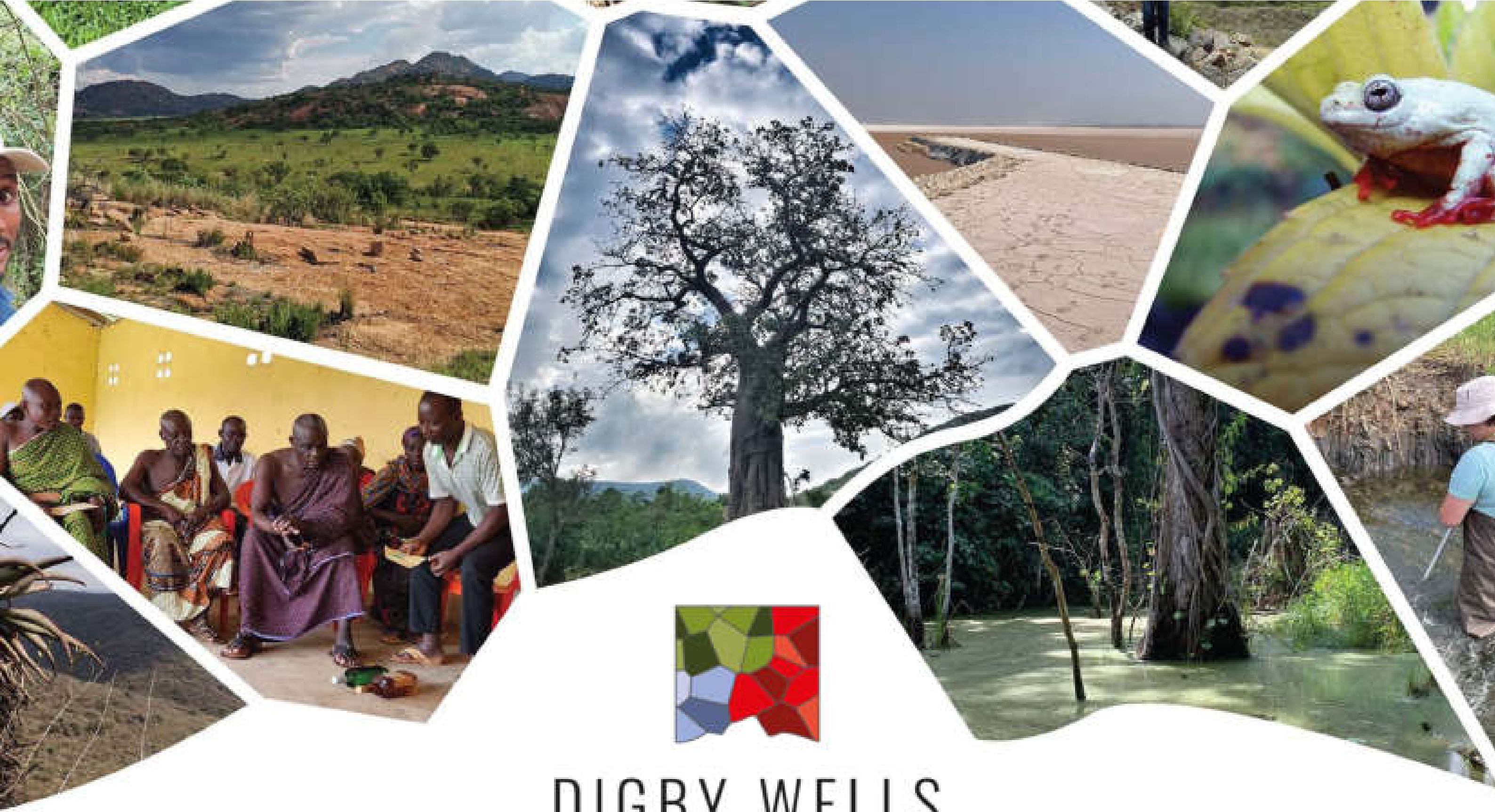

DIGBY WELLS
ENVIRONMENTAL

Reko Diq Mining Project, Pakistan

Environmental and Social Impact Assessment

Prepared for:

Reko Diq Mining Company (Private) Limited

Project Number:

BAR7212

February 2025

Hagler Bailly Pakistan

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Cautionary Statement on Forward-Looking Information

The Reko Diq Project information in this document ("Project Information") has been provided by Reko Diq Mining Company (Private) Limited ("RDMC") and its affiliates (the "Group") to Digby Wells Environmental and Hagler Bailly Pakistan in connection with their preparation of this Environmental and Social Impact Assessment ("ESIA"). The Project Information is current as of the date of this ESIA and is subject to change during the development of the Reko Diq Project.

In particular, the ESIA contains various plans, estimates, projections, forecasts and other forward-looking information (within the meaning of that phrase under applicable securities laws) ("Projections") including, without limitation, with respect to: anticipated timelines and plans for project development, operation and closure; the ability and timeline to secure all relevant rights, licenses, permits and authorizations; RDMC's strategy, plans, targets and goals in respect of environmental and social issues and sustainability matters; stakeholder engagement; the power strategy for the Reko Diq Project including renewable energy sources; forward-looking production guidance, including forecast production, ore, grade, throughput, mine life, leaching results and potential recoveries from Reko Diq; sufficiency of infrastructure, systems and consultants and personnel; operating or technical challenges in connection with mining or development activities, including geotechnical challenges, tailings dam and storage facilities, and the maintenance or provision of required infrastructure and information technology systems; exploration potential; and expectations regarding future price assumptions, financial performance and other outlook or guidance. All statements, other than statements of historical fact, are Projections and the Projections are not representations as to future matters. When used in this document, the words "may", "would", "could", "will", "intend", "plan", "anticipate", "target", "believe", "estimate", "expect", "potentially" and similar expressions may be used to identify Projections. These Projections are necessarily based on various assumptions, opinions and estimates that in some cases involve significant elements of subjective judgment, and are subject to known and unknown risks, many of which are outside the control of the Group and which may ultimately prove to be materially incorrect. In addition, forward-looking statements are inherently subject to significant business, economic, political, security and competitive uncertainties and contingencies, which may include the risk factors identified in Barrick Gold Corporation's most recently filed Annual Information Form / Form 40-F on file with the Canadian provincial securities regulators on SEDAR+ at www.sedarplus.ca and the U.S. Securities and Exchange Commission on EDGAR at www.sec.gov. Should one or more of these risks or uncertainties materialize, or should the assumptions underlying such Projections prove incorrect, it may have a significant, and potentially negative, impact on the Projections and could cause actual results to differ materially.

The Group does not intend and does not assume any obligation to update the Projections or the ESIA whether as a result of new information, plans, events, or otherwise, except as may be required by law.

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ABA	Acid Base Accounting
ARD/ML	Acid Rock Drainage/ Metal Leaching
AIS	Alien Invasive Species
ANFO	Ammonium Nitrate Fuel Oil
AoI	Area of Influence
BGWQ	Background Groundwater Quality
BID	Background Information Document
BDA	Balochistan Development Authority
BEPA	Balochistan Environmental Protection Agency
BEQS	Balochistan Environmental Quality Standards
BMR	Balochistan Mineral Rules
BMRL	Balochistan Minerals Private Limited
BRA	Balochistan Revenue Authority
BRSP	Balochistan Rural Support Program
BHU	Basic Health Unit
BESS	Battery Energy Storage System
BRI	Belt and Road Initiative
BHP	BHP Billiton (Australian Mining Company)
BIT	Bilateral Investment Treaty
BAP/BMP	Biodiversity Action Plan/ Biodiversity Management Plan
BOT	Build, Operate and Transfer
BAU	Business as Usual
CAPEX	Capital Expenditures
CABI	Centre for Agriculture and Biosciences International
CHEJVA	Chagai Hills Exploration Joint Venture Agreement
CFP	Chance Find Procedure
COPHC	China Overseas Port Holding Company
CPEC	China-Pakistan Economic Corridor
CCRA	Climate Change Risk Assessment
CCRVA	Climate Change Risk Vulnerability Assessment
CCTV	Closed Circuit Television

CRA	Closure Risk Assessment
COS	Coarse Ore Stockpile
CPF	Coarse Particle Flotation
CDC	Community Development Committees
CDI	Community Development Initiatives
CDP	Community Development Programme
MARPOL	Convention for Prevention of Marine Pollution
CITES	Convention on the International Trade of Endangered Species
CSR	Corporate Social Responsibility
CMIP	Coupled Model Intercomparison Project (Climate Projections)
CIA	Cumulative Impact Assessment
DWT	Dead Weight Tonnage
DHQ	District Headquarter Hospitals
EV	Electric Vehicles
EC	Electrical Conductivity
EPC	Engineering Procurement and Construction
EM	Enhanced Management
E&S	Environmental and Social
ESAP	Environmental and Social Action Plan
ESG	Environmental and Social Governance
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
ESMMP	Environmental and Social Monitoring and Management Plan
EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EP	Equator Principle
EPFIs	Equator Principle Financial Institutions
EPFIs	Equator Principles Financial Institutions
EEZ	Exclusive Economic Zone
EXP	Expansion Study
EL	Exploration License

EL-249	Exploration License
FLFD	Final Land Form Design
FGDs	Focus Group Discussions
FAO	Food and Agricultural Organisation
FPIC	Free, Prior, and Informed Consent
FEL	Front End Loaders
GIS	Geographic Information System
GBIF	Global Biodiversity Information Facility
GISTM	Global Industry Standard on Tailings Management
GIIP	Good International Industry Practice
GoB	Government of Balochistan
GoP	Government of Pakistan
GHG	Greenhouse Gas
GRM	Grievance Redress Mechanism
GPA	Gwadar Port Authority
HBP	Hagler Bailly Pakistan
HFO	Heavy Fuel Oil
HTV	Heavy Transport Vehicle
HPGR	High Pressure Grinding Rolls
HDPE	High-Density Polyethylene
HPAG	Highly Potentially Acid Generating
HPALS	High-Pressure Acid Leaching Solution
HH	Household
HR	Human Rights
HRA	Human Rights Assessment
IBAT	Important Bird Area
IPs	Indigenous Peoples
IHHN	Indus Hospital & Health Network
ICP	Informed Consultation and Participation
IEE	Initial Environmental Examination
IMD FS	Initial Mine Development Feasibility Study
IBAT	Integrated Biodiversity Assessment Tool
IPCC	Intergovernmental Panel on Climate Change

IATG	International Ammunition Technical Guidelines
IAEA	International Atomic Energy Agency
ICSID	International Centre for the Settlement of Investment Disputes
ICC	International Chamber of Commerce
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICMM	International Council of Mining and Metals
IFC	International Finance Corporation
IFC PS	International Finance Corporation Performance Standard
ILO	International Labour Organisation
IUCN	International Union for Conservation of Nature
IWRMS	Irrigation Department & Integrated Water Resource Management System
JV	Joint Venture
KBA	Key Biodiversity Area
LHVs and LHWs	Lady Health Visitors/Workers
LoM	Life of Mine
LIDAR	Light Detection and Ranging
LTV	Light Transport Vehicle
LLDPE	Linear Low-Density Polyethylene
LNG	Liquefied Natural Gas
LEPP	Local Employment and Procurement Plan
LC	London Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972)
MBI	Marine Benthic Invertebrates
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
CP	Mine Closure and Rehabilitation Plan
MMDD	Mines & Mineral Development Department
ML	Mining Lease
MLA	Mining Lease Area
MAA	Multiple Account Analysis
NEQS	National Environmental Quality Standards

SMART	National Environmental Quality Standards (Self-Monitoring and Reporting by Industry), 2001
NHA	National Highway Authority
NTDC	National Transmission and Despatch Company
NNP	Net Neutralisation Potential
NO_2	Nitrogen Dioxide
NAG	Non-Acid Generating
NGO	Non-Governmental Organisation
NPO	Non-Profit Organisation
NOC	No-Objection Certificate
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Administration
OPEX	Operating Expenses
OHL	Overhead Line
PEPA	Pakistan Environmental Protection Act
PIBT	Pakistan International Bulk Terminal
PMPL	Pakistan Minerals Private Limited
PKR	Pakistani Rupee
PM_{10}	particles with an aerodynamic diameter smaller than 10 µm
$PM_{2.5}$	particles with an aerodynamic diameter smaller than 2.5 µm
PCU	Passenger Car Units
PGA	Peak Ground Acceleration
PPE	Personal Protective Equipment
PV	Photovoltaic
PCB	Polychlorinated Biphenyls
PQA	Port Qasim Authority
PAG	Potentially Acid Generating
PAN	Potentially Acid Neutralising
PEN	Progressive Education Network
PHE	Public Health Engineering
RoR	Rate of Rise
REDD+	Reducing emissions from deforestation and forest degradation
RCD	Regional Corporation for Development

RDMS	Reko Diq Mine Site
RDMC	Reko Diq Mining Company (Private) Limited
RAP	Resettlement Action Plan
RO	Reverse Osmosis
RoW	Right of Way
RA	Risk Assessment
RBC	Rotational Biological Contactor
ROM	Run of Mine
RHC	Rural Health Centres
SDS	Safety Data Sheets
SF	Safety Fundamental (IAEA Safety Fundamental principles)
SSFA	Security Services Framework Agreement
SCR	Selective Catalytic Reduction
STPs	Shovel Test Pits
SEPA	Sindh Environmental Protection Agency
SEQS	Sindh Environmental Quality Standards
SMEC	Snowy Mountains Engineering Corporation
SSP	Socio-economic Pathway
SSV	Soil Screening Values
SODAR	Sonic Detection and Ranging
SASM	South Asian Summer Monsoon
SEP	Stakeholder Engagement Plan
SOP	Standard Operation Procedure
SOEs	State-Owned Enterprises
SRK	Steffen, Robertson and Kirsten Group
SO2	Sulphur Dioxide
SL	Surface Lease
SL-211	Surface Lease Order 211
SRA	Surface Rights Area
TSF	Tailings Storage Facility
TCFD	Taskforce on Climate-related Financial Disclosures
TEVTA	Technical Education and Vocational Training Authority
THQ	Tehsil Headquarter Hospital

TCCA	Tethyan Copper Company Australia
TCC	Tethyan Copper Company Pakistan (Private) Limited
TOS	Top of Sulphide
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TNT	trinitrotoluene
UNGPs	UN Guiding Principles on Business and Human Rights
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNCRC	United Nations Convention on the Rights of the Child
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEP-WCMC	United Nations Environmental Programme: World Conservation Monitoring Centre's
UNFCCC	United Nations Framework Convention on Climate Change
USGS	United States Geological Survey
FHWA	United States' Federal Highway Authority
VECs	Valued Ecosystem Components
VPSHR	Voluntary Principles for Security and Human Rights
WMP	Waste Management Plan
WRD	Waste Rock Dump
WWTP	Wastewater Treatment Plant
WASA	Water and Sanitation Agency
WTP	Water Treatment Plant
WPUP	Western Porphyries Ultimate Pit
WBG	World Bank Group
WHO	World Health Organisation

LIST OF UNITS

%	Percent
°C	degrees Celsius
Bt	Billion tonnes
dBA	A-weighted decibels
g/L	Grams per litre
g/t	Grams per tonne
GL/a	Gigalitres/annum
GL/year (GL/a)	Gigalitres per year (Gigalitres per annum)
GW	Gigawatt
ha	Hectares
K	Permeability (m/day)
kg	Kilograms
KL	Kilolitre
km	Kilometre
km^2	Square Kilometres
kV	kilo volt
L	Litre
l/d	Litres per day
L/s	Litres per second
LA_{eq}	equivalent continuous sound pressure level
m	Metre
m/d	metres per day
m/s	metres per second
m/year	metres per year
m^3	Cubic metre
m^3/h	Cubic metre per hour
mamsl	metres above mean sea level
mbgl	metres below ground level
mg/L	milligrams per day
mm	Millimetre
mm/a	Millimetres per annum

Mm^3	Million cubic metres
Moz	Million Ounces
Mt	Million tonnes
Mtpa	Million tonnes per annum
MW	Megawatts
psi	pounds per square inch
µS/m	micro Siemens per metre
t	tonnes
T	Transmissivity (m^2/day)
t/d	Tonnes per day
t/d	tonnes/day
t/h	tonnes/hour
tCO_2e	tonnes of CO_2 equivalent
tpa	tonnes per annum

GLOSSARY

Aspect	Definition
Accommodation Facility	An onsite facility for accommodation of mine employees and contractors during construction and operation of the Project.
Community Development Programme	Refers to the Community Development Programme (CDP) under which RDMC is and will be taking social development initiatives
Community Development Committee	Community Development Committees (CDCs) are advisory groups whereby members are elected and provides a forum for two-way dialogue and to foster broad community support.
Concentrate	Concentrate refers to both copper-gold concentrate. A concentrate slurry in the form of cake which is produced after reducing the water content.
Gaud-i-Zirreh	Season desert lake in the south of the Sistan Depression north of the Fan Sediment NOC. (Quaternary landscape evolution of the Helmand Basin – Evenstar, 2018)
Hamun	Lakes
Hamun-i-Mashkhel	Season desert lake in the topographical low of the Mashkhel basin. The lake is fed by the surface drainage and overflow from the Tahlab river.
Karez/es	An underground irrigation tunnel bored horizontally into rock slopes in Baluchistan (allows water to be transported over long distances hot dry climates without loss of much of the water to evaporation)
Marine Terminal	Refers to the marine facility to handle the concentrate at PIBT at Port Qasim.
Mine	Reko Diq Mine
Mine Site	Reko Diq Mine Site or RDMS
Northern Groundwater System	Refers to the northern aquifer system which includes Fan Sediments and Sor Baroot.
Pipeline Corridor	Refers to the pipeline to be laid from Northern Groundwater System to the mine site.

Aspect	Definition
Pit	Western Porphyries Pit or the open pit
Power Plant Site	Site for the onsite HFO-based power plant
Processing Plant Site	Site where the main mine operations such as grinding, crushing, ore separation and thickening processes will happen.
Project	Reko Diq Project
Rail Transport Route	The rail route that the Project will use for transporting concentrate and fuel during operations from mine site to the PIBT at Port Qasim.
Road Transport Route	The road network to be used by the Project for the transportation of materials between Karachi and mine site. It will be M-10, N-25 (RCD Highway), and N-40 highway.
Sistan Depression	Structurally closed basin. Formed during the Mid Tertiary as a consequence of the collision of several Gondwanaland fragments. Experienced lacustrine conditions since, at the least, the late Miocene [however, erosion remnant of the Kuh-I Khwaja mesa implies at least one cycle of lacustrine sedimentation, erosion, and then re-sedimentation].
Solar Plant Site	Site for the onsite solar-based power station
Springs	Natural discharge point of subterranean water at the surface of the ground or directly into the beds of colluvium material.
Tanjeel Pit	Tanjeel Pit

Common Names

Name	Other spellings commonly used
Gaud-i-Zirreh	Gowd-i-Zerah
Lulakdan Wetland	Lolokdan Wetland
Hamun-i-Mashkel	Hamun-e-Mashkel
Patangaz	Patangas
Baghichah	Bagichah, Bagicha
Karez	Kareez
Koh-e-Sultan	Koh Sultan, Koh-i-Sultan
Darband Chah	Durban Chah, Durband Chah
Kachow	Kachao, Kachau
Nok Kundi	Nokkundi
Nushki	Noshki
Brahuk	Brahok
Essa Tahir	Isa Tahir
Gwalishtap	Gowalishtap

1. Introduction

Barrick Gold Corporation (Barrick), through its subsidiary Reko Diq Mining Company (RDMC or the "Project Company"), is developing the Reko Diq Mining Project (the "Project"). The Project is located near Nok Kundi in the Chagai district of the Balochistan province of Pakistan.

The Project includes the development of an open pit copper-gold mine, including processing facilities, mine water supply and related infrastructure including pumping and piping, and other ancillary facilities in support of the mine's operations. The Project will also utilise existing associated facilities such as transport routes for supplies to and product from the mine, either by road or railway, and a port facility. These associated facilities require upgrades and relative minor development to meet the Project's needs. The Project will use the port facility for the export of copper-gold concentrate (the "concentrate") at Port Qasim in Malir district, Karachi division, in Sindh province of Pakistan.

The proposed Project is expected to have an initial life of 38 years as a truck-and-shovel open pit operation. The mine will be developed in two phases; Phase 1 capacity is expected to be 45 Million tonnes per annum (Mtpa) and Phase 2 is expected to increase the capacity to a total of 90 Mtpa.

This report documents the process, results and findings of the environmental and social studies associated with the development of the Project's Environmental and Social Impact Assessment (ESIA)IM report (the "Project ESIA").

RDMC appointed Digby Wells Environmental (Digby Wells) and Hagler Bailly Pakistan (HBP) as the environmental practitioners for the Project and to assist in securing the necessary environmental approvals from the Balochistan Environmental Protection Agency (BEPA) and Sindh Environmental Protection Agency (SEPA).

1.1. Project Proponent

RDMC is the Proponent, undertaking the ESIA study for the proposed Project and has an office at 121 - 127, Serena Hotel Zarghoon Road Quetta.

RDMC is committed to working in Pakistan and transforming the natural resources found at the proposed Reko Diq Mine Site (RDMS or the "Mine Site") in a manner that is beneficial to the local region, Balochistan and Pakistan, as well as the company. Barrick believes in managing its operations sustainably, considering and mitigating against environmental, cultural and social risks and impacts with the goal of providing long term value to all stakeholders, including local communities.

1.2. Background and Context

Copper-gold mineralisation was first detected in the Chagai area by the Geological Survey of Pakistan in 1968. The potential of Reko Diq was realised by BHP Mineral Exploration (BHP) in the 1990s. In 1993, BHP formed a joint venture with the Government of Balochistan (GoB). The Government of Pakistan (GoP) subsequently granted export processing zone status to the project. BHP would hold a 75% interest in the Joint Venture (JV) and the GoB would hold 25% through the Balochistan Development Authority (BDA).

The Western Porphyries and Tanjeel deposits, two of at least 13 principal mineralised deposits within the Reko Diq project area, were drilled for the first time in 1996. By the end of 1998, after drilling over 16,000 metres (m) in the Reko Diq camp, BHP estimated that the project had a total resource of 5.3 Million tonnes (Mt) of copper and 9.3 Million ounces (Moz) of gold.

In April 2000, BHP exited the JV and granted Mincor Resources NL (Mincor), a publicly listed Australian company, an option to enter into an alliance (the “Alliance Agreement”) to conduct further exploration of Reko Diq. The GoB formally consented to the transfer between BHP and Mincor and Mincor subsequently exercised its option in October 2000. The formal Alliance Agreement was executed between BHP and Tethyan Copper Company Pty Limited (TCCA), a special purpose company incorporated and wholly owned by Mincor, in October 2002. Subsequently, TCCA incorporated the Project Company as a wholly owned subsidiary (which, at the time, was named Tethyan Copper Company Pakistan (Private) Limited) (together with TCCA, “TCC”). The Alliance Agreement provided for TCC to earn a share of BHP’s 75% interest in the Project by developing the JV mining area.

In April 2006, after TCC had fulfilled all of its obligations under the Alliance Agreement, the GoB, BHP, and TCC signed a novation agreement allowing TCCA to take over BHP’s share of the Chagai Hills Exploration Joint Venture Agreement (CHEJVA) and for BHP to exit the Project. In May 2006, TCCA was subsequently acquired from Mincor by Atacama Copper Pty Ltd, a holding company owned by Antofagasta, a leading copper mining company listed in the United Kingdom (UK) and headquartered in Chile, leading to Antofagasta’s entry into the Project. In September 2006, Antofagasta sold 50% of Atacama Copper to Barrick, a leading Canadian gold mining company, resulting in effective ownership in the Project of 37.5% for each of Antofagasta and Barrick, and 25% for the GoB.

TCC completed a scoping study in 2006, an Initial Mine Development Pre-Feasibility Study in 2009, an Initial Mine Development Feasibility Study (IMD FS) in February 2010 and an Expansion Study (EXP) in July 2010. Several environmental baseline studies were also carried out from 2008 onward, leading to the completion of an Environmental and Social Impact Assessment in 2010 (the “2010 ESIA”).

In August 2010, TCC submitted its application for a mining lease. In November 2010, however, several Pakistani parties filed petitions before the Supreme Court of Pakistan challenging TCC’s eligibility to hold a mining lease. In February 2011, TCC’s application for a mining lease was denied, and in January 2013, the Supreme Court of Pakistan ruled the CHEJVA void on the grounds that GoB participation in CHEJVA fell outside its provincial powers and that some of the CHEJVA terms were contrary to public policy; since other contracts such as the 2006 novation agreement were premised on the CHEJVA, these were also voided.

In November 2011, TCC filed for arbitration against the GoP at the International Centre for the Settlement of Investment Disputes (ICSID) and against the GoB at the International Chamber of Commerce (ICC). The ICC proceedings focused mainly on contractual claims under the

CHEJVA, while the ICSID proceedings deliberated TCC's claims under the Australia-Pakistan Bilateral Investment Treaty (BIT). By July 2019, an ICSID tribunal ruled that TCC's claims were admissible and rendered a multi-billion dollar damages award against the GoP while an ICC tribunal rendered a partial award (collectively, the "Award").

Barrick, Antofagasta, the GoB, and the GoP subsequently engaged in discussions regarding alternatives for the resolution of the Award that maximally satisfied the objectives of each party and all related stakeholders. Ultimately, these negotiations resulted in the reconstitution of the Reko Diq Project (described in Section 1.2.1) and the prevailing ownership structure.

1.2.1. Reconstitution

In furtherance of Barrick's desire to develop Reko Diq, Barrick commenced discussions with Antofagasta, the GoP, and GoB (and ultimately the State-Owned Enterprises (SOEs)) in 2020 regarding the resolution of the ICSID and ICC arbitrations, including the Award, and the terms upon which the study and development of Reko Diq could proceed.

In March 2022, the parties agreed to a standstill of the arbitrations and enforcement of the Award. The parties also executed a suite of agreements (the "Framework Agreements") in which they agreed in principle to the terms for reconstituting the Project, as well as the various terms and conditions on which Antofagasta (then a 37.5% owner in Reko Diq) would exit the Project. The non-binding Framework Agreements were ultimately superseded by a series of definitive agreements providing for the reconstitution of the Project.

Pursuant to these agreements, among other things:

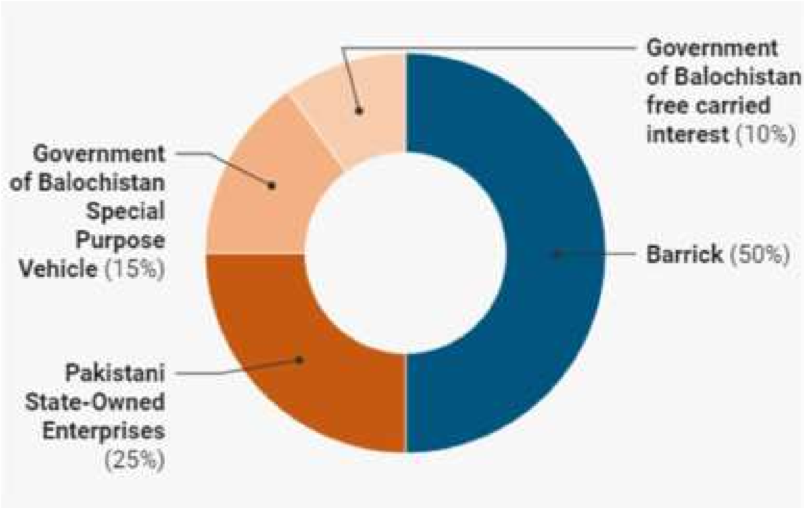
- The Project Company's rights to develop and operate Reko Diq were reconstituted, and the Project Company was issued two Mining Leases, an Exploration License, a Surface Rights Lease, and two Water Rights of Non-Objection;
- A Mineral Agreement was entered into with the GoP and GoB providing the right to develop the Project, investment protections, and fiscal stability, as well as commitments made to develop and operate the Project in accordance with applicable laws and best practices and to provide specific benefits to Balochistan and Pakistan over the life of the Project;
- A JV Agreement was entered into providing for the governance of the Project between the Sponsors and the appointment of Barrick as the Project Operator;
- The reconstitution resolved all outstanding legal proceedings, including the arbitrations and the Award, and a Comprehensive Resolution Agreement was executed; and
- Pakistan Minerals Private Limited (PMPL), Balochistan Minerals Private Limited (BMRL) and the GoB acquired their respective interests in the Project and a reorganisation was implemented to give effect to the current ownership structure. Following the share acquisitions and reorganisation, Barrick holds an effective 50% interest in the Project, the SOEs, through PMPL, collectively hold an effective 25% interest in the Project, the GoB, through BMRL, holds an effective 15% funding interest

in the Project, and the GoB holds a free carried 10% interest in the Project (Figure 1-1).

Prior to the closing of the Reconstitution, the transactions received comprehensive and unprecedented legal recognition in Pakistan. Among other things:

- The agreements were approved by both the Balochistan Provincial Cabinet and the Federal Cabinet of Pakistan;
- The Provincial Assembly of Balochistan passed a Bill amending Balochistan's mining legislation, which was required to allow for the Reconstitution and resolution of the Award;
- Numerous orders were passed by various Federal Ministries of Pakistan, Provincial Ministries of Balochistan, and Provincial Ministries of Sindh to provide for the fiscal regime applicable to the Project, and these orders were granted protected status in Pakistan pursuant to new federal investment protection legislation;
- The Provincial Assemblies of Balochistan and Sindh passed resolutions required to give effect to the new federal investment protection legislation;
- The Supreme Court of Pakistan issued a favourable ruling on the Reconstitution's terms and definitive documentation, as well as the new legislation, finding it lawful and constitutional; and
- The Attorney General of Pakistan issued a legal opinion on the legality of the agreements.

The Reconstitution closed in December 2022 (on the "Effective Date"). Since December 2022, RDMC, in partnership with the GoP and the GoB, has been undertaking an update of the feasibility study for the Project.



Source: Barrick Gold Corporation website accessed on 23 April 2024.

Figure 1-1: Ownership of the Reko Diq Mining Project

1.2.2. Existing Mining License and Resource Rights

RDMC, following the reconstitution of the Project, has been granted the following rights, licenses and concessions by GoP and GoB to explore and develop the Project:

- *Exploration License*: The Exploration License (EL-249) was granted to RDMC on 14 December 2022. EL-249 grants RDMC exclusive rights to conduct mineral exploration in the 312 square kilometre (km^2) area as set out in the License and entitlement rights as under the Balochistan Minerals Rules, 2002. EL-249 is valid for a term of 3 years from the commercial operations date as set out in the Mineral Agreement with renewals permitted for further 3 year periods.
- *Surface Lease Order*: The Surface Lease Order (SL-211) was issued to RDMC on 15 December 2022. SL-211 grants RDMC surface rights over state land measuring 643 km^2, including all improvements, buildings, structures, fixtures and fittings located on the SL-211 which is situated in Koh-e-Sultan, Tehsil Nok Kundi, District Chagai. SL-211 is valid for a term of 30 years with extensions as set out in the Mineral Agreement. Pursuant to SL-211, no other mineral right or title shall be granted to any third party in respect of the area under SL-211 and any applications for an exploration license in the SL area shall be considered on a good faith basis.
- *Mining Leases*: RDMC has been granted Mining Leases (ML-19 and ML-20, together the ML) on 14 December 2022. The ML's provide RDMC with rights under the Balochistan Mineral Rules, 2002 and the exclusive rights to extract, process, transport and sell the minerals listed in the ML within the demarcated area. The term of the ML's is 30 years from 15 December 2022 renewable in accordance with the terms of the ML's and the Mineral Agreement.
- *Water and Land Rights*: RDMC has been granted a No Objection Certificate (NOC) /Permit on 11 December 2022 ("Water NOC") by the District Commissioner Chagai for

water exploration activities within the Water NOC area as set out in the Water NOC. The Commissioner has warranted and represented that the all the property within the Water NOC area is owned by the Government or a public sector entity and, as such, on written notification that RDMC requires the land within the Water NOC area to conduct water exploration activities, the Government shall promptly sell such property to RDMC at rates agreed in the Water NOC. An application has already been made on 6 December 2023 with respect to water exploration activities required in the Mouaz Kachow Fan Sediments and Sor Baroot for which RDMC requires the land rights and is under consideration with the relevant authorities.

In addition to the Water NOC, RDMC has obtained a permit to conduct water exploration activities and abstraction of water from sources located within its Surface Lease and Mineral Lease areas pursuant to the Balochistan Ground Water Rights Administration Ordinance, 1978 and the Balochistan Ground Water Rights Administration Rules, 2014. RDMC has also been granted a NOC/Permit for water exploration activities in the Washuk District (the “Washuk Water NOC”) on the area as more particularly delineated in the Washuk Water NOC.

1.3. Project Location

The Project is in the Chagai District of Balochistan Province of Pakistan, between the Iran (approximately 40 km away) and Afghanistan (approximately 35 km away) borders (Figure 1-2). The nearest town is Nok Kundi, approximately 70 km southeast from the mine site. The nearest community to the site is Humai, which is approximately 20 km away. Other nearby settlements include Mashki Chah, Nok Chah, and Darband Chah.

The Project is located on the Balochistan Plateau, at an average altitude of 600 metres above mean sea level (mamsl) consisting of an arid landscape of mountains, gravel and sandy plains and dry stream beds. The Siahan and Makran mountain ranges transect the Plateau from northwest to southwest forming a divide and ecological transition zone between the west Balochistan desert, (where the Project is located), and the Makran coast to the south.

1.4. Project Overview

The Project will involve the mining of porphyry copper-gold deposits located within the rim of a major eroded stratovolcano. This is part of an ancient multi-phase volcanic system of the Zagros-Chagai Magmatic Arc in the Chagai District of Balochistan (SRK and HBP, 2010). The proposed RDMS will consist of two main pits, Western Porphyry and Tanjeel (Figure 1-3). The Western Porphyry Pit (the Pit) is a complex of four adjacent porphyry centres (H13, H14, H15 and H79) with the highest grades in the H14 and H15 complexes. The Tanjeel Pit represents a minor component of the ore body and will be brought into production after the first 10 years of mining. The proposed RDMS within the Surface Rights covers an area of approximately 58,000 hectares (ha). No private land acquisition is anticipated or resettlement required for the Project.

The proposed beneficiation process involves crushing and milling the mined ore, flotation concentration of the copper sulphide portion and does not require cyanide. The daily processing rate will be 123,000 tonnes ore per day (t/d) in Phase 1, increasing to 246,000 t/d in Phase 2. A concentrate slurry in the form of cake, after reducing the water content, will be produced, and transported via the existing rail route to a marine terminal located at Port Qasim in Karachi. The concentrate will be exported to various locations from Port Qasim for further beneficiation by others. An existing marine terminal at Port Qasim will be modified for the concentrate export.

During the feasibility studies and this ESIA process for the Project, several alternatives have been investigated. The main alternatives (Chapter 1, Project Alternatives) assessed for the Project were:

- Water supply sources (groundwater abstraction and coastal desalination plant with a pipeline to the mine site);
- Power supply sources (various renewable and non-renewable options and combinations, grid connection);
- Power plant technology options (reciprocating engines, boilers, turbines);
- Location of the Project facilities e.g., Tailings Storage Facility (TSF) locations;
- Mode of transport of the concentrate (rail, road, pipeline);
- Location of the marine terminal for shipment (Port Qasim, Gwadar Port);
- Influx mitigation (on-site vs off-site accommodation, RDMC accommodation strategies and Corporate Social Responsibility (CSR) strategy in Nok Kundi);
- Technology (TSF disposal / water recovery options);
- Mining methods (surface / underground);
- Ore separation techniques (physiochemical separation (flotation), heap leaching); and
- Dewatering techniques (filtration, thickening, drying).

The proposed Project will involve the following main components and infrastructure, as shown in Figure 1-3:

- Development of the RDMS, including:
- A processing plant;
- Low-grade ore stockpile and two Waste Rock Dumps (WRD);
- One TSF divided into cleaner and rougher cells;
- Water storage and management systems;
- A Heavy Fuel Oil (HFO) power plant; and
- Solar power plant.
- Ancillary infrastructure including:
    - Accommodation facility;

  - Haul roads;
  - Fire protection systems;
  - Security building and systems;
  - Fuel storage systems;
  - Explosive magazine storage facilities;
  - Communication infrastructure;
  - Medical facilities; and
  - Non-mining waste management facilities.
- Transportation routes and associated infrastructure including:
  - Rail Transport Route: Use of rail from mine to Port Qasim and construction;
  - Road Transport Route:
    - Road between the mine and Karachi Port for transportation of materials during construction and operational phase; and
    - Road between the mine and Port Qasim for transportation of materials during construction and operational phase.
- Water abstraction or supply and associated infrastructure including pipeline and power transmission line from the Northern Groundwater System to the mine; and
- Marine terminal at Port Qasim for product export.

Further detail is provided in Chapter 3 (Project Description). Additionally, a separate ESIA was submitted in Q1 2024 for the required early enabling works, including the construction of a new accommodation facility and construction water supply pipeline. This is also detailed in Chapter 3 (Project Description).

1.5. Project Associated Facilities

Associated facilities, defined in the International Finance Corporation Performance Standards (IFC PS1), are *"facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable."* Associated facilities may include railways, roads, captive power plants or transmission lines, pipelines, utilities, warehouses, and logistics terminals. The only infrastructure considered to be an associated facility is the portion of the existing rail line in Balochistan as this line will require upgrading as a specific Project need. Other infrastructure which will be utilised by the Project, but which aren't considered associated facilities, will include:

- Public roads use for the transport of equipment and other goods, and staff to and from the site. This infrastructure exists and is viable regardless of the Project;

- The Sindh portion of the existing rail network. This infrastructure exists and is viable regardless of the Project; and
- Port Facilities (with the exception of a concentrate storage shed and minor associated infrastructure which will be constructed on an area subleased from the existing port operator). This infrastructure exists and is viable regardless of the Project.

1.6. Project Area

The Project Area refers to the geographical area in which the activities related to the Project are proposed to take place, where the future developments will occur and in which the environmental and social impacts of the activities are expected to occur. The term Project Area does not imply specific spatial boundaries. For assessment of impacts on the bio-physical and socio-economic environment, different Study Areas have been selected based on the identified receptors (see Chapter 5, Environmental and Social Baselines). Unless otherwise specified or implied by context, the term 'Project Area' refers to the area in the vicinity of the Project.

1.6.1. Study Area

The spatial boundaries of the Study Areas for the ESIA were selected to cover all areas where any measurable change to any component of the environment is likely to occur, directly or indirectly, due to any activity directly associated with the Project. To ensure assessment of cumulative impacts, the Study Areas were selected to be large enough to allow the assessment of the Valued Ecosystem Components (VECs) that may be affected by the activities of this Project and other projects that are planned for construction in the area.

The permanent footprint of the Project includes the area that will be acquired for the mining operations; the core and supporting infrastructures. The Study Areas are considerably larger than the Project footprint. The Project facilities extend over two provinces and have different types of impacts spread over relatively large areas. Therefore, a single study area for all types of impacts is not realistic to define. The Study Areas for the physical environment, aquatic and terrestrial ecology and socio-economic environment are outlined in Chapter 5, Environmental and Social Baselines. These study areas were selected to cover the direct and indirect area of influence of the Project.

1.6.2. Area of Influence

The Area of Influence (AoI), defined in IFC PS1, encompasses:

(i) the primary project site(s) and related facilities that the client (including its contractors) develops or controls;
(ii) associated facilities that are not funded as part of the project and whose viability and existence depend exclusively on the project;
(iii) areas potentially impacted by cumulative impacts from further planned development of the project; and

(iv) areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.

1.6.2.1. Direct Area of Influence

The Project's Direct AoI refers to the immediate impact zone directly impacted by mining operations which includes the physical footprint of the mine site, processing facilities and associated infrastructure that covers an area of approximately 58,000 ha. Within this area, the Project activities like blasting, drilling, excavation, ore processing, power generation, waste and tailings disposal and water management will occur and are directly related to the mining operation. This is the zone where the Project activities will have a direct effect on the environment. In addition to the mine site, it includes the Right-of-Way (RoW) of approximately 80 km long water supply pipeline from the Northern Groundwater System (Fan Sediments NOC) to the mine site, Road Transport Route and Rail Transport Route for the transportation of equipment, materials and other goods and staff, and the area handling the concentrate at Port Qasim.

1.6.2.2. Indirect Area of Influence

The Project's Indirect AoI extends beyond the direct impact zone. It encompasses the broader socio-economic and demographic changes that may result and from factors like population influx, increased economic activity, and changes in land use patterns due to the Project. Indirect impacts are often more elusive and harder to capture in assessments but can be significant for long-term sustainability.

1.7. Project Categorisation

The Project is categorised according to local legislation and international standards.

- At the time of writing, the BEPA Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2020 were in draft phase with notification of promulgation awaited. Therefore, following the repealing requirements prescribed in Section 42, sub-section 5 of the Balochistan Act, 2012, the Project's categorisation for environmental assessment has been compared with Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000. The Project encompasses mining, mineral processing along with transportation of ore concentrates from Balochistan. These activities fall under the category of projects requiring an EIA as stipulated by Regulation 4 and Schedule II in the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 specifically under the classification of mining and processing of coal, gold, copper, sulphur and precious stones. Therefore, for the proposed Project, the environmental study required is an EIA.
- The concentrate will be transported to the Pakistan International Bulk Terminal (PIBT) at Port Qasim via rail. The Project will utilise the existing railway route from Nok Kundi to Port Qasim. The construction of this proposed Project component within the Sindh

province can be classified in Schedule II of Regulation 4 (projects requiring an EIA) specifically under the classification of railway works in the Sindh Environmental Protection Agency (Review of IEE and EIA) Regulations, 2014.

- Equator Principle 1: Review and Categorisation, defines three project categories, which are based on the level of potential impact:
  - *Category A*: Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible, or unprecedented.
  - *Category B*: Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures.
  - *Category C*: Projects with minimal or no adverse environmental and social risks and/or impacts.
- Asian Development Bank (ADB): defines four project categories, which are based on the level of potential impact:
  - *Category A*: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
  - *Category B*: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
  - *Category C*: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
  - Category FI: A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary.

Accordingly, the nature and spatial and temporal scale of the Reko Diq Project result in a Category A classification against both the EP and ADB categorisations. This classification agrees with the categorisation given in the IFC's Environmental and Social Review Procedures (ESRP).

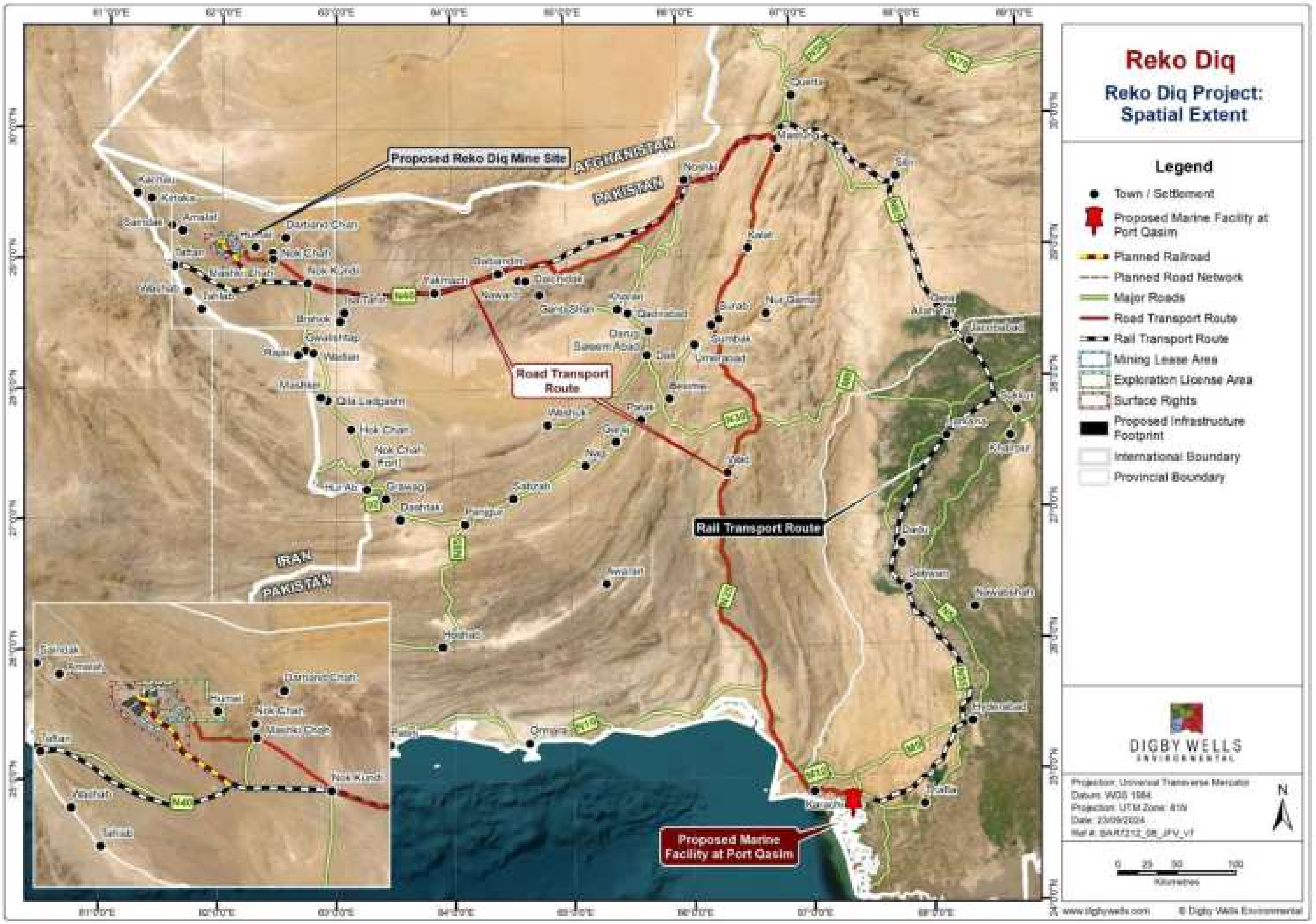


Figure 1-2: Project Location and Reko Diq Spatial Extent

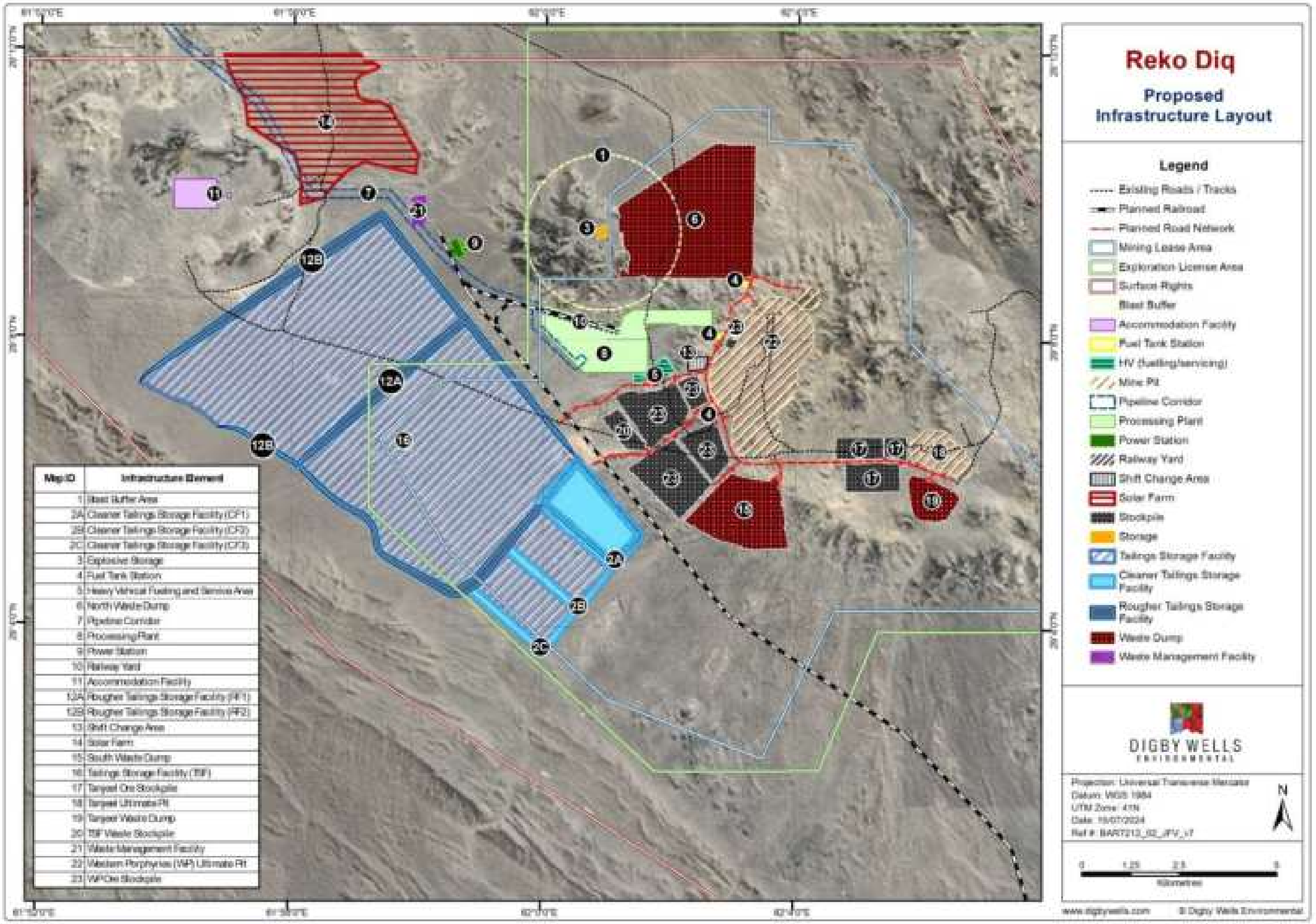


Figure 1-3: Proposed Infrastructure Layout

1.8. Project Motivation

As a major mining development, the project has the potential to deliver long term benefits to Balochistan and Pakistan. Some of the potential benefits of the project are:

- **Employment opportunities:** Barrick's Sustainability Strategy and Social Performance Policy include a local-first hiring approach. In the wider Barrick group 97% of its workforce are nationals of the country they work in, and 77% of site senior leadership positions are held by in-country nationals. During the construction phase it is estimated that the Reko Diq Project will create 10,000 jobs, while 6,000 permanent jobs are expected to be created during the operational phase. Barrick has already started to provide training opportunities to increase the knowledge and skills of the local workforce to enable them to better access direct and indirect job opportunities at the project and enhancing the regional and national human capital capacity.
- **Direct and indirect development of business opportunities:** Barrick is committed to sourcing local goods and services and has a long track record of working with local suppliers over time to train and upskill them to ensure they can meet the company's quality and ethical standards. Indirect economic development is also anticipated as household income and spending increases. In 2023 Barrick's total spend with suppliers in host countries was $6.9 billion.
- **Payments to government through taxes and royalties:** Barrick has a publicly available tax policy and the company's approach to tax management and planning is to pay the right amount of tax at the right time in the right place and to transparently disclose the payments it makes. For example, in 2023 the company's total tax and royalty contributions to states were $2.55 billion and a further $218 million was paid in dividends.
- **Infrastructure Improvements:** The Project will also result in improved and additional infrastructure including health, education and potable water facilities for the local communities which will further improve the living standards of the region. A project of this scale will also measurably reduce the country's trade deficit through increased exports and reduced import costs through currency appreciation (SRK and HBP, 2010).
- **Community Training and upliftment:** In line with Barrick's commitments, set out in its Sustainable Development and Social Performance Policies, the project will also provide important training and education opportunities for local communities, which will help to improve local literacy rates and further drive socio-economic upliftment.

