



# 100 ktpa Polysilicon Project

Environmental and Social  
Impact Assessment Addendum  
Report

PREPARED FOR



DATE  
22 April 2026

REFERENCE  
0784419



SIGNATURE PAGE

# 100 ktpa Polysilicon Project

## Environmental and Social Impact Assessment Addendum Report

0784419



---

**Siyao Jiang**  
Partner

ERM (Shanghai) Limited  
Litong Plaza, 20th floor, No. 1350 Sichuan  
North Road  
Shanghai, Hongkou District, China

© Copyright 2026 by The ERM International Group Limited and/or its affiliates ('ERM'). All Rights Reserved.  
No part of this work may be reproduced or transmitted in any form or by any means, without prior written permission of ERM.

## CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	BACKGROUND	1
1.2	OBJECTIVES	1
1.3	PROJECT TEAM	2
	1.3.1 Project Developer	2
	1.3.2 Finance Parties	2
	1.3.3 Environmental and Social (E&S) Assessment Practitioner	2
1.4	REPORT STRUCTURE	3
<b>2</b>	<b>LEGAL FRAMEWORK</b>	<b>4</b>
2.1	OMANI ADMINISTRATIVE FRAMEWORK	4
	2.1.1 Ministry of Industry and Commerce	4
	2.1.2 Ministry of Environment and Climate Affairs (MECA)	5
	2.1.3 Provincial Government	5
2.2	NATIONAL LEGISLATION	6
2.3	INTERNATIONAL CONVENTIONS	9
	2.3.1 International Protocols and Standards related to Human Rights	11
	2.3.2 International Standards and Guidelines	12
	2.3.3 IFC Performance Standards	12
	2.3.4 World Bank Group/IFC Environmental Health and Safety Guidelines	15
<b>3</b>	<b>PROJECT DESCRIPTION</b>	<b>17</b>
3.1	OVERVIEW AND LOCATION	17
3.2	PROJECT SCHEDULE	18
3.3	PROJECT COMPONENTS	18
3.4	PRODUCTION PROCESS OF USP	26
	3.4.1 Water Electrolysis for Hydrogen Production	28
	3.4.2 Cold Hydrogenation	28
	3.4.3 Distillation Process	31
	3.4.4 Reduction (CVD) Process	33
	3.4.5 Finishing (post handling) Process	33
	3.4.6 Vent Gas Recovery	34
	3.4.7 Sludge and High Boiling Cracking	37
	3.4.8 Mass Balance	37
3.5	PRODUCTION PROCESS OF GOI (ASSOCIATED FACILITIES)	38
	3.5.1 Silicon Melting and Casting	38
	3.5.2 Silicon Grinding	38
3.6	PRODUCTION PROCESS OF OETC	42
3.7	RESOURCE REQUIREMENT	42
	3.7.1 Manpower Plan	42
	3.7.2 Water and Power Supply	42
	3.7.3 Water Discharge	42
3.8	OTHER OPERATIONAL ACTIVITY	46
3.9	ALTERNATIVES	46
3.10	PROJECT AREA OF INFLUENCE (AOI)	47

<b>4</b>	<b>ENVIRONMENTAL AND SOCIAL BASELINE</b>	<b>50</b>
4.1	PHYSICAL ENVIRONMENT	50
4.1.1	Climate and Meteorology	50
4.2	BIOLOGICAL ENVIRONMENT	52
4.2.1	Terrestrial Ecoregion and International and National Recognized Area	52
4.2.2	Land Cover and Habitat	52
4.2.3	Baseline of Flora and Fauna, and Ecosystem Services	54
4.2.4	Critical Habitat Assessment	57
4.3	SOCIO-ECONOMIC BASELINE	61
4.3.1	Demographic Conditions	61
4.3.2	Public Health	64
4.3.3	Electricity	66
4.3.4	Water and Sanitation	66
4.3.5	Income and Livelihood	68
4.3.6	Gender and Gender-Based Violence	71
<b>5</b>	<b>MITIGATION MEASURES FOR AIR EMISSIONS AND SOLID/LIQUID EFFLUENTS</b>	<b>72</b>
5.1	AIR EMISSIONS	72
5.2	LIQUID EFFLUENTS	75
5.3	SOLID WASTE	83
<b>6</b>	<b>IDENTIFICATION OF THE COMMUNITIES AND STAKEHOLDER ENGAGEMENT</b>	<b>87</b>
6.1	IDENTIFICATION OF COMMUNITIES	87
6.1.1	Local Communities Characteristics	87
6.1.2	Community Perceptions of the Project	89
6.2	STAKEHOLDER ENGAGEMENT	89
6.2.1	Stakeholder Identification	90
6.2.2	Stakeholder Engagement in ESIA Process	98
6.3	STAKEHOLDER CONCERNS AND EXPECTATIONS	99
<b>7</b>	<b>SOCIAL ASSESSMENT</b>	<b>101</b>
7.1	INTRODUCTION	101
7.2	SCOPE OF ASSESSMENT	101
7.3	IMPACT ASSESSMENT CRITERIA	101
7.3.1	Step 1: Assessment of Impact Magnitude	102
7.3.2	Step 2: Assessment of Receptors Sensitivity	103
7.3.3	Step 3: Determination of Impact Significance	104
7.4	IMPACT ASSESSMENT	104
7.4.1	Impact on Community Health and Safety from Project Operation Activities	104
7.4.2	Impact on Community Health and Safety from Project Road Transportation	106
7.4.3	Impact on Community Health and Safety from Labor In-migration	107
7.4.4	Impact on Community Health and Safety from Deployment of Security Force	109
7.4.5	Impact on Community Health and Safety from Unplanned Event	110
7.4.6	Impact on Labor and Working Conditions from Project Direct and Indirect Employment	112
7.4.7	Impact on Worker Health and Safety from Project Operation Activities and Accommodation Provision	114
7.4.8	Impact on Local Economy and Employment from Project Recruitment and Sourcing	115
<b>8</b>	<b>BIODIVERSITY ASSESSMENT</b>	<b>117</b>
8.1	INTRODUCTION	117

8.2	SCOPE OF ASSESSMENT	117
8.2.1	Assumption	117
8.2.2	Area of Influence	117
8.3	IMPACT ASSESSMENT CRITERIA	117
8.4	SUMMARY OF BASELINE CONDITIONS	119
8.5	EMBEDDED CONTROL	120
8.6	IMPACT ASSESSMENT	121
8.6.1	Land occupation and habitat loss	121
8.6.2	Influx of workforce	122
8.6.3	Operation activities	123
8.6.4	Operation of transmission line	125

## LIST OF TABLES

TABLE 1-1	ERM CONSULTING TEAM	2
TABLE 2-1	SUMMARY OF NATIONAL LEGISLATION APPLICABLE TO THE PROJECT	6
TABLE 2-2	INTERNATIONAL TREATIES APPLICABLE TO THE PROJECT	9
TABLE 2-3	INTERNATIONAL PROTOCOLS ON HUMAN RIGHTS AND OMANI STATUS	11
TABLE 2-4	INTERNATIONAL TECHNICAL CONVENTIONS AND OMANI STATUS	11
TABLE 2-5	INTERNATIONAL LABOUR STANDARDS AND OMANI STATUS	12
TABLE 2-6	SUMMARY OF IFC PERFORMANCE STANDARDS REQUIREMENTS	13
TABLE 3-1	PROJECT COMPONENTS	18
TABLE 3-2	PROJECT COMPONENTS OF TRANSMISSION LINE AND HIGH-TENSION SUBSTATION	21
TABLE 3-3	PROJECT COMPONENTS OF GOI	22
TABLE 3-4	ESTIMATED MAIN RAW MATERIAL CONSUMPTION OF USP	25
TABLE 3-5	ESTIMATED MAIN RAW MATERIAL CONSUMPTION OF GOI	26
TABLE 3-6	MASS BALANCE SUMMARY	37
TABLE 3-7	ENERGY SUPPLY	42
TABLE 3-8	WATER BALANCE SHEET	44
TABLE 3-9	PROJECT AREA OF INFLUENCE	47
TABLE 4-1	LANDCOVER WITHIN THE PROJETS' AOI	53
TABLE 4-2	OBSERVED FLORA AND FAUNA SPECIES DURING RAPIT VISIT IN JUNE	55
TABLE 4-3	SPECIES OF CONSERVATION CONCERNS WITHIN AOI AND 50KM	56
TABLE 4-4	CRITICAL HABITAT CRITERIA (IFC PS6 GUIDANCE NOTE 2019)	57
TABLE 4-5	LIWA WILAYAT POPULATION BY NATIONALITY AND GENDER IN 2020	61
TABLE 4-6	NEAREST SENSITIVE COMMUNITIES / RECEPTORS TO THE PROJECT	64
TABLE 5-1	VENT GAS EMISSIONS OF UPS AND GOI	72
TABLE 5-2	EXHAUST GAS EMISSIONS OF UPS AND GOI	75
TABLE 5-3	ESTIMATED MAIN SOLID WASTE GENERATION OF USP	83

TABLE 5-4 ESTIMATED MAIN SOLID WASTE GENERATION OF GOI	85
TABLE 5-5 ESTIMATED MAIN SOLID WASTE GENERATION OF OETC	85
TABLE 6-1 STAKEHOLDER CATEGORY LIST	91
TABLE 6-2 STAKEHOLDER ENGAGEMENT CONDUCTED	98
TABLE 6-3 STAKEHOLDER CONCERNS, EXPECTATIONS AND PROJECT FEEDBACK	99
TABLE 7-1 DESIGNATION OF IMPACT MAGNITUDE	103
TABLE 7-2 IMPACT SIGNIFICANCE MATRIX	104
TABLE 8-1 MAGNITUDE CRITERIA FOR IMPACTS TO BIODIVERSITY – HABITAT	118
TABLE 8-2 MAGNITUDE CRITERIA FOR IMPACTS TO BIODIVERSITY – SPECIES	118
TABLE 8-3 SENSITIVITY CRITERIA FOR BIODIVERSITY – HABITATS	118
TABLE 8-4 SENSITIVITY CRITERIA FOR BIODIVERSITY - SPECIES	119

## LIST OF FIGURES

FIGURE 3-1 PROJECT LOCATION	17
FIGURE 3-2 PROJECT FOOTPRINT	18
FIGURE 3-3 RENDERING OF THE PROJECT SITE	21
FIGURE 3-4 LAYOUT OF THE SITE	23
FIGURE 3-5 LAYOUT OF THE TRANSMISSION LINE	24
FIGURE 3-6 PRODUCTION PROCESS	27
FIGURE 3-7 MAIN PROCESS FOLW OF HYDROGEN PRODUCTION	28
FIGURE 3-8 COLD HYDROGENATION PROCESS	30
FIGURE 3-9 PROCESS FOLW OF DISTILLATION	32
FIGURE 3-10 PROCESS FOLW OF REDUCTION	33
FIGURE 3-11 PROCESS FLOW OF FINISHING	34
FIGURE 3-12 PROCESS FOLW OF VENT GAS RECOVERY	36
FIGURE 3-13 PRODUCTION FLOW CHART OF MELTING AND CASTING	40
FIGURE 3-14 PRODUCTION FLOW CHART OF GRINDING	41
FIGURE 3-15 BIODIVERSITY AOI MAP	48
FIGURE 3-16 SOCIAL AOI MAP	49
FIGURE 4-1 THE AVERAGE TEMPERATURE AND PRECIPITATION FOR THE OMAN	51
FIGURE 4-2 LAND COVER WITHIN 3KM OF THE PROJECT SITE	53
FIGURE 4-3 PLANTATION OF DATE PALM TREES IN THE VICINITY OF THE PROJECT SITE	54
FIGURE 4-4 GRAVEL DESERT: GRAVEL PLAIN AND SCATTERED SHRUBLAND	54
FIGURE 4-5 OBSERVED AVIFAUNA IN THE SITE VISIT OF JUNE 2025	55
FIGURE 4-6 ECOSYSTEM SERVICES: LIVESTOCK RAISING (LEFT) AND PLANTATION (RIGHT)	55
FIGURE 4-7 ECOLOGICAL APPROPRIATE AREA OF ANALYSIS (EAAA)	59

FIGURE 4-8 MOSQUE IN SOHAR CITY	64
FIGURE 5-1 GENERAL SEWAGE TREATMENT PROCESS OF USP	77
FIGURE 6-1 PROJECT SOCIAL SENSITIVE RECEPTOR	88
FIGURE 7-1 IMPACT ASSESSMENT PROCESS	102

## ACRONYMS AND ABBREVIATIONS

Abbreviation	Full text
AOI	Area of Influence
AAQS	Air Quality Standards
BID	Background Information Document
BOD	Biological Oxygen Demand
CBD	Convention on Biological Diversity
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CCRA	Climate Change Risk Assessment
CDs	Communicable Diseases
CEACR	Committee of Experts on the Application of Conventions and Recommendations
CBOs	Community-Based Organizations
COD	Chemical Oxygen Demand
DCS	Dichlorosilane (SiH <sub>2</sub> Cl <sub>2</sub> )
DO	Dissolved Oxygen
ESIA	Environmental and Social Impact Assessment
EAAA	Ecologically Appropriate Area of Analysis
ESMPs	Environmental And Social Management Plans
ESIS	Environmental and Social Impact Statement
EHS	Environmental Health and Safety
ESG	Environmental, Social and Governance
EPC	Engineering, Procurement and Construction
EP4	Equator Principles 4
GBV	Gender Based Violence
GBIF	Global Biodiversity Information Facility
GHGs	Green House Gases
GIIP	Good International Industry Practice
GPS	Global Positioning System
HR	Human Resource
HF	Hydrogen Fluoride
IFC	International Finance Corporation

<b>Abbreviation</b>	<b>Full text</b>
IFC PS	International Finance Corporation Performance Standards
ILO	International Labour Organization
IP	Indigenous People
INBC	Institute of Biodiversity and Conservation
KPIs	Key Performance Indicators
NSRs	Nearest Sensitive Receptors
NGOs	Non-Governmental Organizations
NCDs	Non-Communicable Diseases
NSRs	Noise Sensitive Receptors
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of Nitrogen
PS	Performance Standards
PM	Particulate Matter
PPE	Personal Protection Equipment
SO <sub>2</sub>	Sulphur dioxide
SPFZ	Sohar Port and Free Zone
STC	Silicon Tetrachloride (SiCl <sub>4</sub> )
TCS	Trichlorosilane (SiHCl <sub>3</sub> )
UN	United Nations
WHO	World Health Organization
WBG	World Bank Group

# 1 INTRODUCTION

## 1.1 BACKGROUND

United Solar Polysilicon (FZC) SPC (hereinafter referred to as "USP" or the "Company") is currently developing a polysilicon manufacturing facility (hereinafter referred to as "the Project") utilizing the modified Siemens process in Sohar, Oman. The Project is strategically located within the Sohar Port and Freezone, an industrial development zone situated on the northeastern coast of Oman, proximate to the town of Sohar. Upon completion, the Project will represent the Middle East's inaugural polysilicon production facility with an annual capacity of 100,000 metric tonnes.

The Project's development commenced in March 2024, with commercial operations scheduled to initiate in the first quarter of 2026. In August 2024, Geo Resources Consulting completed the Environmental Impact Assessment (EIA) report for the Project. Subsequently, Future Fund Oman (FFO) and EWPARTNERS (易达资本) announced their sequential investments in USP.

The International Finance Corporation (IFC) has proposed financing arrangements for USP, conducting preliminary environmental and social due diligence (ESDD) in preparation for funding. This process involved a gap analysis between local legal requirements pertaining to environmental and social matters, as outlined in the local EIA report, and international benchmarks, particularly the IFC's Environmental and Social Sustainability Performance Standards (2012). The ESDD identified several gaps, prompting IFC to recommend that USP prepare an Environmental and Social Impact Assessment (ESIA) addendum to address these identified deficiencies.

In May 2025, USP engaged ERM (Shanghai) Ltd (ERM) to prepare the ESIA addendum in accordance with established international standards, including the IFC Performance Standards on Environmental and Social Sustainability (2012) and the World Bank Group Environmental, Health and Safety (EHS) Guidelines.

## 1.2 OBJECTIVES

This ESIA addendum report has been prepared for USP by ERM to present an assessment of the potential environmental and social impacts associated with the Project in Sohar Freezone.

This report has been conducted in line with the international standards, guidelines and best practices. The specific objectives of the ESIA study are to:

- Identification and incorporation of any associated facilities previously omitted from the project description in the local EIA report, with subsequent updates to the Project's Area of Influence (AOI) to encompass both direct and indirect impacts;
- Update description of manufacturing process and discharges to the environment that differ from that disclosed in the local EIA, assess discharges against PS3/EHS Guidelines and update mitigation measures for air, waste and wastewater, as necessary;
- Use of desktop data and satellite imagery, and rapid site visit to classify project footprint/AoI as modified, natural or critical habitat, desktop screening of biodiversity risks to determine the presence of CH triggers and assess the major impacts to the biological environment;

- Tour of any communities in vicinity of the project, identify the affected communities and stakeholder, map stakeholders and agree outline engagement approach with USP and prepare stakeholder engagement plan.

## 1.3 PROJECT TEAM

### 1.3.1 PROJECT DEVELOPER

USP is an international clean energy enterprise specializing in the full photovoltaic industry chain, dedicated to delivering high-quality and diversified clean energy solutions on a global scale. The 100KTPA polysilicon production facility located in the Suhar Freezone, Oman, which would be the first polysilicon manufacturing base in the Middle East after operation.

USP has engaged Hualu Engineering & Technology Co., Ltd. (Hualu) for the project's design and feasibility study. Formerly known as the Sixth Design Institute of the Ministry of Chemical Industry, Hualu was established in 1965. Its core business encompasses petrochemicals, coal chemicals, natural gas, environmental engineering, and municipal infrastructure. Hualu operates throughout China and extends its services to countries and regions in South Asia, Central Asia, the Middle East, Africa, and beyond.

Additionally, the construction of the project has been entrusted to China National Chemical Engineering Third Construction Co., Ltd. (TCC) and China National Chemical Engineering Sixth Construction Co., Ltd. (CNCEC). TCC was founded in 1962, while CNCEC was established in 1965. Both companies are subsidiaries of China National Chemical Engineering Corporation and possess Class A general contracting qualifications for petrochemical engineering construction, as well as Class A design qualifications for chemical, petrochemical, and pharmaceutical industries.

### 1.3.2 FINANCE PARTIES

Discussions between IFC and USP (the "Borrower") regarding the structuring and arrangement of financing related to the Project are currently ongoing and are expected to be finalized soon.

### 1.3.3 ENVIRONMENTAL AND SOCIAL (E&S) ASSESSMENT PRACTITIONER

ERM is a leading global provider of consulting services related to environmental, health, safety, risk management, as well as social and sustainability issues. The company employs more than 8,000 professionals across over 150 offices in 40 countries and territories. ERM possesses extensive expertise and experience in infrastructure-related projects in the Middle East. Furthermore, it is internationally recognized for its 'fit-for-finance' advisory services, through which it supports developers in managing environmental and social (E&S) risks, enabling projects to comply with international E&S standards. ERM also maintains in-house technical capabilities relevant to E&S scoping assessments and reporting.

ERM was appointed by USP at a late stage of the Project's construction period. The list of ERM professionals who contributed to the preparation of this study is provided in Table 1-1.

**TABLE 1-1 ERM CONSULTING TEAM**

Name	Role	Location
Siyao Jiang	Partner, Project Director	ERM China

Name	Role	Location
Piers Touzel	Partner, Social Expert	ERM Hong Kong SAR
Yiling Mei	Consulting Director, Coordinator	ERM China
Jinlong Chen	Technical Managing Consultant, Environmental	ERM China
Yunyang Liu	Managing Consultant, Biodiversity	ERM China
Beilu Duan	Consultant, Biodiversity	ERM China
Bize Yang	Senior Consultant, Social	ERM China

## 1.4 REPORT STRUCTURE

The remainder of this ESIA Report is structured as follows:

- Chapter 1: Introduction
- Chapter 2: Legal framework
- Chapter 3: Project description
- Chapter 4: Environmental and social baseline
- Chapter 5: Mitigation measures for air emissions and solid/liquid effluents
- Chapter 6: Identification of the communities and stakeholder engagement
- Chapter 7: Social assessment
- Chapter 8: Biodiversity assessment

## 2 LEGAL FRAMEWORK

### 2.1 OMANI ADMINISTRATIVE FRAMEWORK

The Omani administrative framework is centred on a monarchical system, underpinned by the institutions established under the 1996 Basic Law and regulated by the 2001 Environmental Protection and Pollution Prevention Law. Article 114 of the 2001 Environmental Protection and Pollution Prevention Law establishes the State's obligation to take necessary measures to protect the environment, prevent pollution, and maintain ecological balance.

With respect to regulations, it should be noted that Omani regulations tend to be broadly framed and – as a rule – do not provide detailed standards (e.g., air quality, noise levels, soil pollution, etc) against which compliance can be measured. However, international standards such as the International Finance Corporation (IFC) Performance Standards (PS) will be adhered to over and above the National legislation if requirements are more stringent than those at a national level.

In addition to Omani national regulatory requirements, international standards and requirements are also relevant to the Project. These include international treaties and conventions to which Oman is a signatory. Note that other legislative, regulatory and administrative requirements may pertain to the proposed Project, but identification and interpretation of these is beyond the brief of this study. As such, the summary provided below is not intended to be definitive or exhaustive and serves to highlight key environmental and social legislation relevant to the planned activities.

Considering the nature of the Project, the Ministry of Environment and Climate Affairs (MECA), the Ministry of Industry, as well as relevant provincial authorities (e.g., North Al Batinah Governorate, Dhofar Governorate, etc., depending on the Project location) are responsible for approving the environmental and social aspects of this Project.

#### 2.1.1 MINISTRY OF INDUSTRY AND COMMERCE

The Ministry of Industry in Oman plays a central role in advancing economic diversification and promoting sustainable industrial development. Its primary responsibilities include the formulation of strategic frameworks, such as the Industrial Strategy 2040, aimed at attracting investment, strengthening the manufacturing sector, and enhancing local content development. The ministry oversees regulatory reforms, including the simplification of customs exemption procedures and the optimization of resource efficiency through measures to reduce waste generation and control the export of raw materials. It actively supports circular economy initiatives, particularly within recycling industries, to minimize environmental impact while also fostering the growth of small and medium-sized enterprises (SMEs) through capacity-building programs such as the Itqan training initiative. In collaboration with institutions like the Authority for Electricity Regulation, the ministry establishes energy efficiency standards for industrial equipment and facilitates the phase-out of high-energy-consuming appliances to align with national sustainability objectives. Furthermore, it ensures adherence to international best practices in industrial safety and environmental management, especially in sectors such as oil and gas, by requiring comprehensive technical feasibility assessments for industrial projects.

### 2.1.2 MINISTRY OF ENVIRONMENT AND CLIMATE AFFAIRS (MECA)

The Ministry of Environment and Climate Affairs (MECA) serves as the principal authority responsible for environmental governance in Oman. It is mandated to implement the Environmental Protection and Pollution Prevention Law (2001), which requires all industrial projects to undergo Environmental Impact Assessments (EIAs) and incorporate mitigation measures consistent with internationally recognized standards, including the IFC Performance Standards. MECA regulates pollution control and hazardous waste management, enforcing strict penalties—including fines of up to OMR 50,000 and potential imprisonment—for violations of environmental regulations. The ministry leads Oman's participation in global environmental commitments, such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), integrating relevant international protocols into domestic policy frameworks. Key initiatives under its oversight include large-scale mangrove restoration efforts to enhance carbon sequestration (e.g., the target of planting 100 million trees by 2027) and the establishment of a national carbon credit system to support climate financing. MECA also promotes public participation through mandatory community consultations for major development projects and operates a digital environmental monitoring platform to assess air, water, and soil quality. By coordinating with regional authorities and economic zones, the ministry ensures that industrial expansion is balanced with ecological conservation, maintaining compliance with both national legislation and global sustainability benchmarks.

### 2.1.3 PROVINCIAL GOVERNMENT

The North Al Batinah Governorate's environmental responsibilities in Oman's legal framework are rooted in the Environmental Protection and Pollution Prevention Law (Royal Decree 114/2001) and aligned with national policies and international commitments. As a key implementing authority, the governorate acts as a decentralized arm of the Ministry of Environment and Climate Affairs (MECA), ensuring compliance with both national legislation and global standards. Below is an overview of its legal mandates:

**Constitutional Basis:** While Oman's Constitution (1996) does not explicitly detail environmental roles, it emphasizes the state's duty to protect public welfare and natural resources under Article 11, which forms the basis for environmental governance. The governorate exercises powers delegated by central laws, particularly the 2001 Environmental Law, which grants it authority to enforce regulations at the provincial level.

**Key Legal Instruments:**

**Royal Decree 114/2001:** Establishes the governorate's role in implementing environmental impact assessments (EIAs), pollution control, and ecosystem protection .

**Ministerial Decision 107/2023:** Streamlines environmental permit procedures, empowering the governorate to issue permits for industrial activities (e.g., Sohar Industrial Port) and enforce penalties for violations, including fines up to OMR 50,000 and permit suspension .

**EIAs and Permits:** The governorate reviews and approves EIAs for projects in sectors like mining and agriculture, ensuring alignment with IFC Performance Standards and MECA guidelines.

Penalties: Imposes fines and administrative actions for violations, such as unauthorized waste disposal or failure to submit monitoring reports . Under the 2001 Law, severe offenses (e.g., damaging protected areas) may lead to imprisonment.

The North Al Batinah Governorate serves as a critical link between national environmental laws and local implementation, ensuring sustainable development through legal enforcement, community engagement, and collaboration with central authorities. Its role is pivotal in safeguarding Oman’s ecological integrity while fostering economic growth.

## 2.2 NATIONAL LEGISLATION

This section summarizes the enforceable legislative provisions in Omani that must be considered in the project and, in consequence, must be integrated into the project (Table 2-1).

Oman’s constitutional framework for environmental protection is primarily rooted in the Basic Law of the State (1996), which establishes the state’s responsibility to safeguard natural resources and public welfare. While the Constitution does not explicitly enumerate individual environmental rights, it provides foundational principles that underpin subsequent environmental legislation.

Omani Constitution serves as the bedrock for environmental governance by vesting ownership of natural resources in the state and obliging it to ensure their prudent use. This constitutional foundation enables the development of robust environmental laws and policies, even as specific rights and obligations are elaborated in subsequent legislation. The state’s dual role as custodian of resources and promoter of economic growth reflects a balance between development and conservation, guided by the Constitution’s principles of justice and public welfare.

In the absence of national legislation regarding specific aspects or if it is incomplete, particularly in technical specifications, the project promoters must implement international instruments containing good practices in relevant fields or the appropriate standards in force in other countries.

**TABLE 2-1 SUMMARY OF NATIONAL LEGISLATION APPLICABLE TO THE PROJECT**

Legislation		Description & scope
<b>Environmental Legislation</b>		
RD 114/2001 Law on Conservation of the Environment and Prevention of Pollution	14 November 2001	Oman’s foundational environmental law, requiring environmental impact assessments (EIAs) for projects with significant ecological impact. Prohibits untreated wastewater discharge, mandates pollution control technologies, and imposes fines (OMR 200–5,000) or imprisonment for violations. Authorizes the Environment Authority (EA) to enforce compliance .

Legislation		Description & scope
MD 18/2012 Issuance of the Executive Regulations for Management of Climate Affairs	10 March 2012	Operationalizes climate change mitigation and adaptation strategies. Defines roles for government entities, sets emission reduction targets, and promotes renewable energy integration. Aligns with Oman's commitments under the UNFCCC .
MD 118/2004 Air Pollution from Stationary Sources	2004	Regulates emissions from industrial facilities (e.g., power plants, factories) to reduce air pollution. Sets permissible limits for pollutants like sulfur dioxide and particulate matter, requiring regular monitoring and reporting .
MD 187/2001 Issuance of Environmental Approvals and Final Environmental Permit	2001	Streamlines the environmental permit process, requiring applicants to submit EIAs and operational plans. Establishes timelines for approval and outlines conditions for permit revocation .
MD 79/1994 Noise Pollution Control in Public Environment	1994	Sets noise limits in public spaces (e.g., residential areas, commercial zones). Prohibits excessive noise from construction, transportation, and industrial activities during specified hours .
MD 80/1994 Noise Pollution Control in Working Environment	1994	Protects workers from occupational noise exposure by mandating hearing protection and regular noise monitoring in workplaces like factories and construction sites .

### Health and Safety Legislation

MD 286/2008 Occupational Health and Industrial Safety Precautions Regulation	2008	Mandates employers to provide safe working environments, including ventilation, lighting, and personal protective equipment (PPE). Establishes protocols for medical care, noise control, and hazard prevention. Applies to all workplaces under the Labour Law, with penalties for non-compliance
--	------	--

Legislation	Description & scope	
<b>Labour Legislation</b>		
RD 35/2003 Labour Law	26 April 2003	Governs employment contracts, working hours (45 hours/week, reduced to 30 hours/week during Ramadan), wages, and termination procedures. Requires employers to provide health insurance, safe accommodation, and paid leave (annual, sick, maternity). Explicitly protects foreign workers and prohibits forced labor
<b>Industry Sector Legislation</b>		
RD 67/2014 Competition Protection and Monopoly Prevention Law (as amended by RD 22/2018)	2014	Prohibits anti-competitive practices (e.g., price-fixing, market manipulation) and establishes the Competition Protection and Monopoly Prevention Centre. Requires prior approval for economic concentration (e.g., mergers) that may create market dominance (>35% market share). Aligns with international antitrust standards
<b>Energy Sector Legislation</b>		
RD 42/2019 Renewable Energy Law	2019	Promotes solar, wind, and other renewable energy sources. Sets targets for renewable energy capacity (e.g., 10% of total energy by 2025) and introduces feed-in tariffs. Establishes the Public Authority for Electricity and Water (PAEW) to oversee renewable projects
<b>Water Sector Legislation</b>		
RD 29/2000 Water Resources Protection Law	1 May 2000	Safeguards groundwater and surface water through protection zones and abstraction permits. Prohibits pollution of water sources and mandates penalties for violations. Transfers oversight to the Ministry of Water Resources and repeals earlier laws.

Legislation	Description & scope	
<b>Planning, Land Acquisition and Resettlement Sector Legislation</b>		
RD 5/80 Land Law	1980	Establishes land ownership principles and procedures for government land allocation. Defines categories of land (state, private, public) and regulates land use for agriculture, industry, and infrastructure. Amended in 2010 to allow companies with ≥30% Omani ownership to develop land .

## 2.3 INTERNATIONAL CONVENTIONS

The Omani legal system is a hybrid framework, combining Islamic Sharia law, customary tribal law, and modern statutory law. The foundation of Oman's legal structure is the Basic Law of the State, promulgated by Royal Decree No. 101/96, which serves as the country's de facto constitution.

Omani legislation is divided into primary laws (Royal Decrees issued by the Sultan) and secondary laws (ministerial decisions and regulations). The legal system is heavily influenced by the Ibadhi school of Islamic jurisprudence, which is unique to Oman and emphasizes moderation, justice, and community welfare.

In terms of international law, Oman maintains a selective and pragmatic approach. It is a signatory to several key international treaties, including those related to human rights, trade, and environmental protection. International agreements only become enforceable domestically once ratified by Royal Decree, ensuring alignment with national interests and Islamic principles.

Table 2-2 lists the relevant international conventions and protocols to which Oman is signatory. Many of these are incorporated into the various World Bank Operational Procedures and the IFC PS.

**TABLE 2-2 INTERNATIONAL TREATIES APPLICABLE TO THE PROJECT**

Name of the Convention	Ratification Year	Aspects Related to the Project
United Nations Convention on Biological Diversity (CBD) (1992)	2006	The objectives of the CBD must be considered in the ESIA.
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998)	Signed 1999	The objectives of the Rotterdam Convention should be considered when developing plans and programmes for the management of relevant hazardous chemicals and pesticides.
Basel Convention on Hazardous Waste (1989)	2017	If applicable, obtain consent from the receiving country before the

Name of the Convention	Ratification Year	Aspects Related to the Project
		transboundary movement of hazardous waste.
Abolition of Forced Labour Convention, 1957 (No. 105)	1976	Ensure that forced labour is prohibited and that human resource (HR) policies and procedures are developed and implemented to ensure this.
Minimum Age Convention, 1973 (No. 138)	2001	Ensure that employment policies include prohibitions on the employment of children and that such polices are adhered to.
Worst Forms of Child Labour Convention, 1999 (No. 182)	2001	Ensure that employment policies include prohibitions on the employment of children and that such polices are adhered to.
Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	1976	Discrimination in the field of employment and occupation should be expressly forbidden.
International Convention on the Elimination of All Forms of Racial Discrimination (1969)	2019	All workplace racial discrimination should be expressly forbidden.
Convention on the Elimination of All Forms of Discrimination against Women :1981 (CEDAW)	1986	Ensure that non-discrimination against women is enshrined in HR policies and practices for the proposed Project.
Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment: 1987	2019	Torture in all workplaces should be expressly forbidden.
The Convention on the Rights of Persons with Disabilities	2014	Promotes, protects and ensures the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity
Convention on the Rights of the Child (1990)	1990	Ensure that employment policies include prohibitions on the employment of children.
Framework Convention on Climate Change (1992)	2000	Implement measures to reduce greenhouse gas emissions.
Paris Agreement	2019	In accordance with Omani regulations and standards on GHG emissions to achieve the emission reduction targets set by Oman.

Name of the Convention	Ratification Year	Aspects Related to the Project
Montreal Protocol on Climate Change (1987)	2000	Implement measure to reduce emission of substances that deplete the ozone layer.
Vienna Convention for the Protection of the Ozone Layer (1985)	2000	Implement appropriate measures to protect human health and the environment against adverse effects resulting or likely to result from human activities which are likely to modify the Ozone Layer.

### 2.3.1 INTERNATIONAL PROTOCOLS AND STANDARDS RELATED TO HUMAN RIGHTS

Table 2-3 and Table 2-4 presents the findings of Human Rights Screening related to applicable international protocols, technical conventions and labour standards.

**TABLE 2-3 INTERNATIONAL PROTOCOLS ON HUMAN RIGHTS AND OMANI STATUS**

Convention	Omani Status
The Optional Protocol to the Convention on the Rights of Persons with Disabilities	Accession in 2014
The Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict	Accession in 2007
The Optional Protocol to the Convention on the Rights of the Child on the sale of children child prostitution and child pornography	Accession in 2005

Oman has ratified four out of ten ILO Fundamental Conventions as shown in Table 2-4.

