized by low structural and compositional diversity, and do not support a high abundance or diversity of fauna. The faunal assemblage is dominated by small mammals, generalist bird species, and reptiles adapted to disturbed and urban environments. Most species are tolerant of habitat fragmentation and human disturbance.

The majority of species potentially present in the area are associated with modified habitats and are not dependent on specific habitat features. Due to the absence of natural or semi-natural habitats, the Project Area does not provide suitable conditions for sensitive, specialist, or water-dependent species.

Overall, the ecological baseline reflects a low-sensitivity environment, with limited habitat functionality and low biodiversity value. Consequently, biodiversity-related impacts associated with the Project are expected to be low in magnitude, localized, and reversible, particularly with the implementation of standard mitigation measures.

7.6.2 Impact Analysis

7.6.2.1 Construction Phase

During the construction phase, both direct and indirect impacts on biodiversity may occur. Direct impacts primarily relate to limited vegetation clearance and minor habitat disturbance within the Project footprint, while indirect impacts are associated with construction-related activities such as noise, dust, and increased human presence.

The Project will be developed within a highly modified and urbanized environment, where habitats are already degraded and dominated by ruderal and disturbance-tolerant species. Therefore, vegetation removal is expected to result in minor and localized impacts, with no significant loss of biodiversity or ecological function. No natural or semi-natural habitats will be affected.

Construction activities, including site preparation, excavation, and movement of machinery, may temporarily affect the condition and growth of remaining vegetation. Dust emissions may also impact nearby plant species; however, these effects are expected to be short-term and reversible, with vegetation likely to recover following completion of construction.

Faunal impacts are expected to be limited due to the low ecological value of the site and the presence of predominantly generalist and disturbance-tolerant species. Potential impacts include temporary disturbance, displacement, and a low risk of mortality for less mobile species due to vehicle movement. However, given the urban setting and availability of alternative habitats in the surrounding area, these impacts are expected to be minor and localized.

Noise, vibration, lighting, and human activity during construction may cause temporary disturbance to fauna, including birds and small mammals. These impacts are expected to be short-term, reversible, and limited to the immediate vicinity of the Project Area.

There is a potential risk of introduction or spread of invasive alien species during construction through the movement of vehicles, equipment, and materials. However, considering that the Project Area is already highly disturbed and dominated by ruderal species, the ecological consequence of such introduction is expected to be low, provided that standard site management practices are implemented.

- Habitat loss due to the removal of topsoil and the clearing of vegetation at construction sites, and habitat fragmentation
- Loss or damage of flora species
- Loss of fauna species
- Disturbance to flora species due to dust emissions
- Disturbance and displacement of resident fauna due to noise, visual nuisance and vibration
- Spreading of invasive alien species

The following plant species are commonly used in landscaping practices; however, they are recognized as invasive or potentially invasive in semi-arid and urban environments. Their introduction may lead to uncontrolled spread, competition with native vegetation, and alteration of local ecological conditions. Therefore, the use of these species within the Project Area is not recommended.

Table 7-33. Impact Significances for the Construction Phase

Scientific Name	Common Name	Reason for Restriction
<i>Acacia saligna</i>	Golden wreath wattle	Highly invasive; rapidly spreads and outcompetes native vegetation, especially in semi-arid environments
<i>Leucaena leucocephala</i>	White leadtree	Aggressive invasive species; forms dense stands and suppresses local flora
<i>Robinia pseudoacacia</i>	Black locust	Spreads via root suckers; alters soil chemistry and displaces native species
<i>Ailanthus altissima</i>	Tree of heaven	Extremely invasive; fast-growing, produces allelopathic compounds that inhibit other plants
<i>Melia azedarach</i>	Chinaberry	Moderately invasive; spreads via seeds and may establish outside planted areas if unmanaged
<i>Albizia julibrissin</i>	Silk tree	Potentially invasive; spreads in disturbed areas and may compete with native species

7.6.2.2 Operation Phase

During the operational phase, potential impacts on biodiversity are expected to be limited and primarily related to ongoing human activity, lighting, noise, and site maintenance practices.

Given that the Project Area is located within a highly modified and urbanized environment, and supports predominantly widespread and disturbance-tolerant species, operational impacts on biodiversity are expected to be minimal. The site does not provide important habitats for birds, bats, or other fauna species, and no collision risks associated with infrastructure (e.g. turbines or overhead lines) are anticipated.

Potential operational impacts may include minor disturbance to fauna due to artificial lighting, noise, and human presence. These impacts are expected to be localized, low in magnitude, and not significant, as species present in the area are generally adapted to urban conditions.

Routine maintenance activities and site operations may result in minor habitat disturbance; however, given the already degraded nature of the site, these impacts are considered negligible. The Project Area is not expected to function as an important feeding, breeding, or roosting habitat during operation.

Good practice measures, including proper waste management, control of human activities, and avoidance of unnecessary disturbance, will further minimize potential impacts on biodiversity. Following the completion of construction, it is expected that the site will continue to be utilized only opportunistically by generalist species.

7.6.2.3 Impact Summary

Table 7-34. Impact Significances for the Construction Phase

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Habitat loss due to the removal of topsoil and the clearing of vegetation at construction sites, and habitat fragmentation	Negative Direct and Indirect	Potential impact on vegetation will be directly and indirectly related to the construction activities. The direct impact is immediate destruction or damage of vegetation in the course of construction. The indirect impact is a change in the plant communities' growth conditions induced by the construction activities. The greatest impacts on habitats in the Project area will include: • loss of plant resources. • inhibition of plant growth due to emissions of dust from construction activities and harmful substances;	Habitat loss and fragmentation will be in the project site and its impact will be local	The construction phase spans approximately 5 years.	Impacts related to Habitat Loss and fragmentation are well within legal standards or accepted practices and/or are unlikely to cause tangible changes	Habitat loss and fragmentation will occur due to the construction works to be carried out.	Impacts related to Habitat Loss and fragmentation are expected to be reversible in the medium term.	The project area and its surroundings consist of modified habitats.	Low
		Score	Project Site	Long	Low	Likely	Mid-term	Low	
		Value	1	4	2	3	3	1	
	Impact Magnitude (G+D+I+F (or L)) x R		30					1	30
Loss or damage of flora species	Negative Direct	Vegetation clearing during the construction phase may result in the destruction of floral species of conservation concern.	Impacts on plant species will be local	The construction phase spans approximately 5 years.	The impact on plant species is within legal standards or accepted practices and/or are likely to cause tangible changes	Loss of plant species will occur due to the construction works to be carried out.	Impacts related to plant species are expected to be reversible in the short to medium term.	No endemic or IUCN-listed threatened flora species were detected in the study area. All recorded species are considered	Low

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
								tolerant of, or adapted to, anthropogenic pressures.	
		Score	Local	Long	Medium	Probable	Short/mid-term	Low	
		Value	2	4	3	5	2	1	
	Impact Magnitude (G+D+I+F (or L)) x R		28					1	28
Loss of fauna species	Negative Direct	Small and less mobile species can become trapped, injured and killed during vegetation clearing and earth works. Fauna of particular concern in this context include: - Fossorial mammals; - Nesting birds (ground and tree nesting); and - Reptiles and amphibians. Other common causes of fauna injury, death or disturbance during the construction include: - Vehicle-fauna collisions. - Hunting, trapping and poisoning of fauna by construction workers and contractors; and - Fauna trapped/caught in infrastructure, such as fences and excavations.	Impacts on fauna species will be in the project site and its surroundings	The construction phase spans approximately 5 years.	The impact on fauna species is within legal standards or accepted practices and is likely to result in tangible changes	Loss of fauna species likely to occur due to the construction works to be carried out.	Impacts related to fauna species are expected to be reversible in the short to medium term.	No endemic fauna species identified in the project area.	Low
		Score	Local	Long	Medium	Likely	Mid-term	Low	
		Value	2	4	3	3	3	1	
	Impact Magnitude (G+D+I+F (or L)) x R		36					1	36
Disturbance and displacement of resident	Negative Indirect	The disturbance and displacement of resident fauna species within the footprint will primarily be	Impacts related to noise, visual nuisance and vibration will be	The construction phase spans approximately 5 years.	Impacts related to noise, visual nuisance and vibration is	Impacts related to noise, visual nuisance and vibration likely to	Potential impacts related to noise, visual nuisance and	No endemic fauna species identified in	Negligible

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
fauna due to noise, visual nuisance and vibration		caused by light, noise and vibration impacts during construction. Noise, light and vibration disturbances have the potential to influence breeding, roosting or foraging behaviour of fauna. During the construction phase temporary impacts from the Project are expected. Noise will be the primary disturbance of this nature due to vegetation clearing, excavation, movement of materials and general construction activities. These activities will introduce noise sources to areas not currently exposed to these disturbances. In addition, there may be vibration associated with activities and the movement of any vehicles/machinery.	in the project site and its surroundings		within legal standards or accepted practices and is likely to result in tangible changes	occur due to the construction works to be carried out.	vibration are expected to be reversible in the short term.	the project area.	
		Score	Local	Long	Medium	Likely	Short-term	Low	
		Value	2	4	3	3	1	1	
		Impact Magnitude (G+D+I+F (or L)) x R	12					1	
Impacts on flora due to dust emission	Negative Indirect	Land preparation has the potential to generate dust which may settle on vegetation adjacent to the construction area. Excessive dust deposition on flora may act to suppress growth through limiting photosynthesis and the dusted foliage may also become unpalatable to foraging fauna.	Impacts related to dust emission will be in the project site and its surroundings	The construction phase spans approximately 5 years.	Impacts related to dust emission can be detected or perceived but the effects are unlikely to cause tangible changes	Impacts related to dust emission likely to occur due to the construction works to be carried out.	Potential impacts related to flora species are expected to be reversible in the short term.	No endemic or IUCN-listed threatened flora species were detected in the study area. All recorded species are considered tolerant of, or adapted to,	Negligible

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
								anthropogenic pressures.	
		Score	Local	Long	Low	Likely	Short-term	Low	
		Value	2	4	2	3	1	1	
	Impact Magnitude (G+D+I+F (or L)) x R		11					1	11
Spreading of Alien invasive species	Negative Direct	Clearance of vegetation and disturbances caused by earthworks can create conditions conducive to the establishment and rapid spread of alien invasive vegetation. If left uncontrolled, alien species can spread exponentially, suppressing or replacing native vegetation. This may lead to disruption of ecosystem functioning and loss of biodiversity. Alien invasive plants can potentially be established in all areas where construction activities will disrupt existing vegetation.	Spreading of Alien invasive species will be in the project site and its surroundings	The construction phase spans approximately 5 years.	Impacts related to Spreading of Alien invasive species may result in exceedances of legal standards or accepted practices and/or is likely to cause very serious to catastrophic damage to environmental	It is possible that invasive alien species may spread due to construction works. In the project area, species such as <i>Xanthium strumarium</i> , an invasive species, are especially common in disturbed urban and open soil areas.	In addition to the natural processes, with proper restoration potential impacts during construction is expected to be reversible in the medium term.	The project area and its surroundings consist of modified habitats.	Low
		Score	Local	Long	Very High	Likely	Mid-term	Low	
		Value	2	4	5	3	3	1	
	Impact Magnitude (G+D+I+F (or L)) x R		42					1	42

Table 7-35. Impact Significances for the Operation Phase

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Habitat Alteration	Negative Direct	Alteration of habitat due to the area covered by the Project	Habitat Alteration will be in the project site, and its impact will be in the project site	The impact will continue throughout the life of the project, so the impact will be long-lasting.	Impacts related to Habitat Alteration is within legal standards or accepted practices and is likely to result in tangible changes	Habitat Alteration will occur during the operational phase.	In addition to the natural processes, with proper restoration potential impacts is expected to be irreversible	The project area and its surroundings consist of modified habitats.	Low
		Score	Project Site	Very Long	Medium	Probable	Irreversible	Low	
		Value	1	5	3	5	5	1	
	Impact Magnitude (G+D+I+F (or L)) x R		70					1	70
Disturbance to fauna due to noise and lighting, and attraction of opportunistic fauna due to waste presence	Negative Indirect	Operational activities may result in minor disturbance to fauna due to noise and lighting and may create limited attraction for opportunistic fauna if waste is not properly managed.	Limited to Project Site and immediate surroundings	The operational period will continue throughout lifespan of the project. During this period, Impacts may occur.	Impacts are within legal standards or accepted practices and is likely to result in tangible changes	Impacts likely to occur due to the operational activities to be carried out.	Impacts are expected to be reversible in the short term.	No endemic or IUCN-listed threatened flora species were detected in the study area. All recorded species are considered tolerant of, or adapted to, anthropogenic pressures.	Negligible
		Score	Local	Very Long	Medium	Likely	Short-term	Low	
		Value	2	5	3	3	1	1	
	Impact Magnitude (G+D+I+F (or L)) x R		13					1	13

7.6.3 Mitigation Measures

7.6.3.1 Construction Phase

The mitigation measures to be considered during the construction phase of the Project include the following:

- The disturbance footprint will be clearly demarcated, and vegetation clearance will be strictly limited to the Project footprint and necessary working areas.
- All construction activities will be confined to designated areas to prevent unnecessary disturbance to surrounding urban environments.
- Existing access roads will be used wherever possible to avoid additional land disturbance.
- Vehicle movement will be restricted to designated routes, and speed limits (e.g. 20 km/h) will be enforced to minimize the risk of fauna mortality.
- Open trenches and excavations will be minimized in duration; where necessary, escape routes (e.g. soil ramps) will be provided for small fauna.
- Construction personnel will receive environmental awareness training, including instructions not to harm or collect wildlife.
- If fauna species are encountered, they will be allowed to move away naturally or relocated safely by qualified personnel if necessary.
- Night-time activities will be minimized where possible; if lighting is required, it will be directional and low-intensity to reduce disturbance.
- Dust generation will be controlled through standard measures (e.g. water spraying), and noise impacts will be managed in line with relevant standards.
- Waste will be properly managed and stored in designated areas to avoid attracting fauna or creating pollution.
- Feeding of wildlife and presence of stray animals will be controlled through proper waste management practices.
- Good housekeeping practices will be implemented to prevent accidental spills of fuels and chemicals; any contaminated areas will be promptly remediated.
- Construction vehicles and machinery will be kept clean, and movement of soil and materials will be controlled to prevent the unintentional spread of invasive species.
- Topsoil will be properly stored and managed, and will not be placed near existing invasive plant patches (e.g. *Xanthium strumarium*) to prevent further spread.
- Only certified, non-invasive and locally appropriate species will be used for any landscaping or rehabilitation activities.
- Disturbed areas will be stabilized and revegetated where necessary, and the site will be periodically inspected to control any invasive species through basic measures (e.g. manual removal).

7.6.3.2 Operation Phase

- All open areas within the Project Site will be landscaped and regularly maintained using non-invasive and locally appropriate plant species. The use of plant species with known invasive potential that are commonly introduced through landscaping (e.g. *Acacia saligna*, *Leucaena leucocephala*, *Robinia pseudoacacia*, *Ailanthus altissima*, *Melia azedarach*, *Albizia julibrissin*) will be avoided. Existing invasive species already present on-site (e.g. *Xanthium strumarium*) will be managed through regular maintenance to prevent further spread.
- Waste generated from residential and commercial uses will be properly collected, stored, and regularly removed, ensuring that no conditions are created that could attract fauna or support pest species.
- Lighting within the complex will be carefully designed and managed, using low-intensity and directional fixtures to minimize unnecessary light spill and ecological disturbance.
- Hazardous materials (e.g. cleaning agents, maintenance chemicals) will be stored and handled appropriately, and any accidental spills will be promptly controlled and cleaned.
- General site management and maintenance practices will ensure that the Project Area remains highly controlled and managed, limiting the potential for wildlife presence and preventing the establishment of unmanaged habitats.

7.6.4 Residual Impacts

Summaries of the residual impact significance on biodiversity with the implementation of mitigation measures identified in other relevant sections of the ESIA report are given in Table 7-36 and Table 7-37 for construction and operation phase, respectively.

Table 7-36. Residual Impact Significances for Construction Phase

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Habitat loss and habitat fragmentation	Negative Direct and Indirect	Score	Project Site	Long	Low	Unlikely	Short/Mid-term	Low	Negligible
		Value	1	4	2	1	2	1	
		Impact Magnitude (G+D+I+F (or L)) x R	18					1	18
Loss or damage of flora species	Negative Direct	Score	Local	Long	Low	Unlikely	Short/mid-term	Low	Negligible
		Value	2	4	2	1	2	1	
		Impact Magnitude (G+D+I+F (or L)) x R	18					1	18
Loss of fauna species	Negative Direct	Score	Local	Long	Low	Unlikely	Short/mid-term	Low	Negligible
		Value	2	4	2	1	2	1	
		Impact Magnitude (G+D+I+F (or L)) x R	18					1	18
Disturbance and displacement of resident fauna	Negative Indirect	Score	Local	Long	Low	Unlikely	Short-term	Low	Negligible
		Value	2	4	2	1	1	1	
		Impact Magnitude (G+D+I+F (or L)) x R	9					1	9
Impacts on flora due to dust emission	Negative Indirect	Score	Local	Long	Negligible	Unlikely	Short-term	Low	Negligible
		Value	2	4	1	1	1	1	
		Impact Magnitude (G+D+I+F (or L)) x R	8					1	8
Spreading of Alien invasive species	Negative Direct	Score	Local	Long	Low	Unlikely	Short/mid-term	Low	Negligible
		Value	2	4	2	1	2	1	
		Impact Magnitude (G+D+I+F (or L)) x R	18					1	18

Table 7-37. Residual Impact Significances for Operation Phase

Potential Impact	Impact Type	Definition	Nature of Impacts (Magnitude designations)					Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
			Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Habitat Alteration	Negative Direct	Score	Project Site	Very Long	Low	Probable	Irreversible	Low	Low
		Value	1	5	1	5	5	1	
	Impact Magnitude (G+D+I+F (or L)) x R		60					1	60
Disturbance to fauna due to noise and lighting, and attraction of opportunistic fauna due to waste presence	Negative Indirect	Score	Local	Very Long	Low	Likely	Short-term	Low	Negligible
		Value	2	5	2	3	1	1	
	Impact Magnitude (G+D+I+F (or L)) x R		12					1	12

7.7 Cultural Heritage

7.7.1 Introduction

This section evaluates the potential impacts of the Downtown Slemani Project on cultural heritage in line with the impact significance criteria outlined in Chapter 5. The assessment is based on a desk-based review of historical and regulatory sources, site inspections, and specialist technical evaluations conducted prior to redevelopment.

7.7.2 Impact Analysis

The assessment confirms that no designated cultural heritage features are present within the Project site. The former grain storage structures were assessed for potential architectural, archaeological, or socio-cultural value; however, no characteristics meeting national heritage designation criteria were identified.

The redevelopment site is not located within a recognized archaeological zone, nor is it associated with registered heritage assets. Therefore, no direct or indirect impact pathways to designated cultural heritage resources have been identified.

Tangible Cultural Heritage

- Disturbance of archaeological sites: No designated archaeological sites are located within the Project area. The former industrial structures did not possess statutory heritage status, and demolition was undertaken following technical feasibility and safety assessments.
- Impact on historical structures: The site did not contain protected buildings or historically significant architectural features. Therefore, no impacts on historical structures have occurred or are anticipated.
- Alteration of landscape context: The site previously comprised a long-derelict industrial facility. Redevelopment does not alter a culturally significant landscape and instead represents regeneration of an underutilized urban area.