Beyond the socio-economic benefits of the Project, copper plays a vital global role as an important metal for the transition to a low carbon economy. By 2035, copper demand is expected to double from the current 25 million tonnes/year to 50 million tonnes/year and this demand cannot be offset with the substitution of other metals for copper, therefore new projects, requiring an estimated USD 25 billion investment, will be required. Given that many of these mining projects do not yet exist and it can take between 10-15 years, or longer, to start a new mine, the anticipated supply gap in demand is expected to be around 10 million metric tonnes per year by 2030 (Erik Eberhardt, 2024).

1.9. ESIA Methodology

ESIA is a process used to evaluate the potential impacts of a proposed project or development on the environment, local communities, and other stakeholders Figure 1-4 shows the ESIA process which was adopted for the Project. The ESIA process is in line with national and internationally recognised practices. The ESIA, together with the Environmental and Social Management and Monitoring Plan (ESMMP) is key in supporting the development of the Project.

The following tasks were undertaken as part of the ESIA process, which are discussed in more detail below.

- Screening Process;
- Scoping Process;
- Baseline Assessment;
- Impact Assessment;
- Management and Monitoring;
- Stakeholder Engagement (ongoing process);
- Reporting; and
- Decision-Making and Follow-up.

The objectives of this ESIA process are to:

- Provide a clear description of the Project which is subject to environmental permitting and detail the process followed as part of the environmental approval application for the development of the Reko Diq Mining Project;
- Characterise the biophysical and socio-economic baseline conditions of the Project's AoI;
- Identify and evaluate the potential negative and positive environmental and social impacts that may be caused by the Project's implementation;
- Ensure the stakeholders are appropriately engaged on issues that could potentially affect them and document all engagement activities, accordingly; and
- Provide an ESMMP with practical mitigation and management measures to address and/or minimise the identified potential adverse impacts as well as measures to enhance identified positive impacts and opportunities.

This ESIA has been prepared to meet the regulatory requirements of the Balochistan Environmental Protection Act, 2012 (Balochistan Act, 2012) and Sindh Environmental Protection Act, 2014 (Sindh Act, 2014). The ESIA has also been undertaken in compliance with the IFC PS on Environmental and Social Sustainability of January 2012, the World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines, the Equator Principles (EPs) as well as the Global Industry Standard for Tailings Management (GISTM).

The ESIA will be submitted to BEPA and SEPA for approval.

- The Project facilities span both Balochistan and Sindh provinces in Pakistan. The RDMS, and Rail Transport Route extending from the mine site to Dera Allah Yar fall within the provincial jurisdiction of Balochistan.
- The Rail Transport Route from Dera Allah Yar to Port Qasim, along with the Port Qasim are under the provincial jurisdiction of the Sindh province.

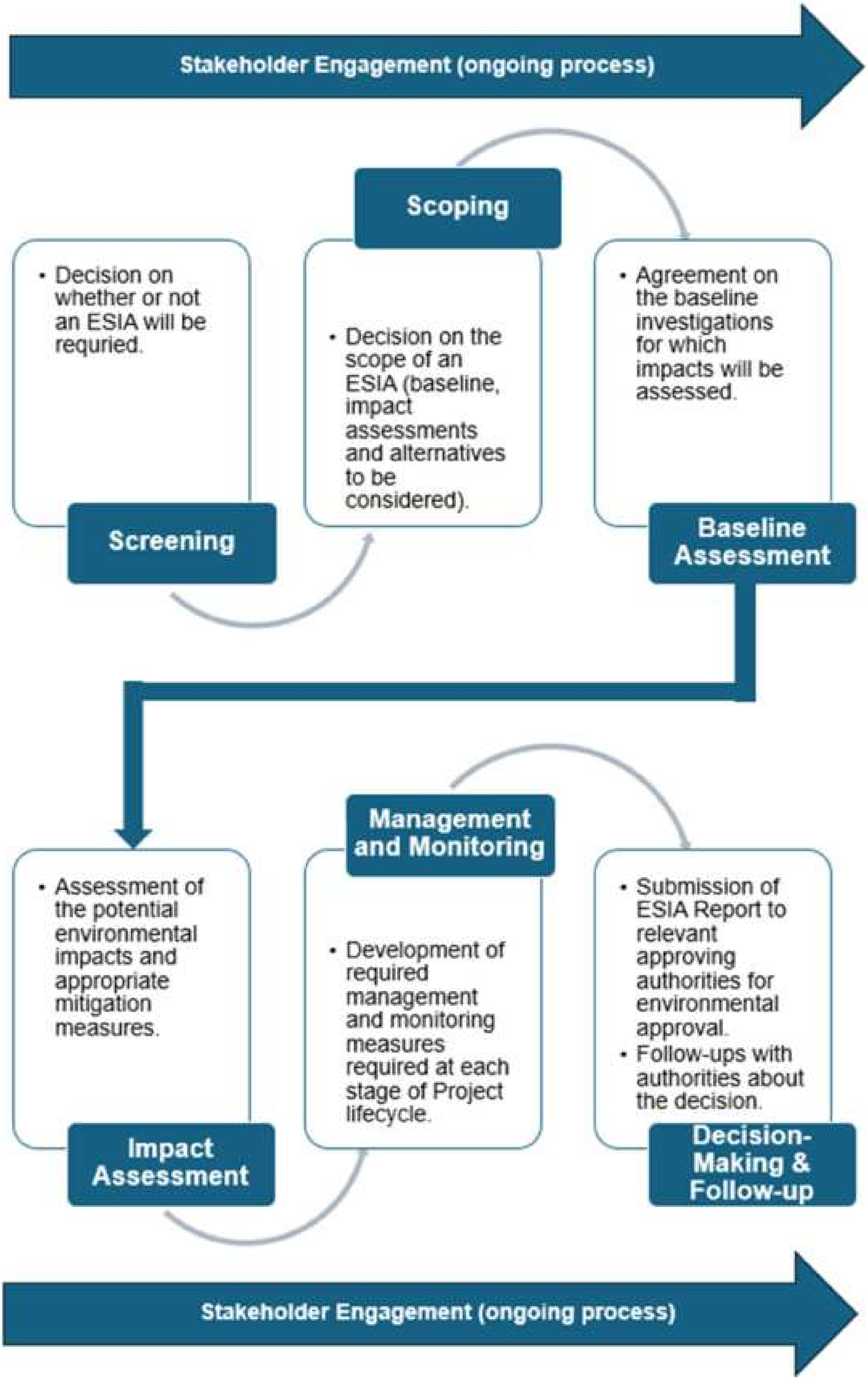


Figure 1-4: ESIA Process

1.9.1. Screening Process

A Screening Process was conducted as a first step to the ESIA process. The Screening Process identifies the level of environmental assessment that is required for the Project, an IEE or a full EIA (or ESIA). The proposed Project is categorised according to the local legislation and international standards (see Section 1.7, Project Categorisation).

1.9.2. Scoping Process

A Scoping Process, or Terms of Reference determination, was conducted in 2021 to determine the scope of work for the ESIA and provide a preliminary report of the potential impacts and mitigation measures for the proposed activities. A gap analysis of previous ESIA studies (2010 and 2020) completed for the Project was also undertaken with a focus on understanding any new requirements for national and international compliance. The following key documents were reviewed:

- Environmental and Social Impact Assessment for the Reko Diq Project by SRK and HBP in 2010 ESIA; and
- Environmental and Social Impact Assessment for the Tanjeel Copper Project by HBP in 2020 (referred to as the “2020 ESIA”).

1.9.3. Baseline Assessment

The environmental and socio-economic characteristics associated with the Project Area, as well as the wider region, were established through desktop and field-based studies. A range of specialist field investigations were carried out between 2022 and 2024 to verify the current state of the biophysical and socio-economic characteristics in the Project’s AoI. This information formed the basis for identifying and assessing the significance of potential environmental and socio-economic impacts (positive and negative) which could arise as a result of the Project.

The baseline investigations for the various components of the Project including the mine site, water supply area, Road Transport Route, Rail Transport Route and Port Qasim were carried out between 2022 and 2023. Nationally and internationally recognised and accepted methodologies were employed for the baseline data collection. Details of the baseline assessment are discussed in Chapter 5 (Environmental and Social Baseline).

The environmental and socio-economic specialist studies undertaken as part of this ESIA process include:

- Soils and Sediments Study;
- Noise Study;
- Traffic Study;
- Air Quality Study;
- Biodiversity – Flora;

- Biodiversity – Fauna;
- Critical Habitat Assessment
- Socio-economic Study;
- Indigenous Peoples Assessment
- Stakeholder Engagement;
- Human Rights Impact Assessment (HRIA);
- Cultural Heritage Study;
- Cumulative Impact Assessment (CIA);
- Hydrogeology (Mine Site);
- Hydrogeology Factual and Interpretive Report;
- Northern Groundwater System Numerical Modelling;
- Surface Water Study;
- Geochemistry;
- Climate Change Study; and
- Remote Sensing.

1.9.4. Impact Assessment

Impact identification was performed with the use of an input-output model to guide the assessment of potential changes to physical, ecological and socio-economic environments during the establishment, operational, closure and post-closure phases of the Project. In this, the Project activities are superimposed onto the environmental and social baseline characteristics of the project area to generate assessment outputs in the form of instances of potential positive or negative biophysical and socio-economic changes in the environment. The details on the methodology employed to quantify and assess the identified impacts is provided in Chapter 6 (Assessment of Environmental and Social Impacts and Risks).

The baseline and impact assessments have been structured by geographic area including the mine site, water supply area, transport routes (Road Transport Route and Rail Transport Route) and the port facility. Specialist study reports have been included in the appendices of this ESIA report.

1.9.5. Management and Monitoring

Based on the outcomes of the baseline and impact assessments, an ESMMP was compiled to provide achievable mitigation measures to minimise the identified potential negative impacts and enhance the positive impacts.

The ESMMP is provided in Chapter 9 of this report and includes a monitoring programme to ensure that potential impacts are measured and monitored throughout the life of the operation.

The monitoring programme is designed to ensure the early detection of impacts to allow for alternative mitigation and management measures to be implemented if necessary. The monitoring programme details the frequency of monitoring, the parameters to be monitored, and the responsible parties for the implementation of the programme. Each subject matter specialist has provided input into the overall monitoring programme.

Furthermore, preliminary closure criteria were developed, and rehabilitation actions/ measures were included as part of the ESMMP.

1.9.6. Stakeholder Engagement

Stakeholder engagement is an ongoing process which takes place at various stages of the project development.

RDMC has been involved in regular and ongoing discussions with the local communities and other stakeholders. However, the key engagement campaigns undertaken by the RDMC for the Project to ensure meaningful consultation are as follows:

1. *Stakeholder Engagement sessions in 2022 and 2023*: Stakeholder consultation and engagement sessions were carried out in during 2022 and 2023 as part of the ESIA process. In this, the local communities located at various Project components and the relevant institutions including regulatory departments, government departments, Non-governmental Organisations (NGOs), were consulted. Separate sessions were carried out with males and females (where required) to record their concerns and suggestions. A Background Information Document (BID) was prepared in English and local Balochi languages and shared with the community and institutional stakeholders.
2. *Early Works ESIA Disclosure Program in 2024*: RDMC undertook a round of engagement and awareness sessions in February 2024 for the Project focussing on the early works activities. The feedback of this engagement was recorded into the consultation logs and incorporated in the Early Works ESIA submitted to BEPA in February 2024. A Public Hearing was also carried out at as part of the Early Works ESIA regulatory assessment process in May 2024. Information pamphlets and presentations were prepared for these engagements.
3. *Reko Diq ESIA Disclosure Program in 2024*: RDMC with the support of HBP conducted additional engagement sessions and awareness programs in June 2024 to inform stakeholders about the Project, the ESIA process and potential environmental and social impacts. A range of information materials including site notices, brochures, community feedback surveys, and information booklets (technical and simplified versions) were developed for the engagement.

The details of these engagements including the community and institutional stakeholders consulted and engaged, dates, and feedback, are provided in Chapter 7, Stakeholder Engagement Process. This chapter also includes the details of the RDMC community development framework.

RDMC developed a Stakeholder Engagement Plan (SEP) in 2021 to carry out the engagement process effectively and according to the international good practices. The SEP was further expanded as a Pre-construction SEP in 2023 to include a comprehensive grievance mechanism. The key principles adopted by this Plan, and as outlined in the IFC Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, are to:

- Provide meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s);
- Provide information early in decision-making processes;
- Disseminate information in ways and locations that make it easy for stakeholders to access it;
- Respect local traditions, languages, timeframes, and decision-making processes;
- Establish two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed;
- Seek inclusiveness in representation of views, including women, vulnerable and/or minority groups;
- Adopt processes free of intimidation or coercion;
- Develop clear mechanisms for responding to people's concerns, suggestions and grievances; and
- Incorporate feedback into program design, and report back to stakeholders.

The regular engagements have ensured that the communities concerns and suggestions are recorded and appropriately addressed.

1.9.7. Reporting

A single report that incorporates the ESIA and ESMMP for all aspects of the proposed Project will be compiled. The ESIA report will be submitted to the Balochistan and Sindh EPAs for review and consideration and will be made public through the RDMC Website and other mediums.

1.10. Structure of this Report

Table 1-1 identifies the structure and contents of the remaining chapters of this report.

Table 1-1: Structure of this ESIA Report

Report Chapter	Description of Chapter Contents
Chapter 1: Introduction	This chapter.
Chapter 2: Regulatory and International Best Practice Framework	Discusses the existing and applicable national legal setting and international standards for sustainable development and environmental protection and presents the legislative requirements that need to be followed while conducting an ESIA.
Chapter 3: Project Description	Provides details on the Project facilities, activities, components, and utilities.
Chapter 4: Project Alternatives Assessment	Presents the alternatives that were considered for the Project along with the reasons for their selection or rejection.
Chapter 5: Environmental and Social Baseline Assessment	Provides information about the existing physical, ecological, and socio-economic conditions across the study areas.
Chapter 6: Assessment of Environmental and Social Impacts and Risks	Presents an assessment of the impacts (positive / negative) during all phases of the Project on the physical, ecological, and socio-economic environment and recommend appropriate mitigation measures.
Chapter 7: Stakeholder Engagement Process	Details the public disclosure and stakeholder engagement undertaken as part of the ESIA process and summarises the concerns raised and suggestions received.
Chapter 8: Mine Closure and Rehabilitation Plan	Presents effective procedures and steps to ensure that mining activities are conducted in an environmentally responsible manner and the mine site can be safely rehabilitated and closed once mining activities cease.
Chapter 9: Environmental and Social Monitoring and Management Plan	Describes the implementation and monitoring of the mitigation measures identified in the environmental and social impact assessment section.
Chapter 10: Conclusions	Summarises the ESIA findings.
References	List of References for additional sources of information.
Appendices	Standalone reports for the following specialist studies: • Socio-economic • Indigenous Peoples • Noise • Traffic

Report Chapter	Description of Chapter Contents

	• Archaeology and Cultural Heritage
	• Flora
	• Fauna
	• Critical Habitat Assessment
	• Hydrology
	• Water Supply:
	  • Water Supply Hydrogeology Factual and Interpretive Report
	  • Northern Groundwater System Conceptual Model Report
	  • Northern Groundwater System Numerical Modelling Report
	  • Northern Groundwater System Impact Assessment
	• Mine Area Hydrogeology
	• Air quality
	• Soils and Sediments
	• Geochemistry
	• Climate Change Risk Assessment Stakeholder Engagement
	• Cumulative Impact Assessment
	• Remote Sensing
	• Closure Plan

1.11. Consultants on the Project

The consultants involved in the ESIA Process, their specialist fields and roles in this ESIA process, are listed in Table 1-2. Digby Wells Environmental, together with their in-country partner, HBP, is the lead consultant for this ESIA Report.

Studies undertaken by additional consultants, as part of the feasibility study for the Reko Diq project, have also been included in the table below.

Table 1-2: Consultants and Specialists Involved in the ESIA Report

Consultant	Title	Roles and Responsibilities	Consulting Firm
Graham Trusler	Chief Executive Officer	Project sponsor	Digby Wells
Barbara Wessels	Executive: Technical Services	Project management, ESIA report review	Digby Wells

Consultant	Title	Roles and Responsibilities	Consulting Firm
Vicki Shaw	Principal Environmental Consultant	Project management, ESIA report compilation and review	Digby Wells
Sadia Asghar	Senior Environmental Consultant	ESIA report compilation	Digby Wells
Phoebe Cochran	Environmental Consultant	ESIA report contributor	Digby Wells
Vaqar Zakaria	Director and Principal	Technical advisory and specialist report review	HBP
Ramsha Fatima	Senior Technical Manager: Sustainability	Technical advisory and specialist report review	HBP
Andre van Coller	Principal: Mine Water Management	Water balance and technical advisory	Digby Wells
Robel Gebrekristos	Principal Hydrogeologist	Specialist report compilation and report reviews	Digby Wells
Megan Taylor	Hydrogeologist	Hydrogeology database and report compilation	Digby Wells
Andrew Paffard	Principal Hydrogeologist	Water supply field management, data analysis and report compilation	SMEC
Len Drury	Principal Hydrogeologist	Water supply field management, data analysis and report compilation	SMEC
Rod Lawrence	Associate Scientist - Geophysicist/ Hydrogeology	Technical advisory for geophysical surveys and report compilation.	SMEC
Doug Brown	Principal	Water supply technical advisory and report reviews	Darkwater Consulting
Callum Gilligan	Senior Hydrogeologist	Water supply, data analysis, geological modelling, and report reviews	Darkwater Consulting
Milos Pavlovic	Principal Groundwater Modeller	Water supply hydrogeological modelling and report compilation	Groundwater Consulting
Levi Ochieng	Manager: Geochemistry	Technical advisory and specialist report compilation	Digby Wells

Consultant	Title	Roles and Responsibilities	Consulting Firm
Matthew Ojelede	Senior Consultant: Atmospheric Sciences	Technical advisory and report review	Digby Wells
Cobus Hoon	Senior Environmental and Mining Legal Consultant	Legal review of Chapter 2.	Digby Wells
Sarah Cooper	Executive: Sustainability Services & Business Development	Review of Executive Summary	Digby Wells
Kgaugelo Thobejane	Geochemist	Technical specialist and report compilation	Digby Wells
Daniel Fundisi	Principal Hydrologist	Technical specialist and report compilation	Digby Wells
Peter Kimberg	Principal Biodiversity Consultant	Technical specialist	Digby Wells
Ahmad Shoaib	Senior Technical Manager: Biodiversity	Technical specialist and report compilation	HBP
Muhammad Shakil	Specialist, Biodiversity	Technical specialist and report compilation	HBP
Kiran Sahar	Analyst, Biodiversity	Data compilation and analysis	HBP
Muhammad Danish	Analyst, Biodiversity	Biodiversity field data collection and report review	HBP
Adnan Arif	Analyst, Biodiversity	Biodiversity field data collection and secondary reviews	HBP
Willnerie Janse van Rensburg	Manager: Wetlands and Soils	Specialist report review	Digby Wells
Syed Ali Imam Tahir	Specialist, Environmental Engineering	Soils report compilation and reviews	HBP
Abdullah Durrani	Analyst, Environment and Climate Change	Noise and air quality specialist	HBP
Keenan Terry	Noise Lead	Technical advisory and report review	Digby Wells
Muhammad Bilal	Specialist, Environment and Climate Change	Noise and air quality specialist	HBP

Consultant	Title	Roles and Responsibilities	Consulting Firm
Emma Woodward	Team Lead: Social Sciences	Socio-economic report reviews	Digby Wells
Muhammad Yasir Asad	Specialist, Socio-economic and Resettlement	Baseline surveys and data collection. Stakeholder consultations report review	HBP
Aamna Abid	Specialist, Gender and Socio-economic	Socio-economic specialist report compilation.	HBP
Jibran Sharif	Analyst, Socio-economic	Field surveys and baseline data collection and analysis for socio-economic surveys	HBP
Muhammad Arshad	Analyst, Stakeholder Engagement and Consultations	Stakeholder consultations and preparation of consultation logs	HBP
Melissa Whellams	Principal	Human rights assessment	Avanzar
Marc Forget	Principal	Human rights assessment	Avanzar
Kathryn Terblanche	Senior Climate Change Consultant	Technical specialist and report compilation	Digby Wells
Matthias Rommelspacher	Climate Change Consultant	Technical specialist and report compilation	Digby Wells
Prevlan Chetty	Manager: GIS & Remote Sensing	Technical advisory and report compilation	Digby Wells
Johan Vermeulen	Environmental GIS Specialist	Technical specialist and report compilation	Digby Wells
Anthony Lamb	Principal Consultant: Closure	Closure plan and closure cost assessment	Digby Wells
Oratile Mokoto	Environmental Intern: Mine Closure and Land-Use Planning	Assistance with closure plan and closure cost assessment	Digby Wells
Shakir Ali Shah	Archaeologist	Field data collection and compilation of heritage specialist report.	Independent consultant to HBP
Jaco van der Walt	Archaeologist	Technical advisory	Digby Wells
Dr Hafeez Ahmed Jamali	Independent expert on socio-cultural anthropology (with particular experience in Baloch culture)	Indigenous Peoples Assessment Reviewer	Independent Reviewer

Consultant	Title	Roles and Responsibilities	Consulting Firm
Tim Hart	Social Development Specialist	Indigenous Peoples Assessment Reviewer	Independent consultant to Digby Wells

2. Legal Framework

This chapter outlines the legislative and policy framework applicable to the environmental and social aspects of the Project at the provincial, national and international levels, and discusses the corporate policies and requirements applicable to the Project.

2.1. National and Provincial Legislative and Regulatory Framework

This section provides a comprehensive overview of the relevant provincial, and national legislation, standards and guidelines applicable to the environmental and social aspects of the Project.

The Project's Environmental and Social (E&S) performance, as well as the procedure for undertaking an ESIA[1] is governed by applicable Pakistan laws and regulations and international treaties. These include the provisions of the Constitution of the Islamic Republic of Pakistan, the laws enacted, and rules and regulations passed by the Governments of Balochistan and Sindh, and international environmental treaties endorsed by Pakistan. The provincial environmental legislation holds jurisdiction solely within their respective provinces, defining the authority of environmental protection agencies over activities conducted within their boundaries. The applicable E&S provincial legislation, along with the corresponding directives, are identified and evaluated in this section to describe their applicability to the proposed Project.

The applicable laws and regulations for the Project include those of the province of Balochistan and the province of Sindh as the Project facilities span both provinces. The Reko Diq Mine Site, and proposed Rail Transport Route extending from the Reko Diq Mine Site to Dera Allah Yar fall within the provincial jurisdiction of Balochistan, while the proposed Rail Transport Route from Jacobabad to Port Qasim, along with the port facility at Port Qasim are located in and under the provincial jurisdiction of Sindh.

2.1.1. Reconstitution and the Legal Context

As discussed in Chapter 1 (Introduction), the Project has been reconstituted after negotiations and resulted joint ownership by Barrick, the GoB and the GoP. Since December 2022, RDMC, in partnership with the GoP and the GoB, has been undertaking an update of the feasibility study for the Project. However, it is pertinent to note that following the Reconstitution of the Reko Diq Mining Project, RDMC was granted concessions and

[1] The term ESIA is used herein to emphasize the inclusion of social aspects in the impact assessment (environmental and social impact assessment) and refers to both the process undertaken and the resulting report. This ESIA is equivalent to the EIA referred to in the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000, Balochistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2020, and Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021.

exemptions from the application of certain labour laws in Pakistan for the duration of the Mineral Agreement, such as establishment of the Workers Welfare Fund and the Workers Participation Fund.

2.1.2. Primer on Applicable E&S Legal Instruments

Constitution: The present Constitution of Pakistan was adopted by the National Assembly of Pakistan on 10 April 1973. It has been amended twenty-five times since 1973, the last time in 2018 through the Constitution (Twenty-Fifth Amendment) Act, 2018.[2] Prior to the 18th Amendment, both the Parliament and the Provincial Assemblies could legislate on environmental pollution and ecology. Following the abolition of the Concurrent Legislative List through the 18th Amendment to the Constitution of Pakistan, Article 142 grants exclusive powers to the Provincial Assemblies to legislate on matters that are not enumerated in the Federal Legislative List. Environmental regulation is not included in the Federal Legislative List, accordingly, environmental regulation is the responsibility of the provinces.

Statutes: Acts are passed by the legislative assemblies whilst Ordinances are generally promulgated when there is an urgent need for legislation and the respective assembly is not in session. Ordinances can be promulgated by the President at the national level and by Governors at provincial levels. Ordinances have the same force and effect as Acts but, unlike Acts, they remain in force for only a limited period. During this period, the President or Governors may withdraw the Ordinance, or it may be disapproved or extended by either House of the Parliament. If the Ordinance is not withdrawn, disapproved or extended, the Ordinance will lapse after the expiry of a specified period, after which, the Ordinance may be laid before the Parliament to be enacted as an Act. This difference is prescribed in the present Constitution, but for a number of reasons, mainly linked to historical events, some Ordinances have a permanent lifetime. Only those Ordinances which were passed during the periods of emergency when Constitution of Pakistan was held in abeyance were validated until altered or repealed under Article 270A of the Constitution.

Rules and Regulations: Rules and regulations are framed by the executive branch of the Government, Federal or Provincial ministry or any other Government agency, under powers granted to them by a specific statute. Rules are the principles to which an action or procedure is intended to conform. Rules may or may not be required to be published in the official gazette to become a law. Regulations provide specific measures that are required to put an act or ordinance into effect.

Standards: In terms of regulatory hierarchy, standards are at par with rules and regulations and are promulgated in the same manner.

Regulatory Guidelines: Compliance with guidelines is not mandatory but voluntary. The Government may, however, frame guidelines on certain issues and require through a rule or

2 The 9th, 11th, and 15th amendments did not come into effect because they were not passed by the Parliament. These proposed amendments remained unimplemented.

regulation adherence to these guidelines. The respective rule or regulation allows a departure from the guideline if satisfactory justification is provided to the regulatory agency.

2.1.3. Historical and Constitutional Context

The development of statutory and other instruments for environmental management has steadily gained priority in Pakistan since the late 1970s. The Pakistan Environmental Protection Ordinance of 1983 was the first piece of legislation designed specifically for the protection of the environment. The promulgation of this ordinance was followed, in 1984, by the establishment of the Pakistan Environmental Protection Agency (Pak–EPA), the primary government institution at that time dealing with environmental issues. Significant work on developing environmental policy was carried out in the late 1980s, which culminated in the drafting of the Pakistan National Conservation Strategy. Provincial environmental protection agencies were also established at about the same time.

The National Environmental Quality Standards (NEQS) were established in 1993. In 1997, the Pakistan Environmental Protection Act (PEPA), 1997, replaced the 1983 Ordinance. PEPA, 1997 conferred broad-based enforcement powers to the environmental protection agencies. This was followed by the publication of the Pak-EPA Review of IEE and EIA Regulations, 2000 which provided the necessary details on the preparation, submission, and review of IEEs and EIAs.

Prior to the 18th Amendment to the Constitution of Pakistan in 2010, the legislative powers were distributed between the federal and provincial governments through two ‘lists’ attached to the Constitution as Schedules. The Federal List covered the subjects over which the federal government had exclusive legislative power, while the ‘Concurrent List’ contained subjects which both the federal and provincial governments could enact laws. The subject of ‘environmental pollution and ecology’ was included in the Concurrent List and hence allowed both the national and provincial governments to enact laws on the subject. However, as a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government other than International Treaties and Agreements. The main consequences of this change were as follows:

- The Ministry of Environment at the federal level was abolished. Its functions related to national environmental management were transferred to the provinces. To manage international obligations in the context of the environment, a new ministry—the Ministry of Climate Change—was created at the federal level. The Ministry of Climate Change retains some of the roles of the Ministry of Environment.
- The PEPA, 1997 is technically no longer applicable to the provinces. The provinces were required to enact their legislation for environmental protection. However, to ensure legal continuity PEPA, 1997 continued to be the legal instrument for environmental protection in the provinces till the enactment of the provincial law.

The PEPA, 1997 specifically includes international agreements which are a federal subject. After the devolution of powers through the Constitution (18th Amendment) Act 2010, some of the Provincial Acts, such as that of Punjab, recognise that it is necessary to fulfil the obligations envisaged under the biodiversity-related Multilateral Environmental Agreements ratified by the Government of Pakistan. Nonetheless, these are within the jurisdiction of the Federal authorities.

The Concurrent List containing subjects, on which both the Parliament and Provincial Assembly could legislate, was omitted after the 18th Constitutional amendment. The subjects on the Federal List were substantially increased by the transfer of some subjects from the omitted Concurrent List, and some subjects from Part I of the Federal Legislative List to Part II of the Federal Legislative List. While certain subjects are still governed exclusively by federal laws which take precedence over principal provincial environmental law (e.g. shipping, oil and gas, nuclear energy and nuclear waste), after deletion of the Concurrent List the additional responsibilities of the provinces related to the environment included:

- Environmental pollution and ecology;
- Boilers;
- Social welfare;
- Evacuee property;
- Ancient and historical monuments; and
- Safety of labour in mines, factories, and oilfields.

All four provinces have enacted their own environmental protection laws. These provincial laws are largely based on PEPA, 1997 and, hence, provide the same level of environmental protection as the parent law. However, where the laws or standards are not formulated, the federal laws shall remain applicable.

2.1.4. Statutory Framework for Environment

The cornerstone of national environmental legislation is embodied in the PEPA, 1997. Following the decentralisation brought about by the 18th Constitutional Amendment in 2010, the provinces have assumed exclusive authority and accountability for legislating on matters concerning 'environment and ecology'. Consequently, for the context of this Project in Balochistan and Sindh, the pertinent legislative instruments include the Balochistan Environmental Protection Act, adopted in 2012, and the Sindh Environmental Protection Act, enacted in 2014. These provincial acts align with the local environmental dynamics and will be applicable to ensure the Project's compliance and sustainability.

Other standards, policies, rules and regulations issued under PEPA, 1997 that are still applicable in Balochistan, and Sindh are:

- Policies and Procedures for Review and Approval, 1997;
- Guidelines for Preparation and Review of Environmental Report, 1997;
- Guidelines for Public Consultation, 1997;

- Guidelines for Sensitive and Critical Areas, 1997; and
- Pakistan Petroleum Exploration and Production Companies Association, 2004.

Updated national policies include:

- National Mineral Policy, 1995;
- National Clean Air Policy, 2023;
- National Hazardous Waste Management Policy, 2022;
- National Climate Change Policy, 2021;
- National Climate Change Policy, 2012;
- National Drinking Water Policy, 2009;
- National Environmental Policy, 2005; and
- National Resettlement Policy, 2002.

2.1.5. Institutional Framework

The success of environmental assessment as a means of ensuring that development projects are environmentally sound and sustainable, depends largely on the capability of regulatory institutions for environmental management. The institutional framework for decision-making and policy formulation in environmental and conservation issues in the Balochistan and Sindh provinces is briefly described below.

On 31 December 1983, under the Pakistan Environmental Protection Ordinance, provision was made for the establishment of the Provincial Environmental Protection Agency. With regards to the Balochistan and Sindh provinces, separate administrative units referred to as the BEPA and the SEPA were formed in 1992 and 1989, respectively. The role of BEPA and SEPA is to serve as the main provincial environmental regulatory bodies for the Balochistan and Sindh provinces, responsible for implementing National and Provincial Laws, improving the protection of the Environmental and Natural Resources of their respective provinces, and developing policies for improvement and sustainable use of natural resources. Summaries of the Balochistan and Sindh environmental protection legislation and regulations are presented in Sections 2.1.6 and 2.1.7, respectively.

2.1.6. Balochistan Environmental Protection Act, 2012

The Balochistan Environmental Protection Act, 2012 (referred to as ‘Balochistan Act, 2012’ hereafter) serves as the primary legislation governing environmental protection and conservation efforts in the province of Balochistan, Pakistan. The Balochistan Act, 2012 applies to a broad range of issues and extends to ambient air, gaseous emissions, drinking water, and noise pollution, as well as to the handling of hazardous wastes. The sections of the Balochistan Act, 2012 that have a direct bearing on the Project are:

- Section 14 which prohibits certain discharges or emissions and potentially harmful items or materials.
- Section 15 which deals with the requirements of the IEE and EIA review and approval process.
- Section 16 which prohibits the import of hazardous substances.
- Section 17 which deals with the handling of hazardous substances and the licensing requirements in respect thereof.
- Section 18 which deals with disposal of electronic wastes.
- Section 19 which provides a general prohibition concerning solid and hospital waste management and provisions relating to waste management licenses.
- Section 20 which deals with the management of water resources.
- Section 21 which provides regulations for motor vehicles.
- Section 22 which deals with the introduction of alien species and living modified organisms.

The subsequent subsections describe the rules and regulations under the Balochistan Act, 2012 along with the process for processing applications for environmental approval.

2.1.6.1. Environmental Approval Process from Balochistan Environmental Protection Agency

At the time of writing this report, the BEPA Review of IEE and EIA Regulations, 2020 (referred here as BEPA IEE / EIA Regulations 2020) were in draft phase with notification of promulgation still pending. Therefore, following the repealing requirements prescribed in Section 42, sub-section 5 of the Balochistan Act, 2012, the Project's categorisation for environmental assessment has been compared with Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 (referred here as PEPA IEE/EIA Regulations 2000). The Project encompasses mining, mineral processing and transportation of ore concentrates from Balochistan. These activities fall under the category of projects requiring an EIA as stipulated by *Regulation 4* and *Schedule II in the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000* specifically under the classification of mining and processing of coal, gold, copper, sulphur and precious stones.

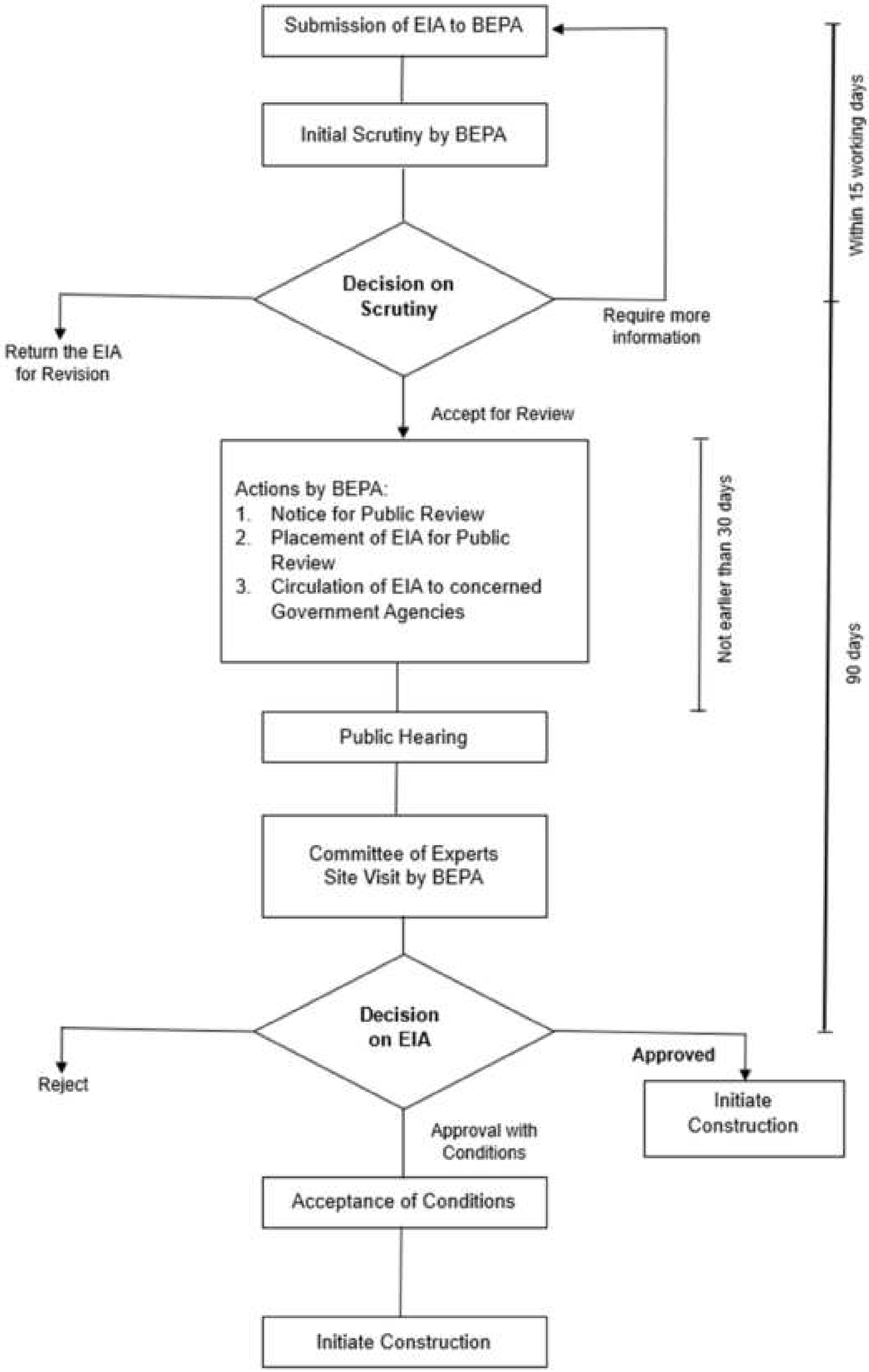
With regards to the Project facilities located in the Balochistan province, the ESIA has been prepared in accordance with Section 15 of the Balochistan Act, 2012 and the Mineral Agreement entered into by among others, RDMC, GoB, and GoP. This ESIA will be submitted to the BEPA for review and assessment and the granting of an environmental approval for the construction and operation of the infrastructure associated with the Project. Table 2-1 describes the environmental approval process described in the *Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000*, currently applicable to developments in Balochistan province. Figure 2-1 illustrates the BEPA assessment and approval process.

Table 2-1: Environmental Approval Process followed at BEPA

Reference Regulation	Description
Regulation 8: Filing of IEE and EIA	(1) Ten paper copies and two electronic copies of an IEE or EIA shall be submitted to BEPA. (2) Every IEE and EIA shall be accompanied by – • an application, in the form prescribed in Schedule IV of PEPA IEE/EIA Regulations 2000; • no objection certificates from the relevant departments (to be included in the EIA report); and • copy of receipt showing payment of the Review Fee prescribed in Schedule III of PEPA IEE/EIA Regulations 2000.
Regulation 9: Preliminary Scrutiny	(1) **Within 15 working days** of the filing of an IEE or EIA, the BEPA will: (a) confirm that the IEE or EIA is complete for initiation of the review process, or (b) require additional information, or (c) return the IEE or EIA for revision, for further study and discussion. (2) Nothing in sub-regulation (1) shall prohibit the Agency from requiring the proponent to submit additional information at any stage during the review process.
Regulation 10: Public Participation	(1) In the case of an EIA, the Agency shall, simultaneously with confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in at least one English and one Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the place at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed. (2) The notice issued under sub-regulation (1) shall fix a date, time, and place for public hearing of any comments on the Project or its EIA. (3) The date fixed under sub-regulation (2) shall **not be earlier than 30 days** from the date of publication of the notice. (4) If required, BEPA will also circulate the EIA to the concerned Government Agencies requesting their reviews.

Reference Regulation	Description
	(5) All comments received by the BEPA, public or any Government Agency will be responded to, and addressed in the final decision on the EIA. BEPA may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement, and participation in EIA assessment.
Regulation 11: Review	(1) BEPA will review an IEE within 45 days, and an **EIA within 90 days** for confirmation of completeness. (2) In reviewing an EIA, the Agency may consult a committee of experts and may solicit views of concerned advisory committee, if any constituted by the Agency. (3) The Director General may, where considered necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified. (4) The review of the IEE or EIA by the Federal Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under Regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above. During the review process, BEPA can ask the applicant and /or their consultant to make a presentation of the Project. The documentary evidence in the form of videos (softcopies) of public hearing may also be submitted by the applicant at any stage of the review process.
Regulation 12: Decision	On completion of the review, the decision of BEPA will be communicated to the applicant in the form prescribed in Schedule V in the case of an IEE, and in the form prescribed in Schedule VI in the case of an EIA attached in PEPA IEE and EIA Regulations, 2000.

Note: At the time of writing this report, the BEPA Review of IEE and EIA Regulations, 2020 were in draft phase, with notification of promulgation still pending. Therefore, the timeline presented here follows the PEPA Review of IEE and EIA Regulations, 2000, which currently applies to developments in the Balochistan province. However, the table displays the consolidated requirements from both the BEPA Review of IEE and EIA Regulations, 2020 and the PEPA Review of IEE and EIA Regulations, 2000.



Source: Pakistan Environmental Protection Agency Review of IEE/EIA Regulations 2000

Figure 2-1: BEPA EIA Approval Timeline

2.1.6.2. National and Balochistan Environmental Quality Standards

At the time of writing this report, the Balochistan Environmental Quality Standards (BEQS) were in draft phase and awaiting formal notification. Therefore, following the repealing requirements prescribed in Section 42, sub-section 5 of the Balochistan Act, 2012, the NEQS remain applicable within the provincial jurisdiction of Balochistan until the implementation of limits prescribed in BEQS is formally notified. These NEQS encompass various parts including industrial gaseous emissions, ambient air quality, noise, and drinking water. Effective from the date of implementation, all projects, whether currently operational or constructed subsequently, are obligated to adhere to these stipulated standards.

As stipulated in Section 14 of the Balochistan Act, 2012, the Project facilities located within the provincial jurisdiction of Balochistan must align with all relevant limits prescribed in NEQS. The Project Proponent and contractors are entrusted with the responsibility of ensuring that no activity undertaken within the Project's scope results in the discharge of pollutants and effluents beyond the limits prescribed in the NEQS. The NEQS for municipal and liquid effluents, industrial gaseous emissions, exhaust emissions of in-use and new motor vehicles (both diesel and petrol), ambient air quality, noise and drinking water quality are provided and addressed in the relevant specialist reports and as Appendix A.

The Project also assesses the compliance with the BEQS for various aspects such as industrial gaseous emissions, ambient air quality, noise, and drinking water. The BEQS have been considered taking into account the possibility that they may come into effect during the development of the Project and to ensure that the Project will remain in compliance even after implementation of these standards.

2.1.7. Sindh Environmental Protection Act, 2014

The Sindh Environmental Protection Act, 2014 (Sindh Act, 2014) applies to a broad range of issues and extends to air, water, industrial liquid effluent, and noise pollution, as well as to the handling of hazardous wastes. The Sindh Act, 2014 will be applicable to the Rail Corridor from Jacobabad to Port Qasim, and the Port Qasim terminal. The sections of the Sindh Act, 2014 that have a direct bearing on the Project are:

- **Section 11** which prohibits certain discharges and emissions and ensures compliance with Sindh Environmental Quality Standards (SEQS);
- **Section 12** which prohibits import of hazardous waste;
- **Section 13** which deals with the handling of hazardous substances;
- **Section 14** which prohibits actions which can adversely affect the environment. These including adverse environmental impacts, including dumping waste or hazardous substances into coastal and inland water bodies etc.;
- **Section 15** which provides regulations for motor vehicles;
- **Section 17** which identifies the requirements of IEE and EIA;
- **Section 19** which identifies requirements of environmental monitoring; and

- **Section 20** which deals with environmental audits and reviews.

The subsequent subsections describe the rules and regulations as stipulated under the Sindh Act, 2014 along with the environmental approval process.

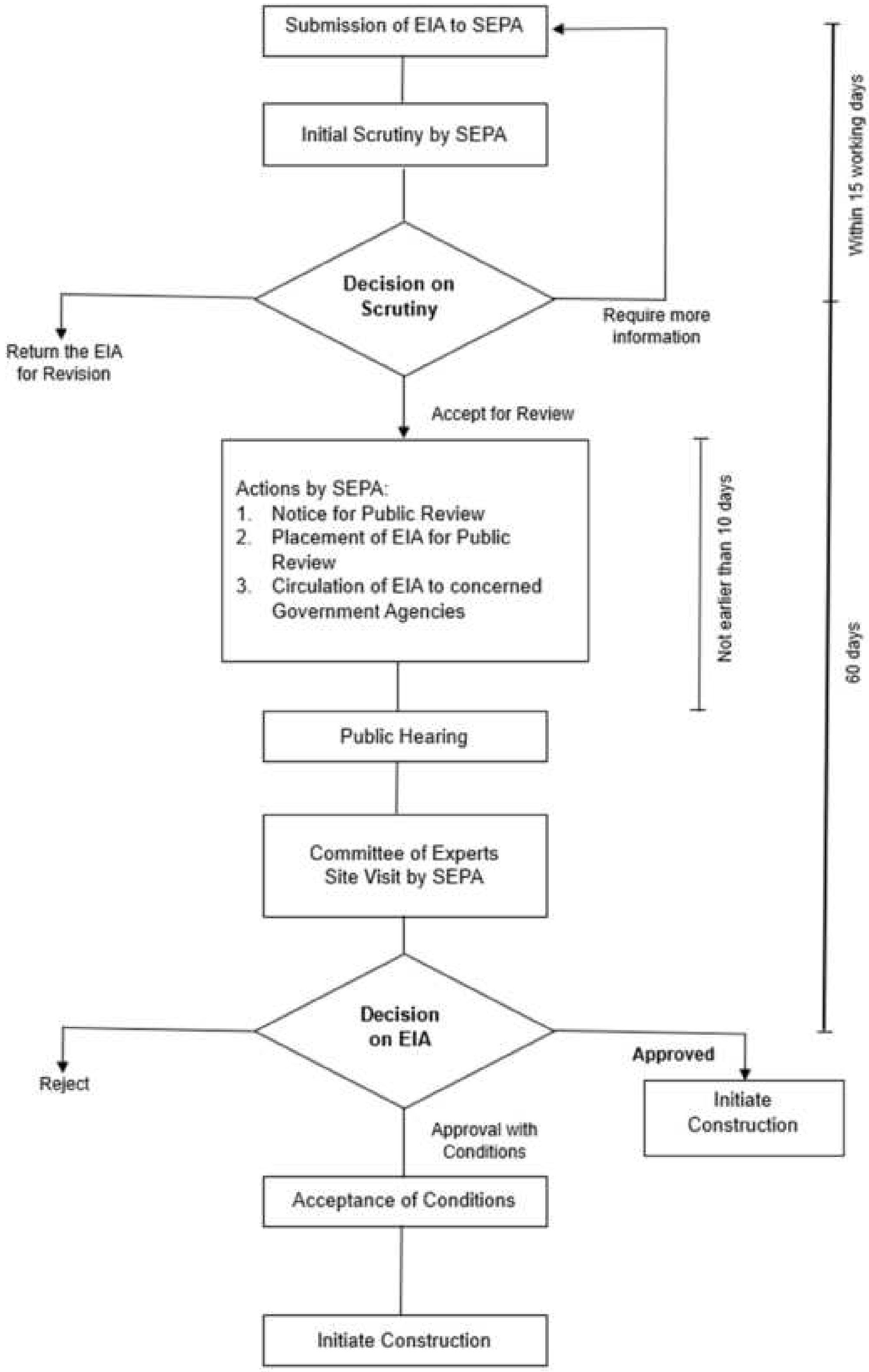
2.1.7.1. Environmental Approval Process from Sindh Environmental Protection Agency

As the Project includes the construction of a concentrate storage shed within the existing facility at Port Qasim. The proposed Project facility within the Sindh province may be classified as requiring either an IEE or an EIA (to be determined by SEPA following submission of an application). Table 2-2 describes the process of environmental approval from SEPA. Figure 2-2 illustrates the SEPA timeline for the assessment and approval of an IEE or an EIA.

Table 2-2: Environmental Approval Process followed at SEPA

Reference Regulation	Description
Regulation 9: Filing of Report	Two hard copies and two electronic copies of an Environmental Checklist (EC), IEE or EIA to be submitted to SEPA. Every EC, IEE and EIA shall be accompanied by an application, in the form set out in Schedule V of Environmental Assessment Regulations, 2021 and a copy of a receipt showing payment of the review fee prescribed in Schedule IV.
Regulation 10: Preliminary Scrutiny	**Within 15 working days** of the filing of an IEE or EIA, the SEPA shall: • confirm that the IEE or EIA is complete for initiation of the review process, or • require additional information, or • return the IEE or EIA for revision, for further study and discussion. Any report filed by the proponent or applicant shall be returned, if found incomplete in terms of Regulation 9. Notwithstanding anything contained in sub-regulation (1) of regulation 12, the Agency may require the proponent to submit additional information at any stage during the review process.
Regulation 11: Public Participation	(1) In the case in an EIA, the Agency shall issue a public notice to be published in widely circulated English, Urdu or Sindh newspapers and in a local newspaper upon confirmation of completeness. The notice will include the Project type, Project location, and name and address of the applicant and the place at which the EIA in respect of the Project can be accessed. The notice issued will fix a date, time, and place for public hearing of any comments on the Project or its EIA. The public hearing will be scheduled after at least 10 days from the date of publication of the notice. (2) The date fixed under sub-regulation (1) shall **not be earlier than ten (10) days** from the date of publication of the public hearing notice.

Reference Regulation	Description
	(3) If required, SEPA will also circulate the EIA to the concerned Government Agencies requesting their comments. (4) All comments received by the SEPA, public or any Government Agency will be responded, and addressed in the final decision on the EIA. (5) SEPA may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement, and participation in EIA assessment.
Regulation 12: Review Process	(1) SEPA will review an Environmental Audit (EA), Environmental Management Plan (EMP) or environmental checklist within 15 days, an IEE within 30 days and an **EIA within 60 days** of receiving a complete case. (2) In reviewing an EIA, the Agency may consult a committee of experts and may solicit views of concerned advisory committee, if any constituted by the Agency. (3) The Director General may, where considered necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified. (4) The review of the IEE or EIA shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent and comments from the public and government agencies received under Regulation 12, and views of the committees mentioned in sub-regulations (2) and (3) above. (5) EMP, EA, EC shall be reviewed as per guidelines issued by SEPA.
Regulation 13: Decision	The documentary evidence in the form of videos (softcopies) of public hearing may be submitted by the applicant within 3 days after conclusion of the public hearing. On completion of the review, the decision of SEPA will be communicated to the applicant in the form prescribed in Schedule VI in the case of an IEE or EMP or environmental checklist or audit, in the form prescribed in Schedule VII in the case of an EIA.