**TABLE 2-4 INTERNATIONAL TECHNICAL CONVENTIONS AND OMANI STATUS**

Convention	Omani Status
C029 - Forced Labour Convention, 1930 (No. 29)	Ratified in 1998
C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)	Not ratified
C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)	Not ratified
C100 - Equal Remuneration Convention, 1951 (No. 100)	Not ratified
C105 - Abolition of Forced Labour Convention, 1957 (No. 105)	Ratified in 2005
C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	Not ratified
C138 - Minimum Age Convention, 1973 (No. 138) (minimum age specified is 14 years)	Ratified in 2005
C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)	Ratified in 2001
C155 - Occupational Safety and Health Convention, 1981 (No. 155)	Not ratified

Convention	Omani Status
C187 - Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)	Not ratified

In addition, Oman has ratified several relevant technical Conventions as shown in Table 2-5.

**TABLE 2-5 INTERNATIONAL LABOUR STANDARDS AND OMANI STATUS**

Technical Convention	Omani Status
C001 – Hours of Work (Industry) Convention, 1919	Ratified in 1976
C006 – Night Work of Young Persons (Industry) Convention, 1919	Ratified in 1976
C014 – Weekly Rest (Industry) Convention, 1921	Ratified in 1976
C017 – Workmen’s Compensation (Accidents) Convention, 1925	Ratified in 1976
C018 – Workmen’s Compensation (Occupational Diseases) Convention, 1925	Ratified in 1976
C019 – Equality Treatment (Accident Compensation) Convention, 1925	Ratified in 1976
C089 – Night Work (Women) Convention, 1948	Ratified in 1976

### 2.3.2 INTERNATIONAL STANDARDS AND GUIDELINES

In addition to Omani standards, the Project will be subject to the following international environmental and social standards and good practice guidance documents as required by lenders:

- World Bank Group General EHS Guidelines (2007)
- World Bank Group EHS Guidelines for Large Volume Inorganic Compounds Manufacturing and Coal Tar Distillation (2007)
- World Bank Group EHS Guidelines for Semiconductors & Other Electronics Manufacturing (2007)
- World Bank Group EHS Guidelines for Electric Power Transmission and Distribution (2007)
- World Bank Group Performance Standards on Environmental and Social Sustainability (2012)
- World Bank Group Good Practice Handbook Cumulative Impact Assessment and Management (2013)
- World Bank Group Good Practice Note Managing Contractor’s Environmental and Social Performance, 2017

Where different standards are prescribed by the different organizations/entities, the most stringent between the national laws or the international Standards will be considered.

### 2.3.3 IFC PERFORMANCE STANDARDS

The IFC is a member institution of the World Bank Group, which promotes development directed at the private sector with a greater focus on developing countries, with a focus on combating inequality between countries and extreme poverty. The IFC defines eight

Performance Standards that establish standards to be met during the period of an investment granted by IFC.

The Performance Standards defined by the IFC are:

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

Together, these eight Performance Standards establish criteria that are expected to be met throughout the life of an investment by IFC. The Performance Standards are directed towards providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate and, manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of direct investments for the IFC (including project and corporate finance provided through financial intermediaries), IFC requires that its clients apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced (IFC, 2012). As the surface clearance work within the Sohar Freezone was completed by the Sohar port and freezone, USP was not involved in land acquisition, involuntary resettlement, indigenous peoples and cultural heritage. Therefore, this project is applicable to PS 1, PS2, PS3, PS4 and PS6. The requirements of applicable PSs to the proposed Project and this scoping report, are outlined in Table 2-6 below.

**TABLE 2-6 SUMMARY OF IFC PERFORMANCE STANDARDS REQUIREMENTS**

Performance Standard	Project Applicability
<p><b>Assessment and Management of Environmental and Social Risks and Impacts</b></p> <p><b>Performance Standard 1</b> underscores the importance of managing environmental and social performance throughout the life of a project (any business activity that is subject to assessment and management).</p>	<ul style="list-style-type: none"> <li>• Identify and evaluate environmental and social risks and impacts of the Project.</li> <li>• Adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.</li> <li>• Promote improved environmental and social performance of clients through</li> </ul>

Performance Standard	Project Applicability
	<p>the effective use of management systems.</p> <ul style="list-style-type: none"> <li>• Ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.</li> <li>• Promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.</li> </ul>
<p><b>Labour and Working Conditions</b></p> <p><b>Performance Standard 2</b> recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by the protection of the fundamental rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company.</p> <p>The requirements set out in this Performance Standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).</p>	<ul style="list-style-type: none"> <li>• Promote the fair treatment, non-discrimination, and equal opportunity of workers.</li> <li>• Establish, maintain, and improve the worker-management relationship.</li> <li>• Promote compliance with national employment and labour laws.</li> <li>• Protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client’s supply chain.</li> <li>• Promote safe and healthy working conditions, and the health of workers.</li> <li>• Avoid the use of forced labour.</li> </ul>
<p><b>Resource Efficiency and Pollution Prevention</b></p> <p><b>Performance Standard 3</b> recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. This Performance Standard outlines a project-level approach to</p>	<ul style="list-style-type: none"> <li>• Avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.</li> <li>• Promote more sustainable use of resources, including energy and water.</li> </ul>

Performance Standard	Project Applicability
<p>resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices.</p>	
<p><b>Community Health, Safety and Security</b></p> <p><b>Performance Standard 4</b> recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities’ role in promoting the health, safety, and security of the public, this Performance Standard addresses the client’s responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related activities, with particular attention to vulnerable groups.</p>	<ul style="list-style-type: none"> <li>• Anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.</li> <li>• Ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.</li> <li>• Note: This Performance Standard addresses potential risks and impacts to the Affected Communities from project activities. Occupational health and safety requirements for workers are included in Performance Standard 2. Environmental standards to avoid or minimize impacts on human health and the environment due to pollution are included in Performance Standard 3.</li> </ul>
<p><b>Biodiversity Conservation and Sustainable Management of Living Natural Resources</b></p> <p><b>Performance Standard 6</b> recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living and natural resources are fundamental to sustainable development.</p> <p>The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity.</p>	<ul style="list-style-type: none"> <li>• Protect and conserve biodiversity.</li> <li>• Maintain the benefits from ecosystem services.</li> <li>• Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.</li> </ul>

### 2.3.4 WORLD BANK GROUP/IFC ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES

The WB Environmental Health and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) and

are referred to in the World Bank's Environmental and Social Framework and in the IFC's Performance Standards. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group and that are generally considered to be achievable in new facilities at reasonable costs using existing technology.

The World Bank Group requires borrowers and clients to apply the relevant levels or measures of the EHS Guidelines. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent.

The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. They should be used together with the relevant Industry Sector Guideline(s). The General EHS Guidelines contain the following information: environmental, occupational health and safety, community health and safety, construction, and decommissioning.

### 3 PROJECT DESCRIPTION

#### 3.1 OVERVIEW AND LOCATION

The Project is located in the Sohar Port and Freezone, an industrial development area on the northeast coast of Oman (Figure 3-1). The Project will be the Middle East’s first polysilicon factory with an annual production capacity of 100,000 tonnes and is due to commence full trial operations in February 2026.

The Project is located on an industrial land parcel of approximately 96.19 ha in the Sohar Port and Freezone, Al Batinah North Governorate, Oman, approximately 9 km from the Sohar port. The total floor area of the Project’s buildings is approximately 20.98 ha, the detailed layout of the site is shown in Figure 3-4.

The Project location and a footprint map of the Project are presented in Figure 3-1 and Figure 3-2 below.

FIGURE 3-1 PROJECT LOCATION

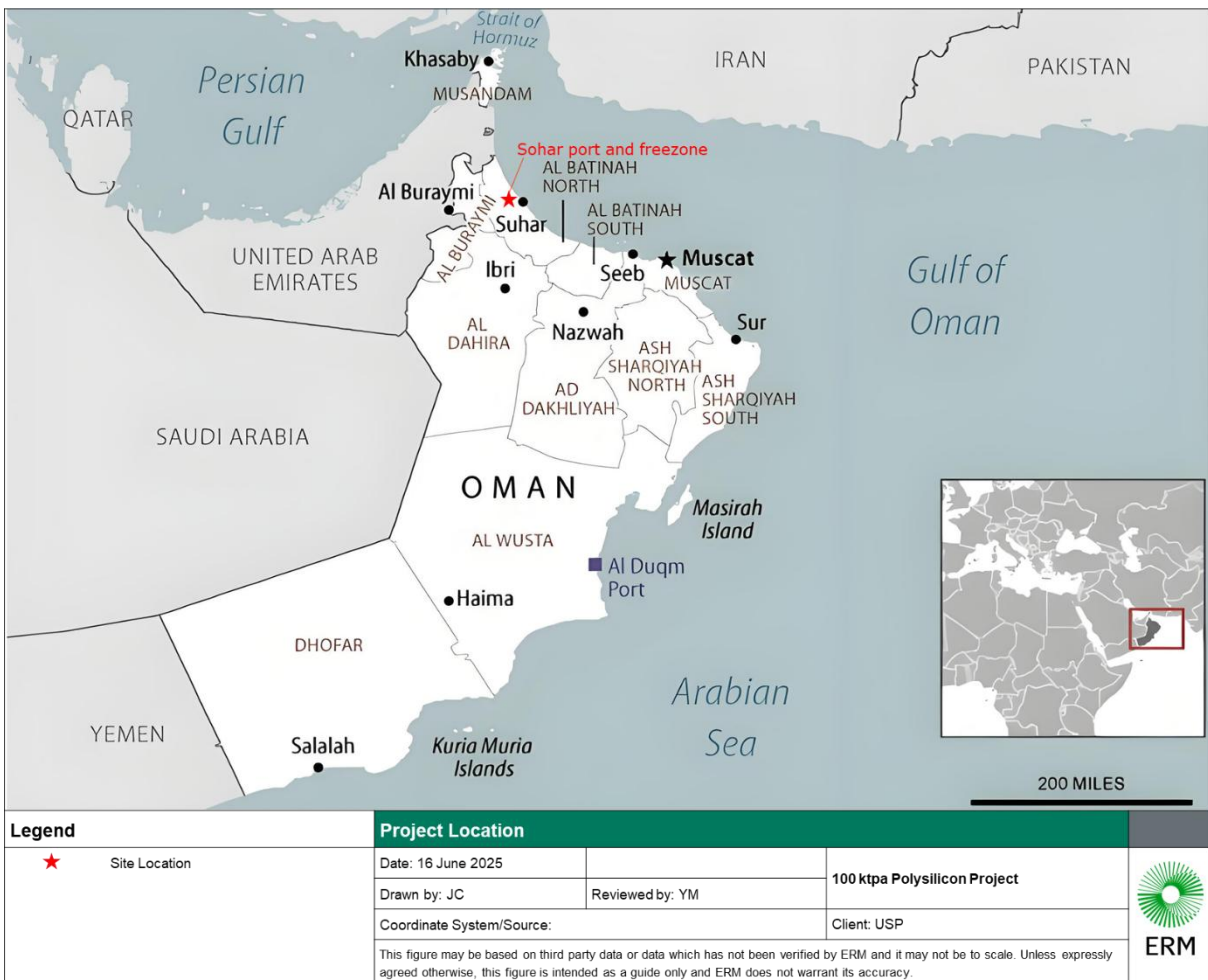
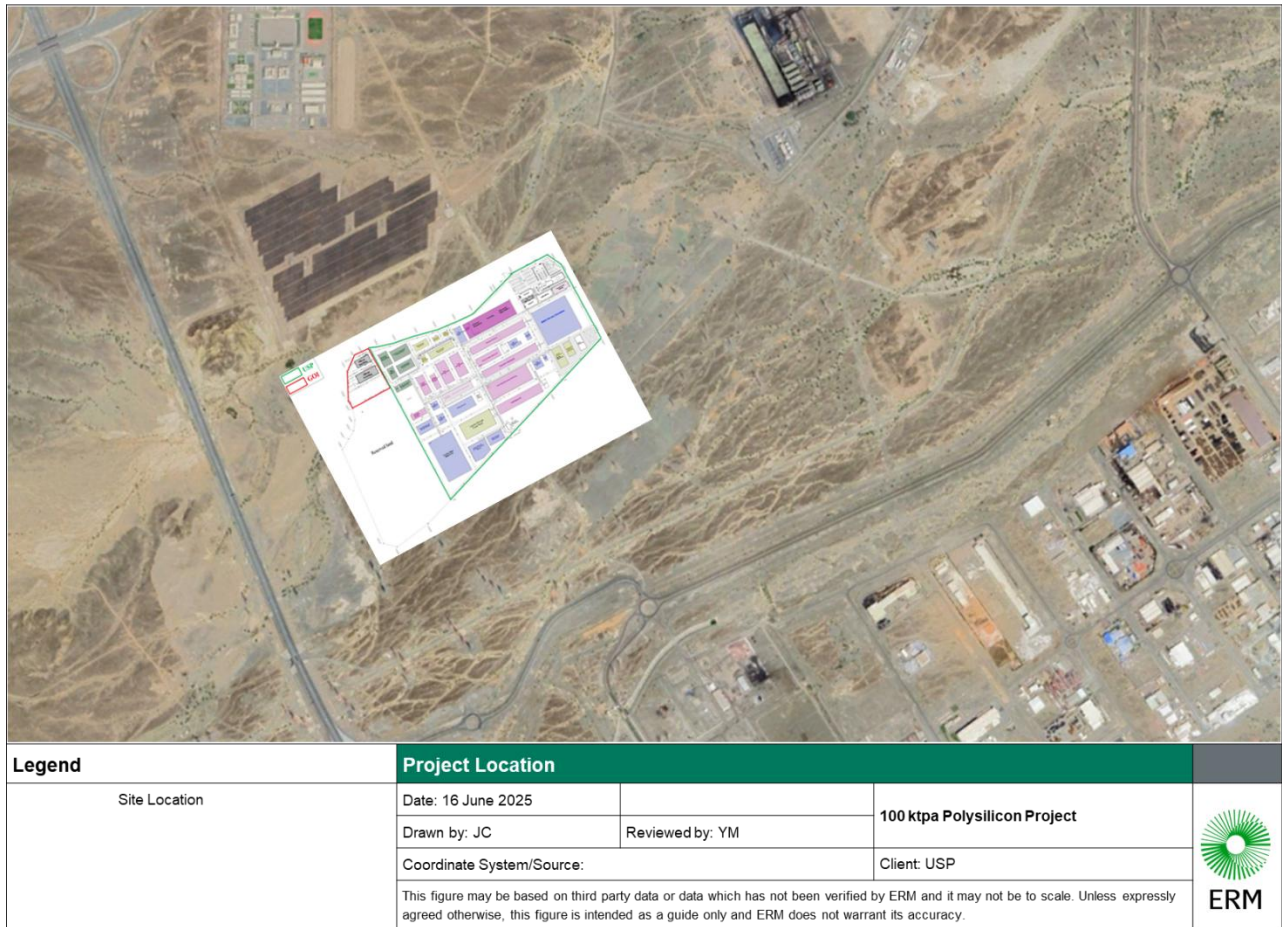


FIGURE 3-2 PROJECT FOOTPRINT



### 3.2 PROJECT SCHEDULE

Feasibility study of the Project was completed by Hualu Engineering & Technology Co., Ltd. in 2024.

Project construction began on 11 March 2024, and is expected to be put into operation in March 2026.

### 3.3 PROJECT COMPONENTS

Key following key components of the Project are located within a 68.4 ha production area:

TABLE 3-1 PROJECT COMPONENTS

Type	Facilities
Main production workshop	Hydrogen production building
	Cold hydrogenation workshops
	Distillation workshop
	Reduction buildings
	Finishing & filament preparation workshop

Type	Facilities
	Vent gas recovery building
	Maintenance workshop
	Central control building
Utilities	West part of 400KV primary substation (The property right belongs to USP)
	Ultra-purity Water Station
	Reduction water station
	Cooling water station
	Fresh water and fire water pumping station
	Demineralized water station
	Air separation and nitrogen building
	Electric boiler
	Chilling stations
	Laboratory
	Equipment/material warehouse
	Spares warehouse
	Oil & chemical storage
	Chemicals warehouse
	Liquids storage tank farm
	MG-Si storage warehouses
	Multi-purpose warehouse
	Waste temporary storage yard
	Waste residue storage yard
Auxiliary buildings	Office building
	Canteens
Associated facilities	Melting and casting workshop
	Grinding workshop

Type	Facilities
	<p>Eastern part of 400kV substation (The property right will be transferred to OETC after completion of construction activities) and 400 kV transmission line</p>
<p>Environmental facilities</p>	<p>USP waste gas treatment facilities                      Five (5) stacks are equipped with three-stage scrubbing systems. Each stack has a height of 25 meters and an inner diameter of 0.35 meters.                      There is one (1) stack, designed for discharging acidic gas, with a height of 25 meters and an inner diameter of 0.35 meters.                      There is one (1) stack, designed for discharging laboratory gas, with a height of 22 meters and an inner diameter of 1.4 meters.</p> <p>GOI waste gas treatment facilities                      Six (6) stacks are equipped with bag filters to remove dust generated during the grinding process.                      One (1) stack is equipped with bag filters to remove dust generated from melting process with a height of 15 meters and an inner diameter of 1.7 meters. Another one (1) is equipped with bag filters to remove dust generated from casting process with a height of 15 meters and an inner diameter of 1.1 meters.</p> <p>USP wastewater treatment facilities                      One (1) high salinity WWTP (Unit 481) with design treatment capacity of 20 m<sup>3</sup>/h                      One (1) fluoride wastewater treatment plant (Unit 460) with design treatment capacity of 65 m<sup>3</sup>/h                      One (1) concentrated water reuse system (Unit 471) with design treatment capacity of 70 m<sup>3</sup>/h                      One (1) domestic sewage treatment station (Unit 461) with design treatment capacity of 65 m<sup>3</sup>/h                      One (1) acidic wastewater treatment plant (Unit 470) with design treatment capacity of 400 m<sup>3</sup>/h                      One (1) 16,000 m<sup>3</sup> emergency wastewater storage basin</p> <p>GOI wastewater treatment facilities                      Domestic sewage treatment relies on UPS’s domestic sewage treatment facility</p>

The rendering of the Project site is presented in Figure 3-3 below:

**FIGURE 3-3 RENDERING OF THE PROJECT SITE**



According to USP and Sohar Free Zone, the transmission line and 400kV primary substation were built by USP on behalf of the local government. After completion, the property rights of transmission lines and high-tension substation will be transferred to the Oman Electricity Transmission Company (hereinafter referred to as "OETC"). The transmission line and primary substation are considered as associated facilities. The substation is a part of USP.

**TABLE 3-2 PROJECT COMPONENTS OF TRANSMISSION LINE AND HIGH-TENSION SUBSTATION**

Type	Facilities
Main production workshop	/
Utilities	Transmission line is approximately 1.7 kilometers from the High-voltage substation to OETC substation. High-voltage substation (400kV) is in the east part of 400KV primary substation in USP site.
Environmental facilities	/

There is a grinding factory in the northwest of the site, USP holds a 30% stake in the entity named GOI (Green origin industry (FZC) LLC) and does not participate in its operation. GOI is located at the northwest part of the USP site. The distance from GOI workshop to USP buildings is approximately 40 meters. The factory provides grinding services for USP by grinding MG-Si into powder with a capacity of 108,000 tons per year. GOI plans to put into operation by March 2026 and most of ongoing business activities at the current stage are specifically allocated to USP. Hence the grinding factory is considered as an associated facility for the Project under IFC definition.

TABLE 3-3 PROJECT COMPONENTS OF GOI

Type	Facilities
Main production workshop	Silicon smelting workshop
	Silicon grinding workshops
Utilities	The water, power and heat supply system relies on USP's existing utility infrastructure. GOI will not install these devices separately.
Environmental facilities	Domestic sewage treatment relies on UPS's domestic sewage treatment facility
	Dust extraction and recycling systems

The layout of the site and transmission line are presented in Figure 3-4 and Figure 3-5 below.

FIGURE 3-4 LAYOUT OF THE SITE

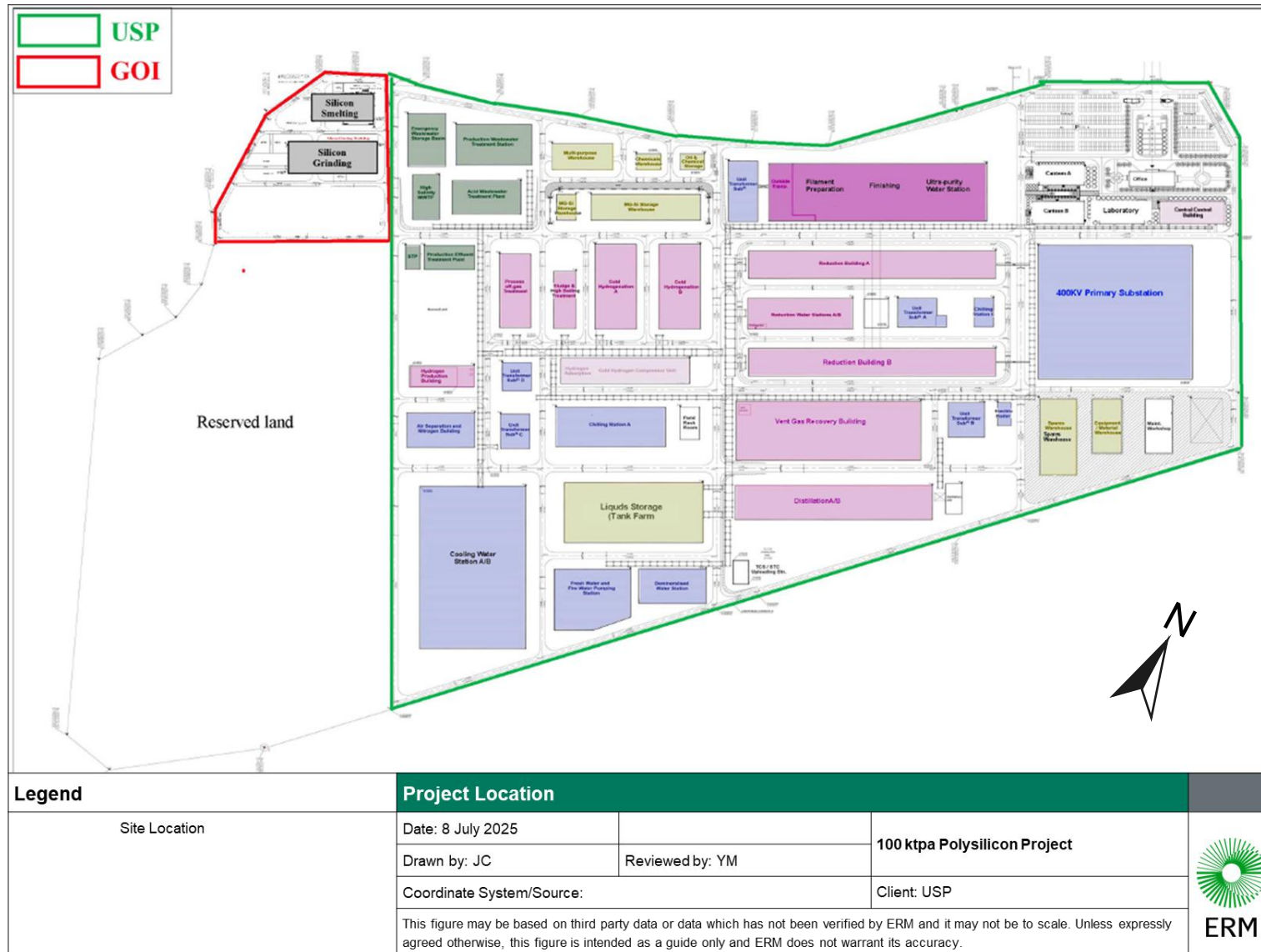
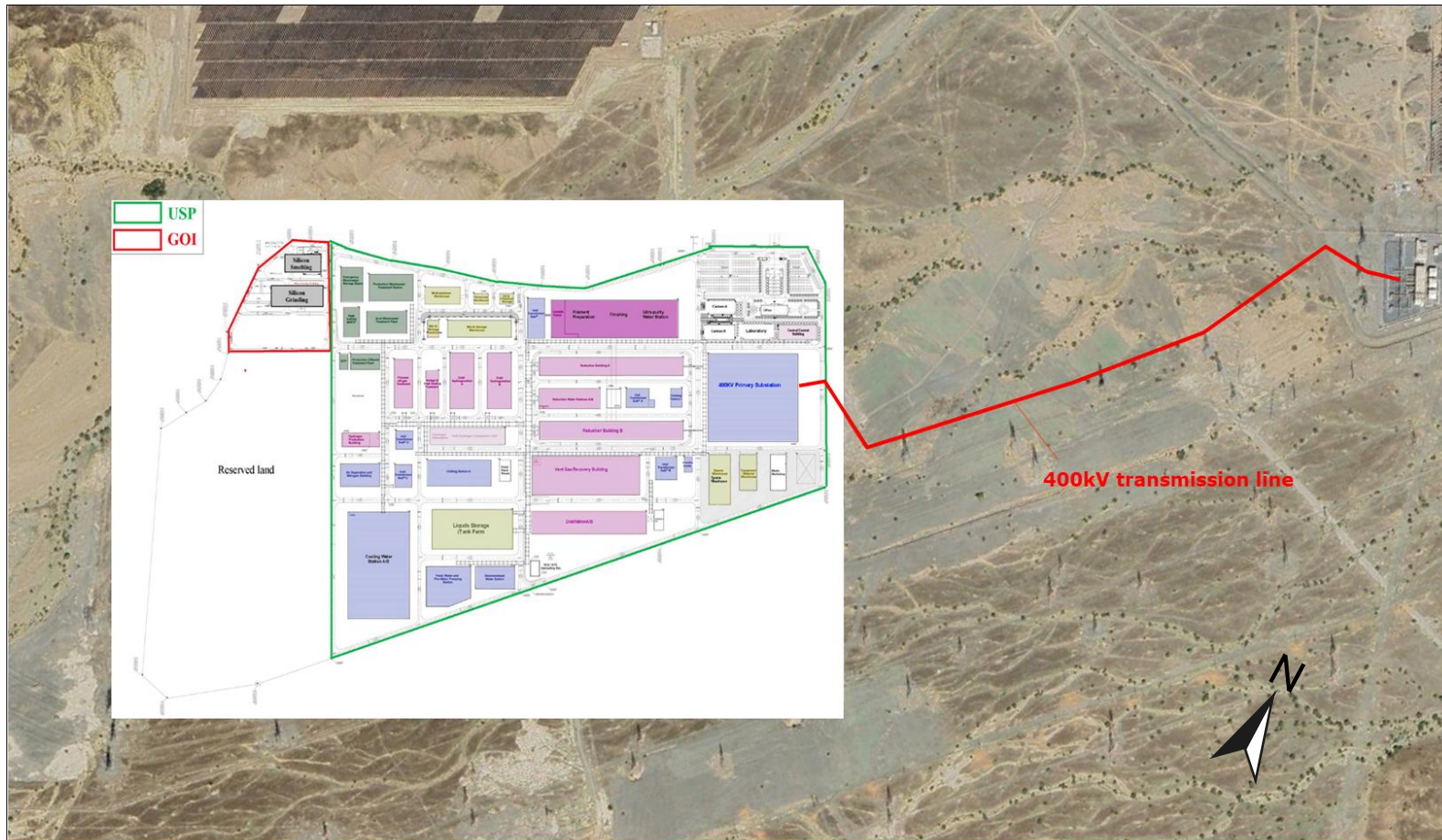



FIGURE 3-5 LAYOUT OF THE TRANSMISSION LINE



Legend	Project Location			 <b>ERM</b>
Site Location	Date: 16 June 2025		<b>100 ktpa Polysilicon Project</b>	
	Drawn by: JC	Reviewed by: YM		
	Coordinate System/Source:		Client: USP	
	This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.			

Raw materials used by the Project mainly include MG-Si, Trichlorosilane, hydrochloric acid, nitric acid, and water, which will be transported to the Project site by road vehicles. Estimated consumption of each raw material is listed in Table 3-4 below.

**TABLE 3-4 ESTIMATED MAIN RAW MATERIAL CONSUMPTION OF USP**

Item	Unit Consumption (t/per t of polysilicon)	Annual Consumption (t)	Source
MG-Si	1.08 t/t product	108,000 t	Malaysia
Trichlorosilane (TCS)	0.075 t/t product	7,500 t	China
Graphite Chuck	6.8 pcs /t product	680,000 pcs	China
Graphite Clamp Ring	2.38 pcs/t product	238,000 pcs	China
Hydrofluoric acid	0.00008 t/t product	8 t	Oman
Nitric Acid (70%wt)	0.00005 t/t product	5 t	Oman
Hydrochloric acid	0.003 t/t product	300 t	Oman

The imported raw material will be temporarily stored in Sohar Harbor and transported to USP site by vehicles. The route for transporting imported raw material to USP is about 15km long, of which 3km passes through residential areas. It starts at Sohar Harbor, travels along public roads to reach Sohar Free Zone, and ends with a 2-kilometer-long access road located to the north of the land plot.

The route for transporting locally sourced TCS starts from Al Ghaith Chemical Industries LLC to the plant, passing along Muscat Sur Highway, Muscat Express Highway and Madayn/Suhar industrial City Road, finally ends with a 2-kilometer-long access road located to the north of the land plot. The total distance is about 450 km, of which 100 km passes through the residential areas. Along this 100 km section, the minimum distance between the road and the nearest residential buildings is about 50 meters. The consumption of other chemicals purchases locally is in small quantities.

Raw materials to be used by the GOI (associated facility) include MG-Si blocks, silicon pieces and powder, which will be transported to the GOI by road vehicles. Estimated consumption of each raw material is listed in Table 3-5 below.

TABLE 3-5 ESTIMATED MAIN RAW MATERIAL CONSUMPTION OF GOI

Item	Annual Consumption (t)
MG-Si blocks	106,000 tons
Silicon pieces (10-100mm)	
Silicon powder	2,000 tons

To address potential environmental and social risks associated with the supply chain (including silicon and carbon), the Project will implement a Supply Chain Management System (SCMS) that provides a structured approach to identifying and assessing risks related to labor and working conditions, human rights, and biodiversity associated with its procurement activities, with reference to the IFC Performance Standards 2 and 6. The system will include supplier mapping and environmental and social risk screening to identify geographic and sector-specific risk factors within the supply chain. Based on the outcomes of this screening, suppliers will be prioritized for proportionate due diligence measures. These may include the communication of environmental and social expectations through procurement processes and the integration of relevant E&S requirements into supplier contractual arrangements, as appropriate. Supplier performance will be monitored using defined indicators to track key environmental and social related risk areas. Where gaps or non-conformances are identified, USP will engage with suppliers to agree on corrective actions and implementation timelines. The SCMS will also include escalation measures for cases of repeated or material non-compliance.

### 3.4 PRODUCTION PROCESS OF USP

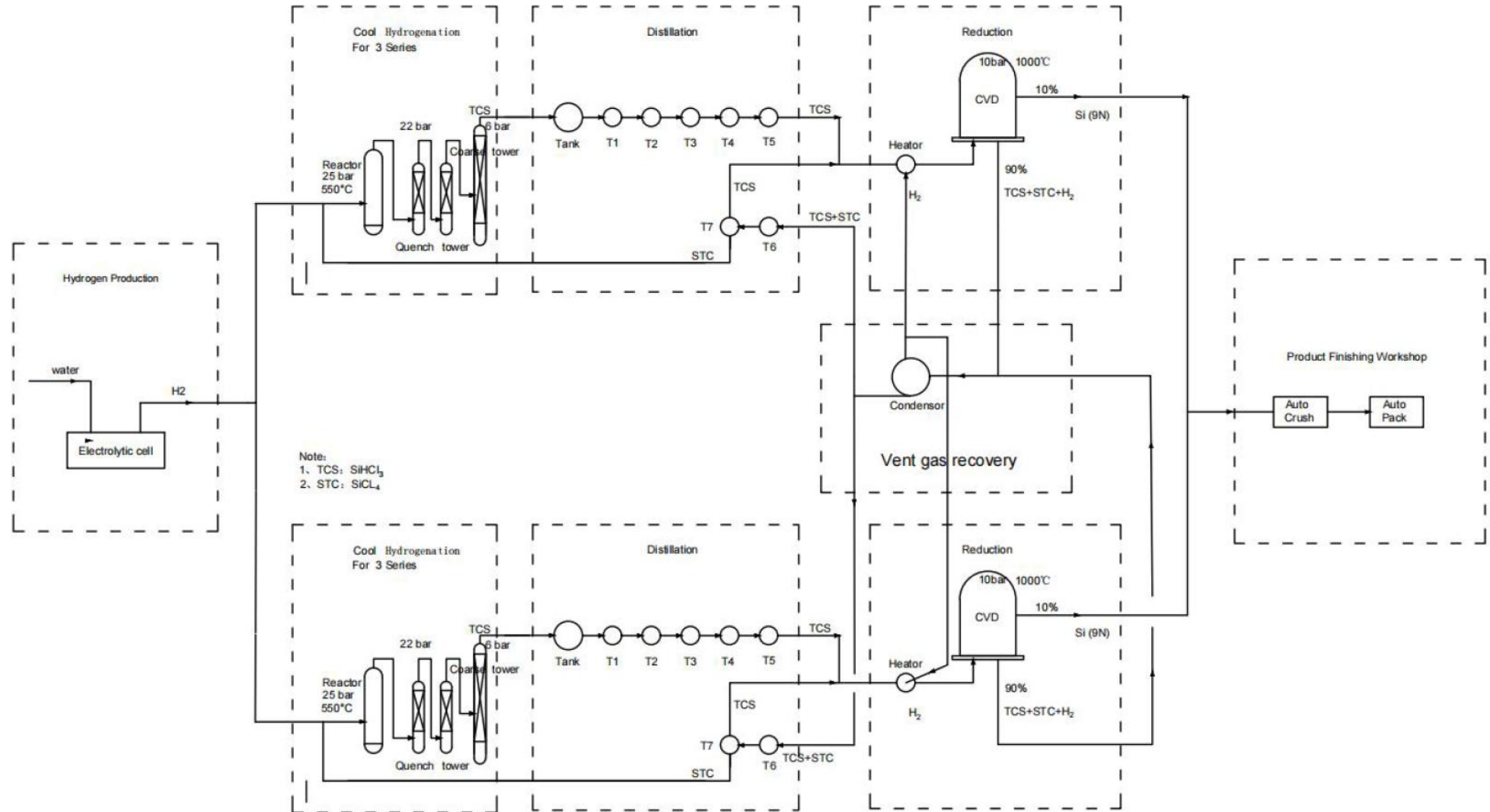
The Project utilizes the Improved Siemens Method, a chemical process that involves reacting metallurgical-grade silicon powder with silicon tetrachloride (STC =  $\text{SiCl}_4$ ), hydrogen chloride (HCl), and hydrogen ( $\text{H}_2$ ) recovered from the reduction tail gas through a cold hydrogenation reaction. This process generates a mixed gas containing trichlorosilane (TCS =  $\text{SiHCl}_3$ ). Following dust removal, the mixed gas undergoes condensation and separation to yield hydrogen and a liquid mixture composed of the generated TCS and unreacted STC. The hydrogen is recirculated back into the system for reuse in subsequent reactions.