Intangible Cultural Heritage

- Erosion of cultural practices: The Project site was not associated with active community cultural practices, rituals, or traditional activities. No displacement of culturally distinct communities has occurred.
- Loss of cultural identity: The site did not function as a cultural landmark nor hold symbolic value linked to community identity. Redevelopment therefore does not weaken community connections to recognized intangible heritage values.

The impacts of the project are analysed in Table 7-38.

Table 7-38. Impact Significances during the Construction Phase – Cultural Heritage

Potential Impact	Impact Type	Nature of Impacts (Magnitude Designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Impacts related to Tangible Cultural Heritage	Negative Direct	Definition	Impacts will be limited to the Project site.	The construction phase spans approximately 5 years.	Any potential impact is estimated to be low in terms of intensity	Given the absence of identified cultural heritage elements within or near the Project site, the occurrence of impacts is considered unlikely.	Any potential impacts, should they occur, would be irreversible.	Low	Low
		Score	Project Site	Long	Low	Unlikely	Irreversible		
		Value	1	4	2	1	5		
	Impact Magnitude (G+D+I+F (or L)) x R		40					1	40
Impacts related to Intangible Cultural Heritage	Negative Direct	Definition	Impacts will be limited to the Project site.	The construction phase spans approximately 5 years.	Any potential impact is estimated to be low in terms of intensity	Given the absence of identified intangible cultural heritage elements within or near the Project site, the occurrence of impacts is considered unlikely.	Any potential impacts, should they occur, would be irreversible.	Low	Low
		Score	Project Site	Long	Low	Unlikely	Irreversible		
		Value	1	4	2	1	5		
	Impact Magnitude (G+D+I+F (or L)) x R		40					1	40

7.7.3 Mitigation Measures

To minimize the adverse impacts on cultural heritage, the following measures are proposed:

Tangible Cultural Heritage

- A formal Chance Find Procedure will be implemented in accordance with Iraq's Law No. 55 of 2002 and IFC PS8 requirements; see *Annex H* for the detailed procedure.
- Provide mandatory induction and refresher trainings to all workers on chance find protocols and cultural heritage awareness.
- Immediately stop work and secure the area if any unexpected archaeological material is encountered during excavation or ground disturbance.
- Notify the relevant cultural heritage authorities and engage qualified archaeologists to assess, document, and recommend appropriate actions for any identified finds.
- Apply risk-based monitoring during deep excavations, with specialist oversight available if necessary.
- Adjust work boundaries or micro-site project components if required to avoid disturbance to any confirmed cultural heritage asset.

Intangible Cultural Heritage

- Engage with local communities to confirm the absence of cultural practices or events that could be affected and maintain open communication channel throughout construction.
- Ensure that community access routes, gathering places, or culturally significant social spaces are not disrupted by construction activities or traffic.
- Conduct stakeholder engagement in a culturally appropriate manner that respects local norms, traditions, and community leader structures.
- Use the Project's grievance mechanism to receive and address any concerns related to cultural or community practices that may arise during construction or operation.

7.7.4 Residual Impacts

Residual significances of the impacts are given in Table 7-39 for construction phase, respectively.

Table 7-39. Residual Impact Significance during the Construction Phase – Cultural Heritage

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
Impact on Tangible Cultural Heritage	Negative Direct	Score	Local	Long	Low	Unlikely	Short-term	Low	Negligible
		Value	2	4	2	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		9					1	9
Impact on Intangible Cultural Heritage	Negative Direct	Score	Local	Long	Low	Unlikely	Short-term	Low	Negligible
		Value	2	4	2	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		9					1	9

7.8 Traffic and Transport

7.8.1 Introduction

This section evaluates the potential traffic and transport impacts associated with the Downtown Slemani Project during both the construction and operational phases.

Given the Project's location within the urban fabric of Sulaymaniyah Governorate, temporary traffic disturbances may occur during construction activities, while operational traffic effects will relate primarily to daily mobility associated with residential, commercial, hospitality and service use. The assessment considers baseline traffic conditions, the Project's access arrangements, and the surrounding road hierarchy, including the Sulaimani–Kirkuk Road and Malik Mahmoud Ring Road corridors.

7.8.2 Impact Analysis

7.8.2.1 Construction Phase

During the construction phase, a temporary increase in traffic volumes is anticipated along the primary access roads connecting the Project site to the wider Sulaymaniyah urban road network. The principal corridors expected to accommodate construction-related traffic include:

- **Temporary Increase in Traffic Volumes:** Construction vehicle movements may increase traffic density along key access corridors, particularly during material delivery periods, potentially resulting in localized congestion and reduced travel efficiency.
- **Short-Term Disruption at Access Points:** Entry and exit movements at the Project access gate may create intermittent slowdowns if not properly managed
- **Road Safety Risks:** Increased interaction between construction vehicles and pedestrians or local traffic, particularly near sensitive receptors such as the Governorate building, Judicial Court, and adjacent residential neighbourhoods may temporarily elevate accident risk.
- **Noise and Nuisance Effects:** Increased vehicle movements may contribute to short-term noise and dust levels along immediate access roads.

7.8.2.2 Operation Phase

During operation, traffic characteristics will shift from construction logistics to urban mixed-use mobility patterns. Vehicular activity will mainly consist of:

Traffic characteristics will shift from construction logistics to urban mixed-use mobility patterns. Vehicular activity will mainly consist of:

- Resident and worker commuting
- Hotel guest arrivals and departures
- Retail and commercial visitors
- Periodic service and maintenance vehicles

Unlike large-scale industrial developments, the Downtown Slemani Project does not require regular heavy truck movements, fuel supply transport, or industrial freight logistics.

Potential operational impacts include:

- **Moderate Increase in Local Traffic:** The Project will generate additional private vehicle and taxi trips associated with residential, retail and hospitality use.
- **Peak Period Demand:** Morning and evening commuting periods may experience increased localized traffic volumes at access junctions.
- **Parking Demand Pressure:** Without adequate management, spillover parking could affect adjacent streets.

However, these impacts are expected to be moderate and manageable due to the urban location and the nature of the development.

7.8.2.3 Impact Summary

The impacts of the project are analysed in Table 7-40 and Table 7-41.

Table 7-40. Impact Significances during the Construction Phase – Traffic and Transport

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
Traffic Flow	Negative Direct	Definition	The impact is limited to the access roads and nearby settlements around the Project area.	The construction phase will last approximately 5 years.	Construction-related traffic will cause noticeable increases in vehicle movement and congestion along access routes, creating tangible but manageable effects on road users.	Traffic movements will occur frequently throughout the construction period, with regular daily cycles of heavy-vehicle and staff transport.	-	Traffic-related effects will fully revert to normal conditions shortly after construction activities end.	Medium	Medium
		Score	Local	Long	Medium	Frequent	N/A	Short/mid-term		
		Value	2	4	3	4	-	2		
	Impact Magnitude (G+D+I+F (or L)) x R		26						3	78
Road Conditions	Negative Direct	Definition	Damage to infrastructure, likely to be caused by heavy traffic, is expected to be local.	The construction phase will last approximately 5 years.	Construction traffic may cause noticeable wear and deterioration on road surfaces, creating tangible but manageable impacts on road conditions.	-	Impacts on road conditions are considered probable due to regular heavy-vehicle movements.	The impact of potential damage to infrastructure will be temporary.	Medium	Medium

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographica l Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
		Score	Local	Long	Medium	N/A	Probable	Short/mid-term		
		Value	2	4	3	-	5	2		
	Impact Magnitude (G+D+I+F (or L)) x R		28							3
Transportati on Safety	Negative Direct	Definition	The impact is limited to the access roads and nearby settlements where project-related vehicles interact with local road users.	The construction phase will extend over several years; however, traffic-related impacts will vary depending on construction activities and phases.	Project-related traffic may create temporary safety risks for road users; however, these are considered moderate and manageable with appropriate traffic management and mitigation measures.	-	Due to frequent interactions between project-related vehicles and local road users, traffic safety impacts are likely to occur.	The impact is largely reversible, with conditions returning to normal upon completion of construction activities.	Medium	Medium
		Score	Local	Long	Medium	N/A	Likely	Irreversible		
		Value	2	4	3	-	3	3		
	Impact Magnitude (G+D+I+F (or L)) x R		36							3

Table 7-41. Impact Significances during the Operation Phase – Traffic and Transport

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
Heavy-Vehicle Traffic Reduction	Positive Direct	Definition	Heavy-vehicle reduction effects are limited to the local road network surrounding the Project site and Primary Road No. 7.	Any changes in tanker and freight traffic would be short-term and temporary.	The reduction alleviates traffic load, but the magnitude of the positive change remains modest relative to the overall baseline traffic.	Operational vehicle movements are occasional, with no regular heavy-vehicle circulation.	-	If operational conditions change, traffic levels could return to previous patterns within a short to medium timeframe.	Medium	Low
		Score	Local	Short	Low	Infrequent	N/A	Short/Mid-term		
		Value	2	2	2	2	-	2		
	Impact Magnitude (G+D+I+F (or L)) x R		16						3	48
Impacts on Routine Traffic Levels	Negative Direct	Definition	The impact is confined to the immediate access roads and staff commuting routes near the Project site.	Impact on traffic is estimated to be last for the project life time.	The slight increase in traffic does not exert measurable pressure on road capacity or safety conditions.	Vehicle movements occur mainly during shift changes and occasional maintenance activities.	-	Traffic levels are expected to return to normal shortly after operations cease or significantly decline.	Medium	Medium
		Score	Local	Very Long	High	Infrequent	N/A	Mid-term		
		Value	2	5	4	2	-	3		
	Impact Magnitude (G+D+I+F (or L)) x R		16						3	117

7.8.3 Mitigation Measures

To address the identified impacts, the following measures are proposed:

Impacts on Heavy-Vehicle Traffic Reduction

Construction Phase

- Heavy-vehicle movements will be scheduled to avoid peak community activity hours and minimize temporary congestion.
- Traffic marshals will be deployed at the Project access gate during high-activity periods to ensure safe vehicle entry/exit and pedestrian protection.
- Traffic Management Plan will be implemented, including speed control, signage and designated stopping/turning points.
- Road watering and dust-suppression practices will be applied along unpaved or sensitive road sections to maintain visibility and safety.
- Coordination with local authorities will be maintained to manage road closures, detours or convoy movements when required.

Operation Phase

- Routine staff transportation will be organized to avoid unnecessary clustering of vehicles during shift changes.
- Periodic safety reviews of access routes will be conducted to ensure safe commuting conditions.
- Maintenance-related deliveries will be planned in off-peak hours to avoid any localized congestion.
- Clear communication with local authorities will be maintained regarding any exceptional transport needs.

Impacts on Routine Traffic Levels

Construction Phase

- Transport of construction materials will be coordinated to avoid simultaneous convoy movements and reduce temporary traffic buildup.
- Drivers will receive mandatory safe driving training with emphasis on speed limits, overtaking rules and community road etiquette.
- Warning signs, visibility markers and temporary lighting will be installed along frequently used access routes.
- Community information notices will be used to inform residents of periods of increased construction traffic.
- Alternative internal routes within the Project site will be used where possible to minimize use of public roads.

Operation Phase

- Implementation of Traffic Management Plan (TMP) for the operational phase in coordination with relevant municipal authorities.
- Community plans will be prepared for operational staff to optimize traffic distribution during shift changes.
- Vehicle access to the site will be controlled through designated entry points to prevent unnecessary circulation around community areas.
- Occasional maintenance traffic will follow predefined routes agreed with local authorities.
- Regular inspections will be conducted to ensure road signage, lighting and surface conditions remain adequate for safe daily use.
- Establish designated loading/unloading areas to prevent obstruction of public roads.
- Install electric vehicle charging stations to encourage the use of low-emission vehicles.
- Implement parking management measures to discourage illegal parking on surrounding roads.
- Maintain smooth traffic flow within the Project Area to minimize vehicle idling.

7.8.4 Residual Impacts

Summaries of the residual impact significance on traffic with the implementation of mitigation measures identified in other relevant sections of the ESIA report are shown in tables below.

Table 7-42. Residual Impact Significance during the Construction Phase – Traffic and Transport

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)								
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency(F)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
Traffic Flow	Negative Direct	Score	Local	Long	Medium	Frequent	N/A	Short/Mid-term	Low	Low
		Value	2	4	3	4	-	2		
	Impact Magnitude (G+D+I+F (or L)) x R			26					1	26
Road Conditions	Negative Direct	Score	Local	Long	Medium	N/A	Likely	Short/Mid-term	Medium	Low
		Value	2	4	3	-	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R			24					3	42
Transportation Safety	Negative Direct	Score	Local	Long	Medium	N/A	Unlikely	Short/mid-term	Medium	Low
		Value	2	4	3	-	1	2		
	Impact Magnitude (G+D+I+F (or L)) x R			20					3	40

Table 7-43. Residual Impact Significance during the Operation Phase – Traffic and Transport

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency(F)	Reversibility (R)	Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
Heavy-Vehicle Traffic Reduction	Positive Direct	Score	Local	Short	Negligible	Infrequent	Short-term	Medium	Negligible
		Value	2	2	1	2	1		
	Impact Magnitude (G+D+I+F (or L)) x R		7					3	21
Routine Traffic Levels	Negative Direct	Score	Local	Very Long	Medium	Infrequent	Short-term	Medium	Low
		Value	2	5	3	2	1		
	Impact Magnitude (G+D+I+F (or L)) x R		12					3	36

7.9 Socio-Economic Impacts

7.9.1 Introduction

This section presents an assessment of the potential socio-economic impacts associated with the Hiwa Rauf Downtown Slemani Project, considering both the construction and operation phases and evaluating impact separately. The Project is located in the Slemani Governorate in northern Iraq, within the administrative boundaries of Slemani City. Settlements within the Project's Primary Area of Influence (Aol) include the Darwaza neighbourhood. These areas are situated in close proximity to the Project site and are characterized by a mixed land-use structure comprising residential, commercial, administrative, and industrial functions.

This section also considers potential human rights implications associated with the identified socio-economic impacts, particularly in relation to vulnerable groups, access to information and access to grievance mechanisms.

7.9.2 Impacts during Construction Phase

During the construction phase, the Project is expected to generate various socio-economic impacts on the surrounding settlements, shaped by the existing socio-economic context and community characteristics. The following subsections provide a comprehensive assessment of the key socio-economic impacts anticipated during this period.

7.9.2.1 Vulnerable Groups

Vulnerable or disadvantaged individuals and groups are those who may be disproportionately affected by Project-related activities due to their socio-economic or demographic characteristics. In the Project's Aol, vulnerable groups were identified through household surveys, community-level interviews and field observations in Darwaza. These groups are described in detail in Chapter 6.

The main vulnerable groups in the surrounding settlement include:

- **Female-headed households:** Women who are responsible for both income generation and households care are more likely to experience economic difficulties and may have limited access to information and participation mechanisms.
- **Elderly individuals in need of care and support:** Older residents may face mobility challenges, health-related limitations and reduced adaptability temporary disturbances arising during construction.
- **Persons with disabilities (physical/mental):** Individuals with physical, sensory or cognitive impairments may encounter obstacles in accessing information, participation activities or project-related support.
- **Unemployed individuals actively seeking work:** unemployment levels in the Aol increase the sensitivity of this group to economic changes and project-related opportunities, creating heightened expectations regarding job availability.

- **Widowed or divorced women:** This group may face reduced economic stability and limited access to social support networks, making them more vulnerable to any disruption in daily routines or access to services.
- **Individuals homebound due to chronic illness:** Residents confined to their homes due to health conditions may have restricted access to engagement activities, information channels and grievance mechanisms.
- **School-age children not attending school:** Children who are outside formal education may be indirectly affected by livelihood changes or household vulnerabilities.

During the construction phase, vulnerable groups may experience indirect and disproportionate impacts primarily related to limited access to information, reduced ability to participate in engagement activities, and heightened sensitivity to temporary disturbances such as traffic, noise, or changes in daily routines. While these impacts are not expected to result in measurable changes to livelihoods or socio-economic conditions, they may be more acutely perceived by vulnerable individuals if communication and engagement mechanisms are not adequately adapted to their needs.

Although no physical or economic displacement is expected as part of the Project, these groups may experience more pronounced impacts during the construction phase if communication, participation and grievance processes are not tailored to their needs.

These impacts also reflect potential human rights sensitivities related to participation, access to information and non-discrimination, particularly for vulnerable groups.

7.9.2.2 Economy, Employment and Local Economic Opportunities

The Project Area of Influence (Aoi) is situated within a fully urbanised setting, where livelihoods are not dependent on agriculture or livestock-related activities. Based on consultations with the Mukhtar of the Awbara neighbourhood (Derwaza District) and field observations, the primary sources of income for residents consist of salaried employment and service-oriented activities, complemented by construction-related work and rental income.

During the construction phase, the Project is expected to create a number of employment opportunities for local residents, mainly in low-skilled or support roles. However, the majority of technical and specialized positions will likely be filled by external workforce. The incoming non-local workers—primarily engineers and technical staff—are anticipated to have minimal interaction with local communities, given both the physical distance between the Project site and settlements and the controlled nature of the Project area.

Construction activities may also lead to minor and temporary economic benefits for nearby businesses, including small shops, local markets, and service providers, particularly if there is some degree of off-site workforce movement. In addition, indirect and induced economic effects may arise through increased demand for basic goods and services, potentially providing modest support to local household incomes.

As the Project does not require physical or economic displacement and does not interfere with agricultural or grazing lands utilized by local populations, no significant adverse impacts on

livelihoods are expected. Potential socio-economic risks related to labour influx—such as pressure on local services or shifts in community dynamics—are addressed separately under the Community Health, Safety and Security section. The Project will ensure effective communication mechanisms and establish clear protocols for workforce-community interactions to prevent any negative impacts on local residents.

These considerations also have relevance from a human rights perspective, particularly in terms of safeguarding access to livelihoods and ensuring fair and equitable access to economic opportunities.

7.9.2.3 Social Dynamics and Community-Project Relations

During construction, the Project Company will establish on-site accommodation for workers who need to reside near the Project facilities. These accommodations will be located within the secured Project boundary, minimizing daily interaction between the workforce and surrounding communities. As a result, impacts on community cohesion or social dynamics are expected to be low.

Management of worker behaviour, worker-community interactions, accommodation standards and on-site living conditions will be governed by the Project's labour management procedures and contractor obligations. Measures to prevent potential social tensions, protect community wellbeing and ensure compliance with international labour standards are addressed comprehensively in the Labour and Working Conditions section.

Given the physical distance between the workforce and the settlements, and the controlled nature of accommodation arrangements, the Project is not expected to introduce significant changes to local social relations. Any residual impacts are anticipated to be minor and easily mitigated.

These changes in social dynamics may also be relevant from a human rights perspective, particularly in relation to community cohesion, participation and perceptions of fairness.

7.9.2.4 Local Procurement and Economic Linkages

The Project may generate limited local procurement opportunities during the construction phase, particularly for basic goods and small-scale services such as groceries, simple consumables and minor support items. Due to the specialized nature of construction activities, most major materials, equipment and technical services will be sourced from regional or national suppliers rather than from the three settlements in the Aol.

No land acquisition or physical/economic displacement will occur for the Downtown Slemani Project. The Project site is located within an existing designated industrial area, and the construction activities do not require the acquisition of agricultural or residential land used by surrounding settlements. Therefore, no livelihood restoration measures are required, and no resettlement-related economic linkages will arise.

While local procurement opportunities are expected to be modest, they may still offer small-scale, short-term commercial benefits for nearby vendors. Broader procurement and supply-chain management practices are addressed under the Labour and Working Conditions and Community Health and Safety sections where relevant.