Source: Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021

Figure 2-2: SEPA EIA Approval Timeline

2.1.7.2. Sindh Environmental Quality Standards

SEPA established the regulations governing the SEQS in 2016. These SEQS specify criteria for various aspects, including industrial gaseous emissions, motor vehicle emissions, ambient air quality, noise levels, and the quality of drinking water. Effective from the date of enactment, all projects within the territorial jurisdiction of Sindh, whether currently operational or constructed subsequently, are legally obligated to comply with these prescribed standards.

Adhering to the applicable SEQS is a crucial aspect of the Project. The responsibility rests with the Project proponents and contractors to ensure that any activities in Sindh carried out within the Project's scope do not result in the discharge of pollutants and effluents exceeding the defined limits outlined in the SEQS (Appendix A).

2.1.8. Balochistan Minerals Rules, 2002

Balochistan Minerals Rules, 2002 deals with the criteria for dealing with applications and the grant of Licenses and Leases, expeditious thinking making process, security of tenure, provision of adequate information on mineral titles, independent resolution mechanism etc., and to equitably meet the objectives of the investors as well as aspirations of the Government.

The Rules provide four types of mineral titles, namely, Reconnaissance License, Exploration License, Mineral Deposit Retention Licensee and Mining Lease. A brief description of each of the mineral title and mineral concession is provided below.

- *Reconnaissance License:* entitles any operations carried out in a general search for any mineral by using aerial sensing techniques, including geophysical surveys, photo geological mapping or imagery carried on from the air, and reconnaissance shall be construed accordingly. The maximum duration of validity of reconnaissance license is 12 months.
- *Exploration License:* entitles the license holders to undertake exploration, including any accessing, extraction or incidental winning of any mineral for the purpose of mineralogical examination, assaying, test work or marketability surveys. The maximum duration of validity of exploration license is 3 years.
- *Mineral Deposit Retention License:* entitles the license holders to retain the retention area in question for future mining operations in order to undertake exploration operations or mining operation or both. The maximum duration of validity of mineral deposit retention license is 2 years.
- *Mining Lease:* entitles the license holders to undertake the development of a mine, or the production of minerals from the mine, or both. The maximum duration of validity of mining lease is 30 years.

As the various mineral titles held by RDMC were customised for the Project as part of the Reconstitution discussed in Chapter 1 (Introduction), the Mining Lease and Exploration Lease titles were issued pursuant to an amendment to the *Regulation of Mines and Oilfields and Mineral Development (Government Control Act, 1948)*, which permits the granting of mineral title through private negotiations without public tendering. As a result, the Project's mineral titles are generally not subject to the Balochistan Minerals Rules 2002 (other than certain specific rules that are referenced in the applicable mining leases/licenses).

The Balochistan Minerals Rules 2002 also prohibit certain discharges and emissions to the environment. As the Balochistan Act, 2012 already provides a comprehensive set of procedures and guidelines which are more stringent than those stipulated in the Balochistan Mineral Rules, 2002, the Project's components located within the Balochistan province will adhere to the requirements of Balochistan Act, 2012.

2.1.9. Labor, Health and Safety Legislation

Labor, health, and safety legislation varies at the federal and provincial levels. Compliance with these laws is critical for maintaining safe workplaces, preventing accidents, and ensuring the overall well-being of employees. Projects operating in Sindh and Balochistan should consider both federal and provincial legislation when formulating their health and safety policies and procedures. Some of the key labour, health, and safety legislations that are applicable at the federal level and may also apply in the provinces of Sindh and Balochistan are discussed in further detail in Table 2-3. However, it is pertinent to note that following Reconstitution of the Reko Diq Mining Project, RDMC was granted concessions and exemptions from the application of certain labour laws in Pakistan for the duration of the Mineral Agreement, such as establishment of the Workers Welfare Fund and the Workers Participation Fund.

2.1.10. Other Applicable Environmental and Social Regulatory Frameworks

Error! Reference source not found. also lists the applicable national regulatory framework and their relevance to the Project. Table 2-4 and Table 2-5 presents the applicable regulatory framework at provincial level, Balochistan and Sindh, respectively. The regulations related to private land acquisitions are not expected to the Project as no acquisition of private land or resettlement will be required for the Project or undertaken by RDMC. The Project facilities will be located on government-owned land and will be acquired or leased by and from the Government following applicable policies.

Table 2-3: Other Applicable Laws, Rules and Regulations regarding E&S at National Level

Legal Instrument	Scope	Relevance
Related to Industry, Employment and Wages		
The Mines Act, 1923	The Act provides provisions for health and safety of the workers engaged in mining operations. This includes working conditions, occupational health and safety, working hours, as well as notified	The Act will be applicable to both construction and operation phases. Although the applicability of this act will be somewhat limited during mine construction due to limited scope of mining, however, the Project will have to comply with each of its requirement during operations phase.

Legal Instrument	Scope	Relevance
	diseases which the workers may get exposed to during mining.	
Related to E&S		
Pakistan Plant Quarantine Act, 1976	Enacted to safeguard the national crop wealth from destructive pests and infections to the crops.	Applicable as the installation of facilities or transport may introduce alien invasive species within the area.
Cutting of Trees (Prohibition) Act, 1992	The Act provides for the prohibition of cutting trees or causing damage to trees.	Applicable during the construction and operations phase of the Project.
National Environmental Quality Standards, 2000	Provide permissible limits for air quality, noise levels, water quality, soil etc.	The NEQS will apply to emissions such as air and noise emissions and will define the permissible limits for environmental discharges from Project facilities which are within the provincial jurisdiction of Balochistan.
National Environmental Quality Standards (Self-Monitoring and Reporting by Industry), 2001	The SMART Rules require different industrial units to submit Environmental Monitoring Reports to their Environmental Protection Agencies. Reporting frequency varies depending on the type of industry.	The SMART Rules will be applicable to the Project as it will result in liquid effluent discharge and gaseous emissions. The Project can be categorised into "Category A" of these Rules which require submission of Environmental Monitoring Reports on a monthly frequency.
Environmental Samples Rules, 2001	Provides guidelines for collection of environmental samples and reporting to relevant EPAs.	Applicable to the construction and operational phase of the Project as per the monitoring requirements of environmental approval from provincial EPAs.
Pollution Charge for Industry (Calculation and Collection) Rules, 2001	Aims to encourage industries to adopt environmentally responsible practices, minimise pollution emissions, and contribute financially towards environmental protection and conservation efforts.	Not applicable as the pollution charges were not prescribed at the time of this ESIA report. However, the Project may have to ensure compliance with these Rules once their applicability is formally notified.
Pakistan National Drinking Water Policy, 2009	Aims to ensure that all individuals in Pakistan have access to safe and clean drinking water, improve the quality and reliability of drinking water supply systems, promote efficient water resource management, and raise awareness about the importance of safe drinking water practices.	Applicable to ensure that the workforce engaged during the Project lifecycle has access to safe drinking water.
Related to Buildings		

Legal Instrument	Scope	Relevance
The Building Code of Pakistan – Fire Safety Provisions, 2016	The Building Code of Pakistan – Fire Safety Provisions (2016) delineates the prerequisites concerning fire prevention, life safety in the context of fire incidents, and fire protection measures applicable to buildings and structures resembling buildings.	The Code will be applicable to both construction and operation phases of the Project to ensure fire safety of the Project infrastructure.
The Building Code of Pakistan – Energy Provisions, 2011	These provide guidelines for energy-efficient designs.	The Code will be applicable during the construction of the Project infrastructure.
The Building Code of Pakistan – Seismic Provisions, 2007	The Code ensures buildings are designed to withstand seismic forces. It sets mandatory structural strength requirements for new construction.	The Code will be applicable during the construction of the Project infrastructure.
The Antiquities Act, 1975	The Act comprehensively sets forth detailed provisions concerning the identification, discovery, and reporting procedures pertaining to antiquities. Furthermore, the Act delineates specific guidelines and protocols to be adhered to by individuals or entities involved in the discovery process, ensuring the proper documentation and reporting of findings.	Applicable to the Project. In the event of discoveries, the Project will be obligated to manage and report them in compliance with the guidelines outlined in this Act.
Related to Ports, Maritime and Shipping		
The Ports Act, 1908	Provides rules for safety of shipping and conservation of ports. These rules restrict the disposal of ballast or any other discharges which may impact the aquatic environment or the shoreline, fire safety, carriage of artifacts etc.	Applicable during operations phase of the Project to ensure that the vessels and ships engaged adhere with the rules defined in this Act. The Project will also ensure that the ships/vessels do not directly discharge untreated effluent or ballast which may adversely affect the aquatic environment or the shoreline. The Project will also have to ensure that the wastes are adequately disposed of and do not form the potential of fire at the ship or at the nearest port of Pakistan.

Legal Instrument	Scope	Relevance
The Dock Labourers Act, 1934	Enacted to provide provisions for occupational health and safety of the dock workers during loading or unloading or cargo from a ship.	Relevant to consider as this Act provides guidelines for development of the Pakistan Dock Laborers Regulations, 1948 for prescribing work procedures to ensure safety of the dock workers and respond to emergency scenarios.
Pakistan Dock Labourers Regulations, 1948	These Regulations provide provisions for safety of dock workers during loading and unloading of cargo from a ship.	Applicable as the Project will have to ensure that dock workers are provided with safe working environment with adequate emergency response facilities. The Project will have to ensure that the working areas are adequately fenced with defined approaches, adequate lighting and have adequate emergency response equipment including first aid facility and ambulances. The Project will also have to ensure that the ships are loaded following the safety provisions provided in these Regulations to ensure dock workers safety.
The Dock Workers (Regulation of Employment) Act, 1974	Established to ensure availability of safe working conditions and equitable environment via formation of management schemes for registration of the dock workers of Pakistan.	Applicable. The Project will involve dock workers for loading vessels at the Port Qasim. Therefore, compliance with this Act will be necessary to ensure that equitable working conditions are available for the workers. The Project will also have to ensure that the Inspectors are given the right of entry for inspection of the working conditions.
The Pakistan Maritime Zones Act, 2023	The Act defines the limit of territorial sea, contiguous zone, exclusive economic zone and continental shelf of Pakistan. It establishes the government's right to declare Exclusive Economic Zones (EEZ).[3] This Act also restricts activities within the EEZs which may directly or indirectly impact the marine environment.	Not applicable as the Project activities will be limited to the Port Qasim. However, if any future activities are planned within the EEZ, the Project will have to ensure that the marine transportation does not involve restricted activities specified for the EEZs unless a formal license is obtained from the relevant authorities. This includes any activity which may impact the marine

3 According to the Pakistan Maritime Zones Act, 2023, the Exclusive Economic Zone is an area beyond and/or adjacent to the territorial sea, the limit of which is two hundred nautical miles from the territorial waters baseline. The limit of the territorial waters sea is twelve nautical miles beyond the land territory and internal waters of Pakistan measured from the baseline. The baseline means the low water line or where applicable the system of straight lines from which limits of the territorial sea, contiguous zone, exclusive economic zone and continental shelf are measured. The baseline is notified by the Federal Government in the official Gazette.

Legal Instrument	Scope	Relevance
		environment e.g., fishing, exploration of minerals etc.
Pakistan Maritime Security Agency Act, 1994	Establishes the Pakistan Maritime Security Agency, which is tasked with to safeguarding Pakistan's maritime interests, enforcing maritime laws, and ensuring security in Pakistan's territorial waters and exclusive economic zones.	Applicable as the Projects shipping activities will be in proximity to the coast, and activities conducted within Pakistan's maritime zones, activities in territorial waters, or interactions with maritime agencies.
The Pakistan Merchant Shipping Ordinance, 2001	Provides provisions for the registration of ships, mortgage and transfer of ships, maintenance and cargo of ships alongside labour and working conditions for the seamen.[4]	Not applicable as the requirements under this Ordinance applies to the operator of the vessel.
The Pakistan Merchant Shipping (Carriage of Hazardous and Dangerous Substances by Ship) Rules, 2009	These Rules provide provisions and guidelines for carriage of hazardous and dangerous substances by ship.	These rules may become applicable during the construction phase if the Project intends to import hazardous substance via ships. If so, the Project will have to report the contents of the ship to the Maritime Security Agency prior to arrival of the ship to ensure that adequate facilities are in place for unloading the hazardous substances in a safe manner.
Related to Power Supply and Distribution		
Electricity Act, 1910 and Electricity Rules, 1937	Regulates production, transmission, distribution, and use / licensing of electricity.	Not applicable as the Project will rely on onsite HFO Power Plant and Solar Farm to fulfil their operations phase power requirement. However, it will become applicable once the Grid Connection is implemented.
Related to Handling of Substances		
Explosives Act, 1884, Explosives	Regulates handling and storage of explosive substances. The 1884	Applicable as the Project will involve the use of explosives[6] during construction and

4 The Pakistan Merchant Shipping Ordinance, 2001 defines seamen as any person who is employed or engaged for service onboard of any ship. A seaman does not include master, or pilot.

6 According to Explosives Act, 1884, explosives include gunpowder, nitro-glycerine, nitroglycol, gun-cotton, dinitro-toluene, trinitro-toluene, picric acid, dinitro-phenol, trinitro resorcinol (styphnic acid), cyclotrimethylene trinitramine, Penta erythritol-tetranitrate, tetryl, nitroguanidine, lead azide, lead styphnate, fulminate of mercury or other metal, diazo dinitro phenol, coloured fires or any other substances, whether a single chemical compound or a mixture of substances, whether solid or liquid or gaseous, used or manufactured with a view to produce a practical effect by explosion, or a pyrotechnic effect. Explosives also include: (i) chemical compounds, compositions or mixtures of which will produce, upon release of its potential energy

Legal Instrument	Scope	Relevance
Rules, 2010, and Explosives Substances Act, 1908 (Amendment 2017)[5]	Act allows the Government to form rules which regulate the different types of explosives and their licensing regime.	operations. The Project will store bulk quantities of explosives for blasting in the open pit mine for loosening of ore. The Project will ensure that the explosives are stored, managed, and transported in a safe manner such that it may not pose any hazards to the site workers, or the nearby receptors, whether within the boundary of the Mine Site or not.
Petroleum Act, 1934, and the Petroleum Rules, 1937	The Act outlines regulations governing the importation, transportation, and storage of petroleum products. Additionally, it incorporates provisions mandating the acquisition of a license if the stored volume of petroleum product exceeds 800 litres. Further, it allows the Government to form rules which regulate the petroleum licensing regime in the country.	The Act will likely be applicable to the construction and operations phases of the Project. As RDMC's storage / use of petroleum products exceeds the thresholds, this Act and the Rules will apply.
Related to Infrastructure		
Canal and Drainage Act, 1873	Regulates the use of water for different purposes, prohibits industrial discharges within the canals and ensures that the Projects have no impacts on drainage infrastructure.	Applicable as the railway crossings include rivers and canals, which can be potentially impacted during operations.
Railways Act, 1890	Governs the operation, maintenance, responsibilities of licensees and safety standards of railway infrastructure nationwide.	Applicable as the Project will use freight trains for transportation of copper concentrate from Mine Site to Port Qasim. Increased railway traffic can cause elevated noise levels at the receptors as well as pose a risk of public safety along the Rail Corridor.
Road Transport Workers Ordinance, 1961	This legislation establishes conditions for vehicle drivers and imposes limits on driving time.	The provisions of the ordinance will be applicable to drivers recruited for both Project and contractor operated vehicles.

sudden outburst of gases, thereby exerting high pressures on its surroundings. Explosives may be solid, liquid or gas, nitro compounds or in the form of water gel or slurry; and (ii) substances for signals, fireworks, fuses, rockets, percussion-caps, detonators, cartridges, ammunition of all descriptions and every adaptation or preparation of an explosive as defined above. The Explosive Rules, 2010, define explosives in different classes under Schedule 1.

[5] The Explosive Substances Act, 1908, is still the applicable regime and has been amended by the Explosive Substance Act, 2017.

Legal Instrument	Scope	Relevance
		This includes vehicles which will be used for transport of goods or passengers.

Table 2-4: Other Applicable Laws, Rules and Regulations at Provincial Level – Balochistan

Legal Instrument	Scope	Relevance
Related to Industry, Employment, and Wages		
Regulation of Mines and Oil-fields and Mineral Development (Government Control) (Amendment) Act, 2022 and the relevant provisions of the Balochistan Mineral Rules, 2002	This is an amendment by the Province of Balochistan of the Regulation of Mines and Oil-fields and Mineral Development (Government Control) Act, 1948. The 1948 act (as amended) provides for regulation of mines and oilfields and mineral development. The mineral titles have been granted to RDMC pursuant to Section 7 of the 1948 Act (as amended). The BMR, 2002, passed under the 1948 Act (as amended) only applies to the extent mentioned in the mineral titles issued to RDMC.	The Act empowers the Government of Balochistan to make rules and the BMR, 2002 sets out the procedure for obtaining permits, licenses, and approvals for mining operations, and governs the rights, obligations, and responsibilities related to mines and minerals.
Mines Act, 1923 as amended by the Balochistan Mines (Amendment) Act, 2011	Regulates and inspects mining operations in Balochistan province.	The 1923 Act will apply to the Project as is, except as and where amended by the Balochistan Mines (Amendment) Act, 2011.
Balochistan Factories Act, 2021	A provincial adaptation of the federal legislation i.e., the Factories Act of 1934, which is applicable specifically in the province of Balochistan. The act enacts the labour and working conditions for labour engaged in Balochistan.	Due to the engagement of a significant workforce, this Act will apply and its requirements will be followed to ensure availability of adequate labour and working conditions for the workers.
Balochistan Workers Compensation Act, 2022	The Act ensures that workers and their families are financially supported in the event of workplace accidents or injuries, emphasizing the importance of workplace safety and well-being.	Applicable as the Project will employ workers, as it provides compensation to workers or their dependents in case of work-related injuries, disabilities, or death.

Legal Instrument	Scope	Relevance
Balochistan Payment of Wages Act, 2021	This legislation governs the payment of wages to workers in the province of Balochistan, Pakistan. The Act outlines the legal framework and procedures for ensuring timely and fair payment of wages to employees, thus safeguarding their rights and economic well-being.	Applicable as compliance with the Act's provisions is crucial to uphold workers' wage rights and promote transparency in wage payment practices for the employed workforce in Balochistan.
Balochistan Minimum Wages Act, 2021	This Act regulates the payment of wages to workers employed in Balochistan.	The Project will engage the workforce during its construction and operations. This Act is applicable to ensure that workers are paid at least minimum wages as per the annual notified minimum wages for Balochistan.
Balochistan Employment of Children (Prohibition & Regulation) Act, 2021	The legislation prohibits the engagement of individuals below the age of 18 in occupations deemed hazardous.	Mining is classified as hazardous activity in this Act due to which, it prohibits the employment of any person under the age of 18-years by the Project.
Balochistan Workers Welfare Fund Act, 2022	The Act mandates employers to make contributions to the Workers Welfare Fund, which is subsequently to be allocated for diverse welfare initiatives with the intention of benefiting workers and their dependents.	Not applicable. The Project obtained an exemption from this requirement in connection with the Reconstitution.
Balochistan Industrial Relations Act, 2022	The legislation encompasses regulations pertaining to labour standards, specifically addressing, among other matters, the entitlement of workers to establish labour unions and the establishment of Labour Courts by the government.	The Act will be applicable to the Project during the construction and operation phase of the Project and will require adherence to the established labour standards delineated in the Act.
Pakistan Penal Code (PPC), 1860	Penal code for all offenses charged in Pakistan and their penalties.	Many of the provisions of the PPC indirectly apply to the Reko Diq project in the context of E&S compliance, worker safety, community engagement, and environmental protection.
Minimum Wages for Unskilled Workers (Amendment) Act, 2016 (Act No.VII of 2016)	This sets the minimum wage for unskilled workers in Pakistan.	The Act provides a clear guideline for determining the minimum wages for unskilled workers employed in the Reko Diq project. This helps ensure fair labor practices and prevents

Legal Instrument	Scope	Relevance
		exploitation of workers. This Act is not applicable in Balochistan.
Workmen's Compensation Act, 1923	This legislation provides compensation to workers who suffer injuries or disabilities arising out of and in the course of their employment.	As a large-scale mining project, Reko Diq involves significant construction, operational, and transport-related activities, all of which present occupational health and safety risks.
The Protection Against Harassment of Women at the Workplace (as amended in 2021)	Provisions for the protection against harassment of women at the workplace.	This legal framework ensures that women working at the site, in associated communities, or as part of RDMC's operations are treated with respect, free from harassment, and have equal access to employment opportunities.
Related to E&S		
Balochistan Groundwater Rights Administration Ordinance, 1978	This law was promulgated to ensure efficient and site-specific management of scarce water resources in Balochistan.	Applicable during the overall Project lifecycle.
Balochistan Groundwater Rights Administration Rules, 2014	The stipulated rules delineate procedures for the administration and utilisation of ground water resources, specifically regulating their extraction.	Applicable as the Project activities involve extraction of groundwater. Thus, the Project will be required to follow the licensing / permit requirements outlined in these Rules.
Balochistan Wildlife (Protection, Preservation, Conservation, and Management) Act, 2014	This Act is enacted to provide protection, preservation, conservation, sustainability and management for wildlife, and the establishment and management of protected areas in the Province of Balochistan.	Relevant due to the potential proximity of the Rail Corridor to sensitive and protected areas, necessitating assessment of the construction and operational impact on these environments. Compliance with this Act will also require the Project to ensure that the staff do not hunt or capture birds and/or animals, including species of conservation significance found within the Project Area.
Balochistan Drinking Water Policy/ Strategy 2017	Balochistan Drinking Water Policy provides strategic direction and a development framework to the stakeholders and addresses the issues	Applicable during both construction and operations phases of the Project.

Legal Instrument	Scope	Relevance
	and challenges faced by both its urban and rural populations. It is envisaged that the efforts of all tiers of government and the local authorities shall be planned, executed, and coordinated accordingly. The new policy/strategy proposes the establishment of new drinking water supply systems, and rehabilitation and upgradation of existing systems in urban as well as rural areas to ensure sustainable access to drinking water for the entire population of Balochistan.	
Balochistan Occupational Safety and Health Act, 2022	A provincial Act that focuses on ensuring occupational safety and health standards in workplaces within Balochistan. It outlines the establishment of an Occupational Safety and Health Council and other regulatory measures.	Applicable to the workforce being employed in the construction and operation phase activities in Balochistan.
Balochistan Environmental Quality Standards, 2020	Provide permissible limits for air quality, noise levels, water quality, etc.	Relevant for ensuring compliance of emissions or any environmental discharges with the BEQS.
Balochistan Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014	These Rules require different industrial units to submit Environmental Monitoring Reports to their Environmental Protection Agencies. Reporting frequency varies depending on the type of industry.	These Rules will be applicable to the Project as it will result in liquid effluent discharge and gaseous emissions. The Project can be categorised into “Category A” of these Rules which require submission of Environmental Monitoring Reports on a monthly frequency.
Balochistan Environmental Samples Rules, 2020	Provides guidelines for collection of environmental samples and reporting to relevant EPAs.	Applicable to the construction and operational phase of the Project as per the monitoring requirements of environmental approval from provincial EPAs.
Balochistan Environmental Pollution Charge for Industry (Calculation	The Rules provide guidelines to calculate pollution charges payable by industrial units and determine pollution levels.	The pollution charges set out schedules to these Rules are applicable to any industrial unit carrying out industrial activity in the Province of Balochistan.

Legal Instrument	Scope	Relevance
and Collection) Rules, 2020		
Related to Motor Vehicles		
The Balochistan Motor Vehicles Ordinance, 1965	This ordinance governs vehicle registration and mandates compliance with specified guidelines. It establishes road safety provisions with corresponding penalties for non-compliance and cautions against using vehicles in unsafe conditions, posing risks to passengers and others.	Applicable to all Project vehicles and drivers, including those engaged by the contractors.
Balochistan Environmental Protection (Motor Vehicles) Rules, 2020	Ensures prohibition of the use of motor vehicles which can potentially exceed relevant threshold limits defined in the Balochistan Environmental Quality Standards.	These Rules will apply to the Project and will ensure that all the Project vehicles are complying to the NEQS for motor vehicles exhaust emissions.
Related to Handling of Substances		
Balochistan Hazardous Substance Rules, 2020	Provides regulations and licensing requirements for transporting, handling, and disposing of hazardous substances.	Applicable as the Project will involve the transportation, management, and storage of hazardous and flammable substances including fuels and explosives. The Project will also have to obtain a license for hazardous materials transportation, management, and storage.
Related to Cultural Heritage		
Balochistan Cultural Heritage Preservation Act, 2010	The Act makes provision for the preservation and protection of ancient places and objects of architectural, historical, archaeological, artistic, anthological, anthropological, and national interest in the Province of Balochistan.	Applicable as the Project may encounter chance finds during excavation for construction or mining activities.
Related to Buildings and Land Development		
Balochistan Development Authority Act, 1974	The Act related to the preparation and execution of comprehensive development programs including projects and schemes related to land and water development, power, industry, mineral exploitation, and development for the economic uplift of relatively under-developed areas.	Applicable during the overall Project lifecycle.

Legal Instrument	Scope	Relevance
Land Acquisition Act, 1894	Regulates the acquisition of land and other properties for development projects in Pakistan.	This law is relevant in terms of land acquisition and compensation, public purpose, and dispute resolution and legal recourse.
Balochistan Buildings Control Ordinance, 1979 (Ord: VI of 1979)	The Ordinance sets the requirements for the approval of buildings.	Applicable to building and facilities during both construction and operation phases of the Project.
Balochistan Antiquities Act, 2014	The Act aims to protect and preserve archaeological sites, architectural remains and cultural monuments in the region and required to be followed for construction of any pipeline within 61 m (~200 feet) of an immoveable antiquity.	Applicable as the Project may encounter chance finds during excavation during construction activities.
Balochistan Boilers and Pressure Vessels Act, 2015	The Act aims to ensure safety, proper design, and adherence to standards for boilers and pressure vessels.	Permits required to install and operate a boiler facility from the Chief Inspector of Boilers.
Balochistan Housing and Town Planning Authority Act, 2020 Balochistan Building Control and Town Planning Rules, 2022	The Act requires the establishment of an authority for regional development plans and town planning. The Rules provide the procedure for applications to be made to the Authority to request building permits.	Under this Act, the mining companies can align their CSR activities with sustainable urban development initiatives. This Act will be applicable if the Project includes urban development initiatives as part of their CSR activities.

Table 2-5: Other Applicable Laws, Rules and Regulations at Provincial Level – Sindh

Legal Instrument	Scope	Relevance
Related to E&S		
Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020	Allows the government to take measures for the protection of wildlife by declaring certain areas as national parks, wildlife sanctuaries, and game reserves, and by declaring certain species as protected.	Relevant for assessing and mitigating impacts of project construction and operation on sensitive wildlife habitats and protected areas, and regulating activities such as hunting or capture of animals.
Forest Act, 1927[7]	Regulates forest resources, empowering the government to declare any forest area reserved or protected.	No cutting of trees is anticipated. This Act will be applicable if project

[7] The Forest Act, 1927, is still the applicable regime, however, it has been amended by the Forest Act (Sindh Amendment) Act, 1972 and the Forest Act (Sindh Amendment) Act, 1994.

Legal Instrument	Scope	Relevance
		activities impact nearby mangrove forest.
Sindh Fisheries Ordinance, 1980[8]	Regulates fishing activities in Sindh province, aiming to sustainably manage fisheries resources and protect aquatic ecosystems.	Applicable as the Project can potentially impact the marine ecology during storage and transport of copper concentrate.
Sindh Environmental Quality Standards, 2016	Provide permissible limits for air quality, noise levels, water quality, soil etc.	Relevant for ensuring compliance of emissions or any environmental discharges with the SEQS.
Sindh Occupational Safety and Health Act, 2017	Enacted at the provincial level to ensure occupational safety and health standards in workplaces.	Applicable during construction, operations, and maintenance along the Rail Corridor and Port Qasim to safeguard workers' safety and health.
Related to Industry, Employment, and Wages		
Sindh Workers Welfare Fund Act, 2014	The Act aims to provide for the establishment of a Workers Welfare Fund to promote the welfare of industrial workers and their families by collecting contributions from employers and utilizing the funds for various welfare purposes.	Not applicable. The Project obtained an exemption from this requirement in connection with the Reconstitution.
Sindh Factories Act, 2015	Aim to ensure the safety, health, and welfare of workers, prevent exploitation and child labour, promote fair employment practices, protect the environment, and ensure compliance with legal standards in factory operations.	Applicable during construction and operation of storage facilities at the Port Qasim and maintenance of railway track within the Rail Corridor to uphold labour standards and environmental protection.
Sindh Payment of Wages Act, 2015	The Act outlines regulations and guidelines for the timely and fair disbursement of wages to employees, wage payment, dispute resolution, and regulatory compliance, ensuring their economic rights and well-being.	Applicable during construction and operation of storage facilities at Port Qasim and maintenance of railway track within the Rail Corridor to ensure that the wages of the workers align with the prevailing payment rates of the Sindh province.
Related to Buildings, Land Development and Coast Operations		

[8] Sindh Fisheries Ordinance, 1980, has been amended by subsequent acts such as the Sindh Fisheries (Amendment) Act, 2003, and the Sindh Fisheries (Amendment) Act, 2011.

Legal Instrument	Scope	Relevance
Port Qasim Authority Act, 1973	This Act governs the development and operations of the Port Qasim Authority, and all of the entities operating within it.	Applicable as the Act mandates all of the Proponents to ensure that port is pollution free. The Act also restricts construction or operations activities in the Port Qasim without obtaining an environmental approval from the Sindh Environmental Protection Agency.
The Sindh Coastal Development Authority Act, 1994 and amendments (2015, 2018 and 2020)	An Act to provide for development, improvement and beautification of the coastal areas of Province of Sindh.	Relevant to consider while carrying out concentrate handling activities and port operations at Port Qasim.
Notice to Mariners	A notice under PQA for maximum permissible draughts and dimensions for ships calling at Port Qasim as per PQA Notice (16/05/2022).	Relevant to consider while carrying out concentrate transportation onto ships at Port Qasim.
Related to Handling of Substances		
Sindh Hazardous Substances Rules, 2014	Provides regulations and licensing requirements for transporting, handling, and disposing of hazardous substances.	Applicable as the Project will handle copper-gold concentrate at the PIBT at Port Qasim, Sindh.

2.2. International Regulatory Framework

Barrick and RDMC is committed to aligning with international standards and guidelines aimed at ensuring the conservation of the environment, and the management and protection of natural resources. The guidelines detailed below seek to ensure that economic development for investor and national interests is done in a sustainable manner, which conserves and/or protects the communities as well as the environment in the Project areas.

The Good International Industry Practice (GIIP) considered for this Project includes the IFC PSs on Environmental and Social Management, the EPs and the GISTM. At the group level, Barrick has committed to aligning with the provisions under these standards. A summary of the provisions is provided in the subsections that follow.

2.2.1. International Finance Corporation's Performance Standards

The IFC PSs were introduced to guide, manage and improve environmental and social performance through a risk and outcomes-based approach. The PSs require that the social and environmental impacts and risks of the Project are identified and assessed during the early stages of the development of the Project and continue to be managed throughout the life of the Project. The IFC PSs (2012) consists of eight performance standards as outlined in Table 2-6. Further guidance on the application of the PSs is provided in the IFC Guidance *Notes*: PS on Environmental and Social Sustainability (2012) and an updated Guidance Note for PS 6 (2018). The section below includes a summary of the PSs and as well as a description of how they apply to this study and the Project, included in Table 2-6.

Table 2-6: IFC Performance Standards and their Key Objectives and relevance to the Project

Performance Standards	Key Objectives	Relevance to the Project
PS 1: Assessment and Management of Environmental and Social Risks and Impacts	• To identify and evaluate environmental and social risks and impacts of the Project; • To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Project Affected Communities, and the environment; • To promote improved environmental and social performance of clients through the effective use of management systems; • To ensure that grievances from Project Affected Communities and external communications from other stakeholders are responded to and managed appropriately; • To consider the risks and impacts of the Project, including Emissions of Greenhouse Gases (GHG), risk of climate change, transboundary effects and adaptation opportunities; and • To promote and provide means for adequate engagement with Project 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.	The assessment of these risks and impacts forms parts of an ESIA process prescribed by the laws of Pakistan, which identifies and assesses potential environmental, social and health impacts of the Project.
PS 2: Labour and Working Conditions	• To promote the fair treatment, non-discrimination, and equal opportunity of workers; • To establish, maintain, and improve the worker-management relationship; • To promote compliance with national employment and labour laws;	This ESIA study has assessed potential positive and negative economic impacts through the provision of employment to the local communities and has included

Performance Standards	Key Objectives	Relevance to the Project
	• To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain; • To promote safe and healthy working conditions, and the health of workers; and • To avoid the use of forced labour.	proposed measures for mitigating negative impacts that can arise through gender discrimination, human toxicity, and poor and unsafe working conditions.
PS 3: Resource Efficiency and Pollution Reduction	• To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from Project activities; • To promote more sustainable use of resources, including energy and water; and • To reduce Project-related GHG emissions.	This ESIA study has specifically addressed the potential sources of pollution stemming from the Project that may have an impact on natural resources and cause detrimental impacts and has suggested ways of mitigating against these impacts.
PS 4: Community Health, Safety and Security	• To anticipate and avoid adverse impacts on the health and safety of the Project Affected Communities during the Project life from both routine and non-routine circumstances; • To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimises risks to the Project Affected Communities; and • Projects must identify and mitigate risks and potential impacts on priority ecosystems services that may be exacerbated by climate change.	This ESIA study has considered community health and safety risks.
PS 5: Land Acquisition and	• To avoid, and when avoidance is not possible, minimise displacement by exploring alternative Project designs; • To avoid forced eviction;	The ESIA has not considered Land Acquisition and Involuntary Resettlement as the Project is not anticipated to require any private

Performance Standards	Key Objectives	Relevance to the Project
Involuntary Resettlement	• To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected; • To improve, or restore, the livelihoods and standards of living of displaced persons; and • To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.	acquisition and all the land required for the Project will be leased from Government of Balochistan. Moreover, no resettlement will be required in connection with the Project. A detailed assessment of PS5 aspects, including economic displacement and informal land use is provided in Section 5.5.6.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	• To protect and conserve biodiversity; • To maintain the benefits of ecosystem services; and • To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.	The ESIA has included an assessment of the community's use and management of natural resources to conserve biodiversity. A Critical Habitat Assessment has also been undertaken as part of this ESIA.
PS 7: Indigenous People	• To ensure full respect for indigenous peoples: • Human rights, dignity, aspirations; • Livelihoods; • Culture, knowledge, and practices; • To avoid and/or minimise adverse impacts; • To ensure sustainable and culturally appropriate development benefits and opportunities; and	Screening has been undertaken against the requirements of PS 7. There are no Indigenous Peoples in the area (see Chapter 5 and Appendix C).

Performance Standards	Key Objectives	Relevance to the Project
	• To ensure Free, Prior, and Informed Consent (FPIC) in certain circumstances.	
PS 8: Cultural Heritage	• To protect cultural heritage from the adverse impacts of Project activities and support its preservation; and • To promote the equitable sharing of benefits from the use of cultural heritage.	There are no cultural or heritage sites of significance in the area or in proximity to the Project facilities. A Chance Find Procedure has been implemented (see Appendix G).

The IFC PSs state that the following elements should be incorporated into the Environmental and Social Management System (ESMS):

- A policy (social and environmental);
- Identification of risks and impacts;
- Management programs;
- Organisational capacity and competency;
- Emergency preparedness and response;
- Monitoring and review;
- Stakeholder engagement;
- External communications and grievance mechanisms; and
- Ongoing reporting to affected communities.

2.2.2. Equator Principles

The EPs were developed in June 2003, by a group of leading private banks and the IFC. Over 125 financial institutions have adopted the EPs covering the majority of international project finance debt in developed and emerging markets. The Equator Principles 4 (EP4) is the latest iteration of the Equator Principles. EP4 came into effect for all EP Financial Institutions on 1 October 2020.

The current set of principles (2020) are regarded as the financial industry's benchmark for determining, assessing and managing social and environmental risk in project financing. The principles require that projects such as the Reko Diq Mining Project (Category A project) are subject to an ESIA and observe the relevant IFC PSs (January 2012).

The EPs are a voluntary set of 10 principles (Table 2-7) intended to serve as a common baseline and framework for financial institutions to identify, assess and manage environmental and safety risks when financing a project. Equator Principles Financial Institutions (EPFIs) are committed to implementing the principles through internal environmental and safety policies, procedures, and standards. EPFIs will not provide project finance to projects which do not comply with the relevant EP requirements. It is therefore necessary that the Project is compliant with the following EPs to ensure that any proposed Project sponsor is satisfied that funding can be released in respect of operations that are compliant.

Table 2-7: EPs and their Requirements for Projects

Equator Principle	Requirements
Principle 1: Review and Categorisation	When a project is proposed for financing, the relevant financial institutions (EPFI) will, as part of its internal social and environmental review and due diligence, categorise such project based on the magnitude of its potential

Equator Principle	Requirements
	impacts and risks in accordance with the environmental and social screening criteria of the IFC. Given the nature and spatial and temporal scale, the Reko Diq Project is classed as Category A. The Project falls within a Category A project and all commitments relevant to Category A projects as set out in Principles 2 throughout 10 shall be complied with.
Principle 2: Social and Environmental Assessment	An ESIA process must be completed to address the relevant social and environmental impacts and risks of the project. The ESIA will include all relevant issues included in Exhibit II of the Equator Principles. The ESIA will also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed Project.
Principle 3: Applicable Social and Environmental Standards	The ESIA will refer to and comply with the applicable IFC PS and the applicable Industry Specific EHS Guidelines. The relevant IFC PS and Guidelines are dealt with in more detail below. The ESIA will establish the project's overall compliance with, or justified deviation from, the respective PS and EHS Guidelines. The ESIA will address compliance with relevant host country laws, regulations and permits that are applicable to social and environmental aspects of the project.
Principle 4: Action Plan and Management System	Outcomes of the ESIA will be the development of Management Plans and an Environmental and Social Action Plan (ESAP) which addresses the relevant findings and draws on the conclusions of the ESIA. The ESAP will describe and prioritise the actions needed to implement mitigation measures, corrective actions, and monitoring measures necessary to manage the impacts and risks identified in the Assessment. RDMC will be required to establish an ESMS that addresses the management of these impacts, risks, and corrective actions required to comply with applicable local and national social and environmental laws and regulations, and requirements of the applicable international regulations, as defined in the ESAP.
Principle 5: Consultation and Disclosure	Consultations with communities affected by a project should be undertaken by the government, the developer or third-party expert in a structured and culturally appropriate manner. The public participation process will ensure that project affected communities are provided free, prior, and informed consultation and will facilitate their informed participation to establish, to the satisfaction of the EPFIs, whether a project has adequately incorporated affected communities' concerns. To accomplish this, the ESIA documentation and ESAP, or non-technical summaries thereof, will be made available to the public by RDMC for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The results of the public participation process will be

Equator Principle	Requirements
	documented; including any actions agreed resulting from the consultations. Disclosure will occur early in the ESIA process, before the project construction commences, and on an on-going basis.
Principle 6: Grievance Mechanism	To ensure that consultation, disclosure, and community engagement continues throughout construction and operation of the project, RDMC must establish a grievance mechanism as part of the ESMS which will be scaled to the risks and adverse impacts of the project. This will allow RDMC to receive and facilitate resolution of concerns and grievances about the project's social and environmental performance raised by individuals or groups from among project-affected communities. RDMC must inform the affected communities about the mechanism in the course of its community engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible to all segments of the affected communities.
Principle 7: Independent Review	The ESIA, ESAP and consultation process documentation will be reviewed by an independent social or environmental expert not directly associated with the project, to assist EPFI's due diligence, and assess RDMC's compliance with the Equator Principles.
Principle 8: Covenants	The following covenants will be included in the financing documentation: • to comply with all relevant host country social and environmental laws, regulations and permits in all material respects; • to comply with the ESAP (where applicable) during the construction and operation of the project in all material respects; • to provide periodic reports in a format agreed with EPFIs (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third-party experts, that documents compliance with the ESAP (where applicable); • to provide representation of compliance with relevant local, state and host country social and environmental laws, regulations, and permits; and • to decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan. Where a borrower is not in compliance with its social and environmental covenants, EPFIs will work with the borrower to bring it back into compliance to the extent feasible, and if the borrower fails to re-establish compliance within an agreed grace period, EPFIs reserve the right to exercise remedies, as they consider appropriate.
Principle 9: Independent	To ensure on-going monitoring and reporting over the life of the loan, EPFIs will require the appointment of an independent environmental and/or social

Equator Principle	Requirements
Monitoring and Reporting	expert or require that the borrower retain qualified and experienced external experts to verify its monitoring information which would be shared with EPFIs.
Principle 10: EPFI Reporting	Each EPFI commits to report publicly at least annually about its Equator Principles implementation processes and experience, considering appropriate confidentiality considerations. As mentioned above under Principle 3, the EP requires that the ESIA refers to and complies with the applicable IFC PS and the applicable Industry Specific EHS Guidelines.

2.2.3. ADB Safeguard Policy Statement

The ADB Safeguard Policy Statement (SPS) 2009 is designed to ensure that projects financed by the ADB are environmentally sustainable and socially inclusive. It sets out comprehensive policies to manage environmental and social risks associated with development projects. The SPS emphasises the importance of conducting thorough environmental impact assessments and implementing robust environmental management plans to mitigate any adverse effects on the environment.

ADB's SPS sets out the policy objectives, scope, and principles for three key safeguard areas:

- Safeguard Requirement 1 (SR1): Environment,
- Safeguard Requirement 2 (SR2): Involuntary Resettlement, and
- Safeguard Requirement 3 (SR3): Indigenous Peoples.

To help clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that clients are required to meet in addressing environmental and social impacts and risks. Table 2-8 provides a summary of the ADB SPS and ESS and the relevance to the project.

Table 2-8: ADB SPS and ESS and their Requirements and Relevance to the Project

ADB SPS 2009	Key Objectives/ Requirements	Relevance to the Project
ADB SPS SR1: Environment	Focuses on identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle. Requirements: • Conduct environmental and social impact assessments. • Develop and implement environmental and social management plans.	An ESIA has been undertaken for the project to assess the E&S risks and propose appropriate mitigation, management and monitoring measures and the associated management plans.

ADB SPS 2009	Key Objectives/ Requirements	Relevance to the Project
	• Monitor and report on E&S performance throughout the project lifecycle.	
	Ensures fair treatment, non-discrimination, and equal opportunity for workers, along with safe and healthy working conditions. Requirements: • Comply with national labour laws and international labour standards. • Implement occupational health and safety measures. • Establish grievance mechanisms for workers.	The project will comply with the labour and working conditions requirements and has adequate occupational health and safety plans and grievance mechanisms in place.
	Promotes the sustainable use of resources and the prevention, reduction, and control of pollution. Requirements: • Implement measures for efficient use of energy, water, and raw materials. • Adopt pollution prevention and control technologies. • Manage waste and hazardous materials responsibly.	This ESIA study has specifically addressed the potential sources of pollution stemming from the Project that may have an impact on natural resources and cause detrimental impacts and has suggested ways of mitigating against these impacts. Waste Management Plan and Hazardous Materials and Management Plan are being developed to address concerns related to waste and hazardous materials.
	Addresses the health, safety, and security risks to local communities that may arise from project activities. Requirements: • Assess and manage risks related to community health and safety. • Implement measures to prevent and respond to emergencies. • Ensure security arrangements respect human rights.	This ESIA study has considered community health and safety risks from the project.

ADB SPS 2009	Key Objectives/ Requirements	Relevance to the Project
ADB SPS SR2: Involuntary Resettlement	Aims to avoid or minimize involuntary resettlement and ensure fair compensation and assistance for affected people. Requirements: • Develop resettlement plans and frameworks. • Provide compensation at replacement cost. • Offer livelihood restoration and improvement programs.	The Project is not anticipated to require any private land acquisition. Moreover, no resettlement will be required in connection with the Project. A detailed assessment of PS5 aspects, including economic displacement and informal land use is provided in Section 5.5.6.
ADB SPS SR1: Environment	Protects biodiversity and promotes the sustainable management of natural resources. Requirements: • Avoid significant impacts on critical habitats. • Implement biodiversity management plans. • Promote sustainable practices in resource use.	The ESIA has included an assessment of the community's use and management of natural resources to conserve biodiversity. A Critical Habitat Assessment has also been undertaken as part of this ESIA and is included as Appendix J.
ADB SPS SR3: Indigenous Peoples	Ensures that projects respect the rights, culture, and livelihoods of Indigenous Peoples and involve them in project planning and implementation. Requirements: • Conduct social assessments and engage with Indigenous Peoples. • Develop Indigenous Peoples plans. • Obtain free, prior, and informed consent (FPIC) for projects affecting their lands.	Screening has been undertaken against the requirements of PS7. There are no Indigenous Peoples impacted by the Project (see Chapter 5 and Appendix C).
ADB SPS SR1: Environment	Protects cultural heritage from the adverse impacts of project activities and promotes its preservation. Requirements: • Identify and assess cultural heritage in project areas.	There are no cultural or heritage sites of significance in the area or in proximity to the Project facilities. A Chance Find Procedure has been implemented (see Appendix G).

ADB SPS 2009	Key Objectives/ Requirements	Relevance to the Project
	• Develop and implement cultural heritage management plans. • Consult with stakeholders on cultural heritage issues.	
	Aims to address the urgent and significant threat posed by climate change, which can reverse development gains and disproportionately affect disadvantaged or vulnerable communities. The standard retains the project-related GHG emissions monitoring and reporting requirements of the SPS. However, ESS9 cuts the monitoring and reporting threshold for GHG emissions from 100,000 tons of carbon dioxide equivalent per year to 20,000 tons of carbon dioxide equivalent per year. This aligns with the ADB GHG emissions guidelines. Requirements: • GHG Emissions Reduction: Minimize project-related greenhouse gas emissions. • Climate Risk Assessment: Conduct assessments to identify and manage climate risks. • Climate Resilience: Enhance the climate resilience of projects and affected communities. • Monitoring and Reporting: Monitor and report on GHG emissions and climate risk management.	A compete Climate Change Risk Assessment has been carried out and included as Appendix T. The assessment includes estimation of the GHG emissions from the Project.
	Ensures meaningful engagement with stakeholders and the disclosure of relevant project information in a timely and accessible manner. Requirements: • Develop and implement stakeholder engagement plans.	RDMC has developed a SEP to address and meet the requirements of the applicable standards with the adequate grievance mechanisms for stakeholders.

ADB SPS 2009	Key Objectives/ Requirements	Relevance to the Project
	• Provide accessible information to stakeholders. • Establish grievance mechanisms for stakeholders.	

2.2.4. Global Industry Standard for Tailings Management

The GISTM is the first global standard on tailings facility management and prescribes various requirements relating to social, environmental, local economic, and technical considerations. In the preamble of the GISTM it is stated that the GISTM "*strives to achieve the ultimate goal of zero harm to people and the environment with zero tolerance for human fatality*". During 2020, Barrick, as a member of the International Council of Mining and Metals (ICMM), was actively involved in the development of the GISTM.

The GISTM includes the Preamble, the Requirements, the Glossary and Annexes. Under each of the Principles the Requirements are set out which apply to individual facilities and are intended to be auditable. The standard encourages operators to take responsibility and prioritise the safety of tailings facilities, through all phases of a facility's lifecycle, including closure and post-closure. It has to be noted that the GISTM is not mandatory and is applied voluntarily. Conformance with the standard does not replace the need to comply with the local country specific legislation and where there is a conflict the local legislation should prevail.

The GISTM consists of the five topics and fifteen principles, namely:

- TOPIC I: AFFECTED COMMUNITIES

Companies are encouraged to engage with a broad range of stakeholders, including local communities, to ensure that the impacts and risks associated with tailings facilities are understood and addressed.

  - *PRINCIPLE 1: Respect the rights of project-affected people and meaningfully engage them at all phases of the tailings facility lifecycle, including closure.*

- TOPIC II: INTEGRATED KNOWLEDGE BASE

Companies should ensure that they maintain an extensive knowledge base and have documented the social, environmental and local economic context of the tailings facility. The knowledge base should be kept updated at least every five years.

  - *PRINCIPLE 2: Develop and maintain an interdisciplinary knowledge base to support safe tailings management throughout the tailings facility lifecycle, including closure.*

- *PRINCIPLE 3: Use all elements of the knowledge base - social, environmental, local economic and technical - to inform decisions throughout the tailings facility lifecycle, including closure.*

- TOPIC III: DESIGN, CONSTRUCTION, OPERATION AND MONITORING OF THE TAILINGS FACILITY

The standard outlines specific requirements for the safe design, construction, operation, and closure of tailings facilities. This includes measures to assess and manage risks associated with these facilities.

- *PRINCIPLE 4: Develop plans and design criteria for the tailings facility to minimise risk for all phases of its lifecycle, including closure and post closure.*
- *PRINCIPLE 5: Develop a robust design that integrates the knowledge base and minimises the risk of failure to people and the environment for all phases of the tailings facility lifecycle, including closure and post-closure.*
- *PRINCIPLE 6: Plan, build and operate the tailings facility to manage risk at all phases of the tailings facility lifecycle, including closure and post-closure.*
- *PRINCIPLE 7: Design, implement and operate monitoring systems to manage risk at all phases of the facility lifecycle, including closure.*

- TOPIC IV: MANAGEMENT AND GOVERNANCE

The governance element emphasises the need for clear accountability within companies for tailings management. This includes establishing effective governance structures, policies, and procedures. Regular and independent reviews of tailings facilities are essential to ensure compliance with the standard. Assurance processes are necessary to confirm that the management measures are effective.

- *PRINCIPLE 8: Establish policies, systems and accountabilities to support the safety and integrity of the tailings facility.*
- *PRINCIPLE 9: Appoint and empower an Engineer of Record.*
- *PRINCIPLE 10: Establish and implement levels of review as part of a strong quality and risk management system for all phases of the tailings facility lifecycle, including closure.*
- *PRINCIPLE 11: Develop an organisational culture that promotes learning, communication and early problem recognition.*
- *PRINCIPLE 12: Establish a process for reporting and addressing concerns and implement whistleblower protections.*

- TOPIC V: EMERGENCY RESPONSE AND LONG-TERM RECOVERY

Companies are required to develop and implement emergency response plans to effectively respond to and mitigate the impacts of potential incidents.