The liquid mixture is then subjected to distillation to separate high-purity TCS and STC, with the latter being recycled into the cold hydrogenation process. Subsequently, vaporized TCS and hydrogen are mixed in a controlled ratio and introduced into the polysilicon reduction furnace. Through reduction reactions and chemical vapor deposition (CVD), high-purity polysilicon is produced. The tail gas generated during the reduction process undergoes dry recovery treatment, enabling the closed-loop recycling of hydrogen and chlorosilanes (including STC, TCS, and DCS =  $\text{SiH}_2\text{Cl}_2$ ).

The resulting polysilicon is transported to finishing workshops for further processing, including the production of chunks and filament materials.

Refer to Figure 3-6 for an overview of the production process.

FIGURE 3-6 PRODUCTION PROCESS



### 3.4.1 WATER ELECTROLYSIS FOR HYDROGEN PRODUCTION

The maximum hydrogen consumption is 4,000 Nm<sup>3</sup>/h. Four sets of electrolyzers, each with a capacity of 1,000 Nm<sup>3</sup>/h, will be installed in the hydrogen production building.

#### Hydrogen Generation

The hydrogen production system comprises electrolyzers, followed by hydrogen-side systems, oxygen-side systems, make-up water systems, and alkali solution filtration systems. The operating temperature of the electrolyzers ranges from 85°C to 90°C, and a 30% potassium hydroxide solution is used as the electrolyte. A diaphragm made of treated high-molecular polyphenylene sulfide is employed to prevent gas crossover. When a direct current is applied, water undergoes decomposition: hydrogen is generated at the cathode and oxygen at the anode.

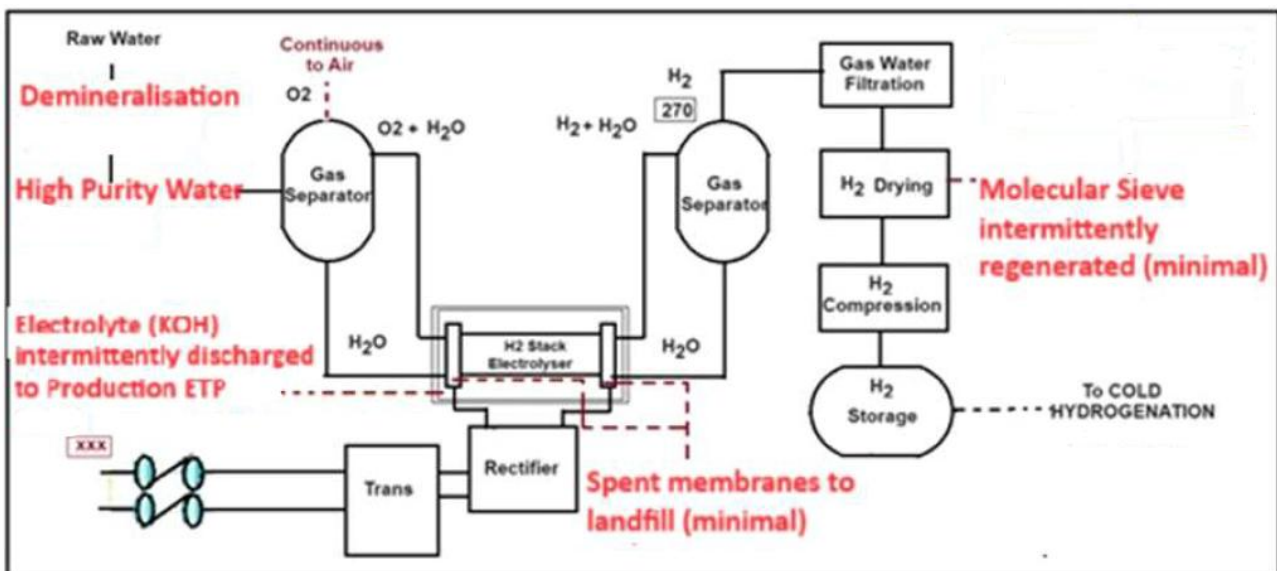
#### Hydrogen Purification

Hydrogen and oxygen exiting the hydrogen- oxygen separator are at elevated temperatures and contain moisture and residual electrolyte.

Hydrogen exiting the gas-liquid separator is directed into the deoxygenator, which contains a high-efficiency platinum-palladium catalyst. At an operating temperature of 165 °C, residual oxygen reacts with hydrogen to form water, thereby achieving effective oxygen removal.

Three dryer units operate in alternating cycles—two in adsorption mode and one in regeneration mode—to ensure continuous and uninterrupted operation of the entire system. Oxygen produced during the process is vented directly into the atmosphere.

FIGURE 3-7 MAIN PROCESS FLOW OF HYDROGEN PRODUCTION



### 3.4.2 COLD HYDROGENATION

Cold hydrogenation recycles silicon tetrachloride (STC), a major byproduct of the Siemens process, into trichlorosilane (TCS), reducing waste and lowering production costs.

Six cold hydrogenation lines, each with 350 ktpa STC capacity, are located in Buildings A and B.

### Hydrogen Preparation

Recycled and fresh hydrogen is compressed, heated, and fed to a static mixer.

### STC Vaporization

STC from a buffer tank is pressurized, preheated using waste heat, fully vaporized, and sent to the mixer.

### Mixture Heating

The H<sub>2</sub>-STC vapor mix is heated to reaction temperature.

### MG-Si Feed

Metallurgical-grade silicon (MG-Si) powder is dried, weighed, and injected into the reactor using high-pressure hydrogen.

### Reaction

In a fluidized bed reactor at high temperature, the main reaction is:  $3\text{SiCl}_4 + 2\text{H}_2 + \text{Si} \rightarrow 4\text{SiHCl}_3$  (TCS). The exothermic reaction is temperature-controlled via an external jacket. Minor byproducts include DCS and metal chlorides.

### Gas Purification

Reactor gas passes through a dust remover; solids are recycled. Then, in a venturi scrubber, countercurrent contact with recycled chlorosilane condensate removes metal chlorides, polychlorosilanes, and fine Si powder.

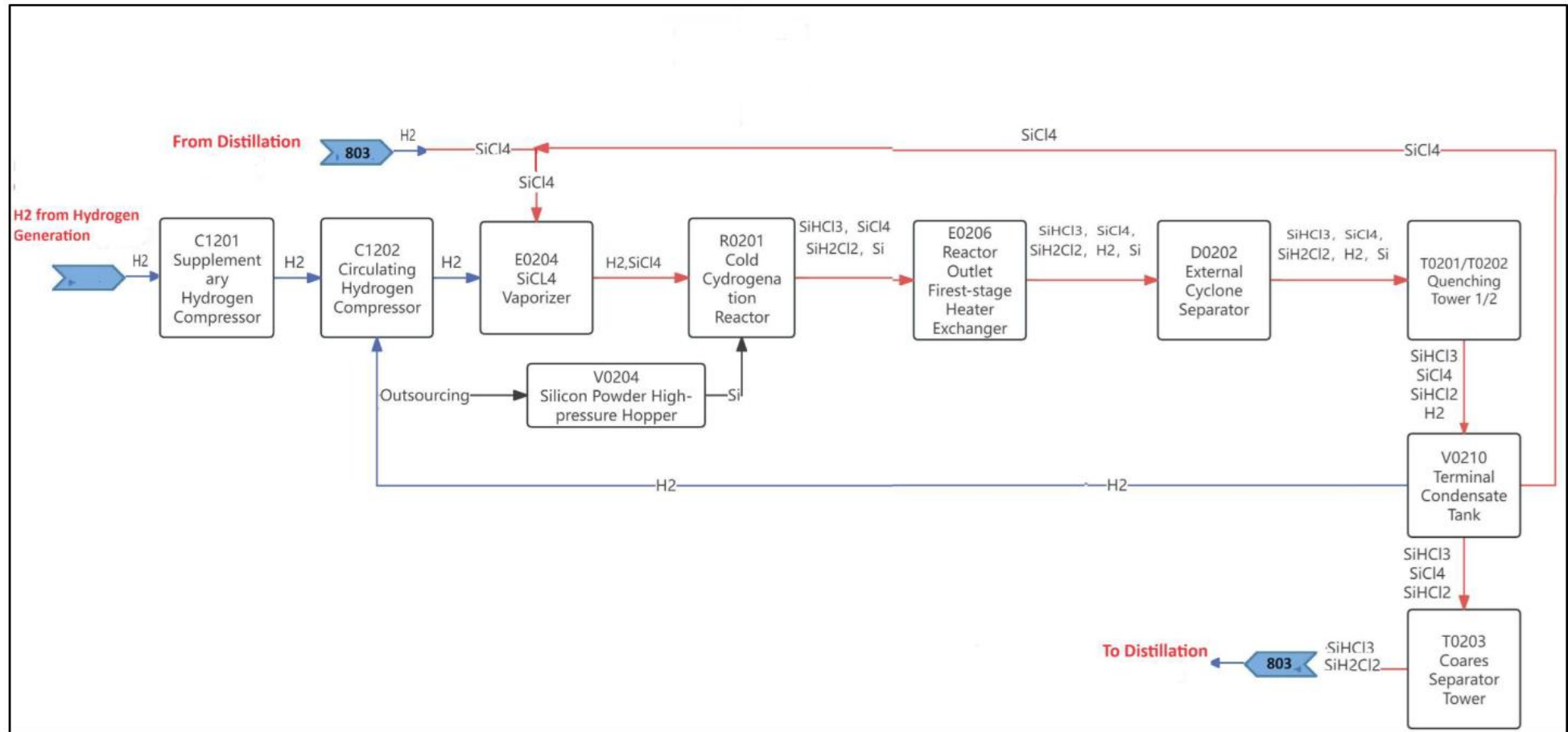
### Condensation & Recovery

Scrubber off-gas is cooled stepwise—heat exchangers, quench tower, deep condenser. After separation, liquid chlorosilane goes to distillation; non-condensable gases are recovered as recycled hydrogen.

### Cooling Media:

Circulating water and Freon refrigerant support condensation.

FIGURE 3-8 COLD HYDROGENATION PROCESS



### 3.4.3 DISTILLATION PROCESS

#### Liquid Chlorosilane Distillation Purification

- Distillation System Composition: 3 crude distillation columns, 2 intermediate distillation columns, and 4 high-low boiling point separation columns.
- Separation Principle: Trichlorosilane (TCS) and silicon tetrachloride (STC) are separated via repeated partial vaporization and condensation cycles (based on their boiling point differences) in columns and heat exchangers.
- Impurity Removal: Resin adsorption columns eliminate impurities (e.g., aluminum, iron, boron) from the TCS stream.
- Product Routing: Purified TCS is sent to the reduction process for chemical vapor deposition (CVD); STC is recycled to the cold hydrogenation process.

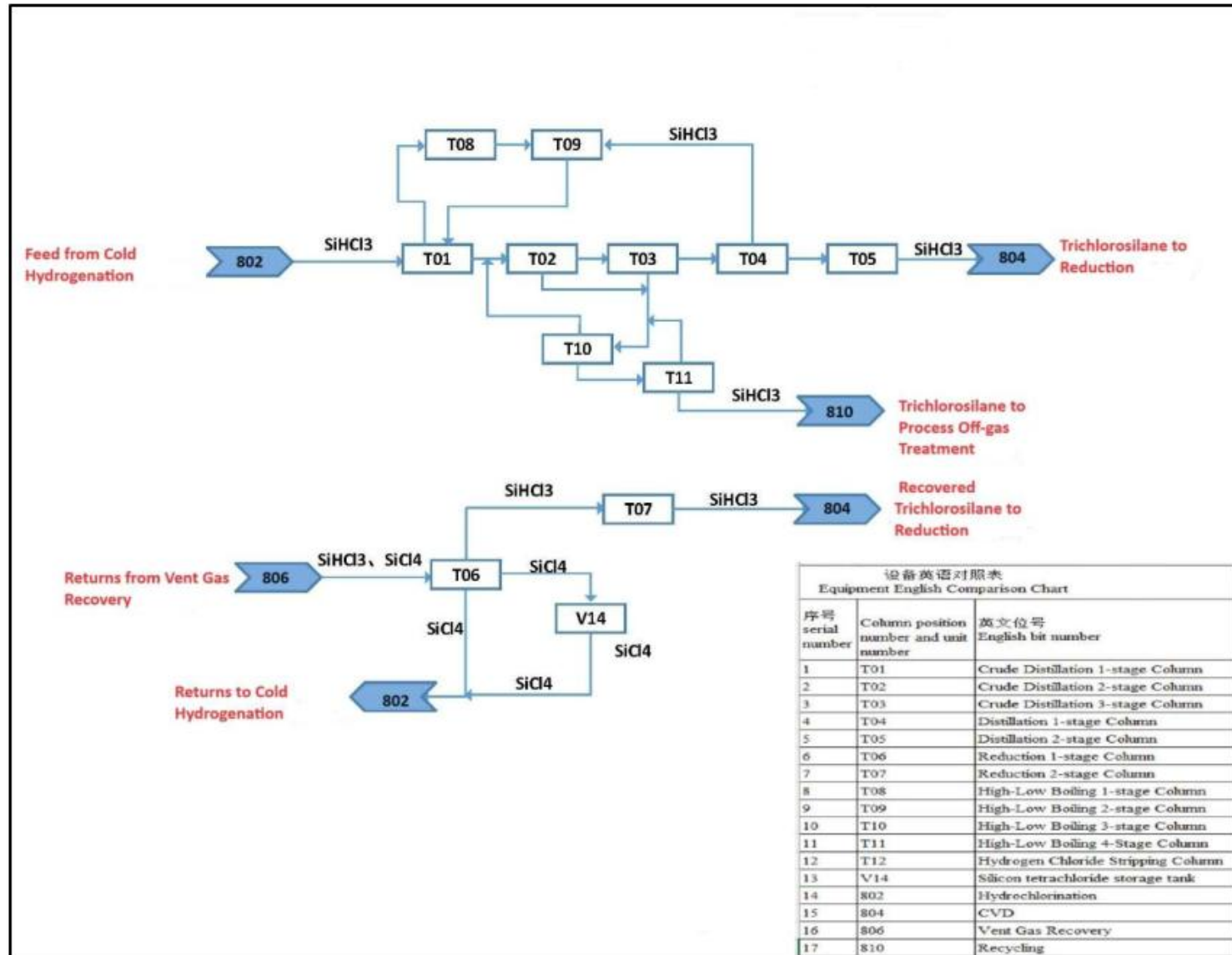
#### High-Boiling Component Handling

- Source: High-boiling components from the venturi scrubber and crude distillation columns.
- Process Steps:
- Cool the components and perform solid-liquid separation.
- Recover chlorosilane via flash evaporation and reintroduce it to the distillation column for further processing.
- Store residual high-boiling fractions in a dedicated high-boiling storage tank.

#### DCS-STC Comproportionation Reaction

- Reaction Purpose: Convert separated dichlorosilane (DCS) into additional TCS by reacting with STC.
- Primary Chemical Reaction:  $\text{SiCl}_4 + \text{SiH}_2\text{Cl}_2 \rightarrow 2\text{SiHCl}_3$
- Post-Reaction Handling: The reaction product is fed back to the distillation column for further purification.

FIGURE 3-9 PROCESS FOLW OF DISTILLATION



### 3.4.4 REDUCTION (CVD) PROCESS

#### TCS Vaporization & Gas Mixture Prep

- High-purity TCS is vaporized and mixed with recycled or fresh hydrogen at a controlled ratio before entering the reduction furnace.

#### Reaction in Reduction Furnace

- The gas mixture reacts on silicon cores in the furnace, depositing high-purity polysilicon as the cores grow into rods.
- Primary chemical reaction:  $4\text{SiHCl}_3 \rightarrow 3\text{SiCl}_4 + 2\text{H}_2\uparrow + \text{Si}\downarrow$

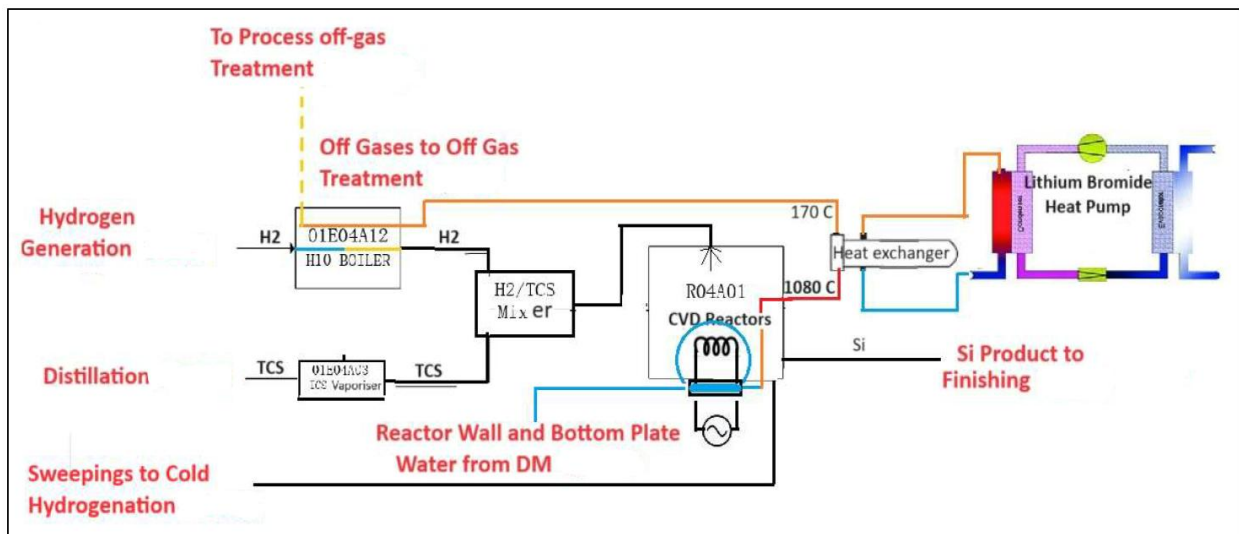
#### Off-Gas Recovery & Recycling

- Off-gas ( $\text{H}_2$ , TCS, STC, DCS, HCl) is sent to the vent gas recovery unit.
- Recovered  $\text{H}_2$  is reused in the furnace; HCl goes to cold hydrogenation for TCS synthesis; chlorosilanes are purified in distillation.

#### Post-Reaction Handling of Polysilicon Rods

- When rods reach target diameter, feeding stops, the system cools, and protective gas is replaced.
- Rods are removed and transferred to the finishing workshop.

FIGURE 3-10 PROCESS FOLW OF REDUCTION



### 3.4.5 FINISHING (POST HANDLING) PROCESS

Process polysilicon rods from the reduction unit and prepare filaments and graphite components for reuse.

#### Chunk Production

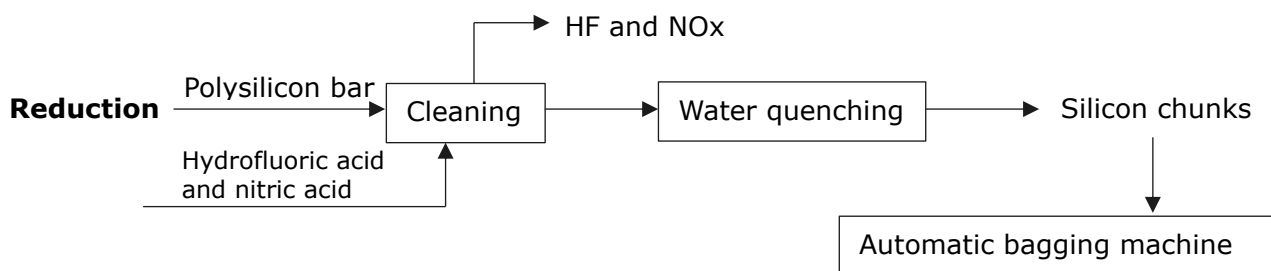
- Remove graphite tips using a metal hammer.
- Quench rods with water to induce thermal shock, rapidly cooling and fragmenting them into dust-free chunks.

- Clean contaminated rods with nitric-hydrofluoric acid.
- Treat acidic off-gas (HF mist, NO<sub>x</sub>) in a 3-stage spray tower before release.

### Filament Preparation

- Melt high-purity polysilicon and extrude through a precision pump and spinneret to form liquid filament bundles.
- Cool with high-speed nitrogen to suppress grain growth and produce continuous polycrystalline filaments.
- Anneal at 800 - 1000° C in nitrogen to relieve internal stress and improve mechanical strength and electrical uniformity.
- Use filaments as silicon cores in the reduction unit for rod production.

FIGURE 3-11 PROCESS FLOW OF FINISHING



### 3.4.6 VENT GAS RECOVERY

Two vent gas recovery systems—each handling 50,000 t/a of electronic-grade polysilicon off-gas—recover STC, TCS, DCS, HCl, H<sub>2</sub>, and silicon powder through five stages: cooling & condensation, H<sub>2</sub> compression, HCl absorption, HCl distillation, and H<sub>2</sub> adsorption.

#### Cooling & Condensation:

Gas is cooled in multiple stages (heat recovery, circulating water, cold energy recovery, 7° C water, -25° C Freon). Most chlorosilanes condense and are collected; non-condensable gas (mainly H<sub>2</sub> with traces of chlorosilanes/HCl) proceeds to compression.

#### H<sub>2</sub> Compression:

Gas is pressurized and sent to the HCl absorber.

#### HCl Absorption:

Compressed gas enters the absorber bottom after cooling. Lean chlorosilane absorbs HCl, producing high-purity H<sub>2</sub> (reheated for adsorption). Rich chlorosilane combines with condensed chlorosilanes and feeds HCl distillation.

#### HCl Distillation:

Overhead vapor is cooled and separated—reflux returns, HCl goes to cold hydrogenation. Part of lean chlorosilane recycles to absorption after heat exchange; the rest is stored.

#### H<sub>2</sub> Adsorption:

Activated carbon removes HCl and DCS. Each unit uses three adsorbers (adsorption, regeneration, standby):

- Adsorption: H<sub>2</sub> flows through a cooled adsorber; output purity reaches 99.9999 wt.%. Saturated units switch to regeneration.
- Regeneration: Unit is set to micro-positive pressure; impurities are stripped with hot water and 180° C H<sub>2</sub>; off-gas returns to cold hydrogenation. Carbon is replaced every 8 – 10 years.
- Standby: Cooled with water; H<sub>2</sub> pressure is equalized before reuse.



### 3.4.7 SLUDGE AND HIGH BOILING CRACKING

#### Sludge Treatment:

Sludge from cold hydrogenation and distillation is cooled below 40° C, settled, and separated. Clear liquid is filtered and sent to the high-low boiling column. Solid sludge is dried and hydrolyzed with recycled water:

- $\text{SiCl}_4 + 2\text{H}_2\text{O} \rightarrow \text{SiO}_2 + 4\text{HCl} \uparrow$
- $\text{SiHCl}_3 + 2\text{H}_2\text{O} \rightarrow \text{SiO}_2 + 3\text{HCl} \uparrow + \text{H}_2 \uparrow$
- $\text{SiH}_2\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{SiO}_2 + 2\text{HCl} \uparrow + \text{H}_2 \uparrow$

Hydrolysis gas ( $\text{H}_2$ ,  $\text{HCl}$ ,  $\text{H}_2\text{O}$ ,  $\text{N}_2$ ) is scrubbed to remove acid and released; effluent is neutralized with  $\text{NaOH}$ , and concentrated wastewater is sent to high-salinity treatment.

#### High-Boiling Component Treatment:

High-boiling liquids and off-spec streams are collected and fed to the high-low boiling column. Overhead chlorosilanes go to crude distillation. Bottom residue is cracked at ~120° C using steam and recycled  $\text{HCl}$  with catalyst, producing TCS and STC, which are recovered via the high-low boiling column. Residual solids are sent to hydrolysis.

### 3.4.8 MASS BALANCE

The balance summary of chlorine, hydrogen and silicon elements is as follows:

TABLE 3-6 Mass Balance Summary

Input	Elements	Amount	Output	Elements	Amount
$\text{SiHCl}_3$	Cl	736.13 kg/h	$\text{NaCl}$	Cl	466.64 kg/h
$\text{HCl}$		33.30 kg/h	$\text{CaCl}_2$		302.79 kg/h
<b>subtotal</b>		<b>769.43 kg/h</b>	<b>subtotal</b>		<b>769.43 kg/h</b>
$\text{SiHCl}_3$	H	6.98 kg/h	$\text{H}_2$	H	61.93 kg/h
$\text{H}_2$		54.00 kg/h			
$\text{HCl}$		0.95 kg/h			
<b>subtotal</b>		<b>61.93 kg/h</b>	<b>subtotal</b>		<b>61.93 kg/h</b>
MG-Si	Si	13365.00 kg/h	Polysilicon	Si	12500.00 kg/h

Input	Elements	Amount	Output	Elements	Amount
SiHCl <sub>3</sub>		194.40 kg/h	Filter residue		1059.40 kg/h
<b>subtotal</b>		<b>13559.4 kg/h</b>	<b>subtotal</b>		<b>13559.4 kg/h</b>

### 3.5 PRODUCTION PROCESS OF GOI (ASSOCIATED FACILITIES)

#### 3.5.1 SILICON MELTING AND CASTING

Three production lines, each with a 6-ton medium-frequency induction furnace (including transformer, control cabinet, and cooling system), have a total annual capacity of 12,000 tons. Raw materials—fine silicon powder (from dust collection) and non-conforming silicon (USP project)—are melted at 1600 - 1700° C into 100×80×10 cm silicon ingots, which are sent to the grinding workshop.

##### Material Handling

- Bulk-bagged silicon is moved by forklift to storage, then lifted by crane to silos on rail-guided feeder cars. Dust hoods capture loading emissions. Cars deliver material to furnaces via screw conveyors.

##### Melting

- Furnaces (3000 kW, 1.8 t/h) operate continuously using electromagnetic induction. Molten silicon is poured by tilting the furnace 95° hydraulically into ladles. Shell temperature is maintained at 30 - 40° C by cooling water; fumes are captured overhead.

##### Casting & Cooling

- Ladles transport molten silicon to casting machines, where it is poured into molds and cooled into ingots. Ingots are transferred to the milling workshop for crushing and screening.

##### Environmental Controls:

- The system is fully enclosed. Dust is captured by two collectors, centralized negative-pressure ducts, and a baghouse collector (100% particulate capture); treated exhaust is released through 15 m stacks ( $\leq 10$  mg/m<sup>3</sup> dust).
- No wastewater, exhaust gas, or byproducts are generated; cooling water integrates with the USP circulating network.

#### 3.5.2 SILICON GRINDING

The workshop crushes, grinds, and screens silicon blocks into controlled-particle-size silicon powder in a fully enclosed system (prevents dust emissions). It has an annual capacity of 100,000 tons (for USP) with 6 milling lines, each paired with a dedicated dust collector.

##### Jaw Crusher:

Silicon blocks are fed into a silo and conveyed via vibrating feeders to a jaw crusher, where they are reduced to small fragments. Crushed material is gravity-discharged into sealed bulk bags and transported to the hammer crusher area.

#### Primary Crushing (Hammer Crusher):

In the hammer crusher, material is reduced from 10 - 100 mm to 5 - 500 mesh and discharged into Bucket Elevator.

#### Screening & Iron Removal:

From Elevator, material passes through a magnetic separator to remove metal impurities, then splits to two swing screens:

- Qualified powder undergoes secondary magnetic separation and enters the finished product silo for bagging.
- Oversized powder is sent to a dual-wheel centrifugal crusher for secondary grinding.

#### Secondary Crushing (Dual-Wheel Centrifugal Crusher) & Recirculation:

Ground oversized material is lifted by Bucket Elevator, passes another magnetic separator, and returns to Elevator to re-enter the screening-grinding loop.

#### Silicon Dust Recirculation:

All processes are enclosed with dust collectors; nearly 100% of dust is captured and reused. Dust goes to a cyclone separator:

- Fine dust is collected in a baghouse, packaged, and sent to the smelting workshop.
- Coarse dust is screened—oversized to hammer crusher, qualified to product silo.

#### Environmental Measures

- Fully enclosed system with dust collectors; purified air is discharged via 15-meter stacks (dust concentration  $\leq 10 \text{ mg/m}^3$ ).
- No wastewater generated;  $\sim 8$  tons of fine silicon dust is produced daily.

FIGURE 3-13 PRODUCTION FLOW CHART OF MELTING AND CASTING

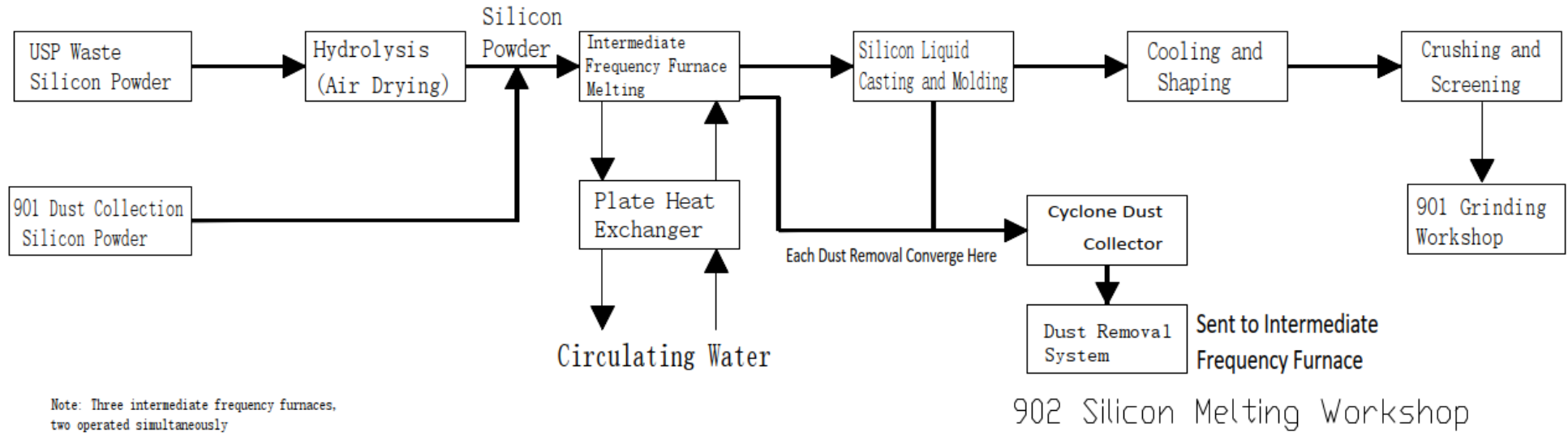
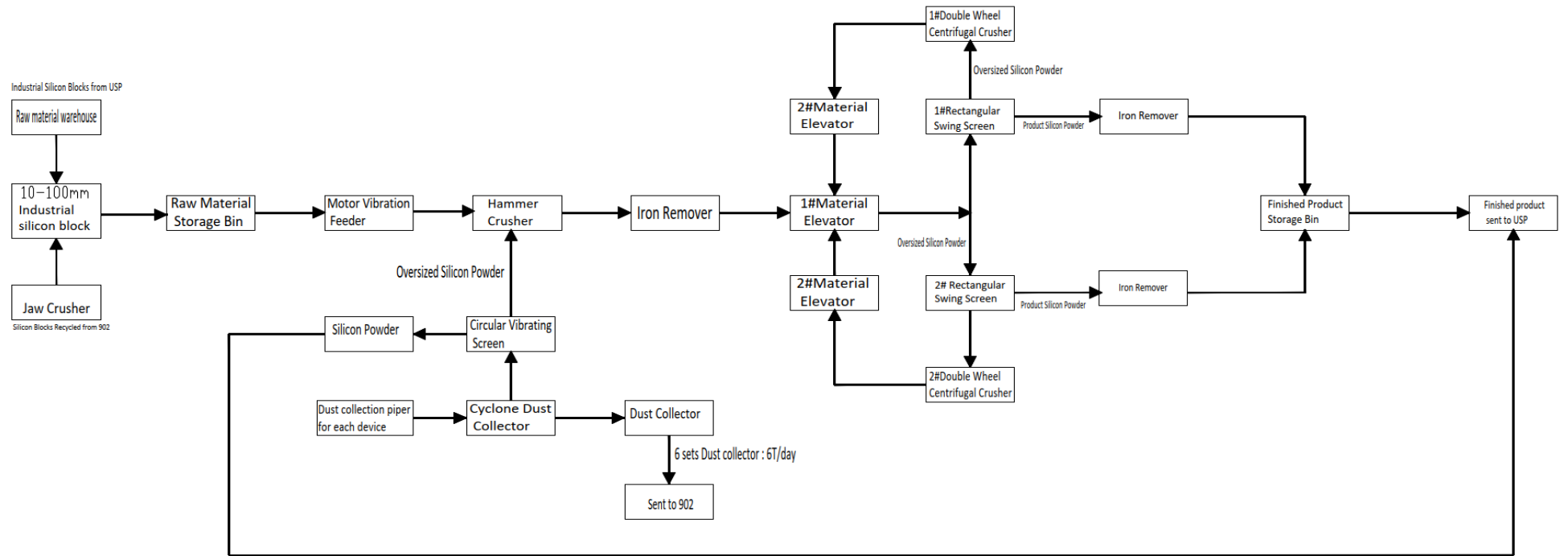


FIGURE 3-14 PRODUCTION FLOW CHART OF GRINDING



### 3.6 PRODUCTION PROCESS OF OETC

During the operation phase, the maintenance work of transmission lines and High-tension substation is carried out by OETC. The main tasks include regular inspection and maintenance, as well as fault repair.