Table 7-44. Summary of Impact Significances of the Receptors for the Construction Phase – Socio-economic Impacts

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Vulnerable Groups	Negative Direct	Definition	Vulnerable groups in the Aol may experience disproportionate impacts during construction if participation, communication and grievance channels are not fully accessible.	Vulnerable groups will continue to be affected during construction works (approximately 5 years).	Any impacts are expected to remain minor and are not anticipated to result in measurable or lasting changes to livelihoods, income levels, or access to services.	Baseline findings show limited project awareness and restricted mobility among vulnerable groups.	Effects on vulnerable groups are expected to be fully reversible within a short period once construction-related disturbances cease.	Medium	Low
		Score	Local	Long	Low	Likely	Short-term		
		Value	2	4	2	3	1		
	Impact Magnitude (G+D+I+F (or L)) x R		11					3	33
Employment and Local Economic Opportunities	Positive Direct	Definition	Some temporary employment opportunities may arise for local residents, and workers' spending is expected to generate minor positive effects on small-scale economic activities within the Aol.	It is planned that the construction phase of the project will take approximately 5 years. The duration of potential impacts is expected to be long.	The impact is expected to generate tangible but moderate improvements in household income and local economic activity.	The impact is considered probable, as Project will generate employment opportunities for local workers during the construction phase.	Most benefits will end after construction, but some may persist into the operation phase; therefore, the impact is mid-term reversible.	Medium	Medium
		Score	Local	Long	Medium	Probable	Mid-term		
		Value	2	4	3	5	3		
	Impact Magnitude (G+D+I+F (or L)) x R		42					3	126

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Social Dynamics and Community-Project Relations	Negative Direct	Definition	The impact is limited to the local communities located and does not extend beyond the immediate settlements surrounding the Project site.	It will continue throughout the construction period (approximately 5 years) and end once construction is completed.	Effects are minimal and unlikely to cause noticeable changes in community dynamics.	Due to the continuous presence of non-local workers during the construction phase, albeit at a low level, the occurrence of this impact is expected.	The effects are expected to be reversible in the mid-term once construction activities and worker presence come to an end.	Medium	Medium
		Score	Local	Long	Low	Likely	Mid-term		
		Value	2	4	2	3	3		
	Impact Magnitude (G+D+I+F (or L)) x R		33					3	99
Local Procurement and Economic Linkages	Positive Direct	Definition	Limited to small-scale economic benefits for local businesses within the Project's Aol, as major materials and services are sourced from regional or national suppliers.	It will continue throughout the construction period (approximately 5 years) and end once construction is completed.	During the construction phase, the local procurement of basic goods and small-scale services is expected to generate moderate benefits.	It is expected to occur as basic goods and small services will be procured locally during construction.	The effects are expected to be reversible in the mid-term once construction activities and worker presence come to an end.	Medium	Medium
		Score	Local	Long	Medium	Likely	Mid-term		
		Value	2	4	3	3	3		
	Impact Magnitude (G+D+I+F (or L)) x R		36					3	108

7.9.3 Impacts during Operation Phase

During the operation phase, the Project is expected to generate mostly positive socio-economic impacts, primarily through limited long-term employment and continued local economic activity. The following subsections summarise these operational impacts, focusing on employment needs, skill requirements and broader long-term benefits.

7.9.3.1 Operational Employment and Skills

During the operation phase, the Project will create a small number of long-term employment opportunities. Operation of a Downtown Slemani requires mainly skilled and semi-skilled personnel – such as technicians, control room operators and maintenance staff – therefore most positions will need to be filled by experienced workers. Where local candidates meet the required qualifications, the Project Company will prioritize local recruitment.

Although direct employment will be limited, some indirect and induced economic benefits may arise through the periodic procurement of goods and routine services from nearby settlements. In the longer term, potential training or capacity-building initiatives may also enhance local skill levels. Overall, operational-phase employment impacts are expected to be positive but modest on a scale.

Overall, operational phase employment impacts are expected to be positive but modest in scale, with potential human rights relevance in relation to access to employment and non-discrimination.

7.9.3.2 Long-Term Socio-Economic Benefits

The operation of the Project is expected to provide modest long-term socio-economic benefits, primarily associated with stable employment for a small number of skilled personnel and the continued procurement of routine goods and services from nearby settlements. Although the scale of these benefits will remain limited due to the specialized nature of project operations, the Project may nonetheless contribute to broader local development through capacity-building efforts, periodic training opportunities and the circulation of operational expenditures in the regional economy.

For the purposes of impact significance assessment, operational-phase socio-economic effects are consolidated under a single impact category (“Operational Socio-Economic Impacts”). This approach reflects the limited scale, stable nature and shared impact pathway of operational activities, whereby employment, skills utilisation and minor indirect economic benefits arise from the same underlying mechanisms. Unlike the construction phase – during which multiple, distinct and temporary impact pathways are present – operational activities are fixed, predictable and do not give rise to differentiated or materially adverse socio-economic effects that would warrant separate impact classifications. Potential differential effects on vulnerable groups, particularly in relation to access to long-term employment opportunities due to qualification requirements, are assessed separately. Accordingly, a single consolidated impact assessment is considered appropriate and proportionate for the operation phase.

Table 7-45. Summary of Impact Significances of the Receptors for the Operation Phase – Socio-Economic Impacts

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Operational Socio-Economic Impacts	Positive Direct	Definition	Operational socio-economic benefits are confined to settlements within the Project's Area of Influence. Employment opportunities and minor indirect economic benefits (e.g. routine services) are locally based and do not extend to the regional or national level.	Operational employment and associated economic activities will continue throughout the full operational lifetime of the Project representing a long-term and sustained effect.	While positive, operational employment opportunities are limited in number and scale. The impacts are not expected to result in measurable or lasting changes to community-level economic structures, employment patterns or livelihood conditions.	Operational employment needs will persist on a long-term and potentially permanent basis, reflecting the continuous nature of residential use; therefore, the occurrence of this impact is considered probable.	Operational socio-economic effects are directly tied to project operation and cease shortly after operations end, which supports a short- to mid-term reversibility classification.	Medium	Medium
		Score	Local	Very Long	Low	Probable	Short/mid-term		
		Value	2	5	2	5	2		
	Impact Magnitude (G+D+I+F (or L)) x R		28					3	84

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Vulnerable Groups	Negative Direct	Definition	Any potential effects on vulnerable groups would be limited to settlements within the Project's Area of Influence and would not extend beyond the local level.	Potential differential effects related to access to employment would persist on a long-term and effectively permanent basis, as long as the residential development remains in use and occupied.	Operational activities are not expected to cause tangible adverse socio-economic changes for vulnerable groups. Any effects are indirect and limited, primarily related to access to skilled employment opportunities.	Operational activities are not expected to adversely affect vulnerable groups; therefore, the occurrence of differential effects is considered unlikely.	Any potential effects on vulnerable groups would cease shortly after operational activities end and are not expected to result in lasting socio-economic changes.	Medium	Low
		Score	Local	Very Long	Low	Unlikely	Short/mid-term		
		Value	2	5	2	1	2		
	Impact Magnitude (G+D+I+F (or L)) x R		20					3	60

7.9.4 Mitigation Measures

7.9.4.1 Construction and Operation Phase

The mitigation measures to be implemented during both construction and operation phases of the Downtown Slemani Project are summarised below. The measures aim to enhance positive socio-economic outcomes, reduce risks associated with labour influx, protect vulnerable groups, and ensure compliance with IFC Performance Standards. These measures also contribute to the management of associated human rights risks identified through the ESIA process under the EP 4.

Employment and Working Conditions

- Transparent, fair and non-discriminatory recruitment procedures will be implemented.
- Local residents will be prioritised for suitable unskilled, semi-skilled and skilled roles.
- Workers will receive written contracts outlining terms, wages, working hours, leave entitlements and benefits.
- For workers with limited literacy, contract terms will verbally explain before signing.
- Child labour and forced labour will be strictly prohibited.
- Equal opportunity and non-discrimination principles will be enforced.
- All workers will have access to a confidential Worker Grievance Mechanism.
- Contractors and subcontractors will be required to comply with labour standards consistent with IFC PS2.

Worker Conduct and Interaction with Communities

- A Code of Conduct will established expectations for respectful behaviour, including prohibitions on harassment, exploitation and GBV/SEAH.
- All workers will receive induction and refresher training on acceptable conduct, cultural sensitivities and community interaction rules.
- Worker accommodation will be located within a controlled area to minimise unnecessary contact with nearby settlements.
- Movement between accommodation, worksites and public areas will be managed through controlled access protocols.

Local Economic Development and Procurement

Construction Phase

- Procurement procedures will encourage participation of local suppliers and small businesses.
- Tender packages will be structured at scale appropriate for local market capacity.
- Opportunities related to transportation, supply of materials or small services will be communicated locally.

- The Project will explore opportunities to support local suppliers through introductory briefings and basic technical guidance on meeting procurement standards, depending on identified needs and feasibility.

Operation Phase

- Routine procurement of goods and services from nearby settlements will continue where feasible.
- Local residents will be informed of any future operational employment opportunities requiring skilled or semi-skilled labour.
- Capacity-building or skill-development initiatives may be considered to enhance long-term employability.

Stakeholder Engagement and Grievance Management

- Meaningful engagement with communities will continue throughout project implementation.
- Information on construction activities, operational changes and recruitment will be disclosed in accessible formats and in Kurdish.
- A Community Grievance Mechanism will remain active, with submission channels suitable for all groups, including verbal options.
- Records of grievances and responses will be maintained and reported regularly.

Vulnerable Groups and Inclusion

- Engagement methods will be adapted to ensure accessibility for vulnerable groups, including women, elderly persons and households with limited mobility.
- Project information will be provided through channels accessible to those with limited literacy.
- GM support will be strengthened for vulnerable individuals, ensuring confidentially and timely follow-up.
- Workers receiving community-facing roles will be trained on cultural sensitivity and inclusive practices.
- Project-related information will be communicated through appropriate and accessible channels to ensure that all stakeholders, including vulnerable groups such as female-headed households, elderly residents, persons with disabilities, and individuals with limited mobility, are adequately informed.
- A grievance mechanism will be established through accessible communication channels, allowing stakeholders to submit feedback through designated contact points, including options suitable for individuals with mobility or literacy limitations.
- Project information will be simplified into literacy-sensitive formats, including pictorial materials, audio messages and community noticeboard visuals, to facilitate comprehension among low-literacy groups.

- Monitoring indicators will track participation of vulnerable groups, including number of vulnerable individuals engaged, grievance accessibility, and follow-up response times.

Gender-Based Violence (GBV/SEAH)

- Zero tolerance for GBV/SEAH risks, behavioural expectations and reporting channels.
- Worker will receive training on GBV/SEAH risks, behavioural expectations and reporting channels.
- Confidential reporting pathways will be available to both workers and community members.
- Designed female focal points will support GBV/SEAH-related grievances.
- The Project will coordinate with relevant authorities in addressing allegations involving GBV/SEAH.
- GBV/SEAH-related grievances will be managed in accordance with survivor-centred principles, ensuring confidentiality, non-retaliation, informed consent and referral to appropriate local support services.

Social Monitoring and Adaptive Management

- Employment outcomes, contractor performance, community grievances and stakeholder engagement activities will be monitored.
- Monitoring results will inform ongoing improvements to mitigation measures.
- Reports will be reviewed periodically to ensure compliance with IFC standards and responsiveness to community feedback.

7.9.5 Residual Impacts

Summaries of the residual impact significance on socioeconomic conditions with the implementation of mitigation measures identified in other relevant sections of the ESIA report are shown in below tables.

Table 7-46. Residual Impact Significance during the Construction Phase – Vulnerable Groups

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Vulnerable Groups	Negative Direct	Score	Local	Long	Negligible	Unlikely	Short-term	Medium	Negligible
		Value	2	4	1	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8					3	24
Employment and Local Economic Opportunities	Positive Direct	Score	Local	Long	Medium	Probable	Mid-term	Medium	Medium
		Value	2	4	3	5	3		
	Impact Magnitude (G+D+I+F (or L)) x R		42					3	126
Social Dynamics and Community-Project Relations	Negative Direct	Score	Local	Long	Negligible	Likely	Short/mid-term	Low	Low
		Value	2	4	1	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		20					3	60
Local Procurement and Economic Linkages	Positive Direct	Score	Local	Long	Medium	Likely	Mid-term	Medium	Medium
		Value	2	4	3	3	3		
	Impact Magnitude (G+D+I+F (or L)) x R		36					3	108

Table 7-47. Residual Impact Significance during the Operational Phase – Operational Socio-Economic Impacts

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Operational Socio-Economic Impacts	Negative Direct	Score	Local	Very Long	Low	Probable	Short-term	Medium	Low
		Value	2	5	2	5	1		
	Impact Magnitude (G+D+I+F (or L)) x R		14					3	27
Vulnerable Groups	Negative Direct	Score	Local	Very Long	Low	Unlikely	Short-term	Low	Negligible
		Value	2	5	2	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		10					1	10

7.10 Labour and Working Conditions

7.10.1 Introduction

This chapter provides an assessment of labour and working conditions for Downtown Slemani Project during construction and operation, based on Project design, workforce structure and socio-economic information gathered in Derwaza and Awbara. The Project expected to employ approximately 800 workers at peak construction, with worker presence, on-site accommodation and workforce movements forming key considerations for labour management and worker-community interactions.

The assessment examines the main labour-related risks and requirements, including employment practices, working conditions, worker accommodation, OHS, contractor oversight and worker grievance mechanisms. It also outlines measures to ensure that working conditions are safe, fair and aligned with international standards, while supporting worker welfare and maintaining positive community relations.

The assessment of labour and working conditions also addresses human rights considerations related to fair working conditions, occupational health and safety and access to remedy.

7.10.2 Impacts during Construction and Operation

7.10.2.1 Workforce Characteristics, Labour Influx and Community Interaction

During the construction phase, the Project will require a large and multi-tier workforce of approximately 800 personnel, including engineers, technicians, skilled and unskilled labourers and support service staff. Owing to the specialized nature of project construction, a significant proportion of the workforce will be non-local. Most workers are expected to reside in secure, controlled accommodation units located within the Project boundary, which will help manage worker mobility and limit unnecessary movement outside the site.

The presence of a large non-local workforce may raise employment expectations among residents of nearby settlements such as Derwaza, Awbara, where livelihood opportunities are limited. While basic support roles may be accessible to residents, most technical and specialized positions will need to be filled by external personnel. The distance between the Project site and nearby settlements, together with controlled access arrangements, will substantially limit daily interaction between workers and community members, thereby reducing the likelihood of labour-influx-related pressures or negative effects on social cohesion.

During the operational phase, the workforce may remain at a similar level or potentially increase depending on project requirements and associated activities. In this context, the workforce is expected to have a more stable and longer-term presence. Due to the continuity of operations, interaction between workers and the local community may continue. Therefore, effective management of worker–community interactions will be important. Accordingly, these

impacts may have human rights relevance, particularly in relation to community perceptions, non-discrimination, and the management of worker–community interactions.

7.10.2.2 Employment Practices, Working Conditions and Contractor Management

Employment practices, working conditions, contract terms, remuneration and equal opportunity principles will be key areas of focus throughout both construction and operation. The involvement of multiple contractors and subcontractors during construction may result in inconsistencies in recruitment processes, working hours, wage payments or the provision of personal protective equipment. To address these risks, it is essential that Project rules, OHS requirements and site procedures are communicated clearly to all workers and applied consistently across all contractors.

During operation, the workforce will be smaller and composed mainly of experienced technical personnel, reducing variability in labour practices. Nevertheless, continuous monitoring of working conditions, regular training and consistent enforcement of fair employment principles will remain necessary.

These impacts are directly relevant from a human rights perspective, particularly in relation to fair working conditions, equal treatment and labour rights.

7.10.2.3 Occupational Health and Safety (OHS)

Construction activities will involve heavy machinery, simultaneous work fronts and high worker density, which contribute to elevated OHS risks. Differences in safety performance and procedures among contractors may arise, making emergency preparedness, site security, routine inspections and safety training critical throughout the construction phase.

During the operation phase, OHS risks are expected to be lower than during construction due to the smaller workforce and more predictable work routines. Nevertheless, strict safety procedures will remain necessary, particularly during maintenance activities involving high-voltage equipment and other technical systems. In the absence of adequate safety measures, there remains a risk of major accidents at the facility.

These impacts are directly linked to workers' right to safe and healthy working conditions.

7.10.2.4 Worker Grievance Mechanism

The Worker Grievance Mechanism is a key tool enabling employees to raise concerns safely, confidentially, and without retaliation during both construction and operation. Due to the large workforce in the construction phase, the number of grievances may increase, highlighting the need for systematic logging, timely responses, and continuous follow-up.

During operation, grievance volume is expected to decrease, but the mechanism must remain functional and accessible.

The Worker Grievance Mechanism is a key element in ensuring access to remedy and protecting workers' rights throughout construction and operation. The mechanism is aligned with the Project's Stakeholder Engagement Plan (SEP) and the grievance management framework described in Chapter 8.