- *PRINCIPLE 13: Prepare for emergency response to tailings facility failures.*
- *PRINCIPLE 14: Prepare for long term recovery in the event of catastrophic fail.*

- TOPIC VI: PUBLIC DISCLOSURE AND ACCESS TO INFORMATION

The standard emphasizes the importance of transparent disclosure of information related to tailings facilities. This includes information about the design, construction, operation, and monitoring of these facilities.

- *PRINCIPLE 15: Publicly disclose and provide access to information about the tailings facility to support public accountability.*

Barrick has committed to construct and operate its TSFs in alignment with the principles of GISTM. The CTSF3's conformance to these principles and associated requirements will be evaluated throughout the life of the facility.

2.2.5. World Bank Group Environmental, Health and Safety Guidelines

The World Bank Group EHS Guidelines provide general and industry-specific best practice guidance and numerical limits for occupational and community health and safety, noise, gaseous emissions, effluent discharges, noise, and other waste products.

The t following World Bank Group had guidelines that are applicable to this Project include:

- *Guideline for Waste Management Facilities, 2007:* This guideline covers facilities or Projects dedicated to the management of municipal solid waste and industrial waste, including waste collection and transport; waste receipt, unloading, processing and storage; landfill disposal; physicochemical and biological treatment; and incineration Projects. It also covers the most common commercial methods of waste management. It does not cover other activities such as the management of radioactive wastes, co-incineration at combustion plants, or deep well injection.
- *Guideline for Waste Management, 2007:* This guideline applies to Projects that generate, store, or handle any quantity of waste across a range of industry sectors. It is not intended to apply to Projects or facilities where the primary business is the collection, transportation, treatment, or disposal of wastes.
- *Guideline for Contaminated Land*: This guideline provides a summary of management approaches for land contamination due to anthropogenic releases of hazardous materials, wastes, or oil, including naturally occurring substances. Releases of these materials may be the result of historic or current site activities, including, but not limited to, accidents during their handling and storage, or due to their poor management or disposal.

- *Guideline for Mining, 2007:* This guideline is applicable to underground and open-pit mining, alluvial mining, solution mining and marine dredging. The extraction of raw materials for construction products is addressed in the EHS Guidelines for Construction Materials Extraction.
- *Guideline for Construction and Decommissioning, 2007:* This guideline provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new Project development, at the end of the Project life cycle, or due to expansion or modification of existing Project facilities.
- *Guideline for Water Conservation:* Water conservation programs should be implemented commensurate with the magnitude and cost of water use. These programs should promote the continuous reduction in water consumption and achieve savings in the water measures include water monitoring/management techniques; process and cooling/heating water recycling, reuse and other techniques and sanitary water conservation techniques.
- *Guideline for Energy Conservation:* This guideline applies to facilities or Projects that consume energy in process heating and cooling; process and auxiliary systems, such as motors, pumps and fans; compressed air; and lighting systems.
- *Guideline for Wastewater and Ambient Water Quality, 2007:* This guideline applies to Projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or stormwater to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Process wastewater may include contaminated wastewater from utility operations, stormwater and sanitary sewage. It provides information on common techniques for wastewater management, water conservation and reuse that can be applied to a wide range of industry sectors.
- *Guideline Air Emissions and Ambient Air Quality, 2007:* This guideline applies to facilities or Projects that generate emissions to air at any stage of the Project life cycle. It also provides an approach to the management of significant sources of emissions, including specific guidance for the assessment and monitoring of impacts. It is also intended to provide additional information on approaches to emissions management in Projects located in areas of poor air quality, where it may be necessary to establish Project-specific emissions standards.
- *Guideline for Hazardous Materials Management:* This guideline applies to Projects that use, store, or handle any quantity of hazardous materials, defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. HazMat's can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidising substances; toxic materials; radioactive material; and corrosive substances.

- *Guideline for Noise:* This guideline addresses the impacts of noise beyond the property boundary of the facilities.
- *Guideline for Addressing Grievances from Project-Affected Communities, 2009:* Combined with effective community engagement, a transparent and legitimate grievance mechanism that is a joint effort between the company and communities can increase trust and improve communication.
- *Guideline for Community Health and Safety:* This guideline complements the guidance provided in the preceding environmental and occupational health and safety sections, specifically addressing some aspects of Project activities taking place outside of the traditional Project boundaries, but nonetheless related to the Project operations, as may be applicable on a Project basis. These issues may arise at any stage of a Project life cycle and can have an impact beyond the life of the Project.
- *Guideline for Thermal Power Plants:* This guideline is relevant to combustion processes fuelled by gaseous, liquid and solid fossil fuels and biomass and designed to deliver electrical or mechanical power, steam, heat, or any combination of these, regardless of the fuel type (except for solid waste which is covered under a separate Guideline for Waste Management Facilities), with a total rated heat input capacity above 50 Megawatt thermal input.

2.3. Environmental and Social Design Criteria

The environmental and social design criteria is shown in Table 2-9. These criteria were developed to guide the design and development of the Project by outlining key potential environmental and social risks, design criteria considerations and relevant guidelines and standards.

Table 2-9: Environmental and Social Design Criteria

Key Issue/Risk	Project Design Criteria/Considerations	Relevant International Guidelines
Water	• Design to prioritise objective of achieving zero discharge of contaminated water from the operation; • Design to prioritise diversion of uncontaminated surface water runoff around Project facilities; • Design to safeguard community drinking water resources; and • Design to ensure water loss is kept to a minimum (thorough water management plan).	• IFC General EHS Guideline (Discharge) (2007); • IFC EHS Guidelines for Mining (Discharge) (2007); and • World Health Organisation (WHO) Guidelines for Drinking Water Quality (2017).

Key Issue/Risk	Project Design Criteria/Considerations	Relevant International Guidelines
Land Acquisition	• Where possible, avoid and/or minimise the requirement for land disturbance; and • Duty to protect communities and those affected by mining activities.	• IFC PS5 Land Acquisition and Involuntary Resettlement (2012).
Hazardous Materials and Management	• Maintain secure containment of hazardous materials and chemicals and maintain safe distances between storage of hazardous materials and human settlements and/or built structures; • Bulk fuel storage enclosed with bunds designed to a capacity of 110% of the largest tank. Or the combined capacity of any tanks that are hydraulically linked; and • Compliance with national and international guidelines for transport of hazardous materials.	• IFC EHS Guidelines on Hazardous Materials Management (2007).
Air quality, noise, vibration, and light emissions	• Minimise the possibility of windblown dust, noise, vibration, and light emissions adversely affecting the nearby settlements; • Where possible maximise distance between emission sources and nearby settlements, including fixed and mobile plant; and • Minimise use of fossil fuels and generation of greenhouse gases.	• IFC EHS Guidelines for Mining (2007). • IFC EHS Guidelines for Thermal Power Plants
Radiation	• Protect people and the environment from harmful effects of ionising radiation; • Minimise and avoid exposure of public workers to radiation; • Assessment of the facility or activity and demonstrate that the design and operation are compliant with safety requirements; and	• International Atomic Energy Agency (IAEA) Safety Fundamental and Principles (SF-1) 2016.

Key Issue/Risk	Project Design Criteria/Considerations	Relevant International Guidelines
	• Assure the use of a safety case that demonstrates, with an appropriate level of confidence, that the facility and associated activities are feasible to implement and that it will be safe.	
Natural habitat and threatened species	• Where possible, avoid and/or minimise the requirements for any form of land disturbance – in particular land disturbance to Natural Habitat and avoid Critical Habitat; • Ensure development will not lead to the reduction of critically endangered or endangered species on a global, national or regional scale; • Ensure a no-net-loss of biodiversity and eco-system functioning; and • Project design must avoid adverse impacts on downgradient aquatic habitat, including potential water points for threatened species.	• IFC PS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012).
Community safety	• Define/reinforce controls for community access around Project facilities; and • Implement a safety plan for the Project.	• IFC PS4 Community Health, Safety and Security (2012); and • IFC General EHS Guideline (2007).
Cultural heritage and archaeology	• Known heritage resources must be avoided through the amendment of the Project design. If the Project design avoidance is unfeasible, the impact must be mitigated; and • Mitigation of unknown heritage resources must be avoided through the development and implementation of a Chance Finds Procedure.	• IFC PS8 Cultural Heritage.
Transport and transport infrastructure	• All Project traffic to use the proposed access roads. • Air transport	• IFC PS4 Community Health, Safety and Security (2012); and • IFC General EHS Guidelines (2007).

Key Issue/Risk	Project Design Criteria/Considerations	Relevant International Guidelines
		• Pakistan Aviation Standards. • Barrick Aviation Standards.

2.4. Environmental and Social Permits, Licenses, and Approvals

A list of E&S permits, licenses, and approvals which will be applicable during Project lifecycle is provided in Table 2-10.

Table 2-10: Permits, Licenses, and Approvals required for the Project

No.	Type of License/Approval	Applicable Legislation	Issuing Authority	Project Phase	Description of License/ Approval
1.	Environmental Approval –EIA	• Balochistan Act, 2012 • Balochistan IEE and EIA Regulations 2020 • Pakistan IEE and EIA Regulations 2000	BEPA	Early Works / Construction	Environmental approval is required and has been obtained in respect of the early works construction activities of the Project, which is valid for three years and is extended for a further period of three years if construction activity commences during the initial three-year period.
2.	Environmental Approval – Operations Phase	• Balochistan Act, 2012 • Sindh Act, 2014 • Balochistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2020	BEPA SEPA	Operations	Environmental approval will be required before commencing the operations phase of the Project, which is valid for one year (and renewed annually subject to payment of a fee). A request for this approval must be accompanied by an environmental audit of the construction phase (indicating compliance with the conditions of the environmental approval) and an EMP in the ESIA indicating proposed environmental protection measures and procedures for the life of the Project.

No.	Type of License/Approval	Applicable Legislation	Issuing Authority	Project Phase	Description of License/ Approval
3.	Permit for disposal of hazardous and non-hazardous waste	• Balochistan Act, 2012 • Sindh Act, 2014	BEPA SEPA	Construction Operations	The Project will dispose hazardous and non-hazardous waste during its construction and operations phases. Therefore, a permit will be required from the relevant EPAs to ensure that the disposal of this waste and effluents is in line with the procedures identified in the Project's ESIA.
4.	Certificate of Stability of Infrastructure	• Sindh Factories Act, 2015 • Balochistan Factories Act, 2021	Directorate of Labor	Operations	This certificate will be required after commissioning of the Project infrastructure, before initiating commercial operations. The Directorate of Labour may also conduct their own tests of the Project infrastructure to ensure that its operations will not potentially affect the workforce.
5.	License for Possessing Explosives For Use (Including Ammonium Nitrate Fuel Oil (ANFO))	• The Explosives Act, 1884 • The Explosives Rules, 2010	Ministry of Energy (Petroleum Division), Department of Explosives	Operations	This license will be required during the operations phase of the Project. The Project will store approximately 7,000 tons of Ammonium Nitrate Fuel Oil (ANFO) for loosening the ore via blasting during its operations phase. Therefore, the license from the Department of Explosives, Ministry of Energy will be required to ensure that the explosives are stored adequately and do not pose hazards to the nearby receptors.
6.	License for Storage and Management of Hazardous Substances	• Balochistan Act, 2012 • Balochistan Hazardous	BEPA SEPA	Construction Operations	A license is required to generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substances. The Project will manage and store hazardous substances during construction and

No.	Type of License/Approval	Applicable Legislation	Issuing Authority	Project Phase	Description of License/ Approval
		Substances Rules, 2020 • Sindh Act, 2014 • The Hazardous Substances Rules, 2014 (Sindh)			operations phase. These include, but not limited to, medical supplies, batteries, paints, oils and lubricants, solvents etc. Therefore, license will be required from relevant EPAs to ensure that the hazardous substances are stored in line with the provisions provided in the relevant legislations and are in line with the commitments set forth in the ESMP of the ESIA.
7.	Mining Lease	• Balochistan Mineral Rules, 2002	Department of Mines and Minerals, Balochistan	Construction Operations	The Project will construct an open pit mine for extraction of the raw ore and has thus obtained the necessary leases and mineral titles (Section 2.1.1). Each mining lease provides the Project with exclusive rights to extract, process, transport and sell for its own account copper, gold, molybdenum and/or other mineral deposits (including other base and precious metals and rare earth minerals) from the areas covered by the lease. The leases remain valid over a period of 30 years with automatic renewals for incremental periods of up to 30 years, at the request of the Project.
8.	Permit for Installation of Tube Well for Groundwater Extraction, NOC / Permission to	• Balochistan Groundwater Rights Administration Ordinance, 1978 • The Balochistan Ground Water Rights	Provincial Water Board, Balochistan or relevant authority	Construction Operations	The Project will rely on groundwater from the Fan Sediments area. As this groundwater will be extracted for industrial uses, the Project will obtain permit from the Provincial Water Board of Balochistan & District Water Committee / Deputy Commissioner in Chagai, Balochistan before commencing the installation and

No.	Type of License/Approval	Applicable Legislation	Issuing Authority	Project Phase	Description of License/ Approval
	Construct and Operate Portable Water Treatment, Storage, and Distribution System	Administration Rules, 2014			extraction activities. This permit will be set as a basis of registration of the tube wells and will be acquired prior to operations of these tube wells. The Project will also consult the issuing authority in case of any installation of tube wells other than those prescribed in the permit.
9.	License for Storage of Petroleum Products	• The Petroleum Act, 1934 • Pakistan Petroleum Rules, 1971	Ministry of Petroleum and Natural Resources	Construction Operations	The stored volume of petroleum at the Reko Diq Mine Site is expected to be more than 800 litres. Therefore, the Project will be required to obtain License for storage of petroleum products at the Reko Diq Mine Site.
10.	Waste Management License	• Balochistan Act, 2012 • Balochistan Waste Management Rules, 2020	BEPA	Construction Operations	A waste management license is required to construct, own, operate a landfill site, incinerator, or other facility at which waste is permanently disposed of or is stored indefinitely.

2.5. International Agreements, Treaties, and Conventions

Pakistan is signatory to several international agreements, treaties, and conventions relating to environmental and social management and maritime. These set the context within which the laws of Pakistan regulatory regime operates and may therefore directly or indirectly affect the proposed developments and overall operation of the Reko Diq Mining Project. Table 2-11 sets out the conventions that the Pakistan is a part of.

Table 2-11: Relevant International Environmental Treaties and Conventions endorsed by Pakistan

Aspect	Agreement / Convention/ Treaty	Effective
Hazardous chemicals, materials and wastes	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989.	1994
	Rotterdam Convention on the Prior Informed Consent Procedure on Certain Hazardous Chemicals and Pesticides in International Trade, 1998.	2005
	Stockholm Convention on Persistent Organic Pollutants, 2001.	2008
Climate change, air quality, and the depletion of the ozone layer	United Nations Framework Convention on Climate Change (UNFCCC), Rio De Janeiro, 1992.	1994
	Paris Agreement under the United Nations Framework Convention on Climate Change, 2016.	2016
	Kyoto Protocol, 1997.	2005
	Vienna Convention for the Protection of the Ozone Layer, 1985.	1992
	Montreal Protocol on Substances that Deplete the Ozone Layer, 1987.	1992
Biodiversity, protected areas and the protection of the plants and animals	Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar/Wetlands Convention), 1971.	1976
	Agreement on the Network of Aquaculture Centres in Asia and the Pacific, Bangkok, 1988.	1988
	Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.	1976

Aspect	Agreement / Convention/ Treaty	Effective
	Convention on Biological Diversity, Rio De Janeiro, 1992.	1994
	Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000.	2009
	Convention on the Conservation of Migratory Species of Wild Animal also known as the Bonn Convention on Migratory Species, 1979.	1987
	United Nations Convention to Combat Desertification, 1994.	1997
	Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.	1965
	Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.	1988
	International Plant Protection Convention, Rome, 1951.	1954
Cultural heritage	UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, 1970.	1981
	UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention).	1976
	Convention for the Safeguarding of the Intangible Cultural Heritage, 2003.	2005
Human rights	International Convention on the Elimination of All Forms of Discrimination Against Women, 1979.	1996
	International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), 1969.	1966
	International Covenant on Civil and Political Rights, 1966.	2010
	International Covenant on Economic, Social and Cultural Rights, 1966.	2008

Aspect	Agreement / Convention/ Treaty	Effective
	Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment commonly known as the United Nations Convention Against Torture, 1985.	2010
	United Nations Convention on the Rights of the Child (commonly abbreviated as the CRC or UNCRC), 1989.	1990
Labour, health and safety	Limit to working hours: • Hours of Work (Industry) Convention, 1919 (No. 1); • Weekly Rest (Industry) Convention, 1921 (No. 14); and • Night Work (Women) Convention (Revised), 1948 (No. 89).	1921 1923 1951
	Elimination of all forms of forced and compulsory labour: • Forced Labour Convention, 1930 (No. 29); and • Abolition of Forced Labour Convention, 1957 (No. 105).	1957 1960
	Elimination of discrimination in respect of employment and occupation: • Equal Remuneration Convention, 1951 (No. 100); and • Discrimination (Employment and Occupation) Convention, 1958 (No. 111).	2001 1961
	Effective abolition of Child Labour: • Minimum Age Convention, 1973 (No. 138); • Minimum Age (Industry) Convention (Revised), 1937 (No. 59); • Night Work of Young Persons (Industry) Convention, 1919 (No. 6); • Night Work of Young Persons (Industry) Convention (Revised), 1948 (No. 90); and • Worst Forms of Child Labour Convention, 1999 (No.182).	2006 19551921 1951 2001

Aspect	Agreement / Convention/ Treaty	Effective
Dockers	Marking of Weight (Heavy Packages Transported by Vessels) Convention, 1929 (No. 27).	1931
	Protection against Accidents (Dockers) Convention (Revised) – Protection against Accidents of Workers Employed in Loading or Unloading Ships, 1932 (No. 32).	1947
Maritime	Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, 1988.	1992
	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978, or "MARPOL 73/78" (short for "marine pollution").	1995
	United Nations Convention on the Law of the Sea (UNCLOS), also called the Law of the Sea Convention or the Law of the Sea Treaty, 1982.	1997
	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, commonly called the "London Convention" or "LC '72" and also abbreviated as Marine Dumping.	1975

2.6. Corporate Policy

Barrick, as the developer of the Project, has internal corporate policies which it is committed to in addition to international legislation and standards and GIIP. The policies which Barrick is committed to and which are directly relevant to this Project are:

- Environmental Policy:
  - Barrick is committed to full compliance with all relevant environmental legislation and regulations; implementation of proven management practices and mitigation measures; transparency communication and engagement in relation to environmental performance; efficient use of natural resource; protection and conservation of flora and fauna; and high-quality waste management, among other things.
- Biodiversity Policy:
  - Barrick is committed to conducting regular biodiversity assessments; developing site specific Biodiversity Action Plans (BAPs); engaging with

communities on biodiversity value; partnering with environmental groups and local authorities; and reporting on biodiversity performance annually.

- Human Rights Policy:
  - Barrick respects the human rights of all individuals impacted by its operations, including employees, contractors and external stakeholders and seeks to avoid causing or contributing to human rights violations and to facilitate access to remedy. Barrick consider “human rights” to be all internationally recognised human rights in the International Bill of Human Rights and the International Labour Organisation (ILO) Declaration of Fundamental Principles and Rights at Work.
- Social Performance Policy:
  - Barrick’s social performance vision aims to contribute to the social and economic development of host countries and communities. The company emphasizes respectful relationships with stakeholders and believes that mining can positively impact development. Among other things, Barrick commits to building trust through engagement, mitigating operational impacts, fostering equitable distribution of benefits and costs, and being accountable for its social performance to both internal and external stakeholders.
- Sustainable Development Policy:
  - Barrick’s sustainability vision centres around creating long-term value for stakeholders. The company contributes to social and economic development in its host countries and communities, prioritises workforce safety and health, respects human rights, and manages environmental impacts with future generations in mind. Barrick integrates environmental, social, and economic considerations into decision-making, collaborates with governments and communities, and engages respectfully with stakeholders. Barrick’s commitments include compliance, effective management, transparent communication, and continuous performance improvement.
- Tailings Management Policy and Standard:
  - All Barrick operated or controlled tailings storage facilities are subject to the company’s Tailings Management Standard. The company believes that safe management of tailings is an integral part of its commitment to sustainable development. Among other things, Barrick will: conform to the GISTM and comply with the host country laws and regulations; regularly review and update its tailings management system in line with international best practice; regularly audit tailings facilities; review and monitor the performance of tailings; and plan thoroughly for emergency preparedness and response as well as prepare for post-incident recovery.

- Occupational Health and Safety Policy:
    - Barrick acknowledges its responsibility to provide a secure and safe environment in the workplace with a vision of "Every person going home safe and healthy every day". To achieve this vision, Barrick is committed to complying with all relevant legislation and regulations, implementing effective managements systems, and promoting a proactive safety culture. The company also recognises the importance of Occupational Health and Safety (OHS) plans and policies for the successful implementation of the project.

3. Project Description

The Project is a Copper-Gold mining operation with an onsite processing plant which will produce a high-quality concentrate that will be exported for final processing. The current Life-of-Mine (LoM) is 38 years in terms of defined resources (resources that have been identified already) with significant exploration upside potential.

The mine will be a truck-and-shovel open pit mining operation. The final concentrate will be railed to Port Qasim for export by ship.

The construction phase is anticipated to take approximately 40 months. The mine will be developed in two phases, Phase 1 is expected to have a capacity of 45 Mtpa and Phase 2 is expected to have a combined processing capacity of 90 Mtpa. Phase 1 operations are anticipated to commence in 2028 and Phase 2 operations in 2030.

This Chapter presents details of the Project including infrastructure and activities which, in conjunction with the environmental and social baseline presented in Chapter 5, enable the identification and evaluation of environmental and social impacts.

3.1. Early Works ESIA

An Early Works ESIA was undertaken and submitted to the BEPA in February 2024 for approval of the activities listed below (Figure 3-1):

- An accommodation facility constructed to house the full complement of RDMC staff and contractors for the duration of the Project as detailed in Table 3-7. The accommodation facility will be located approximately 12 km to the northwest of the processing plant site inside a crater which provides shelter from the wind and sandstorms (Figure 3-4). The continuous development of the accommodation facility will occur during the construction phase for long-term occupancy. The accommodation design is single-story prefabricated blocks, and will include the following general facilities upon its full establishment:
    - Accommodation blocks, kitchen and dining facilities;
    - Prayer facilities;
    - Commercial space, recreational facilities;
    - Administrative and office buildings;
    - Workshop and warehouse area;
    - Fire station;
    - Bus services;
    - Water supply and storage;
    - Sewage and potable water distribution systems;
    - Sewage treatment facilities;

- Standby generators;
- Laundry facilities;
- Security facilities including security fencing and guard houses;
- Medical facilities including doctors' offices, examination rooms, treatment/observation rooms with bathrooms, reception waiting area, storage/supply rooms, ambulance bay etc.; and
- Telecommunications.

- A 300 millimetre (mm) diameter steel (with Victaulic couplings) water supply pipeline of approximately 80 km in length from the Northern Borefield to the proposed RDMS. The water supply boreholes will be fitted with submersible pumps, headworks, and a portable generator. The peak monthly water demand during the Early Works Phase will be approximately 113,193 Kilolitres (KL). The pipeline will be buried to depth of between 1 and 1.5 m for pipeline security and to prevent freezing or excessive movement. Several trench types with varying depth of general fill will be used, based on the geotechnical assessments conducted on the borefield pipeline corridor. Several trench types with varying depth of general fill will be used, based on the geotechnical assessments conducted on the borefield pipeline corridor;
- A chain link fence constructed along the boundary of the surface rights lease. The fence will consist of 180 cm high galvanised steel chain link mesh from ground level (i.e. not buried) topped with three lines of barbed wire. Supports will be steel poles spaced every 366 cm (12 foot) with concrete footings buried to a depth of ~45 cm.
- A Water Treatment Plant (WTP) with Reverse Osmosis (RO) and chlorination to treat a portion of water abstracted from the Northern Borefield to provide potable water for the accommodation facility and work areas;
- Access roads from the accommodation facility to the Northern Borefield and an upgrade of the existing roads for access to the Project;
- Early works power supply to be provided by diesel generators for the expected power requirements of 15 Megawatts (MW);
- Storage facilities for chemicals, lubricants, fuel and water; and
- An onsite Wastewater Treatment Plant (WWTP) to treat the generated wastewater. Solid non-hazardous waste will be collected and stockpiled separately onsite before removal offsite for reuse or recycling.

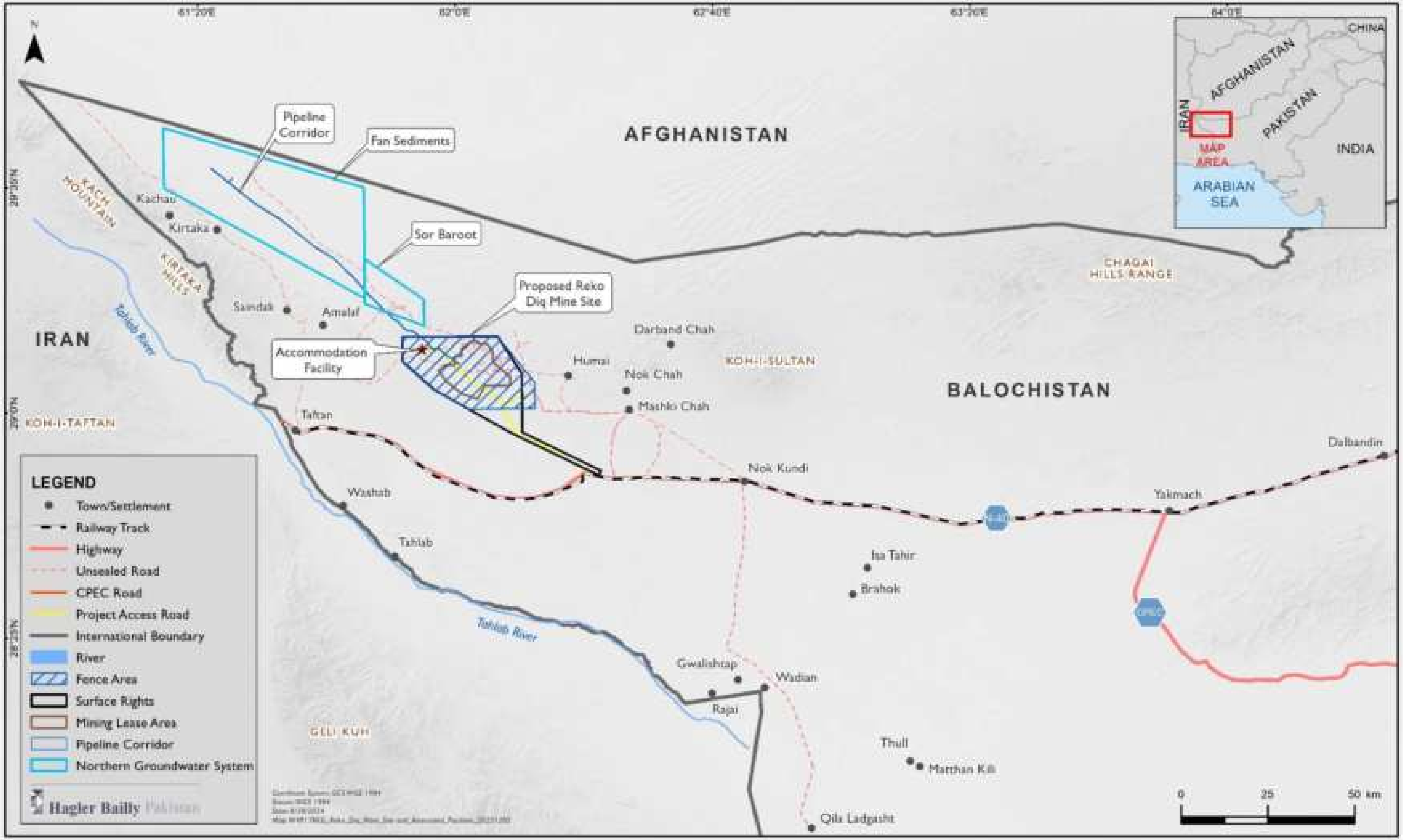


Figure 3-1: Early Works Activities – Accommodation Facility, Water Supply Pipeline, and Access Road to the Mine Site

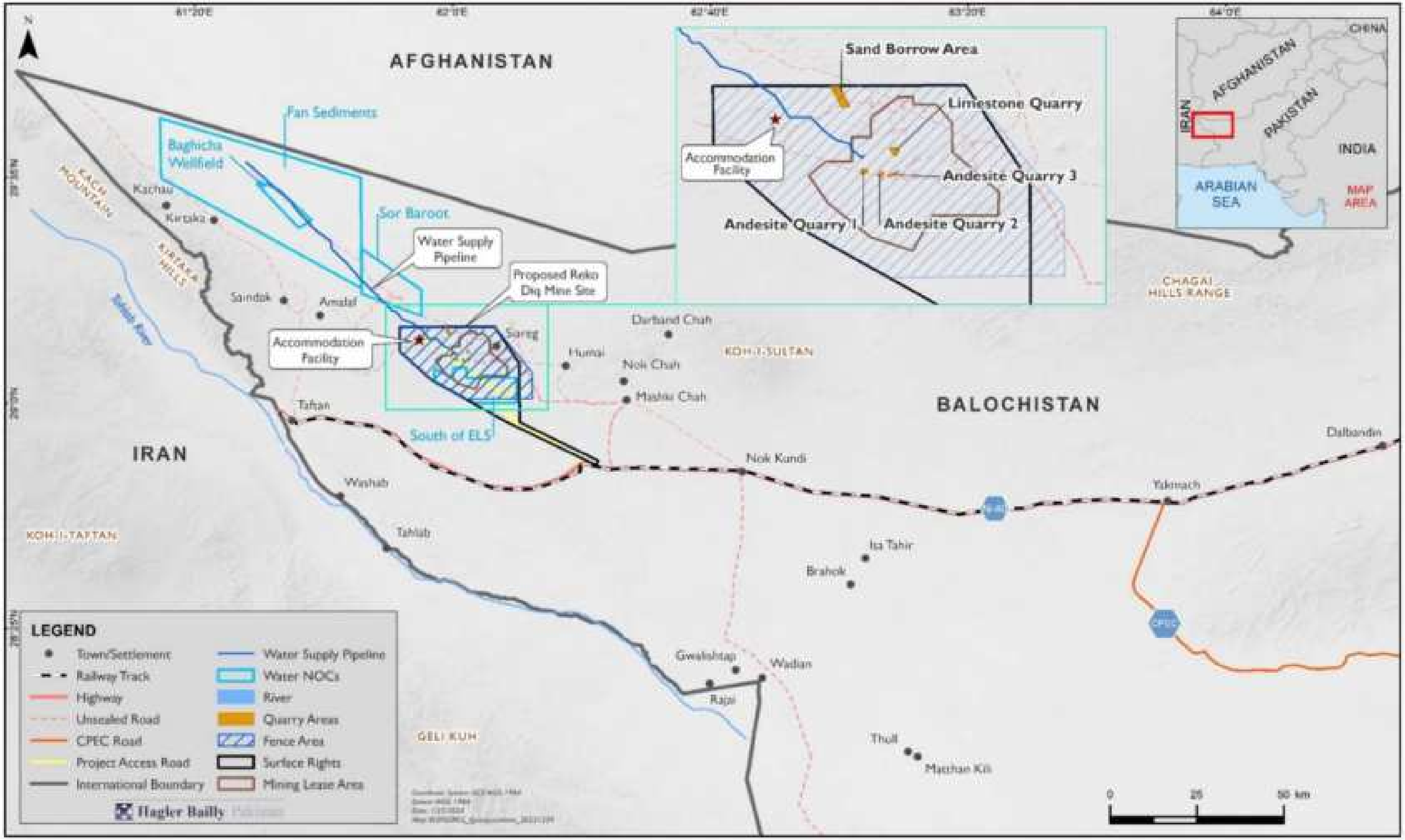


Figure 3-2: Previous Quarry Location for Construction Materials (submitted as part of Early Works ESIA)

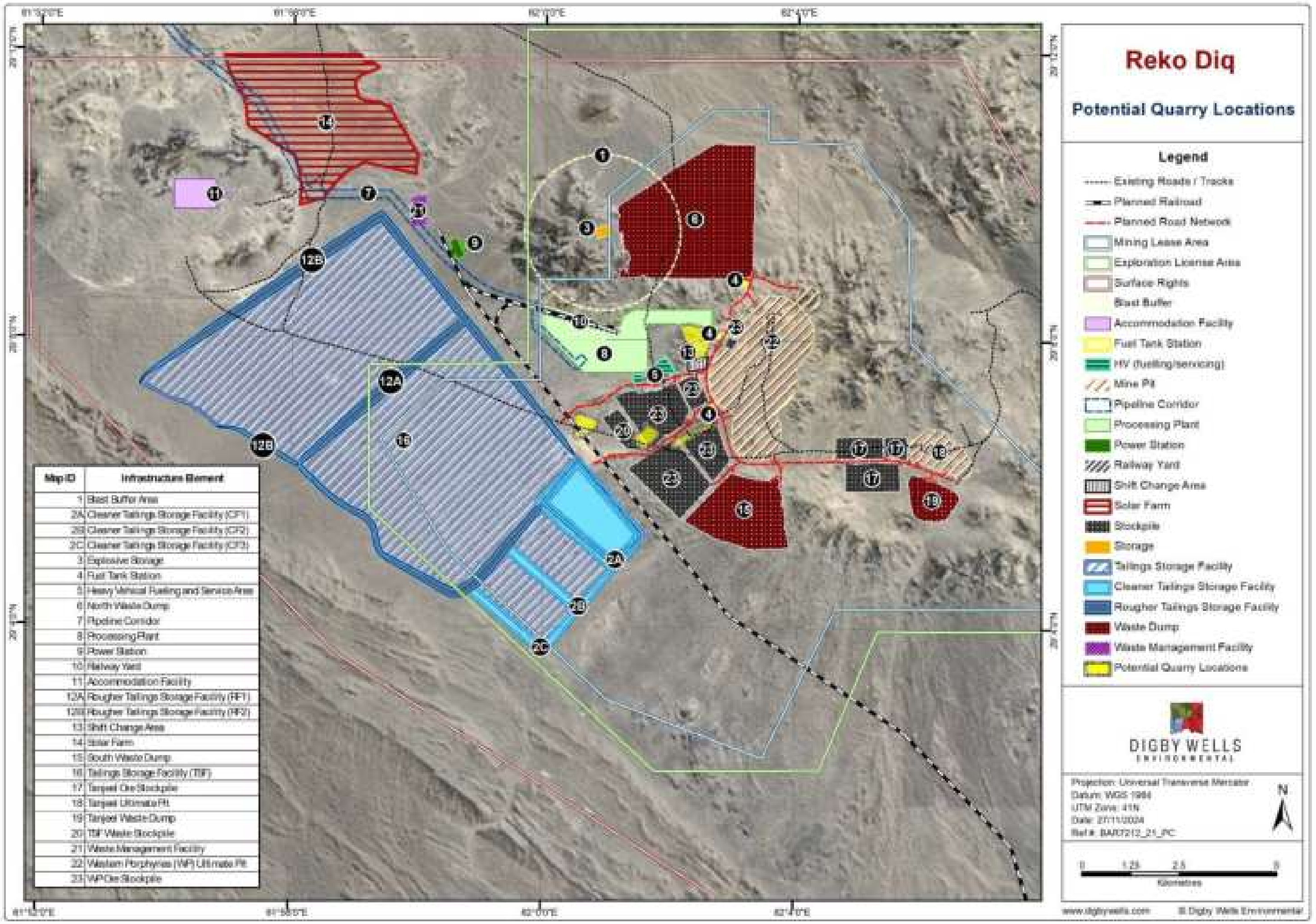


Figure 3-3: Updated Quarry Location for Construction Materials

- Four quarries were originally identified during the Early Works ESIA process (three andesite and one limestone quarry) and one sand borrow area. The locations of these quarries are outlined in Figure 3-2. Additional investigation work has been conducted and new quarry locations have been identified and these are outlined in Figure 3-3. The new quarry locations all fall within the disturbance footprint of the Project, underlying the future stockpile areas and adjacent to the process plant and ancillary buildings.

- The andesite from the quarries will be used as construction material and will be managed as part of the overall construction activities. The quarry footprint will be rehabilitated at the same time as the stockpile areas.

The Early Works is expected to take approximately nine months to implement.

3.2. Proposed Reko Diq Mine Site

The below sections describe the mine infrastructure and activities, including the major components such as the open pit, waste rock dumps, processing plant, TSF and other supporting infrastructure. The proposed RDMS within the Surface Rights covers an area of approximately 58,000 ha. Figure 3-4 provides an overview of the RDMS and the major proposed infrastructure.

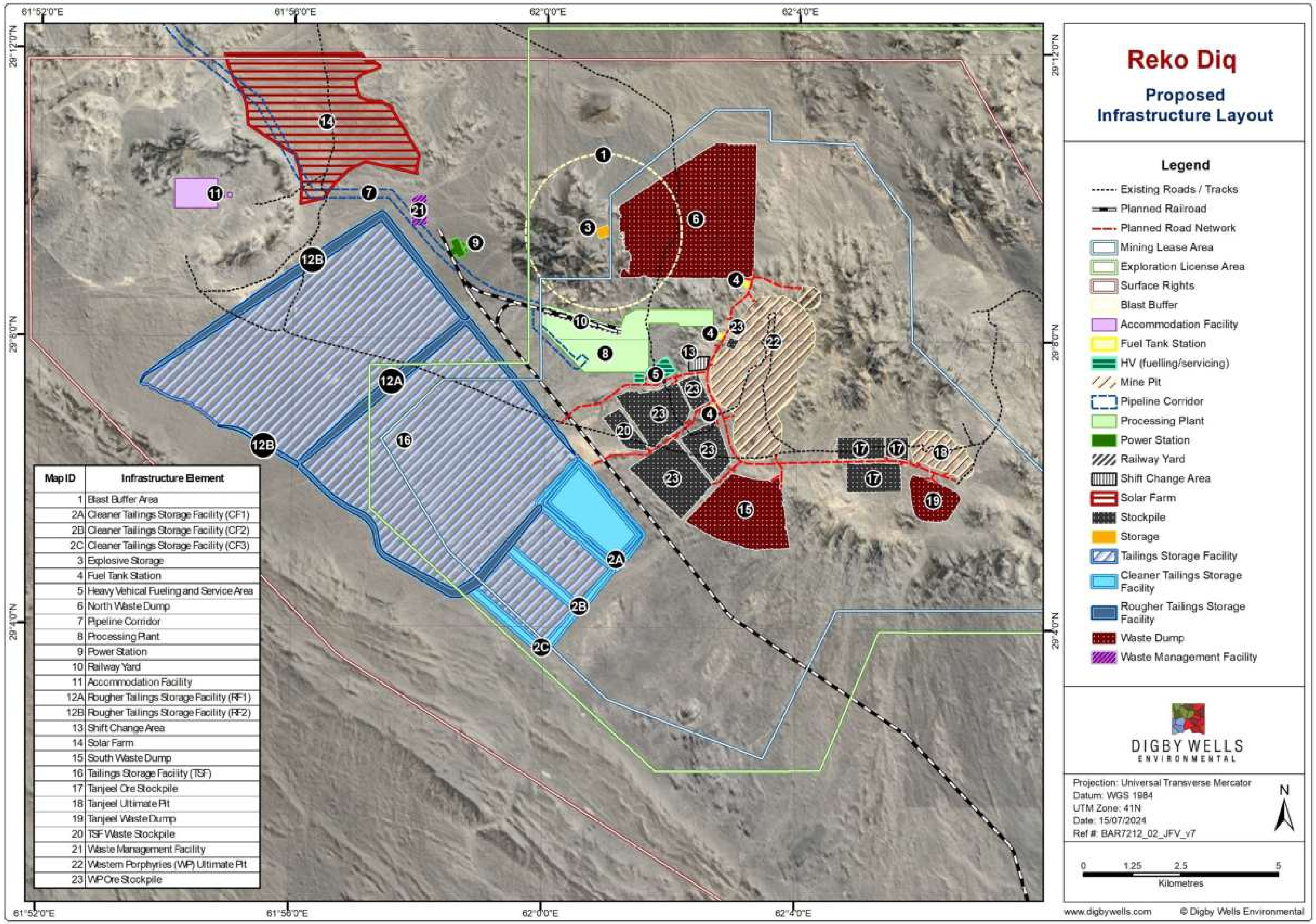


Figure 3-4: Proposed Reko Diq Mine Site Layout

3.2.1. Core Infrastructure

The open pits and processing plant are the core infrastructure of the mine development.

3.2.1.1. Open Pit

The mine will consist of two main pits, Western Porphyry and Tanjeel (Figure 3-4). The Western Porphyry Pit (the Pit) will mine a complex of four adjacent porphyry centres aligned in a south-west to north-east orientation Mining will be a 24-hour open-pit shovel and truck operation.

The Western Porphyries Pit will comprise two expanding sections across two primary ore zones. In phases, the mining will alternate between the two ore bodies starting with the centre of each deposit. The two pit sections will be combined and will extend approximately 3.5 km by 5 km when complete. The final depth will be approximately 850 m. A 40 m wide ramp will provide access into the pit and external haul roads will be used to transport ore to the plant and waste material to the waste dumps. The haul roads will be constructed using waste rock for the road foundations and 500 mm of aggregate material for the final surface.

The Tanjeel Pit is located to the east of the Western Porphyries pit and has a supergene blanket with associated alteration, oxidation and higher sulphide content. Mining will commence in the higher-grade centre with pushbacks into H13 and H79 to access deeper into the core of the deposit. Tanjeel represents a minor component of the ore body and will be brought into production after the first 10 years of mining. Access to the pit will be through external haul roads that are 40 m wide and have 500 mm of aggregate material for a compacted running surface. This includes waste rock to build road foundations and aggregate material for the final surface.

The ore body or ROM will be extracted and stockpiled onto the low-grade stockpile or hauled to the processing plant. The waste rock from the Western Porphyries pit will be hauled to one of two designated WRDs; one located south of the Pit, and the other located to the north of the Pit. The Tanjeel Pit will have a separate WRD and low-grade ore stockpile in its proximity.

Based on the current mine plan, which is subject to change as the feasibility study is finalised, mining is anticipated to begin in 2027 at the Western Porphyries pit, with first concentrate production targeted for 2028. From 2028 to 2032 the total average ore that will be mined is estimated to be approximately 80 Mtpa, ramping up to a maximum of c.140 Mtpa in 2038 following commencement of mining at the Tanjeel pit in 2037. Over the current LoM in excess of 3 Bt of ore is expected to be mined with an average copper grade of 0.48% and a gold grade of 0.26 grams per tonne. Approximately 3.2 Bt will be excavated from the pit as waste rock which cannot be recovered and reused. The total expected excavated material for the LoM is shown in Table 3-1.

Table 3-1: Total Material Movement (Source: Mine Plan Summary 2024)

Destination	Tonnage for LoM (kt)
Total Ore Mined (Western Porphyries & Tanjeel pits)	3,011,694
Total Waste Mined (Western Porphyries & Tanjeel pits)	3,200,800
Waste Dump North	2,063,287
Waste Dump South	670,298
Tanjeel Waste Dump	160,319
Waste to TSF Stockpile	306,896

3.2.1.2. Processing Plant

The Project is designed to be developed in two identical phases, with each phase aimed at processing 45 million metric tons of ore annually, producing 800,000 metric tons of copper concentrate at a grade of between 26% and 30% contained copper.

Ore from the pits will be hauled to the ROM pad, where it will be directly tipped into gyratory primary crushers. These crushers, optimised for high throughput, are fed through dual-sided tipping arrangements that ensure maximum utilisation of crusher capacity. The coarsely crushed ore is then conveyed via screens to the High Pressure Grinding Rolls (HPGR) circuit, while the oversize is directed to secondary crushers. The crushed product is recycled back to the coarse ore screen feed conveyor.

The fine ore is then conveyed to the grinding process and then to the flotation process via conditioning tanks which act to dilute the slurry to the required density.

The flotation circuit comprises a series of tank cells for the initial concentration (referred to as rougher concentration), followed by a rougher concentrate regrind circuit prior to further processing in a secondary recovery circuit (referred to as the cleaner concentration). Rougher Tailings will be pumped to high-rate thickeners from where it is pumped to the TSF. The cleaner tailings report to the cleaner tailings thickener.

The cleaner tailings will be typically higher in potentially acid generating sulphides so will be directed to separate lined cells within the TSF.

The copper concentrate will be dewatered using a high-rate thickener, with thickener overflow recycled back into the cleaner flotation water tank.

The thickened concentrate from the concentrate thickener underflow will be stored in agitated tanks and then filtered in pressure filters to recover as much water as possible. Filtered concentrate will be stored on a stockpile inside a concentrate storage shed. The concentrate handling and storage area will be enclosed to minimise dust emissions and contamination. All filter cake handling will take place inside the storage shed.

The concentrate will be reclaimed by Front End Loaders (FEL) and loaded onto the concentrate loadout bin feed conveyor. The concentrate load-out bin will discharge bulk concentrate into rotainers. Rotainers loaded with concentrate will be transported on rail cars or road. The concentrate produced at Riko Diq will be transported to the port, and from there shipped to smelters for further refining.

The infrastructure associated with the processing plant will include:

- Primary crusher;
- Secondary crusher;
- HPGR circuit;
- Conveyor belts;
- Ball and regrind mills;
- Flotation plant;
- Concentrator thickening plant;
- Administrative offices;
- Laboratories;
- Warehouse; and
- Maintenance shops.

The ore processing is illustrated in Figure 3-5.

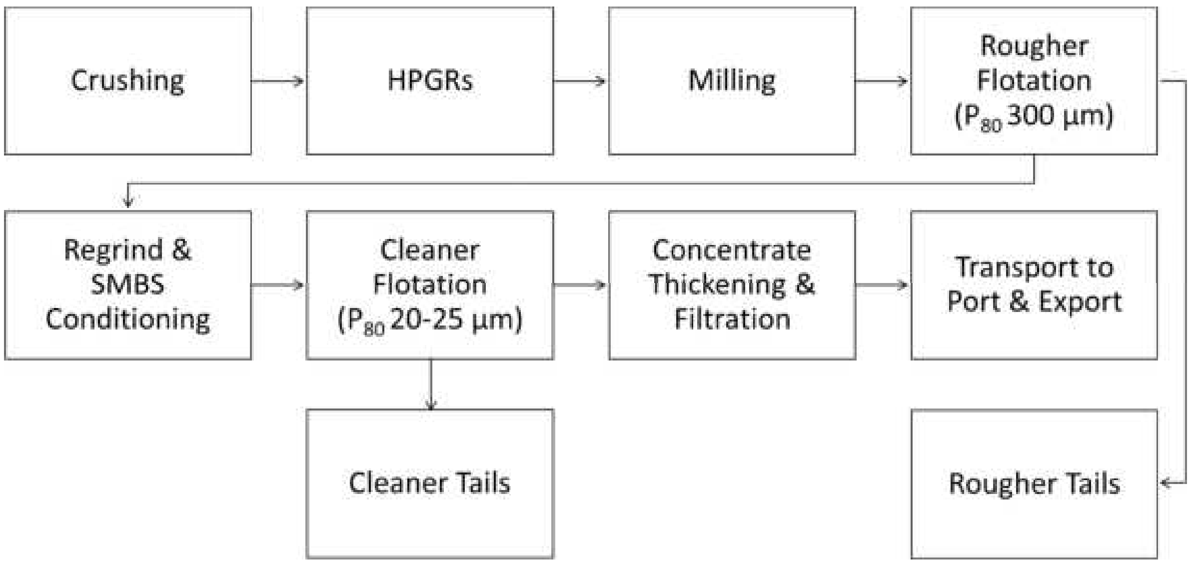


Figure 3-5: Ore Processing Flow Diagram

3.2.2. Supporting Infrastructure

3.2.2.1. Power

The Project's estimated average operating power demand will be 149.7 MW in Phase 1 and 264.8 MW in Phase 2. The Project will draw on a number of different sources of power supply during the LoM and the roadmap showing the progression of these proposed options over time is presented in Figure 3-6.

The primary source of power for the Project until Year 15 will be a combination of HFO and solar power generation. From Year 15 it is anticipated that a connection to the National grid (as described in Section 3.2.2.1.2) will replace these sources of power.

3.2.2.1.1. Power Supply to Year 15 – HFO and Solar

The Project will utilise diesel generators during the early works and construction phases until the establishment of the HFO and solar power stations. The HFO and solar power stations will be constructed at the mine.

Power generation infrastructure will comprise:

- Twelve (12) HFO-based reciprocating engines with electric generators each with a capacity of 17.6 MW. The power station will have two main stacks where the flue gas ducts of the 12 generators will be combined in clusters of six per stack. An additional set of 11 HFO-based generators (with two additional flu stacks) will be installed at the power station to meet the energy requirement in Phase 2.
- A Solar Photovoltaic (PV) system within the Surface Rights Area (SRA) about 10 km northwest of the Pit (Figure 3-4) over an area of 300 to 350 ha. The system will be integrated with HFO-based power plant and will have capacity to provide a penetration of approximately 20% (the amount of PV capacity installed with respect to the peak load demand) which is the maximum solar penetration which can be achieved without a Battery Energy Storage System (BESS). At this stage a BESS has been determined to not be economically feasible, so as such any additional solar capacity would not be able to be used. On sunny days this capacity will enable the project to run entirely on solar during daylight hours. Battery storage options will continue to be explored as the Project progresses.
- A tracking system at the solar plant to track the sun's rise and fall on a daily and seasonal basis to improve solar yield.
- Sixteen (16) diesel generators, each with 1.8 MW capacity will be utilised for emergency power supply during operations. These will be located at the power plant (Figure 3-4).
- Provision for future Waste Heat Steam Recovery Turbine (WHSRT) to further optimize the net efficiency of the HFO power station (possible implementation once stable operations are achieved and there is adequate power demand).

Power will be supplied to the mine, processing plants and various units in three voltages, 220 kilovolts (kV), 33 kV and 11 kV. Transformers will be oil-immersed and located in an open area with a secondary spill containment design.