The maintenance and repair work will not generate waste gas and wastewater; the noise impact of maintenance and repair work is negligible; the solid waste including metal, oil and oily cloth, etc.

### 3.7 RESOURCE REQUIREMENT

#### 3.7.1 MANPOWER PLAN

According to the data provided in February 2026, USP engages a total workforce of 1,027 direct employees and 233 agency workers for its operation. For direct employees, gender ratio is approximately 9:1 with 922 male and 107 female. And all agency workers are male.

#### 3.7.2 WATER AND POWER SUPPLY

Water will be supplied by local seawater desalination plant. The estimated water consumption of the Project is 1018 m<sup>3</sup>/d of industrial water and 12.5 m<sup>3</sup>/d of domestic water.

Industrial wastewater of the Project will be treated and reused for production, domestic sewage will be treated for greening after treatment and no discharge of wastewater is expected.

The Project will develop a 400 kV/110 kV substation to be constructed in the northeast portion of the site to connect the power pipeline in the industrial park for power supply. According to the information provided by USP, electricity comes mainly from a natural gas power plant established and operated by OETC. The estimated annual electricity consumption is 5,500,000,000 kWh.

The energy required by the Project during the construction and operation is summarized in the table below.

TABLE 3-7 ENERGY SUPPLY

Type	Operation phase
Electricity	5.5×10 <sup>9</sup> kWh/a
Water	3.435×10 <sup>5</sup> m <sup>3</sup> /d

#### 3.7.3 WATER DISCHARGE

##### Industrial Wastewater

Reduction, distillation and melting process is heated to a very high temperature and requires large amount of cooling water to cool the machine. All industrial wastewater is treated and reused as process water, such as cooling water and spray liquid. The cooling water evaporated, and fresh water is used to replenish the loss. No industrial wastewater will be discharged out of the plant.

The freshwater consumption of the project is 1030.5 m<sup>3</sup> per day, which is used for deionized water, air separation & nitrogen preparation, ground cleaning, cooling towers and domestic water. The flow rate of the circulating water is 161,526 m<sup>3</sup> per day.

The project generates 549.8 m<sup>3</sup> of industrial wastewater and 10.6 m<sup>3</sup> of domestic sewage per day. After being treated by the WWTPs mentioned below, these can be reused to production system. Additionally, 481.2 m<sup>3</sup> per day of the reused water can be directly reused.

Water consumption incurred during the water consumption and wastewater treatment is 1077 m<sup>3</sup> per day.

The industrial wastewater treatment facilities include:

Unit 460<sup>1</sup>: fluoride WWTP, treating fluoride wastewater generated from vent gas recovery unit.

Unit 470: acidic wastewater WWTP, treating wastewater generated from reduction, demineralized water, surface wash, process off gas treatment, sludge and high boiling treatment and unforeseeable wastewater.

Unit 471: concentrated water reuse system, treating wastewater generated from demineralized water, cooling tower, finishing & ultra-purity water station and concentrated water reuse system.

Unit 481: High salinity WWTP (including MVR and three-effect evaporation), treating concentrated wastewater treatment station and acidic wastewater WWTP.

The detail treatment process of above mentioned WWTP refer to Section 3.7.2.

### **Domestic sewage**

All the domestic sewage generated onsite, including generated from GOI and OETC, is treated by Unit 461: domestic sewage treatment station before being reused in greening.

The water balance is summarized in Table 3-8.

---

<sup>1</sup> Unit number is based on the internal process design.

TABLE 3-8 WATER BALANCE SHEET

No.	Points of water use	Time pattern of water use	Parameter of water supply		Water supply				Discharge				Water loss	Note
			Pressure	Temperature	Fresh Water	Reuse water	Circulating water	Reaction water	Circulating water	Reuse water	Industrial wastewater for reuse	Domestic sewage for reuse		
			h	MPa	°C	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d		
1	Production													
1.1	Hydrogen production	24	0.25	35			600		600					
1.2	Cold hydrogenation	24	0.25	35			11200		11200					
1.3	Distillation	24	0.25	35			21720		21720					
1.4	Reduction	24	0.25	35			4450	6.5	4450	5	1.5			To acidic wastewater WWTP
1.5	Finishing & ultra-purity water station	24	0.25	35			70	40	70		40			To concentrated wastewater treatment station
1.6	Unforeseeable water	24	0.25	35	10						10			To acidic wastewater WWTP
	<b>Subtotal</b>				<b>10</b>		<b>38040</b>	<b>46.5</b>	<b>38040</b>	<b>5</b>	<b>51.5</b>			
2	Utility													
2.1	Plant process and heating pipe rack	24	0.25	35			600		600					
2.2	Demineralized water station	24	0.25	35	89						30		59	To acidic wastewater WWTP and concentrated water reuse system
2.3	Tank farm	24	0.25	35			50		50					
2.4	Electric boiler	24	0.25	35			68		68					
2.5	Steam booster station	24	0.25	35			64		64					
2.6	Cold hydrogenation compressor unit	24	0.25	35			1044		1044					
2.7	Air separation & Nitrogen preparation	24	0.25	35	10		956		966					
2.8	Surface wash water	24	0.25	35	10						10			To acidic wastewater WWTP
2.9	Chilling station	24	0.25	35			6605		6605					
2.10	Refrigeration station	24	0.25	35			25867		25867					
2.11	Cooling tower	24	0.25	35	899	236	80768		80758		146		999	To concentrated wastewater treatment station
	<b>Subtotal</b>				<b>1008</b>	<b>236</b>	<b>116022</b>		<b>116022</b>		<b>186</b>		<b>1058</b>	
3	Environmental protection facilities	24	0.25	35										
3.1	Vent gas recovery	24	0.25	35			5200		5200					

No.	Points of water use	Time pattern of water use	Parameter of water supply		Water supply				Discharge				Water loss	Note
			Pressure	Temperature	Fresh Water	Reuse water	Circulating water	Reaction water	Circulating water	Reuse water	Industrial wastewater for reuse	Domestic sewage for reuse		
			h	MPa	°C	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d	m <sup>3</sup> /d		
3.2	Process of gas treatment	24	0.25	35		185	300		300		180		5	To acidic wastewater WWTP
3.3	Sludge and high boiling treatment	24	0.25	35		49.6	1464		1464		49.6			To acidic wastewater WWTP
3.4	Concentrated wastewater treatment station	24	0.25	35		272.7				208.5	64.2			To high salinity WWTP
3.5	Acidic wastewater WWTP	24	0.25	35		248.1				229.6	18.5			To high salinity WWTP
3.6	High salinity WWTP	24	0.25	35		29	500		500	27.5			1.5	
3.7	Domestic sewage treatment station	24	0.25	35		10.6				10.6				
	<b>Subtotal</b>					<b>795</b>	<b>7464</b>		<b>7464</b>	<b>476.2</b>	<b>312.3</b>		<b>6.5</b>	
4	Other													
4.1	Domestic water	24	0.25	35	12.5							10.6	1.9	
4.2	Greening water	24	0.25	35		10.6							10.6	To domestic sewage treatment station
	<b>Subtotal</b>				<b>12.5</b>	<b>10.6</b>						<b>10.6</b>	<b>12.5</b>	
	<b>Total water use</b>				<b>1030.5</b>	<b>1041.6</b>	<b>161526</b>	<b>46.5</b>	<b>161526</b>	<b>481.2</b>	<b>549.8</b>	<b>10.6</b>	<b>1077</b>	
	<b>Water reuse rate</b>						99.4%							

### 3.8 OTHER OPERATIONAL ACTIVITY

USP plans to commence its operating activities of the Project in Oct 2025, and the Project operation is planned for 25 years.

### 3.9 ALTERNATIVES

The alternatives that have been considered during the design phase consists only of the 'No-Project' option.

The option to not proceed with the project will result in the proposed project area remaining in their current environmental state. No action alternative entails no change to the status quo, in other words, the plant construction and equipment installation activities will not be conducted.

The Project is proposed to meet the fast-growing demand for polysilicon products in the Middle East region. 'No-Project' Option may lead to a severe shortfall of polysilicon products in the local area due to the growing demand, and consequently block solar energy industrial and commercial development opportunities. The installed capacity of photovoltaic power in the Middle East and North Africa (MENA) region reached 40 GW in 2024 and is expected to reach 180 GW by 2030, indicating that there is still great potential of the electrolytic aluminum industry in Middle East region. The Project creates jobs for Omanis and economic benefits to the region. The products are mainly sold to Europe and America.

Sohar Freezone, established in 2010, is a strategically located industrial and logistics hub in northern Oman, adjacent to Sohar Port and outside the Strait of Hormuz. The Freezone spans 4,500 hectares and offers seamless integration with deep-sea port facilities. In recent years, it has increasingly positioned itself as a regional center for renewable energy and green industrial transformation. Oman is promoting large-scale photovoltaic projects in Sohar and Ibri. Currently, Sohar Free Zone is the best option of the Project.

### 3.10 PROJECT AREA OF INFLUENCE (AOI)

The ESIA adopts both quantitative and qualitative methods to assess environmental and social impacts caused by the Project. Quantitative analysis will refer to some of the analysis conclusions in local EIA of USP and GOI.

The AOI for the current assessment comprises of the area identified for the project which potentially may experience direct and indirect impacts from the Project activities. The table below summarizes the AOI of direct and indirect potential impacts associated with the Project components.

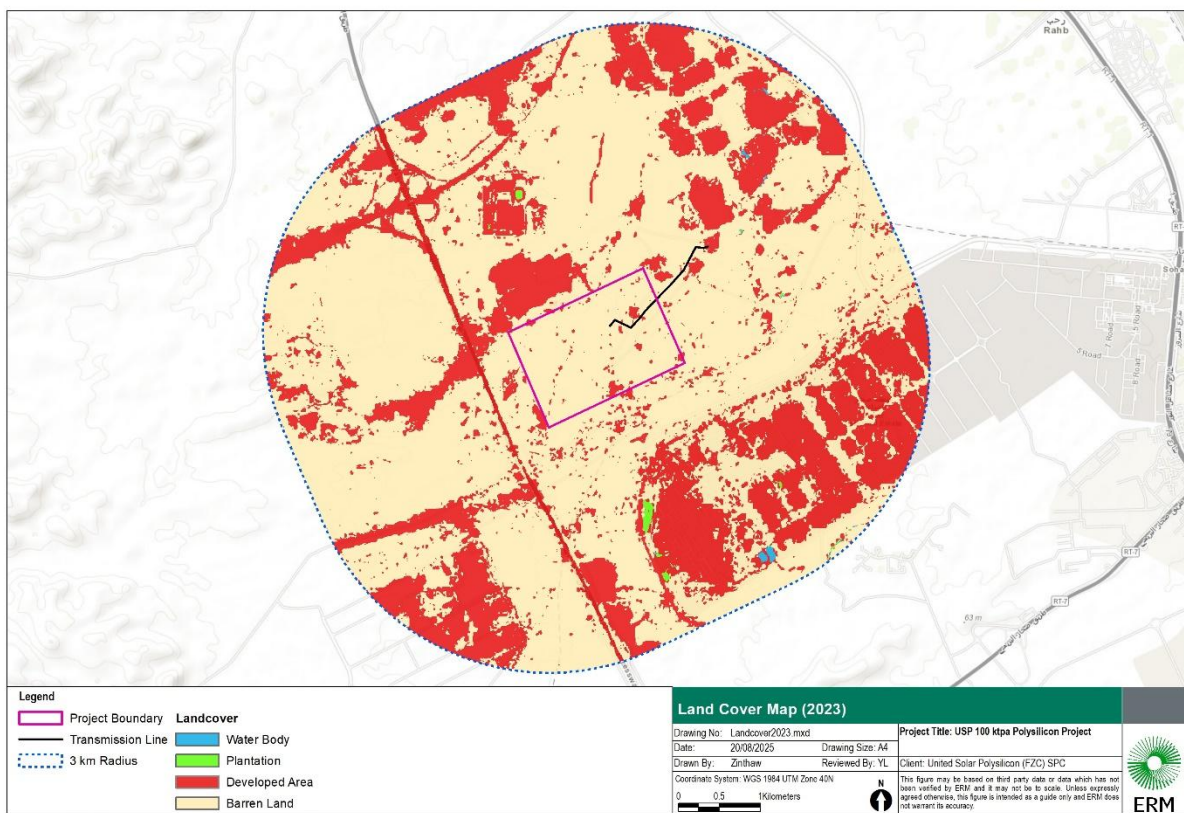
**TABLE 3-9 PROJECT AREA OF INFLUENCE**

Type	AOI
Air Quality	<p>The AOI for the Operational Phase is 10km from the Site.</p> <ul style="list-style-type: none"> <li>Referring to the modeling result in USP local EIA, the max contribution concentration of major pollutant factors are located at Ghadfan South Station and Majan, which are approximately 7.1 kilometers away from the stations.</li> </ul>
Water	<p>Oman has a tropical desert climate. There are no natural water bodies around USP.</p> <p>USP uses the fresh water provided by the municipal water network. The industrial wastewater of USP is treated and reused, and the domestic sewage is treated and reused for greening.</p> <p>The impact of the project on the water environment is negligible. Therefore, no AOI is set up for this project to water environment.</p>
Noise	<p>500m around the site boundary and 250m alongside the main access roads to be used during operation for the land transportation of the equipment, materials and products, covering the nearest receptor locations off-site.</p> <p>There are no Noise Sensitive Receptors (NSRs) within 500m of the site boundary. The nearest NSRs alongside the access roads is located in the northeast of the site with a distance of more than 5 kilometers.</p>
Biological Environment	<p>The AoI for biodiversity impact is designated as a 3km radius around the Project site. The homogenous gravel desert plain and scattered existing industrial facilities leading to the low-sensitive ecological environment. The biodiversity AoI is</p>

Type	AOI
	<p>delineated based on conservative consideration of habitat loss (vicinity of project footprint), noise (500m from the site) and air emission (impacts of the most parameters are limited in 3 km radius from the Project site).</p> <p>The associated transmission line follows an existing corridor (&lt;50 m), resulting in no incremental impacts; therefore, a 3-km AoI around the Project site adequately captures all credible zones of influence.</p>
Socio-Economic	<p>The AoI for social impact is designated as 10 km radius around the Project site. The social AoI has taken the location of nearby communities into consideration which was between 5 to 10 km from the Project site and who may experience mostly direct impacts (e.g., employment opportunities, traffic incidents risks) and indirect impacts from the project (e.g., increased risks of communicable disease, pressured infrastructure).</p>

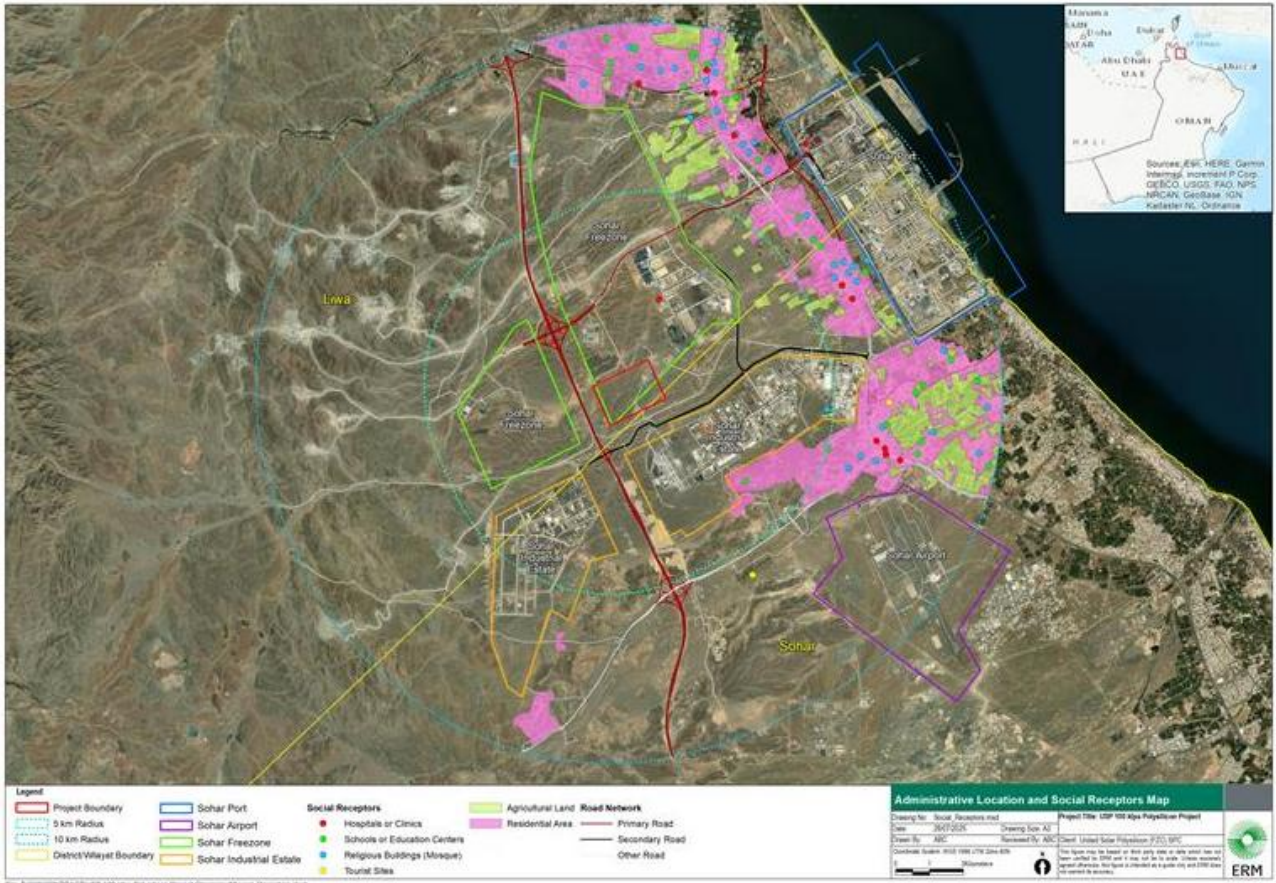
The AOI maps are presented in Figure 3-15 and Figure 3-16.

**FIGURE 3-15 BIODIVERSITY AOI MAP**



File: T:\GIS\CONTRACT\USP 100 ktpa Polysilicon Project Oman\mxd\Landcover2023.mxd

FIGURE 3-16 SOCIAL AOI MAP



## 4 ENVIRONMENTAL AND SOCIAL BASELINE

### 4.1 PHYSICAL ENVIRONMENT

#### 4.1.1 CLIMATE AND METEOROLOGY

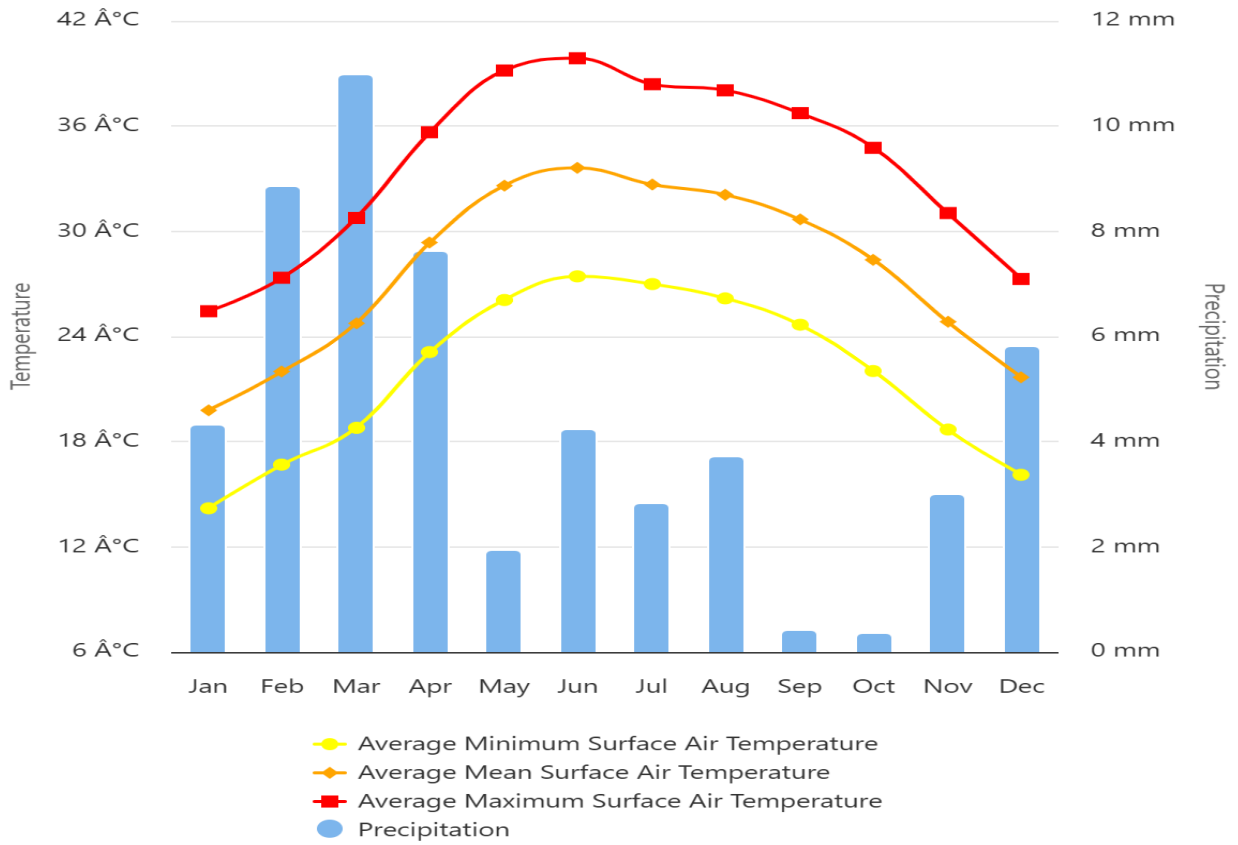
The Sultanate of Oman is situated in the southeastern part of the Arabian Peninsula, straddling the Tropic of Cancer and spanning latitudes from approximately 16°40' N to 26°20' N and longitudes from about 51°50' E to 59°50' E. It covers a total land area of approximately 309,500 square kilometers and boasts a diverse landscape, featuring mountain ranges, arid deserts, and fertile plains. Oman's extensive coastline, which stretches for approximately 3,165 kilometers, borders the Arabian Gulf, the Sea of Oman, and the Arabian Sea. The mountainous regions occupy approximately 15% of Oman's territory, with the Hajar mountains in the north extending in a 700-kilometer arc from Musandam in the north to Ras Al Hadd in the east. Jebel Akhdar, part of the northern Oman Mountains, includes Jabal Shams, the highest peak, which rises to 3,075 meters above sea level. In the southwestern part of Oman, the Dhofar Mountains feature peaks ranging from 1,000 to 2,000 meters above sea level. Oman's climate is arid according to the Köppen-Geiger classification system.

Oman features a predominantly tropical desert climate, characterized by long, hot summers and mild winters. Average annual temperatures range from 10°C to 12°C in the northern highlands and 16°C to 18°C in the southern coastal regions, with summer highs often exceeding 40°C (104°F) in lowland areas. The year is divided into two seasons: the hot season, from May to October, when temperatures soar above 40°C; and the cool season, from November to April of the following year, with an average temperature of around 24°C.

Humidity varies significantly by region and season. Coastal areas can experience humidity levels up to 90% during summer, especially in July and August, making the heat feel more intense. Inland desert areas, however, remain dry and arid throughout the year. Rainfall is generally scarce and highly seasonal. The northern regions, including Muscat and the Al Batinah coast, receive 150–300 mm of rain annually, mostly between December and April.

Oman enjoys abundant sunshine, with over 3,500 hours of sunlight annually, positioning it as a prime location for solar photovoltaic (PV) and green hydrogen projects.

FIGURE 4-1 THE AVERAGE TEMPERATURE AND PRECIPITATION FOR THE OMAN



## 4.2 BIOLOGICAL ENVIRONMENT

### 4.2.1 TERRESTRIAL ECOREGION AND INTERNATIONAL AND NATIONAL RECOGNIZED AREA

The Project is located in the Sohar Port and Freezone, Oman, which falls into the Arabian-Persian Gulf Coastal Plain Desert ecoregion<sup>2</sup>. Overall, this 12,202 ha ecoregion consists of disjointed habitats of rocky shores, rock, gravel desert, sand dunes, and reed beds, mudflats, salt marshes and mangrove swamps which support diverse population of the avifauna that breed and winter there, as well as sea turtles to nest.

Two Key Biodiversity Areas (KBA), Khawr Shinas and Khawr Liwa<sup>3</sup> and Al Batinah coast<sup>4</sup>, are located along the shoreline, around 10km to the northeast to the Project site. The Khawr Shinas and Khawr Liwa consist of two tidal inlets on the northern Batinah Coast, supporting mangrove habitat.

The endangered subspecies, Collared Kingfisher (*Todirhamphus chloris kalbaensis*), occurs irregularly in the mangrove as a non-breeder, over 11 km from the northeast to the site. The Al Batinah coast, a 300km sand beach crawling from north to south located approximately 9.5km from the east to the site, faces the Gulf of Oman and extends from As Seeb north-westwards to Shinas. The following bird species meet the KBA criteria under Criterion 3(a): Pallas' Gull (*Larus ichthyaetus*, LC), Slender-billed Gull (*Larus genei*, LC), Sanderling (*Calidris alba*, LC), Black-headed Gull (*Larus ridibundus*, LC), etc.

There are no National Nature Reserves (NNR), National Resource Reserves (NRR) or National Scenic Reserves (NSR) within the vicinity of the project area.

### 4.2.2 LAND COVER AND HABITAT

The project is located within the Sohar free zone which is highly modified by industrial development. The habitat within the project area is homogenous gravel desert which spans for 5-15 km till it reaches residential areas on the east or hills on the west. The most likely affected biodiversity in this context will be large avifauna which may hover over the area when foraging. Considering the disturbance from the project activities and the homogeneous habitat surrounding the project footprint, a range of 3km radius is defined as Project's Area of Influence (AoI) for biodiversity to capture impact mainly on flora and avifauna from precautionary way (details in TABLE 3-9). There are four types of land cover within the Project AoI: Water body, Plantation, Development area and Gravel desert (FIGURE 4-2, TABLE 4-1). The gravel desert is natural habitat, while plantation, water bodies, and developed area are modified habitat.

**Water Body and Development area:** These land areas consist of artificial infrastructure and water ponds used for manufacturing purposes. It is categorized as IUCN habitat 14.5 Artificial-Terrestrial-Urban Areas. Surface runoff flows through seasonal channels in low-lying areas after the heavy rainfall but there are no perennial rivers in this area.

<sup>2</sup> <https://www.oneearth.org/ecoregions/arabian-persian-gulf-coastal-plain-desert/>

<sup>3</sup> <https://www.keybiodiversityareas.org/site/factsheet/8218>

<sup>4</sup> <https://www.keybiodiversityareas.org/site/factsheet/8220>

**Plantation:** This habitat mainly consists of plantation of Date Palm (*Phoenix dactylifera*) and as green space (Figure 4-3). One of the other small pieces of green space is planted grassland uses as playground. It is categorized as IUCN habitat 14.3 Artificial-terrestrial-Plantations.

**Gravel desert:** This habitat consists of extensive sand and gravel plain with scattered shrub vegetations. The dominant shrub species are Salam (*Acacia ehrenbergiana*) and *Euphorbia larica* (Figure 4-4). It is categorized as IUCN habitat type 8 Desert.

FIGURE 4-2 LAND COVER WITHIN 3KM OF THE PROJECT SITE

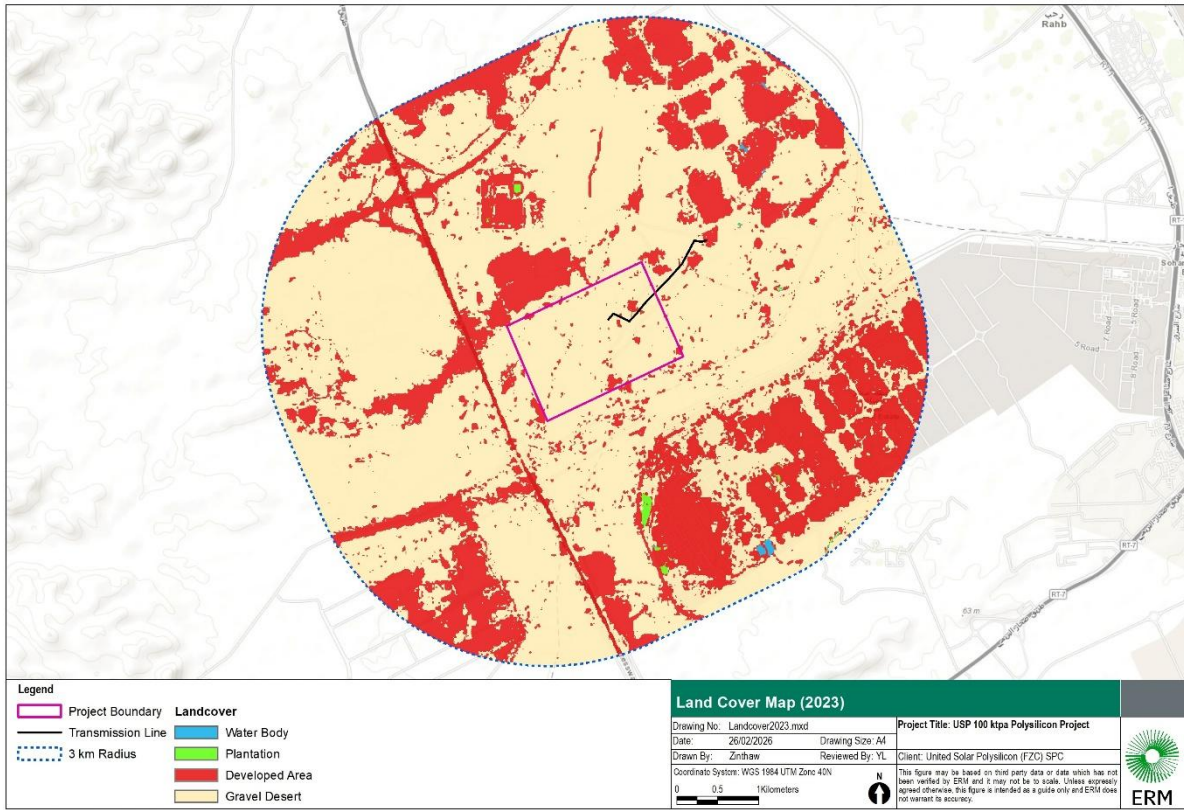


TABLE 4-1 LANDCOVER WITHIN THE PROJETS AOI

Land Cover in Biodiversity AoI	Habitat Types	Area (ha)	% Distribution
Plantation	Modified	7.1	0.14%
Gravel Desert	Natural	3437.0	69.45%
Developed Area	Modified	1500.6	30.32%
Water Body	Modified	4.2	0.08%
		<b>4948.9</b>	<b>100.00%</b>

FIGURE 4-3 PLANTATION OF DATE PALM TREES IN THE VICINITY OF THE PROJECT SITE



Source: ERM (photo taken on 12 June 2025)

FIGURE 4-4 GRAVEL DESERT: GRAVEL PLAIN AND SCATTERED SHRUBLAND



Source: ERM (photo taken on 12 June 2025)

### 4.2.3 BASELINE OF FLORA AND FAUNA, AND ECOSYSTEM SERVICES

#### RESULT OF RAPID FIELD VISIT

During the rapid site visit of the Project Area on June 12, 2025, we observed two flora species and three bird species within Project AoI (Table 4-2).

**TABLE 4-2 OBSERVED FLORA AND FAUNA SPECIES DURING RAPIT VISIT IN JUNE**

Taxa	Common Names	Scientific Names	IUCN Red List
Birds	Crested Lark	<i>Galerida cristata</i>	LC
Birds	Rock Dove	<i>Columba livia</i>	LC
Birds	Likely House Crow	<i>Corvus spp.</i>	LC
Plants	Date Palm	<i>Phoenix dactylifera</i>	LC
Plants	Likely Salam	<i>Acacia ehrenbergiana</i>	LC

**FIGURE 4-5 OBSERVED AVIFAUNA IN THE SITE VISIT OF JUNE 2025**



During the site visit, we also recorded provisioning and regulating services around the Project area. This included livestock raising (camel), agriculture and plantation (mainly date palm trees) (Figure 4-6).

**FIGURE 4-6 ECOSYSTEM SERVICES: LIVESTOCK RAISING (LEFT) AND PLANTATION (RIGHT)**



**SPECIES OF CONSERVATION CONCERN**

As marine habitats are 10km away from the Project site and no freshwater habitat is within the Project’s AoI, this study focuses on impact assessment of terrestrial flora and fauna. An initial list of the likely occurred terrestrial species of conservation significance (Critical Endangered,

Endangered, Vulnerable) is identified based on the IUCN Red List and species' distribution range (Table 4-3).

Since the Project site is located in a highly industrialized area with heavy disturbance and modified habitats, the mammal species Arabian Tahr (*Arabitragus jayakari*) and Arabian Gazelle (*Gazella arabica*) are likely to avoid the Project site. Although the dragonfly species *Arabineura Khalidi* has a natural range in the Project area, there is no associated freshwater habitat within the AoI.

The two sandpipers and one plover bird species Curlew Sandpiper (*Calidris ferruginea*), Broad-billed Sandpiper (*Calidris falcinellus*), and Grey Plover (*Pluvialis squatarola*) are associated with estuarine and coastal habitats where are located over 10km from the Project site, and thus unlikely to occur with Project's AoI. The suitable habitats in the area for the species Lappet-faced Vulture (*Torgos tracheliotos*) and Egyptian Vulture (*Neophron percnopterus*) are mountainous areas that 15 km away on the west of the Project site. According to the IUCN distribution range, these two species are not distributed within AoI.

According to the distribution range and suitable habitat types, the Greater Spotted Eagle (*Clanga clanga*), Steppe Eagle (*Aquila nipalensis*), European Turtle-dove (*Streptopelia turtur*), Saker Falcon (*Falco cherrug*), and Sooty Falcon (*Falco concolor*) theoretically likely occur within AoI. The rapid site visit in summer season did not capture their occurrence. As the industrial part in the project area getting developed, the likelihood of occurrence of these species may be further reduced due to avoidance.