7.10.3 Impact Summary

Table 7-48. Summary of Impact Significances of the Receptors for the Construction Phase – Labour and Working Conditions

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent(G)	Duration (D)	Intensity(I)	Likelihood (L)	Reversibility (R)		
Workforce Characteristics, Labour Influx & Community Interaction	Negative Direct	Definition	Impact is limited to communities around the Project site Derwaza, Awbara).	Continues throughout the construction period (approximately 5 years) and ceases once construction is completed.	The continuous presence of a large non-local workforce during construction constitutes a high-intensity impact, with the potential to affect local employment expectations, perceived inequalities and community–project relations in surrounding settlements.	Given the planned and continuous presence of a large non-local workforce during construction, the occurrence of this impact is considered likely.	the impact is temporary and linked to the construction phase; however, effects on community perceptions and expectations may take time to subside following workforce demobilisation and are therefore considered reversible in the mid-term.	High	High
		Score	Local	Long	High	Likely	Mid-term		
		Value	2	4	4	3	3		
	Impact Magnitude (G+D+I+F (or L)) x R		39					5	195
Employment Practices, Working Conditions and Contractor Management	Negative Direct	Definition	Impacts limited to the workforce and contractor practices inside the Project boundary.	Labour management issues may persist throughout the full construction phase	During construction, the involvement of multiple contractors and subcontractors creates a high potential for	Given the scale and complexity of the construction workforce, and in the absence of effective oversight mechanisms, the occurrence of	Potential impacts are not structural in nature and can be addressed through management action;	High	High

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent(G)	Duration (D)	Intensity(I)	Likelihood (L)	Reversibility (R)		
				(approximately 5 years).	inconsistencies in employment practices and working conditions. When assessed without mitigation measures, such issues may result in high intensity impacts on worker welfare, working hours, wage practices and occupational health and safety.	labour-related issues is considered moderately likely during the construction phase.	however, when assessed without mitigation measures, the resolution of such issues may take time, and impacts are therefore considered reversible in the mid-term.		
		Score	Project Site	Long	High	Likely	Mid-term		
		Value	1	4	4	3	3		
	Impact Magnitude (G+D+I+F (or L)) x R		36					5	180
Occupational Health and Safety	Negative Direct	Definition	OHS risks are confined to internal construction areas within the Project site.	OHS risks persist throughout the entire construction period approximately 5 years).	Without mitigation, failures in controls may result in major accidents causing severe harm to workers.	Given daily high-risk activities and dense workforce conditions, the occurrence of OHS incidents is considered likely in an unmitigated scenario.	Major accidents may result in permanent injury or loss of capacity, and impacts may not be fully reversible even after medical treatment.	High	Very High
		Score	Project Site	Long	High	Likely	Irreversible		

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent(G)	Duration (D)	Intensity(I)	Likelihood (L)	Reversibility (R)		
		Value	1	4	4	3	5		
		Impact Magnitude (G+D+I+F (or L)) x R	60					5	300
Worker Grievance Mechanism	Negative Direct	Definition	Grievance issues are confined to on-site workforce and contractor units.	The need for grievance management persists during the entire construction period.	Grievances may affect worker satisfaction and perceptions of fairness but are not expected to result in severe or widespread harm.	Given the large and diverse construction workforce, the submission of worker grievances is considered likely.	Issues resolve quickly once addressed, no long-term residual impacts.	High	Low
		Score	Project Site	Long	Medium	Likely	Short-term		
		Value	1	4	3	3	1		
		Impact Magnitude (G+D+I+F (or L)) x R	11					5	55

Table 7-49. Summary of Impact Significances of the Receptors for the Operation Phase – Labour and Working Conditions

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)		
Workforce Characteristics, Labour Influx & Community Interaction	Negative Direct	Definition	During operation, workforce presence is limited to the Project site, with minimal interaction with surrounding communities due to the small and stable operational workforce.	Operational workforce presence will continue throughout the full operational lifetime of the Project (	The limited size of the operational workforce and controlled working arrangements mean that effects on community perceptions or social dynamics are minimal and not expected to cause tangible social change.	Given the small, stable workforce and minimal worker-community interaction, any impacts on community relations during operation are considered unlikely.	Any minor effects related to workforce presence would dissipate shortly after operational activities cease and are not expected to have lasting social consequences.	Medium	Low
		Score	Local	Very Long	Low	Unlikely	Short-term		
		Value	2	5	2	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		10					3	30
Employment Practices, Working Conditions and Contractor Management	Negative Direct	Definition	During operation, employment practices and working conditions are limited to the Project workforce within the Project site, with no external spill-over effects.	Employment practices and working conditions will apply throughout the entire operational lifetime of the Project	The operational workforce is small, stable and composed mainly of experienced personnel, reducing the likelihood of significant inconsistencies or adverse working condition impacts.	Given the reduced workforce size, limited use of contractors and more standardised employment arrangements during operation, the occurrence of employment-related issues is considered unlikely.	Any employment-related issues that may arise during operation can be addressed promptly through management action and do not result in lasting impacts.	Medium	Low

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)								
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)	
		Score	Project Site	Very Long	Low	Unlikely	Short-term			
		Value	1	5	2	1	1			
	Impact Magnitude (G+D+I+F (or L)) x R		9						3	27
Occupational Health and Safety	Negative Direct	Definition	Restricted to internal plant areas.	OHS risks persist throughout operational lifetime.	Real safety risks, though mitigated by experience and systems.	OHS exposure is continuous during operation, and routine maintenance activities regularly involve high-risk tasks, making the occurrence of OHS incidents likely over the operational lifetime.	Due to the inherently high-hazard nature of plant operations, major incidents may result in long-term health impacts, making effects reversible only in the long term.	Medium	Medium	
		Score	Project Site	Very Long	Medium	Likely	Long-term			
		Value	1	5	3	3	4			
	Impact Magnitude (G+D+I+F (or L)) x R		48						3	144
	Worker Grievance Mechanism	Negative Direct	Definition	Limited to operational staff.	Required throughout operations.	Operational grievances are expected to be limited and non-systemic.	Given the stable operational workforce, worker grievances are unlikely.	Quickly reversible once addressed.	Medium	Low
Score			Project Site	Very Long	Low	Unlikely	Short-term			
		Value	1	5	2	1	1			
Impact Magnitude (G+D+I+F (or L)) x R		9						3	27	

7.10.4 Mitigation Measures

7.10.4.1 Employment Practices and Labour Management

Construction Phase

- Transparent, fair and non-discriminatory recruitment procedures will be implemented across all contractors and subcontractors.
- Local residents will be prioritised for suitable unskilled, semi-skilled and skilled positions where qualifications match job requirements.
- All workers will receive written contracts outlining job roles, wages, working hours, overtime arrangements, benefits and leave rights.
- Contract terms will be verbally explained to workers with limited literacy before signing.
- Contractors and subcontractors will be required to comply with labour standards consistent with IFC PS2, including wage payment, working hours and provision of Personal Protective Equipment.
- Regular labour audits, worker interviews and compliance inspections will be undertaken to verify adherence to labour requirements.
- No child labour forced labour or exploitative practices will be permitted on-site.

Operation Phase

- Transparent and fair recruitment procedures will continue to apply for all technical and administrative roles.
- Employment opportunities for local residents will be advertised locally where skills match operational needs.
- Employment contracts will continue to include clear information on wages, benefits and working hours.
- Labour conditions will be reviewed periodically to ensure compliance with national labour regulations and IFC PS2.

7.10.4.2 Working Conditions, Worker Welfare and OHS Aligned

Construction Phase

- Adequate welfare facilities will be provided, including sanitary units, potable water, rest shelters and first-aid stations.
- Fatigue management measures will be applied during peak construction periods.
- A comprehensive Occupational Health and Safety (OHS) Management Plan will be developed and implemented in line with national legislation and the requirements of the International Finance Corporation Environmental, Health and Safety Guidelines, incorporating risk assessments, method statements, and safe work procedures for all construction activities.

- A site-specific risk assessment will be conducted prior to the commencement of works, and regularly updated to identify hazards associated with excavation, working at height, lifting operations, electrical works, confined spaces, and use of heavy machinery.
- All workers will receive mandatory OHS induction training prior to site entry, along with task-specific training and regular toolbox talks to ensure awareness of hazards and safe working practices.
- Appropriate personal protective equipment (PPE) (e.g., helmets, high-visibility clothing, safety boots, gloves, eye and hearing protection) will be provided and its use strictly enforced at all times.
- Qualified and competent personnel will be assigned to supervise high-risk activities, including lifting operations, scaffolding, and electrical works, and all equipment will be operated by trained and certified operators.
- Safe working procedures will be established for working at height, including the use of properly designed scaffolding, guardrails, fall arrest systems, and regular inspection of access platforms.
- Excavation and trenching works will be properly designed and supported to prevent collapse, with appropriate shoring, sloping, or benching, and restricted access to hazardous areas.
- Traffic and site access management measures will be implemented to segregate pedestrians and vehicles, including designated walkways, signage, speed limits, and trained flag personnel where necessary.
- All machinery and equipment will undergo regular inspection, maintenance, and certification, and will be fitted with necessary safety features such as alarms, guards, and emergency shut-off systems.
- Electrical safety measures will be implemented, including proper grounding, use of residual current devices, safe cable management, and lockout/tagout procedures during maintenance.
- Adequate housekeeping practices will be maintained to prevent slips, trips, and falls, including proper storage of materials, waste management, and keeping work areas clean and organized.
- Measures will be taken to control exposure to dust, noise, and vibration, including water spraying, equipment maintenance, use of silencers, and provision of appropriate PPE.
- Welfare facilities such as drinking water, sanitation, rest areas, and first aid services will be provided in accordance with applicable standards.
- A fully equipped first aid system and trained first aiders will be available on site at all times, and arrangements will be made with nearby healthcare facilities for emergency response.
- An Emergency Preparedness and Response Plan will be established, covering incidents such as fire, accidents, hazardous material spills, and natural events, with regular drills conducted.
- All incidents, near misses, and unsafe conditions will be reported, recorded, and investigated, and corrective actions will be implemented to prevent recurrence.

- Contractors and subcontractors will be required to comply with the Project's OHS requirements, and their performance will be monitored through regular inspections and audits.
- Working hours, rest periods, and labour conditions will be managed in accordance with national legislation and relevant international standards, including guidance from the International Labour Organization.

Operation Phase

- A comprehensive Occupational Health and Safety (OHS) Management System will be implemented for the operation phase in line with national legislation and the requirements of the International Finance Corporation Environmental, Health and Safety Guidelines.
- Site-specific risk assessments will be conducted for all operational activities, including facility management, maintenance works, security operations, cleaning services, and event management within the performance hall, and will be periodically updated.
- All staff, including facility management, security, cleaning, and technical personnel, will receive OHS induction and periodic refresher trainings, along with task-specific instructions and emergency response training.
- Appropriate PPE will be provided and enforced for relevant tasks such as maintenance, cleaning, and technical operations.
- Fire safety systems (e.g., fire detection and alarm systems, sprinklers, fire extinguishers) will be installed, regularly maintained, and periodically tested. Fire evacuation plans will be clearly displayed, and drills will be conducted regularly.
- Emergency preparedness and response procedures will be established, including coordination with local emergency services, covering fire, medical emergencies, power outages, and security incidents.
- Building systems (HVAC, electrical systems, elevators, escalators) will be regularly inspected, maintained, and certified to ensure safe operation and prevent accidents.
- Electrical safety measures will be implemented, including lockout/tagout procedures during maintenance, proper grounding, and use of certified equipment.
- Traffic and parking management plans will be implemented to ensure safe movement of vehicles and pedestrians within the project area, including signage, speed limits, and designated walkways.
- Public safety measures will be implemented to protect residents, visitors, and employees, including adequate lighting, security personnel, CCTV systems, and controlled access points.
- Contractor management procedures will be applied for all third-party service providers to ensure compliance with Project OHS requirements.
- Measures will be taken to control indoor air quality, including proper ventilation, regular maintenance of HVAC systems, and management of emissions from kitchens and enclosed parking areas.
- Ergonomic considerations will be incorporated into office and commercial spaces to reduce risks associated with repetitive work and poor workstation design.

- Hazardous materials (e.g., cleaning chemicals, fuels) will be stored, handled, and disposed of in accordance with safety data sheets and applicable regulations.
- Adequate first aid facilities and trained personnel will be available on site, and clear procedures will be established for access to external medical services.
- All incidents, near misses, and unsafe conditions will be reported, recorded, and investigated, and corrective actions will be implemented.
- Working conditions, including working hours and rest periods, will be managed in accordance with national legislation and guidance from the International Labour Organization.

These measures also contribute to the prevention and management of associated human rights risks.

7.10.4.3 Worker Accommodation and Mobility Management

Construction Phase

- Worker accommodation will be located within a secured and controlled area inside the Project boundary.
- Accommodation facilities will meet international good practice standards for hygiene, space, lighting, ventilation and waste management.
- Controlled access protocols will regulate movement between accommodation and the worksite.
- Recreational and basic service facilities will be provided within the accommodation area to minimise unnecessary travel outside the site.

Operation Phase

- Large-scale workers accommodation will not be required.
- Any temporary accommodation for maintenance teams or external specialists will comply with Project standards for safety and hygiene.

7.10.4.4 Contractor and Subcontractor Oversight

Construction Phase

- All contractors will prepare Labour Management Plans covering recruitment, worker welfare, disciplinary procedures and grievance channels.
- Routine monitoring - including site inspections, document reviews and worker interviews – will evaluate contractor performance.
- Corrective Action Plans will be issued where non-compliance is identified.
- Contractors will receive regular briefings to ensure alignment with Project labour standards and IFC PS2.

Operation Phase

- Subcontractors involved in maintenance or specialised technical tasks will be monitored for compliance with labour, OHS and welfare requirements.
- Labour performance reviews will be conducted periodically for all operational contractors.

7.10.4.5 Worker Grievance Mechanism

Construction Phase

- A confidential and accessible Worker Grievance Mechanism will be established early in construction.
- Workers will have multiple grievance submission channels, including verbal options for low-literacy workers.
- All grievances will be logged, investigated and resolved within defined timeframes.
- Anti-retaliation measures will be strictly enforced.

Operation Phase

- The Worker Grievance Mechanism will remain active and fully accessible to operational personnel.
- Grievance data will continue to be monitored to identify patterns or systemic issues requiring corrective action.

7.10.4.6 Gender, Inclusion and Prevention of Workplace Harassment

Construction Phase

- Mandatory training will be delivered on respectful behaviour, prevention of harassment and GBV/SEAH.
- Female workers will have access to gender-sensitive grievance pathways, including female focal points.
- Separate sanitation and changing facilities will be provided where applicable.
- Disciplinary actions will apply for breaches of the Code of Conduct.

Operation Phase

- Awareness sessions on harassment prevention and inclusive behaviour will continue.
- Gender-sensitive grievance pathways and focal points will remain available.

7.10.5 Residual Impacts

Summaries of the residual impact significance on labour and working conditions with the implementation of mitigation measures identified in other relevant sections of the ESIA report are shown in Table 7-50 and Table 7-51.

Table 7-50. Residual Impact Significance during the Construction Phase – Labour and Working Conditions

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	
Workforce Characteristics, Labour Influx & Community Interaction	Negative Direct	Score	Local	Long	Medium	Unlikely	Short/mid-term	Medium	Low
		Value	2	4	3	1	2		
	Impact Magnitude (G+D+I+F (or L)) x R		20					3	60
Employment Practices, Working Conditions and Contractor Management	Negative Direct	Score	Project Site	Long	Medium	Unlikely	Short/mid-term	Medium	Low
		Value	1	4	3	1	2		
	Impact Magnitude (G+D+I+F (or L)) x R		18					3	54
Occupational Health and Safety (OHS)	Negative Direct	Score	Project Site	Long	Medium	Unlikely	Mid-term	High	Medium
		Value	1	4	3	1	3		
	Impact Magnitude (G+D+I+F (or L)) x R		27					5	135
Worker Grievance Mechanism	Negative Direct	Score	Project Site	Long	Low	Unlikely	Short-term	Low	Negligible
		Value	1	4	2	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8					1	8

Table 7-51. Residual Impact Significance during the Operation Phase – Labour and Working Conditions

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	
Workforce Characteristics, Labour Influx & Community Interaction	Negative Direct	Score	Local	Very Long	Negligible	Unlikely	Short-term	Low	Negligible
		Value	2	5	1	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		9					1	9
Employment Practices, Working Conditions and Contractor Management	Negative Direct	Score	Project Site	Very Long	Negligible	Unlikely	Short-term	Low	Negligible
		Value	1	5	1	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		8					1	8
Occupational Health and Safety (OHS)	Negative Direct	Score	Project Site	Very Long	Low	Unlikely	Short/Mid-term	Medium	Low
		Value	1	5	2	1	2		
	Impact Magnitude (G+D+I+F (or L)) x R		18					3	54
Worker Grievance Mechanism	Negative Direct	Score	Project Site	Very Long	Low	Unlikely	Short-term	Low	Negligible
		Value	1	5	2	2	1		
	Impact Magnitude (G+D+I+F (or L)) x R		10					1	10

7.11 Community Health, Safety, and Security

7.11.1 Introduction

This section evaluates the potential risks and impacts of the Project on the health, safety and security of communities located within the Aol, specifically Awbara, Darwaza while the Project does not require land acquisition and maintains a controlled work environment with on-site accommodation, nearby communities may still be affected by construction-related disturbance (e.g. dust, noise, etc.), increased traffic, visible security presence, or rare emergency events associated with energy infrastructure.

Community health, safety and security impacts are assessed with consideration of associated human rights risks, including the right to health, safety and security of affected communities.

7.11.2 Impacts during Construction

During the construction phase, several pathways may affect community health, safety and security. These impacts are generally short-term, intermittent and reversible, but require consideration due to the presence of vulnerable groups and the increased activity levels around the Project site.

7.11.2.1 Construction Activities and Community Nuisance

Construction works involving excavation, machinery operation and material handling may be indirectly noticeable to nearby communities, particularly during peak activity periods. Short-term increases in dust, noise and vibration – already assessed in earlier section – may extend toward the edges of settlements, especially where access roads pass close to residential structures. Although these effects are not expected to create lasting health impacts, they may temporarily reduce comfort levels, cause brief disturbances to daily routines, or heighten sensitivity among vulnerable individuals such as the elderly, children, or people with chronic respiratory or cardiovascular conditions. In some instances, the visual presence of heavy machinery or the sound of intermittent construction activities may also contribute to a general sense of disruption, even when physical exposure is low.

Overall, these impacts remain localized, intermittent and diminish significantly with distance from construction routes, stabilizing once heavy works start to wind down.

These impacts are relevant from a human rights perspective, particularly in relation to the right to health and well-being of affected community members, including vulnerable individuals.

7.11.2.2 Traffic and Road Safety

The most significant construction phase CHSS impact relates to increased heavy-vehicle movement, as transport activities are concentrated during this stage and involve frequent movement of trucks, machinery carriers and material delivery vehicles. Communities located near access roads may encounter elevated accident risks, especially along narrow or partially degraded road sections where pedestrians, motorcyclists or livestock often share the route

with vehicles. In dry and windy periods, dust generated by passing trucks can temporarily reduce visibility, making it harder for drivers and residents to anticipate oncoming traffic or roadside activity. For households located close to the road, the combination of increased vehicle speed, limited roadside lighting and the presence of children or animals near property entrances can create heightened concern about road safety.

Although these risks are considered manageable, they require disciplined implementation of traffic controls, clear routing decisions and strict adherence to speed limits, as construction represents the period during which transport intensity and corresponding safety sensitivities are at their highest.

These impacts also have human rights relevance in relation to the right to life and safety of community members and road users.

7.11.2.3 Workforce Presence

Although workers are housed in a controlled on-site camp with restricted access, the presence of a large, predominantly non-local construction workforce may generate notable levels of concern among nearby communities. For households located in isolated areas or for individuals with limited social support – such as elderly residents, single women, young girls, or people with existing health vulnerabilities – the awareness of a sizeable temporary workforce in close proximity can create a more pronounced sense of discomfort, reduced perceived safety, or heightened vigilance in daily routines, even in the absence of direct interaction.

In some instances, community concerns may extend beyond general uneasiness to include worries regarding inappropriate behaviour, or gender-based risks. These concerns can be reinforced by existing socio-cultural norms, limited information flow, or uncertainty about worker codes of conduct, making the perceived impact more significant for vulnerable groups.

While these effects remain perceptual rather than physical, the level of anxiety or behavioural adaptation among sensitive community segments may be substantial enough to influence their wellbeing throughout the construction period. Importantly, despite the Project's controlled accommodation, managed transport and access protocols -which greatly limit opportunities for actual contact – community perceptions may persist or intensify during visible workforce movements or peak construction activities.

These perceptual impacts reflect potential human rights sensitivities, particularly in relation to dignity, personal security and the well-being of vulnerable community members.

7.11.2.4 Security Personnel

Security staff deployed at site entrances and strategic points may create a more pronounced sense of concern or unease among nearby residents, especially in communities with limited prior exposure to formal security protocols, where the visible presence of uniformed personnel,

checkpoints and controlled entry systems can influence daily behaviour, heighten vigilance and contribute to a persistent perception of reduced personal or community safety.

This impact is relevant from a human rights perspective in relation to the right to security of person and freedom from intimidation.

7.11.2.5 Emergency Risks

Construction activities involving fuel storage, equipment maintenance, welding, electrical work and the operation of temporary generators can create a sustained perception of emergency-related risk among nearby residents. The continuous visibility of fuel handling, hot works and emergency equipment, combined with limited familiarity with technical construction processes, makes it likely that communities will associate these activities with the potential for fires, chemical spills or mechanical failures. As a result, some residents, particularly those living closest to access routes or those with higher sensitivity, may experience ongoing anxiety, heightened alertness and a persistent sense of elevated risk throughout the construction period.