An overhead transmission line will supply power to the Northern Borefield via a single circuit. The Overhead Line (OHL) will follow the water pipeline corridor, where pump stations at the borefield will be supplied by a 33 kV distribution line. Detailed design is yet to be finalised but likely key characteristics of the transmission line include:

- Emplacement of poles of either wood, concrete or steel construction (all of which are suitable for the environment at Reko Diq). Poles will be spaced between 100 and 150 m apart with heights of between 9 and 15 m to provide adequate clearance from obstacles, traffic and non-flying fauna.
- AAAC (All Aluminium Alloy Conductor) or ACSR (Aluminium Conductor Steel Reinforced) will be used due to strength and conductivity.
- Use composite insulators to withstand high temperatures, dust, and potential salinity in the region.
- Capacitor banks or voltage regulators installed at strategic points to maintain voltage levels.

The well pumps will be powered by diesel generators during the construction phase, and which will act as a backup should the transmission lines fail.

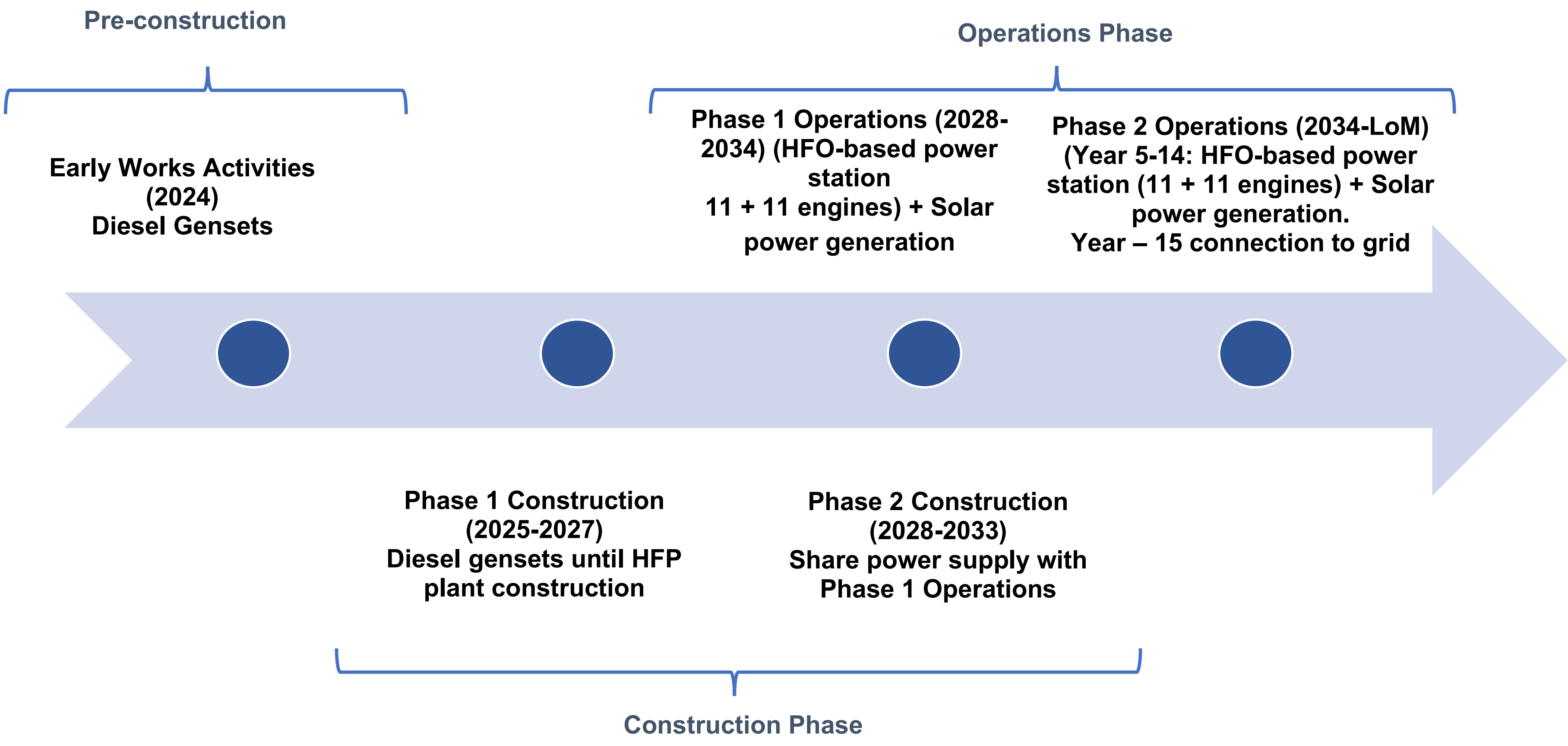
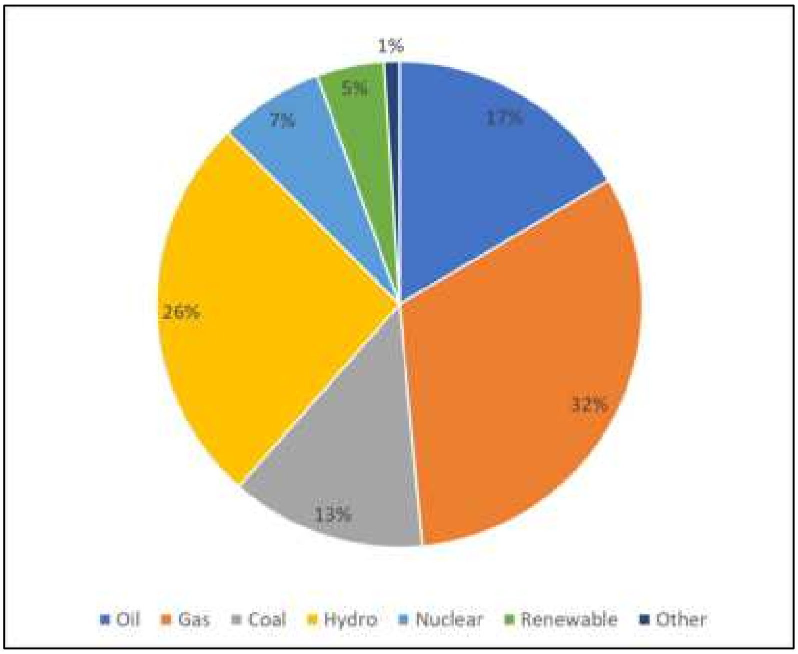


Figure 3-6: Roadmap for Power Supply

3.2.2.1.2. Power Supply from Year 15 - Grid Connection

It is anticipated that the Project's energy requirements will be met through a grid connection after Year 15 of operation. Pakistan has over 37 Gigawatt (GW) of installed generation capacity and a combined customer demand of 25 GW, therefore a significant reserve generation capacity is available on the system. Importantly, large proportions of the current power generation across the grid are provided from hydropower, with Pakistan aiming to generate 60% of its energy from clean and renewable power sources by 2030 (refer to Figure 3-7 for a breakdown of generation sources) (ECG, 2024).

There is a 500 kV transmission network that serves as the central infrastructure of power distribution across the country, however, there is limited transmission infrastructure within Balochistan, with only a 220 kV transmission link to Quetta. With augmentation of the network or the supply to Quetta, there would sufficient capacity to meet the power demand requirements of Reko Diq.



Source: Reko Diq Power Supply Option Study, 2024

Figure 3-7: Electricity Generation in Pakistan

Several options have been considered with respect to the route required for the transmission line to connect to the Pakistan National grid and these are discussed in Chapter 1. The current preferred route is outlined in Figure 3-8. The anticipated length of 220 kV transmission lines from mine site to Quetta is 670 km. Ownership of these transmission lines would remain with the Pakistan Government.

The HFO and solar power plants will remain in place to provide backup power should the grid go down for any reason.

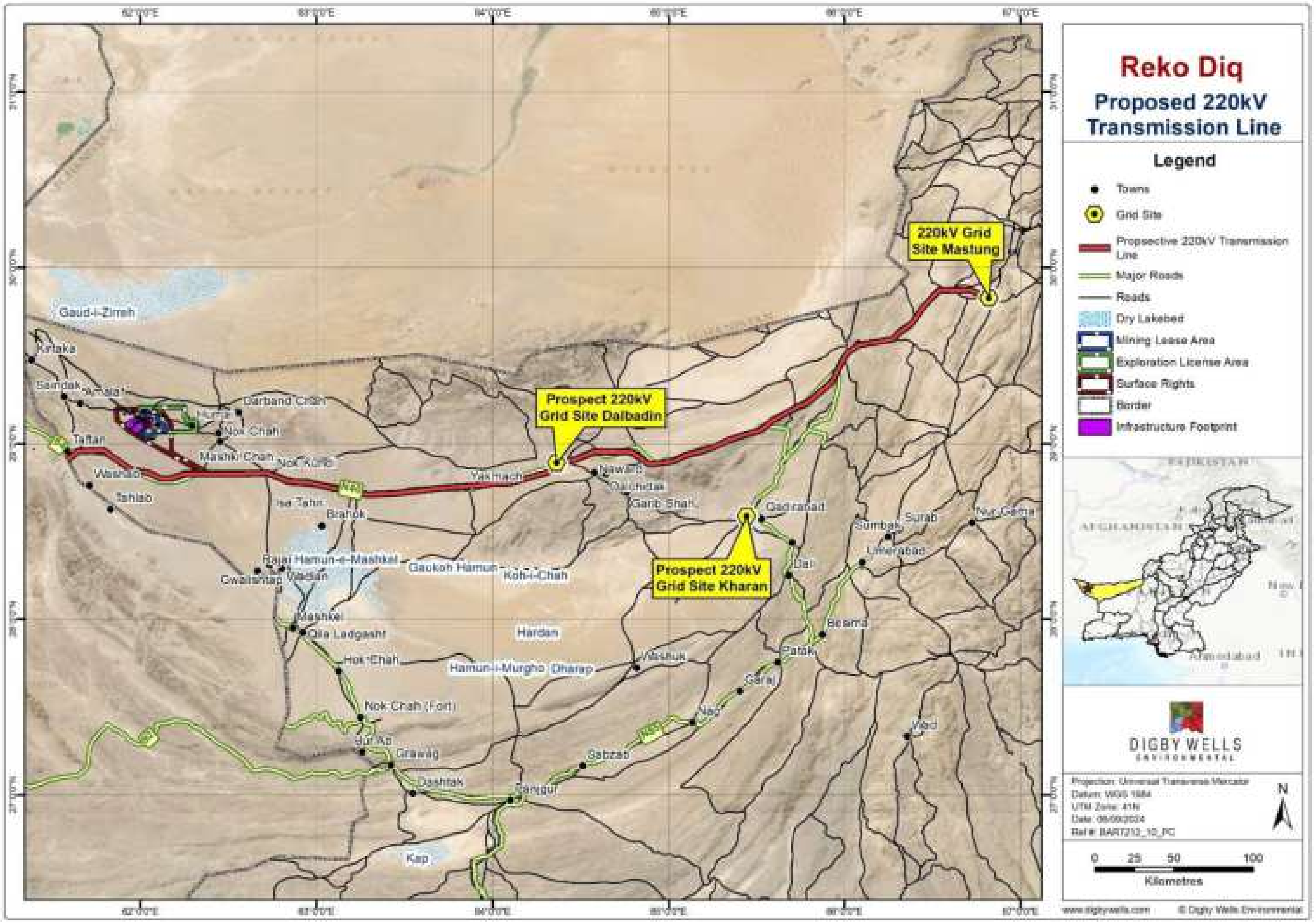


Figure 3-8: Prospective Grid Connection Layout for the Project

3.2.2.2. Fuel Use and Handling

During the construction phase, the estimated average diesel consumption will be 26,000 KL per annum, increasing to 96,000 KL in Phase 1 and a predicted maximum annual consumption of 260,000 KL in 2049. During construction diesel fuel will be required for equipment, vehicles and generators that will serve as the primary energy supply. The use of diesel will continue for equipment and vehicles, as the fleet increases to meet production demands in both Phase 1 and 2.

HFO will replace diesel as the primary fuel source for electricity generation once the HFO plant construction is complete for the commencement of Phase 1 production. The average HFO fuel consumption per annum between 2029 to 2032 will be 216,000 KL, with an increase to 425,000 KL per annum required for peak energy production in Phase 2. The use of HFO will decrease with the introduction of a grid connection in Year 15 of the Project. This, in conjunction with the use of solar up to Year 15 is expected to offset approximately 9 Mm^3 of HFO over the LoM.

Diesel, HFO and other sources of fuel will be railed to site from Port Qasim and stored in atmospheric tanks designed in accordance with the American Petroleum Institute (API) 650 Standard. Tanks will be installed at three locations: the mine truck shop, the processing plant, and the power plant and will be housed within a bunded containment area that will be sized to capture and contained rainwater and any unforeseen spillages within the containment area which will be collected into a sump and disposed of in accordance with the respective management plan.

3.2.2.3. Security

The following security infrastructure will be implemented:

- A 2 m high fence along the perimeter of the mine site with patrolling routes and anti-vehicle berm constructed from the waste rock;
- Access gates with access control;
- Detection and surveillance systems (e.g. closed-circuit television (CCTV));
- Intruder detection systems and alarms;

- Static guards and mobile patrols, with associated infrastructure. Four forts outside the fence line with the Frontier Corps security. Each fort will be sized for approximately 50 guards; and
- A control room at the processing plant for security monitoring.

In terms of security management, a multi-tiered approach has been implemented, including:

- Private security contractor engaged through a through due assessment process using Barrick due diligence questionnaires and onboarding processes. The research into the service provider included Voluntary Principles for Security and Human Rights (VPSHR) related criteria, and the RDMC evaluated it using its due diligence questionnaires and onboarding process.
- Public security: On 15 December 2022, RDMC signed a Security Services Framework Agreement (SSFA) with the provincial government of Balochistan and the federal government of Pakistan for the provision of security services by two public security forces; the Levies and the Frontier Corps Balochistan (South), usually referred to as FC. This agreement defines the scope of services, the standards of security services, security infrastructure, communication between the parties, etc. To ensure consistency in the understanding and application of these international standards, RDMC has taken responsibility for the training of public as well as private security personnel on the VPSHR and international law enforcement principles. The SSFA requires the public security personnel covered by the agreement to act in a manner consistent with the Barrick Human Rights Policy, the VPSHR and with international law enforcement principles, which include the UN Code of Conduct for Law Enforcement Officials, and the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials. In the Agreement, the public security forces commit to not deploying to Reko Diq any personnel that has been the subject of credible allegations of violations of any international law enforcement principle, excessive use of force or other violation of the laws of Pakistan.

3.2.2.4. Fire Protection and Emergency Response Facility

Fire protection systems that will be implemented include alarms, sprinklers, fire hoses and suppression systems in areas such as warehouses, offices, laboratories, shops, compressor rooms, lubrication rooms, workshops etc. Fire hydrants will be provided outside buildings and three fire water systems will be provided at the processing plant, mine site and accommodation facility. Conveyor belts will be installed with linear heat cable detectors.

In addition, an on-site emergency team will be available on standby to deal with any emergency situation. A dedicated Emergency Response facility will have a fire truck and ambulances, and sick bay (first aid).

3.2.2.5. Explosive Storage

An explosives store area to store the blended bulk explosives will be located near the WRD North, northwest of the Western Porphyries Pit (Figure 3-4). At the storage area, the ammonium nitrate for the bulk explosives will be stored in a manner to ensure it is protected from heat and rain. It is estimated that 7,000 t (3 months' supply) of ammonium nitrate stock will be kept at the mine site at any one time. An emulsion plant will be located in this storage area to produce waterproof explosives before transportation to the mine. Primers, detonators and other explosive accessories will be stored in protected magazines and bunkers in this area.

3.2.2.6. Workshops

A truck workshop will be located to the west of the Western Porphyries Pit that will service the haul trucks, provide oil lubrication, vehicle repair and roofed warehouses. A separate building will contain the first aid station, officers, lockers for employees and other facilities. Runoff from workshop areas will be directed to oily water sumps where oils will be separated and collected into drums for disposal according to the Waste Management Plan (WMP) (Section 3.2.4).

3.2.3. Water Supply and Management

Water for the Construction Phase as well as Phase 1 and Phase 2 of the Project will be sourced from a sedimentary groundwater system located approximately 70 km to the northwest of the mining area referred to as the Northern Groundwater System. The system represents a small and isolated part of a much larger basin and there are no communities or community water sources located within the proposed borefield and its area of influence (refer to Sections 5.11 and 6.25, and Appendices L, M, N, and O).

Water in the system is saline and challenging to access, and as such is not suitable for human consumption or most agricultural or industrial uses without significant treatment and abstraction infrastructure. There are currently no planned developments or users of the target groundwater system, and the scope of the Project would not preclude future use of the broader basin by others. Independent international best practice environmental and social impact assessment and hydrogeological studies, using physical surveying and remote sensing techniques, have demonstrated that there are no surface expressions of the groundwater system and no known dependent biodiversity.

The technical and economic challenges in utilising this water source for the Project have been addressed. This groundwater system is considered capable of enabling development and sustaining operation of the Project, which is expected to add significantly to the socio-economic advancement within the region and country through employment, infrastructure, and services.

3.2.3.1. Construction Phase

The early works activities include the construction of an approximately 78 km long buried water supply pipeline with a diameter of 300 mm from the Northern Borefield to the Process plant and Accommodation camp (see Section 3.1) to provide water for the Construction Phase and will be commissioned during 2025.

This pipeline is designed to provide 180 m^3/h of water from the initial borefield, where water will be abstracted from 2 production bores, namely FSWW004-PB and FSWW013-PB, located approximately 19.5 km from the booster pumping station, and 65 km from the Reko Diq project. site.

Figure 3-9: Construction Phase Pipeline upstream of the Booster Pumping Station

The pipeline begins at Bore FSWW004-PB at an elevation of approximately 552 m RLand then moves towards FSWW013-PB before continuing towards the booster pumping station as shown in Figure 3-9.

3.2.3.2. Operational Phase (1 and 2)

The final proposed borefield will consist of approximately 40 boreholes, of which (notionally) 37 will be operational and 3 will be standby boreholes. The flow rates of each borehole will vary depending on the local hydrogeological conditions however the designed water abstraction rates from the total borefield will be between 778L/s and 1100 L/s.

Figure 3-10 shows the proposed borefield layout based on the optimised groundwater modelling scenario presented by Darkwater Consulting. It includes a double line borefield that stretches through to the western extent of the Fan Sediments NOC.

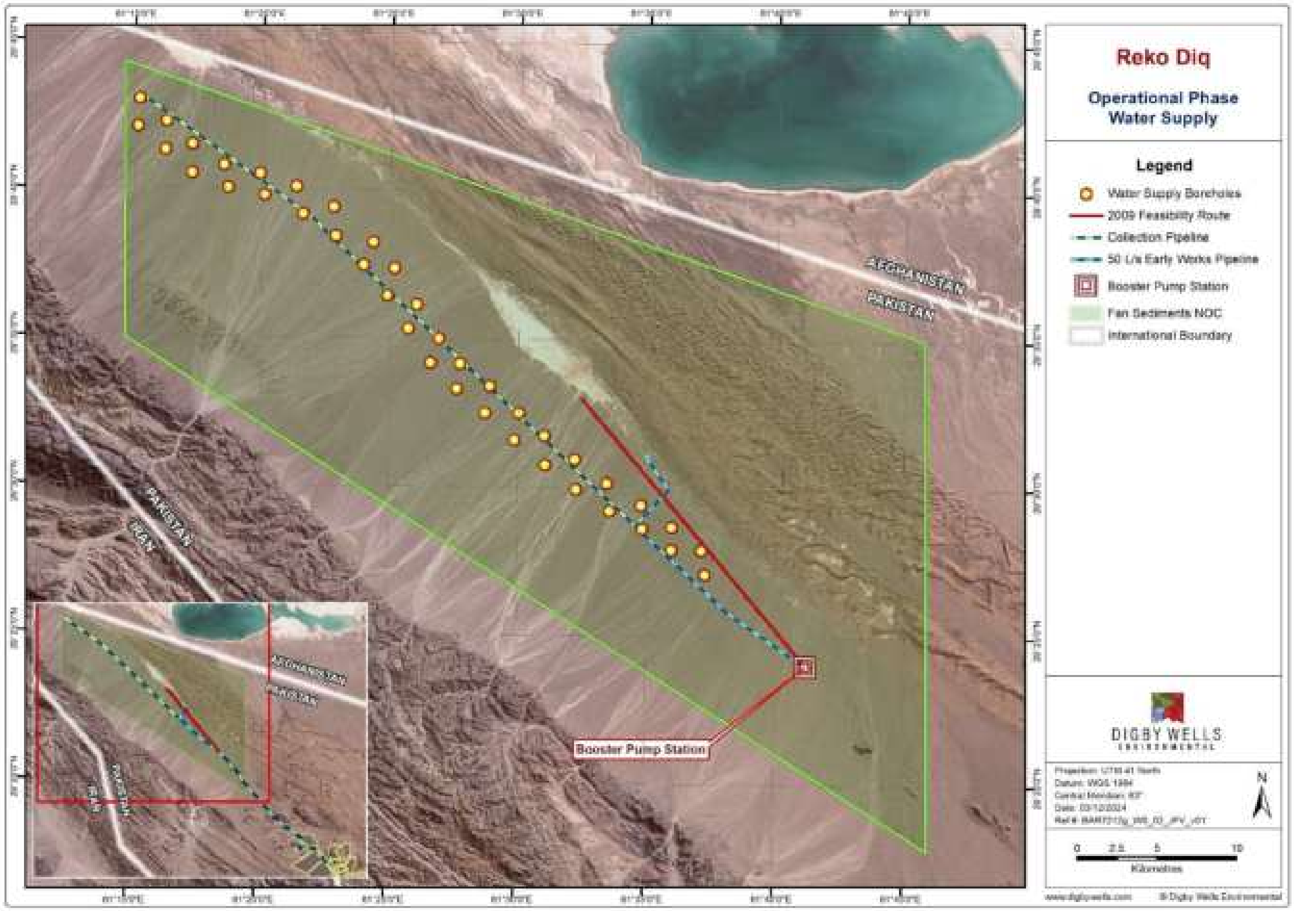


Figure 3-10: Proposed location of borefield based on hydrogeological modelling

The double-line bore field has the bores arranged in almost parallel lines stretching from the northwest towards the booster pump station, which are spaced roughly 1300m apart, with a bore spacing of around 2300m within each line.

illustrates the proposed design for each borehole, connection to the pipeline and associated infrastructure.

The furthermost bore is at an elevation of 559 mamsl and from this, the bore field moves southeast across the gentle slope, across two major ebbs and an intermediate high point at an elevation of 603 mamsl at 16km from the start of the bore field, then gradually rises again to the booster pump station at an elevation of 636masl.

A simple route has been adopted for the collection pipeline, a 900 mm buried, cement lined steel pipe, which will be constructed from the furthermost borehole to the booster tank, with the intent of keeping the pipeline within the double-line bores on either side as much as possible to reduce the branch line distances. The collection pipeline will be approximately 55 km in length and water collected from the bore field will be discharged to an atmospheric balance tank at the booster pump station (Figure 3-11).

The booster pump station is intended to hydraulically disconnect the upstream borehole field pumps and piping from the high-pressure overland pipeline to the plant. The high-pressures in the pipeline are largely due to the static elevation gain between the Northern Groundwater Barefield area and the RDMS.

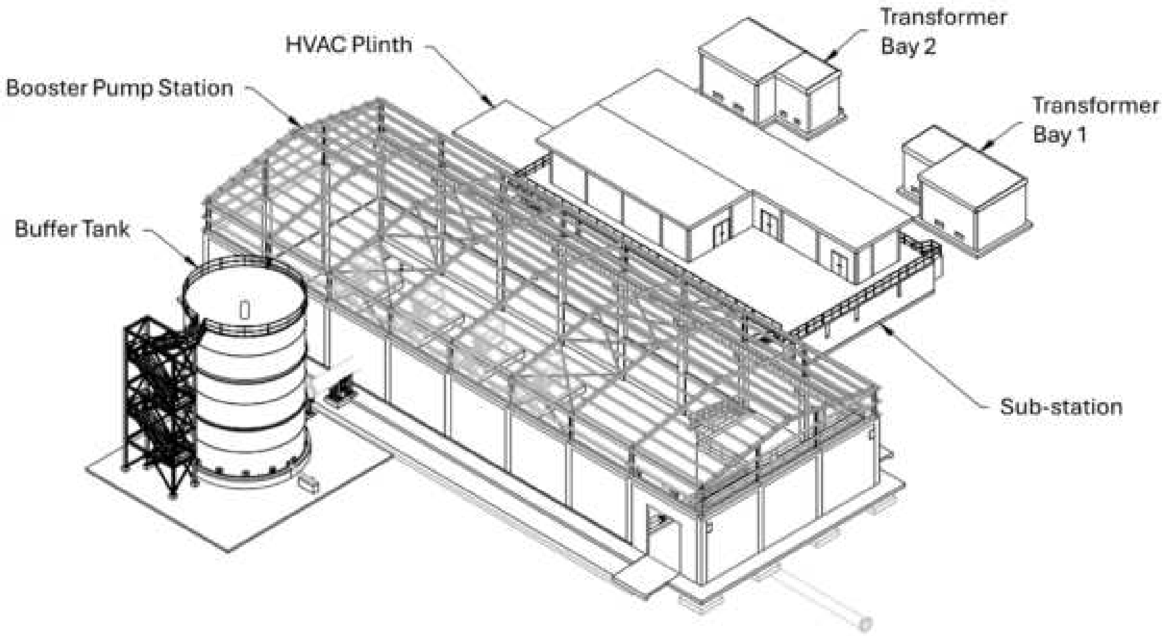


Figure 3-11: Booster Pump Station with surrounding infrastructure

Downstream of the booster station, the pipeline route is in the same corridor as the Construction Phase pipeline apart from near the construction camp area where the Construction Phase pipeline routes directly to the plant. The pipeline route for downstream of the booster station portion will be around 46 km long and will terminate at the raw water storage dam located at the Processing plant at the RDMS. The pipeline route is shown in Figure 3-13.

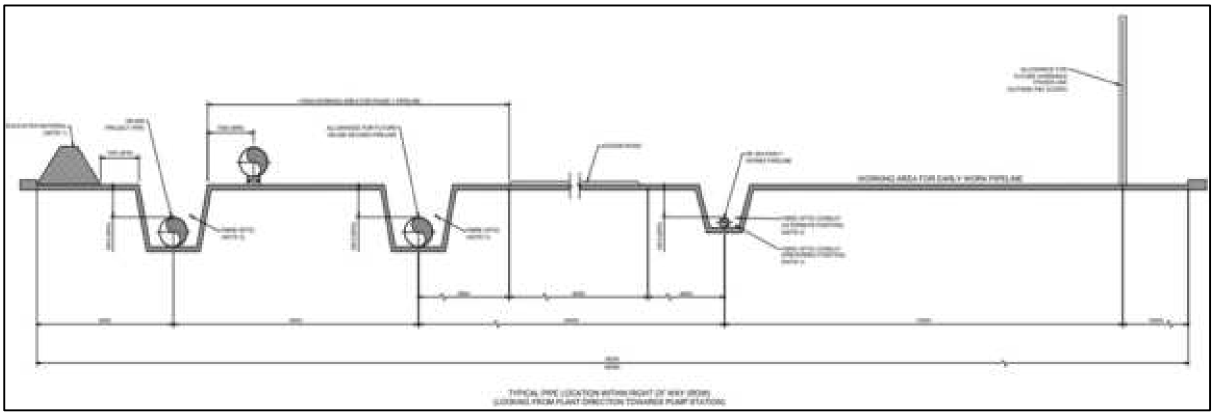


Figure 3-12: Pipeline and associated infrastructure servitude design

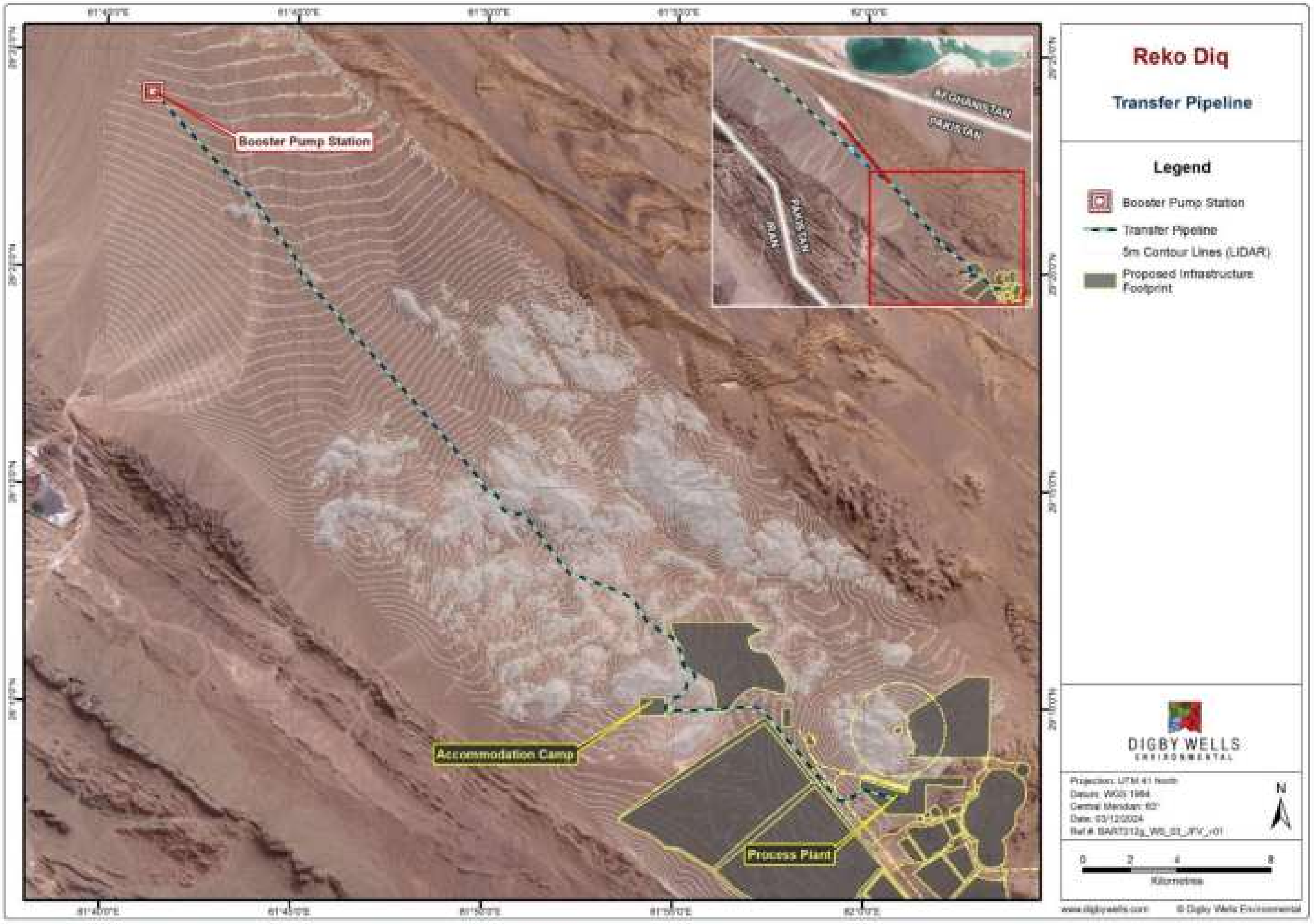


Figure 3-13: Proposed route for pipeline from Booster Pump Station to Accommodation Camp and Process Plant

This pipeline rises from 635 mamsl to 939 mamsl for the first 29 km at an average grade of 1.05%. After 29 km there is undulating terrain with gradients less than 3%, reaching a maximum of 9.7% nearing the high point of 948 mamsl at 35 km, and a low point of 886masl at 39km from the booster station.

The pipelines are buried along the route to provide protection from the environment as well as to mitigate the risk of accidental or intentional damage. The water quality indicates that there is a possibility of sediment formation within the pipelines over time. A pigging system is installed in both pipelines to regularly clean the pipeline to minimise the accumulation of scale.

HDPE piping, continuous welded steel piping and steel piping with Victaulic couplings were evaluated as part of a materials options study considering capital and operational costs, environmental requirements, process and construction requirements.

Steel piping spools with Victaulic couplings was selected because HDPE piping would require additional booster stations along the route due to the low-pressure ratings and steel piping with Victaulic couplings had the same benefits as continuous welded steel but with faster construction times. Figure 3-14 is an example of this buried piping, similar to what will be used at Reko Diq. Conceptual borefield and associated infrastructure design is shown in Figure 3-15.

Figure 3-14: Photo of buried steel piping with Victaulic couplings

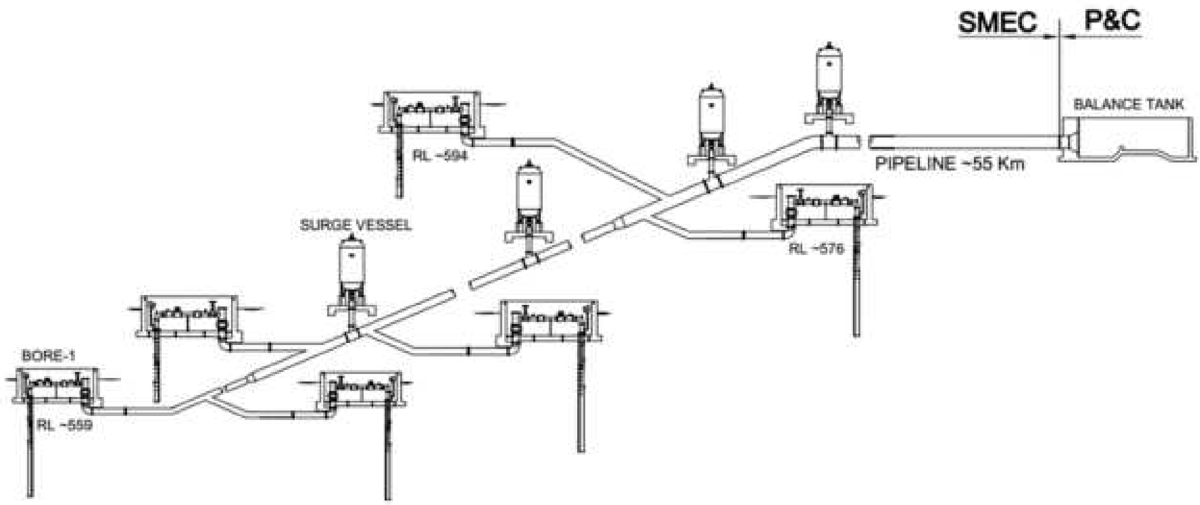


Figure 3-15: Conceptual borefield and associated infrastructure design

3.2.3.3. Raw Water

The Project requires a continuous and consistent supply of water of varying volumes for the different stages of the Project: construction, operation (Phases 1 and 2), and decommissioning. The water requirements for each stage will progressively increase until decommissioning, after which water requirements are expected to revert to volumes similar to those required for construction.

The Project water requirements have been calculated using estimates from the primary users, including; process, mining, power generation and camp services. The mine processing facility, which utilizes flotation methods, is the primary user of raw water, followed by the reverse-osmosis treatment plant. Water consumption estimates include water recycling and efficiencies captured in the processing and tailings disposal facilities.

The Project requires an average of 0.56 m^3/t of ore processed on an annual basis. The total volume of water required will increase as the project moves from construction into operation, peaking during Phase 2, and returning during decommissioning to volumes similar to those required for construction.

Estimated water requirements for each Project stage are as follows:

- Construction (included in the Early Works ESIA submission) Phase (including early works):1.6 GL/a (50L/s)
- Phase 1 Production (base case throughput of 45Mtpa): 25.2 GL/a (800L/s)
- Phase 2 Production (base case of 90Mtpa cumulative): 50.4 GL/a (1600L/s)
- Decommissioning (assumed to be similar to construction): 1.6 GL/a (50L/s)

The projected raw water demand for the LOM is an estimated 1800 GL.

3.2.3.4. Water Treatment (potable)

A WTP will be installed at the mine site to provide potable water to the accommodation facility and work areas. The raw water will be treated to meet potable water quality standards through filtration, reverse osmosis and dosing with chlorine (for bacterial control) and soda ash (for pH adjustment). The treatment process flow is presented in Figure 3-16 and Figure 3-17. This will be a containerised solution with two trains with a combined capacity of 145 m^3/hr:

- *Train1*: will consist of a 1 x 20 foot container and 1 x 40 foot container treating a total of 52 m^3/hr; and
- *Train 2*: will consist of 2 x 40 foot containers treating a total of 93 m^3/hr.

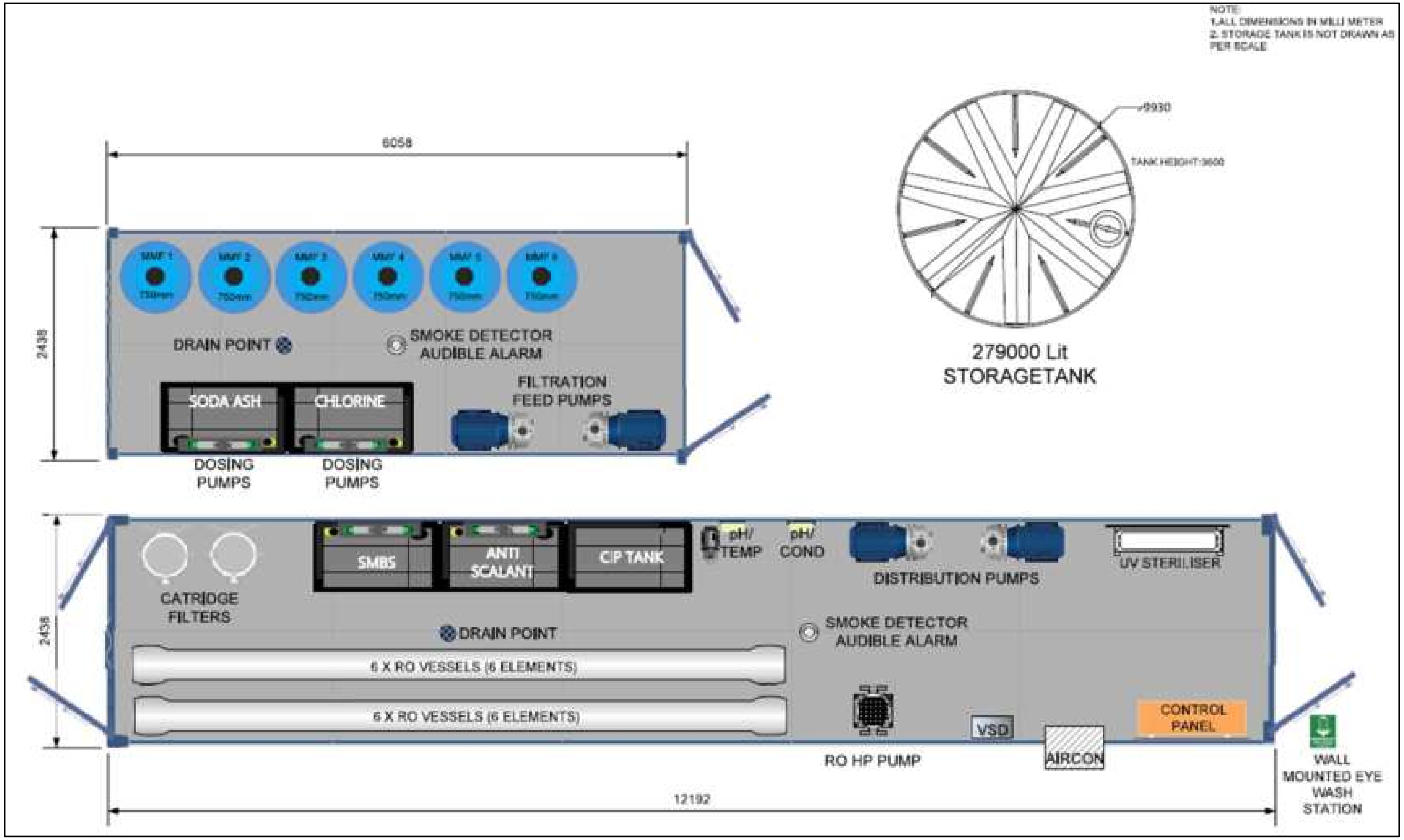


Figure 3-16: Arrangement of containers for 52 m^3/hr RO containerised plant

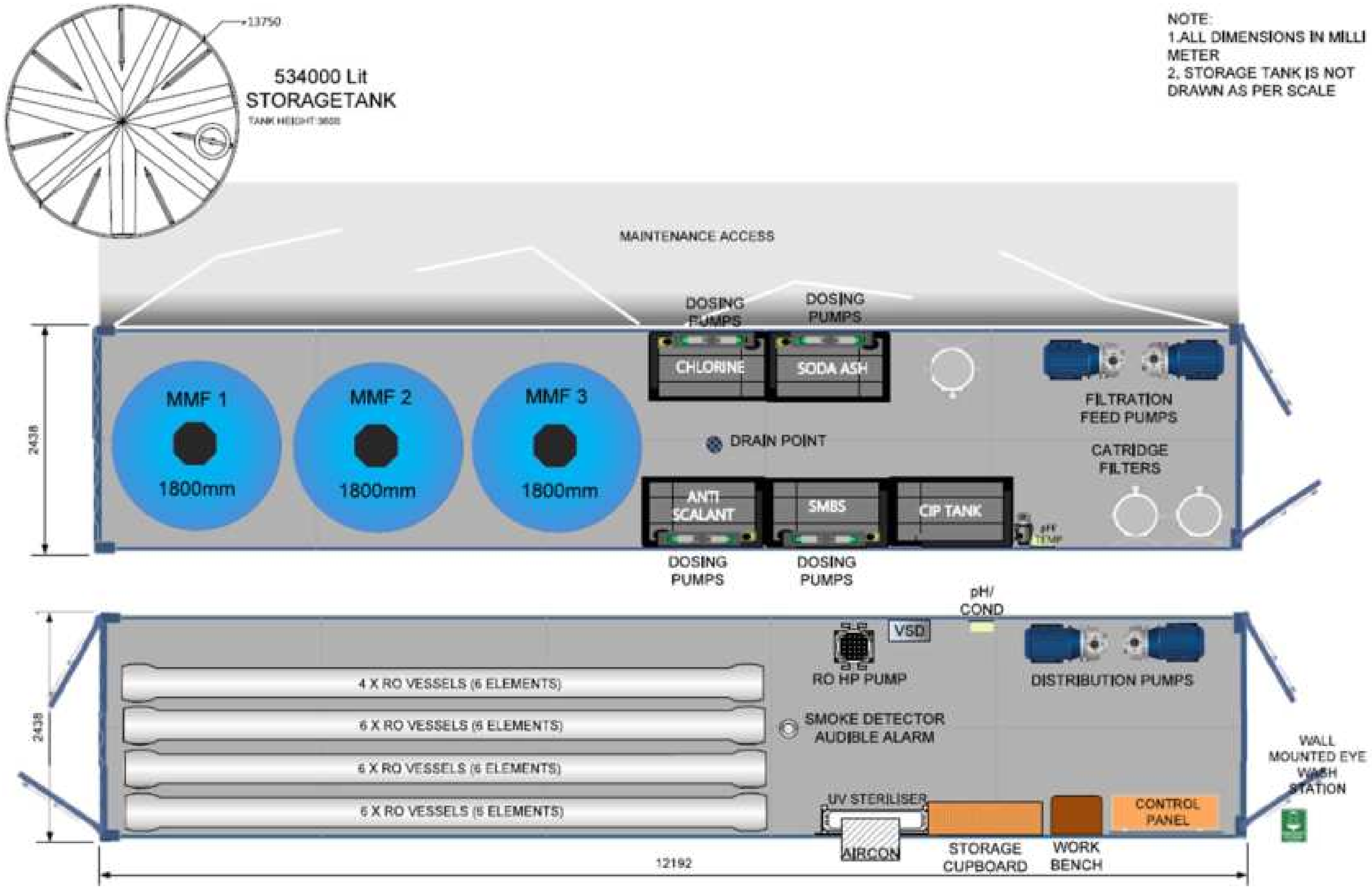


Figure 3-17: Arrangement of containers for 93 m^3/hr RO containerised plant

3.2.3.5. Sewage Treatment

Sewage Treatment Plants (STP) will be installed at the accommodation facility and at the processing plant. The sewage treatment process will include Rotational Biological Contactor (RBC) technology.

Relatively small amounts of sewage will also be treated from the guard houses (along the perimeter fence), airstrip and explosive storage area using septic tank and infiltration systems. The STPs will be designed to handle four times the average daily intake and accommodate shift changes.

The effluent from the RBC plants will be treated using ultraviolet light to decrease the bacterial concentration and will then be recycled into the processing plant circuit.

Sludge will be removed and transported to a licenced facility (most likely in Quetta) for composting. It is estimated that during the construction phase, 2.9 m^3 of sludge will be produced daily reducing to approximately 1.5 m^3 during the operation phase.

3.2.3.6. Water Storage Facilities

Details of proposed water storage facilities are presented in Table 3-2.

Table 3-2: Proposed Water Storage Facilities

Facility	Location	Storage Capacity	Water Source	Destination (Water Use)
Raw Water Pond	Process plant	400,000 m^3 (5 days of storage)	• Groundwater pumped from Northern Borefield.	• Directly to the plant – cooling tower and process facilities; • Indirectly to the plant – via the process water pond or plant site water treatment system; • Fire water system; and • Mine site freshwater tank.
Process Water Pond	Process plant (adjacent to raw water pond)	70,000 m^3 (18 hrs storage)	• Raw water pond; • Plant freshwater tank overflow; • Reclaim water from rougher tailings dewatering plant; • Effluent from the sewage treatment plant.	• Plant (process water).

Facility	Location	Storage Capacity	Water Source	Destination (Water Use)
Cooling Water Tank	Process plant	2,000 m^3	• Cooled raw water.	• Process plant equipment.
Plant Fresh Water Tank	Process plant	675 m^3	• Heat exchanger discharges; and • Treated raw water– if required.	• Process plant (where clean raw water is required - such as pump gland seal water and vibrating screen sprays).
Village Raw Water Tank	Village	4,170 m^3 (24-hrs demand plus 2-hrs of fire water at 340 m^3/h)	• Groundwater pumped from the Northern Borefield.	• Potable water treatment plant; and • Fire water.
Village Potable Water Tank	Village	2,600 m^3 (provide 24-hrs demand)	• Treated raw water.	• Potable water around the village.
Mine Site Fresh Water Tank	Mine truck shop	1,150 m^3 (24-hrs demand plus 2-hrs of fire water at 340 m^3/h)	• Raw water pond.	• Fire water.

3.2.3.1. Water Balance

Figure 3-18 outlines the site wide water balance indicating the various water flows between the key infrastructure and building on the RDMS. Where possible water is retained in the process circuit, including recovery of water from tailings thickeners and concentrate filtration. In addition, approximately 1.18 M m^3/annum is expected to be recovered from the TSF for recycling in the process plant (at full plant Phase 2 production). Other water saving and recovery measures include:

- Utilisation of brine from the RO plant for either processing or dust suppression purposes;
- Water recovered from the wastewater treatment plant utilised as process water;
- Inflow to mining pits will be utilised as process water;
- Runoff from dirty areas, when it does occur, will be captured and utilised as process water.

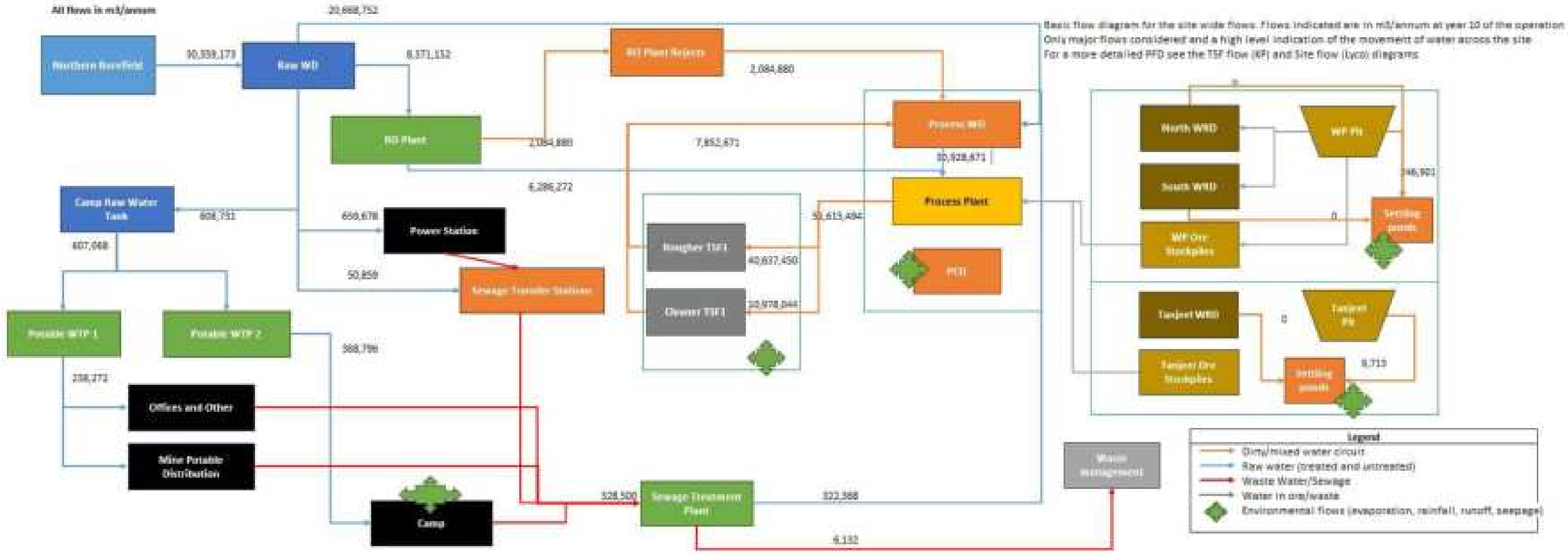


Figure 3-18: Basic flow diagram outlining the main flows and planned water infrastructure

3.2.3.2. Stormwater Management

While the rainfall in the region is low, there are storm events where water from these events will require management to prevent unnecessary contact stormwater with operational areas that could impact water quality as well as ensure that operations are not severely impacted by the accumulation of water on site.

Following are key areas on the mine site that will require specific management:

- *Plant Area*: Stormwater accumulating in the plant area will be collected and conveyed to stormwater holding and settling ponds for use and recycling in the mine's processes and dust control. These ponds will be designed to store a 1 in 25-year storm event during the construction phase and a 1 in 100 year during the operational phase.
- *Pit area*: Stormwater accumulating in the pit will be collected in a slump and pumped out of the pit for reuse in various mining activities. Bunding and stormwater channels will be constructed to prevent additional rainwater from the surrounding catchment to flow into the pit during rainfall events. Diversion channels will need to be adapted and hew channels constructed as both pits grow over time.
- *TSF*: Rainwater falling on the TSF will be collected using the constructed drainage system and recycled back into the processing plant circuit.