**TABLE 4-3 SPECIES OF CONSERVATION CONCERNS WITHIN AOI AND 50KM**

Taxa	Common Names	Scientific Names	IUCN	Residency	Likely Within 3km	Likely Within 50km
Birds	Lappet-faced Vulture	<i>Torgos tracheliotos</i>	EN	R	No	Yes
Birds	Curlew Sandpiper	<i>Calidris ferruginea</i>	VU	NB	No	Yes
Birds	Greater Spotted Eagle	<i>Clanga clanga</i>	VU	NB	Yes	Yes
Birds	Egyptian Vulture	<i>Neophron percnopterus</i>	EN	R	No	Yes
Birds	Steppe Eagle	<i>Aquila nipalensis</i>	EN	M	Yes	Yes
Birds	Broad-billed Sandpiper	<i>Calidris falcinellus</i>	VU	M	No	Yes
Birds	Grey Plover	<i>Pluvialis squatarola</i>	VU	NB	No	Yes
Birds	European Turtle-dove	<i>Streptopelia turtur</i>	VU	B	Yes	Yes
Birds	Saker Falcon	<i>Falco cherrug</i>	EN	NB	Yes	Yes
Birds	Sooty Falcon	<i>Falco concolor</i>	VU	B	Yes	Yes
Insects	-	<i>Arabineura khalidi</i>	EN	R	No	Yes

Taxa	Common Names	Scientific Names	IUCN	Residency	Likely Within 3km	Likely Within 50km
Mammals	Arabian Tahr	<i>Arabitragus jayakari</i>	EN	R	No	Yes
Mammals	Arabian Gazelle	<i>Gazella arabica</i>	VU	R	No	Yes

Notes: IUCN refers to IUCN Red List: CR=Critical Endangered, EN=Endangered, VU=Vulnerable. Migration: B=breeding; R=Resident; P=Passage; NB=Non-breeding; M=Migration.

#### 4.2.4 CRITICAL HABITAT ASSESSMENT

This section identifies whether there is critical habitat that should be considered for this Project. Critical habitat candidate species have been screened based on critical habitat criteria defined in IFC PS6 and set out below.

Both natural and modified habitats may contain high biodiversity values, thereby qualifying as "Critical Habitat"<sup>5</sup>. Critical habitats<sup>6</sup> are defined in IFC PS6 as areas with: "high biodiversity value (Table 4-4), including:

- Criterion 1: habitat of significant importance to Critically Endangered and/or Endangered species<sup>7</sup>;
- Criterion 2: habitat of significant importance to endemic and/or restricted-range species;
- Criterion 3: habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- Criterion 4: highly threatened and/or unique ecosystems; and/or
- Criterion 5: areas associated with key evolutionary processes.

TABLE 4-4 CRITICAL HABITAT CRITERIA (IFC PS6 GUIDANCE NOTE 2019)

Criteria	Thresholds
<b>Criterion 1: Critically Endangered (CR) / Endangered (EN) species:</b>	<ul style="list-style-type: none"> <li>• Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (<math>\geq 0.5\%</math> of the global population AND <math>\geq 5</math> reproductive units of a CR or EN species);</li> <li>• 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 and meet the thresholds in (a).</li> <li>• As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.</li> </ul>

<sup>5</sup> GN28. IFC Guidance Note (2019) of PS6 (2012).

<sup>6</sup> Paragraph 16. IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012)

<sup>7</sup> As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species.

Criteria	Thresholds
<b>Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;</b>	<ul style="list-style-type: none"> <li>Areas that regularly hold <math>\geq 10\%</math> of the global population size AND <math>\geq 10</math> reproductive units of a species.</li> </ul>
<b>Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species;</b>	<ul style="list-style-type: none"> <li>Areas known to sustain, on a cyclical or otherwise regular basis, <math>\geq 1</math> percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.</li> <li>Areas that predictably support <math>\geq 10\%</math> of the global population of a species during periods of environmental stress.</li> </ul>
<b>Criterion 4: Highly threatened and/or unique ecosystems; and/or</b>	<ul style="list-style-type: none"> <li>Areas representing <math>\geq 5\%</math> of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.</li> <li>Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.</li> </ul>
<b>Criterion 5: Areas associated with key evolutionary processes</b>	No set thresholds. Some potential examples of spatial features associated with evolutionary processes are: Landscapes with high spatial heterogeneity; environmental gradients; Connectivity between habitats; and sites of demonstrated importance to climate change adaptation

## Notes:

- Restricted-range/ Endemic Species = Terrestrial species with an extent of occurrence (EOO) of less than 50,000 km<sup>2</sup>, and marine species with an EOO of less than 100,000 km<sup>2</sup>. Plant species may qualify as endemic if has  $\geq 95\%$  of its global range sits within the country or region of analysis.
- Migratory species = Any species or lower taxon of wild animals, in which a significant proportion of the members of the entire population or any geographically separate part of the population cyclically and predictably crosses one or more national jurisdictional boundaries<sup>8</sup>;
- Congregatory Species = Species that gather in globally significant numbers at a particular site and at a particular time in their life cycle for feeding, breeding or resting (during migration)<sup>9</sup>.

The Project area consists of mainly gravelling desert plain with scattered developed areas. The nearest mountainous habitat is 15 km away on the west of the Project site; and concentrated residential areas and Ocean are respectively 5 km and 10 km to the East of the Project site. Given the habitat is uniform between the mountainous habitat to the residential area, the EAAA is defined roughly as gravel desert plain and agricultural land between the mountain and

<sup>8</sup> Convention on the Conservation of Migratory Species of Wild Animals (1979) Convention on the Conservation of Migratory Species of Wild Animals. Convention on Migratory Species Secretariat, Bonn, Germany.

<sup>9</sup> Langhammer PF, Bakarr MI, Bennun LA, et al (2007) Identification and gap analysis of Key Biodiversity Areas: targets for comprehensive protected area systems. IUCN, Gland, Switzerland

residential area and potentially provide food and habitat for both terrestrial volant and non-volant species group. This makes the area of EAAA 904 km<sup>2</sup> (Figure 3-1).

**FIGURE 4-7 ECOLOGICAL APPROPRIATE AREA OF ANALYSIS (EAAA)**



**Criteria 1 Critically Endangered and/ or Endangered species**

The Steppe Eagle (*Aquila nipalensis*) is an Endangered (EN) species with a global population of 50,000 to 75,000<sup>10</sup>. It may pass Sohar, Oman area during migration. As a migratory raptor, the EAAA is unlikely to support its key life-cycle stage, such as breeding.

The Endangered species Saker Falcon (*Falco cherrug*) potentially occurs in the Sohar, Oman area during non-breeding period<sup>11</sup>. It has a global population of 12,200 to 29,800 individuals. Although it may hunt in the open terrain like the Project site, based on the rapid site visit in June, the burrows of its prey small mammals are rare due to human activities leading to lacking of vegetation as food sources and strong disturbance. Thus, the EAAA area is not likely to support more than 122 species (1%) of this species nor trigger critical habitat.

Therefore, critical habitat would not be triggered under criteria 1.

<sup>10</sup> BirdLife International. 2021. *Aquila nipalensis*. *The IUCN Red List of Threatened Species 2021*: e.T22696038A205452572. <https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T22696038A205452572.en>. Accessed on 15 August 2025.

<sup>11</sup> BirdLife International. 2021. *Falco cherrug*. *The IUCN Red List of Threatened Species 2021*: e.T22696495A204182473. <https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T22696495A204182473.en>. Accessed on 15 August 2025.

## Criteria 2 Endemic and/or Restricted-range Species

The only terrestrial endemic species, Desert Basker (*Urothemis thomasi*), is found more than 200km from the Project site and thus not likely trigger the Critical Habitat under this criterion.

## Criteria 3 Migratory Species and/ or Congregatory Species

The Greater Spotted Eagle (*Clanga clanga*) is a Vulnerable migratory species with a global population of 3,900-10,000 individuals<sup>12</sup>. However, this species usually occurs in lowland forest near wetland and nesting on trees. The gravel desert with low shrubland in the Project site thus is not likely to host this species.

The migratory Vulnerable species European Turtle-dove (*Streptopelia turtur*) may breed in Sohar, Oman area<sup>13</sup>. However, the European Turtle-dove breeds predominantly across continental Europe and mid-Asia, where it favors heterogeneous landscapes combining farmland, woodland edges, and shrubland. At the southern edge of its breeding range, including coastal Oman, the species adapts to semi-arid conditions by using areas with scattered shrubs or artificial vegetation. Thus the Project site is not likely to be a breeding site for the species.

The migratory Vulnerable (VU) species Sooty Falcon (*Falco concolor*) breeds in the Oman costal area along the gulf of Oman. However, the Sooty Falcon nests on cliffs around Bandar Jussah, which is more than 200km away from the Project site<sup>14</sup>. Thus the Project site is not likely to be a breeding site for the species.

Overall, Critical Habitat is not be triggered under this criterion.

## Criteria 4 Highly Threatened and/ or Unique Ecosystems

From the data available, none of the triggers identified meet the thresholds for Criterion 4, and therefore Critical Habitat is not triggered under this Criterion.

## Criteria 5 Key Evolutionary Processes

No physical or spatial features in the Project surroundings have been identified as being associated with evolutionary processes and the species assessments have not identified any species subpopulations known to be phylogenetically or morphogenetically distinct.

It is therefore considered that critical habitat would not be triggered under Criterion 5 for this Project.

<sup>12</sup> BirdLife International. 2021. *Clanga clanga*. *The IUCN Red List of Threatened Species 2021*: e.T22696027A203868747. <https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T22696027A203868747.en>. Accessed on 15 August 2025.

<sup>13</sup> BirdLife International. 2019. *Streptopelia turtur*. *The IUCN Red List of Threatened Species 2019*: e.T22690419A154373407. <https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T22690419A154373407.en>. Accessed on 15 August 2025.

<sup>14</sup> Arabian-Persian Gulf Coastal Plain Desert. <https://www.oneearth.org/ecoregions/arabian-persian-gulf-coastal-plain-desert/>

### 4.3 SOCIO-ECONOMIC BASELINE

The Project is located in Wilayat of Liwa, Al Batinah North Governorate, Oman Sultanate. This section aims to outline the socio-economic background of the Study Area. It includes the following components:

- Overview of the Study Area;
- Demography;
- Education;
- Public health;
- Public service;
- Water and sanitation;
- Income and livelihood;
- Gender and Gender-Based Violence; and
- Community perceptions of the Project.

Considering the existing information in the local Environmental Impact Assessment which has already been developed<sup>15</sup>, the methodology used for understanding the socioeconomic setting of the Project area includes desktop research of available secondary data, stakeholder engagement (as summarized in Table 6-2) and site visit observation.

#### 4.3.1 DEMOGRAPHIC CONDITIONS

##### URBAN AND RURAL POPULATION

Liwa Wilayat comprises both urban and rural settlements. Urban areas are concentrated along the coastal corridor and near Sohar Free Zone, while rural areas are characterized by agricultural activities, particularly date palm and lime cultivation supported by shallow wells and falaj systems.

##### RATIO OF MALES TO FEMALES

The overall male-to-female ratio in Liwa in 2020 is approximately 169 males per 100 females, driven by the high number of male expatriate workers in the industrial sector, as shown in Table 4-5.

TABLE 4-5 Liwa Wilayat Population by Nationality and Gender in 2020

Category	Population	Liwa		N. Batinah		Oman	
		Pop.	%	Pop.	%	Pop.	%
Omani	Male	18,522	33.3%	277,272	35.3%	1,376,291	30.8%
	Female	17,805	32.0%	271,883	34.6%	1,355,165	30.3%
	<b>Total Omani</b>	<b>36,327</b>	<b>65.2%</b>	<b>549,155</b>	<b>70.0%</b>	<b>2,731,456</b>	<b>61.1%</b>

<sup>15</sup> Though local EIA has been prepared, no ESIA is prepared or is expected in the future at the time of developing this ESMS, other than an ESIA Appendix.

Category	Population	Liwa		N. Batinah		Oman	
		Pop.	%	Pop.	%	Pop.	%
Expatriate	Male	16,450	29.5%	190,920	24.3%	1,363,663	30.5%
	Female	2,921	5.2%	44,606	5.7%	376,029	8.4%
	<b>Total Expat.</b>	19,371	34.8%	235,526	30.0%	1,739,692	38.9%
Total	Male	34,972	62.8%	468,192	59.7%	2,739,954	61.3%
	Female	20,726	37.2%	316,489	40.3%	1,731,194	38.7%
	<b>Grand Total</b>	55,698	100.0%	784,681	100.0%	4,471,148	100.0%

Source: Ministry of National Economy (2020)

### AGE GROUP DISTRIBUTION

In Al Batinah North, which accounts for around 17.6% of the national population, the age group (0–34) comprises approximately 65.5% of the population in 2023. The most populous cohorts were individuals aged 15–34, totaling over 174,000, reflecting a steady increase from 2022. Moreover, Omani population in Al Batinah North shows a relatively balanced distribution across age group, slightly skewed towards the 15–39 age range, indicating a young and growing population. The expatriate population is heavily concentrated in the 25–49 age range and predominantly male, reflecting the labor-intensive industrial economy of the region

In Liwa Wilayat, with a total population of 66,204, the 15–34 age group comprises 36.1%, up from 35.6% the previous year<sup>16</sup>.

### MIGRATION

At the Wilayat (district) level, Liwa has a high proportion of expatriate residents, who made up approximately 40.9% of the local population in 2023. Stakeholder interviews with community members in Liwa indicated that the majority of expatriates are male workers employed in industrial facilities located in or near the Sohar Freezone. Residents attributed this to the concentration of manufacturing, logistics, and heavy industry in the area, which tends to rely on a rotational or unaccompanied male workforce. This trend is further reflected in demographic data, with 84.9% of expatriates in Liwa being male, pointing to a gender-imbalanced migrant population<sup>17</sup>.

At the Sohar Freezone level, Sohar Freezone management confirmed that industrial growth has led to a steady inflow of expatriate labor to meet operational demands, particularly in construction, heavy industry, and logistics. While the workforce is predominantly non-resident (i.e., housed in worker accommodation or commuting from outside), the scale of employment

<sup>16</sup> Oman National Centre for Statistics and Information. (n.d.). *Oman population and demographic data* [Data set]. Data.gov.om. <https://data.gov.om/OMPOP2016/population>

<sup>17</sup> Ibid

has directly influenced migration patterns in the surrounding district. Freezone representatives noted this dynamic is expected to continue in line with ongoing industrial expansion.

Considering the high proportion of expatriate workers in the country, the Oman government has made it mandatory for foreign companies to employ at least one Omani national within one year of operation. The new policy, which entered into force on 1 April 2024, requires Omani citizen in the foreign-owned companies' operations within the country, which will be mandated by Ministry of Commerce, Industry, and Investment Promotion (MoCIIP)<sup>18</sup>. According to consultation with Sohar Freezone, as an economic hub fostering foreign investment, Sohar Freezone mandates that its tenant companies employ a 15% Omani workforce during its first 10 years in the Sohar Freezone.

## ETHNICITY

While Oman is largely ethnically homogeneous, the population in Liwa and Sohar Freezone is more diverse due to migration associated with industrial activity. Based on interviews with Sohar Freezone management and local community members, the expatriate workforce includes individuals primarily from South Asia (India, Bangladesh, Pakistan), Southeast Asia (Philippines), and East Africa. South Asians make up the majority, especially in construction and manufacturing roles. Community members described limited but respectful interaction between locals and expatriates, with integration mostly occurring through informal encounters or shared public spaces. Freezone representatives noted that while most workers are housed separately, companies are encouraged to maintain good community relations. Residents highlighted positive examples from other firms that engage during local events and holidays, suggesting room for improved integration across the board.

## RELIGION

Oman is a Muslim country, with the majority of Omani citizens in Liwa adhering to the Sunni or Ibadi sect of Islam<sup>19</sup>. In Sohar Freezone, the expatriate workforce is religiously diverse, including Muslims, Hindus, Christians, and Buddhists. Interviews confirmed that several mosques are accessible to both locals and Muslim workers, while non-Muslim workers typically travel to Sohar city for worship, as there are no churches or temples within the Freezone. Community members and SPFZ representatives reported peaceful religious coexistence, with companies generally accommodating workers' religious practices.

<sup>18</sup> HKTDC. (2024). *Oman: Employing Omani Citizens Now Mandatory for Foreign Companies*. Retrieved from <https://research.hktdc.com/en/article/MTY2ODQ2NDMxMA>.

<sup>19</sup> Al-Salimi, A. (2017). OMAN AND IBADISM FROM A RELIGIOUS REGIONAL PERSPECTIVE. Istituto Lombardo-Accademia di Scienze e Lettere • Incontri di Studio. And Valeri, M. (2015). The Şuḥār Paradox: social and political mobilisations in the Sultanate of Oman since 2011. *Arabian Humanities. Revue internationale d'archéologie et de sciences sociales sur la péninsule Arabique/International Journal of Archaeology and Social Sciences in the Arabian Peninsula*, (4).

FIGURE 4-8 MOSQUE IN SOHAR CITY



Source: JASPERNEUPANE-FREEPIKEDUCATION

### 4.3.2 PUBLIC HEALTH

#### PUBLIC HEALTH

**Governorate Level:** In 2023, notable infectious disease in Al Batinah North include 196 cases of Dengue, 28 cases of Malaria, 71 cases of Pulmonary tuberculosis, 275 COVID-19 cases, 41 cases of HIV/AIDs (Omani only), 578 chicken pox and 9 mumps<sup>20</sup>. Al Batinah North has the third largest population affected by Dengue among all Omani governorates, and the second largest population affected by COVID-19 and HIV/AIDs<sup>21</sup>.

According to morbidity data from Ministry of Health institutions in 2023, 37 people per 10,000 population died from communicable diseases (31 from airborne infections, 4 from infections caused by contaminated hands, food, and water, and 1 from other sources), while 158 people per 10,000 population died from non-communicable diseases<sup>22</sup>. The top cause of death from non-communicable disease is cardiovascular disease.

**Wilayat Level:** Consultation with community members indicated concerns about dust, flaring and poor air quality which community members attributed to industrial activities in the area. Some Liwa residents have reportedly relocated due to the proximity to industrial facilities. The nearest sensitive communities / receptors to the Project site are summarized in TABLE 4-6.

TABLE 4-6 Nearest Sensitive Communities / Receptors to the Project

Location	Distance (km)	Direction
Ghadfan	5.6	NE

<sup>20</sup> Ministry of Health. (2024). *Annual health report 2023* [PDF]. Sultanate of Oman: Author. <https://www.moh.gov.om/documents/10194/10486727/annual-health-report-2023.pdf>

<sup>21</sup> Ibid

<sup>22</sup> Ibid

Location	Distance (km)	Direction
Al Hadd	7.3	E
Farm Liwa	4.8	NE
ROP Training Centre	1.7	NNW
Nearest Construction Camp	5.16	NNE

Source: GRC (2024). EIA Report.

## PUBLIC HEALTH FACILITIES

**National Level:** Oman’s healthcare system is led by the Ministry of Health and includes over 250 hospitals and health centers, with free or subsidized care provided to Omani citizens. National data from 2023 shows 6,033 government hospital beds and widespread service coverage, including in rural areas<sup>23</sup>.

**Governorate Level:** In Al Batinah North, the public health network comprises 5 government hospitals, 20 health centers, and 5 extended health centers, supported by 198 private pharmacies and 50 medical centers. Al Batinah North is the governorate with second most population per hospital bed (1,674 persons per hospital bed), just less than Al Batinah South.

Sohar Hospital, the second largest public hospital in Oman, is the main referral facility, with 456 beds and the highest bed occupancy rate in the governorate at 83.6%, offering services ranging from emergency care to maternity and surgery<sup>24</sup>. Private health options are also accessible through insurance.

**Wilayat Level:** In Liwa, interviews with residents and Sohar Freezone representatives confirmed the presence of at least one public health center (i.e., Liwa Health Center) and several pharmacies, though there are no hospitals or dedicated emergency facilities within the wilayat. Community members noted challenges in accessing timely care during emergencies, especially for industrial accidents near Sohar Freezone. In one instance, they reported a delayed response when an explosion occurred at a nearby facility, highlighting the need for faster coordination and improved emergency coverage. There are no mobile clinics or health posts currently serving Freezone workers, who are typically referred to the Sohar Hospital (30 mins by car/6 hrs walking). Sohar Wilayat hosts Sohar Hospital, a 408-bed tertiary-care facility with emergency services, ICUs, and pediatric care common. In addition, the Wilayat has primary health centers and local pharmacies distributed across urban neighborhoods. While most residents access care facilities within close proximity, emergency response for industrial accidents can still involve delays or complex coordination between facilities, especially for incidents near the Freezone where mobile clinics are not yet deployed.

## ACCESS TO HEALTHCARE

**Wilayat Level:** While Liwa does not have a hospital, antenatal and pediatric services are available through its local health center, with referrals made to Sohar Hospital for complex

<sup>23</sup> Ibid

<sup>24</sup> Ibid

cases. Interviews with community members and healthcare providers indicated satisfaction with maternal health services, though transport challenges remain for remote households. No local data on infant mortality in Liwa was available, but no significant concerns were raised by providers or residents regarding access or quality of care. Sohar Wilayat hosts Sohar Hospital, a 408-bed tertiary-care facility with emergency services, ICUs, and pediatric care common. Maternal and pediatric healthcare in Sohar is readily available through Sohar Hospital and local clinics. Residents and healthcare providers generally express satisfaction with the quality and accessibility of antenatal and pediatric services. Complicated cases are routinely referred to the hospital.

### COMMUNITY PERCEPTIONS OF PUBLIC HEALTH FACILITIES AND SERVICES

Interviews with residents of Liwa and Sohar Freezone revealed mixed perceptions of public health services. On a scale of 1 (good) to 4 (not available), availability of services was rated 2, reflecting adequate access to basic care. Waiting times received a 3, with several residents noting delays, especially at referral hospitals like Sohar. Quality of care was generally viewed as acceptable (rating 2), though some elderly residents felt follow-up care was limited. Access to medications was rated between 2 and 3, with occasional shortages reported. Women and industrial workers expressed appreciation for the free care available but raised concerns about limited specialized services and transport to facilities during emergencies.

#### 4.3.3 ELECTRICITY

**Governorate Level:** Al Batinah North is fully electrified, with reliable grid access in both urban and rural areas. The region is served by the Oman Electricity Transmission Company (OETC), which operates a 400 kV substation in Sohar<sup>25</sup>. The governorate benefits from stable electricity supply due to its proximity to major power generation and industrial infrastructure.

**Liwa Wilayat:** According to consultation with Sheikh of Liwa, Wilayat Liwa is nearly fully electrified, with household access to electricity estimated above 98%, including in smaller villages. Power is supplied via the Sohar 400 kV substation, which also serves the Sohar Freezone. Sohar Wilayat is also virtually fully electrified, with household electricity access estimated at 97–98%, aligning with the national average. Power is supplied via the national grid, including infrastructure that also supports the Sohar 400 kV substation serving both Sohar city and the Freezone. Within the Freezone, electricity is provided by third-party suppliers, primarily for industrial operations. While overall reliability is high, residents reported occasional power instability, particularly during peak summer periods, with one instance in 2022 linked to industrial load surges. These were typically resolved within hours, with preventive measures including load distribution adjustments. Some industrial users and rural households use diesel generators or solar backup systems, particularly for critical operations. governorate is a logistics hub, with heavy vehicle traffic supporting industrial operations.

#### 4.3.4 WATER AND SANITATION

##### DRINKING WATER SUPPLY

**National Level:** Oman has made significant progress in expanding access to safe drinking water. According to the Ministry of Health and the Public Authority for Water (formerly Diam),

<sup>25</sup> Ibid

over 90% of the population has access to improved drinking water sources, including piped water, desalinated water, and bottled water<sup>26</sup>. The government continues to invest in desalination plants and water distribution networks, especially in coastal and urban areas.

**Governorate Level:** Al Batinah North is served by a combination of piped municipal water and private wells. Sohar and surrounding wilayats benefit from desalinated water supplied through the Sohar Water Desalination Plant. The region has relatively high coverage of improved drinking water sources, particularly in urban centers<sup>27</sup>.

**Wilayat Level:** In Liwa, piped municipal water is available to most urban households, with estimated coverage above 90%, while rural areas still rely in part on tanker-delivered or bottled water. Storage tanks are commonly used to manage supply interruptions. Interviews confirmed that while coverage is generally reliable, remote villages experience occasional pressure issues. Municipal piped water is widely available throughout Sohar city and major urban neighborhoods, with high coverage among eligible urban households. The city is served by water facilities tied to infrastructure investments within Sohar Port and Freezone development. Rural and outlying communities may still rely partly on tankered or stored water, although expansion of the distribution network continues. In Sohar Freezone, potable and industrial water is provided by Majis Industrial Services. Across the Sultanate, the majority of water is supplied through desalination, with Liwa and Sohar receiving desalinated water via the Sohar Water Desalination Plant.

## DOMESTIC WATER SUPPLY

**National Level:** Domestic water use in Oman includes water for cooking, washing, and sanitation. The average per capita water consumption is high by regional standards, driven by climate and lifestyle<sup>28</sup>. The government promotes water conservation through public awareness campaigns and smart metering.

**Governorate Level:** In Al Batinah North, domestic water is supplied through piped networks in urban areas and supplemented by wells and tankers in rural zones. Sohar and Liwa benefit from desalinated water distributed by Majis Industrial Services and the Public Authority for Water.

**Wilayat Level:** In Liwa, domestic water is primarily supplied through piped networks, particularly in urban areas. Community members reported no significant complaints regarding access, quality, or supply reliability. While bottled water is commonly used for drinking, this is based on preference rather than necessity. In Sohar Freezone, Majis Industrial Services supplies domestic water to industrial users and worker accommodations. Overall, water access is viewed as stable and sufficient. In Sohar Free Zone, domestic water for industrial workers and facilities is supplied by Majis Industrial Services. The proposed project will consume up to 38,000 m<sup>3</sup>/day of water during operation, with a portion allocated for domestic use (e.g., sanitation, cooling, landscaping).

<sup>26</sup> MOH Reviews GLAAS Country Survey

<sup>27</sup> **Authority for Public Services Regulation. (2024).** *Annual performance statistical report 2023 (APSR-EN-2023)* [PDF]. Sultanate of Oman. <https://www.apsr.om/Publications/APSR-EN-2023.pdf>

<sup>28</sup> Ibid

## SANITATION

**Governorate Level:** In Al Batinah North, Sohar is partially connected to a centralized sewerage network.

**Wilayat Level:** Liwa wilayats primarily use on-site sanitation systems such as septic tanks and leach drains. The region is undergoing gradual expansion of sewerage infrastructure. According to consultation, households near Sohar Freezone are connected to the public sewage system and use private toilets. During interviews, no complaints were raised regarding sanitation services, and no issues such as overflow, odor, or groundwater contamination were reported. Community members expressed general satisfaction with the existing system. In Sohar Wilayat, on-site sanitation systems—such as septic tanks and leach drains—remains common, particularly in less dense areas. However, given the city’s ongoing growth and status as an industrial and urban hub, there is progressive expansion of centralized sewerage and wastewater treatment facilities, particularly tied to Sohar’s urban planning and port area development

## COMMUNITY PERCEPTIONS OF WATER AND SANITATION

Interviews with residents in Liwa villages reflected overall satisfaction with water and sanitation services. On a 1–4 scale (1 = good, 4 = not available), drinking water quality and availability was rated 1, with bottled water used by preference rather than necessity. Domestic water reliability also received a 1, with no major issues reported. Sanitation systems and maintenance were rated 1, as all households reported having private toilets and being connected to the public sewerage network, with no concerns raised regarding system performance.

### 4.3.5 INCOME AND LIVELIHOOD

#### ECONOMY OVERVIEW

**National Level:** Oman’s economy is transitioning from oil dependency to a more diversified model under Vision 2040<sup>29</sup>. Key sectors include oil and gas, manufacturing, logistics, tourism, and agriculture. The government promotes employment of Omani nationals through the Omanisation policy, which mandates quotas for local employment in various sectors<sup>30</sup>.

**Governorate Level:** Al Batinah North is one of the most economically active governorates, with Sohar as its industrial and commercial hub. The region hosts Sohar Port, Sohar Free Zone, and Sohar Industrial Estate, which together provide thousands of jobs in manufacturing, logistics, and services. Agriculture and fishing remain important in rural areas.

**Wilayat Level:** Liwa’s economy is based on a mix of public service, fishing, agriculture, and industrial employment. According to consultations, many breadwinners are employed as:

- Public servants
- Fishermen
- Industrial workers (including Sohar Free Zone)

<sup>29</sup> International Civil Aviation Organization. (2025). *2025 Environmental report: Sustainable development and Vision 2040 in Oman* (p. 71). ICAO. [https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2025/Envreport2025\\_71.pdf](https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2025/Envreport2025_71.pdf)

<sup>30</sup> Paul Hastings LLP. (2025, January 28). *Oman. In Practice Area Articles*. Retrieved July 6, 2025, from <https://www.paulhastings.com/insights/practice-area-articles/oman>

The area has seen a shift from traditional livelihoods to industrial employment due to proximity to Sohar Port and Free Zone.

In Liwa, interviews confirmed a gradual shift from traditional livelihoods—such as fishing and agriculture—towards industrial and public sector employment, driven by the area's proximity to Sohar Port and Sohar Freezone. Many households now rely on income from industrial jobs, including roles in manufacturing, logistics, and support services tied to SPFZ. While agriculture and fishing still exist, they are increasingly secondary sources of income. Community members noted that most residential areas near the Freezone are long-established Liwa communities, not worker housing tied to specific enterprises.

The economy of Sohar is underpinned by a diversified mix of public service, industry, commerce, and port-related sectors. A significant portion of breadwinners are employed as:

- Public servants (administrative and institutional roles)
- Industrial workers in Sohar Industrial Port and Freezone facilities
- Roles in logistics, petrochemicals, metals, food clusters, and related support services

The region has seen a notable shift from traditional livelihoods (e.g., agriculture or fisheries) toward industrial and service-based employment, driven by proximity to Sohar Port, Freezone, and associated infrastructure investments.

### AGRICULTURE, LIVESTOCK, AND FISHERY

**National Level:** Agriculture contributes modestly to Oman's GDP but remains vital for rural livelihoods. Key crops include dates, limes, and vegetables. Livestock such as goats, sheep, and poultry are raised for domestic consumption and local markets<sup>31</sup>.

**Governorate Level:** Al Batinah North is one of Oman's most fertile regions<sup>32</sup>. Agriculture is practiced along the coastal plain using falaj<sup>33</sup> and well irrigation. Common crops include:

- Dates
- Limes
- Tomatoes
- Cucumbers

Livestock rearing (goats, chickens) is also common. In the first half of 2024, North Al Batinah Governorate recorded 47,904 tons of fish landed through traditional fishing<sup>34</sup>.

**Wilayat Level:** Interviews with Sohar Freezone management and Liwa community members confirmed that agriculture and livestock are still practiced in Liwa but have become less common due to industrial development. Previously, parts of the Freezone area had been used

<sup>31</sup> FAO & Sultanate of Oman. (2016). *Sustainable Agriculture and Rural Development Strategy (SARDS) 2040*. FAO. Retrieved July 9, 2025, from <https://faolex.fao.org/docs/pdf/oma214204E.pdf>

<sup>32</sup> Al-Kindi, A., Zaiter, G., Al-Rawahi, M., Al-Mashikhi, A., Al-Hinai, H., & Al-Busaidi, H. (2020). Evaluation of salinity intrusion in arable lands of Al-Batinah coastal belt using unmanned aerial vehicle (UAV) color imagery. *Journal of Agricultural and Marine Sciences*, 24, 44–50. <https://doi.org/10.24200/jams.vol24iss0pp44-50>

<sup>33</sup> Falaj (plural: aflaj) is a traditional Omani irrigation system that channels groundwater or spring water through gravity-fed channels to agricultural fields and villages. It is especially common in arid regions such as Al Batinah North and has been recognized by UNESCO as part of the world's cultural heritage.

<sup>34</sup> Oman News Agency (2024). *Value of fish landed in Oman reaches RO 276 million by July 2024*. <https://www.thearabianstories.com/2024/12/04/value-of-fish-landed-in-oman-reaches-ro-276-million-by-july-2024/>

for livestock grazing, especially camels, though on a small scale. Currently, scattered farming and livestock activities (e.g. goats, chickens) continue within Liwa communities outside the Freezone, mainly for household use. Fishing remains a core livelihood for some Liwa residents, particularly in coastal neighborhoods. While fishing is prohibited within the port area, local fishermen are sometimes granted informal access for livelihood purposes under port-monitored conditions. No individual or communal fishing occurs directly within Sohar Freezone, but commercial fishing operations likely take place offshore.

### LABOUR FORCE PARTICIPATION RATE

**National Level:** Oman's labour force participation rate is approximately 61%, with a significant gender gap. Male participation is around 80%, while female participation is below 40%<sup>35</sup>. The government is actively promoting female employment and private sector engagement.

**Governorate Level:** Al Batinah North has a high concentration of industrial jobs, especially in Sohar. Labour force participation is higher than the national average due to employment opportunities in manufacturing, logistics, and services.

**Wilayat Level:** In Liwa, stakeholder interviews confirmed that the labour force includes public servants, fishermen, and a growing number of industrial workers, particularly in connection with Sohar Freezone. Community feedback highlighted limited local hiring, with many companies bringing in workers from outside the area. Younger generation employment opportunities were noted to be growing, but job security remains a concern, especially among newly employed or contract-based workers. Gender participation is skewed, with men dominating industrial roles and women more represented in administrative and education sectors. Some interviewees expressed concern that the lack of stable, long-term roles discourages family planning and investment in housing. According to the Oman National Centre for Statistics, Sohar Wilayat had approximately 136,796 workers in 2023 across private, family, communal, and other sectors. Gender roles within the labor market suggest an uneven distribution — women remain underrepresented in industrial roles, with higher participation in administrative and service-oriented positions. Overall, while industrial expansion is increasing job opportunities, locals emphasized the need for more inclusive hiring and community-focused employment initiatives.