Although engineering controls and safety procedures significantly reduce the actual likelihood of off-site impacts, community perceptions may remain strong and tend to diminish gradually once construction-related hazards and visual triggers are no longer present.

These perceived risks are relevant from a human rights perspective, particularly in relation to the right to life and safety of nearby communities.

Table 7-52. Summary of Impact Significances of the Receptors for the Construction Phase – Community Health, Safety and Security

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
Construction Activities and Community Nuisance	Negative Direct	Definition	Construction-related dust, noise and vibration may be perceptible only in localized areas near access roads and the edges of nearby settlements.	These disturbances will intermittently occur throughout the approximately 4-year construction period and will cease once construction is completed.	Dust, noise and vibration may cause pronounced discomfort and disturbance to nearby communities, particularly sensitive receptors.	Construction activities and associated nuisance sources will be present on a near-continuous basis during active construction periods.	-	Conditions are expected to return to normal within a short period after construction is completed.	High	Medium
		Score	Local	Long	High	Continuous	N/A	Short-term		
		Value	2	4	4	5	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		15						5	75
Traffic and Road Safety Risks	Negative Direct	Definition	Increased heavy-vehicle movement affects communities located along the access roads and immediate road corridors near the Project area.	Traffic-related risks will persist throughout the entire construction period of approximately 5 years and will end once construction transport activities cease.	Heavy vehicle movements may significantly increase accident risk for pedestrians, local vehicles and livestock.	-	Given the sustained volume of construction traffic and existing road conditions, the occurrence of traffic safety incidents is considered likely.	Road safety risks are reversible and will gradually diminish over the short to medium term as construction traffic decreases and transport activities come to an end.	High	Medium
		Score	Local	Long	High	N/A	Likely	Short/mid-term		

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
		Value	2	4	4	-	3	2		
		Impact Magnitude (G+D+I+F (or L)) x R	26						5	130
Workforce Presence	Negative Direct	Definition	Community sensitivities are limited to settlements surrounding the Project area where residents are aware of the temporary increase in workforce presence.	Perceptual concerns may continue throughout the entire 4-year construction period while the workforce remains present.	The impact may create noticeable concerns regarding perceived safety and personal security, particularly among vulnerable groups, without causing direct physical or socio-economic harm.	Perceptions affecting community safety and wellbeing are continuously present as long as the construction workforce remains visible within the Project area.	-	Perceptual effects on community health, safety and security are expected to gradually diminish within months following workforce demobilisation and the end of construction activities.	High	Medium
		Score	Local	Long	Medium	Continuous	N/A	Short/Mid-term		
		Value	2	4	3	5	-	2		
		Impact Magnitude (G+D+I+F (or L)) x R	28						5	140
	Negative Direct	Definition	Visible security presence affects only communities in the immediate vicinity of the Project site.	Perceptions related to security presence persist throughout the construction period.	Security personnel may create noticeable concern regarding perceived safety, without	Security presence is continuous during construction, leading to sustained community perceptions.	-	Perceptual effects are expected to diminish gradually after construction and security demobilisation.	High	Medium

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
					causing direct harm.					
		Score	Local	Long	Medium	Continuous	N/A	Short/Mid-term		
		Value	2	4	3	5	-	2		
	Impact Magnitude (G+D+I+F (or L)) x R		28						5	140
Emergency Risks	Negative Direct	Definition	The impact is limited to communities located in the immediate vicinity of the Project site and access routes.	The impact may persist throughout the entire 4-year construction period due to the continuous presence of emergency-related activities and visible risk sources.	The impact generates noticeable concern and heightened awareness among residents but does not result in physical harm due to established safety systems.	-	Perceived emergency risks are likely to persist among residents due to the continuous visibility of hazardous equipment, despite effective engineering controls.	Community concerns are expected to diminish progressively after construction-related activities cease, although some risk awareness may persist into early operation.	High	Medium
		Score	Local	Long	Medium	N/A	Likely	Short/Mid-term		
		Value	2	4	3	-	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		24						5	120

7.11.3 Impacts during Operation

Once the facility becomes operational, overall community exposure reduces substantially. Most construction-phase disturbances cease, and activities are confined to fenced, access-controlled areas.

7.11.3.1 Operational Activities and Community Nuisance

Operation does not involve dust-generating activities or heavy construction equipment, resulting in negligible nuisance conditions. Routine project noise and emissions remain within acceptable limits and are largely contained on site. Communities therefore experience minimal daily impact from normal project operations.

7.11.3.2 Traffic and Transport Safety

Operational traffic remains significantly lower than during construction and is limited mainly to staff transport and occasional deliveries, resulting in only minor and manageable safety concerns for households located along access routes.

Key considerations:

- Traffic volumes are infrequent and occur primarily during routine staff movements.
- Noticeable but moderate safety concerns may arise for residents close to the access road.
- Visibility, dust and congestion-related risks are substantially reduced compared to construction.
- Road safety conditions are expected to return to normal over the short to medium term once operational traffic declines or ends.

7.11.3.3 Security Personnel

Security personnel remain stationed at the project entrance and controlled access points throughout the operational period to protect infrastructure and regulate entry. Their presence is stable, routine and predictable, which helps minimize concern compared to the construction phase. Although some residents living nearest to the access point may continue to experience minor perceptual discomfort due to the continuous visibility of security staff, the effect remains limited to the immediate project area and carries no physical or socio-economic risk. Overall, this perceptual impact is low in intensity, medium in significance given local sensitivity, and is expected to diminish quickly once security visibility decreases.

7.11.3.4 Emergency Risks

Certain inherent hazards – such as gas systems, turbines and high-voltage equipment – remain present within the facility, and their continuous visibility can lead nearby residents to associate the plant with potential emergency events. Although engineering controls significantly limit the likelihood of these hazards causing off-site impacts, the perception of risk

is likely to persist among community members with high sensitivity to technological infrastructure. Overall, the impact reflects sustained, medium-intensity concern that gradually decreases over the medium term as continued safe performance and clear communication strengthen community confidence.

These impacts are relevant from a human rights perspective in relation to the right to health and safety of affected communities.

Table 7-53. Summary of Impact Significances of the Receptors for the Operation Phase – Community Health, Safety and Security

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
Operational Activities and Community Nuisance	Negative Direct	Definition	The impact is limited to communities located in the immediate vicinity of the Project site and associated access routes.	The impact will persist throughout the full operational lifetime of the project	The impact causes only minor nuisance and does not lead to measurable or lasting health or structural effects.	Low-level nuisance associated with normal operational activities is recurrent in nature.	-	Conditions are expected to return to normal over the short to medium term once operations cease or are significantly reduced.	Medium	Medium
		Score	Local	Very Long	Low	Recurrent	N/A	Mid-term		
		Value	2	5	2	3	-	3		
	Impact Magnitude (G+D+I+F (or L)) x R		36						3	108
Traffic and Transport Safety	Negative Direct	Definition	The impact is limited to communities located along the immediate access routes used during operation.	The impact may persist throughout the entire operational lifetime of the project	The impact presents a noticeable but manageable level of road safety concern for nearby residents.	Vehicle movements occur occasionally during staff transport and periodic material deliveries.	-	Road safety conditions are expected to return to normal over the short to medium term once operational traffic decreases or ceases.	Medium	Low
		Score	Local	Very Long	Medium	Infrequent	N/A	Short/Mid-term		
		Value	2	5	3	2	-	2		
	Impact Magnitude (G+D+I+F (or L)) x R		24						3	72
Security Personnel	Negative Direct	Definition	The impact is confined to	The impact persists	The effect is limited to	Security personnel	-	Perceptual concerns are	Medium	Low

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)							Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)		
			the immediate project entrance and security-controlled areas.	throughout the full operational life of the project	minor perceptual discomfort without physical or socio-economic consequences.	are visibly present on a continuous daily basis during operation.		expected to diminish rapidly once security presence is removed or reduced.		
		Score	Project Site	Very Long	Low	Continuous	N/A	Short-term		
		Value	1	5	2	5	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		13						3	39
Emergency Risks	Negative, Direct	Definition	The impact is limited to communities located near the facility, with any potential effects confined to the immediate surrounding area.	The impact persists throughout the full operational lifetime of the project, as inherent technological risks remain present as long as the facility operates.	The impact reflects sustained perceptual concern among residents despite the absence of physical exposure.	-	Risk perception is likely to persist due to the continuous visibility of energy infrastructure, despite safety controls.	Risk perception is expected to decrease gradually over time through continued safe operation and improved community awareness, but not immediately.	High	Medium
		Score	Local	Very Long	Medium	N/A	Likely	Short/mid-term		
		Value	2	5	3	-	3	2		
	Impact Magnitude (G+D+I+F (or L)) x R		26						5	130

7.11.4 Mitigation Measures

7.11.4.1 Construction and Operation Phase

Operational Activities and Community Nuisance

Construction Phase

- Water spraying, road wetting, and covering of materials will be applied to reduce dust generation.
- Noise and vibration levels will be managed in accordance with limit values, and well-maintained machinery will be used.
- Construction activities will be restricted to daytime hours where feasible.
- Speed limits will be reduced on road sections close to settlements to lessen the impact of heavy machinery movement.
- Communities will be informed in advance to increase awareness during periods of high construction activity.
- Advance notification system will be used to inform communities about planned noisy or visually intrusive works.

Operation Phase

- Routine noise levels during operation will be maintained within acceptable limits through regular maintenance and emission controls.
- Facility equipment will be operated in accordance with environmental management plans to prevent nuisance during normal operations.

Traffic and Road Safety

Construction Phase

- Speed limit enforcement and mandatory safe-driving training will be provided for all heavy-vehicle drivers.
- Traffic regulation, guidance and temporary warning signage will be installed along roads close to communities.
- Additional speed-reduction measures (e.g., speed bumps, signage) will be implemented in areas with high concentrations of children and pedestrians.
- Regular road watering will be conducted to control dust.
- Transport of materials and equipment will be scheduled, where possible, during off-peak hours.
- Additional child-safety signage and speed-reduction measures will be installed near household clusters, schools and informal play areas.

Operation Phase

- Personnel transport and delivery vehicles will adhere to designated routes without deviation.
- Speed limits and safety rules will continue to be enforced for low-intensity operational traffic.
- Periodic maintenance and signage improvements will be carried out to enhance road visibility.
- Additional child-safety signage and speed-reduction measures will be installed near household clusters, schools and informal play areas.

Workforce Presence

Construction Phase

- Strict access control will be applied at the worker camp, and unauthorized worker movement toward settlements will be prevented.
- A Worker Code of Conduct will be developed and mandatory training will be provided to all employees.
- Transport routes and shift movements will be planned in a controlled manner to minimise the risk of direct interaction between workers and community members.
- Issues requiring special sensitivity for vulnerable groups (e.g., GBV/SEA risks, privacy concerns, night-time safety) will be monitored by the Project team.
- The community grievance mechanism will remain visible, accessible and available in multiple languages.
- Mandatory GBV/SEA awareness training will be provided to all workers, with a clear zero-tolerance policy communicated to both workers and communities.

Operation Phase

- The Code of Conduct for operational personnel will be updated and enforced.
- The controlled access system will continue to operate, ensuring that unnecessary worker-community interaction is minimised.
- Regular information meetings will be held to help reduce community concerns.

Security Personnel

Construction Phase

- Comprehensive training will be provided to security personnel on human rights, prohibition of excessive force and appropriate community interaction.
- The security team's area of responsibility will be clearly defined, ensuring no intervention in community spaces.
- A visible but non-intrusive security approach will be adopted at controlled entry points.

- Security activities will be supported by clear, transparent and timely communication with communities.
- Joint emergency drills will be conducted with local authorities to strengthen preparedness and build community confidence.

Operation Phase

- Unnecessary patrol activities will be limited to reduce the visibility of security personnel.
- Behaviour and communication protocols for security staff will be regularly reviewed and reinforced through ongoing training.
- Regular information sharing will be conducted with local mukhtars and relevant authorities to help reduce community concerns.
- A community-friendly emergency communication system (sirens, SMS/WhatsApp groups, mukhtar notifications) will be established to ensure rapid and clear communication.

Emergency Risks

Construction Phase

- Strict permit-to-work procedures (e.g., hot work permits, fuel handling SOPs) will be implemented for fuel storage, hot work and electrical equipment operations.
- Fire extinguishers, spill kits and emergency response materials will be kept readily accessible across the construction site.
- Regular information sessions will be held to inform communities about emergency preparedness measures and safety protocols, helping to reduce perceived risk.
- Rapid response procedures for spills, fires and equipment failures will be established and supported through periodic drills.

Operation Phase

- Operational safety inspections will be conducted regularly for all high-risk equipment within the facility.
- Coordination with local authorities (fire brigade, health services) will be maintained to strengthen emergency preparedness.
- Periodic information will be shared with communities to reduce perceptual risk regarding safety measures and facility performance.
- Emergency response plans will be updated, and drills will be conducted throughout the operational phase.

These measures also contribute to the prevention and management of associated human rights risks identified through the ESIA process.

7.11.5 Residual Impacts

Summaries of the residual impact significance on community health and safety conditions with the implementation of mitigation measures identified in other relevant sections of the ESIA report are shown in tables Table 7-54 and Table 7-55.

Table 7-54. Residual Impact Significance during the Construction Phase – Community Health, Safety and Security

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)								
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency(F)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
Construction Activities and Community Nuisance	Negative Direct	Score	Local	Long	Medium	Continuous	N/A	Short-term	Medium	Low
		Value	2	4	3	5	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		14						3	42
Traffic and Road Safety	Negative Direct	Score	Local	Long	Medium	N/A	Unlikely	Short-term	Medium	Low
		Value	2	4	3	-	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		10						3	30
Workforce Presence	Negative Direct	Score	Local	Long	Low	Continuous	N/A	Short-term	Medium	Low
		Value	2	4	2	5	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		13						3	39
Security Personnel	Negative Direct	Score	Project Site	Long	Low	Continuous	N/A	Short-term	Medium	Low
		Value	2	4	2	5	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		13						3	39
Emergency Risks	Negative Direct	Score	Local	Long	Low	N/A	Unlikely	Short-term	Medium	Low
		Value	2	4	2	-	1	1		
	Impact Magnitude (G+D+I+F (or L)) x R		9						3	27

Table 7-55. Residual Impact Significance during the Operation Phase – Community Health, Safety and Security

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)								
		Criteria	Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency(F)	Likelihood (L)	Reversibility (R)	Receptor Sensitivity	Impact Significance (Magnitude x Sensitivity)
Operational Activities and Community Nuisance	Negative Direct	Score	Local	Very Long	Low	Recurrent	N/A	Short/mid-term	Medium	Low
		Value	2	5	2	3	-	2		
	Impact Magnitude (G+D+I+F (or L)) x R		24						3	42
Traffic and Transport	Negative Direct	Score	Local	Very Long	Low	Infrequent	N/A	Short-term	Low	Negligible
		Value	2	5	2	2	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		11						1	11
Security Personnel	Negative Direct	Score	Project Site	Very Long	Negligible	Continuous	N/A	Short-term	Low	Negligible
		Value	1	5	1	5	-	1		
	Impact Magnitude (G+D+I+F (or L)) x R		12						1	12
Emergency Risks	Negative Direct	Score	Local	Very Long	Low	N/A	Unlikely	Short/mid-term	Medium	Low
		Value	2	5	2	-	1	2		
	Impact Magnitude (G+D+I+F (or L)) x R		20						3	60

7.12 Cumulative Impacts

7.12.1 Introduction

Cumulative impacts are defined as the incremental environmental and social effects that arise when the impacts of the Downtown Slemani Project interact with those of other past, existing, or reasonably foreseeable future developments within the Project's Area of Influence (AoI). These impacts may occur when multiple activities affect the same environmental or social receptors over time and space.

In the context of the Downtown Slemani Project, cumulative impacts are particularly relevant due to the Project's location within the central urban fabric of Sulaymaniyah, where ongoing urbanization, infrastructure development, and commercial expansion may collectively influence environmental quality and socio-economic conditions.

This section presents the approach to the Cumulative Impact Assessment (CIA), including applicable guidance, methodology, scoping considerations, and preliminary identification of cumulative impact pathways. The assessment considers interactions between the Project and:

- Existing urban conditions (baseline urban pressures such as traffic, air quality, and infrastructure demand),
- Ongoing developments within the central business district, and
- Reasonably foreseeable future urban growth and municipal planning initiatives.

7.12.2 Methodology

Assessment of cumulative impacts considers the effects of other past, present and planned projects with similar impacts on the project area of influence. The key point in determining the need for cumulative impact assessment is to identify one or more impact topics which are affected by different developments.

Cumulative effects can occur as interactions between actions and the environment, and between components of the environment. These "pathways" between a source and an effect are often the focus of an assessment of indirect or cumulative impacts. The magnitude of combined effects along a pathway can be equal to the sum of the individual effects (additive effect) or can be an increased effect (synergetic effect).

The objective of the assessment of cumulative impacts is to identify and focus on significant impacts, and to ensure that these impacts are taken into consideration in the decision-making process. In order to make the assessment effective, at first, these main impacts should be analysed. They can be generally defined as follows.

Cumulative Impacts: These impacts are incremental effects of past, present or future activities together with the proposed project.

Indirect Impacts (Secondary Impacts): These impacts are not directly caused by project. Indirect impacts occur in complex pathways or away from the project.

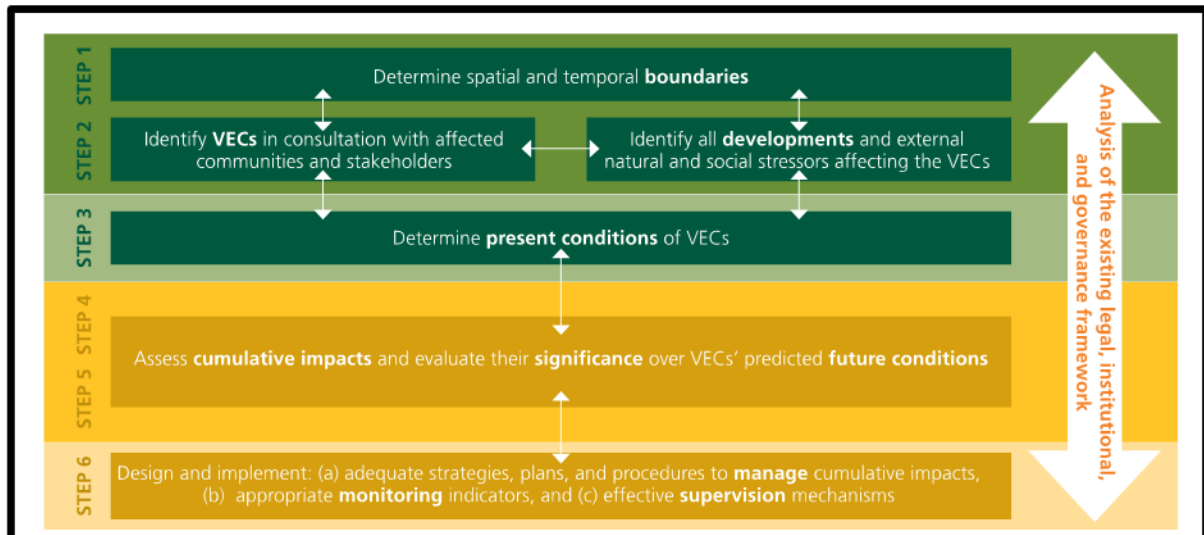
Impact Interactions: These impacts (e.g. reaction of emissions of proposed project) are the results of reactions between impacts of proposed project or other actions.