3.2.4. Waste Management Facilities

The primary waste that will be generated by the Project is the waste rock from the open pit mining and tailings from the process plant, as described in Sections 3.2.4.4 and 3.2.4.5, respectively. There will be dedicated management plans and Standard Operating Procedures (SOPs) for the management of these waste streams.

General and hazardous waste will also be produced by the Project as described in Sections 3.2.4.4 and 3.2.4.5 and the predicted non-mineralised waste streams are presented in Table 3-3. A detailed WMP will be developed for the Project to outline the responsible handling of the various general and hazardous waste streams.

Table 3-3: Expected Non-Mineralised Waste Streams

Type	Waste Stream
General Domestic Waste (non-hazardous)	• Waste paper and cardboard; • Metal; • Plastic containers; • Glass; • Tin cans; • Food waste; and • Grey water from human use.

Type	Waste Stream
General Industrial Waste (non-hazardous)	• Ferrous and non-ferrous scrap metal; • Rubber and cable material; • Cement; • Non-compactable waste (including ash and wood waste); and • Refurbish-able waste (including pumps, valves and pipes).
Hazardous Waste	• Hydrocarbon contaminated waste (including rags, filters, used oils and lubricants and their containers); • Chemicals; • Fluorescent tubes, batteries, printer cartridges and acids; • Aerosols and chemical waste; • Contaminated soil; • Sewage Waste (solid and sludge); • Medical Waste; • Contaminated Protective Personal Equipment (PPE) (including safety boots, glasses, helmet and plastic gloves); • Polychlorinated biphenyls (PCBs); • Pesticide-, herbicide-, insecticide- and fertiliser waste; • Paint and cleaning liquids; and • Chemical containers.

3.2.4.1. General Waste Management

The RDMS will generate general and domestic waste such as food waste, cardboard boxes, glass bottles and other day-to-day waste. Further to this will be industrial waste streams such as concrete, metals, rubble, foam and other miscellaneous wastes. Waste management options are continually being explored; current planning assumes the following:

- Plastics, cardboard and paper will be bailed and transported offsite for recycling by a registered waste management provider. These items will be temporarily stored on site until there is adequate volume for transportation.
- Food and other non-hazardous organic waste (i.e. wood) will initially be disposed of in a landfill facility, with the future option of composing being explored.
- Metallic waste will be transported offsite for recycling.
- Contaminated soils will initially be stored in leak proof containers and sent offsite for incineration by a registered waste management company.
- Rubber tyres will initially be stored onsite. Options are being explored for offsite recycling or reuse alternatives.

- Ash generated from incineration will be analyzed for heavy metal content and safely landfilled or stabilized.
- Building rubble (waste concrete etc.) will be emplaced within the footprint of the waste rock dumps and will be buried.

The anticipated average annual volume of general and domestic solid waste that will be generated during the construction phase is around 890 tonnes per annum (tpa), increasing to 940 tpa while Phase 1 production and Phase 2 construction take place concurrently. Once the construction phase is complete these volumes will reduce to approximately 490 tpa, mostly owing to the significantly reduced number of people of site.

3.2.4.2. Hazardous Waste Management

Hazardous waste includes batteries, fuels and oils, hydrocarbon, contaminated materials from vehicle servicing and other mine related activities etc. and other chemical wastes.

Waste management options are continually being explored; current planning assumes the following:

- Oily wastes and grease (not including waste oils) will be incinerated on site at >850°C as per Pakistan EPA requirements.
- Used oil will be transported offsite for recycling at certified recycling facilities. Transport of waste oil will be by a certified contractor.
- Batteries will be stored in acid resistant containers and send offsite to certified recyclers or disposal services.
- Medical waste will be incinerated onsite.
- Contaminated soils will initially be stored in leak proof containers and sent offsite for incineration by a registered waste management company. Future options for an onsite bioremediation area for soils contaminated with hydrocarbons are being assessed.
- Fluorescent tubes will be sent offsite to a licenced hazardous landfill for safe handling of mercury.
- Other hazardous waste deemed to be unsuitable for onsite incineration (i.e. those which could release toxic emissions when burned) will be transported offsite for disposal by a registered waste management company. Storage will utilize specialized containers such as leak-proof steel drums, Intermediate Bulk Containers (IBCs), and over pack drums to prevent leakage and cross-contamination. Storage sites will feature secondary containment systems, such as berms or lined areas, to prevent accidental spillage into the environment

3.2.4.3. Waste Management Facilities

The proposed waste management facilities that will be constructed at the mine site are as follows:

- *Waste storage and transfer facility:* A centralised facility will be developed to collect and temporarily store the waste from various areas of the RDMC and placed in the designated waste streams before its recovery or final disposal. The facility will be designed to accommodate both general and hazardous wastes streams and the waste will be fully contained to prevent pollution of the environment or risk to human health.

  Suitable containers will be required for hazardous waste storage, collection and removal which will be in a suitable bin/container and to a demarcated area which is concrete to prevent seepage or spillage into the environment. Flammables, oils, empty aerosol tins and other materials that can ignite spontaneously will be deposited in the hazardous containers marked for this purpose.
- *Landfill:* The onsite non-hazardous landfill will be approximately 8 ha between the processing plant area and the accommodation facility.
- *Tire Dump*: This will be established adjacent to the landfill for tire deposition. It is estimated that each of the haul trucks will generate six sets of used tires per year and two sets for other Project vehicles.
- *Bioremediation Area*: If feasible will be established close to the landfill to treat hydrocarbon-contaminated soils. The area will be graded with a perimeter embankment.
- *Solid and Liquid Waste Incinerator:* The incinerator's capacity will be determined by the estimated volumes for the various waste streams and will include post-scrubber emission control.
- *HFO Waste Incinerator*: A second incinerator will be dedicated to the disposal of HFO sludge and the processing plant and will include a post-scrubber. Its capacity will be approximately 15,000 kilograms (kg) a day.

3.2.4.4. Tailings Management

Tailings are a by-product from the processing of the copper and gold ore and will be deposited in the TSF. Tailings will be stored in enclosed cells, as shown in Figure 3-4 where TSF embankments will be raised in stages to increase the storage capacity of the tailings impoundments. The TSF embankments will be constructed with predominantly waste rock that is traffic-compacted to provide structural support. The TSF structure will include a low permeable layer to retain water within the TSF and the cells will include sand filter drains to reduce seepage and phreatic levels in the facilities.

The general design criteria used for the TSF are shown in Table 3-4.

Tailings will be conveyed from the processing plant to the TSF through High-Density Polyethene (HDPE) pipes. Based on the current mine schedule the TSF deposition period is 37.4 years, and the total volume deposited during this period will be 3.1 Bt.

Table 3-4: TSF Design Criteria (April 2024)

Design Component		Predicted Design Criteria
Throughput	Rougher Tailings (88%)	39.6 Mtpa in Phase 1 79.2 Mtpa in Phase 2
	Cleaner Tailings (10%)	4.5 Mtpa in Phase 1 9 Mtpa in Phase 2
	Concentrate (2%)	0.9 Mtpa in Phase 1 1.8 Mtpa in Phase 2
Solids Content	Rougher Tailings	60% solids w/w
	Cleaner Tailings	45% solids w/w
Density	Rougher Tailings	1.59 t/m^3
	Cleaner Tailings	1.34 t/m^3
Seismic	Operating basis earthquake loading	Significant 1,000 years 0.28 g High 2,475 years 0.43 g Very High 5,000 years 0.58 g Extreme MCE 0.67 g
	Post-closure maximum credible earthquake loading	0.67 g
Hydrology	Embankment Levels	Designed to contain design storm events and maintain specific freeboard
	Freeboard	500 mm (preliminary estimate)
	Design Storm	Probable maximum flood
	Runoff diversion (construction phase)	1 in 25-year storm event
	Runoff diversion (operation phase)	1 in 100-year storm event

Geochemical analysis of the tailings estimates that cleaner tailings contain over 10% sulphide with a high acid-generating potential. The water that interacts with these tailing shows elevated metals, high sulphate levels and a low pH. The rougher tailings typically contained less than 0.5% sulphide with a negligible acid-generating potential, leachate had low sulphates and metals, and pH was acidic to neutral. Therefore, the TSF has been designed to store the cleaner and the rougher tailings in separate facilities.

3.2.4.4.1. Cleaner Tailings

Three cells have been designed for the cleaner tailings (Figure 3-4) which will be lined with 1.5 mm HDPE liner underlain by a layer of compacted, low permeability soil. This will limit seepage of leachate and contaminate water into the local groundwater system. The cells will be constructed in 10 m high stages using mostly waste rock. A low permeability upstream zone will be constructed of 3 m of clay and 3 m of filter sand behind it. Eventually, the filter zone will be constructed from coarse tailings. The slopes will be 1:3 (vertical: horizontal) with 5 m wide benches constructed at 10 m height intervals and a crest 20 m wide.

Water will be controlled during operations by adjusting spigot deposition, forming a large tailings beach and a relatively small pond near the decant structures. Water will be collected and circulated back to the processing plant for reuse.

3.2.4.4.2. Rougher Tailings

The rougher tailings storage cells are designed to contain 2,728 Mt (88%) of the total tailings produced. The rougher tailings impoundment design will have a slope of 1:2 with a 40 m wide crest, to accommodate the two-way passing of mine haul trucks. The average height of the embankments will be 30 m with a maximum height of 66 m. At closure, the crest will be 20 m wide.

Deposition of tailings will be controlled to accumulate supernatant water at a decant point. The water will be collected for reuse in the process plant. The embankments at the supernatant pond will be constructed downstream and will be lined with a single layer of 1.5 mm Linear Low-Density Polyethylene (LLDPE) liner. The other embankments will be constructed as centreline raises.

3.2.4.4.3. Tailings Drainage Systems

A toe drain will be installed at the upstream toe of the embankments to promote drainage of tailings. The collected water will flow by gravity to a sump equipped with a pump, where it will be pumped to the supernatant pond. An under-drainage system will be installed surrounding the decant system with a 500 m radius, consisting of sand and gravel overlying a low permeability layer at the base of the TSF. The under-drain layer will have a network of 100 mm diameter perforated HDPE pipes (‘finger drains’) that will flow into 160 mm diameter collector drains. The collector drains will then flow to the sumps. The water from the sumps will be pumped to the supernatant pond (from where it will be pumped back to the plant for re-use).

The decant and drainage systems are designed to:

- Recycle tailings water to reduce water consumption;
- Reduce seepage from the TSF basins and embankments, to protect the environment;
- Increase the density of the tailings to improve storage efficiency; and
- Enhance the TSF stability by lowering the phreatic level in the tailings.

3.2.4.4.4. Tailings Monitoring and Closure

Piezometers will be installed in the embankments to monitor phreatic levels, and settlement pins in the downstream zone of the embankments will monitor for potential embankment movements. The TSF has been designed to withstand significant seismic or storm events. The cells will be progressively closed to reduce long-term wind erosion and excessive dust.

During closure and decommissioning of the TSF, Non-Acid Generating (NAG) coarse waste rock will be placed on the cleaner cells' surfaces. Rougher cells will be closed with the construction of contour causeways (500 m spacing) with swales across the final tailings surface. A spillway will be constructed to allow discharge over the southern embankment. The decant systems will be decommissioned and closed.

Boreholes will be installed as per the Water Management Plan to monitor groundwater levels and regularly assess groundwater quality around the TSF.

3.2.4.5. Waste Rock Dump and Ore Stockpile Management

Two WRDs will be constructed, WRD North and WRD South, as well as two low-grade ore stockpiles to the west of the Western Porphyries Pit. The WRD and stockpiles will be approximately 60 m high with an estimated slope of 2H:1V (horizontal: vertical). The WRDs will be constructed with three lifts to achieve a height of approximately 180 m, each lift will have a set of modules (Figure 3-19, Figure 3-20 and Figure 3-21).

Ore stockpiles will be constructed from the bottom up in 15 m lifts. A 20 m wide berm will be included every 30 vertical meters. The stockpiles will be reclaimed from the top down in 15 m lifts.

Tanjeel pit will have a high-grade ore stockpile and its own WRD.

Separate stockpiles will be developed for very high grade, high grade, medium grade and low grades ores (Figure 3-22 and Figure 3-23).

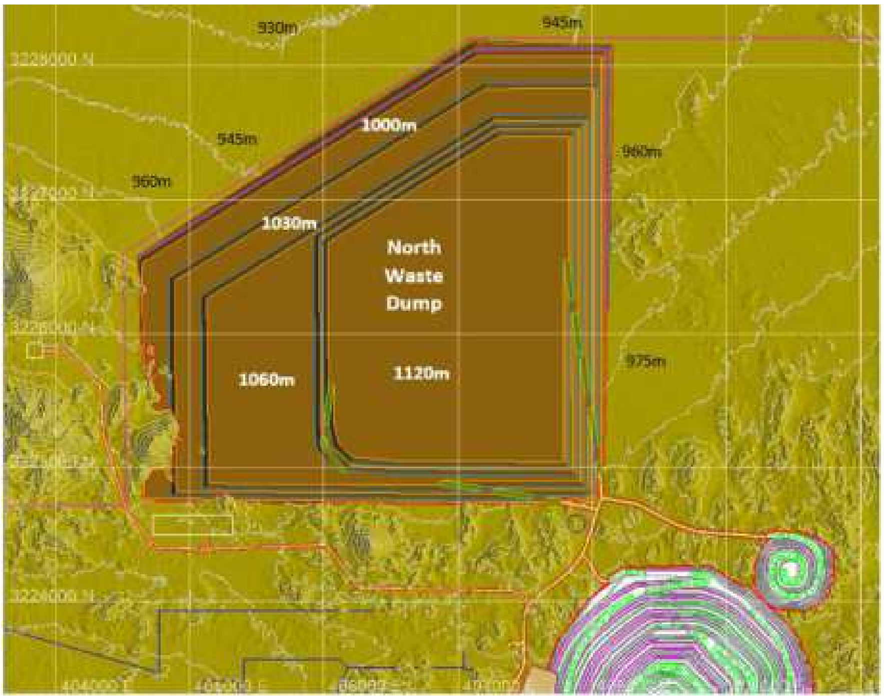


Figure 3-19: North Waste Dump Design

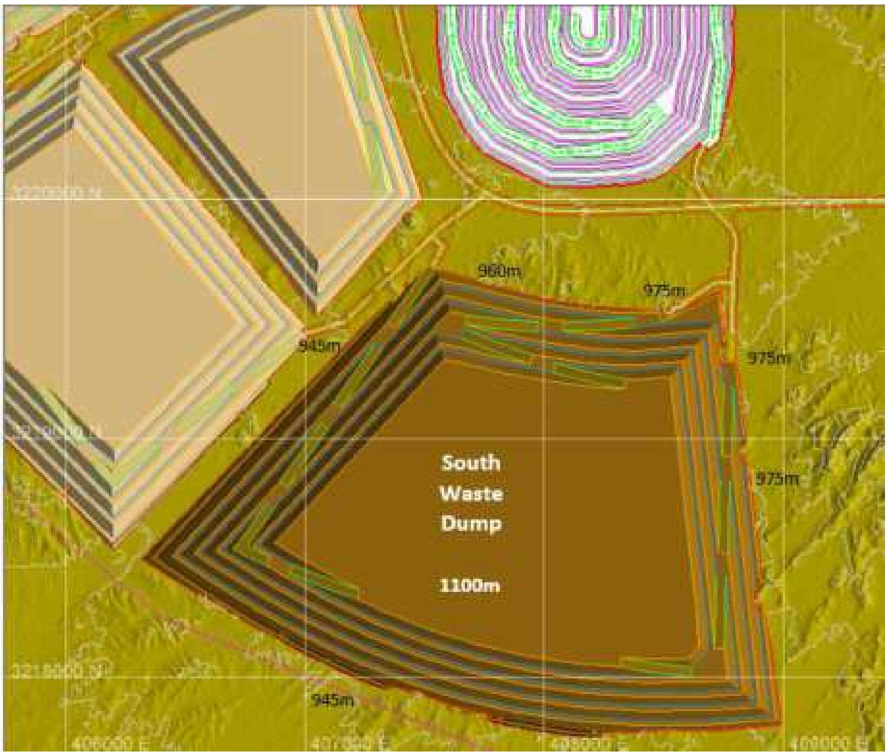


Figure 3-20: South Waste Dump Design

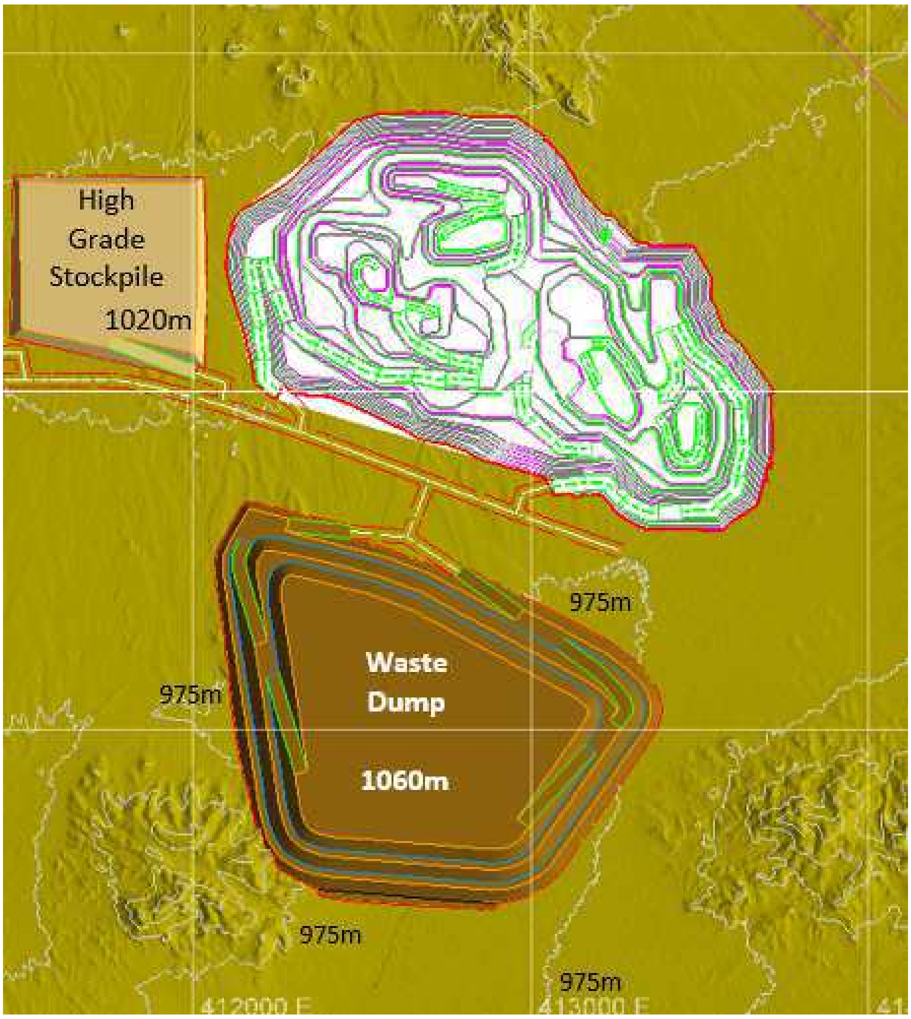


Figure 3-21: Tanjeel Waste Dump Design

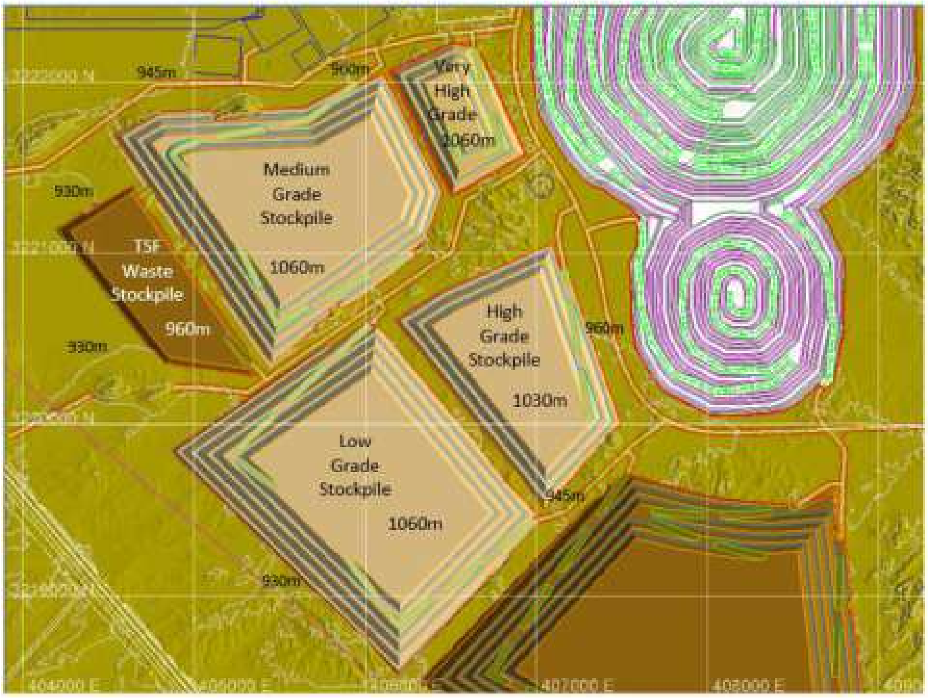


Figure 3-22: Western Porphyries Stockpile Layout

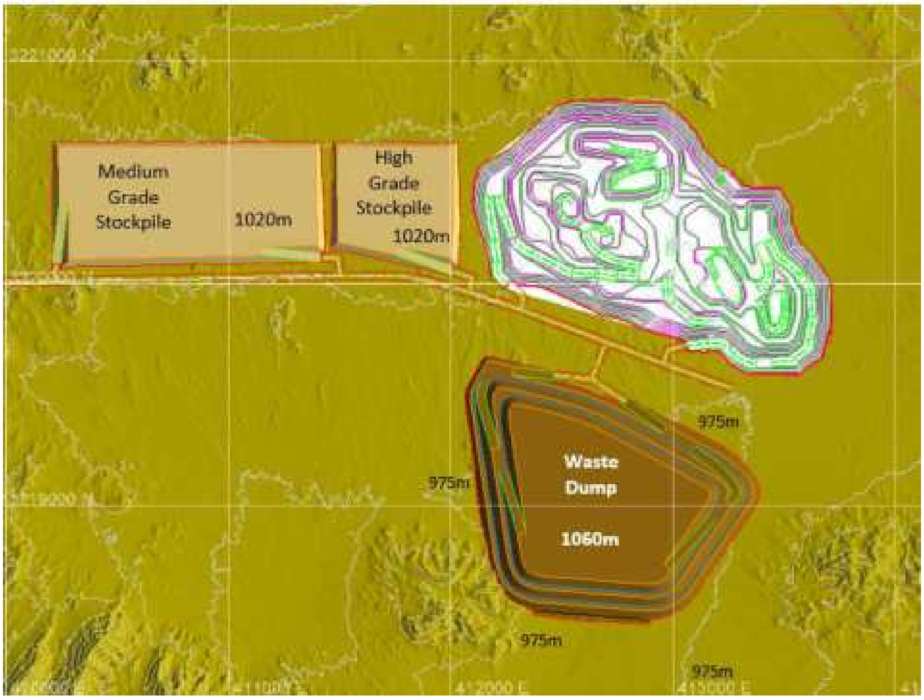


Figure 3-23: Tanjeel Stockpile Layout

3.2.5. Reagents

Reagents for the Reko Diq mine site will be stored at a dedicated reagent storage yard area, which will provide 90 days of storage time. The reagent storage yard includes four reagent sheds, which will include:

- A dedicated SMBS reagent shed, for storage of bulk bags.
- A dedicated collector reagent shed, for storage of bulk bags.
- A flammable reagent shed, for storage of flammable Intermediate Bulk Containers (IBCs).
- A non-flammable reagent shed, for storage of non-flammable IBCs.

The reagents area will consist of bulk reagent storage, mixing, storage, and dosing facilities for the various reagents used in the process plant. This area also includes the storage and handling of grinding media for the grinding mills. The reagents area is located adjacent to the rail yard to facilitate the unloading and logistics of consumables stock handling from the shipping containers to the reagents storage and mixing areas.

The reagent sheds will not cater for the full 90 days storage, excess reagents will be stored in shipping containers within the adjacent yard.

A list of reagents to be used for the project is presented in Table 3-5.

Table 3-5: List of Reagents

Category	Type	Description
Promoters (used in froth flotation to nhance the attachment of the primary collector to the desired mineral to be recovered)	Promotor 1	Aero 3894-IBC 1,000kg.
Promoters	Promotor 2	Aero MAXGOLD 900-IBC 1,050kg.
Promoters	Promotor 3	Aero 7249-IBC 1,100kg.
Collectors (rganic compounds that are added to a pulp to modify the surface properties of minerals and allow them to float)	Collector (PAX)	Delivered in pellet form in 1,000 kg bulk bags and stored in a collector reagent shed.
Frothers (chemical compounds used in mineral froth flotation that consist of polar and nonpolar groups, with the polar group being hydrophilic and the	Frother 1	MIBC-IBC 800kg, located in the flammable IBC shed.

Category	Type	Description
nonpolar group being hydrophobic)		
Frothers	Frother 2	Kemtec F160-05-IBC 1,000kg, located in the non-flammable IBC shed.
Sodium Metabisulphite (control the floatability of minerals and for pH control in froth flotation)	SMBS	Delivered in powder form in 1,000 kg bulk bags and stored in a SMBS reagent shed.
Flocculant (chemicals that are used to separate solid mineral particles from water)	Flocculant 1	(Concentrate Thickener)-Anionic Polymer.
Flocculant	Flocculant 2	(Rougher and Cleaner Tailings Thickeners)-BASF Magnafloc M155

3.2.6. Explosives

Production blasting of ore and waste will use of a 50:50 blend of bulk emulsion and ammonium nitrate prill respectively. The blended product will be manufactured on site in a dedicated facility. This blend will deliver the ore fragmentation required and maintain consistency and maximum utilisation of the bulk explosives delivery vehicles. A 50:50 blend was recommended as it is the best standard ratio that will fill the interstitial spaces between the prill. This will increase the powder factor and provide some mitigation in the event of water being found at the operation.

When excessively wet blastholes (those that cannot be dewatered practically) are encountered, a waterproof pumped blend of explosives will be used. A 70:30 blend of bulk emulsion and ammonium nitrate will be adopted

The ammonium nitrate and chemical components for the emulsion will be transported to site by road by specialist transport providors as separate components to minimise risk. Initiation systems, boosters and packaged explosives will be transported to site by road separately from the bulk explosive components.

3.3. Transport

The Project will use the existing road and rail networks to transport materials during construction and operational phases and utilise the air transportation option for personnel. The main Project transport routes (Road Transport Route and Rail Transport Route) are shown in Figure 3-24.

3.3.1. Road Network

Existing roads will be used to transport supplies and equipment to the mine site for the construction and operational phases. The access roads to the mine site will also be upgraded and improved the as part of the project early works (see Section 3.1).

The Project will utilise key highway system from Port Qasim/Karachi comprising the M10 Northern Bypass to the Regional Corporation for Development (RCD) Highway (also known as N-25 Highway) to Noshki and the N-40 Highway to Nok Kundi and the mine access road (Figure 3-24). The approximate length of this route is 1,200 km. This is an existing road network owned and operated by others which exists regardless of the project so is not an associated facility. No public roads require upgrade as part of the project.

The main equipment and materials that will be transported by road to the mine site during the construction phase include cement, steel, pipes, fuel, processing equipment, mining equipment, food and other supplies. In addition, diesel fuel will be transported to the mine site via road during the construction phase.

A new 8 m wide, two-lane surfaced road will be constructed as part of the early works activities, connecting the mine site to the N-40. Within the mine site, a new gravel road will be constructed which connects the main gate to the processing plant site, airstrip and the accommodation facility. This road will be used by Project-authorised vehicles only.

The mine haul roads will be constructed to facilitate the transport of the ore and waste rock from the open pit to the crushers, ore stockpile processing plant and WRDs.

3.3.2. Air Transportation

Charter flights will be used to transport personnel (not local to the region) routinely between Karachi and the mine site as well as for any emergency medical evacuations. A private airstrip was constructed within Surface Rights Area (SRA) to the south of the accommodation facility in 2010 and was recommissioned in May/June 2023. The airstrip is approximately 1.8 km in length and is located ~10 km from the RDMS. RDMC have implemented the Barrick Gold Aviation Standards, which detail requirements for both charter companies (including personnel qualifications, maintenance, aircraft and other equipment standards etc.) and air strips. The Standard requires regular audits by someone who has a pilot, maintenance, ATC or aircrew licence issued by a recognized national aviation regulatory body such as Transport Canada, FAA, CASA, CAA, or military equivalent, or who is approved by the Barrick Chief Pilot and is listed in the Experience Based Auditor Approval List. Airstrips must comply with Pakistan Aviation Standards and the Barrick Standards.

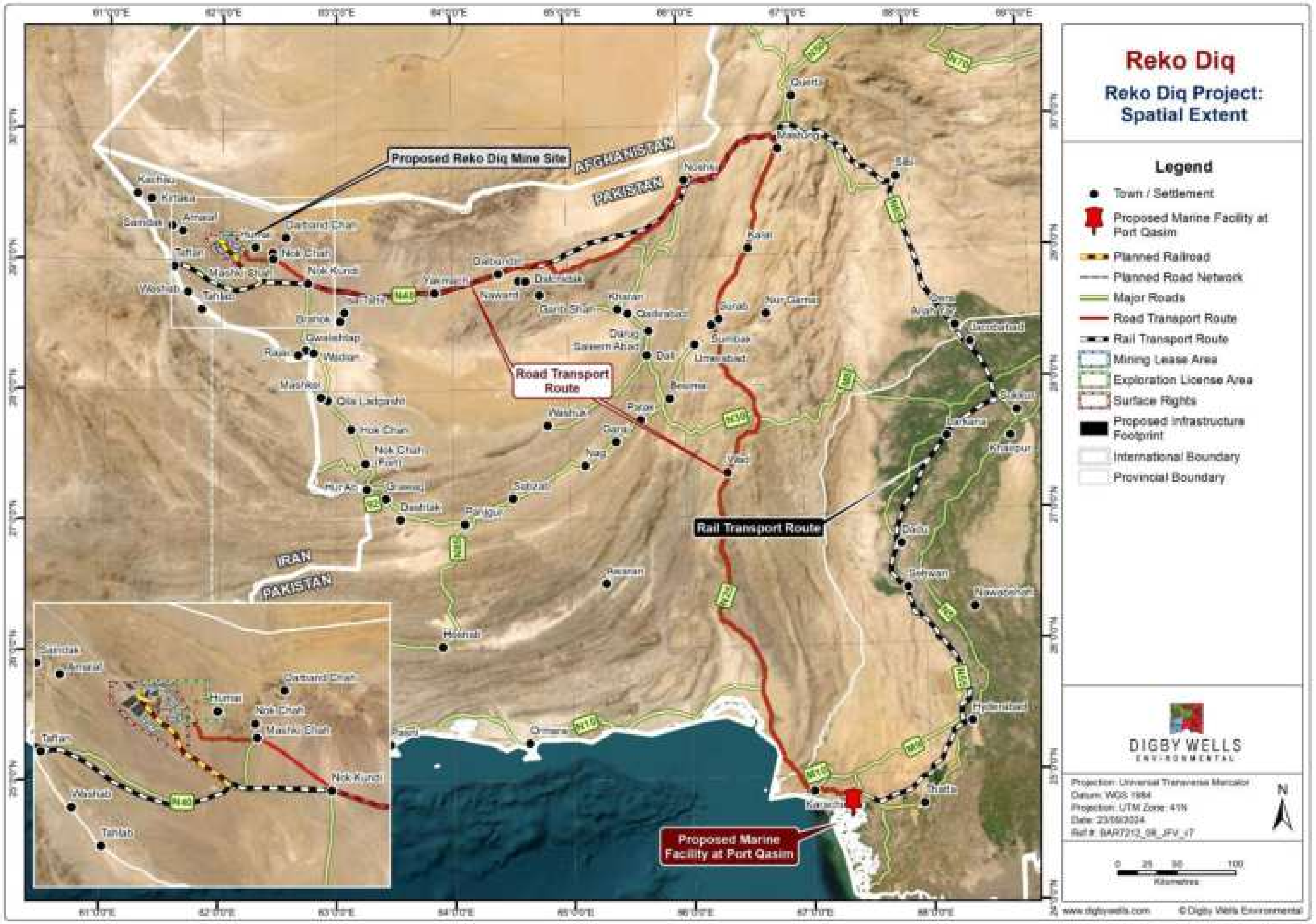


Figure 3-24: Reko Diq Spatial Extent and Transport Routes (Rail Transport Route and Road Transport Route)

3.3.3. Rail Transport

Transport of concentrate to and fuel from Port Qasim will be via an existing railway line, passing through the Balochistan and Sindh provinces. The existing rail route is approximately 1,350 km in length as outlined in Figure 3-24. The existence of the railway does not depend exclusively on the Project, however there are certain repairs and upgrades that will be required to be completed by Pakistan Railways (PR) for the Project. This is particularly relevant for the sections between Spezand (south of Quetta) and the Project site as this portion of the rail has minimal traffic, and as such more closely meets the definition of an associated facility than the more heavily used section between Karachi and Spezand.

The existing railway route runs through Sindh and Balochistan provinces and includes Main Line Sections ML-1, ML-2 and ML-3. A comprehensive assessment of the railway has been completed as part of the Project feasibility.

- **ML-1**: This line runs from Karachi to Peshawar and is the most developed section, carrying 75% of Pakistan's cargo and passenger traffic. It is currently undergoing upgrades as part of the China Pakistan Economic Corridor (CPEC) initiative, aiming to increase the line speed to 140 km/h. This is already under active renewal, no additional upgrades are specified beyond the ongoing CPEC improvements.

- **ML-2 and ML-3**: From Rohri Junction, the route continues onto ML-2 and then ML-3, passing through Jacobabad, Sibi, and Spezand. These sections are in poorer condition, with single tracks, numerous speed restrictions, and frequent interruptions due to natural hazards like floods and sandstorms. Repair works are needed, particularly from Rohri to Taftan to improve safety, reliability, and capacity. These upgrades are crucial for ensuring the efficient operation of the railway, especially for heavy haulage activities. Key areas requiring attention include:

    - **Track Renewal**: Track renewals on sections at Spezand-Alam Reg and Rohri-Sibi.
    - **Sleeper Replacement**: Replacing obsolete or broken sleepers is essential to maintain track stability and safety.
    - **Bridge Repairs**: Repairing bridges damaged by floods is critical to ensure uninterrupted railway operations.
    - **Natural Hazard Protection**: Raising tracks and constructing embankments to protect against floods and sand accumulation.

The upgrades are categorised into three priority levels based on urgency and the condition of the infrastructure. The following sections detail the works required to bring the proposed rail haulage route to the capacity, safety and reliability standards required for the purposes of the Reko Diq Project:

- **Priority 1 (Immediate)**: These works must be executed before the start of heavy haulage operations, focusing on the most critical defects. This includes:

- **Track Renewals**: On sections at Spezand-Alam Reg (513.27 km), Sibi-Abi Gum (13.02 km), and Rohri-Sibi (42.68 km).
- **Sleeper Replacements**: On sections at Kolpur-Spezand (13.28 km) and Sibi-Abi Gum (53.86 km).
- **Bridge Repairs**: On sections at Spezand-Alam Reg (48.70 meters) and Rohri-Sibi-Spezand (229.23 meters).
- **Natural Hazard Protections**: Raising tracks and constructing embankments in flood-prone areas like Spezand-Alam Reg and Rohri-Sibi-Spezand.

- **Priority 2 (5-10 Years)**: These upgrades address defects that are acceptable for continued use but require intervention within the next decade. This includes:
  - **Additional Track Renewals**: On sections at Abi Gum-Kolpur (Down Line, 18.46 km) and Rohri-Sibi (34.24 km).
  - **Further Sleeper Replacements**: On sections at Rohri-Sibi (12.36 km).
  - **Ongoing Bridge Repairs**: On sections at Rohri-Sibi-Spezand.
  - **Enhanced Natural Hazard Protections**: Additional measures to safeguard against future events.
- **Priority 3 (10-15 Years)**: Long-term upgrades for defects that can be monitored and addressed over a longer period. This includes:
  - **Final Track Renewals**: Completing any remaining sections at Abi Gum-Kolpur (Up Line, 19.35 km).
  - **Comprehensive Sleeper Replacements**: Ensuring all sleepers meet safety standards.
  - **Long-term Bridge Maintenance**: Regular inspections and repairs.
  - **Sustained Natural Hazard Protections**: Continuous improvements to protective measures.

Pakistan Rail will be responsible for carrying out these upgrades. They will utilize internal resources, including production facilities for track materials and rolling stock for transportation. Pakistan Rail may also subcontract parts of the work if internal capacity is insufficient. The upgrades aim to ensure the safety, reliability, and capacity of the railway infrastructure to meet future demands, particularly for the Reko Diq Project.

A new project dedicated railway section will be constructed from the mine site to the existing railway line at Nok Kundi. This section of rail is a Project facility as it will be owned and operated by RDMC. The line will stretch over a distance of approximately 56 km to serve as rail link between the mine site and the existing network of Pakistan Railways on Main Line 3. Its alignment has been optimized within contextual constraints for efficient network integration and reliable support of mining and freight operations.

To match the existing network, the line will be a broad-gauge (1676 mm) ballasted track, laid on prestressed concrete sleepers with elastic fastenings and sleeper density of 1640 sleepers per km as per Pakistan Railways standards.

Track design speed (Vmax) 80 km/h for freight trains. The permissible axle load following current Pakistan Railways prescriptions will be 22.5 t/axle.

The prescribed ruling gradient will be 10‰ on the main track and 0 – 0.25‰ in stations and yards.

Available line assessment projects 42 engineering works of various types, including reinforced concrete box culverts, 12 meter simple or multiple span girder bridges and Hume pipes, appropriately distributed and combined for efficient drainage and road crossings.

The fuel required during operations will be transported in bulk via rail from various import terminals at Port Qasim or Karachi Port. Concentrate will be railed from the mine to Port Qasim using special tipping containers, with a size equivalent to a standard 20 foot container, measuring approximately 6 m in length by 2.3 m in width, carrying an average capacity of 27.5 tons of concentrate each.

The rail transport will terminate at an existing railway loop located 13 km northeast of the PIBT. The layout of existing railway loop and proposed facilities is shown in Figure 3-25.

Offloading and rail maintenance facilities will be constructed at this railway loop and concentrate will be trucked from the railway loop to PIBT for further handling. At the marshalling yard, the containers will be unloaded from the train using reach stackers, which will then place the containers on the ground before transporting them to the temporary storage area, or alternatively they may be unloaded directly onto trucks, which will transport the containers to the port area. The rail loop, rail maintenance facilities and rail offloading facilities are to be constructed, owned and operated by others and at this stage will depend exclusively on the Project and as such are classed as associated facilities.

The route from the rail loop to the PIBT will use existing roads within the Port industrial area and it is anticipated that there will be 46 round trips for trucks transporting the concentrate containers to the terminal during Phase 1 and then an additional 46 round trips in Phase 2. The road route to be utilised is existing and is not exclusively dependent on the Project.

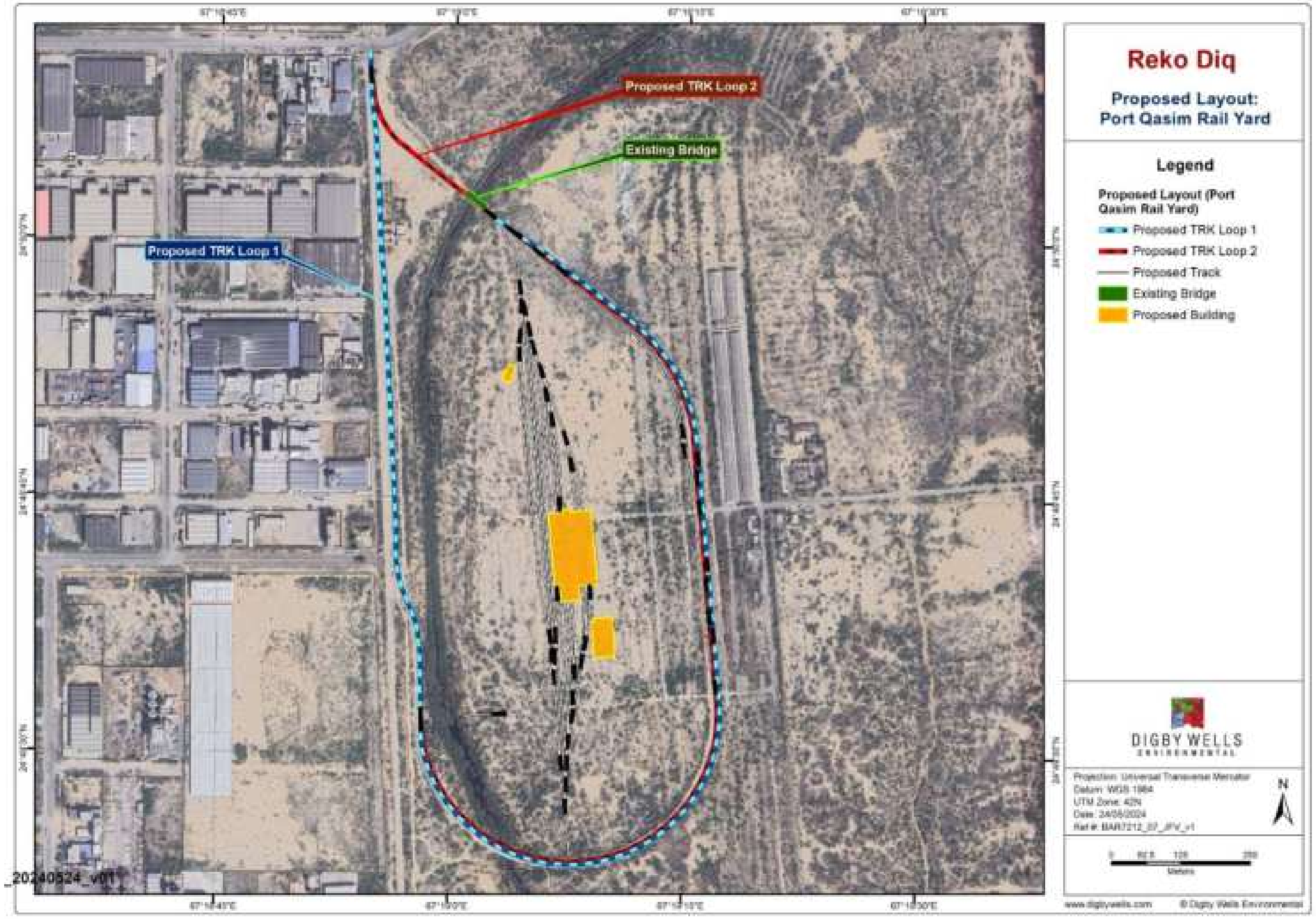


Figure 3-25: Proposed Rail Yard Layout at Port Qasim

3.4. Port Facilities

Port Qasim is a marine terminal port located 50 km from Karachi, on the coastline of the Arabian Sea, in the Malir District of Sindh Province of Pakistan. Port Qasim is under the administrative control of the Secretary to the Government of Pakistan for Maritime Affairs and operated by Port Qasim Authority (PQA) and handles more than 40% of all Pakistan's cargo in and out of the country.

The Project will make use of the existing PIBT where all facilities are owned and operated by PIBT. An area will be leased to RDMC for the construction of a storage shed, for which RDMC will be responsible and all other activities will be ancillary and operated by PIBT.

Accordingly, the PIBT approved ESIA by EMC (2011) and associated plans will continue to guide the PIBT operations while used for the handling and exporting of the concentrate. The construction and operation of the concentrate storage shed will be the responsibility of RDMC.

A study was carried out by PRDW (2024) to evaluate the existing infrastructure and new requirements for the export of the concentrate using the PIBT terminal. PIBT includes access via a 45 km long navigation channel providing safe and convenient passage for vessels. The Terminal has a built capacity for handling up to 12 Mt of coal and 4 Mt of cement and clinker per annum, which together can be further enhanced to ramp up to 20 Mt of bulk product export per year. For this reason, there will be no need for additional port infrastructure to facilitate the requirements of the Project.

The terminal has three onshore product storage areas called Alpha, Bravo and Charlie yards (from west to east) and provides a mechanised material conveying system with a marine jetty including two dedicated berths.

The following is a general description of the existing PIBT facilities that will be used for concentrate loading:

- Existing berth consisting of a concrete platform supported on metal piles spanning approximately 460 m x 35 m, allowing two berthing sites for vessels that can operate simultaneously. The terminal is capable of accommodating Handymax vessels of approximately 60,000 Dead Weight Tonnage (DWT).
- Mechanical equipment consisting of a travelling shiploader for loading, and two gantry cranes for unloading. At the rear, two conveyor belts, one above the other, which can currently transport product to the shiploader and from the cranes.
- No major modifications to the existing berth are required, as the equipment and infrastructure is designed to receive the same vessels expected to load the concentrate.

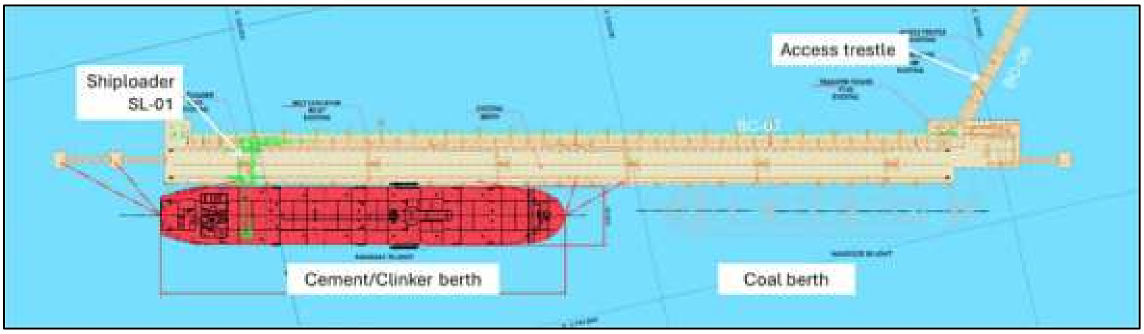


Figure 3-26: Layout of existing PIBT berths

Some new facilities will be constructed at PIBT for the handling and storage of the concentrate and will be projected northeast of the terminal in the Charlie yard; an administration building, a concentrate storage shed, truck unloading building, roads, maintenance workshop, entrance and exit gates, truck scales and product handling conveyors and the connection to existing conveyors for transfer of the product to vessels. These new facilities will be owned and operated by RDMC and as such are classed as Project facilities, all other infrastructure at PIBT does not be exclusively dependent on the Project and as such is not classed as an associated facility.

An extract of the onshore and offshore layout is shown in Figure 3-26 and Figure 3-27.

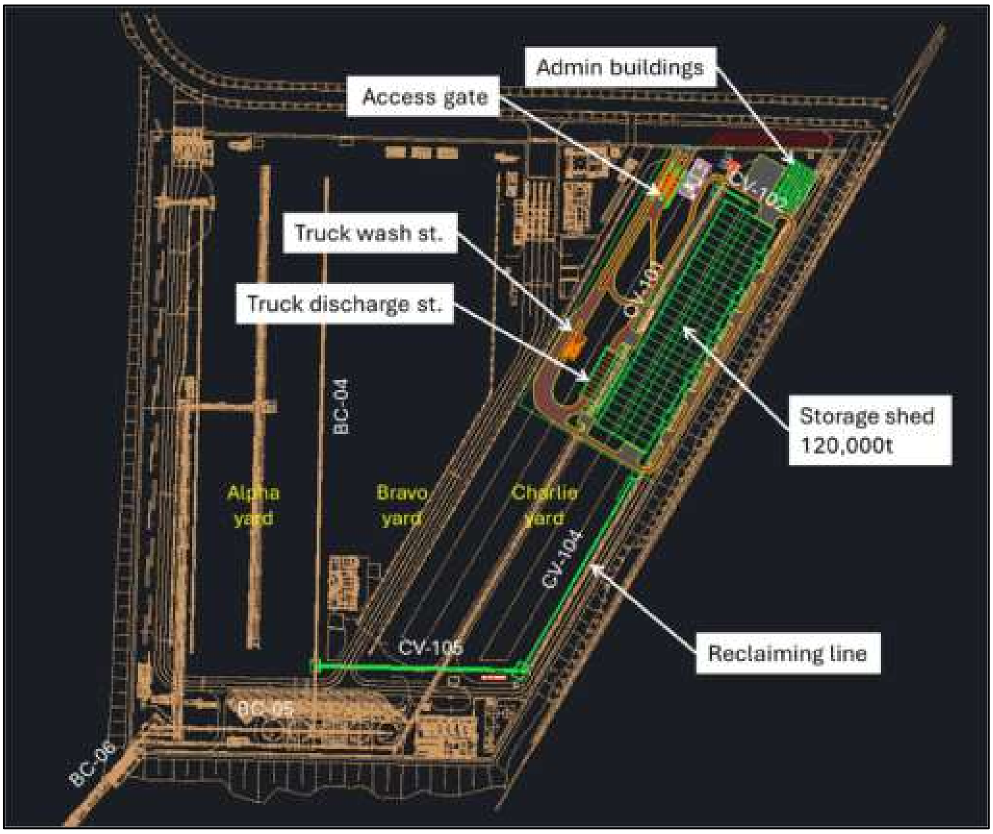


Figure 3-27: Layout of Concentrate Facilities at PIBT at Port Qasim

3.4.1. Port Qasim Processes

There will be several steps in the processing of the concentrate when arriving at the Port, with a separation of responsibilities between RDMC and the management of the PIBT.

- *Truck discharge station*:

Trucks will enter the terminal through a dedicated and independent access gate separate from the current terminal entrances, where trucks will be controlled upon entry, weighed using a weighing bridge, and then directed to the truck unloading station.

The containers will be lifted by two overhead cranes that will unload the concentrate into the receiving hoppers. There will be capacity to discharge two trucks simultaneously, thereafter the empty containers will be returned to the trucks, which will proceed to the exit gate, where again their weight will be checked before authorisation to return to the marshalling yard.

- *Concentrate storage*:

The concentrate will be conveyed from the hoppers to the concentrate storage building, a steel structure with a footprint of 225 x 50 m and is designed to protect the concentrate against weather conditions such as wind and rain.