### COMMUNITY PERCEPTIONS OF JOB OPPORTUNITIES

Community interviews in Liwa and near Sohar Freezone revealed mixed perceptions on employment. Using a 1–4 scale (1 = good, 4 = not available), job availability was rated between 2 and 3, with many noting that companies tend to hire from outside the local area and locals felt underrepresented. Job security received ratings of 3 to 4, with concerns about contract-based employment and limited long-term stability, with many fearing terminations (tasreeh). Gender inclusivity was rated 2 to 3—while women are active in administrative and healthcare roles, industrial jobs remain male-dominated. Several residents expressed hope for more local hiring, especially for youth and women, and emphasized the need for structured, stable career paths tied to Freezone growth.

<sup>35</sup> Tabti, B., & Troug, H. (2025, April 15). *Labor market dynamics in Oman: Selected Issues Paper No. 2025/034*. International Monetary Fund. Retrieved July 9, 2025, from <https://www.elibrary.imf.org/view/journals/018/2025/034/018.2025.issue-034-en.xml>

#### 4.3.6 GENDER AND GENDER-BASED VIOLENCE

**National Level:** The labor force participation rate in Oman among females is 30.7% and among male is 87% in 2024<sup>36</sup>. Compared with labor force participation in the high-income group, the gap between men and women is higher in Oman<sup>37</sup>. There are currently no women in the Shura Council of the national parliament.

Gender-based violence is generally considered underreported in Oman. According to a study by the Ministry of Social Development published in 2018, 74% of women and girls suffering violence did not report it or turn to authorities for help. 36% of these cases occur after marriage<sup>38</sup>. The most common types of violence identified in the study were: beating (15%), humiliation (13%), verbal abuse (10%), forced marriage, threat of divorce and not allowing women to go out (5%)<sup>39</sup>.

**Governorate Level:** No data is available at governorate level.

**Wilayat Level:** According to SPFZ, gender segregated occupation was observed with female mostly involved in administrative roles while men are involved in industrial roles. Both Sohar and Liwa reflect broader national trends where women are significantly underrepresented in industrial labor and more commonly found in administration or education sectors. No gender-based violence incidents were reported or raised during community interviews in Liwa or SPFZ.

---

<sup>36</sup> Ibid

<sup>37</sup> Ibid

<sup>38</sup> The Omani Center for Human Rights and Democracy. (2018). *Violence against Women*. Retrieved from <https://ochrdoman.org/en/the-annual-report-2023/>

<sup>39</sup> Ibid

## 5 MITIGATION MEASURES FOR AIR EMISSIONS AND SOLID/LIQUID EFFLUENTS

Given the fact that the Project-specific regulatory EIA for USP and GOI have been completed and obtained the corresponding approval, the impacts on air quality, ambient noise, waste disposal were well assessed and thus scoped out for further assessment. However, ERM has reviewed the Project design and has made further recommendations to mitigate Project-related air emissions and both solid and liquid waste.

### 5.1 AIR EMISSIONS

No waste gas will be generated during normal operation phase of transmission line and High-tension substation.

#### 1) Planned Mitigation Measures

The air emission from No.1~ No.6 is generated by USP and No.7~ No.8 is generated by GOI. The planned mitigation measures of USP and GOI is as follows:

TABLE 5-1 VENT GAS EMISSIONS OF UPS AND GOI

Generati on entity	Exhaust gas	Mitigation measures	Discharge
USP	1) Uploading dust from Cold Hydrogenation	Silicon powder is lifted into a buffer tank using nitrogen gas. The vent nitrogen containing silicon powder and bag house filters are equipped to remove particulate matter. The design treatment efficiency of the filter system is >95% has a performance guarantee emission concentration is 10mg/Nm <sup>3</sup> .  The collected silicon powder will be sent to GOI for recycling.	Emissions generated from the cold hydrogenation process, vent gas from the reduction (CVD) process and tank farm, as well as vent gas from the hydrolysis treatment process, will be discharged via five (5) stacks, each 25 m in height.
	2) Vent gas from Reduction (CVD) Process and tank farm	Before CVD process, the internal atmosphere of the reduction furnace is flooded with hydrogen and a small amount of silicon powder will be taken out. The vent gas from the reduction furnace containing hydrogen, TCS, STC, DCS and HCl. The vent gas from tank farm contains TCS, STC and DCS.  The vent gas recovery unit separates Hydrogen, HCl and chlorosilane	

Generation entity	Exhaust gas	Mitigation measures	Discharge
		<p>(TCS, STC and DCS). The recovered hydrogen is returned to the reduction furnace for recycling; HCl is sent to the cold hydrogenation unit for the synthesis of TCS; Chlorosilane (TCS, STC and DCS) is sent to the distillation unit for separation and purification.</p>	
	<p>3) Vent gas from Hydrolysis Treatment Process</p>	<p>The vent gas from the Hydrolysis Treatment Process mainly contains water vapor, hydrogen, nitrogen (protective gas), hydrogen chloride, etc. Most hydrogen chloride will be absorbed by spray tower and neutralized with sodium hydroxide.</p> <p>Vent gas from hydrolysis treatment process mainly contains water vapor, hydrogen, nitrogen (protective gas), hydrogen chloride, etc. After being treated by spray towers, vent gas will be discharged into the atmosphere.</p> <p>The design capacity is 5,000 Nm<sup>3</sup>/h for each spray tower.</p>	
	<p>4) Finishing acidic gas from Finishing (post handling) Process</p>	<p>The main content of finishing acidic gas includes hydrofluoric acid mist and nitrogen oxides. The waste gas is discharged into the atmosphere after being treated by a three-stage spray tower system.</p> <p>The design capacity is 5000 Nm<sup>3</sup>/h.</p>	<p>There is one(1) stack, designed for discharging acidic gas, which has a height of 25 meters and an inner diameter of 0.35 meters.</p>
	<p>5) Reaction gas from Cold Hydrogenation</p>	<p>The reaction gas from cold hydrogenation reactor, carrying a small amount of silicon powder, enters the dust removal system from the top of the reactor.</p>	<p>Recycle</p>

Generation entity	Exhaust gas	Mitigation measures	Discharge
		<p>Most of the silicon powder in the gas was separated and returned to the fluidized bed reactors for recycling. The vent gas from venturi scrubbers is condensed successively through heat exchangers, two-stage quench towers and deep condensation system. After gas-liquid separation, the liquid chlorosilane is collected and directed to the distillation process; the non-condensable gas from deep condensation process is reused as recycled hydrogen in cold hydrogenation process.</p>	
	6) Vent gas from Laboratory	<p>The main content of vent gas from Laboratory includes nitrogen oxides. The waste gas is discharged into the atmosphere after being treated by a three-stage spray tower system, the design capacity is 68000 m<sup>3</sup>/h.</p>	<p>There is one (1) stack, designed for discharging laboratory gas, which has a height of 22 meters and an inner diameter of 1.4 meters.</p>
GOI	7) Grinding dust	<p>There are six(6) sets of baghouse dust removal systems to remove the dust generated by grinding. For each baghouse system, the design capacity is 23000 m<sup>3</sup>/h with emission concentration of 10 mg/m<sup>3</sup>.</p>	<p>There are six (6) stacks, designed for discharging grinding dust, each stack has a height of 15 meters and an inner diameter of 0.8 meters.</p>
	8) Melting and casting dust	<p>There are two (2) sets of baghouse dust removal systems to remove the dust generated by melting and casting. The design capacity is 120000 m<sup>3</sup>/h for melting and 51000 m<sup>3</sup>/h for casting with emission concentration of 10 mg/m<sup>3</sup>.</p>	<p>There is one (1) stack, designed for discharging melting dust, with a height of 15 meters and an inner diameter of 1.7 meters. And another one, designed for discharging casting dust, with a height of 15 meters and an inner diameter of 1.1 meters.</p>

All the dust generated is disposal with baghouse dust removal systems and all the acidic gas (HF, HCl) and NO<sub>x</sub> is treated by spray towers, which is compliance with mitigation measures proposed in IFC EHS guidelines for semiconductors, large volume inorganic compounds manufacturing and the general guidelines.

There is no applicable emission standard to polysilicon industry in Omani regulations, the emission limit in local EIA of USP and GOI are summarized in Table 5-2.

There is no applicable emission standard to polysilicon industry in WB EHS guideline of large volume organic chemicals, the emission limit refers to similar inorganic industrials in the guideline. The vent gas emissions after disposal of UPS and GOI are summarized as follows:

**TABLE 5-2 EXHAUST GAS EMISSIONS OF UPS AND GOI**

Generati on entity	Exhaust gas	Factors	Emission concentra tions	Omani Emission limits	IFC Emission standards
USP	Uploading dust, vent gas from CVD and tank farm, vent gas from Hydrolysis	PM	10 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	50 mg/m <sup>3</sup> <sup>a</sup>
		HCl	3~5 mg/m <sup>3</sup>	50 mg/m <sup>3</sup>	20pv <sup>a</sup> (32.6 mg/m <sup>3</sup> )
	Finishing acidic gas	HF	0.22 mg/m <sup>3</sup>	3 mg/m <sup>3</sup>	5 mg/m <sup>3</sup> <sup>b</sup>
		NO <sub>x</sub>	0.14 mg/m <sup>3</sup>	150 mg/m <sup>3</sup>	200 mg/m <sup>3</sup> <sup>a</sup>
GOI	Grinding dust	PM	10 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	50 mg/m <sup>3</sup> <sup>a</sup>
	Melting and casting dust	PM	10 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	50 mg/m <sup>3</sup> <sup>a</sup>

Note: a. refer to Table 1 of Environmental, Health and Safety Guidelines for Large Volume Inorganic Compounds Manufacturing and Coal Tar Distillation.

b. refer to Table 2 of Environmental, Health, and Safety Guidelines for Semiconductors & Other Electronics Manufacturing.

## 2) Additional Mitigation Measures

The emission concentrations from USP and GOI can meet the referenced standards. No additional mitigation measures for air emission are considered to USP and GOI.

## 5.2 LIQUID EFFLUENTS

### 1) Planned Mitigation Measures

If the employees of OETC carry out maintenance work within the USP site, they may use the toilets and other facilities of USP.

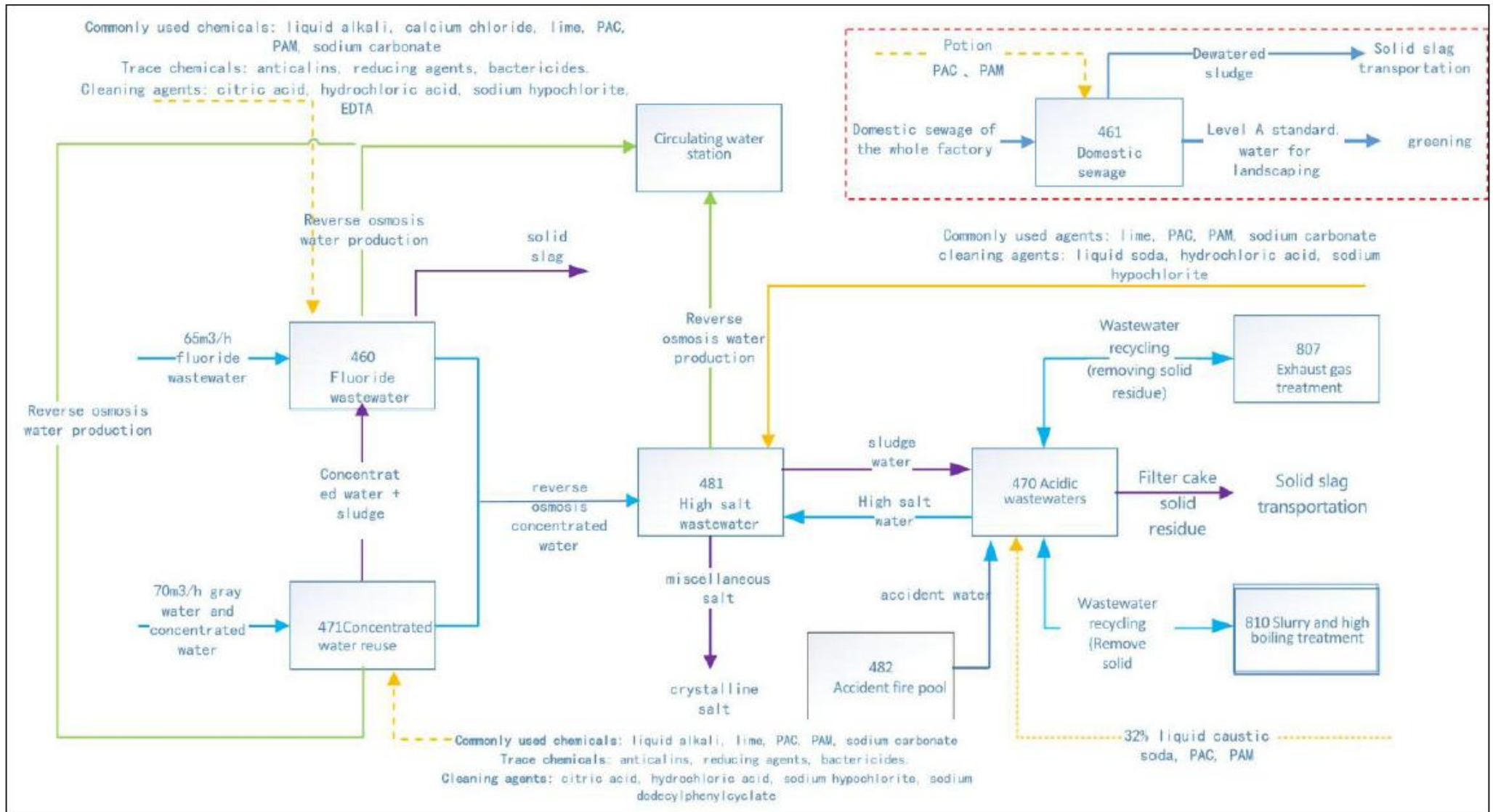
The domestic sewage of USP, GOI and OETC will be treated by Unit 461: domestic sewage treatment station and recycled for greening.

The industrial wastewater is respectively treated by Unit 460: fluoride WWTP, Unit 470: acidic WWTP, Unit 471: concentrated water reuse system and Unit 481: High salt WWTP (including MVR and three-effect evaporation) before reusing. The reclaimed water will be reused as process water and cooling water, and no liquid wastewater will be discharged outside plant.

The cooling water of GOI relies on the cooling system of USP. No additional industrial wastewater will be generated by GOI.

The following wastewater treatment facilities of USP are as follows:

FIGURE 5-1 GENERAL SEWAGE TREATMENT PROCESS OF USP



**① Unit 460: fluoride wastewater treatment plant:**

a. The wastewater treatment system has a design capacity of 65 m<sup>3</sup>/h. Fluoride-containing influent from the vent gas recovery unit enters the raw water conditioning tank, which is equipped with a pH meter and air agitation system. Liquid alkali (lime water) from the dosing unit is automatically introduced into the conditioning tank and thoroughly mixed via air stirring. Once the pH value is adjusted to within the range of 6 - 9, the treated water flows into the high-efficiency clarification tank.

b. Two PAC chemical storage tanks are installed. After preparing the PAC solution, it is dosed into the high-efficiency clarifier A to remove silicon powder and suspended solids. The treated effluent then passes through an intermediate pool, multi-media filter, first-stage ultrafiltration membrane, and first-stage reverse osmosis (RO) unit. The resulting first-stage RO concentrate is directed into the regulating (reaction) tank.

c. The first-stage RO concentrate proceeds through regulating (reaction) tank 2 before entering high-efficiency clarifiers B and C, followed by the concentrated water multi-media filter, concentrated water ultrafiltration membrane, second-stage RO, and third-stage RO units. Alongside the concentrated water recovered from the Unit 471 (Concentrated water reuse system), it is fed into regulating (reaction) tank, high-efficiency clarifiers D and E, undergoes multi-stage filtration, resin softening, and ultimately recrystallization and evaporation. The fluoride ion concentration in the treated fluorine-containing wastewater is ≤10 mg/L, with a flow rate of ≤15 m<sup>3</sup>/h.

To ensure the longevity of the reverse osmosis membranes in the first, second, and third stages, trace amounts of antiscalant, reducing agents, and biocides are added prior to membrane entry. Chemical cleaning is regularly performed using citric acid, hydrochloric acid, sodium hypochlorite, EDTA, and liquid alkali.

d. The permeate from the first-stage RO meets the reclaimed water quality standards and can be reused twice as makeup water for both the circulating cooling water system and desalted water supply.

e. The permeate from the second- and third-stage RO units is combined with that from the 471 system's corresponding stages. It then undergoes further treatment in the produced water RO unit, after which it meets the required water reuse standards and is supplied as makeup water for the circulating water system.

f. The concentrate from the produced water RO unit is used for backwashing the multi-media filter. Backwash water from the multi-media filter and first-stage ultrafiltration unit is returned to the intermediate pool. Similarly, backwash water from the concentrated water multi-media filter and concentrated water ultrafiltration unit is discharged into regulating reaction tank 2.

g. Sludge generated from the Unit 460 (fluoride WWTP) and Unit 471 (acidic wastewater WWTP) is collected in the sludge tank, lifted by a sludge transfer pump, and sent to the filter press for dewatering. The supernatant and filtrate from the sludge treatment process are returned to the 460 intermediate tank, while the solid waste is transported off-site for disposal.

**② Unit 470: acidic wastewater treatment plant:**

The facility has a design treatment capacity of 400 m<sup>3</sup>/h. Acidic influent is first buffered in the acidic wastewater regulating tank and then pumped into a four-stage neutralization reactor. Sodium hydroxide solution is dosed into the reactor to neutralize hydrochloric acid, adjusting the effluent to a neutral or slightly alkaline condition. The neutralization system consists of two parallel sets of four-stage stirred reaction tanks connected in series. Each set includes upper and lower propeller-type agitators and a middle folding-paddle type mixer. Reaction chambers are separated by baffles to ensure full mixing between the wastewater and alkali solution. The neutralized effluent flows by gravity or is pressurized by pumps into the integrated high-efficiency clarifier.

a. The integrated high-efficiency clarifier comprises a two-stage flocculation zone and a clarification zone. Upon entering the reaction zone, coagulants such as PAC and PAM are added to promote particle aggregation and accelerate settling. Following the coagulation reaction, the wastewater flows into the inclined plate clarifier through the distribution area. Further flocculation increases floc size and enhances sedimentation efficiency. Under optimal pH conditions, the settling velocity of the formed flocs is controlled at approximately 0.3 mm/s.

b. Within the clarifier, solid flocs separate from the liquid under the influence of gravity and inclined plates. The settled sludge is concentrated at the bottom and periodically discharged via electric butterfly valves under DCS control. Clarified effluent rises upward and is directed into the reuse water pool for recycling in Unit 807(Process off gas treatment) and Unit 810(Sludge and high boiling treatment). When the total dissolved solids reach 80,000 - 120,000 mg/L, a portion of the water undergoes air flotation to remove residual suspended solids before being sent to the high-salt wastewater pretreatment unit. The dewatered sludge is temporarily stored and later transported off-site, while the filtrate is returned to the reuse pool.

### ③ Unit 471: concentrated water recovery system:

After removing hardness using soda ash, the concentrated water is filtered through a multi-media filter and ultrafiltration unit before entering the primary RO system. The permeate meets reuse water standards and can be utilized twice as makeup water for the circulating water and desalted water systems. A dedicated pumping station pressurizes the treated water to  $\geq 0.4$  MPa for delivery to these systems.

The first-stage concentrate undergoes re-hardening, ozone-catalyzed oxidation for COD removal, multi-stage filtration, and ultrafiltration before entering the second- and third-stage RO units. The resulting permeate is sent to the 460 fluorine-containing wastewater RO unit for further treatment and reuse. The third-stage concentration is transferred to the third-stage concentration tanks of Unit 460, where it is combined with fluorine-containing wastewater for silica and hardness removal before undergoing triple-effect evaporation and crystallization to produce salt. The sludge from this system is sent to the sludge tank of Unit 460 for centralized dewatering via filter press.

### ④ Unit 481: high salt wastewaters treatment plant:

#### 1. High-salt wastewater pretreatment

a. The pretreatment system has a design capacity of 480 m<sup>3</sup>/day, equivalent to 20 m<sup>3</sup>/h.

b. Wastewater from the acidic wastewater treatment system is directed into the high-salinity wastewater stream after being neutralized with sodium hydroxide. It undergoes primary and secondary precipitation processes to remove suspended solids, silicon, calcium, magnesium, iron, barium, and other metal ions. Once the treated water meets the required quality standards, it is sent to the MVR (Mechanical Vapor Recompression) unit for concentration, evaporation, and crystallization. The generated sludge is returned to the acidic wastewater system for centralized filtration.

c. The pretreated high-salinity brine first enters the primary reaction tank, where calcium hydroxide is added as a silicate removal reagent. Silicon dioxide (or silicates) reacts with calcium hydroxide to form calcium silicate ( $\text{CaSiO}_3$ ) precipitate, which settles through an inclined plate settler. The quartz sand filter performs preliminary solid-liquid separation by removing large particles. Subsequently, PAM coagulant is added to enhance flocculation. The first-stage self-cleaning filter further removes residual  $\text{CaSiO}_3$  precipitates, followed by ultrafiltration using a membrane with a pore size  $\geq 0.02 \mu\text{m}$ . The treated effluent then proceeds to the secondary reaction and precipitation stage.

d. After silica removal, the main remaining impurities in the high-salt wastewater are  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Ba}^{2+}$ , and  $\text{Sr}^{2+}$  ions.  $\text{Na}_2\text{CO}_3$  is dosed to remove these metal ions via precipitation reactions, forming insoluble carbonates such as  $\text{CaCO}_3$ ,  $\text{MgCO}_3$ , and  $\text{BaCO}_3$ . These precipitates are removed using quartz sand filters and ultrafiltration membranes. The resulting high-salt wastewater meets the influent requirements for the MVR evaporation and crystallization unit and is subsequently fed into the MVR system for further processing.

e. The high-salinity brine from the acidic wastewater treatment facility passes through the pretreatment unit to reduce the concentrations of Si,  $\text{SiO}_2$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and other ions to acceptable levels before being transferred to the MVR unit for evaporation and crystallization.

## 2. MVR (evaporation crystallization)

The MVR process consists of six sequential stages: feeding, preheating, crystallization, vapor compression, centrifugal desalting, and mother liquor treatment, as outlined below:

### a. Feeding Process:

Wastewater is introduced into the evaporator. When the liquid level reaches the set point, the feeding pump stops, and the forced circulation pump is activated to initiate the evaporation cycle.

### b. Preheating Process:

Circulating cooling water is supplied to the condenser, and steam valve is opened to heat the evaporator. Once the target evaporation temperature is reached, the system enters normal operation. During this phase, the feedwater is preheated using condensate and non-condensable gas heat exchangers before entering the evaporator.

### c. Crystallization Process:

The heated wastewater is circulated at high velocity through the heat exchange tubes. Simultaneously, it exchanges heat with shell-side steam, initiating evaporation and crystal formation. The material enters the chamber tangentially and rotates slowly to ensure

uniform distribution. As the liquid rises, superheat is dissipated—small crystals dissolve while larger ones grow. Near the liquid surface, rapid flash evaporation occurs, transforming the solution from saturated to supersaturated. This supersaturation serves as the driving force for crystal growth. The grown crystals are discharged via the discharge pump into the centrifuge for solid-liquid separation.

d. Vapor Compression:

The flashed secondary steam is washed in the steam scrubber, and entrained fine droplets are removed using a demister. The clean secondary steam enters the compressor, where its pressure and temperature are elevated through mechanical compression. The upgraded steam is redirected to the heater shell side for heat exchange with the incoming feed. This establishes a closed-loop thermal energy cycle.

e. Centrifugal Desalting Process:

The concentrated feed enters the centrifuge, where solid salt crystals are separated and collected for packaging.

f. Mother Liquor Treatment Process:

The mother liquor from the centrifugation step is collected in a dedicated tank and continuously recirculated into the evaporator via the mother liquor pump to participate in further evaporation and crystallization cycles. With continuous recirculation, organic matter accumulates in the system. Excessive enrichment can negatively impact evaporation efficiency, hinder salt production, and lead to operational instability. To mitigate this, periodic discharge of a portion of the mother liquor is performed. This high-concentration mother liquor is fed into a low-temperature distillation unit for deep evaporation and volume reduction.

### 3. **Three-effect evaporation (evaporation crystallization)**

This process employs a counter-current configuration, with the feed medium consisting of fluorine-containing wastewater, gray water, and concentrated brine, undergoing three-effect counter-current evaporation.

The process flow of the three-effect evaporation system is divided into six sequential stages: feeding → preheating → concentration → crystallization → centrifugal desalting → mother liquor discharge and reprocessing, as described below:

a. Feeding process: Wastewater is pumped into the three-effect evaporator, followed by the second-effect and first-effect evaporators sequentially via the feed pump. Once the liquid level in the first-effect evaporation crystallization chamber reaches the preset level, the forced circulation pump is activated, and the feed pump is stopped, marking the completion of the feeding process. During feeding, the system is simultaneously evacuated to establish the required vacuum conditions.

b. Preheating Process:

System startup includes vacuum pumping to achieve a pressure above -0.08 MPa and circulating cooling water introduced into the condenser. The raw steam valve is opened to heat the first-effect evaporator. Once the first-effect unit reaches the preset evaporation temperature, the evaporation process begins. Subsequently, the second- and third-effect

evaporators enter operation in sequence, with increasing temperature and pressure differences between each effect.

c. Concentration and Crystallization Process:

The second and third effects serve as concentration stages responsible for preliminary solution concentration. The feed first enters the third-effect evaporator for initial concentration, then is transferred via pump to the second-effect unit for further concentration. Finally, the concentrated liquid is pumped into the first-effect evaporator for efficient evaporation and crystallization.

d. Centrifugal Desalting Process:

The concentrated slurry enters the centrifuge, where solid salt crystals are separated and collected for packaging.

e. Mother Liquor Discharge and Reprocessing:

The mother liquor separated during centrifugation is discharged into the mother liquor tank and continuously recirculated into the three-effect evaporation system via the mother liquor pump for further processing. As the mother liquor continues to recirculate, organic matter accumulates, which may negatively impact evaporation efficiency and crystal formation. When evaporation capacity declines, either the entire tank contents or a portion of the mother liquor must be periodically discharged to maintain COD balance within the system.

f. High-Concentration Mother Liquor Treatment:

Approximately 5 - 10% of the feed volume consists of high-concentration mother liquor, which is directed to the low-temperature distillation unit for deep evaporation and volume reduction.

The mother liquor from both the MVR and three-effect evaporation systems is sent to the low-temperature distillation unit for final recovery. The boiling point of a liquid is dependent on the external pressure — boiling occurs when the saturated vapor pressure of the liquid equals the surrounding pressure. By reducing system pressure, the boiling point decreases, enabling evaporation at lower temperatures. This is the principle of negative-pressure low-temperature distillation. The vacuum pump reduces the system pressure to above -90 kPa, lowering the boiling point of water to approximately 45 ° C. At this temperature, water evaporates and is removed as vapor, while higher-boiling-point solids and insoluble substances remain in the chamber. Wastewater can be directly dried to crystallization without fouling or scaling, and the residual solids are discharged through internal agitation. The evaporated water is condensed and reused, achieving zero liquid discharge across the facility.

⑤ **Unit 461: domestic sewages treatment station:**

Domestic sewage generated within the factory area is collected through the sewer pipeline network and directed to a grating well, where larger domestic waste, suspended solids, fibrous materials, and debris are removed. This preliminary screening prevents potential clogging of pumps and interference with the normal operation of downstream treatment units. The screened wastewater then flows by gravity into the regulating tank.

Within the regulating tank, fluctuations in flow rate and water quality are balanced to ensure stable conditions for subsequent treatment stages. The regulated wastewater is subsequently lifted by submersible pumps and conveyed to the integrated biochemical treatment unit. Inside this unit, the wastewater comes into full contact with a high-biomass microbial membrane. Through a series of biochemical processes—including adsorption, degradation, nitrification, and metabolic transformation—the organic pollutants and nutrients present in the wastewater are effectively removed.

The treated effluent, along with detached biofilm, flows into the sedimentation tank. In this tank, coagulants such as PAC (Poly Aluminum Chloride) and PAM (Polyacrylamide) are dosed to facilitate solid-liquid separation, thereby achieving efficient removal of residual suspended solids.

The clarified effluent is then discharged into the disinfection tank, temporarily stored in the outlet pool, and filtered before being pumped into the reclaimed water distribution system for landscape irrigation purposes. Meanwhile, excess sludge accumulated in the sludge tank is thickened and dewatered using a mechanical dewatering unit, after which the resulting cake is transported off-site for final disposal.

## 2) Additional Mitigation Measures

All domestic sewage of USP, GOI and OETC will be treated and recycled for greening. All the industrial wastewater is treated and reusing as process water and cooling water, and no liquid wastewater will be discharged outside plant. No additional mitigation measures for liquid effluents are considered to USP, GOI and OETC.

## 5.3 SOLID WASTE

### 1) Planned Mitigation Measures

TABLE 5-3 ESTIMATED MAIN SOLID WASTE GENERATION OF USP

Waste	Generation process	Main Components	Annual generation (t)	Disposal method
Waste activated carbon	Vent gas recovery	Activated carbon	390	Collect and regenerated by the manufacturer
Waste molecular sieve	Hydrogen Production Air separation station	Molecular sieve	5	Collect and disposal as general waste
Waste catalyst	High boiling cracking	Resin	9	Collect and disposal as hazardous waste
Waste resin	Water purification	Waste ion exchange resin	0.5	Collect and disposal as general waste

Waste	Generation process	Main Components	Annual generation (t)	Disposal method
	Wastewater treatment		20	Collect and disposal as hazardous waste
Waste membrane	hydrogen production Wastewater treatment	Waste resin	26	Collect and disposal as hazardous waste
	Water purification	Waste Filter Membranes Waste Reverse Osmosis Membranes	1.2	Collect and disposal as general waste
Crystalline salt	Wastewater treatment	sodium chloride Water	3000	Following collection, hazardous waste identification is proposed. If non-hazardous, it will be managed as general industrial waste; if hazardous, it should be handled and disposed of according to hazardous waste regulations.
Sludge	Wastewater treatment	Silicon Silicon dioxide	3485.5	
	Finishing process	Calcium fluoride	14.75	
MG-Si powder	Cold hydrogenation Finishing process	Silicon	2000	Collect to GOI for recycling
Waste graphite	Finishing process	Graphite	3	Collect and disposal as general waste
Waste package	Raw Materials	Plastic bags, Paper boxes	5	Collect and disposal as general waste
	Raw Materials	Waste oil drums Waste paint cans Waste chemical packaging	5	Collect and disposal as hazardous waste
Waste oil	Mechanical maintenance	Mineral oil	10	Collect and disposal as hazardous waste

Waste	Generation process	Main Components	Annual generation (t)	Disposal method
Laboratory Waste	Laboratory	Inorganic acids and alkalis, etc.	1	Collect and disposal as hazardous waste
Waste lead acid batteries	Forklifts	Lead, sulfuric acid	1	Collect and disposal as hazardous waste
Domestic sludge	Domestic effluent treatment	Domestic sludge	67	Collect and disposal as general waste
Domestic Waste	USP employee, contractor and visitor	Waste paper, kitchen waste, etc.	520	Collect and disposal as general waste

TABLE 5-4 ESTIMATED MAIN SOLID WASTE GENERATION OF GOI

Waste	Generation process	Main Components	Annual generation (t)	Disposal method
MG-Si powder	Grinding and Melting	Silicon	2000	Collect and recycle for melting and grinding
Packing Jumbo and Plastic Bags	Grinding and Melting	Paper Plastic	3	Collect and disposal as general waste
Iron impurities	Grinding	metal	2	Collect to steel recycling plant
Domestic Waste	GOI employee, contractor and visitor	Waste paper, kitchen waste, etc.	160.5	Collect and disposal as general waste

TABLE 5-5 ESTIMATED MAIN SOLID WASTE GENERATION OF OETC

Waste	Generation process	Main Components	Generation	Disposal method
Metal	Maintenance and repair	Metal	0.05~1 t/times	Collect and disposal as

Waste	Generation process	Main Components	Generation	Disposal method
				general waste by OETC
Insulating material	Maintenance and repair	Ceramic	0.05~0.1 t/times	Collect and disposal as general waste by OETC
Oil	Maintenance and repair	Transformer oil	3-5 t/times	Collect and disposal as hazardous waste by OETC
Oil-impregnated waste	GOI employee, contractor and visitor	Paper, cotton, transformer oil, etc.	0.05~0.1 t/times	Collect and disposal as hazardous waste by OETC

## 2) Additional Mitigation Measures

All the solid waste generated from USP, GOI and OETC will be collected and disposal as Omani regulations. Most of the solid waste will be disposal by Be'ah (local industrial waste comprehensive disposal center in SPFZ).

No additional mitigation measures for solid waste are considered to USP and GOI.

## 6 IDENTIFICATION OF THE COMMUNITIES AND STAKEHOLDER ENGAGEMENT

### 6.1 IDENTIFICATION OF COMMUNITIES

#### 6.1.1 LOCAL COMMUNITIES CHARACTERISTICS

Based on satellite imagery analysis and consultations with local communities, there are residential areas distributed within a 10-kilometer radius of the Project. These residential areas fall under the administrative jurisdictions of Sohar Wilayat and Liwa Wilayat, with the nearest residential area located 5 kilometers away from the Project site. For a more detailed description of the local communities, please see Section 4.3.



## 6.1.2 COMMUNITY PERCEPTIONS OF THE PROJECT

### SOURCES OF PROJECT INFORMATION

Interviews in Liwa and Sohar Freezone found that most community members first heard about the Project through word of mouth, including friends, colleagues, and local WhatsApp group. A few mentioned hearings about it via social media (Instagram) or community discussions in malls and public spaces. Reportedly, no formal announcements or public consultations related to the Project were held. Most participants felt they were not adequately informed and expressed a desire for more direct communication from Project developers or Freezone representatives.

### COMMUNITY PERCEPTIONS OF THE PROJECT'S POTENTIAL NEGATIVE IMPACTS

Community consultations in Liwa revealed moderate to high concern about the project's potential environmental impacts, particularly air pollution and odors from industrial activity. Using a 1–4 scale (1 = not concerned, 4 = very concerned), air quality was rated 3–4 by most residents, especially those living within 5 km of the Freezone. Some reported past experiences with chest infections and respiratory issues, linking them to industrial fumes. Noise and water use were of lesser concern (rated 1–2), with no significant issues reported. On the social side, safety concerns (rating 3) were raised in relation to emergency response and previous incidents involving fire and delayed medical care. One resident stated, "We fear what happens in an emergency—the hospitals are not equipped, and pollution affects our health."