The approach to this CIA has been undertaken in line with the IFC Good Practice Handbook, Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets. CIA can be considered when the challenges are due to:

- Lack of baseline data related to the other project developments
- Uncertainties associated with anticipated developments
- Limited and emergent, strategic regional, sectoral, or integrated resource planning schemes

In line with IFC PS 1 guidance notes (GN41) the assessment should be “commensurate with the incremental contribution, source, extent, and severity of cumulative impacts anticipated”. The assessment also focuses only on potentially significant cumulative impacts, and on cumulative impacts where the Project’s contribution to cumulative impact is considered to be significant.

The CIA methodology follows the steps indicated in Figure 7-3.



(Source: IFC Good Practice Handbook: Cumulative Impact Assessment and Management)

Figure 7-3. Steps of CIA

Cumulative impact assessment is based on consideration of the status of the activities/developments in the vicinity of the Project site and the nature of the information available in order to predict the magnitude of the impact arising from the other activities/developments. The focus is the condition of the Valued Environmental and Social Components (VECs) and the scope of the expanded spatial and temporal boundaries for the analysis.

The CIA methodology comprises the following:

- Scoping phase, which is to: (i) determine spatial and temporal boundaries, (ii) identify VECs and identify all other activities/ developments affecting VECs
- Baseline condition of VECs

- Assessment of cumulative impacts and evaluation of the significance over VECs' predicted future conditions
- Mitigation measures and management strategies

It is important to note that since the impacts and mitigation measures are detailed in the ESIA Report, the assessment given in this section is focused on the residual impacts from the Project after taking necessary mitigation measures.

7.12.3 Cumulative Impacts

The Downtown Slemani Project is located in a rapidly developing urban environment, where cumulative impacts are primarily associated with:

- Urban traffic and mobility patterns
- Air quality and emissions from transportation
- Noise levels in densely populated areas
- Demand on municipal infrastructure (water, wastewater, waste management)
- Socio-economic dynamics (employment, land value, service demand)

No single large-scale industrial or infrastructure project has been identified in the immediate vicinity that would independently drive significant cumulative impacts. Instead, cumulative effects are expected to arise from the combined influence of multiple urban developments and existing city conditions.

7.12.3.1 Cumulative Impacts During Construction

During the construction phase, cumulative impacts may arise where Project activities overlap with other urban construction activities and existing city dynamics.

- Traffic and Transportation
 - Increased construction traffic combined with existing urban congestion on key routes (e.g., Malik Mahmoud Ring Road)
- Air Quality
 - Combined dust emissions from multiple construction sites and urban traffic
- Noise and Vibration
 - Overlapping construction activities contributing to elevated ambient noise levels
- Waste Management
 - Increased pressure on municipal waste collection and disposal systems
- Community Health and Safety
 - Cumulative risks associated with traffic, pedestrian movement, and construction activities in a dense urban setting
- Labour and Social Dynamics

- Localized labour influx and increased demand on services (limited due to moderate workforce scale)

Given the temporary nature of construction activities and the moderate scale of workforce (approx. 400–800 personnel), cumulative impacts during construction are expected to be:

- Short-term and localized,
- Manageable through standard mitigation measures, and
- Not significant, provided that traffic management, dust control, and community safety measures are effectively implemented.

7.12.3.2 Cumulative Impacts During Operation

During the operation phase, cumulative impacts become more relevant due to the long-term presence of the Project and its interaction with existing urban systems. In this context, cumulative effects are primarily associated with traffic, air quality, noise, infrastructure demand, and socio-economic conditions within the Project's Area of Influence.

With respect to traffic and mobility, the Project will generate additional vehicle movements associated with residents, visitors, and commercial activities. When combined with existing and anticipated future urban traffic, this may contribute to increased congestion during peak periods and may influence local mobility patterns, including pedestrian flows. However, considering the Project's central location and mixed-use design, which promotes walkability and internal trip distribution, the overall cumulative impact on traffic is expected to remain moderate and manageable.

In terms of air quality, cumulative impacts are mainly linked to traffic-related emissions within the urban airshed. The Project itself does not introduce significant point-source emissions, and its contribution is therefore indirect. When assessed together with existing urban emission sources, cumulative impacts on air quality are expected to remain localized and within the range of typical urban baseline conditions. Provided that applicable standards are met, these impacts are not anticipated to be significant.

Regarding the noise environment, operational activities such as commercial functions, traffic, and periodic events may contribute incrementally to existing urban noise levels. Given that the Project is located in an area already characterized by elevated baseline noise conditions, the additional contribution is expected to be limited. As such, cumulative noise impacts are assessed as minor to moderate, localized, and consistent with typical urban settings.

For infrastructure and utilities, the Project will introduce additional demand on municipal services, including water supply, wastewater management, solid waste systems, and energy infrastructure. While this may contribute to cumulative pressure on existing systems, the scale of the Project and the anticipated implementation of appropriate management measures are expected to ensure that these impacts remain manageable. Coordination with relevant authorities will be important to maintain service capacity and performance.

Finally, in terms of socio-economic conditions, the Project is expected to contribute positively when considered cumulatively with other urban developments. Benefits are likely to include

increased employment opportunities, enhanced commercial activity, and support for urban regeneration and improved public spaces. Some indirect pressures, such as increased cost of living or demand for housing and services, may occur; however, these are typical of urban growth dynamics. Overall, cumulative socio-economic impacts are assessed as moderate and predominantly beneficial.

The cumulative impacts associated with the Downtown Slemani Project are primarily driven by its integration within a dynamic urban environment, rather than interaction with major individual projects.

Key conclusions are:

- Cumulative impacts are largely related to urban systems (traffic, infrastructure, air quality)
- Most impacts are incremental, localized, and manageable
- No significant or critical cumulative impacts have been identified at the scoping stage
- Positive cumulative effects related to urban development and economic growth are expected

With the implementation of appropriate mitigation measures and coordination with municipal planning, cumulative impacts are expected to remain within acceptable limits in line with IFC and national requirements.

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER 8 – STAKEHOLDER ENGAGEMENT)



JULY 2026

ANKARA



DOWNTOWN SLEMANI PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By				Quality Management By	Checked By	Approved By
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Revision Codes: A: Draft, B: Final Draft, C: Final

Project No: 25 / 026

JULY 2026

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TABLE OF CONTENTS

	<u>Page</u>
8 STAKEHOLDER ENGAGEMENT	1
8.1 The Project Social Area of Influence	2
8.2 Stakeholder Identification	4
8.3 Stakeholder Engagement Activities during ESIA Study	6
8.3.1 Stakeholder Engagement Activities Conducted to Date	6
8.3.2 Planned Stakeholder Engagement Activities	7
8.4 Grievance Mechanism	7
8.4.1. Public Grievance Mechanism	8
8.4.2. Worker Grievance Mechanism	9

LIST OF TABLES

	<u>Page</u>
Table 8-1. Social Area of Influence	3
Table 8-2. Stakeholder Groups	5

LIST OF FIGURES

	<u>Page</u>
Figure 8-1. Nearby neighbourhoods and sensitive receptors in the vicinity of the Project Area	4

ABBREVIATIONS

AoI	Area of Influence
CLS	Community Level Survey
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
IFC	International Finance Corporation
NGO	Non-Governmental Organization
NTS	Non-Technical Summary
SEP	Stakeholder Engagement Plan

8 STAKEHOLDER ENGAGEMENT

Stakeholder engagement constitutes a core component of the Environmental and Social Impact Assessment (ESIA) process for the Downtown Slemani Mixed-Use Urban Development Project. The purpose of stakeholder engagement is to ensure that all individuals, groups and institutions that may be affected by the Project, or have an interest in its outcomes, are informed in a timely, transparent and culturally appropriate manner, and are provided with opportunities to express their views, expectations and concerns.

- Identify all individuals, groups and institutions who may be directly or indirectly affected by the Project, including vulnerable groups,
- Provide stakeholders with accurate and easy-to-understand information regarding the Project's scope, design and potential impacts,
- Understand community perceptions, expectations, local needs and socio-economic conditions in the Area of Influence (AoI),
- Maximize potential benefits to neighbouring communities, including through employment and local procurement opportunities,
- Ensure that mitigation measures are feasible, effective and responsive to stakeholder inputs,
- Establish a long-term, transparent and trust-based communication system between the Project and local communities throughout the Project lifecycle.

A stand-alone SEP has been prepared for the Project to guide structured and continuous engagement with stakeholders during the ESIA study and subsequent phases. The SEP outlines the key stakeholder groups, consultation approaches, disclosure practices and grievance management procedures that the Project will implement. It also presents the full list of engagement methods tailored for affected communities, local institutions, government authorities, and vulnerable groups such as female-headed households, elderly individuals and persons with disabilities.

The stakeholder engagement approach has also been informed by the identification of potential human rights risks through the ESIA process, in line with the requirements of the Equator Principles 4, particularly in relation to access to information, inclusion of vulnerable groups, community perceptions and access to grievance mechanisms.

The SEP includes a Project level Grievance Mechanism (GM), which is one of the most important tools of stakeholder engagement. The GM enables community members and other external stakeholders to submit comments, concerns or complaints through accessible channels (in-person, phone, email, website or grievance boxes). All grievances are recorded, classified and addressed in line with Hiwa Rauf corporate procedures and international good practice.

Stakeholder engagement is an ongoing and adaptive process. The SEP will be regularly updated as the Project progresses from ESIA preparation to construction, operation and ultimately decommissioning. The current version of the SEP covers the consultation activities

undertaken as part of the ESIA study and the planned engagement activities for disclosure and implementation stages.

The SEP will be published on the Project Owner's website together with the Draft ESIA Report, enabling stakeholders to review both Project information and engagement plans, and to provide their feedback.

This chapter presents:

- Definition of the Project Aol,
- Identification of key stakeholders for the Project,
- Stakeholder engagement activities conducted to date,
- Planned stakeholder engagement activities for ESIA disclosure and Project implementation,
- The Project Grievance Mechanism.

8.1 The Project Social Area of Influence

The social baseline conditions presented in this section are based on desk research, field consultations and socio-economic surveys carried out for Downtown Slemani Project. The Social Aol has been defined by considering potential demographic, livelihood, community health and safety, and environmental impacts that may occur during the construction and operation phases.

In line with the overall Project Aol definition:

- The primary Area of Influence (Aol) includes the Project footprint (approximately 100,000 m²), the immediate surrounding residential and industrial areas, as well as adjacent sensitive receptors such as schools, and public institutions. This area comprises locations that are expected to experience direct environmental and social impacts during both construction and operation phases. These impacts may include noise and dust emissions, increased construction traffic, temporary access disruptions, as well as risks associated with worker presence and community health and safety.
- The secondary Aol includes neighbourhoods connected to the Project through transport corridors, users of nearby facilities such as courts, offices, and commercial areas, as well as local businesses and industrial zones. These areas are expected to experience indirect impacts resulting from Project activities. Such impacts may include increased traffic volumes, economic interactions, labour influx, and potential community health and safety risks

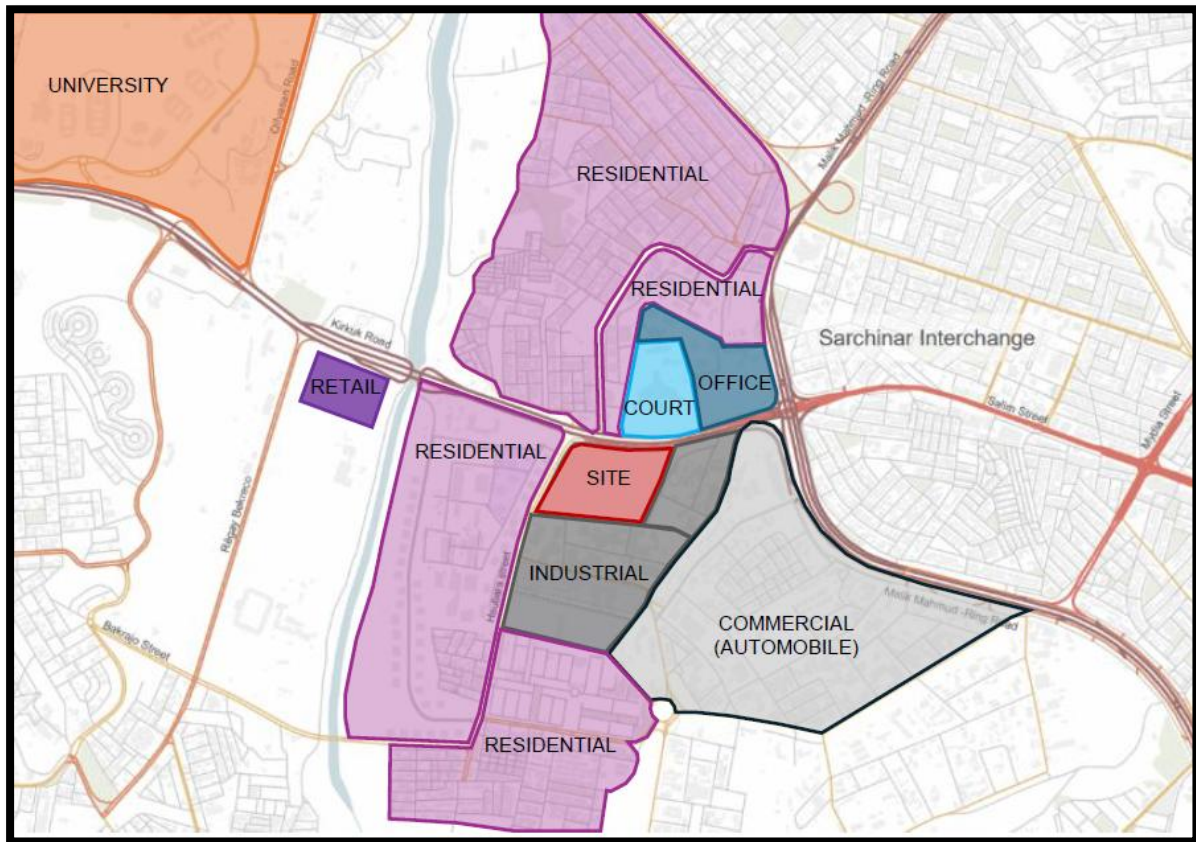
The wider Area of Influence includes provincial and national-level stakeholders, such as ministries and relevant authorities, as well as non-governmental organizations (NGOs) and institutions with regulatory, environmental, or social interests in the Project. These stakeholders may not be directly affected by physical Project activities but play an important role in oversight, governance, and stakeholder engagement processes.

The Project will implement appropriate mitigation measures to minimise potential adverse effects on local communities, workers and institutions within this Social AoI. The classification of the Social Area of Influence is summarised in Table 8-1 below.

Table 8-1. Social Area of Influence

Primary Social Area of Influence		
Component / Group		Description of Potential Impacts
Project site and immediate surroundings within Downtown Slemani Project Area		Direct environmental and social impacts during construction and operation, including noise, dust, waste generation, increased construction traffic, temporary disturbance to nearby facilities, and occupational health and safety risks for on-site personnel.
Project workers (including contractor and subcontractor personnel)		Risks related to labour and working conditions, occupational health and safety, accommodation conditions, worker–community interaction, and the need for effective worker grievance mechanisms and information channels.
Secondary Social Area of Influence - Settlement		
Province/District	Neighborhoods	Description of Potential Impacts
Sulaymaniyah / Central District	Derwaza	During the construction and operation: • Increased traffic along access routes • Temporary labour influx • Noise and dust • Community health, safety and security risks • Mid/Short-term employment opportunities
Sulaymaniyah / Central District	Awbara	
Secondary Social Area of Influence		
Component / Group		Description of Potential Impacts
Wider Sulaymaniyah Municipality		Indirect impacts associated with transport routes, administrative coordination, demand for services and accommodation, and increased interaction with Project staff and contractors.

The locations of nearby neighbourhoods and sensitive receptors in the vicinity of the Project site are illustrated in Figure 8-1. **Error! Reference source not found.**



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Figure 8-1. Nearby neighbourhoods and sensitive receptors in the vicinity of the Project Area

8.2 Stakeholder Identification

Stakeholder identification is a key step in managing the overall stakeholder engagement process. IFC defines stakeholders as “persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence the Project’s outcome. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses” (IFC, 2007:10).

For the Downtown Slemani Project, stakeholders are grouped into three key categories in line with the SEP: affected parties, interested parties and vulnerable/disadvantaged groups.

Affected parties include individuals, households, workers and communities that may experience direct or indirect impacts from the Project’s construction or operation activities. Interested parties include governmental bodies, NGOs, local institutions, academic entities and other organizations whose mandates or interests may be influenced by the Project. Vulnerable or disadvantaged groups are individuals or households that may be disproportionately affected due to factors such as age, disability, income level, health condition

or social status, and who may face additional barriers to accessing information or participating in engagement activities. The identification of vulnerable groups also reflects a consideration of potential human rights risks related to unequal access to information, participation and grievance mechanisms.

Stakeholder groups identified for the Downtown Slemani Project are presented in Table 8-2 below.

Table 8-2. Stakeholder Groups

Stakeholder Groups	Stakeholder Type	Impact/Interest Reason	Impact/ Interest Level
Internal Stakeholders			
Project employees, including contractor and subcontractor personnel, suppliers, and camp staff.	Project-affected party	Workers directly involved in construction, operation activities; potentially affected by occupational health and safety, working conditions, and accommodation standards.	High
Government / Authorities			
Ministry of Environment (MoEn)		Responsible for issuing Environmental Approval and Permit, and for ensuring compliance with Law No. 27 of 2009.	High
Ministry of Health (MoH)		Oversees public health, worker health, and community health related to emissions and water quality.	Medium
Slemani Governorate and District Authorities		Local authorities responsible for land use planning, local infrastructure, environmental health, waste management, and coordination with MoE.	High
State Board of Antiquities and Heritage (SBAH)		May have an interest in the protection and preservation of cultural heritage assets within or near the project area, particularly in relation to potential impacts of construction activities on archaeological sites, historical structures, or undiscovered heritage resources	Low – Medium
Local Communities and Institutions			
Derwaza neighbourhood	Project-affected party	Within Aol; may experience dust, noise, and traffic during construction and benefit from temporary job opportunities.	High
Awbara neighbourhood		Within Aol; may experience dust, noise, and traffic during construction and benefit from temporary job opportunities	High
Nearby small enterprises and service facilities along access roads		May be affected by construction-phase traffic, dust, and temporary road use changes.	Medium

Stakeholder Groups	Stakeholder Type	Impact/Interest Reason	Impact/Interest Level
Non-Governmental Organizations (NGOs)			
National and local environmental or social NGOs (Women)	Project-interested party	May advocate for gender-inclusive planning, community health, and environmental protection, with particular attention to the needs and potential impacts on women and vulnerable groups during construction and operation phases; may also support awareness-raising and stakeholder engagement activities.	Medium
Vulnerable/Disadvantaged Groups			
- Female household head - Elderly in need of care and social assistance - Person with disabilities (Physical/mental) - Unemployed (actively seeking work) - Widowed/divorced women - Individuals homebound due to chronic illness - School-age children unable to attend school	Project-affected party	May experience limited access to project information, consultations, or benefits due to social, economic, or physical constraints. Require targeted engagement and inclusive mitigation measures to ensure equal participation and benefit-sharing.	High

Stakeholder identification will be updated regularly to reflect any new individuals, groups, or institutions that may become relevant during Project implementation.

Engagement methods will be tailored to the needs and capacities of each stakeholder group, ensuring that vulnerable people and those in remote settlements are adequately reached and consulted.