The concentrate storage building is a portal frame structure with pitched rafters that form a triangular shaped roof that provides an unobstructed clear span without the need for internal bracing or columns. The frame span has a length of 48.60 m and the height of the building is 31.60 m. The frames are positioned at an interval of 8.0 m from each other and the structure is covered with lightweight steel sheets that are fastened to purlins supported on rafters. The rafters rest on top of concrete columns, which are connected by a retaining wall; this vertical wall acts as a barrier to hold copper concentrate in place. Additionally, the concentrate rests on top of the reinforced concrete slab in tandem with the retaining wall, providing a confinement for the concentrate.

The concentrate storage building features a tripper conveyor belt system that distributes copper across the storage floor. The front end loaders pick up the concentrate and transfer it to the hoppers for transportation through a tunnel. The tunnel is a structure that is constructed from rectangular concrete segments. These segments are arranged in a way that forms a tunnel with a width of 5.0 m and a height of 4.5 m. The tunnel's walls, floor, and ceiling are made of reinforced concrete. where the hoppers are located, the height of the tunnel increases to 7.5 m. This increase in height allows for the installation of hoppers or other equipment for the export of copper. Figure 3-28 illustrates the storage shed design.

It is anticipated that the storage shed will likely be constructed in two phases. Phase 1 will provide the storage space for 60,000 tons and the building will then be expanded for Phase 2 for a final storage capacity of 120,000 tonnes.

Figure 3-29 below illustrates the phased approach and what areas constitute Phase 1 and Phase 2 of the storage shed. All layer works will be completed during Phase 1 so the expansion of the storage shed is the only activity for Phase 2 development.

Figure 3-28: Storage Shed Design

Figure 3-29: Model extract showing development phasing of the concentrate shed

- *Transfer by conveyor to loading facility*:

The concentrate will be stored until ready for loading, where Font-end loaders will operate with five hoppers and belt feeders to receive the material during loading. Once a ship is moored and ready for the loading operation, the export system will be activated, consisting of the concentrate reclaiming line inside the storage shed, which will deliver the material to the conveyor belts, and two transfer towers, connecting to the existing terminal loading line, a series of conveyor belts, which will feed into the existing ship loader.

- *Ship loading*:

The existing ship loader is of the travelling type, i.e. it moves longitudinally across the offshore platform and presents a nominal loading capacity of 1,200 t/h. It also has dust control systems, a telescopic chute for loading the product into the ship's hold. It is anticipated that the telescopic chute will be replaced by a new multi-purpose loading chute suitable for export of concentrate.

Minor adjustments are foreseen to be made along the loading conveyor. Nevertheless, the bulk export system is considered to be fully suitable for concentrate shipments.

3.4.1.1. Concentrate handover point at PIBT export conveyor

The battery limit for the RDMC concentrate export conveyor system terminates at a handover point located at the existing belt conveyor BC-04 (Figure 3-30). Material from belt conveyor CV-105 will be dropped via a new chute located at transfer tower TR-104 as depicted in the image below. The connection requires intervention of a segment of BC-04 conveyor to make space for the new transfer tower.

It is assumed that PIBT will maintain BC-04 operational as there is no intent to demolish or decommission this system at this stage. This solution also provides flexibility to material stockpiled at Bravo yard to be transferred to the jetty via this conveyor in future.

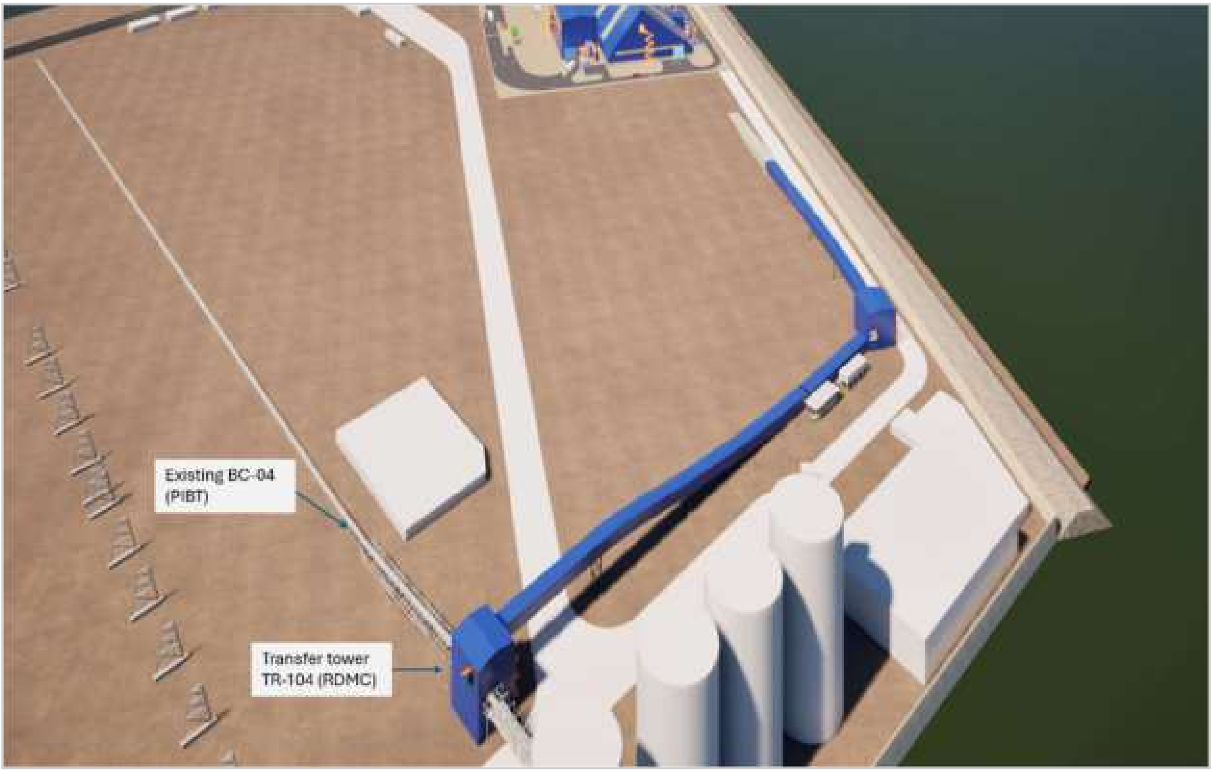


Figure 3-30:Location of transfer of concentrate from RDMC facility to PIBT export conveyor system

3.5. Land Requirement

No private land acquisition is anticipated, nor resettlement required for the Project. All the land required for the Project is Government owned land which will be either leased or purchased from the Government.

Pursuant to the Project Agreement and Pakistan law, the Project Company has been granted valid land rights in relation to the Project Area noting that: (i) the GoB was lawfully entitled to grant the land rights in relation to the Project Area and issue and enter into the Project Agreements; (ii) the Supreme Court of Pakistan held that the Project Agreements, are lawful and constitutional; and (iv) the Attorney General of Pakistan issued a legal opinion on the legality of the Project Agreements.

Further, registration of the Project Agreements with the sub-registrar in Quetta, Balochistan: (i) affirms the validity and legality of the rights of the Project Company under the Project Agreements under Pakistani law; and (ii) serves to ensure that the rights of the Project Company prevail over competing third-party claims against such rights of the Project Company arising from unregistered transfer instruments. This is because, under Pakistani law, rights to immovable property cannot be transferred without a registered instrument.

The GoB has also given representations in the Mineral Agreement that prior to the Reconstitution, the GoB had taken all steps necessary to ensure that no adverse rights are held by any third party or exist at the date of the Mineral Agreement. The GoB has also given broad ongoing undertakings to: (i) cleanse title (at no cost and expense to the Project Company) to the Project Area to ensure that there are no mineral rights or other adverse property rights held by any person other than the Project Company to all or any part of the Project Area; (ii) ensure that no other mineral rights or other property rights, will be permitted to exist in respect of the Project Area throughout the term of the Mineral Agreement; and (iii) indemnify and hold harmless the Project Company (among others) from all losses incurred and arising out of or in connection with the inability of the GoB to obtain binding written releases from any right to or claim in any part of the Project Area from any party claiming that it holds mining, exploration or prospecting rights to or within the Project Area.

Table 3-6 provides a description of existing or planned tenure for each Project aspect as well as classification as a Project Facility, Associated Facility or other.

Table 3-6: Project Land Tenure Requirements

Project Aspect	Categorisation	Tenure Details
Mine area (including pits, waste dumps, processing plant, TSF, waste management facility, accommodation facility, rail loading/unloading infrastructure and haul and other site roads)	Project Facility	1. Mining Leases (ML 19 and 20) issued on 14 December 2022. Term is 30 years from 15th December 2022 being the Effective Date as set out in the Mineral Agreement and renewable in accordance with the terms set out in the

Project Aspect	Categorisation	Tenure Details
		ML. 2. Surface Lease Order issued on 15th December 2022. Term is 30 years from 15th December 2022 and in accordance with Mineral Agreement.
Mine Access Road from the N-40 Highway to the mine area	Project Facility	Surface Lease Order issued on 15th December 2022. Term is 30 years from 15th December 2022 and in accordance with Mineral Agreement.
Rail spur line from the existing rail line to the Mine area	Project Facility	Surface Lease Order issued on 15th December 2022. Term is 30 years from 15th December 2022 and in accordance with Mineral Agreement.
Water Supply Pipeline (construction and operations water pipelines) from the Northern Borefield to the Mine Area, including pump stations	Project Facility	Lease order dated 25th July 2024 and Land Lease Deed dated 30th September 2024 issued pursuant to the Water NOC and Land Lease Policy for foreign Investors 2018.
Northern Borefield, including bore locations, feeder piping etc.	Project Facility	Lease order dated 25th July 2024 and Land Lease Deed dated 30th September 2024 issued pursuant to the Water NOC and Land Lease Policy for foreign Investors 2018.
Power Transmission Line from the Northern Borefield to the Mine Area	Project Facility	Lease order dated 25th July 2024 and Land Lease Deed dated 30th September 2024 issued pursuant to the Water NOC and Land Lease Policy for foreign Investors 2018.
Road Network across Pakistan	Not a Project Facility or Associated Facility. Exists regardless of the Project and is owned and managed by others.	Public roads

Project Aspect	Categorisation	Tenure Details
Existing Rail Network	Rail network will remain under the ownership and management of Pakistan Rail. Section from Karachi to Spezand is fully functional with existing regular rail traffic and as such is not considered an associated facility. Section from Spezand to the intersection with the Rail Spur will require remediation work to be functional for the project and as such is considered an associated facility	Accessed through agreement with Pakistan Rail (still to be finalised)
Rail Loop at Port Qasim, including train loading and unloading facilities	To be constructed for the Project, but will be owned and operated by others and as such is an associated facility	Land has been leased to the Port Qasim Authority who has granted certain rights to Pakistan Rail.
Road Routes from the Port Qasim Rail Loop to PIBT	Not a Project Facility or Associated Facility. Exists regardless of the Project and is owned and managed by others.	Public roads managed by Port Qasim
Concentrate Storage and Handling Facilities at Port Qasim (excluding the existing PIBT Infrastructure)	Project Facility	Area within the PIBT facility to be sub-leased to RDMC through and agreement currently being negotiated.
Existing PIBT Infrastructure including existing conveyors, ship berthing and loading infrastructure		Owned and operated by PIBT.

3.6. Employment

Preference will be given to locals for employment and appropriately qualified individuals from the surrounding communities. Table 3-7 presents the estimated average staffing during different stages of the Project. The type of employment required includes skilled and management, semi-skilled (such as drivers, fitters and carpenters) and unskilled (labourers and guards).

Table 3-7: Employment at Reko Diq Mine Site in various stages of the Project

Project Phase	Early Works, Feasibility Study & Detailed Engineering	Phase 1 Construction	Phase 1 Operations & Phase 2 Construction	Phase 2 Operations
	2024	**2025-2027**	**2028-2033**	**2034-2040**
A. Contractors				
A.1. Contractors - Construction	2,353	8,255	6,803	-
A.2. Contractors - Operations & Services	200	200	331	614
Total Contractors	2,553	8,455	7,133	614
B. RDMC Employees				
B.1. RDMC Local	460	1,761	2,465	4,814
B.2. RDMC Expat	86	120	449	404
RDMC Total Employees	546	1,881	2,914	5,218
Total Engaged Workforce (A+B)	**3,099**	**10,336**	**10,047**	**5,832**

Local employment (defined as a native or registered resident of Balochistan) is a key focus for the project and other stakeholders. RDMC have established a training centre to improve the skills and overall employment prospects of local people in readiness for the Project. Targets for local employment are defined for operational phases of the Project in the Mineral Agreement, and RDMC are also seeking to achieve certain targets (as a minimum) for the construction and early operations phases:

- 2025 – 2030:
  - Unskilled RDMC employees – 60%.
  - Skilled RDMC employees – 10%.
  - Professional/Management RDMC employees – 3%.
- 2025 – 2035:
  - Unskilled RDMC employees – 70%.
  - Skilled RDMC employees – 15%.
  - Professional/Management RDMC employees – 5%.

- 2035 – 2042 (as per the Mineral Agreement):
    - Unskilled RDMC employees – 80%.
    - Skilled RDMC employees – 30%.
    - Professional/Management RDMC employees – 10%.
- From 2042:
    - Unskilled RDMC employees – 90%.
    - Skilled RDMC employees – 50%.
    - Professional/Management RDMC employees – 30%.

RDMC are also implementing programs to maximise female employment, both directly and indirectly in the Project.

3.7. Project Schedule

The Project will be developed in stages as per each area with the initial production of concentrate in 2028. Table 3-8 presents the anticipated Project schedule.

Table 3-8: Project Schedule

Phase	Aspect	Scheduled
Construction Phase	Early Works	Q3 2024 – Q2 2025
	Phase 1 construction	2025 – 2028
	Phase 2 construction	2028 – 2030
Operational Phase	Phase 1 commissioning	2028
	Phase 2 commissioning	2031
Decommissioning	Rehabilitation and post-closure management	After mine operations have ceased.

Q refers to one-fourth of a year i.e., Q2 is second quarter of the year 2025.

4. Project Alternatives

The purpose of the alternatives analysis is to identify and assess the feasibility of various options for the Project. It is a crucial step in project planning and decision-making. The alternatives were selected through professional investigation, experience and consultation with Project stakeholders. Additionally, the alternatives consider environmental, social, technical and economic factors to identify the preferred and most feasible option.

This chapter provides an overview of the alternatives assessment process, including the alternatives considered, and the rationale for selecting the preferred alternatives. The process included the involvement of the RDMC multidisciplinary Project team, including independent consultants with expertise in mining, mineral processing, hydrogeology and water supply development, tailings management and power generation. Each option is assessed and evaluated against multiple criteria including technical, economic, environmental and social. These are then further analysed as a specialist team and assessed with Project and Barrick leadership and JV partners throughout the feasibility study process to ensure environmental and social considerations in the decision making and Project design processes.

Figure 4-1 presents the alternatives assessment process adopted for the Project. This assessment process aligns with approach outlined in the IFC PS1: Assessment and Management of Environmental and Social Risks and Impacts. Several Project aspects were considered for the alternatives analysis such as mining and ore processing methods, power supply, tailings management, water supply, concentrate transport, marine facilities for product export, accommodation options, and infrastructure layout as well as a “no-go” alternative in which the Project would not be implemented. Table 4-1 presents the list of alternatives considered for the assessment and selected options. These alternatives are discussed in further detail below.

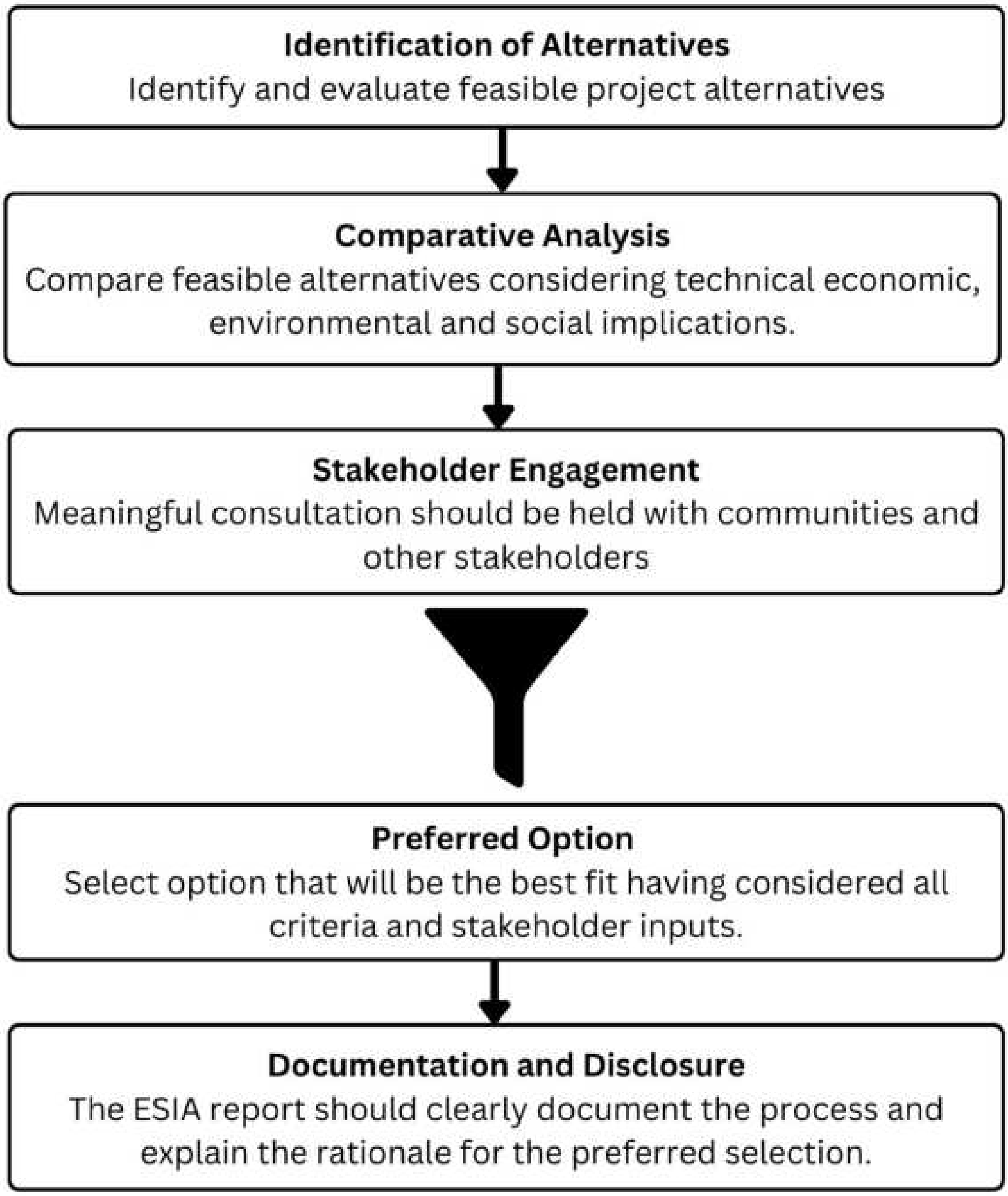


Figure 4-1: Approach to Alternatives Assessment

Table 4-1: Summary of Alternatives Considered for the Project and Selected Option

Project Aspect	Alternatives Considered	Preferred/ Selected Alternative	Reference Section
No-Go Alternative	This alternative considers no project development.		Section 4.1, No-Go Alternative
Mining Methods	• Surface (open-pit) Mining; and • Underground Mining.	Surface (open-pit) Mining	Section 4.2, Mining Methods Alternatives
Ore Processing Methods – Ore Separation Techniques	• Physiochemical Separation (Flotation); • Heap Leach; • High-Pressure Acid Leaching Solution; and • Bioleaching.	Physiochemical Separation (Flotation)	Section 4.3.1, Ore Separation Techniques Alternatives
Ore Processing Methods – Dewatering Techniques	• Filtration; • Thickening; and • Drying.	Thickening	Section 4.3.2, Dewatering Techniques Alternatives
Power Supply Sources	• On-site Power Station (HFO); • On-site Power Station (Diesel); • On-site Power Station (Gas via pipeline); • On-site Power Station (Geothermal); • On-site Power Station (Solar); • On-site Power Station (Wind); and • Grid Connection.	• First 15 Years: On-site Power Station (HFO) integrated with renewables i.e., on-site Power Station (Solar) • From 15 Years onwards: Grid Connection	Section 4.4, Power Supply Alternatives Section 4.4.1, Analysis of Emissions for Power Supply Alternatives

Project Aspect	Alternatives Considered	Preferred/ Selected Alternative	Reference Section
Power Supply Alternatives – Power Plant Technologies	• High Speed Reciprocating Engines; • Medium Speed Reciprocating Engines; • Turbines; and • Boilers.	Medium Speed Reciprocating Engines	Section 4.4.2, Power Plant Technology Alternatives
Tailings Management – Tailings Storage Facility Locations	• 17 alternative sites were considered; and • Site 0E, Site 0 to Site 15.	Site 0E	Section 4.5.1, Tailing Storage Facility Locations Alternatives
Tailings Management – Tailings Disposal Technologies	Seven technologies were considered. • Un-thickened Tailings; • Conventional Thickened Tailings; • Ultra Thickened Tailings; • Coarse Filtered Tailings; • Separated Tailings (streams produced by coarse particle flotation); • Co-Mingling; and • Co-Disposal.	Conventional Thickened Tailings	Section 4.5.2, Tailings Disposal Technology Alternatives
Water Supply Sources	Several alternatives were considered: • Groundwater source alternatives; and • Seawater Desalination Plant at Gwadar Port with a pipeline to the mine site.	Groundwater abstraction from the Northern Groundwater System	Section 4.6, Water Supply Sources Alternatives
Concentrate Transport Alternatives	• Rail;	Rail	Section 4.7, Concentrate Transport Alternatives

Project Aspect	Alternatives Considered	Preferred/ Selected Alternative	Reference Section
	• Pipeline; and • Road.		
Marine Terminal Alternatives	• Gwadar Port; and • Port Qasim.	Port Qasim	Section 4.8, Marine Terminal Alternatives
Accommodation Options	• On-site Accommodation; and • Off-site Accommodation.	On-site Accommodation	Section 4.9, Accommodation Options
Infrastructure Layout	Several alternatives were considered for the placement of various facilities at the mine site. Key criteria included safety, cost, travel distance, organisational requirements and environmental considerations.	The final layout has been selected to minimise the overall footprint and therefore reduce the impact on the surrounding environment, flora and fauna whilst maintaining an efficient operation	Section 4.10, Infrastructure Layout

4.1. No-Go Alternative

The No-Go alternative considers no development of the Project. The construction and operation of the proposed Reko Diq Mine and its associated facilities will affect the physical and ecological environments surrounding the proposed mine resulting in impacts which are manageable. Not developing the project will result in significant socio-economic benefits not being realised.

No significant impacts on the ecological environment are expected to occur if the project had to proceed, including impacts on any species of conservation concern or sensitive environments. There are no protected forests or nature reserves within a 100 km radius of the proposed RDMS. Impacts on the physical environment will be localised, including air quality and noise. State land will be allocated to this Project and no private land acquisition is anticipated for the Project and its facilities and no resettlement of people is necessary.

Impacts on the physical environment will be localised. Key physical and social impacts of the Project include:

- Increased noise levels along railway and sidings along the Rail Transport Route;
- Increased noise levels along the Road Transport Route;
- Mobilisation of dust from the TSF, waste dumps and haul roads;
- Influx of people to the district and larger towns e.g. Nok Kundi, Taftan and the need for improved social services to meet the needs of the growing community; and
- Air and GHG Emissions generated by the project, predominantly resulting from on-site energy sources, incinerators, transportation of goods to the mine site and transportation of the copper-gold concentrate to port.

However, if the No-Go alternative occurs the following will also occur:

- Reko Diq represents one of the largest undeveloped copper gold porphyry projects in the world (Barrick, 2024). The No-Go Option will prevent the extraction of these minerals and there will continue to be a copper supply demand gap. The copper will not be available for the electrification processes planned in many countries.
- The proposed Project will provide many local contractual and permanent job opportunities, business opportunities, and other direct or indirect local economic activities which the No-Go alternative will fail to provide.
- If the Reko Diq Mining Project is not developed, the GoP and the GoB will be deprived of revenues and royalties that could be utilised for local and regional development projects. Associated opportunities for employment and growth of local businesses will also be lost.
- RDMC has a commitment to spend approximately 0.4% of revenue generated through the Project on community development investments. Currently the region is severely underdeveloped with very limited access to quality healthcare, education, clean drinking water and economic activity. The revenues are expected to make significant

improvements to livelihoods of communities across the region, which would be lost should the project not proceed.

- The No-Go alternative will undermine the local economic growth and the utilisation of much-required copper reserves globally.

Considering the above statements, the No-Go alternative may avoid the localised environmental impacts, which are largely manageable and can be mitigated through identified measures and monitoring programmes, but the significant economic and social benefits would not be realised.

4.2. Mining Methods Alternatives

Mining has changed and evolved significantly over time. Technological advancements have improved efficiency, created a safer workplace, and minimised and mitigated the environmental impacts associated with mining processes. Generally, the location of the mineral, the way it is concentrated in the orebody and its proximity to the surface determines the mining method that will be used.

There are two major methods of mining: open-pit (surface) and underground. Table 4-2 provides a comparison between the two methods.

Table 4-2: Alternative Mining Methods

Aspect	Open-pit (Surface) Mining	Underground Mining
Applicability	Open-pit mining is used when the ore is near the earth's surface. It is accomplished by creating and using benches or terraces to gradually reach deeper under the earth's surface. The ore and non-ore materials are excavated using surface mining equipment, typically excavators/rope shovels and trucks (IFC, 2007) It is the most widely used technique for mining copper and gold.	Underground mining is used when the ore deposit is deeper and open pit mining methods are not viable. The deposit is accessed from the surface by vertical shafts, horizontal adits (tunnels), or inclines (ramps) (National Research Council, 2002). Mining then follows the vein of ore as the underground mine develops.
Operational Flexibility	Open-pit mines allow for heavy machinery and workers to conduct their jobs in the open and usually with more manoeuvrability.	Underground mining generally requires a complex system of access, service and stopping excavations to recover the ore (IFC, 2007). Machinery and workers' access are not easy in underground mining operations, especially when the mines are very deep, and ore bodies are complex.
Safety	Open-pit mines do not have to safeguard against the loss of air and cave-ins however, hazards	Fire, flood, collapse, toxic atmospheric contaminants, and dust or gas explosions are the most critical hazards

Aspect	Open-pit (Surface) Mining	Underground Mining
	associated with rockslides and structural integrity of the surrounding material are still present (Micromine, 2017).	that makes this mining method more prone to accidents. Inadequate ventilation in underground mines can worsen dust buildup and raise the risk of respiratory problems in personnel (Veriforce, 2024). In underground environments, communication challenges can hinder emergency response and coordination resulting in potentially serious safety issues (Massachusetts Institute of Technology, 2024).
Environmental Impacts/ Footprint	Open-pit mining can have a significant impact on the environment, as it involves removing large amounts of rock and soil, disrupting of habitats and ecosystems, and creating large pits and waste dumps. This may result in habitat degradation, water contamination, and soil erosion, all of which may have long-term consequences for the ecosystems and local communities (Construction Civil Engineering, 2024). Generally open pits leave large footprints, and backfilling is typically not an option at closure. This, together with the associated waste rock dumps, can result in a permanent, significant visual impact.	Underground mining methods typically involve the removal of much less material than open pit mining. However, there are still certain environmental impacts associated, including water contamination, air pollution, soil subsidence, and sinkholes and other types of ground deformation. Underground operations generally have smaller surface footprints, which are more easily rehabilitated, thereby reducing / removing long-term visual and ecological impacts. However, it has other environmental consequences. The construction of tunnels or shafts may disrupt natural drainage patterns, potentially affecting groundwater systems. In some cases, underground mining can lead to subsidence, causing ground instability and potentially affecting surface structures.
Cost	Surface mining generally has lower operating cost per unit (i.e. ton of ore) compared with underground methods due to relatively straightforward extraction processes and the use of large-scale equipment and expenditure is mainly on direct production activities i.e., drilling, blasting and moving rock.	Underground mining is generally more expensive per unit (i.e. ton of ore) due to the complex infrastructure required for accessing and extracting minerals including the construction and maintenance of tunnels, shafts, ventilation systems, and underground support structures. Furthermore, the depth, complexity of mining and geological conditions, such as the presence of faults or unstable rock formations, requiring extensive

Aspect	Open-pit (Surface) Mining	Underground Mining
		engineering measures and reinforcement, add to the overall expenditure.
Depth of Ore Body	Open-pit mining is generally more suitable for large-scale operations, where the ore body is located near the surface. Open-pit mining is also a faster option, which can be beneficial for operations with tight production schedules.	Underground methods are deployed when the ore body is too deep to be accessed using open-cut methods or the surface impacts are too significant, and it is more economic to use these methods.
Interconnection	For reserves that are closer to the earth's surface, open-pit mining is typically preferred for its reduced complexity and associated risks.	When an open pit mine depletes its surface minable reserves there may be an option to move to the underground mining process for further extraction of ore.

Surface mining, wherever applicable, is more advantageous than underground mining in terms of access to ore body operational flexibility, productivity, safety, and cost. Open-pit mining has been selected for the proposed Project with the following advantages in mind:

- The proximity of mineral reserves to the earth's surface, where the Top of Sulphide (TOS) is 25m to 30 m below surface;
- More manoeuvrability and operational flexibility;
- Safe and ease of access for the extraction of minerals;
- Lower capital and operating costs for bulk mining operations; and
- Increased productivity for extraction of minerals which are closer to the earth's surface and where strip (waste) ratio is low.

The impacts resulting from this choice such as greater dust levels and large waste rock dumps need to be managed and this will be dealt with in various management plans which will accompany this ESIA.

4.3. Ore Processing Alternatives

The assessment of ore processing alternatives considered two categories:

- Ore Separation (concentrate preparation) Techniques Alternatives; and
- Dewatering Techniques Alternatives.

4.3.1. Ore Separation Techniques Alternatives

Two primary options have been identified for extracting the valuable metals from the ores and have been assessed (Table 4-3). These are: physiochemical separation (flotation) and leaching. The options considered and their processes are discussed below. Flotation was selected as the preferred option. Heap leaching alternatives were assessed during Project Pre-feasibility study however these options were discarded early primarily due to the Reko Diq ore type not being suitable. Additional factors for not advancing heap leach as an option include:

- Finer grind requirements resulting in an increased power demand;
- High evaporation environment presenting resulting in significant losses of leaching solution; and
- Environmental risks including contamination of soil and groundwater.

4.3.1.1. Physiochemical Separation (Flotation)

Flotation is the most widely used method for the concentration of fine-grained minerals. It takes advantage of the different physicochemical surface properties of minerals—in particular, their wettability, which can be a natural property, or one artificially changed by chemical reagents. By altering the hydrophobic (water-repelling) or hydrophilic (water-attracting) conditions of their surfaces, mineral particles suspended in water can be induced to adhere to air bubbles passing through a flotation cell or to remain in the pulp. The air bubbles pass to the upper surface of the pulp and form a froth, which, together with the attached hydrophobic minerals, can be removed. The tailings, containing the hydrophilic minerals, can be removed from the bottom of the cell.

4.3.1.2. Leaching

Heap leaching is an industrial mining method used to extract precious metals such as gold, copper, uranium, and other compounds from low-grade ores. It is a hydrometallurgical process which involves placing crushed ore in large heaps or piles on an impermeable liner. A leach solution or a leaching reagent (often sulphuric acid) is then continuously sprayed or dripped over the heap, allowing it to percolate through the ore. The leach solution dissolves the valuable metals from the ore, separating them from other minerals. The pregnant solution (containing dissolved metals) is collected and processed to recover the target metal. Various leaching technologies exist, but all are typically employed in oxidised type ore bodies.

Table 4-3: Ore Separation Techniques Alternatives

Aspect	Physiochemical Separation (Flotation)	Heap Leaching
Applicability/ Suitability	Suitable for various ores, especially those with complex mineral compositions and particularly sulphide ores	Primarily used for low oxide containing ores and suitable for low grade ores.
Economics	Moderate cost due to reagents and equipment.	Economical for oxide ore deposits. Requires less and simpler infrastructure compared to flotation but more spread

Aspect	Physiochemical Separation (Flotation)	Heap Leaching
	Requires significant and complex infrastructure than heap leaching, including flotation cells, thickeners, and tailings management systems. However, the footprint is relatively compact. Produces a concentrated product that is easier and more cost-effective to transport.	out for construction of leach pads, ponds, and solution management systems resulting in larger footprints Produces a solution containing the dissolved metals, which then needs to be processed to recover the metals. This can involve additional steps and infrastructure for transportation and processing of the final product.
Environmental Concerns	Generates wastewater containing reagents and fine particles which requires proper management.	Potential contamination of soil and water resources due to leakage or spillage of leaching solution which requires careful management to prevent contamination. Acid drainage can be an issue. Involves acid and produces acidic effluent which needs treatment.
Energy Consumption	Higher energy consumption compared to heap-leaching due to the need for grinding the ore to a fine particle size and the mechanical agitation required to keep particles in suspension.	More-energy efficient and lower energy consumption compared to flotation because it operates at ambient temperatures and pressures and does not require fine grinding of the ore so there is less grinding and milling.
Efficiency/ Process Speed	It is a faster process, which can be beneficial in terms of throughput and overall operational efficiency.	It is a slower process, often taking several months to complete, which can impact the overall efficiency of the operation.
Transportation Requirements	This process produces copper in form of copper concentrates. These are typically transported in bulk, making the logistics simpler and cost-effective. The concentrate is a fine, powdery material that can be easily compacted and loaded, transported, and unloaded using standard bulk handling equipment. Can be transported using various modes, including trucks, trains, and ships, without the need for specialised containers. Easier to handle and store in bulk facilities. They can be stored in silos	This process produces copper in form of copper cathodes/sheets. These are solid, heavy, and often require more careful handling to avoid damage. They are usually transported in stacks, which need to be secured and protected during transit. These take up more space and are heavier per unit of volume compared to concentrates which can increase transportation costs and complexity. Often require more specialised handling and packaging to prevent damage, which can limit the flexibility in transportation options.

Aspect	Physiochemical Separation (Flotation)	Heap Leaching
	or large warehouses without significant risk of damage.	Require more careful handling and storage to prevent physical damage and oxidation. They often need to be stored in covered or climate-controlled environments.
Reference	(Alicja *et. al*., 2024)	LibreTexts (2023)

4.3.2. Dewatering Techniques Alternatives

Concentrates and tailings produced by the flotation method must be dewatered to convert the pulps to a transportable state. In addition, the water can be recycled into the existing water circuits of the processing plant, reducing the demand for new water added into the circuit. The thickening dewatering technique has been selected for the Project because of significantly lower capital and operating costs than other solutions.

4.3.2.1. Filtration

Filtration is the separation of a suspension into a solid filter cake and a liquid filtrate by passing it through a permeable filtering material. Important factors in this process are the properties of the suspension (e.g., size distribution, concentration), the properties of the filtering materials (e.g., the width and shape of pores), and the forces applied to the suspension. Filtration is carried out in gravity filters (screens, dewatering bins), in centrifugal filters (screen centrifuges), in vacuum filters (drum cell filters, disk filters), or in pressure filters (filter presses). Such devices make it possible to produce filter cakes containing 8% to 15% moisture.

4.3.2.2. Thickening

In the process of thickening (also called sedimentation), the solids in a suspension settle under the influence of gravity in a tank and form a thick pulp. This pulp, and the clear liquid at the top of the tank, can be removed continuously or intermittently. The thickening of finely grained pulps is often aided by the use of flocculating agents.

4.3.2.3. Drying

The removal of water from solid materials by thermal drying plays a significant role in modern mineral processing. A great number of dryer types are available. Convection dryers, employing a flow of hot combustion gases to remove moisture from a pulp stream, are the most common.

4.4. Power Supply Alternatives

This section discusses the various alternatives considered to meet the power requirements of the proposed Project.

The Project will utilise diesel generators during the pre-construction (early works) and construction phases until the establishment of the on-site power station for the operational phase.

The mine will be developed in two stages and each stage will have different power requirements based on production capacity.

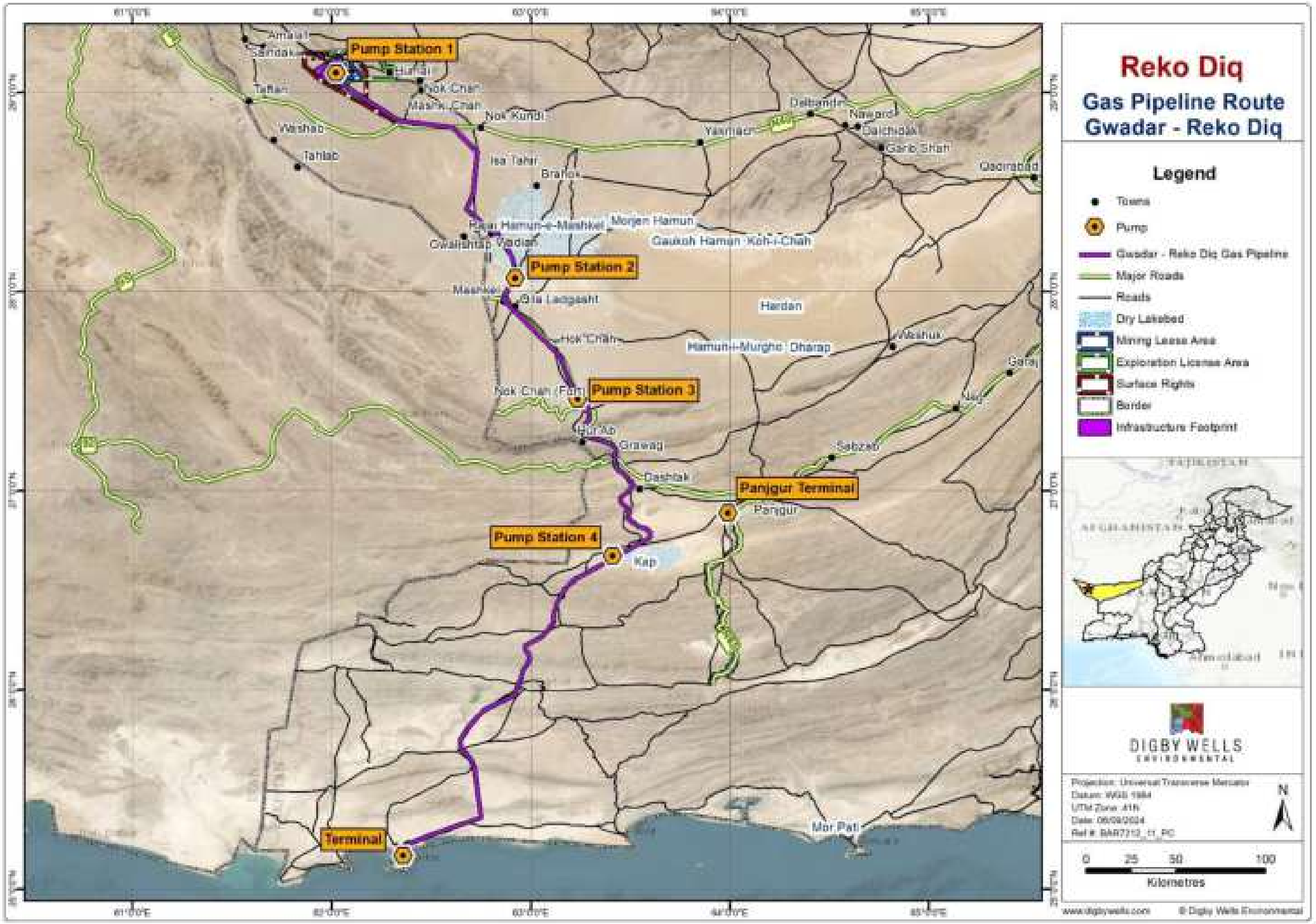
- Stage 1 Mine Development (Initial Mine Development): 45 Mtpa, 149.7 MW average operating power demand, required for years 1 to 5.
- Stage 2 Mine Development (Expanded Mine Development): 90 Mtpa, 264.8 MW average operating power demand and required for the remaining LoM (with future provision for Waste Heat Steam Recovery to further optimise efficiency).

The power options explored to meet the energy requirements for both stages are presented in Table 4-4. Information in this section was obtained from the studies conducted as part of the Project feasibility study.

Table 4-4: Power Supply Options Investigated and Considered

Alternative	Description
Heavy Fuel Oil	This option considers establishing an HFO-based power station at the proposed RDMS. The fuel will be transported by rail from suppliers in Pakistan to the mine site (ESG, 2024).
Diesel	This option considers the construction of a diesel-based power station at the proposed RDMS. The fuel to the power station will be transported by truck via road from suppliers in Pakistan to the mine site (ESG, 2024).
Gas	This option includes the establishment of a gas-based power station at the proposed RDMS, and a pipeline where gas will be pumped to the mine site from a Liquefied Natural Gas (LNG) import terminal at Gwadar Port. Figure 4-2 shows the route considered for the gas pipeline from the Gwadar Port to the mine site (ESG, 2024).
Geothermal	This option assessed the Geothermal potential of the Koh-I-Sultan volcano system that is located about 50 km east of the Reko Diq Mining Lease Area (Geothermal Consulting Services, 2023).
Solar	This option evaluates the viability of establishing a Solar PV power station at the proposed RDMS with and without BESS (Browne, 2023).
Wind	This option considers setting up wind turbines at the proposed RDMS (Browne, 2023).
Grid Connection	This option considers a Grid connection to the Pakistan national electricity network (ESG, 2024). Figure 4-3 shows three options for grid power along with the alignment of a transmission line from the mine site to these grid stations. These options, provided by National Transmission and Despatch Company (NTDC), include: Option 1: Dadu – RDMC

Alternative	Description
	Option 2: Hubco – RDMC Option 3: Sibi – RDMC



Source: Reko Diq Power Supply Options Study (Memo) for Barrick by ECG Engineering (2024).

Figure 4-2: Gas Pipeline Route Option from the Gwadar Port to Reko Diq Mine Site

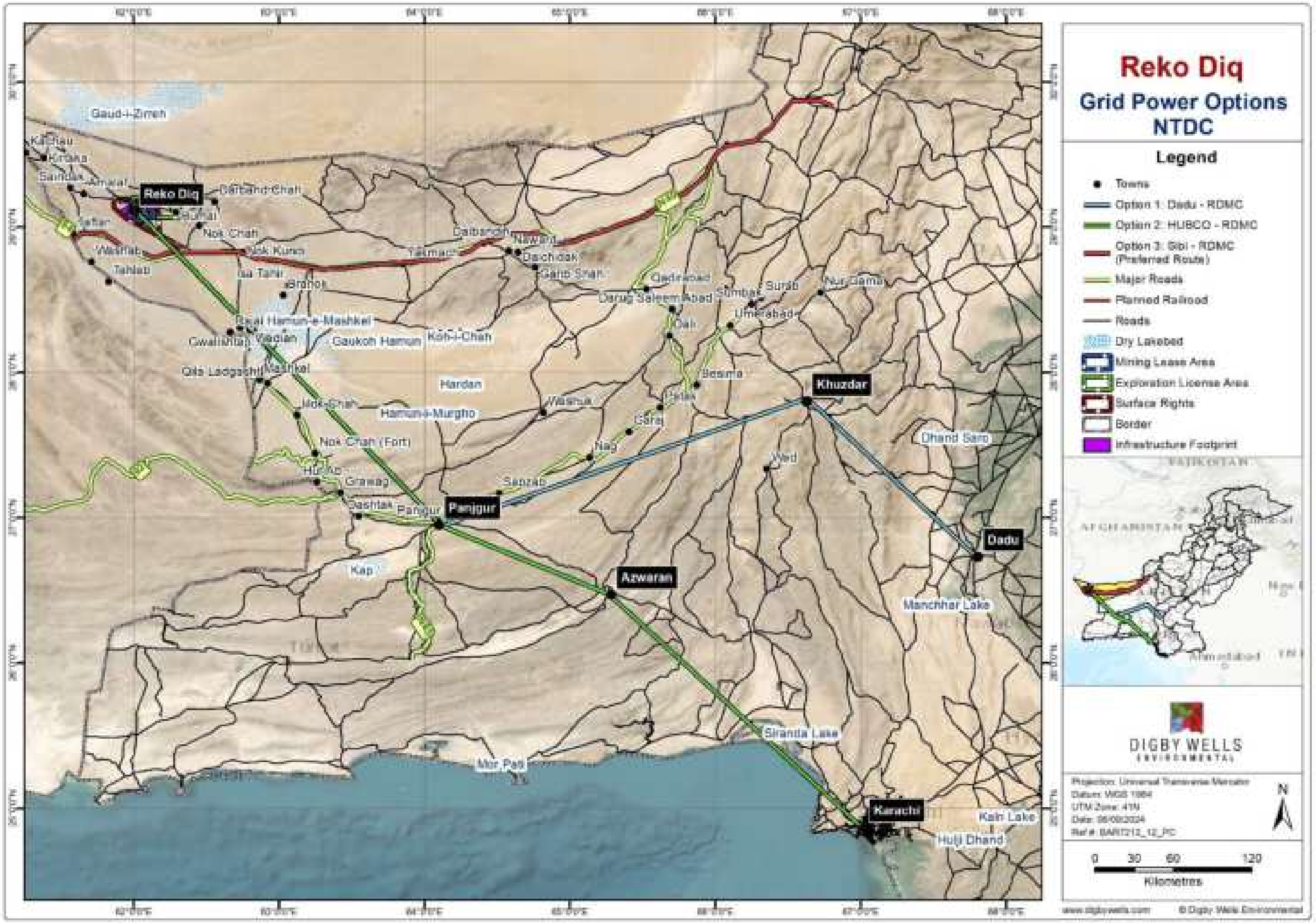


Figure 4-3: Grid Power Options for Reko Diq Project by NTDC

Alternatives have been assessed considering multiple factors such as availability and ease of access, capital, operating and maintenance costs, land requirements and environmental and social impacts, details are provided in Table 4-6. The preferred option for the Project is initial utilisation of an onsite, Project dedicated HFO power station and solar plant (providing approximately 20% of the total power requirement, the maximum capacity without installing energy storage), with power from Year 15 expected to be provided through connection with the Pakistan National Grid. Key factors in this selection are:

- The need for mature and reliable technology to ensure smooth commissioning and operations, and consistent and immediate power on demand.
- Need for consistent power supply. Renewable energy sources are reliant on natural resources (sunshine or wind). Consistent supply from these sources can only be achieved with the inclusion of battery storage which is not considered economically feasible at this time. The maximum penetration considered feasible for stable operations is 70%, which would result in a capital requirement of $800M for Stage 1 of the Project, doubled to $1.6B for both Stages 1 and 2, with additional capital in the order of $190M for each stage of the Project also required for thermal generation to meet the remaining 30%. Further cost analysis completed by ECG Engineering in 2022 indicate capital outlays for Stage 1 of the Project, above the cost of the proposed power system (HFO and 20% solar penetration), for varying degrees of renewable penetration including the costs of battery storage are provided in Table 4-5.

Table 4-5: Indicative Capex and Opex Implications for Various Rates of Renewable Energy Penetration

Renewables penetration	Indicative Phase 1 capital cost (over and above the capital cost for the currently proposed power system)	Indicative reduction in operating cost from the currently proposed power system	Indicative GHG emissions reductions from the currently proposed power system
40%	$220M	15%	37%
50%	$425M	28%	50%
70%	$600M	48%	64%

- Wind will continue to be investigated as an option, however currently when compared to solar renewable, this option has larger land requirements and higher operating and maintenance costs, increased capital outlay, longer project development schedules and a requirement for highly skilled construction and maintenance personnel.
- There are options using a combination of wind and solar which may reduce the amount of BESS required for more significant renewable penetration, however further study is required to determine wind prospectivity. At least one year of wind data collection is required; data collection is due to commence in 2025 to further assess this option.

- HFO is readily available with significant cost benefits over diesel. Both diesel and HFO options enable rapid power station deployment with established fuel supply chains in Pakistan.
- Despite lower fuel costs (than HFO or diesel), the required capital costs for gas fired power generation are not feasible (Figure 4-4), requiring significant investment in gas import and pipeline infrastructure. Critically, the construction of the pipeline from Gwadar Port to the mine site poses security concerns as it will pass through some of the high-risk areas of Balochistan, including Parom, Dashtak, Pui Wani, and Chib. This option would also require significant land acquisition for construction of the approximately 670 km long pipeline from Gwadar Port to the mine.
- Grid connection has significant benefits, including the introduction of reliable power to towns and communities along proposed transmission routes, the fact that there is already significant renewable penetration on the National Grid, power costs would be expected to be significantly lower and there would not be a need to transport large volumes of HFO. However, the capital (Figure 4-4) and timing and technical (reliability improvements are required for parts of the existing grid) constraints make this option unfeasible until later in the project life. The Project is however committed to introducing grid connection as soon as practically possible given the overall benefits not only for Project operational costs, but also emissions reductions and benefits to communities.
- There is complexity around the grid connection as this is Government infrastructure and would require Government funding to be available. RDMC is in discussions with the National Transmission and Dispatch Company (NTDC) with regards to this grid expansion as part of their Integrated National Expansion Plan. Industry norm is for the planning, engineering and permitting (including likely land acquisition) process to be typically in the order of 10 years or more, which is why connection in year 15 is currently targeted. RDMC are continuing to work with the NTDC to identify opportunities to bring forward this grid expansion as there are significant benefits not only for the Project but also for the region more broadly. In parallel, RDMC will, as noted, continue to explore alternatives including additional solar, wind and battery storage should the grid connection not eventuate.