### COMMUNITY PERCEPTIONS OF THE PROJECT'S POTENTIAL POSITIVE IMPACTS

Interviews with Liwa residents highlighted high expectations for the Project to create local job opportunities and stimulate income growth, particularly for young people. Many participants hoped the Project would lead to improved infrastructure, including better roads, utilities, healthcare access, and school support. Several stakeholders specifically emphasized the importance of long-term benefits for families, such as sports programs for youth, educational support, and stable employment for men and women. The most frequently mentioned anticipated benefits included job creation, economic activity for small businesses, and greater cultural exchange. Community members recommended that the project team ensure regular engagement with local representatives, prioritize local hiring, and contribute to visible social development initiatives (e.g., sponsoring events, supporting schools, youth programs).

## 6.2 STAKEHOLDER ENGAGEMENT

Stakeholder engagement is a key component of sustainable development and the ESIA process. It involves those stakeholders interested in, or affected by, a proposed development working to actively identify opportunities, risks and issues of concern. The primary objectives of stakeholder engagement are as follows:

- ensure that adequate and timely information about the Project is provided to stakeholders.
- provide sufficient opportunity to stakeholders to voice their opinions and concerns, and to ensure that these concerns influence Project decisions.
- establish a relationship and form of communication between the Project and affected communities in particular during the construction phase of the Project; and

- Stakeholder engagement is a requirement of the Oman ESIA regulations. It is also a requirement of international lenders as it is recognized that failure to engage stakeholders can create significant risks to a project development.

### 6.2.1 STAKEHOLDER IDENTIFICATION

The objective of stakeholder identification is to establish which organizations and individuals may be directly or indirectly affected (positively and negatively) by, or have an interest in, the Project. Stakeholder identification is an on-going process, involving regular review and the updating of the stakeholder register as the Project proceeds. The following sections will provide an overview of stakeholder groups that were identified for the purpose of ESIA development and consultation.

As part of ESIA scoping, a stakeholder mapping exercise was undertaken to identify key stakeholder groups and organizations.

Stakeholders identified for inclusion in engagement activities must meet at least one of the following criteria:

- Have an interest in the Project.
- Would potentially be impacted by or have an influence on the Project (negatively or positively); and/or and
- Could provide commentary on issues and concerns related to the Project.

The mapping exercise drew on knowledge on the working experience of the consultants, including knowledge and understanding of the local context; satellite imagery; the ESIA Scoping Phase; and recommendations from other stakeholders.

Table 6-1 presents an overview of the main stakeholder groups of relevance to the Project as per engagement conducted during the ESIA Field Survey.

TABLE 6-1 STAKEHOLDER CATEGORY LIST

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
National Government	Public Authority for Special Economic Zones and Free Zones (OPAZ) Address: PO Box: 77, PC 100, Muscat, Sultanate of Oman Tel: +968 2450 7500 Email: info@opaz.gov.om	OPAZ is the national regulator for all Special Economic Zones and Free Zones in Oman, including Sohar Freezone. It is responsible for land allocation, permitting, and ensuring compliance with national policies. The Project is located within Sohar Freezone and must comply with OPAZ regulations and reporting requirements.	High	Low	Inform
	Environment Authority (EA) Address: Thaqafah St, Muscat Tel: +96824404696 Email: complaints@ea.gov.om	The EA is responsible for environmental permitting, compliance monitoring, and EIA approvals. The Project's EIA was submitted to and approved by the EA, and ongoing environmental compliance will be monitored by this authority.	High	High	Collaborate
	Ministry of Health Address: HCX9+7W7, Dauhat Al Adab St, Muscat, Oman Tel: +968 24 946374 Email: contact.center@moh.gov.om	The Ministry of Health may be involved in reviewing occupational health and safety measures, emergency medical preparedness, and public health risks associated with the Project.	High	Low	Inform
	Ministry of Labour Address: H8QF+CX6, Muscat	Responsible for enforcing Oman's Labour Law (RD 53/2023), including grievance mechanisms, worker welfare, and	High	Low	Inform

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
	Tel: +968800 77000 Email: doc@mol.gov.om	employment standards. The Project must comply with labour regulations during construction and operation.			
	Ministry of Energy and Minerals Address: Thaqafah St, Muscat Tel: +968 24640555 Email: info@mog.gov.om	Oversees industrial energy use, emissions, and resource extraction. The Project may be subject to reporting requirements or inspections related to energy consumption and emissions.	High	Low	Inform
Local authority	Local Municipal Council (Liwa Wilayat) Address: P.O. Box 140, Postal Code 311 Wilayat Sohar, North Al Batinah Governorate, Sultanate of Oman Tel: +968 8000-0007 Email: info@bng.gov.om <a href="https://bng.gov.om/index.php?lang=ar">https://bng.gov.om/index.php?lang=ar</a>	Coordinates community-level issues such as employment, infrastructure, and social services. May be involved in community engagement and local development planning related to the Project.	High	Low	Inform
	Sohar Port and Freezone (SPFZ) Address: Port and Freezone - Head Office, Sohar 327 Tel: +968 26 852700	SPFZ is the local authority managing land use, infrastructure, and permits within Sohar Freezone. The Project must coordinate with SPFZ for utilities, logistics, and compliance with zone-specific regulations.	High	High	Collaborate

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
	Local Police Address: The Al Batinah Region Operation Centre (Police) Tel: +968 2684 0099 Emergency No: 9999	Responsible for road safety, emergency response, and site security coordination. The Project will engage with local police for traffic management and emergency planning.	<i>High</i>	<i>Low</i>	Inform
Infrastructure	Oman Electricity Transmission Company (OETC)	OETC will own and operate part of the substation infrastructure. The Project must coordinate with OETC on technical integration, asset transfer, and operational planning.	<i>High</i>	<i>High</i>	Collaborate
	Majis Industrial Services S.A.O.C	Majis is the water supplier for the Project. Engagement includes service agreements, water demand planning, and operational coordination.	<i>High</i>	<i>High</i>	Collaborate
	Be'ah (Oman Environmental Services Holding Co.)	Be'ah is responsible for hazardous and solid waste management. The Project must establish waste handling agreements and ensure compliance with Be'ah's regulations.	<i>High</i>	<i>High</i>	Collaborate
	Sohar Industrial Port Company (SIPC) Address: SOHAR Industrial Port Company SAOC PO Box 9 Postal Code 327 Sohar, Sultanate of Oman	SIPC manages port logistics and customs. The Project will coordinate with SIPC for import/export of equipment and materials.	<i>High</i>	<i>High</i>	Collaborate

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
	<p>Tel: +968 2685 2700 / +968 2685 2777</p> <p>Email for operational issues: ops@soharportandfreezone.com</p>				
	Religious facilities	No formal religious facilities (e.g. mosques, churches, temples) are located within Sohar Freezone. However, workers typically access nearby facilities such as Sultan Qaboos Grand Masjid (Sohar) and The Apostolic Vicariate of Southern Arabia, both located within a 15–20 minute radius and accessible to project workforce outside working hours.	Low	Low	Monitor
	Healthcare facilities (incl. first aid)	Sohar Freezone does not have a public hospital or clinic within its boundary. However, project workers may access nearby healthcare facilities such as Sohar Hospital (public) and Badr Al Samaa Hospital (private, Al Tareef Street). Additionally, onsite first aid centers or occupational clinics may be established by the Project or tenant companies, as required by Sohar Freezone health and safety regulations.	Low	Low	Monitor

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
Contractors	China National Chemical Engineering No.6 & No.3	EPC contractors responsible for plant construction. Engagement includes contract management, HSE compliance, and progress reporting.	<i>High</i>	<i>High</i>	Collaborate
	Chongqing Industrial Equipment Group	EPC contractor involved in construction. Coordination focuses on safety, quality, and schedule adherence.	<i>High</i>	<i>High</i>	Collaborate
Local Communities	Majan Township (5 km away) Includes: Future Science International School Address: Majan Street, Oman Tel: <u>+968 26 750877</u>	Closest residential area to the Project. Engagement includes informational updates, community consultation, and access to the grievance mechanism.	<i>High</i>	<i>High</i>	Collaborate
	Residents of Liwa, Ghadfan, Al Ghuzayyil, Wadi Al Qasab, Ad Hadd (5+ km away)	Residents are part of the broader project-affected area, with potential indirect exposure to cumulative impacts such as air quality or traffic. Community interviews highlighted the need for proactive communication, local job opportunities, and participation in social initiatives. Engagement will prioritize transparency, grievance redress, and CSR inclusion.	<i>High</i>	<i>High</i>	Collaborate

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
	Vulnerable groups	Interviews with Sohar Freezone management and local communities identified several vulnerable groups in the area. These include migrant workers, who often face limited job security and access to services; low-income households, particularly those burdened by rising utility costs; and persons with disabilities, supported by NGOs such as the Oman Blind Association. While not explicitly mentioned, elderly residents and female-headed households may also face challenges accessing employment and healthcare. The Project may engage with these groups through targeted CSR initiatives, community feedback mechanisms, and inclusive hiring or social programs.	<i>High</i>	<i>High</i>	Collaborate
NGOs and CSOs	Oman Association for the Disabled, Oman Charitable Organization, Jusoor Foundation  Tel: +968-80026262, request transfer to Sohar Disabled services center	SPFZ confirmed that several NGOs are active in Liwa and the wider region, including the Oman Blind Association. While some NGOs have shown interest in collaborating with the Freezone, SPFZ noted that partnerships have been limited due to the lack of region-specific, sustainable initiatives. Future collaboration is possible if	<i>Low</i>	<i>High</i>	Engage

Category	Stakeholder and Contact Details	Connection to Project	Level of Influence	Level of Interest	Engagement Approach
		the Project supports structured, long-term programs aligned with local community priorities. NGOs may be relevant partners for social welfare, health, or education-focused CSR efforts.			
Adjacent Companies	Tenants in Sohar Freezone	Share infrastructure and may be affected by any potential incidents. Engagement includes coordination on shared services and emergency planning.	<i>High</i>	<i>High</i>	Collaborate
	Tenants in Sohar Industrial Estate	Adjacent industrial operations. Engagement includes information sharing and joint risk management.	<i>Low</i>	<i>Low</i>	Monitor

## 6.2.2 STAKEHOLDER ENGAGEMENT IN ESIA PROCESS

### LOCAL EIA CONSULTATION

It is confirmed that no regulatory requirements mandated any public consultation during the preparation of the local Environmental Impact Assessment.

### ESIA PHASE CONSULTATION ACTIVITIES

The ERM team conducted the site visit and stakeholder engagement from 10 to 12 June 2025 with the activities summarized in Table 6-2.

**TABLE 6-2 STAKEHOLDER ENGAGEMENT CONDUCTED**

Stakeholder and Engagement Activities	Engagement Topics
3 Key Informant Interviews with Project workers, including <ul style="list-style-type: none"> <li>• one local worker, and</li> <li>• two expatriate workers.</li> </ul>	<ul style="list-style-type: none"> <li>• Understand their labor and working conditions as either local or expatriate workers;</li> <li>• Understand their concerns and expectation of the Project;</li> <li>• Understand the local socioeconomic settings of the Project area.</li> </ul>
5 Key Informant Interviews with local community representatives, including <ul style="list-style-type: none"> <li>• one café owner,</li> <li>• one doctor,</li> <li>• one nurse,</li> <li>• one local resident, and</li> <li>• one foreign resident.</li> </ul>	<ul style="list-style-type: none"> <li>• Understand their concerns and expectation of the Project;</li> <li>• Understand the local socioeconomic settings of the Project area.</li> </ul>
1 Key Informant Interviews with government authority, which is the representative of Ministry of Environment (MoE)	<ul style="list-style-type: none"> <li>• Understand their concerns and expectation of the Project;</li> <li>• Understand the local socioeconomic settings of the Project area.</li> </ul>
1 Focus Group Discussion with 6 local community representatives from Liwa, including the Sheikh of Liwa, sports committee members, female community members, one relocated resident (because of the establishment of Sohar Free Zone).	<ul style="list-style-type: none"> <li>• Understand their concerns and expectation of the Project;</li> <li>• Understand the local socioeconomic settings of the Project area.</li> </ul>

### 6.3 STAKEHOLDER CONCERNS AND EXPECTATIONS

This Section provides an overview of the key issues raised by stakeholders during the ESIA phases. Key findings as well as the implications for Project's activities are summarized in Table 6-3.

**TABLE 6-3 STAKEHOLDER CONCERNS, EXPECTATIONS AND PROJECT FEEDBACK**

Type	Overview of Concerns/Issues	Stakeholder Expectations	Project Feedback
PS1 Assessment and Management of Environmental and Social Risks and Impacts	Inadequately or insufficiently informed raised by local community members.	Expectation for more direct communication from Project developers or Freezone representatives	Develop and implement the Project SEP which provide for more proactive and periodic engagement with local communities.
PS2 Labor and Working Conditions	Job security is of concerns with local community members noted companies hiring from outside the local area and the contract-based employment and limited long-term stability with many fearing terminations.	Expectation for more local hiring, especially for youth and women, and emphasized the need for structured, stable career paths tied to Freezone growth.	Develop and implement a Local Content Management Plan which provide for local hiring with emphasize on youth and women.
PS4 Community Health, Safety, and Security	Challenges in accessing timely care during emergencies, especially for industrial accidents near Sohar Freezone as well as limited specialized services and transport to healthcare facilities during emergencies.	Need for faster coordination and improved emergency coverage.	Develop and implement a Community Health and Safety Management Plan which provide for emergency response with considerations of limited specialized services and transport for accessing timely care.
	Dust, flaring and poor air quality which experienced by community members who believed attributed to the industrial activities. The local community member concerned	Collaboration efforts needed for environmental compliance and pollution control of all tenants, including the Project.	Compliance with the national EIA regulations and international standards as required by IFC.

<b>Type</b>	<b>Overview of Concerns/Issues</b>	<b>Stakeholder Expectations</b>	<b>Project Feedback</b>
	the cumulative impacts from the Project emission which may affect their health.		

## 7 SOCIAL ASSESSMENT

### 7.1 INTRODUCTION

In accordance with IFC PS1 and PS6, the assessment process aims to predict and assess the Project's potential adverse impacts and risks to biodiversity values, in quantitative terms where possible. The objective of the biodiversity impact assessment is to identify and quantify the potential Project impacts as identified through scoping; design measures to avoid, minimize, or restore/compensate potential adverse impacts; and identify likely residual impacts.

### 7.2 SCOPE OF ASSESSMENT

Noise emission, wastewater discharge, and hazardous and non-hazardous waste transportation and disposal are unlikely to significantly impact on the local community under normal circumstances given the distance of the local communities to the Project site. The project's energy and water consumption during its operational phase is also unlikely to have a significant impact on the availability of these resources for the local community. As a result, this aspect has been scoped out of the social assessment presented below.

### 7.3 IMPACT ASSESSMENT CRITERIA

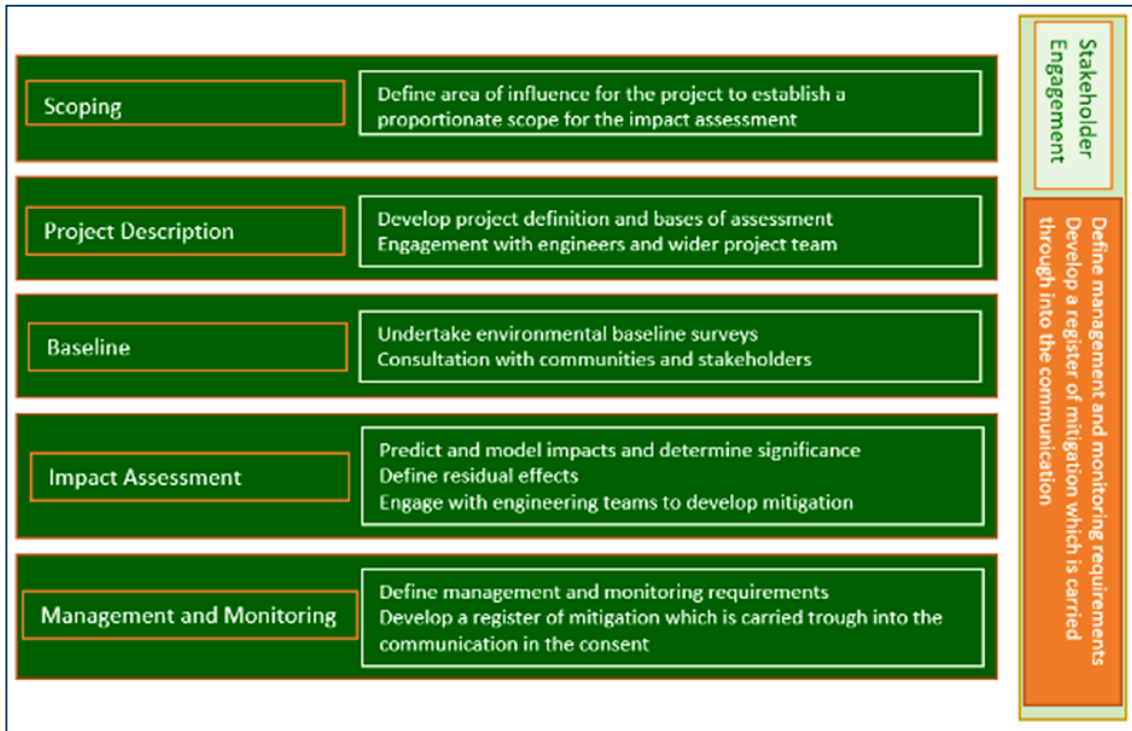
The social impact assessment is the determination of what is likely to happen with the environmental and socio-economic Receptors / Resources (R/R) as a consequence of the Project and its associated activities. It is noted that the Project's construction is out the scope of this impact assessment as it is almost completed by the time of this ESIA addendum.

At the stage of impact prediction, the following characteristics/ parameters are identified:

- Project-related activities;
- Impacts' Receptors / Resources (R/R);
- All potentially impacts;
- Embedded controls - measures envisaged by the Project to prevent / reduce impacts.

An overview of the Impact Assessment process being implemented by the Project is shown in Figure 7-1.

FIGURE 7-1 IMPACT ASSESSMENT PROCESS



Source: ERM, 2022

Once the prediction of impacts is complete, each Impact and R/R are described in terms of its various relevant characteristics and finally impact significance is assessed.

The significance of the impact is assessed in three steps:

- **Step 1.** Assessment of the **Impact Magnitude** that is a combined characteristics of scale, duration, frequency and extent:
- **Step 2.** Assessment of the **Sensitivity /Vulnerability/ Importance** of R/Rs.
- **Step 3.** Determination of **Impact Significance** is the final step, conducted qualitatively in a matrix based on the previously assessed Impact Magnitude (Step 1) and R/R Sensitivity /Vulnerability/ Importance (Step 2), with the results expressed as Negligible, Minor, Moderate or Major. A detailed description of the impact significance evaluation steps is provided below.

### 7.3.1 STEP 1: ASSESSMENT OF IMPACT MAGNITUDE

**Scale** for social impact is the degree of change to a household level livelihood, individual or household level health status or quality of life. In the Project context, an impact that leads to a fundamental change in the way of life of people or to the livelihood patterns is considered as large, an impact that leads to evident change from the baseline of livelihood but remain part of the livelihood ability is considered as medium, and one that resulted in only subtle changes in conditions would be considered as small.

**Duration** is the timeframe over which an impact will be experienced, and it is classified into temporary, short-term, long-term, and permanent. In the Project context, it is defined that an impact that lasts shorter than 6 months is considered as temporary; an impact that lasts 6 months to 2 years is considered as short-term, an impact that extends beyond the 2 years but

is expected to end within a foreseeable timeframe (e.g., by the end of the operation or decommissioning phase) to be expected is considered as long-term; an impact that persists indefinitely unless specific interventions/mitigation measures are introduced is considered permanent.

**Extent** is the geographical 'reach' of the impact and takes into the account the proportion of the households or communities within a jurisdiction that are potentially affected by the change. Site – impacts that are bounded to the site locations and immediate surroundings; local – impacts that are limited to the local communities around the Project site (i.e. Liwa Wilayat and Sohar Wilayat); regional – impacts that extend beyond local area (i.e., Al Batinah North); national – impacts that affect social parameters that are nationally important; international – impacts that extend beyond the country.

**Frequency** is a measure of the constancy or periodicity of the impact: rare – not occurring very often; occasional – occurring irregularly; frequent – occurring repeatedly at intervals; continuous – occurs constantly.

**Magnitude** is designated by taking Duration, Scale, Extent and Frequency into consideration, and the appropriate description is selected based on the overall combination of characteristics values. Impacts can be positive or negative. The impact magnitude is classified as negligible, small, medium or large for negative impacts, as defined in Table 7-1.

**TABLE 7-1 DESIGNATION OF IMPACT MAGNITUDE**

<b>Designating Magnitude</b>	<b>Description</b>
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the Area of Influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional, and impact may be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of households and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

### 7.3.2 STEP 2: ASSESSMENT OF RECEPTORS SENSITIVITY

**Sensitivity** is the accepted term for describing the vulnerability of the receptors that will experience impacts.

Receptor sensitivity is considered **High** when receptors have little capacity and means to adapt to a given change and to maintain or improve quality of life (i.e., when they have low resilience).

Receptor sensitivity is considered **Medium** when there is limited capacity and means to adapt to a given change and maintain/improve quality of life (i.e., medium resilience).

Receptor sensitivity is considered **Low** when there is a moderate to high capacity and means to adapt to a given change and maintain or improve quality of life (i.e., high resilience).

### 7.3.3 STEP 3: DETERMINATION OF IMPACT SIGNIFICANCE

Once the magnitude of the impact and sensitivity of the resource/receptor has been characterized, the resulting impact *significance* is assigned using the significance matrix presented in Table 7-2 below.

TABLE 7-2 Impact Significance Matrix

Evaluation of Significance		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

## 7.4 IMPACT ASSESSMENT

### 7.4.1 IMPACT ON COMMUNITY HEALTH AND SAFETY FROM PROJECT OPERATION ACTIVITIES

Project operation activities may result in health and safety (H&S) impacts on local communities from the following activities:

- Air emissions

During operation, the air emissions are from batch reactions of CVD units, cold hydrogenation, cleaning process, hydrolysis treatment process and Laboratory. After each batch reaction, the CVD chambers are purged using nitrogen gas. The purged gas, which contains gas-phase HCl, SiCl<sub>4</sub>, SiH<sub>2</sub>Cl<sub>2</sub>, SiHCl<sub>3</sub> and others, is scrubbed by water which is then sent to the wastewater treatment plant. In addition, the MG-Si grinding and melting process (associated facility) generates silicon dust which will be captured and collected via negative pressure ducts and discharged to dust removal systems (cyclone separators and dust bag house) capable of separating almost 100% of the generated dust from air. The purified air from inside the baghouses is discharged through 15-meter exhaust stacks, maintaining a particulate matter (PM) concentration < 10 mg/m<sup>3</sup>. According to the Environmental Impact Assessment, the emission concentrations from USP and GOI can meet the referenced standards.

However, consultations with local communities reveal their concerns about air emissions from the Project, including dust, stemming from past complaints regarding poor air quality, which community members attribute to other industrial activities.

Impact		Impacts from air emission on community health				
Impact Nature		Negative		Positive		Neutral
IMPACT CHARACTERISTICS	Type	Direct		Indirect		Induced
	Indirect results of project-induced environmental impacts					
	Extent	Site	Local	Regional	National	International
	Scale	Small		Medium		Large
	SPATIAL EFFECTS	Low		Medium		High
	Given localized environmental impacts and small scale of impacts assessed in the EIA					
	Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Frequency	Constant during operation				
	TEMPORAL EFFECTS	Negligible	Low	Medium	High	
	Frequent impacts during the operation phase					
IMPACT MAGNITUDE		Negligible	Small	Medium	Large	
Localized and short-term impacts, and negligible residual environmental impacts after mitigation						
RECEPTOR VULNERABILITY		Low	Medium	High		
Stakeholders' concerns regarding the project's potential health impacts, combined with a lack of access to remedies, evidenced by unresolved grievances related to suspected industrial air pollution in the past, demonstrate a medium level of vulnerability.						
IMPACT SIGNIFICANCE		Negligible	Minor	Moderate	Major	

### SPECIFIC MITIGATION MEASURES

- Implement the vent gas emission mitigation measures as listed in Table 5-1 and exhaust gas mitigation measures as listed in Table 5-2.
- Develop and implement a Community Health and Safety Plan which address the air emission impacts on and concerns from the local community, including disclosing the Project activities and air emission monitoring results in accordance with Oman regulation and community expectation.
- Develop and implement the external Grievance Redress Mechanism of USP to receive and address any air-emission related concerns and complaints.

### RESIDUAL IMPACTS

With the implementation of the additional mitigation measures noted above, the significance of this residual impact is considered **Negligible**.

### 7.4.2 IMPACT ON COMMUNITY HEALTH AND SAFETY FROM PROJECT ROAD TRANSPORTATION

The nearby Sohar Port will be the main logistic hub for goods movements to and from the USP plant. Trichlorosilane, as input material for the USP plant, will be transported by trucks from a chlor-alkaline company located 300 km south of Sohar. Third-party contractors are expected to manage the transport of goods, raw materials and products to and from the project site.

Project-related transportation activities may have adverse impacts on the local transportation network. Most residents of the local community rely on private vehicles for transportation, as public transportation services in the area remain highly limited. While no data on current local road traffic volumes was available at the time of this assessment, the increased traffic generated by the project, when considered alongside other road users, could lead to congestion during peak hours and disrupt the normal travel of local road users.

Impact	Impacts on traffic and roads during operation				
Impact Nature	Negative		Positive	Neutral	
Type	Direct		Indirect	Induced	
	Direct from the Project transportation activities				
Extent	Site	Local	Regional	National	International
Scale	Small		Medium	Large	
SPATIAL EFFECTS	Low		Medium	High	

Localized impact and small impact scale on traffic and road due to the small amount of Project transportation activities. The spatial effects are low.

Duration	Temporary	Short-term	Long-term	Permanent
Frequency	Frequent			
TEMPORAL EFFECTS	Negligible	Low	Medium	High

Short impacts during construction and are expected to be frequent.

IMPACT MAGNITUDE	Negligible	Small	Medium	Large
	Considering the small spatial and temporal effects, the impact magnitude is considered small.			
RECEPTOR VULNERABILITY	Low	Medium	High	
	Vulnerability is assessed as medium given the area serves as a logistics hub with fundamental capacity to handle a certain volume of traffic and other roads and transportation networks are also available to accommodate other road users (e.g., local residents, non-project vehicles).			
IMPACT SIGNIFICANCE	Negligible	Minor	Moderate	Major

#### SPECIFIC MITIGATION MEASURES

- Develop and implement a Traffic Management Plan to manage traffic-related impacts aligned with the WBG EHS Guidelines, with particular focus on in-country transportation of trichlorosilane and related emergency response requirements.
- Prepare and implement a Community Health and Safety Plan aligned with the WBG EHS Guidelines which should include transport safety that integrates considerations for the safety of local community.

**RESIDUAL IMPACTS**

With the implementation of the additional mitigation measures noted above, the significance of this residual impact is considered **Negligible**.

**7.4.3 IMPACT ON COMMUNITY HEALTH AND SAFETY FROM LABOR IN-MIGRATION**

Sohar Freezone management has confirmed that industrial growth has driven a steady inflow of expatriate labor into Liwa Wiayat and Sohar Wilayat to meet operational needs, particularly in construction, heavy industry, and logistics; such workers are predominantly non-resident males, living in worker accommodation or commuting from outside the area. This trend aligns with baseline statistics showing that expatriates account for approximately 40.9% of the local population, 84.9% of whom are male.

The Project’s direct and indirect employment requirements could further elevate this labor in-migration which potentially increases the spread of communicable diseases such as dengue, HIV/AIDS, and COVID-19, the infectious disease rate of which is already higher in population of Al Batinah North compared to other governorates.

Local communities have reported challenges accessing healthcare services, including long wait times at referral hospitals and medication shortages. Should the project workforce share existing healthcare facilities with local residents without proper planning and management, these issues could be exacerbated.

In addition, the economic opportunities brought out by the Project could heighten the risk of gender-based violence between the influx of laborers and local communities.

<b>Impact</b>		<b>Increased risks of communicable diseases and GBV concerns due to the Presence of Project Workforce</b>				
<b>Impact Nature</b>		<b>Negative</b>		Positive	Neutral	
<b>IMPACT CHARACTERISTICS</b>	<b>Type</b>	<b>Direct</b>		Indirect	Induced	
		Direct impact from the presence of Project workforce and interactions with communities				
	<b>Extent</b>	Site	<b>Local</b>	Regional	National	International
	<b>Scale</b>	Small		<b>Medium</b>		Large
	<b>SPATIAL EFFECTS</b>	Low		<b>Medium</b>		High
	Can bring impacts to the health status of the affected population which may lead to evident change of health status of the affected households					
	<b>Duration</b>	Temporary	<b>Short-term</b>	Medium-term	Long-term	Permanent
	<b>Frequency</b>	Rare				
	<b>TEMPORAL EFFECTS</b>	Negligible	<b>Low</b>	Medium	High	
	Short-term and rare impacts as of the cases to be experienced by the social receptors					
<b>IMPACT MAGNITUDE</b>		Negligible	Small	<b>Medium</b>	Large	
Medium spatial and temporal effects						
		Low	<b>Medium</b>		High	

<b>RECEPTOR VULNERABILITY</b>	Vulnerability is assessed as Medium given healthcare facilities available in the AoI yet reported long waiting compounded by slightly higher rate of communicable disease reported in the area.			
<b>IMPACT SIGNIFICANCE</b>	Negligible	Minor	<b>Moderate</b>	Major

**SPECIFIC MITIGATION MEASURES**

- Prepare and implement a Community Health and Safety Plan aligned with the WBG EHS Guidelines which addresses the communicable disease and GBV risks potentially induced by Project labor in-migration.
- Disclose the anti-harassment policy included in the USP Employee Handbook and the USP Employee Rights and Sustainable Development Commitment Policy to direct workers and the anti-harassment policy included in the USP Management Measures for Labor Suppliers and Agency Workers to agency workers, explicitly stating a Zero Tolerance to violence and harassment of all workers, contractors and agency workers, and disclose USP’s Grievance Redress Mechanism in local languages.
- Ensure the onsite medical clinic remains operational and explore possibilities of expanding its range of services, encouraging the project workforce to use it for their healthcare needs as much as possible.
- Develop and implement external Grievance Redress Mechanism of USP. The external GRM should be designed to systematically receive, assess, and respond to gender-based violence (GBV) concerns or incidents, in line with survivor-centered principles. This includes establishing secure channels for anonymous reporting; ensuring strict protection of personal data and confidentiality throughout the process to prevent retaliation or re-victimization; and integrating referral pathways to specialized GBV support services (such as counseling, legal aid, or medical assistance) as part of its response protocols. The GRM should also be available to address any concerns regarding the project’s potential strain on local healthcare services.

**RESIDUAL IMPACTS**

With the implementation of the additional mitigation measures noted above, the significance of this residual impact is considered **Minor**.

### 7.4.4 IMPACT ON COMMUNITY HEALTH AND SAFETY FROM DEPLOYMENT OF SECURITY FORCE

Though no excessive use of force has been reported in Liwa Wilayat or Sohar Freezone, unarmed security personnel engaged for the operation of the polysilicon manufacturing plant (18 persons and primarily responsible for monitoring the gates to prevent unauthorized access) may still disturb the lives of nearby community residents or the Project workforce through the following behaviors: gender-based violence potentially perpetrated by security guards using their power dynamics, as well as other improper or disrespectful conduct. Conflicts arising from these interactions can lead to direct negative consequences, including physical harm, psychological intimidation, damage to personal property, and erosion of community trust.

Impact		Impact on community safety due to the presence of security personnel					
Impact Nature		Negative		Positive	Neutral		
IMPACT CHARACTERISTICS	Type	Direct		Indirect	Induced		
	Direct impact from the presence of Project security personnel						
	Extent	Site	Local	Regional	National	International	
	Scale	Small		Medium		Large	
	SPATIAL EFFECTS	Low		Medium		High	
	Localized impacts and evident changes on community security in case of conflicts						
	Duration	Temporary	Short-term	Medium-term	Long-term	Permanent	
	Frequency	Rare					
	TEMPORAL EFFECTS	Negligible		Low	Medium	High	
	Occasional incidents anticipated throughout the Project operation phase						
IMPACT MAGNITUDE		Negligible		Small	Medium	Large	
Conflicts between communities and the security personnel of the Project can affect community security							
RECEPTOR VULNERABILITY		Low		Medium		High	
Vulnerability is assessed as Low given the available police force in the area responsible for resolving any inappropriate conduct of the private security personnel.							
IMPACT SIGNIFICANCE		Negligible		Minor	Moderate	Major	

#### SPECIFIC MITIGATION MEASURES

- Prepare and Implement a Security Management Plan which defines security rules, procedures, as well as roles and responsibilities. The Security Management Plan will be aligned with IFC’s Good Practice Handbook on the Use of Security Forces; Assessing and Managing Risks and Impacts.
- Conduct regular training for the security workers and guards on the implementation of the security rules.
- Train all security personnel regularly on GBVH and the Code of Conduct.
- Prepare and implement the external Grievance Redress Mechanism of USP which allows neighboring communities to express any concerns about the security arrangements and acts of security personnel.

## RESIDUAL IMPACTS

With the implementation of the additional mitigation measures noted above, the significance of this residual impact is considered **Negligible**.

### 7.4.5 IMPACT ON COMMUNITY HEALTH AND SAFETY FROM UNPLANNED EVENT

The possible scenarios of unplanned events include:

- Fire and explosion
- Leakage and spill
- Strikes
- Community protest

Fire and explosion events may release pollutants into the atmosphere, including particulate matter, volatile organic compounds (VOCs), and potentially hazardous gases. These emissions can degrade air quality, leading to respiratory and other health issues for both workers and nearby communities. Furthermore, the combustion of materials during fire incidents can contribute to the formation of smog and air pollutants that affect the overall air quality in the vicinity. Moreover, even distant blasts and fires can cause physical discomfort and long-term mental health impacts.