8.3 Stakeholder Engagement Activities during ESIA Study

8.3.1 Stakeholder Engagement Activities Conducted to Date

During the ESIA preparation phase of the Project, stakeholder engagement activities were carried out to inform relevant authorities and local stakeholders and to collect baseline socio-economic information within the Project Area of Influence (Aoi).

As part of the fieldwork, meetings were conducted with key governmental institutions, including the Investment Directorate, Wastewater Directorate, and Traffic Directorate, to introduce the Project, discuss its potential implications, and ensure coordination regarding infrastructure, environmental considerations, and permitting processes.

At the local level, a community-level survey was conducted with the mukhtar of Derwaza to obtain initial information on local conditions, settlement characteristics, and community dynamics.

In addition, engagement activities were carried out with women-focused NGOs, during which information about the Project was provided and feedback was collected regarding community expectations, potential social impacts, and specific concerns related to women and vulnerable groups.

These stakeholder engagement and data collection activities aimed to develop a comprehensive understanding of the local socio-economic baseline, including demographic structure, livelihoods, access to services, and stakeholder perceptions regarding the Project.

The information collected through these activities has been incorporated into the relevant sections of the ESIA Report, where detailed analysis and findings are presented. Records of the consultations, including meeting notes and participant information, are documented within the SEP.

The primary purpose of these activities was to collect comprehensive baseline information on demographic structure, livelihoods, vulnerability, local infrastructure and services, as well as perceptions regarding potential Project impacts. The data collected have been incorporated into Chapter 6 of the ESIA Report, where detailed findings and their analysis are presented.

Photographic records, daily field logs, and participant list from the consultation meetings conducted during the ESIA fieldwork are included in the SEP.

8.3.2 Planned Stakeholder Engagement Activities

As the Project progresses, stakeholder engagement will continue to ensure transparent communication, meaningful dialogue, and inclusive participation throughout both the ESIA disclosure process and the Project's implementation. Planned activities focus on providing timely information to stakeholders, collecting feedback, and ensuring that community concerns are reflected in Project planning and decision-making.

The Draft ESIA Report and its Non-Technical Summary will be publicly disclosed through the Project Owner's website and local institutions, supported by announcements via local media and community notice boards. A Public Consultation Meeting will be held in Slemani to present key ESIA findings, discuss potential impacts, and introduce the mitigation measures and Grievance Mechanism. Feedback received during disclosure will be reviewed, documented, and incorporated into the Final ESIA.

During construction and operation, regular updates on Project progress, environmental monitoring, and community health and safety will be shared through accessible channels. Periodic meetings with local authorities, mukhtars, and community representatives will help address emerging issues, while the Grievance Mechanism will remain continuously available through multiple submission channels. Awareness-raising activities for workers and nearby residents will be delivered as needed, and stakeholder engagement performance will be

monitored annually to improve the SEP. All activities will be conducted in line with ESS10, ensuring inclusiveness, cultural appropriateness, and systematic documentation.

8.4 Grievance Mechanism

The Project will implement a project-level Grievance Mechanism (GM) to receive, assess, and resolve concerns from external stakeholders and workers in a timely, fair, and transparent manner. The system is aligned with Hiwa Rauf's corporate procedure and national requirements, ensuring accessibility in Kurdish and English, confidentiality, non-retaliation, and the option for anonymous submissions. All grievances will be registered, classified, investigated, and tracked through a standardized process. Detailed procedures, workflow, and templates are provided in the SEP. The Grievance Mechanism constitutes a key measure for addressing potential human rights risks by ensuring access to remedy for affected communities and workers in line with international good practice.

8.4.1. Public Grievance Mechanism

Complaints from external stakeholders will be received through multiple accessible channels, including designated contact points such as digital platforms, email, and on-site communication channels. Grievance boxes located in Derwaza and Awbara neighbourhoods, email, postal mail, telephone/hotline, and the Project website. All grievances submitted in Kurdish or English will be registered in the Public Grievance Log and assigned a unique reference number. Complainants will be informed of their reference number either on the same day (for in-person or phone submissions) or within seven days of receipt (for email or postal submissions).

The Public Grievance Log will be used to track the status of each grievance, monitor response timelines, and analyse recurrent issues, trends, and sources of complaints. Each grievance record will include, at minimum:

- Unique grievance reference number,
- Date and method of submission,
- Location where the grievance was received (including grievance boxes),
- Complainant's contact details (for non-anonymous submissions),
- Summary of the concern or complaint,
- Responsible parties for investigation,
- Dates of investigation initiation and completion,
- Investigation findings and proposed corrective actions,
- Date when the response was communicated to the complainant (for non-anonymous submissions),
- Deadlines for required follow-up actions,
- Confirmation of whether the complainant is satisfied or an explanation for unresolved cases,
- Close-out status and any outstanding actions.

Following registration, grievances will be classified (A/B/C/D) in accordance with Hiwa Rauf's procedure, and the significance of the issue will be evaluated. Critical cases, including allegations of GBV/SEA/SH, will follow a survivor-centred approach and the escalation pathway outlined in the SEP. Routine and non-critical grievances will be investigated and resolved by the relevant departments, with final responses generally targeted within 14 days where practicable. Anonymous submissions will be accepted and addressed based on available information, and outcomes will be communicated through public channels without revealing personal details.

8.4.2. Worker Grievance Mechanism

A separate mechanism is provided for all Project workers – including subcontracted and migrant workers – to raise workplace-related concerns confidentially and without fear of retaliation. Workers may submit grievances through multiple channels, including worker grievance boxes located in dormitories, dining halls, and site offices (none of which are monitored by CCTV), dedicated worker grievance email, and face-to-face meetings with supervisors or contractor representatives.

Contractors manage the day-to-day grievance process, including registration of each grievance in the Worker Grievance Log, acknowledgement within seven days, classification (A/B/C/D), coordination of investigations, and issuance of a final response – typically within 14 days where practicable. Unresolved or escalated cases are referred to HRID for review and oversight. All cases are monitored until closure, and corrective actions are tracked to ensure effectiveness. Anonymous submissions are fully accepted and handled with the same level of diligence. Detailed procedures, responsibilities, and grievance templates are provided in the SEP.

DOWNTOWN SLEMANI PROJECT



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER 9 – ENVIRONMENTAL AND SOCIAL MANAGEMENT)



JULY 2026

ANKARA



DOWNTOWN SLEMANI PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By				Quality Management By	Checked By	Approved By
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Revision Codes: A: Draft, B: Final Draft, C: Final

Project No: 25 / 026

JULY 2026

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TABLE OF CONTENTS

	<u>Page</u>
9 ENVIRONMENTAL AND SOCIAL MANAGEMENT	1
9.1 Environmental, Health and Safety and Social Policy (EHSS)	2
9.2 ESMS Planning	2
9.2.1 Environmental Social Management Plan (ESMP).....	2
9.2.2 Environmental, Social Management System (ESMS)	3
9.3 Implementation of the ESMS	3
9.3.1 Overall Governance of the Project and Responsibilities	3
9.3.2 Management of Construction and Operation Works	5
9.3.3 Contractor Management.....	7
9.3.4 Communication	7
9.3.5 Documentation and Document Control.....	7
9.3.6 Operational Control	7
9.3.7 Environmental and Social Emergency Preparedness and Response	8
9.4 ESMS Control	9
9.4.1 Monitoring, Measurement and Review	9
9.4.2 External Reporting.....	9
9.4.3 Internal Reporting.....	9
9.4.4 Non-conformities and Corrective, Preventive, and Improving Actions.....	10
9.4.5 Data Control.....	10
9.4.6 Management Review.....	11
9.5 Stakeholder Engagement.....	11
9.6 Grievance Management	11

LIST OF TABLES

	<u>Page</u>
Table 9-1. Project Organizational Management.....	5

LIST OF FIGURES

	<u>Page</u>
Figure 9-1. Organizational Chart	4

ABBREVIATIONS

ADM	Administration Supervisor
EHS	Environment, Health, and Safety
EHSS	Environment, Health, Safety and Social
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
HR	Human Resources
IFC	International Finance Corporation
OHS	Occupational Health and Safety
PS	Performance Standard
SEP	Stakeholder Engagement Plan

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT

This chapter outlines the arrangements for managing environmental, occupational and community health and safety, as well as social and labour-related risks and impacts (collectively referred to as “environmental and social” risks) throughout the construction, operation, and decommissioning phases of the Project. A comprehensive management system is proposed to ensure effective control of these risks and to ensure compliance with applicable national legislation and Lenders’ Requirements. Human rights risks identified through the ESIA process are addressed through the ESMS as an integral part of the management of environmental and social risks and impacts, in line with applicable international good practice.

The Project Owner, together with the contractor, will establish an integrated Environmental and Social Management System (ESMS) covering both construction and operation phases. The ESMS will facilitate effective management of environmental and social risks and impacts by:

- i) implementing, monitoring, and reviewing the identified mitigation measures
- ii) ensuring continuous supervision of all relevant processes
- iii) promoting ongoing improvement of environmental and social performance

The ESMS will be developed and implemented for the entire duration of the Project. Decommissioning activities will be addressed through specific management plans, which will be prepared during the construction and operation phases.

The ESMS will be prepared in line with the following international good practice and guidelines:

- Project relevant national laws and regulations,
- International Finance Corporation (IFC) Performance Standard (PS) 1 - Assessment and Management of Environmental and Social Risks and Impacts,
- IFC Environmental, Health and Safety (EHS) General Guidelines,
- Environmental and Social Management Plan (ESMP) prepared within the scope of the Environmental and Social Impact Assessment (ESIA) study.

The ESMS will integrate the planning, implementation, control, and review of all processes associated with environmental and social impacts. Its scope will be clearly defined in an “ESMS Manual” to be developed for the Project. This chapter has been prepared to outline the proposed structure of the ESMS and the associated documentation. The ESMS will address the following components:

- Environmental, Health and Safety and Social (EHSS) Policy
- Planning of the ESMS
- Implementation of the ESMS
- Control of the ESMS (including monitoring and audit)

- Stakeholder Engagement
- Grievance Management

9.1 Environmental, Health and Safety and Social Policy (EHSS)

The Project Owner has established corporate-level Environmental & Social (ES) and Environmental, Health and Safety (EHS) policies. These policies will be applied to the Project and will guide all activities and associated environmental and social considerations, providing a framework for setting and reviewing environmental and social objectives and targets.

In addition, the Project Owner has established Human Resources (HR), Recruitment, and Diversity, Equity and Inclusion (DEI) policies, which define core values and principles, including fair and transparent hiring practices, equal employment opportunities, diversity and inclusion, and active participation of all employees in management and decision-making processes, in alignment with IFC Performance Standard 2.

The ES and EHS policies apply to the Project Owner, contractors, and all subcontractors involved in the Project. The Project Owner will ensure the implementation of these policies by all Project-related parties through contractual agreements. HR, Recruitment, and DEI policies apply to the Project Owner's direct workforce and will inform labour and management practices across the Project.

The policies will encompass the following:

- Compliance with environmental protection and applicable EHS regulatory requirements
- Compliance with occupational health and safety and human resources management standards
- Adherence to Lenders' requirements
- Commitment to engagement with affected communities and relevant stakeholders
- Commitment to continuous improvement and enhancement of service quality

9.2 ESMS Planning

9.2.1 Environmental Social Management Plan (ESMP)

The ESIA process has identified key environmental and social impacts and risks associated with the Project, along with the corresponding mitigation and management measures required. An ESMP will be developed to define how these mitigation commitments will be implemented, monitored, and managed. The ESMP serves as a critical link between the ESIA findings and the practical application of mitigation measures, providing an initial framework for management and monitoring to ensure the effective fulfilment of ESIA commitments.

The ESMP also outlines the procedures and responsibilities for managing the Project's environmental and social obligations from the design and pre-construction stages through to construction and operation. As a dynamic document, the ESMP:

- Integrates the environmental and social mitigation measures identified through the ESIA process into a comprehensive framework to support and ensure effective management throughout the Project lifecycle.
- Establishes a structure for embedding these commitments into the Project's construction and operation plans and procedures.
- Defines the allocation of responsibilities for fulfilling ESMP requirements, including the provision of necessary training.
- Provides a framework for the Project Owner to implement specific management plans that comply with national legislation and IFC Performance Standards.
- Outlines the monitoring, verification, and reporting programme, including procedures for corrective actions

This ESMP is applicable to the following stages of the Project's lifecycle:

- Construction
- Operation

This ESMP represents a commitment by the Project Owner to environmental and social sustainability, and this commitment will also apply to the Project (sub)contractors. Relevant commitments are also made about the Project supply chain.

9.2.2 Environmental, Social Management System (ESMS)

The identification of the EHSS aspects, significant risks and impacts of the Project is considered to be the principal stage of the planning of an effective ESMS. Significant impacts of the Project have been identified within the scope of the ESIA study and an ESMP (Annex-A) has been developed for the Project in order to manage these significant impacts as set out in.

EHSS objectives and targets will be established for the Project to ensure compliance with legal requirements and to promote continuous improvement in environmental and social performance. These objectives and targets will address matters such as the efficient use of raw and auxiliary materials, the conservation and reduction of natural resource and energy consumption, enhancement of employee awareness, and the reduction of health and safety incidents. All targets will be specific, measurable, achievable, and supported by dedicated programmes. Each programme will include defined timelines and assigned responsibilities to ensure the achievement of the desired outcomes. All environmental and social objectives, targets, and associated programmes will be formally documented and regularly monitored.

9.3 Implementation of the ESMS

9.3.1 Overall Governance of the Project and Responsibilities

Project Owner is responsible for financing, construction, and operation of the Project. The Project Owner, in collaboration with contractors and suppliers, will establish, maintain and promote, as required, a project-specific organizational structure that defines roles,

responsibilities for the implementation of ESMP. Specific personnel with clear boundaries of responsibility and authority should be appointed, including management representatives.

The Project-specific organizational structure will clearly identify responsibilities for the management of EHSS issues, including stakeholder engagement, environmental management, and occupational health and safety. These functions will be managed by the designated Environmental & Social (E&S) Specialist, with support from relevant specialists as required. Core environmental and social responsibilities will be clearly defined and communicated to relevant personnel. Additionally, personnel will have the necessary knowledge, skills, and experience to effectively implement the measures and actions required under the ESMP. An indicative organizational chart of the governance structure is provided in Figure 9-1.

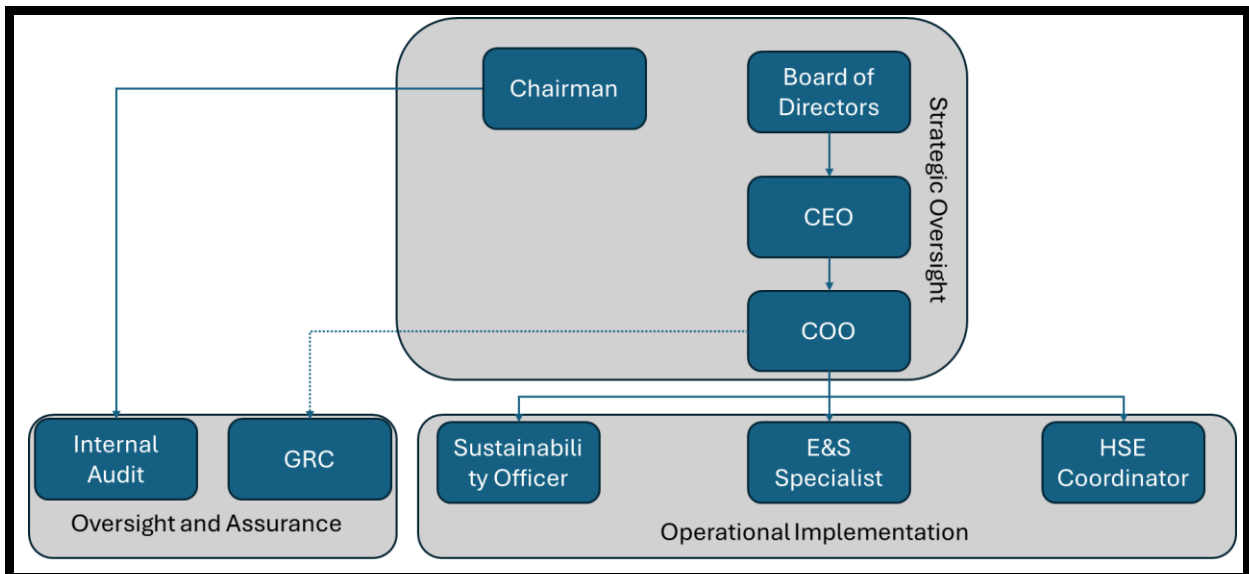


Figure 9-1. Organizational Chart

The Project Owner has the overall responsibility for the establishment, implementation, maintenance, and effectiveness of ESMS and will provide necessary human and financial resources and technical infrastructure for the management of ESMS during all phases of the Project. Human rights risks identified through the ESIA process are managed through the Project's ESMS and associated plans and procedures, as an integral part of the management of environmental and social risks and impacts.

Project Owner has the following responsibilities:

- Develop and implement the EHSS Policy and HR Policy
- Manage environmental, health, safety and social aspects of the Project in line with all relevant international and national environmental, health and safety legislation and commitments as detailed in the ESIA
- Prepare policies, procedures and plans within the scope of national and international requirements and standards to which the Project is subject to, to ensure their implementation, and to inform all relevant parties

- Establish and maintain resources for the management of environmental and social performance of the Project with appropriate mandate, capacity and Environmental and Social (E&S) assurance process
- Appoint qualified resources to maintain regular communication with affected communities and other stakeholders in line with the Project SEP, and manage, review and monitor social commitments within the Environmental and Social Management Plan (ESMP), and Stakeholder Engagement Plan (SEP)
- Ensure SEP is developed and implemented, and that grievance redress mechanism is in place both for workers and external stakeholders (communities, etc.)
- Appoint resources such as Environmental, Health and Safety experts to manage, review and monitor the environmental, occupational health and safety programs to meet Project requirements, including commitments within the ESMP
- Establish a policy/procedure on internal reporting that includes incident reporting and investigation, system to record observations, non-conformance and actions that includes ESMP performance indicators
- Review the (sub)contractors' site-specific implementation plans to ensure they meet the requirements of and support the implementation of the ESMP
- Conduct periodic review of the ESMP effectiveness in line with the provisions of this plan
- Appoint qualified resources such as Social/Human Resources Expert to manage, review and monitor the human resources programs to meet Project requirements, including commitment within the ESMP

9.3.2 Management of Construction and Operation Works

As it is stated above, Project Owner and (sub)contractors play important roles and hold responsibilities for execution of the Project during its construction and operation stages. The Project Owner will employ experts in order to ensure effective collaboration between these parties and to meet environmental and social requirements of the Project during construction and operation stages.

Responsible parties and terms of references are shown in Table 9-1.

Table 9-1. Project Organizational Management

Responsible Party	Terms of Reference
Project Owner	• The Project Owner is responsible for ensuring sufficient EHSS resources are available for the effectively implementation of ESMS practices at the Project site. • The Project Owner is responsible for supervision of contractors for the implementation of ESMP and overall environmental and social risk management for the Project. • The Project Owner will check both the technical and administrative progress of contract packages and the implementation of the points provided in ESMP and SEP on site together with the Environmental & Social Specialist, Sustainability Officer, and HSE Coordinator, who will be involved in the Project Organizational Chart.

Responsible Party	Terms of Reference
	In addition to on-site inspections, the Project Owner will review the Environmental and Social Monitoring reports to be submitted by contractors on a monthly basis and will submit these reports to Lender periodically.
Environmental, Health, Safety and Social (EHSS)	The Project Owner will assign responsibility for EHSS management to designated roles within the organization, including the Sustainability Officer, E&S Specialist, and HSE Coordinator, under the oversight of senior management. These roles will be responsible for inspecting contractor activities to ensure that the recommendations and requirements of the ESIA and ESMP are fulfilled. They will continuously monitor processes and actions undertaken by the contractor and identify measures required to address any areas of non-conformity. This includes periodic audits, inspections and/or on-site checks of Project areas or worksites and/or records and reports compiled by contractors. These roles are also responsible for supervising the implementation of all environmental and social measures as specified within the ESIA, ESMP and other relevant plans and procedures forming the ESMS of the Project, and for regular reporting to the Project Owner's management on environmental and social performance during construction and operation. The Environmental & Social Specialist will be responsible for stakeholder engagement and grievance management, consultation on land acquisition, providing affected communities with information on the timing of key activities, and identifying and responding to grievances. The Environmental & Social Specialist will also be responsible for the implementation of the SEP and relevant engagement activities and public grievance management system, as well as managing social commitments of the ESMP. The Environmental & Social Specialist will also be responsible for supervising the implementation of all environmental and biodiversity measures provided in the Project disclosure package and for reporting to the Management regularly. The HSE Coordinator is responsible for the implementation of health and safety practices. The HSE Coordinator will be suitably competent and have a strong understanding of health and safety best practice requirements, including the Project HS requirements. The HSE Coordinator will have the authority to suspend works when necessary, and allocate resources, personnel and equipment required to undertake any corrective actions.
Contractors	- The contractors will be responsible to meet ES and HSE requirements related with their activities in line with the ESMP and their contracts. - The contractors will be responsible to adopt the requirements of the Project ESMS and related management plans while executing project tasks. - The contractor will ensure continuous monitoring of environmental and social performance of its activities. - During the construction phase, the contractor will provide training to the personnel who will take part in the Project, including the measures within the scope of ESMP, to raise awareness of environmental, occupational and worker health and safety, public health and safety and social issues. - As part of ESMP, implementation of the measures identified for the construction phase will be coordinated by Environmental, Social and Occupational Health and Safety Experts who will be involved in the Project Organizational Chart. The said experts will be responsible for taking actions required to eliminate/minimize environmental and social impacts in line with ESMP and for putting monitoring plans into practice. - In the event of unforeseen circumstances such as environmental, social and labour issues or accidents or loss of time, the contractor will immediately notify the Project Owner, who will in turn notify the relevant national authorities and the Lenders immediately. The immediate incident report on the root causes of the incident and corrective measures to be taken will be submitted to relevant national authorities and the Lender within 48 hours.

9.3.3 Contractor Management

The Project Owner will ensure that contractors working on the Project site meet the ESMS requirements by adopting and implementing an appropriate contractor management system. The contractor management shall include the following:

- i) assessment of environmental and social risks associated with contracted works and services and incorporating relevant ESMS conditions
- ii) overseeing that contractors have the knowledge and skills to perform their tasks in accordance with contractual environmental and social conditions
- iii) monitoring contractor compliance with contractual environmental and social conditions
- iv) requiring contractors to have equivalent environmental and social arrangements with their subcontractors

9.3.4 Communication

Project Owner will develop procedures to establish and maintain an effective and strong internal and external communication within the scope of the Project.

SEP has been developed for the Project as part of the ESIA studies that covers engagement activities during all phases of the Project and will be updated on regular basis (not less than annually). Communication methods/tools defined in the SEP will be considered in the establishment of this procedure and these methods/tools will be updated as necessary as the Project proceeds.

The Project will also establish internal grievance mechanism (for workers) and external grievance mechanism to ensure effective ongoing communication with stakeholders. Grievances, requests, and suggestions coming from all parties (personnel, community and other stakeholders) will be received, recorded, evaluated and solved/responded.

9.3.5 Documentation and Document Control

A “*Document and Data Control Procedure*” will be established within the scope of construction and operation phases ESMS to control and approve any document before it is issued, to determine the writing format and numeration system to be used; to determine the approval system; to provide controlled distribution, review and update of documents; to provide relevant and updated documents; to abolish invalid documents and to manage external documents.

9.3.6 Operational Control

An *ESMP* has been developed for the Project in order to manage the adverse impacts on the environment and society. The ESMP is prepared based on the international standards and best practices as well as national laws and regulations. The ESMP of the Project is presented in Annex-A of this ESIA report. The ESMP includes description of the mitigation measures to avoid, minimize or compensate adverse impacts during the construction and operation phases of the Project; responsible parties for the implementation of the mitigation measures; the timing of implementation; monitoring and audit requirements. The ESMP focuses on the avoidance of impacts, and where this is not possible, presents technically and financially feasible and cost-effective mitigation measures to minimize possible impacts to acceptable levels. The

ESMP is based on the results of the ESIA study and is a framework document that specifies the necessary work to be conducted for the Project such as preparation of detailed management plans for each topic (e.g. air quality control and monitoring, noise control and monitoring, traffic management). The ESMP will be kept up to date with any required additional mitigation throughout the Project lifecycle and to reflect the requirements of new and/or amended laws and regulations.

The following plans and procedures are described in the ESMP. A number of plans and policies, including but not limited to the following, will be or already have been developed to achieve EHSS objectives for both construction and operation phases:

For All Phases of the Project (under the Responsibility of the Project Owner):

- Human Resources Policy
- Code of Conduct
- Environmental, Health and Safety and Social Policy
- Pollution Prevention and Management Plan
- Waste Management Plan
- Chemical and Hazardous Materials Management Plan
- Spill Prevention Plan
- Construction Site Traffic Management Plan
- Community Health and Safety Plan
- Occupational Health and Safety Plan
- Construction Emergency Preparedness and Response Plan
- Operation Emergency Preparedness and Response Plan
- Stakeholder Engagement Plan, including,
 - External Grievance Mechanism
 - Worker Grievance Mechanism
- Subcontractor Management and Monitoring Plan
- Labour and Working Conditions Management Plan
 - Personnel Selection and Employment Procedure
- Biodiversity Management Plan
- Invasive Species Management Plan
- Cultural Heritage Management Plan
- Chance Find Procedure

These plans will be supported by operational procedures and related instructions, as necessary, as part of the ESMS. The ESMS procedures and plans will be periodically (or when necessary) reviewed and revised. Additional procedures and plans will be developed as the Project progresses, as necessary and will be included in the ESMS.

9.3.7 Environmental and Social Emergency Preparedness and Response

An “*Emergency Preparedness and Response Plan*” has been developed for emergency situations that consist of incidents such as accidents, explosions, fires, gas leakages, hazardous chemical/biological and liquid waste spills, disease outbreaks and similar events

that occur unexpectedly due to equipment/infrastructure failures, employee errors, natural disasters (flooding, landslides, earthquakes, storms), sabotage and similar, for the Project in line with national regulations and international standards. Emergency situations are incidents that cause the activities to cease, terminate and also cause serious damage on environment, occupational health and safety and assets.

9.4 ESMS Control

9.4.1 Monitoring, Measurement and Review

For effective environmental and social management, the ESMS should be continuously monitored and periodically reviewed. The Project Owner will monitor:

- The compliance of the ESMS with the environmental and social provisions of the legal and other requirements as well as the commitments given in the ESMP
- Overall implementation of the ESMP and other plans and procedures
- Improvements achieved as the Project progresses

Tools employed for this purpose will include periodic internal and external audits, regular site inspections and measurements, impact monitoring, regular audits of the overall implementation of the ESMP and site inspections. Monitoring and review will be undertaken in accordance with requirements of ESMS and relevant legislation. Realization of environmental targets and objectives, environmental and social performance, equipment calibration, air emissions, energy, natural resource consumption, noise, waste amounts, environmental and social complaints and similar issues will be monitored, measured and evaluated. Conformance with legal and other requirements will be periodically evaluated and recorded.

Internal audits will be conducted in line with an *"Internal Audit Process Procedure"* to be developed within the scope of the ESMS. The *"Legal and Other Requirements Follow-up List"* will be used to evaluate conformance with the legal and other requirements. Other relevant and required procedures for the monitoring and measurement processes will be established for the Project as needed.

9.4.2 External Reporting

All external reporting will be managed by the Project Owner within their obligations to the government entities under the national legislation and to the Lenders.

9.4.3 Internal Reporting

Internal reporting with regards to the commitments within the ESMP will be managed jointly by Social, Environmental, Occupational Health and Safety Experts. The Project will share, as appropriate, inspection and audit findings with their suggested measures regularly with the Project Owner and employees. To maintain an open communication between the employees and management on occupational health, safety, environmental and social issues the following tools will be used:

- Team Briefings
- On-site work group meetings
- Work Specific Instructions

9.4.4 Non-conformities and Corrective, Preventive, and Improving Actions

Non-conformities detected during inspections carried out by the Project Owner, (sub)contractors are subject to a process adapted to the severity of the situation. The non-conformities will be defined as deviations from the requirements of the contract, the ESMP and supporting EHSS documentation. Non-conformities are divided into 4 categories as follows:

Level 1 non-conformity: Non-conformities that do not represent a serious immediate EHSS risks. The non-conformity is the subject of a report addressed to the Contractors and shall be resolved within 5 days. The Contractor addresses to the Project Owner a report explaining how the non-conformity has been corrected. Further to an inspection and a favourable evaluation of effectiveness of the corrective action, the Project Owner (experts) signs a close-out report for the non-conformity. In all cases where a non-conformity of level 1 is not resolved within one (1) month, the severity of the non-conformity is raised to level 2.

Level 2 non-conformity: apply to all non-conformities that represent a risk with major consequences to health and/or the environment, social or safety. The same procedure as for level 1 non-conformities is applied. Corrective action shall be taken by the Contractor within 3 days. The Contractor issues a report explaining corrective actions implemented. All level 2 non-conformities, which are not resolved within 1 month, are raised to level 3.

Level 3 non-conformity: apply to all non-conformities that have resulted in damage to health or the environment, or which represent a high safety hazard or high social risk. The highest levels of the Contractor's management and the Project Owner are informed immediately, and the Contractor has 24 hours to address the issue. A level 3 non-conformity results in the staged reduction of interim payments until the non-conformity has been resolved. Following the resolution of the Level 3 non-conformity the reduction(s) will be included in the next Interim Payment Certificate for payment. No interest will be paid on any reductions or suspended payment amounts. If the situation requires, the Project Owner can order the suspension of work until the resolution of the non-conformity.

Notification of observation of minor non-conformity: The non-conformity results in a notification to the Contractor followed up by a signed notification of the observation prepared by the Project Owner. The multiplication of notifications of observation, or absence of corrective actions by the Contractor can result in the severity of the non-conformity being raised to that of level 1.

9.4.5 Data Control

Any information and data relevant to the ESMS will be recorded in line with a “*Document and Data Control Procedure*” to be developed for the Project, which will set out procedures and principles related to establishment, prevention, maintenance, and disposal of the data records.

9.4.6 Management Review

Management reviews will be conducted (at least once a year) to maintain effectiveness of the ESMS and to determine the modification requirements and improvement opportunities in line with a “*Management Review Procedure*”. Internal and external audit results, conformance of the Project with legal and other requirements, external notifications including grievances, ESMS performance (e.g. achievement level to targets and objectives), corrective and preventive actions taken, decisions/actions coming from previous meetings, improvement recommendations will be subject of management reviews. Based on the results generated from the reviews, senior management will take the necessary and appropriate actions to ensure that the provisions of environmental and social policy are met, and procedures and plans are effectively updated.

9.5 Stakeholder Engagement

Stakeholder engagement has started during the ESIA study and will be conducted during the lifetime of the Project. Consultation activities will continue during the construction and operation phases of the Project aiming to maintain constructive relationships with the local communities and other stakeholders. SEP has been prepared for the Project to help structure a systematic communication with the stakeholders including information disclosure and grievance mechanism. Detailed information on stakeholder engagement at each stage of the Project is provided in Chapter 8 Stakeholder Engagement and SEP of the ESIA report.

9.6 Grievance Management

A Workers’ Grievance Mechanism (as part of Labour and Working Conditions Management Plan) and Public Grievance Mechanism (as part of the SEP) will be established in order to ensure that all comments, suggestions and objections received from the Project stakeholders, especially from nearby surrounding communities and facilities, are dealt with appropriately and in a timely manner. The Project Owner will be responsible for the overall management of grievances.

Local communities will be informed about the grievance mechanism during the consultation and disclosure activities. All grievances will be recorded, responded to and resolved within a defined timeframe. It is expected that comments and grievances will be sent to The Project Owner via mail, e-mail or fax during the construction and operation stages as well as through the Project website and telephone numbers. Grievance management of the Project is detailed in *Chapter 8* Stakeholder Engagement and SEP of the ESIA report.

DOWNTOWN SLEMANI PROJECT

AIR QUALITY MEASUREMENT REPORT



Sulaymaniyah/Kurdistan Region /IRAQ

IRAQ 2026

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Test Report

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Order No.	EN-M/2603/495_02
Name and identity of test item	Immission (Air Quality)
Remarks	-
Date of Test	17.02.2026
Number of Pages of the Report	8 Pages
Test Method	Air Quality Sensors
Test results	The test results are given in the measurement result tables.
Environmental conditions	Environmental conditions during the measurement are given in the measurement result tables.
Comments	-

The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.

Reporter and Approval
Ismail Ulusoy Environmental Engineer


TABLE OF CONTENTS

1. INTRODUCTION	4
2. MEASUREMENT METHODS	4
2.1. FIELD APPLICATION	5
3. MEASUREMENT LOCATION	6
4. LEGAL FRAMEWORK	7
5. RESULTS	8

LIST OF TABLES

Table 1 Measurement Point Coordinates and Measurement Dates	6
Table 2 Air Quality Standards	7
Table 3 Measurement Results for Location S1	8

LIST OF FIGURES

Figure 1 Monitoring Points on satellite Map	6

1. INTRODUCTION

This report has been prepared with the aim of determining the air quality in the sensitive receptors located in the impact area of the Downtown Slemani Project. Air quality results were determined for PM₁₀ and PM_{2.5}, parameters.

2. MEASUREMENT METHODS

PM₁₀ and PM_{2.5} concentrations were monitored using calibrated optical particulate matter sensors (Sensirion), which are widely applied in supplementary air quality monitoring studies. These sensors are increasingly used as indicative monitoring tools, provided that appropriate calibration and quality assurance procedures are implemented. Under the European Union Ambient Air Quality Directive (2008/50/EC), reference methods are defined for the determination of particulate matter concentrations; also, alternative measurement techniques may be applied, provided that their equivalence to reference methods is demonstrated or that they are used within the scope of indicative measurements and supplementary assessment. In this context, sensor-based monitoring systems, when supported by appropriate calibration and quality assurance procedures, are considered acceptable applications such as spatial assessment. Similarly, within the framework of the United States Environmental Protection Agency (US EPA), air quality monitoring methods are formally designated as Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) under 40 CFR Part 53 for compliance purposes. Particulate matter sensor systems are widely recognized as suitable tools for supplementary monitoring, research applications, and community-level air quality assessments when appropriately calibrated and validated.

The corrected measurement results after the Smart Calibration Process are shown in the figures below. The correlation between Sensor Unit's PM_{2.5} measurements between Reference Station's PM_{2.5} measurements for hourly and daily mean of data is 0.73, and the correlation between Sensor Unit's PM₁₀ measurements between Reference Station's PM₁₀ measurements for hourly and daily mean of data is 0.77.

2.1. FIELD APPLICATION

This section describes how the measurements, the general methodology of which is given above, are applied in the field.

Preliminary Preparations

Preliminary preparations for air quality measuring stations with sensors include factory calibrations and field calibrations. Factory calibrations are provided by the sensor manufacturer. Stations capable of making reference measurements were used for field calibrations, as described above. For this purpose, a 1-month comparison measurement was carried out at a reference station in the Turkish air quality monitoring network, and the calibration factors were applied.

During Measurements

Air quality measurements were conducted at one monitoring location.

The location of the sampling points was defined in the macro-scale ESIA report. A site visit was conducted to identify the exact micro-scale positions where the monitoring devices were installed. Measurements were carried out at heights ranging from 1.5 to 4 meters above ground level, depending on the suitability of each sampling point.

At location, 24-hour measurement was conducted. Parameters recorded by the sensor devices represent the averages of instantaneous measurements taken at 5-minute intervals.

After Measurements

Measured values were derived from direct readings recorded by sensor-based air quality monitoring devices. Raw data were subjected to quality control procedures and subsequently corrected based on the calibration methodology outlined in the previous section.

3. MEASUREMENT LOCATION

Ambient air quality measurements were conducted at one monitoring location, as defined in the macro-scale ESIA report and finalized based on site-specific observations. Measurements and data processing were carried out in accordance with the methodology and quality control procedures described in the previous sections. The results are presented in Table 1. The satellite map illustrating the measurement locations is presented in Figure 1.

Table 1 Measurement Point Coordinates and Measurement Dates

Location	Coordinates	Measurement Date
S1	Latitude 35.562774 Longitude 45.383204	17.02.2026



Figure 1 Monitoring Point on Satellite Map

4. LEGAL FRAMEWORK

The limit values determined for the project in accordance with national legal requirements are as summarized in **Error! Reference source not found.** in addition to EU limit values which have been used to supplement national standards where specific averaging periods are not included.

Table 2 Air Quality Standards

Parameter	Averaging Period	EU Limit Values ⁽¹⁾ (µg/m ³)	WHO/ (Guideline) Values	Project Standards
PM₁₀	24 hours	50 (not to be exceeded more than 35 times a year)	45 (not to be exceeded more than 3-4 times a year)	45
	Annual	40	15	15
PM_{2.5}	24 hours	-	15 (not to be exceeded more than 3-4 times a year)	15
	Annual	20	5	5

⁽¹⁾ EU Council Directive “2008/50/EC

5. RESULTS

Table 3 Measurement Results for Location S1

Location	Sampling Hour	Air Quality Results ($\mu\text{g}/\text{m}^3$)		Ambient Conditions	
		PM ₁₀	PM _{2.5}	Humidity (%)	Temperature (°C)
S-1	1	25,17	14,26	44,44	18,61
	2	17,53	10,00	43,65	18,12
	3	16,08	9,52	38,53	20,51
	4	20,05	11,81	38,78	21,40
	5	22,76	13,19	41,63	20,89
	6	13,01	7,83	36,33	20,50
	7	10,41	6,10	39,64	18,97
	8	15,95	9,00	45,22	17,22
	9	20,33	11,01	51,39	15,97
	10	30,08	15,67	57,17	14,61
	11	29,29	15,07	59,25	13,85
	12	73,19	37,89	56,62	13,74
	13	23,96	12,67	55,14	13,89
	14	16,78	8,93	54,03	14,14
	15	17,88	9,65	51,84	14,01
	16	29,33	14,92	60,59	12,94
	17	31,19	15,41	65,76	12,06
	18	38,13	18,50	68,21	11,78
	19	33,20	16,29	65,87	11,59
	20	25,33	12,69	63,57	12,15
	21	26,62	13,13	66,27	11,84
	22	23,35	12,04	58,89	13,95
	23	32,53	17,33	53,18	16,86
	24	29,14	16,06	48,47	18,92
	25	27,51	15,13	49,13	18,47
	26	20,92	11,73	45,76	19,27
	27	11,85	6,96	39,54	20,83
	28	10,95	6,59	36,07	22,30
	29	13,66	8,08	38,13	25,52
	24h Average	24,35	13,02	50,80	16,72
Project Standards		45	15	-	-