Spills and leaks can originate from storage, handling and transportation of hazardous material (hazardous material to be used onsite include Trichlorosilane, Silicon (Powder), Hydrogen, Silicon Tetrachloride, Dichlorosilane, Hydrogen Chloride, HF, HNO<sub>3</sub>, and Healthcare Waste) and various sources. Such incidents, including resulting in fire and explosions, carry could lead to significant environmental, social, and economic consequences, including but not limited to the contamination of air and soil, risks to health and safety and well-being of workers and roadside communities, and costs associated with emergency response, environmental remediation, damage to assets and potential disruptions to local life.

The primary sources of impact of the Project include:

- Storage and Handling: Inadequate containment measures, equipment failure, or human errors can result in the release of these materials into the environment.
- Transportation and Logistics: The transportation of hazardous materials to and from the Project site presents potential spill and leak risks. Accidents during transportation, such as vehicle collisions or equipment failures, can result in the release of hazardous substances into the environment.

Additionally, strikes and community protests could be triggered by unaddressed grievances related to worsen working conditions, underrepresentation in the workforce, overlooked engagement strategies, health and safety concerns, squeezed adequate public services. Community protest may result in severe health and safety issues of the local community from traffic congestion, hindering the passage of emergency forces such as ambulances and fire trucks and delaying the handling of critical situations, overcrowding and public disorder, creating conditions for health and safety hazards like the spread of infectious diseases and accidental stampedes.

Community members in Liwa Wilayat noted challenges in accessing timely care during emergencies, especially for industrial accidents near Sohar Freezone. In one instance, they

reported a delayed response when an explosion occurred at a nearby facility, highlighting the need for faster coordination and improved emergency coverage.

SPFZ has implemented an Emergency Response Plan (ERP) to ensure the provision of a prepared response to an emergency situation within the Port and Freezone area. SPFZ emergency response is available 24/7 and is in direct contact with the Civil Defense Department (CDD). Every tenant, including USP, is responsible for preparing their own Emergency Preparedness and Response Plan (EPRP) aligned with SPFZ ERP and for activating the emergency procedures based on incident tiering. In case of incidents, the tenant immediately informs SPFZ, which informs the CDD.

SPFZ encourages grievances to be resolved through employer-led grievance mechanisms or escalated to Oman Public Authority for Social Insurance (OPAZ) or Ministry of Labour.

Community protest would lead to the involvement of the Royal Oman Police, which demonstrated no records of use of force in the past five years.

Impact		Fire, Explosion, Spills and leaks, strikes and community protest					
Impact Nature		Negative		Positive	Neutral		
IMPACT CHARACTERISTICS	Type	Direct		Indirect	Induced		
	This impact is direct on community health and safety.						
	Extent	Site	Local	Regional	National	International	
	Scale	Small		Medium	Large		
	SPATIAL EFFECTS	Low		Medium	High		
	The spatial impact is expected to be localized and considered as Medium.						
	Duration	Temporary	Short-term	Medium-term	Long-term	Permanent	
	Frequency	Accidental event and but the remaining impact will be long-term.					
	TEMPORAL EFFECTS	Negligible		Low	Medium	High	
	The temporal impact is considered as Low.						
Likelihood	Low		Medium		High		
IMPACT MAGNITUDE	Negligible		Small	Medium	Large		
	Evident and long-term change on the health and safety of the community. But according to the QRA results conducted, the FN curve simulation was not generated as the off-site public is located for from the USP plant area, indicating minimum likelihood of societal risk.						
RECEPTOR VULNERABILITY	Low		Medium	High			
	Vulnerability is assessed as medium given the available yet reportedly slow emergency response.						
IMPACT SIGNIFICANCE	Negligible		Minor	Moderate	Major		

### SPECIFIC MITIGATION MEASURES

- Prepare and implement an updated Emergency Preparedness and Response Plan for operations aligned with the IFC PSs and with the SPFZ ERP, taking into consideration all key emergency scenarios for production processes, such as release of liquid/gaseous hazardous and toxic materials, fire, explosion and community protest.

- Prepare and implement a Community Health and Safety Plan aligned with the WBG EHS Guidelines which should include emergency risks analysis and emergency planning from community’s perspective.
- Participate in SPFZ-wide programs such as "Be Safe Week", defensive driving courses, and joint emergency response drills.

**RESIDUAL IMPACTS**

With the implementation of the additional mitigation measures noted above, the significance of this residual impact is considered **Minor**.

**7.4.6 IMPACT ON LABOR AND WORKING CONDITIONS FROM PROJECT DIRECT AND INDIRECT EMPLOYMENT**

As of June 2025, USP employed 979 direct employees of which 89% are men and 11% women, and 9 agency workers. The largest group of direct employees comes from Bangladesh, China, Oman and Pakistan.

After production commences, USP plans to engage a total workforce of 1,505 employees, of which 1,130 in-house employees and 375 agency workers. USP estimated that 65-70% of its direct workforce in operation phase are expatriates from China and 20-25% are Omani employees, the rest may come from other countries such as Bangladesh and Nepal.

Without proper management, the physical and mental health of the Project workers may be compromised in the way of:

- Potential employment of children or forced or bonded labour. This risk is often higher for vulnerable groups, including migrant workers who do not speak or read the local language (e.g., workers from Southeast Asia) and may be exacerbated by the adoption of employment agencies;
- Potential discriminatory working conditions for migrant workers;
- Potential for discriminatory practices to occur in the hiring process;
- Potential for discrimination against workers that join unions (or other similar organizations) or take part in collective bargaining;
- Inappropriate or delayed payments to workers; and
- Risks of violence and sexual harassment and exploitation between workers.

USP has adopted corporate HR policy and procedures developed as per national law requirements and generally in line with IFC PS2. The Employee Handbook covers aspects such as hiring, working conditions and terms of employment, and dismissals, as well as a Code of Conduct.

Impact		Increased Working Condition risks					
Impact Nature		Negative	Positive		Neutral		
IMPACT	Type	Direct	Indirect		Induced		
		Direct impacts from Project activities					
	Extent	Site	Local	Regional	National	International	
	Scale	Small		Medium		Large	
	SPATIAL EFFECTS	Low		Medium		High	

The spatial effects are medium considering the evident change in health status of the workers ('scale')				
<b>Duration</b>	Temporary	<b>Short-term</b>	<b>Long-term</b>	Permanent
<b>Frequency</b>	Constant during operation			
<b>TEMPORAL EFFECTS</b>	Negligible	Low	<b>Medium</b>	High
Long-term impacts during operation				
<b>IMPACT MAGNITUDE</b>	Negligible	Small	<b>Medium</b>	Large
Medium impact scale due to evident consequences on workers' health				
<b>RECEPTOR VULNERABILITY</b>	Low	<b>Medium</b>	High	
Public grievance mechanism available for Project workers to utilize for reporting any concerns of their working conditions however, the grievance mechanism may be unfamiliar with the migrant workers.				
<b>IMPACT SIGNIFICANCE</b>	Negligible	<b>Minor</b>	<b>Moderate</b>	Major

### SPECIFIC MITIGATION MEASURES

- Revise the Employee Handbook to explicitly state prohibition of child labor and forced labor. As part of its HR policy and procedures, USP will include provisions for non-discrimination and equal opportunity, anti-harassment, protection of human rights for direct and indirect employees, workers' organization, and retrenchment. USP will also formalize its worker management relationship, demonstrating its commitment to workers' right to organize and collective bargaining.
- Develop and implement a Human Resources Management Plan for Migrant Workers, ensuring adherence to labor laws, immigration regulations and employment rights, preventing exploitation and promoting hiring practices in line with IFC PS2.
- Develop and implement an internal Grievance Redress Mechanism (GRM) for workers, to enable anonymous complaint submission, and disseminate it among all direct, contracted, and third-party workers. The GRM will include provision for reporting gender-based violence and harassment (GBVH). The HR department will conduct GRM-related training and awareness campaigns for workers. The company will extend the GM to third-party workers. The GM should maintain an up-to-date worker grievance log where grievances from workers could be retrieved and analyzed for management improvements.
- To address language barriers between Chinese and Omani workers, key personnel including human resource staff, compliance officers, supervisors, safety officers, equipment operators and team leaders at all levels will be required to have appropriate bilingual capacity, verified through pre-job qualification checks and interviews. All company policies, operational procedures, safety warnings, equipment labels and emergency protocols will be clearly displayed in Chinese, English and Arabic using pictograms and standardized text. Mandatory pre-job and regular bilingual training covering company policies, operational procedures, safety requirements, standard commands and emergency language will be provided with multilingual training materials. A unified set of clear, simple verbal and written operational commands are recommended to be established to prevent miscommunication and reduce operational risks.

### 7.4.7 IMPACT ON WORKER HEALTH AND SAFETY FROM PROJECT OPERATION ACTIVITIES AND ACCOMMODATION PROVISION

Potential OHS risk and impacts include workers’ exposure to noise, heat, dust, potential chemical leaks, as well as risks related to vehicular traffic, and contingencies (gas threats, fire and biological hazards).

Per SPFZ policy of workers must live outside the Freezone, USP’s direct workers are accommodated in rented apartment buildings in residential areas of Sohar. Inadequate accommodation can harm workers’ health through multiple interconnected risks, including the spread of communicable diseases (such as respiratory or vector-borne illnesses) in overcrowded, poorly ventilated, or unsanitary spaces; mental health strain from lack of privacy or noise; safety risks due to substandard infrastructure and inadequate emergency preparedness and response system.

USP has in place HSE policies and procedures. On-site accidents statistics for the construction show minor injury accidents only, resulting in Lost Time Injury Frequency Rate (LTIFR) below industry benchmark, although this might be related to under-reporting and sub-optimal management of sub-contractors.

For medical services and emergencies, USP has established a medical clinic, including first aid services, on site and has an ambulance readily available in case of transfer to public health facilities. On site medical personnel include a trained doctor and nurse. In the absence of such medical services onsite, the Project may face risks of delayed emergency response as well as addition pressure placed by the Project on the emergency response services locally. In addition, though Sohar Freezone does not have a public hospital or clinic within its boundary, the Project workers may access nearby healthcare facilities such as Sohar Hospital (public) and Badr Al Samaa Hospital (private, Al Tareef Street).

Impact		Increased OHS risks					
Impact Nature		Negative	Positive		Neutral		
IMPACT CHARACTERISTICS	Type	Direct	Indirect		Induced		
	Direct impacts from Project activities						
	Extent	Site	Local	Regional	National	International	
	Scale	Small		Medium		Large	
	SPATIAL EFFECTS	Low		Medium		High	
	The spatial effects are medium considering the evident change in health status of the workers ('scale')						
	Duration	Temporary	Short-term	Long-term		Permanent	
	Frequency	Constant during operation					
	TEMPORAL EFFECTS	Negligible	Low	Medium		High	
	Long-term impacts during operation						
IMPACT MAGNITUDE		Negligible	Small	Medium		Large	
Medium impact scale due to evident consequences on workers’ health and safety							
RECEPTOR VULNERABILITY		Low		Medium		High	
Healthcare services, including first aid, are available onsite but reportedly slow response from public health services.							

IMPACT SIGNIFICANCE	Negligible	Minor	Moderate	Major
---------------------	------------	-------	----------	-------

### SPECIFIC MITIGATION MEASURES

- Develop and implement an OHS Management Plan for operations aligned with IFC PS2, WBG EHS Guidelines, national regulatory requirements and Good International Industrial Practices (GIIP). As part of this plan, USP will develop and implement a system to collect statistics on OHS in compliance with national regulations and PS2 and will use international benchmark for the chemical manufacturing sector to set Key Performance Indicators (KPIs) for LTIFR and other parameters including near misses.
- Update and implement the OHS Management Plan with requirements of the worker accommodation requirements, including IFC/EBRD Work Accommodation: processes and standards. This OHS Management Plan shall include monitoring requirements for accommodation conditions and enable periodic spot checks and worker interviews to verify Project workers' living conditions and capture their concerns or suggestions.
- Reinforce the OHS training for all workers and supervisory staff.
- Undertake internal OHS inspections regularly by the Company HSE team.
- Undertake a third-party process safety/EHS/OHS audit on an annual basis, the associated corrective action plans of which shall be implemented by USP.
- Implement the recommendation actions proposed in HAZOP exercise.
- Conduct regular drills covering all onsite workers for different identified emergency issues.
- Maintain the availability of the ambulance and first-aid capability of the medical clinic onsite.
- Collaborate with DFZ and engage with Sohar Hospital or other available healthcare services to understand their response mechanism in case of emergency which should be followed by USP.

### 7.4.8 IMPACT ON LOCAL ECONOMY AND EMPLOYMENT FROM PROJECT RECRUITMENT AND SOURCING

In Liwa, a shift has been observed from traditional livelihoods such as fishing and livestock rearing to industrial wage employment. Many households now depend on income from industrial jobs, including roles in manufacturing, logistics, and support services linked to the Sohar Free Zone (SPFZ). The youthful demographic profile across Liwa Wilayat, Sohar Wilayat, Al Batinah North, and Oman underscores local residents' demand for and expectations around employment—a point emphasized by local communities during consultations, alongside concerns about the underrepresentation of locals in the industrial workforce.

Moreover, the gender segregated occupation pattern identified in Sohar Free Zone as well as the female labor force participation rate observed in Oman called out for gender inclusiveness considerations for local hiring which were also emphasized by local communities during consultation stating the expectation of recruiting women.

USP is committed to enhancing the hiring of a local workforce during operations and expects to gradually increase the local hires in the future after operation starts. Local hiring of USP in a fair manner can contribute to the local employment.

<b>Impact</b>	<b>Contribution to local employment and economy</b>		
<b>Impact Nature</b>	Negative	<b>Positive</b>	Neutral

### SPECIFIC ENHANCEMENT MEASURES

- Develop and implement a Local Content Management Plan, defining the Company strategy for prioritizing local hiring of Omani nationals, particularly from Liwa and surrounding areas and the plan for developing competences and skills.
- Disclose employment opportunities in a transparent and accessible manner, particularly to the Liwa and Sohar community members.

## 8 BIODIVERSITY ASSESSMENT

### 8.1 INTRODUCTION

In accordance with IFC PS1 and PS6, the assessment process aims to predict and assess the Project's potential adverse impacts and risks to biodiversity values, in quantitative terms where possible. The objective of the biodiversity impact assessment is to identify and quantify the potential Project impacts as identified through scoping; design measures to avoid, minimize, or restore/compensate potential adverse impacts; and identify likely residual impacts.

### 8.2 SCOPE OF ASSESSMENT

The biodiversity impact assessment is based on the project activities. It is noted that the Project's construction is out the scope of this impact assessment as it is almost completed by the time of this ESIA addendum. The water needed for the project is supplied by centralized municipal services. The ecosystem services are limited at the project site; The unplanned events and transportation are described and addressed in details in Emergency Preparedness and Response Plan and Traffic Management Plan respectively. Even though some materials will be sourced internationally, the road transportation will take use of the existing highways, causing very limited impact on biodiversity. Thus, these perspectives are not assessed in this section. The following activities can have potentially significant impacts on terrestrial biodiversity during the Project life cycle and

- Land occupation and habitat loss;
- Influx of workforce: will live at existing urban residential areas, 1700~1800,
- Industrial activities during operation phase
  - Air emission
  - Noise emission
  - Solid waste
  - Light pollution
- Operation of transmission line

#### 8.2.1 ASSUMPTION

- No comprehensive on-site biodiversity baseline surveys are conducted for this study, other than the 5-day observation.

#### 8.2.2 AREA OF INFLUENCE

The Biodiversity AoI is defined in Section 4.2.2 as the 3km radius of the Project site.

### 8.3 IMPACT ASSESSMENT CRITERIA

The impact assessment is conducted based on the environmental baseline conditions and Critical Habitat Assessment presented in Chapter 4.2. The specific considerations for the methods of biodiversity impact assessment are provided in this section.

The significance of the impacts has been assessed using the approach and methodology as described below. The criteria for magnitude of the impact to Terrestrial Biodiversity (Habitat &

Species) are defined in Table 8-1 and Table 8-2. The sensitivity criteria are defined in Table 8-3 and Table 8-4.

**TABLE 8-1 MAGNITUDE CRITERIA FOR IMPACTS TO BIODIVERSITY – HABITAT**

Magnitude	Definition
<b>Negligible</b>	No existing habitat is affected, or effect on the extent and the condition of the habitat is within the range of normal natural variation.
<b>Small</b>	Affects only a small area of habitat, such that there is no loss of viability/function of the habitat.
<b>Medium</b>	Affects part of the habitat but does not threaten the long-term viability/function of the habitat.
<b>Large</b>	Affects the entire habitat, or a significant proportion of it, and the long-term viability/function of the habitat is threatened.

**TABLE 8-2 MAGNITUDE CRITERIA FOR IMPACTS TO BIODIVERSITY – SPECIES**

Magnitude	Definition
<b>Negligible</b>	No species affected, or effect on the population of the species is within the range of normal natural variation.
<b>Small</b>	Effect does not cause a substantial change in the population of the species, or other species dependent on it.
<b>Medium</b>	Effect causes a substantial change in abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long-term viability / function of that population, or any population dependent on it.
<b>Large</b>	Affects entire population, or a significant part of it causing a substantial decline in abundance and / or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).

**TABLE 8-3 SENSITIVITY CRITERIA FOR BIODIVERSITY – HABITATS**

Sensitivity	Definition
<b>Low</b>	Habitats with no, or only a local designation / recognition, habitats of significance for species listed as Least Concern (LC) on IUCN Red List of Threatened Species, habitats which are common and widespread within the region, or with low conservation significance based on expert opinion.
<b>Medium</b>	Habitats within nationally designated or recognised areas, habitats of significant importance to globally Vulnerable (VU), Near Threatened (NT), or

Sensitivity	Definition
	Data Deficient (DD) species, habitats of significant importance for nationally restricted range species, habitats supporting nationally significant concentrations of migratory species and / or congregatory species, and low value habitats used by species of medium value.
High	Habitats within internationally designated or recognised areas, habitats of significant importance to globally Critically Endangered (CR) or Endangered (EN) species, habitats of significant importance to endemic and / or globally restricted-range species, habitats supporting globally significant concentrations of migratory species and / or congregatory species, highly threatened and / or unique ecosystems, areas associated with key evolutionary species, and low or medium value habitats used by high value species.

TABLE 8-4 SENSITIVITY CRITERIA FOR BIODIVERSITY - SPECIES

Sensitivity	Definition
Low	Species and sub-species of LC on the IUCN Red List, or not meeting criteria for medium or high value.
Medium	Species on IUCN Red List as VU, NT, or DD, species protected under national legislation, nationally restricted range species, nationally important numbers of migratory, or congregatory species, species not meeting criteria for high value, and species vital to the survival of a medium value species.
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (i.e. plants endemic to a site, or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) of less than 50,000 km <sup>2</sup> ), internationally important numbers of migratory, congregatory species, key evolutionary species, and species vital to the survival of a high value species.

## 8.4 SUMMARY OF BASELINE CONDITIONS

The Project is located in the Arabian-Persian Gulf Coastal Plain Desert ecoregion, Oman. Two Key Biodiversity Areas (KBA), Khawr Shinas and Khawr Liwa and Al Batinah coast are located in shoreline, around 10km away from the northeast to the Project site. The habitats within the Project footprint are mainly gravel desert plain with low conservation interest. Based on habitats and distribution range from IUCN red list, two Endangered bird species Steppe Eagle (*Aquila nipalensis*) Saker Falcon (*Falco cherrug*), and three Vulnerable species Greater Spotted Eagle (*Clanga clanga*), European Turtle-dove (*Streptopelia turtur*) and Sooty Falcon (*Falco concolor*) potentially occur within region where the Project's AoI (3km radius around the Project site) is located. But no threatened species were observed or interviewed to occur in the AoI during rapid visit in summer (Section 4.2).

Although above mentioned bird species are known to occur at a regional level, the AoI comprises gravel desert and industrial land that does not provide suitable breeding, foraging or roosting habitats for these species. Steppe Eagle and Saker Falcon are expected only as occasional passage or wide-ranging individuals, while species reported as breeding in the region (e.g. Greater Spotted Eagle, Sooty Falcon and European Turtle-dove) rely on wetlands, marine intertidal-salt marshes, coastal cliffs, riparian woodlands or vegetated agro-ecosystems, none of which are present within the Project AoI. In conclusion, the Project is not expected to result in direct or significant impacts on these bird species, and any potential interactions would be limited.

## 8.5 EMBEDDED CONTROL

The following measures have been recommended in the local EIAs for the Project and are therefore considered as embedded control in this ESIA Addendum:

- The workers will be accommodated in the existing housing without newly-built ones to reduce the land alternation.
- The transportation will rely on the existing roads.
- The pollutant treatment facilities are designed to mitigate the impacts on the physical environment, further mitigating the indirect impacts on the biological environment.
- The overhead transmission line is equipped with aerial marker ball to prevent collision.

## 8.6 IMPACT ASSESSMENT

### 8.6.1 LAND OCCUPATION AND HABITAT LOSS

#### SIGNIFICANCE OF IMPACT

The Project will occupy approximately 96.19 ha land within the Project's footprint across the whole 25 years' operation phase. The main habitat lost are gravel desert. Although it is categorized as natural habitat, it consists of low abundance of flora with low biodiversity value. Most of the fauna will avoid the Project site as this area is heavily industrialized. The Endangered species Saker Falcon (*Falco cherrug*) and Steppe Eagle (*Aquila nipalensis*) potentially occur in the Sohar, Oman area. However, these two species may rarely use the Project site given that the burrows of its prey within the Project footprint are scarce. The impact magnitude is estimated to be small.

Impact		Impact of Land Occupation and Habitat Loss				
Impact Nature		Negative		Positive	Neutral	
IMPACT CHARACTERISTICS	Type	Direct		Indirect		Induced
		Impacts will be both direct on flora, mammals and reptiles, and indirect on predator and bird species.				
	Extent	Site	Local	Regional	National	International
	Scale	Small		Medium		Large
	SPATIAL EFFECTS	Low		Medium		High
	The Project will occupy 96.19 ha of land.					
	Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Frequency	The land occupation occurs once after the site clearance.				
	TEMPORAL EFFECTS	Negligible	Low	Medium		High
	Impacts will last for at least for 25 years during operation on the 96.19 ha project site.					
IMPACT MAGNITUDE		Negligible	Small	Medium	Large	
		The land occupation will cause long-term habitat loss and displacement, but of a relatively small area and it is not considered to cause the loss of viability/function to any habitat overall.				
RECEPTOR / RESOURCE SENSITIVITY		Low		Medium	High	
		The sensitivity of the terrestrial environment (habitats and species) affected is considered low due to no observation regarding conservation significant species during site visit and low likelihood of threatened species' presences within the Project's direct footprint.				
IMPACT SIGNIFICANCE		Negligible	Minor	Moderate	Major	

#### ADDITIONAL MITIGATION MEASURES

- Re-vegetation on site to restore impacted land in the Project's AoI.
- Limiting the extent of cleared areas to the minimum through careful site planning.

## RESIDUAL IMPACT

With the implementation of the additional mitigation measures noted above, the impacts of habitat loss may be further reduced during operation phase, however conversion of habitat are almost permanent and cannot be further mitigated. Therefore, the significance of this residual impact is considered **Minor**.

### 8.6.2 INFLUX OF WORKFORCE

#### SIGNIFICANCE OF IMPACT

It is estimated that there will be 1,505 employees during the operation phase. Employees will live in the nearby urban residential area and commute to the Project site to work.

Operation of the Project and its associated infrastructure is expected to increase human pressures such as noise and vibration, light levels, vehicle, and pedestrian presence within and around the area. The presence of international workforce may also increase the risk of illegal hunting and consumption of threatened mammals Arabian Tahr (*Gazella arabica*) and Arabian Gazelle (*Arabitragus jayakari*) (CITES II). These may cause direct and indirect impacts to wildlife. These effects will be localized.

Impact		Impact from influx of workforce					
Impact Nature		Negative		Positive		Neutral	
IMPACT CHARACTERISTICS	Type	Direct		Indirect		Induced	
		Impacts from consumption of illegal wildlife-based products will be direct on terrestrial fauna. The disturbance during operation will be indirect.					
	Extent	Site	Local	Regional	National	International	
	Scale	Small		Medium		Large	
	SPATIAL EFFECTS	Low		Medium		High	
	The illegal consumed wildlife and wildlife-based products are local species. The disturbance will occur on local wildlife.						
	Duration	Temporary	Short-term	Medium-term	Long-term	Permanent	
	Frequency	Disturbance will be constant during operation phase; illegal hunting and consumption will be occasional.					
	TEMPORAL EFFECTS	Negligible	Low	Medium		High	
	The temporal impact of the disturbance and displacement of flora and fauna is considered as Medium, since it expected to remain during the operational phase.						
IMPACT MAGNITUDE		Negligible	Small	Medium	Large		
The impact is direct, long-term and may only affects small area of habitat or few species, with no loss of viability / function of habitats likely, therefore is considered small.							
RECEPTOR / RESOURCE VULNERABILITY		Low		Medium		High	
Sensitivity of the terrestrial environment (habitats and species) is considered Low due to no observation regarding conservation significant species during site visit and low likelihood of threatened species' presences. And the sensitivity of the accommodation, the urban area, is considered low.							
IMPACT SIGNIFICANCE		Negligible	Minor	Moderate	Major		

## SPECIFIC MITIGATION MEASURES

- Monitoring and enforcing bans on hunting and collection of wildlife resources by workers and contractors.
- Provide environmental induction and training programs for all workers and contractors to raise awareness of biodiversity values and environmentally responsible practices.

## RESIDUAL IMPACTS

With the implementation of the additional mitigation measures noted above, the impacts of habitat loss may be further reduced. Therefore, the significance of this residual impact is considered **Negligible**.

### 8.6.3 OPERATION ACTIVITIES

#### SIGNIFICANCE OF IMPACT

The Project Description in **Section 3** gives a comprehensive description of the Project at operation. During the operation phase of the Project, the key aspects that may impact biodiversity both directly and indirectly due to continuous industrial activities from both the USP and GOI, include the impacts from air emissions, vibrations and noise, lighting and increased human and vehicle movement around the project area.

Airborne pollutants, including particle matters, SO<sub>2</sub> and NO<sub>2</sub>, could lead to habitat degradation if not adequately controlled.

Artificial lighting—particularly during nighttime operations—may disturb wildlife behaviour, especially among nocturnal or sensitive species. For birds, they can become disorientated by artificial lights, flying off course and this may be particularly relevant for any migratory species and seabirds flying at night. However, the presence of the nocturnal faunas is unlikely in the biodiversity AoI.

Vehicle or machinery movements around the Project site, may result in direct loss due to mortality or injury of fauna if not adequately controlled. Even though some materials will be sourced internationally, the road transportation will take use of the existing highways, causing very limited impact on biodiversity.

The impact of air emission are assessed in the regulatory EIA (Geo-Resources Consulting, August 2024), the modelling results indicate that all parameters could meet the (Section 5). Therefore the magnitude of the air emission's impact towards the biodiversity is minor.

All domestic sewage of USP, GOI and OETC will be treated and recycled for greening. All the industrial wastewater is treated and reusing as process water and cooling water, and no liquid wastewater will be discharged outside plant. Therefore the magnitude of the wastewater's impact towards the biodiversity is negligible.

According to the regulatory EIA, the noise and vibration sourced from production machinery, HVAC system, and transformers will be abated through the wall and attenuated by the distance. Industrial criterion (70 dB(A)) will be met at plot boundaries at all times, while 45dB(A) will be met from 500m from the center of the Project. Therefore the magnitude of the noise and vibration emission's impact towards the biodiversity is minor.

All the solid waste generated from USP, GOI and OETC will be collected and disposal as Omani regulations. Most of the solid waste will be disposal by Be'ah (local industrial waste comprehensive disposal center in SPFZ). Therefore the magnitude of the solid waste's impact towards the biodiversity is minor.

The raptor species, Greater Spotted Eagle (*Clanga clanga*), Saker Falcon (*Falco cherrug*), Steppe Eagle (*Aquila nipalensis*), and Sooty Falcon (*Falco concolor*) that potentially occur in the Sohar, Oman area during non-breeding period. However, these species generally prefer the habitats with higher availability for prey and nesting, like wetlands, wadis, coastal cliffs, etc. While European Turtle-dove (*Streptopelia turtur*) is long-distance migrant typically selects ecotones where woodlands mixed with farmland, dense shrubs, or proximity to surface water. These species of conservative significance are unlikely to occur in the proximity of the Project except occasional passage or brief stopover.

While the gravel desert, most part of the land cover with the AoI, is categorized as low sensitivity. In summary, the sensitivity of the receptors or resources are low.

Impact		Impact of industrial activities during operation phase				
Impact Nature		Negative		Positive		Neutral
IMPACT CHARACTERISTICS	Type	Direct		Indirect		Induced
		Impacts will be both direct on flora and fauna through lighting, noise and vibration from machinery, and air emission as disturbance; and will be indirect impact on flora and fauna through habitat degradation.				
	Extent	Site	Local	Regional	National	International
	Scale	Small		Medium		Large
	SPATIAL EFFECTS	Low		Medium		High
	Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Frequency	The impact will be constant since operation begins.				
	TEMPORAL EFFECTS	Negligible	Low	Medium		High
		Impacts will last for at least for 25 years during operation.				
	IMPACT MAGNITUDE	Negligible	Small	Medium		Large
	Continuous industrial activities over the operation period is likely to cause a change in abundance and/or reduction in distribution of a population over one, or more generations, but will not threaten the long-term viability/function of that population, or any population dependent on it.					
RECEPTOR / RESOURCE SENSITIVITY	Low		Medium		High	
	The sensitivity of the terrestrial environment (habitats and species) affected is considered low due to no observation regarding conservation significant species during site visit and low likelihood of threatened species' presences within the Project's direct footprint.					
IMPACT SIGNIFICANCE	Negligible	Minor	Moderate		Major	

## SPECIFIC MITIGATION MEASURES

- Maintenance of green buffer zones around the facility to reduce edge effects on adjacent habitats.
- Limiting night-time lighting and using wildlife-friendly fixtures to reduce light pollution impacts on nocturnal species.
- Employee training on biodiversity values and operational best practices to reduce unintentional harm.

## RESIDUAL IMPACTS

With the planned additional mitigation, management, and monitoring measures, the impacts from industrial activities operations are expected to be remained minor levels.

### 8.6.4 OPERATION OF TRANSMISSION LINE

#### SIGNIFICANCE OF IMPACT

The project includes one 1.7 km long 400 KV transmission line. It is in parallel with several existing transmission lines and links from the Project site to the nearby substation. The 400 KV transmission line uses big towers with suspended insulators. These settings ensure large spacing between conductors and avoid possible electrocution of birds perching on it. Large raptor bird species that may occur within AoI will mainly have the risk of collision with these transmission lines. Given the IUCN red list conservation status and likelihood of occurrence within AoI, the Endangered species Saker Falcon (*Falco cherrug*), Steppe Eagle (*Aquila nipalensis*), have medium sensitivity, while Vulnerable species Greater Spotted Eagle (*Clanga clanga*) and Sooty Falcon (*Falco concolor*) have low sensitivity. Based on field observation and interviews, there are no bird carcasses found under the adjacent existing transmission lines. Since the Project transmission line is short, located in parallel with existing ones, and equipped with aerial marker balls the magnitude of impact is likely be limited.

Impact		Operation of transmission line				
<b>Impact Nature</b>		Negative		Positive		Neutral
<b>IMPACT CHARACTERISTICS</b>	<b>Type</b>	<b>Direct</b>		Indirect		Induced
	The mortality due to collision and electrocution will all be direct.					
	<b>Extent</b>	Site	Local	Regional	National	International
	<b>Scale</b>	Small		Medium		Large
	<b>SPATIAL EFFECTS</b>	<b>Low</b>		Medium		High
	Both collision and electrocution may happen at the Transmission Lines and affect local population.					
	<b>Duration</b>	Temporary	Short-term	Medium-term	<b>Long-term</b>	Permanent
	<b>Frequency</b>	The collision may happen rarely during the operation phase.				
	<b>TEMPORAL EFFECTS</b>	Negligible	Low	<b>Medium</b>		High
	The collision may happen rarely during operation phase.					
<b>IMPACT</b>	Negligible	<b>Small</b>	Medium		Large	

<b>Impact</b>	<b>Operation of transmission line</b>			
<b>MAGNITUDE</b>	The collision may occur during the 25 years-long operation phase although it may happen occasionally. However, considering the short length of the transmission line which is in parallel with existing transmission lines in the highly industrialized area, and is equipped with aerial marker ball, the magnitude is estimated to be small.			
<b>RECEPTOR VULNERABILITY</b>	Low	<b>Medium</b>	High	
	Given the IUCN conservation status and likelihood of occurrence within AoI, the Endangered species Saker Falcon ( <i>Falco cherrug</i> ), Steppe Eagle ( <i>Aquila nipalensis</i> ) have medium sensitivity, while Vulnerable species Greater Spotted Eagle ( <i>Clanga clanga</i> ) and Sooty Falcon ( <i>Falco concolor</i> ) have low sensitivity.			
<b>IMPACT SIGNIFICANCE</b>	Negligible	<b>Minor</b>	Moderate	Major

### SPECIFIC MITIGATION MEASURES

- Remove the corpse of livestock, if any, to avoid attraction of scavenger bird species.
- Monitor and record the bird electrocutions as to repair and maintain protection devices, including insulators.
- Maintain the use of aerial marker balls and monitor the bird carcasses to improve the line makers.

### RESIDUAL IMPACTS

With the implementation of the additional mitigation measures noted above, the impacts of presence and operation of transmission line will be reduced, however there is still collision risk for bird species cannot be further mitigated. Therefore, the significance of this residual impact is considered **Minor**.



ERM is a leading global provider of environmental, health, safety, risk, social consulting services and sustainability related services. We have more than **8,000** people in **35+** countries and territories working out of over **140** offices. ERM is committed to providing a service that is consistent, professional and of the outstanding quality to create value for our clients.

---

**Shanghai Office**

Suite 2005A,  
Litong Plaza,  
No. 1350 Sichuan North  
Road,  
Shanghai 200080 China

T: +86 21 5385 3050

**Beijing Office**

Unit A, 10th Floor, Tower B,  
Gateway Plaza,  
No. 18 Xia Guang Li,  
North Road East Third Ring,  
Chaoyang District,  
Beijing 100027 China

T: +86 10 8440 0686

**Guangzhou Office**

Room 120, 66th Floor,  
No. 28 Zhujiang East Road,  
Tianhe District,  
Guangzhou 510000, China

T: +86 20 6299 5392

[www.erm.com](http://www.erm.com)