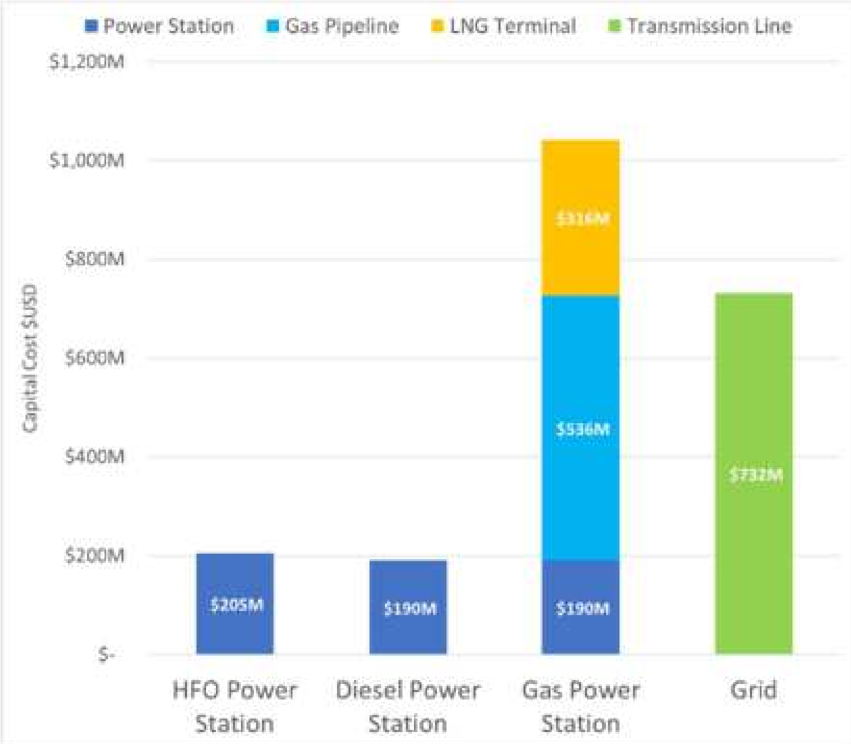


Figure 4-4: CAPEX for Onsite Power Station (HFO, Diesel and Gas) and Grid Option (capital estimate accuracy ±25%)

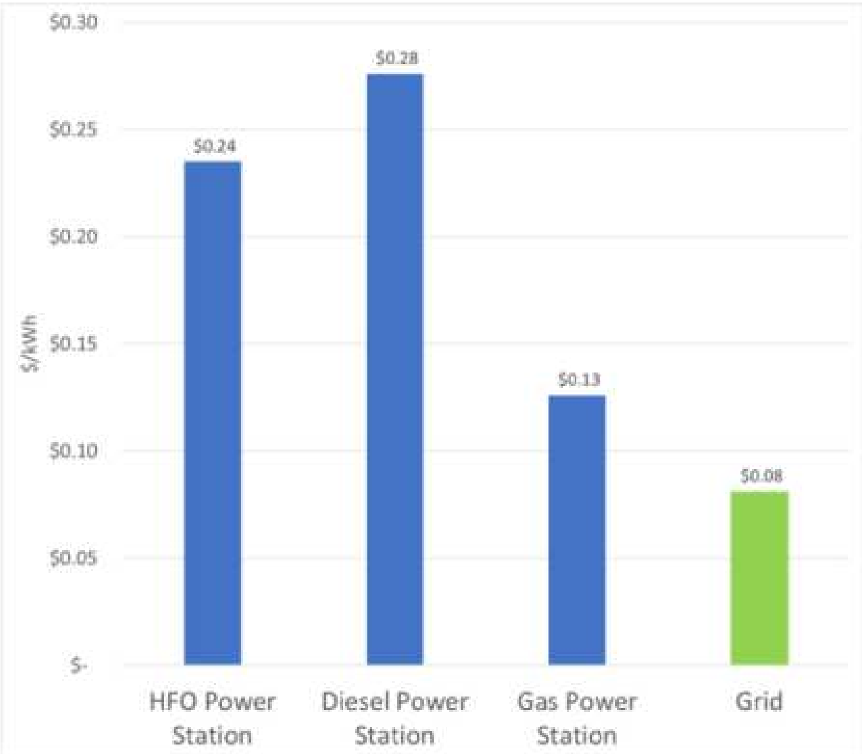


Figure 4-5: OPEX for Onsite Power Station (HFO, Diesel and Gas) and Grid Option

Table 4-6: Power Supply Alternatives (On-site Power Station with Renewables and Non-Renewables)

Aspect	On-site Power Station with Non-Renewables			On-site Power Station with Renewables		Grid Connection
	HFO	Diesel	Gas	Solar	Wind	
Required Infrastructure	Power station at the mine site only.	Power station at the mine site only.	Power station at the mine site. Gas Pipeline from Gwadar Port to the mine site. LNG import terminal at Gwadar Port. LNG would be imported into Gwadar and an LNG import terminal and storage facility or a floating protection storage regassification unit would be constructed to offload the imported gas into the pipeline for transport to site.	Solar plant at the mine site only.	Likely requirement to construct turbines across a large area outside of the lease boundaries.	Transmission lines and associated towers from one of the existing Pakistan national electricity networks at Quetta, Dadu and Karachi to the mine site.
Environmental Considerations	There will be dust and gaseous emissions (SO_x and NO_x) from the combustion of HFO and diesel, which can be mitigated. However, land and/or water contamination can be a risk in the case of any spillage. HFO often contains higher levels of sulphur than diesel.		Gas pipeline leakage and risk to nearby communities. Although there will be emissions created, they will be lower compared to HFO and diesel.	Comparatively large land requirement. Significant reduction in emissions when compared to fossil fuel alternatives.	Individual turbines have small footprints but would be potentially required to be spread across a large area with interconnected transmission line. Turbines can impact birds. Significant reduction in emissions when compared to fossil fuel alternatives.	Construction of new transmission infrastructure could impact biodiversity and water resources if not properly managed. Would result in reduced emissions given the current and planned penetration of renewables on the grid (including possible further opportunities for renewables development in Balochistan which may open up with grid expansion).

Aspect	On-site Power Station with Non-Renewables			On-site Power Station with Renewables		Grid Connection
	HFO	Diesel	Gas	Solar	Wind	
Economic Considerations	Fast deployment without significant investment in fuel or transmission infrastructure. Increased maintenance costs compared to gas. Capital expenses similar to the diesel-based power station. Fuel transport costs similar to diesel.	Higher operating costs, including fuel and operating and maintenance costs, when compared with HFO and Gas (Figure 4-5). Capital expenses are similar to the HFO based power station. Fuel transport costs similar to HFO.	Lower operating costs. Requires significant investment for both gas infrastructure at Gwadar Port and a pipeline to RDMS.	Dust reduces performance particularly in mining environments. This can be managed through maintenance/ cleaning which adds operating costs. The footprint for required for solar PV has limited use for other applications or services (powerlines, roads etc). This option is limited to daylight operation unless battery storage is added (see notes on capital costs above). Cloud cover can cause significant variability in the solar PV output.	The area between wind turbines can be utilised for other applications such as access roads, powerlines, pipelines. Enables a higher renewable fraction than Solar PV. Payback period is longer than Solar PV. Large wind turbines require large cranage for construction which could be difficult to source in Pakistan. A large area is required between turbines and there is a subsequent increase in costs for power integration and road access. Can produce electricity during day and night.	Capital expenses are about four times that of HFO and diesel-based on-site power stations (Figure 4-4). Capacities, and possible constraints, on network requiring improvements to existing transmission network. Power costs would be expected to be lower overall (Figure 4-5) as well as a reduction in costs associated with fuel transport.
Technical Concerns	Integration of renewables to reduce the contribution to the project carbon footprint.	Less flexible than HFO when integrated with renewables.	Less flexible than HFO when integrated with renewables.	Proven and reliable technology with deployable solutions to integrate to the plant generation systems. Installation is relatively simple and within capability of general contractors. Skill levels required for maintenance and cleaning is relatively low.	Need highly skilled personnel for both construction and maintenance.	Significant work is anticipated to ensure adequate grid reliability. Limited connection options and long distances of transmission line required. This option does not require integration of a renewable fraction but may enable development of solar and wind generation in western Balochistan. Schedule delays due to challenges around land access, government permits and approvals processes.

Aspect	On-site Power Station with Non-Renewables			On-site Power Station with Renewables		Grid Connection
	HFO	Diesel	Gas	Solar	Wind	
Social/ Security Concerns	No land acquisition or disturbance to the community. However, there will be risk to community safety due to increased traffic from fuel transport and with resulting increased risk of road accidents. No security concerns relating to this option.		This option may require land acquisition as the pipeline route will follow the existing roads (sealed/ un-sealed) from Gwadar Port to the mine site where settlements are also inhabited. There are security concerns as the proposed pipeline route will traverse through some of the higher-risk areas of Balochistan. There will be a need for increased security at compressor stations and along the pipeline.	The nearest community to the proposed RDMS is about 20 km thus, and as such no impact to the community is anticipated. Moreover, the planned solar power station will be constructed within the land Surface Rights Lease.	Wind turbines can impact visual amenity. Turbines would likely be required to be spread across a large area with interconnecting transmission infrastructure presenting an increased security risk.	Extending the grid would also enable connection to villages and towns currently without a reliable electricity source. This is regarded as a significant opportunity for economic development and livelihood improvement for the region which at this stage would only be enabled by development of the Project.

4.4.1. Analysis of Emissions for Power Supply Alternatives

An analysis of emissions for the various alternatives considered is required for projects aligning to the Equator Principles (EP AP II). For scope 1 emissions, the analysis must aim to ascertain the best practicable environmental option with inclusion of consideration of alternative fuel or energy sources, if applicable. An analysis of potential emission reductions in GHG footprint are presented in Table 4-7.

Implementation of these is limited by the availability of technology and their respective costs. Some mitigation measures are therefore not immediately implementable but should be revisited throughout the LoM.

Table 4-7: Potential Emission Reductions from Alternatives Analysis

Alternatives Considered	Possible Reduction in GHG Footprint	Outcome from Barrick investigations
Due to the remote location of the project area, the transportation of materials to and from site contributes a significant portion of the GHG emissions. The mode of transportation can have a significant impact on the GHG emissions.	Two main modes of transportation exist to transport materials between site and PIBT. If roads are used, then the transportation of goods would contribute approximately 17% of the annual GHG emissions. An alternative mode of transport is the existing rail system in Pakistan. Transporting goods by rail can reduce GHG emissions by approximately 157 000 tCO_2e per year. This would reduce the contribution of the transportation of goods to approximately 7% of the annual GHG emissions. This alternative is already being considered by the project proponent.	Barrick has investigated both transport by road and by rail. Barrick is focusing on transporting material by rail for the majority of the life of mine, reducing costs and GHG emissions.
The onsite electricity demand is to be met using onsite fuel oil generators. These can be replaced by grid electricity (after connecting to the national grid) or onsite solar PV.	Connecting to the national grid would reduce the onsite scope 1 GHG emissions by approximately 835 000 tCO_2e per year. However, due to the current reliance on fossil fuels of the national grid, scope 2 GHG emissions would be 644 000 tCO_2e per year. Onsite solar PV systems (with sufficient battery storage) could meet the project electricity demand. This could reduce the scope 1 GHG emissions by the same amount as connecting to the grid without an increase in scope 2 GHG emissions. This would reduce annual scope 1 GHG	Barrick has investigated both onsite solar PV as well as connecting to the grid. These have been integrated into the mining plan. Below is a summary of the GHG emissions for some of the alternatives considered. Detailed year-on-year emissions for the alternatives can be found in Appendix T.

Alternatives Considered	Possible Reduction in GHG Footprint	Outcome from Barrick investigations
	emission by 56% - 63%, depending on the mode of transportation used. This alternative is already being considered by the project proponent, however at this stage it is determined to be cost prohibitive (see Section 4.1).	
Investigate the option of using alternative electrical equipment to replace the need for fossil fuel vehicles. For example, using conveyor belts or electric vehicles.	Other processes and equipment, such as conveyor belts, can perform the same tasks as some of the mobile equipment. Depending on the design of the systems or the method of application, this can have little to no negative impact on the production of the project. However, this is highly dependent on the “quality“ of the electricity used, in terms of the grid emission factor associated with the consumed electricity. For example, electrical vehicles (EVs) should only replace fossil fuel vehicles if the grid emission factor for the sourced electricity is < 0.5 tCO_2e/MWh*.	Electric vehicles have been investigated by Barrick. At the time of writing, these were deemed impractical due to technological limitations and lack of renewable electricity.

*This is a conservative estimate based on current internal combustion engine and electrical drive train vehicle efficiencies.

The alternatives assessed focus on the provision of electricity to the site. In general, the approach is to have onsite electricity generation for the first 2 stages of the operation, until 2041. From 2042 onwards, the site will connect to the national grid and gradually switch over to the national grid. During the switching period, the onsite sources will be scaled down and remain as back-up electricity sources.

The current intended system is to have an energy mix comprising of 80% HFO-based electricity and 20% solar photovoltaic-based electricity. This ratio will be maintained as the site ramps up operations in the initial decade. The electricity generation infrastructure will be kept for back-up purposes once the site is connected to the national grid.

The alternative onsite electricity generation options considered for this GHG analysis are indicated below:

- All onsite electricity generation using HFO.
- All onsite electricity generation using diesel.
- All onsite electricity generation using natural gas.
- 70% of onsite electricity generation supplied by a combination of renewable energy with battery storage and 30% generated using HFO.

As indicated above, the site will connect to the national grid in 2042. Once connected and fully integrated, the scope 2 GHG emissions for all alternatives are expected to be approximately 642,000 tCO_2e per year.

The estimated average annual GHG emissions for each alternative across the various stages (both before and after connecting to the national grid) is shown in Table 4-8. A detailed breakdown of the annual GHG emissions can be found in Appendix T. It is important to note that these GHG emissions are **only** for the electricity consumed onsite and exclude other GHG emission sources, such as mobile combustion from fleet vehicles.

Table 4-8: Annual Average GHG for alternative power supply options per Stage (tCO2e)

	Base Case (80% HFO, 20% RE)	HFO	Diesel	LNG	70% RE/ 30% HFO
Stage 1 (2029 - 2033)	644,257	805,322	792,002	576,555	241,596
Stage 2 (2034 - 2041)	1,266,474	1,583,093	1,556,909	1,133,386	474,928
Post-grid connection	754,598	796,463	793,001	737,000	826,074

4.4.2. Power Plant Technology Alternatives

Numerous methods for electricity generation from an HFO-based Power Plant can be adopted, however most of these techniques depend on various factors such as Project location and technical requirements such as requirement of steam. The following technologies were examined for the proposed HFO-based Power Plant:

- Reciprocating Engines (High and Medium Speed);
- Turbines; and
- Boilers.

Figure 4-6 presents a comparison of the applicability, advantages and disadvantages of the different technologies considered for the proposed HFO-based power plant at the mine site. Medium Speed Reciprocating Engines was selected as the preferred technology for the following reasons:

- This is a modern, but tried and tested technology;
- No production or requirement for steam as is used in boilers and turbines; and
- This technology has higher efficiency and fuel flexibility when compared with High Speed Reciprocating Engines.

Although there is a high maintenance cost in comparison with turbines, reciprocating engines have better performance and reliability at part-load conditions and have quick start-up capabilities.

High Speed Reciprocating Engines

- **Applicability:** Smaller power plants (~20-30MW) and short mine life (5-10) years.
- **Advantages:** Lower capital costs for smaller plant sizes and fast deployment.
- **Disadvantages:** Higher maintenance and operational staff costs than medium-speed, larger power station footprint required, greater loss of efficiency between overhauls, higher capital costs for larger plant sizes due to extra cabling, piping and civils, and limited fuel options (usually natural gas or diesel)

Medium Speed Reciprocating Engines (Selected Technology)

- **Applicability:** Larger power plants (~30 MW and above) and longer mine life.
- **Advantages:** Better fuel efficiencies than high speed, lower maintenance costs, reduced operations costs/manpower, smaller footprint than high speed options. longer serviceable life, and dual fuel options available.
- **Disadvantages:** Higher capital and maintenance costs for smaller sized stations compared to high-speed, longer construction time, and Selective Catalytic Reduction (SCR) system may be required for emissions control.

Turbines

- **Applicability:** Larger power plants and suitable for combined cycle power plants.
- **Advantages:** Lower lube oil consumption than reciprocating engine, lower maintenance costs than engines, higher availability due to lower service requirements, smaller power plant footprint and reduced civil costs, lower NOx emissions that doesn't require an SCR.
- **Disadvantages:** HFO is not an option for liquid fuel, slower start-up time than engines, higher deratings for site ambient temperature and altitude, and expensive initial costs.
- .

Boilers

- **Applicability:** Boilers are not engines but are essential components in power plants. They generate steam by heating water using fuel (such as coal, natural gas, or oil).
- **Advantages:** High efficiency, low construction cost, and fuel flexible.
- **Disadvantages:** Large water consumption, slow start-up times due to heating of water, and large physical footprint.

Figure 4-6: Power Plant Technology Alternatives

4.5. Tailings Management Alternatives

A number of options have been identified for managing the tailings storage and disposal associated with the project. These were evaluated through a pre-screening assessment where some options were immediately disregarded, and the remaining options qualified for further assessment using the Multiple Account Analysis (MAA) tool. MAA is a decision-making tool or method that helps evaluate different options by considering multiple criteria or accounts. The assessment of alternatives was undertaken as a formal MAA as per the requirements of the GISTM (Global Tailings Review, 2020) and in accordance with the Guidelines for the Assessment of Alternatives for Mine Waste Disposal published by Environment Canada (Environment Canada, 2013).

The tailings management alternatives considered two categories:

- Tailings Storage Facility Location Alternatives; and
- Tailings Disposal Technologies Alternatives.

Information in this section was obtained from the studies conducted as part of the Project feasibility study (Knight Piésold, 2024b).

4.5.1. Tailing Storage Facility Locations Alternatives

A total of 17 sites were considered as possible locations for the TSF and these locations are indicated in Figure 4-7:

Several parameters were generated to compare each option, these included:

- Storage description – either paddock, side hill, or cross valley.
- Distance from orebody and the processing plant site – indicates haulage and pumping costs (closer is better).
- Height difference between the site and the orebody and the processing plant site – indicates haulage and pumping costs (downhill or level is better).
- Upstream catchment – indicates the cost of surface water diversions (lower cost is better).
- Total basin area – indicates whether too large or too small (target range 2,400 ha to 3,200 ha per active cell).
- Maximum and average embankment height – indicates embankment stability and risk profile (lower is better).
- Indicative embankment volume – indicates cost and efficiency (lower volume is better).

Some of the sites identified were discarded during the pre-screening assessment as they were found to have obvious significant technical or non-technical challenges. The screening criteria adopted to assess the sites are detailed in the following sections and summarised in Table 4-9.

4.5.1.1. Tailings Rate of Rise and Embankment Heights

The Rate of Rise (RoR) refers to how quickly layers of tailings accumulate within a facility over time. After deposition, tailings slurry expels water as solids settle. Further water removal occurs through evaporation from tailings pore spaces. As tailings dry, matrix suction forces cause volume reduction and increased dry density. A strong relationship exists between tailings density and strength. High Rates of Rise limit dewatering and drying, potentially resulting in lower strength tailings. Conversely, low RoR in arid climates can lead to wind erosion and dusting issues.

The RoR of the facility and embankment heights were used as the first pre-screening tool to eliminate options which would have either an undesirably high or low RoR or very high embankments.

4.5.1.2. Embankment Efficiency

Embankment efficiency is a measure of the quantity of tailings that can be stored by the construction of a set volume of embankment. For this assessment the volume of tailings stored (in cubic metres) per cubic metre of embankment construction was applied. Facilities with low embankment efficiencies required larger volumes of constructed embankments to store the tailings that will be produced over the life of the project and are thus undesirable.

4.5.1.3. Distance from the Processing Plant and Mine

Transporting tailings to the storage facility and returning recycled water involves pipelines, access roads, infrastructure, and energy for pumping. Efficiency matters, especially for sites distant from the mine, where transporting waste rock for construction becomes uneconomical. The TSF sites which were distal (>30 km) from the orebody and did not show significant merits in other areas such as technical, environmental and social aspects, were eliminated.

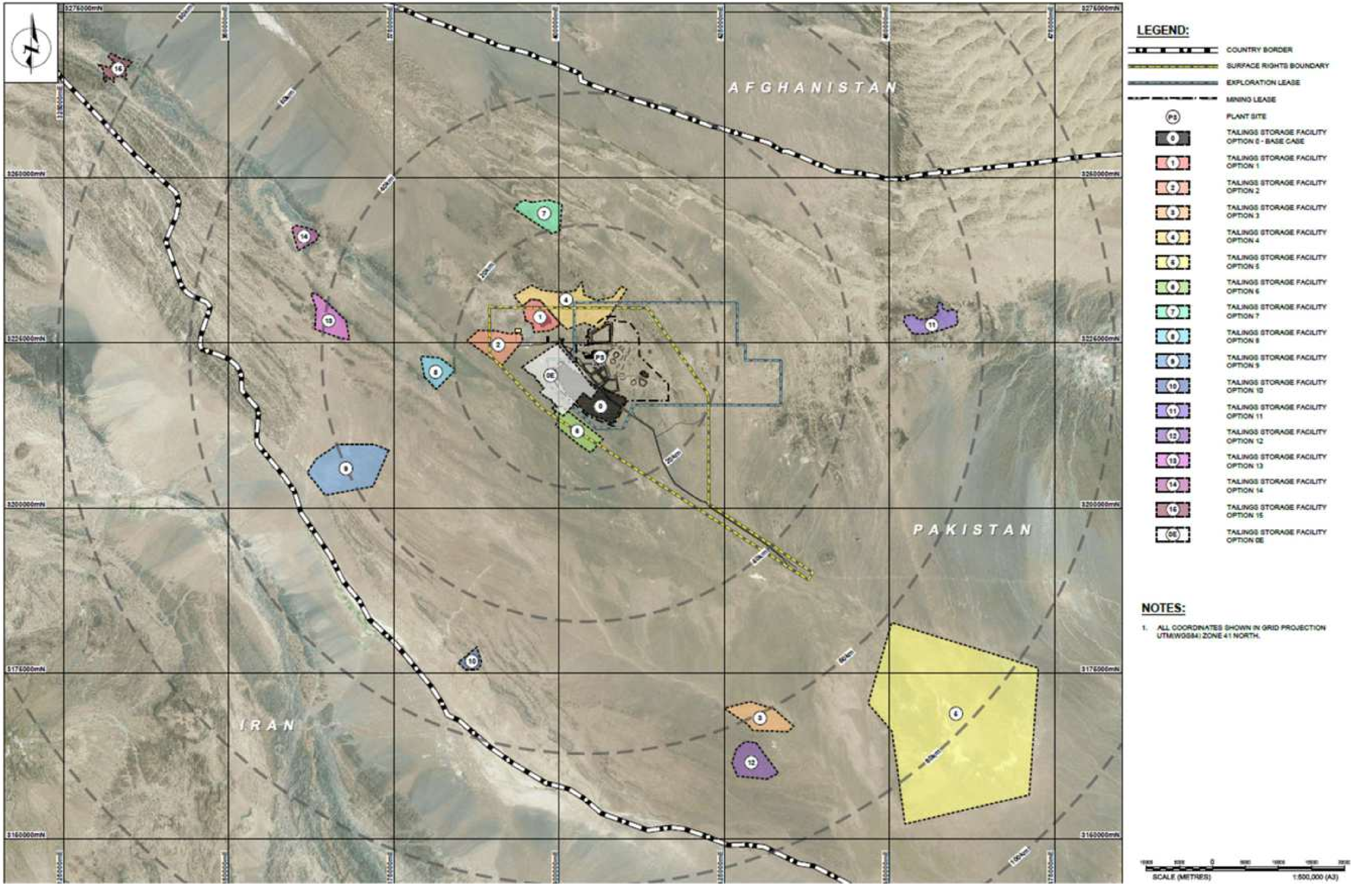


Figure 4-7: TSF Location Alternatives

Table 4-9: Reasons for Elimination of the TSF Sites during Pre-Screening Assessment

Alternative Sites	Storage Description	Reason for Elimination
1	Paddock	High RoR (rate of rise = 3.3 m/year)
5	Cross Valley	Low RoR (rate of rise = 0.3 m/year)
9	Cross Valley	Low RoR (rate of rise = 0.5 m/year) Immediately upstream of the large border town of Taftan. A failure at this location may also impact agricultural sites across the border.
10	Paddock	High RoR (rate of rise = 4.1 m/year) Located close to and upstream of agricultural areas in Iran. There is a highly productive groundwater system along and across the Iranian border, and an ephemeral water course which flows to the permanent Lulakdan Wetlands to the south-east.
14	Paddock	High RoR (rate of rise = 3.4 m/year) Located proximal to the Saindak Copper Mine. FC Fort located within the footprint. Also upstream of the Northern Groundwater System (potentially productive brackish to saline aquifer system and likely project water supply).
15	Cross Valley	High Embankment Height (maximum embankment height = 317 m highest of all sites) Upstream of the Northern Groundwater System (potentially productive brackish to saline aquifer system and likely project water supply).
6	Paddock	Inefficient – low embankment efficiencies (efficiency <5%)
8	Paddock	Inefficient – low embankment efficiencies (efficiency <5%)
3	Paddock	Distance from orebody: 59 km
11	Cross Valley	Distance from orebody: 49 km Village of Darband Chah located within footprint, including village water supply wells.
12	Cross Valley	Distance from orebody: 65 km
13	Cross Valley	Distance from orebody: 44 km Proximal to, and upstream of the Saindak Copper Mine, also sits atop the Saindak water supply pipeline. In addition, there is a small village located within the dam footprint.

Each option was assessed based on a number of subaccounts relating to environmental, social, technical and economic factors. Table 4-10 presents a comparison of the five sites selected for the MAA and the assessment results.

Table 4-10: Tailings Storage Facility Location Alternatives (MAA Process)

	Site 0E	Site 0	Site 2	Site 4	Site 7
Storage Description	Paddock	Side Hill	Paddock	Cross Valley	Paddock
Average Embankment Height (m)	39	59	67	48	71
Embankment Efficiency (%)	13.0	7.7	7.7	15.3	8.7
Distance from Ore Body (m)	10	7	18	10	25
Economic in terms of accessibility and haulage and pumping costs	6 km south of the processing plant site. 10 km from ore body. Lowest haulage and pumping costs are expected.	6 km south of the processing plant site. 7 km from ore body. Lowest haulage and pumping costs are expected.	14 km west of the processing plant site. 18 km from ore body. Lower haulage and pumping costs are expected.	8 km north of the processing plant site. 10 km from ore body. Lower haulage and pumping costs are expected.	23 km north of the processing plant site. 25 km from ore body. Higher pumping costs are expected and local borrows will be needed.
Required Area	Footprint of approximately 6,124 ha	Footprint of approximately 6,180 ha	Footprint of approximately 3,340 ha	Footprint of approximately 6,510 ha	Footprint of approximately 3,200 ha
Required Land	Within Surface Rights Lease but partially outside the Mining Lease.	Within the Mining Lease	Partially within the Surface Rights Lease but outside the Mining Lease.	Partially within the Surface Rights Lease and Exploration Lease, but outside the Mining Lease.	Outside all leases. Located within sand dunes.

	Site 0E	Site 0	Site 2	Site 4	Site 7
Social	No agricultural land, populated areas, international borders, or infrastructure impacted.	No agricultural land, populated areas, international borders, or infrastructure impacted.	No agricultural land, populated areas, international borders, or infrastructure impacted.	No agricultural land, populated areas, international borders, or infrastructure impacted.	No agricultural land, populated areas, international borders, or infrastructure impacted.
Technical Considerations	Downhill of the Plant Site and Orebody (- 78 m and -136 m respectively). Lower haulage and pumping costs are expected. Moderate upstream catchment (11,519 ha). Diversion is possible with surface water management structures. Basin area larger than desirable (6,124 ha), however, within the target range if multiple cells are considered. Low to moderate embankment elevations (39 m average). Lower stability risk.	Downhill of the Plant Site and Orebody (- 71 m and -129 m respectively). Lower haulage and pumping costs are expected. Moderate upstream catchment (11,519 ha). Diversion is possible with surface water management structures. Basin area larger than desirable (6,124 ha), however, within the target range if multiple cells are considered. Low to moderate embankment elevations (39 m average). Lower stability risk.	Downhill of the Plant Site and Orebody (- 66 m and -124 m respectively). Lower haulage and pumping costs are expected. Moderate upstream catchment (22,400 ha). Diversions are possible with surface water management structures. Basin area smaller than desirable for multiple cells (3,340 ha). Moderate embankment elevations (67 m average). Higher stability risk. Low embankment volume (253 Mm^3) and	Downhill of the Plant Site and Orebody (- 59 m and -117 m respectively). Lower haulage and pumping costs are expected. Moderate upstream catchment (10,700 ha). Diversion is possible with surface water management structures. Basin area larger than desirable (6,510 ha), however, within the target range if multiple cells are considered. Moderate embankment elevations (48 m average). Higher stability risk.	Downhill of the Plant Site and Orebody (- 182 m and -240 m respectively). Pumping downhill will be easier, however, due to distance the costs associated with pumping will be higher. Moderate upstream catchment (24,500 ha). Diversions are possible with surface water management structures. Basin area smaller than desirable for multiple cells (3,200 ha). Moderate embankment elevations (71 m average). Higher stability risk.

	Site 0E	Site 0	Site 2	Site 4	Site 7
	Low embankment volume (148 Mm^3) and excellent embankment efficiency (13). In the event of embankment failure, tailings, and liquor would report to local depressions downstream, where further transport is considered unlikely.	Low embankment volume (148 Mm^3) and excellent embankment efficiency (13). In the event of embankment failure, tailings, and liquor would report to local depressions downstream, where further transport is considered unlikely.	moderate embankment efficiency (7.7). In the event of embankment failure, tailings, and liquor would report to local depressions downstream, where further flow is considered unlikely.	Third lowest embankment volume (128 Mm^3) and excellent embankment efficiency (15.3). The site overlaps some small mineralisation areas, which may impact mine planning. In the event of embankment failure, tailings and liquor would report to local depressions downstream, where further flow is considered unlikely.	Low embankment volume (224 Mm^3) and moderate embankment efficiency (8.7). In the event of embankment failure, tailings and liquor would report to local depressions downstream, where further flow is considered unlikely.
Future Expansion	Possible	Possible	Possible, however, embankment volumes may be excessive.	Possible	Possible

The MAA identified Site 0E as the preferred location. This option scores best on economic account, second best on environmental accounts, third for technical accounts and fifth for social accounts. Site 0E's lower ranking for the social category was due to a marginally higher inundation area in the event of a failure in comparison to the other options, all other criteria in the social category were equal across all options.

The option which came in second was Site 0 with conventional thickened tailings, Sites 0 and 0E are similar in design and located in close proximity to each other. The base case evaluation in the MAA clearly indicated that Site 0E, located approximately 6 km from the processing plant, is the preferred site, with the use of conventionally thickened tailings as the preferred tailings technology.

A dam breach assessment has also been completed for Site 0E, which concluded:

- There are no communities or community infrastructure in the determined inundation area.
- Several site roads and haul roads and the RDMC rail spur would be at risk of inundation.
- The mine accommodation facility is not within the inundation area
- Tailings solids and supernatant would impact soils and groundwater within the inundation area.
- On the basis of potential loss of life (i.e. personnel operating within the inundation area) the GISTM Consequence Classification is "Very High" - note that the Barrick standard is that all tailings storage facilities are designed according the GISTM "Extreme" classification.

4.5.2. Tailings Disposal Technology Alternatives

A total of seven disposal technologies were considered for assessment. These included:

- Un-thickened Tailings (highest water content and lowest solids percentage);
- Conventional Thickened Tailings (moderate dewatering and moderate solids concentration – higher than un-thickened tailings);
- Ultra Thickened Tailings (significant dewatering and achieves higher solids concentration than conventional thickened tailings);
- Coarse Filtered Tailings (dry stack tailings);
- Separated Tailings (streams produced by coarse particle flotation);
- Co-Mingling; and
- Co-Disposal.

A pre-screening assessment was carried out to reduce the technologies taken forward into the MAA process. The technologies were assessed using criteria including water efficiency, current industry acceptance and if it is a proven or viable technology. The technologies discarded were:

- *Un-thickened Tailings*: Water efficiency is too low for a dry climate where water resources are scarce.
- *Ultra Thickened*: Unprecedented at proposed throughput and has poor performance historically.
- *Co-disposal*: Does not allow for efficient water recovery which would mean poor efficiency in a dry climate.
- *Co-mingling*: Variable throughput of tailings and waste rock and requirement to crush waste to allow blending, not practical at the scale of operation contemplated.

Three technologies were selected to take forward into the MAA namely, conventional thickened tailings, filtered tailings and separated tailings streams produced by Coarse Particle Flotation (CPF). CPF is where a very coarse rougher tailings and fine rougher tailings are produced.

Each of the tailings disposal technologies were evaluated with Site 0E as the preferred site for deposition.

- **Conventional Thickened Tailings**

Conventional Thickened Tailings involve the dewatering of the output from the process plant generally through the use of high-rate thickeners. This allows water recovery at a higher rate than un-thickened tailings increasing density and reducing the size of the storage facility. This is the most used method of tailings storage at modern mining operations. The thickened tailings is still able to be transported as a slurry in most cases using pipelines and centrifugal pumps.

This technology is generally suitable for all climate conditions and more water efficient than un-thickened tailings; however, it will still require a containing embankment with water recovery systems.

- **Separated tailings streams into coarse and fine fractions.**

Separated Tailings is when tailings are split into streams based on their grain size. This is most commonly done after discharge from the processing plant utilising cyclones, either on the embankment or in cyclone stations prior to discharge to the facility.

Cyclone separation produces a fine overflow product and a coarse underflow product which can be disposed in separate facilities or can be disposed of as separate streams within the same facility. The nature of the cyclone coarse underflow material can make this a suitable construction material for impounding the finer grained overflow material.

The effectiveness of cyclones at separating the tailings is dependent on the grain size distribution of the material, the percent solids of the slurry and the pressure which can be applied at the cyclone. It is common for cyclones to be run at relatively low percent solids to achieve a good split of material such that without additional thickening of the overflow cyclone separation can have relatively poor water efficiency. This poor water efficiency can be compensated by the production of a construction material allowing beneficial use of the waste tailings stream.

Cyclone sand dams have been demonstrated, if constructed properly, to have a high resistance to seismic events and have been employed for construction of high to very high dams.

In addition to cyclone separation, a relatively new processing technology, coarse particle flotation separates the material into coarse and fine fractions prior to beneficiation, with the fine fraction sent to conventional flotation and the coarse fraction put through a coarse particle flotation process to separate the higher grade material (for regrind and conventional flotation) and the lower grade material, which is rejected, forms a coarse tailings similar in nature to the coarse cyclone underflow. This technology has not been widely employed at scale and as such is not considered further.

- **Filtered Tailings**

Filtered tailings adds filtering after the initial thickening of the tailings generally employing either vacuum filters, disk filters or filter presses. After filtering, the material acts as a solid rather than fluid with transportation being done via trucks or conveyor as pumps and pipes are no longer practicable.

The solid nature of the tailings allows for mechanical compaction in the facility to achieve higher densities, and potentially higher strengths, than the other techniques. The key geotechnical advantage of filtered tailings is that in the correct climatic regime, the filtered tailings can be placed at a moisture content such that the tailings are maintained unsaturated, behaving in a drained manner and flow failure of the tailings is prevented. However, in wet climates where precipitation and surface runoff onto the tailings placement area has the potential to increase the moisture of the tailings such that it become saturated, then this advantage is lost. Likewise, in high and very high stacked facilities the consolidation of the tailings post placement has the potential to reduce the void ratio and increase the degree of saturation to the point where the material behaves in an undrained manner, again removing the key geotechnical advantage.

In general, this method is deployed in arid climates where water conservation is a critical aspect of design and maintenance of the tailings as an unsaturated material is possible. Filtered tailings has been employed on sites with throughputs of up to 18,000 t/d (La Coipa in Chile) with designs for projects with throughputs up to 85,000 t/d (Rosemont Stage 2 – USA, not yet permitted). Both of these sites experience arid to semi-arid climates. However, the reliability of the filters and maintenance requirements are high, therefore either requiring significant standby capacity or alternative disposal locations.

Filtered tailings storage facilities can employ the strength of the tailings to reduce the size of the containment embankment but for sites where storm rainfall is common, some form of containment of the facility is required to prevent erosional loss of tailings from the outer batters of the facility.

4.5.2.1. Comparison of Key Aspects for Conventional Thickened Tailings and Filtered Tailings

Table 4-11 provides a comparison of aspects assessed where key differences were identified as part of the MAA for conventional thickened tailings and filtered tailings. Whilst there are significant water savings with the use of filtered tailings, the power requirements (and subsequent emissions) are several times higher. There are also significant capital and operating cost benefits with the conventional thickened tailing options. A key driver for not selecting filtered tailings at this stage of the project are the challenges relating to reliability, particularly given the technology is yet to be implemented at this scale elsewhere.

Table 4-11: Comparison of Conventional Thickened Tailings and Filtered Tailings for Site Option 0E

Aspect	Conventional Thickened Tailings	Filtered Tailings
TSF Footprint Area (ha)	6,130	2,820
Power demand as a proxy for emissions (LOM GW/hr)	3,416	22,379
Make up water demand (m^3/ton of processed ore)	~0.5	~0.25
Scale at which technology has been commercially applied at other operations (as % of Project Phase 1 throughput) (see notes)	250	18
Number of world-wide operations at which technology has been commercially applied	>100	10-100
TSF Capital Cost ($)	$19M	$38M
Other infrastructure capital cost ($)	$50M	$695M
TSF operating cost ($/t)	$0.13/t	$1.18/t
Water cost (averaged over LOM excluding capital works) ($/t)	$0.25/t	$0.12/t

Notes:
Karara Iron Ore is operating filters for 8.0 to 8.3M tpa or ~ 18% of Phase 1 throughput
Cero Verde operates at 123.5M tpa or approximately 250% of Phase 1 throughput

4.6. Water Supply Sources Alternatives

The Project requires a consistent supply of water of varying volumes for the different phases of the project; construction, operation (Phase 1 and 2) and decommissioning (Table 4-12). As detailed in Chapter 3.

Table 4-12: Estimated Water Consumption during Project Lifecyle

Phase of the Project	Water Consumption (GL/a)
Construction Phase (included in the Early Works ESIA submission)	1.6
Phase 1 Production (including continued construction works for Phase 2)	24
Phase 2 Production	48
Decommissioning (assumed to be similar to construction phase)	1.6

When considering a source(s) of water to meet the demand over the life of mine, there are a variety of factors, the most important including:

- Volume of water available in resource;
- Proximity of water source to the operation;
- Quality of the water;
- Engineering requirements to deliver water to the point of use;
- Cost of delivery (both capital and operational costs); and
- Environmental and Social impacts and/or benefits.

Generally, sources of water can include nearby surface water bodies (e.g. rivers, dams), groundwater (local aquifer systems) and/or water imported from significant distances away from the operation via pipeline.

The Project is however located in a region with extreme arid climatic conditions, and as a result there are no rivers/ streams flowing through the landscape and subsequently, no active dams that are viable for the supply of water for the project.

Securing a viable water supply for the Project has therefore focussed on exploring abstraction from local groundwater systems and/ or transporting treated water from the Arabian Sea (near Gwadar Port, South of the Project).

In December 2022, two NOCs were granted to RDMC for the purpose of exploring groundwater resources in Balochistan. The NOCs cover 10 different areas, namely, Humai, Sorbaroot, Mouaz Kachow Fansediments (Fan Sediments), Patangas (Patangaz), Tahlab, South of Nokkundi, Koh-e-Sultan, EL5 South, Washuk (South Mashkel) and Mashkel Rud. Figure 4-8 shows the location of these water supply areas with respect to the Mine Site.

Several options were not advanced for immediate further investigation due to low prospectivity (i.e. fractured rock type aquifers with likely very limited storage). Further high level of assessment was undertaken assessing aspects including:

- **Physical Resource** (including the conceptual understanding to date, aquifer prospectivity, heterogeneity and storage as well as recharge to the aquifer system).
- **Environment** (habitat value, proximity to protected areas, cross-border impacts, potential impact to groundwater and limitations for supply).
- **Socio-economic** (potential impacts to water quantity for drinking and economic purposes, permits and legal restrictions).
- **Technical** (design complexity, reliability, additional studies required, climate adaptability, impact on closure and expansion flexibility).
- **Project Costs** (capital, operating and closure costs).

A second, more detailed prioritisation using the above selection criteria was completed on four options, Fan Sediments, Patangaz, Tahlab and Nokkundi South. This evaluation determined that the level of social risk associated with Tahlab was too great as it is close to important agricultural areas along the Iranian border as well as the water supply borefield for the Sandaik Copper Mine.

The three remaining NOC areas are now referred to as the Northern Groundwater System (Fan Sediments) and Southern Groundwater System (Patangaz and Nok Kundi South). The Northern Groundwater System is in closer proximity to the mine site and was the focus of previous water supply feasibility studies ensuring that more data was available for this option and as such was prioritised for additional investigations.

A comprehensive regional hydrocensus survey was undertaken to understand social and environmental water uses, which included the various water supply NOCs as well as settlements, towns and other areas outside of the NOCs (full details are provided in Section 5.11.1 and Appendix L). Results of the hydrocensus concluded:

- There are no settlements within the Northern Groundwater System itself, but there a several settlements located in the Mirjawa hills to the south close to the Iranian border in areas that are disconnected from the Northern Groundwater System. A mix of water sources were surveyed including boreholes, springs and karez.
- Fifty-five community water sources were identified across the region to the south of the RDMS. These generally access shallow, unconfined groundwater units predominantly in areas close to the Iranian border which receive regular recharge from mountain areas in Iran.

In February 2023, a Water Supply Feasibility Study was initiated within the Northern Groundwater System, focussing on the evaluation of existing data, identification of gaps and the implementation of a field programme including extensive geophysical surveys, drilling and aquifer testing.

In Parallel, a study was commissioned to evaluate the option of a desalination plant at Gwadar Port, with a pipeline to the mine site along the proposed route presented in Figure 4-8. The study included pre-feasibility engineering designs and associated cost estimates. The outcome of the study proved this option to be untenable at this point in time due to the inaccessibility of areas along the pipeline route due to security risks as well as the high initial capital costs.

On completion of the fieldwork programme a predictive model was developed indicating that the Northern Groundwater System has sufficient volumes of water to meet the demand for the current Life of the Project. It was also found that this water is saline, therefore unusable for drinking or agriculture without expensive treatment. Further discussion of water supply aspects are detailed in subsequent ESIA Report Chapters.

Although the Northern Groundwater System has shown to be a viable option for the total water supply requirements for the Life of Mine, RDMC will continue to explore the remaining NOC permit areas, in order of priority. This, together with the regular re-evaluation of the seawater desalination plant and pipeline to the mine site, will allow for the supplementation of the future water supply as required. Currently further studies of alternatives are focussed on the Southern Groundwater System with the following planned for 2025/2026:

- Hydrocensus update.
- Geophysical surveys.
- Drilling and hydrogeological testing including:
    - Diamond core drilling (and installation of monitoring bores).
    - Drilling, installation and testing of four large diameter test production bores.
    - Drilling and installation of a minimum of 12 additional monitoring bores.
- Updated numerical groundwater modelling.

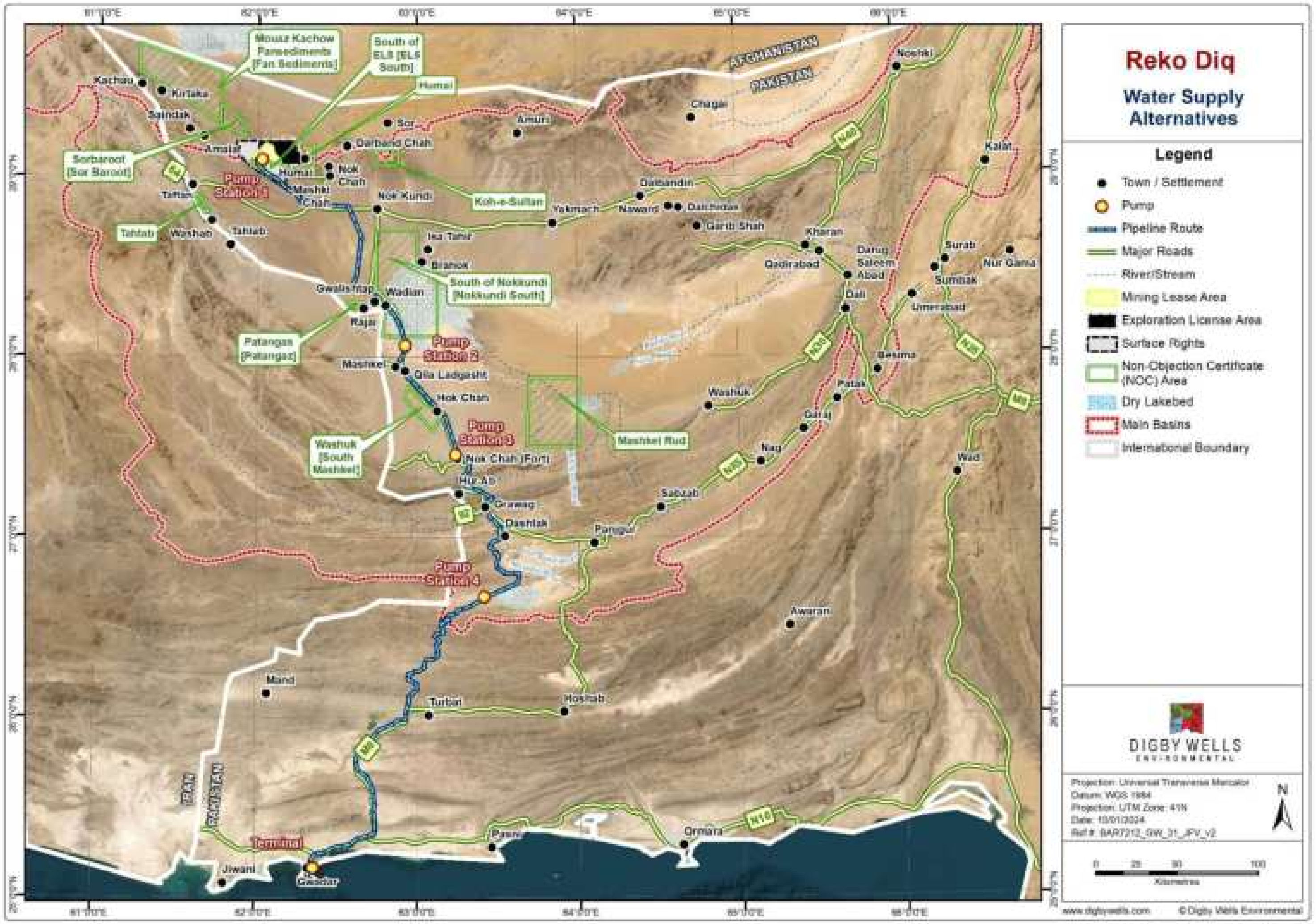


Figure 4-8: Water Supply Sources Alternatives

4.7. Concentrate Transport Alternatives

The following alternatives were considered and assessed for the transportation of the concentrate from the mine site to a coastal port for export to market. These options are described in the subsections below and include:

- *Pipeline*: A slurry pipeline will be constructed from the mine site to the marine facility at Gwadar Port.
- *Rail*: The use of the existing railway to transport concentrate (filtered cakes) from the mine site to Port Qasim via Nok Kundi.
- *Road*: The use of the existing road network to transport concentrate via trucks from the mine site to Gwadar Port.

Figure 4-9 illustrates the above transport options to the marine terminals, Port Qasim and Gwadar Port. Each transport route option was assessed using economic, environmental, and social criteria to determine the most suitable route. Security concerns were also considered during the screening process.

4.7.1. Pipeline

One of the transport options is the construction of an approximately 670 km slurry pipeline that will traverse through the Chagai, Washuk, Panjur, Kech and Gwadar Districts and terminate at Gwadar Port Figure 4-9).

The pipeline would be buried and supported by four pump stations, including one located at the proposed Reko Diq Mine Site to transport an annual throughput of 800,000 t of equivalent dry concentrate with a flow rate approximately 100 m^3 per hour of slurry or 96 t/h of dry equivalent concentrate. Pump stations would be powered by diesel and will provide extra pressure along the pipeline. To an extent, the pipeline would follow existing roads and avoid drainage channels with an un-surfaced track along the length to allow for construction or upgrading during operation. Permanent drainage infrastructure (ditches and culverts) would be constructed to reduce erosion and sedimentation and provide stormwater management and erosion control measures.

The construction of the pipeline would require extensive manpower and capital. The current pipeline route would pass through some of the high-risk areas from a security point of view including Dashtak, Parom, Pui Wani, Kalatuk, and Chib. Construction of, and maintenance work for the pipeline along these settlements would pose a serious security risk to personnel. This, together with the additional costs, make this option unfeasible at this point in time.

4.7.2. Rail

This option utilises the existing rail route from Nok Kundi to Port Qasim, with a new section to be constructed between Nok Kundi and the Reko Diq Mine Site. The rail route traverses through two provinces of Pakistan; Balochistan, including the section from the RDMS to Nok Kundi and then to Jacobabad in the Sindh province, comprising the remaining rail route from

Jacobabad to Port Qasim. The existing rail route from Nok Kundi to Port Qasim is approximately 1,350 km in length (Figure 4-9).

Port Qasim is a marine terminal port in Karachi, Malir District of Sindh Province of Pakistan and is under the administrative control of the Secretary to the Government of Pakistan for Maritime Affairs and operated by PQA.

The selected port for the export of the concentrate is the PIBT at Port Qasim, which is a fully dedicated bulk handing terminal that operates coal unloading (import) and cement and clinker loading (export). Port Qasim is located 50 km from Karachi, on the coastline of the Arabian Sea. Access to the PIBT terminal is via a 45 km long navigation channel which provides safe and convenient navigation for vessels.

The Project will utilise the existing infrastructure at PIBT, taking into account its good operational state. Additionally, new facilities will be developed at the terminal to meet concentrate handling and export requirements. A brief description of the existing and new facilities at the terminal are as follows:

- *Existing Facilities*: The terminal has three onshore product storage areas called Alpha, Bravo and Charlie yards (from west to east), it provides a mechanised material conveying system and has a marine jetty with two dedicated berths. Moreover, the existing infrastructure for potable water supply, stormwater and sewerage drainage, and site lightings will be utilised by the Project.
- *New Facilities*: The facilities for concentrate storage are projected northeast of the terminal in the Charlie yard and consist of a concentrate storage shed, truck unloading building, roads, entrance and exit gates, truck scales and product handling conveyors and connection to existing conveyors for transport and transfer of product to vessels.

This option has been selected as the most feasible option both financially and environmentally, whilst also having a significantly lower security risk than the other two options.

4.7.3. Road

The existing road network consists primarily of the N-40 highway, China-Pakistan Economic Corridor (CPEC) road, N-85 highway and M-8 motorway which will connect the RDMS to Gwadar Port. The approximate length of this route is 1,150 km. In this option, the concentrate will be loaded onto trucks and will reach the N-40 highway via the site access road (Figure 4-9) Moving to the east from Nok Kundi, the trucks will travel to the CPEC road near Yakmach (locally known as the Yakmach-Kharan road) and this road then ends at Besima. From here it will follow the N-85 highway and then follow the M-8 motorway from Hoshab to finally reach Gwadar Port. The road route from Panjgur to Gwadar city poses a security risk to personnel making this option unfeasible.

4.8. Marine Terminal Alternatives

Two marine terminals, namely Gwadar Port and Port Qasim, were considered as terminals where concentrate will be transferred to for export to market. Gwadar Port is in the Balochistan province and Port Qasim is in the Sindh province. Figure 4-10 shows the locations of the two ports considered for the marine facility for the Project.

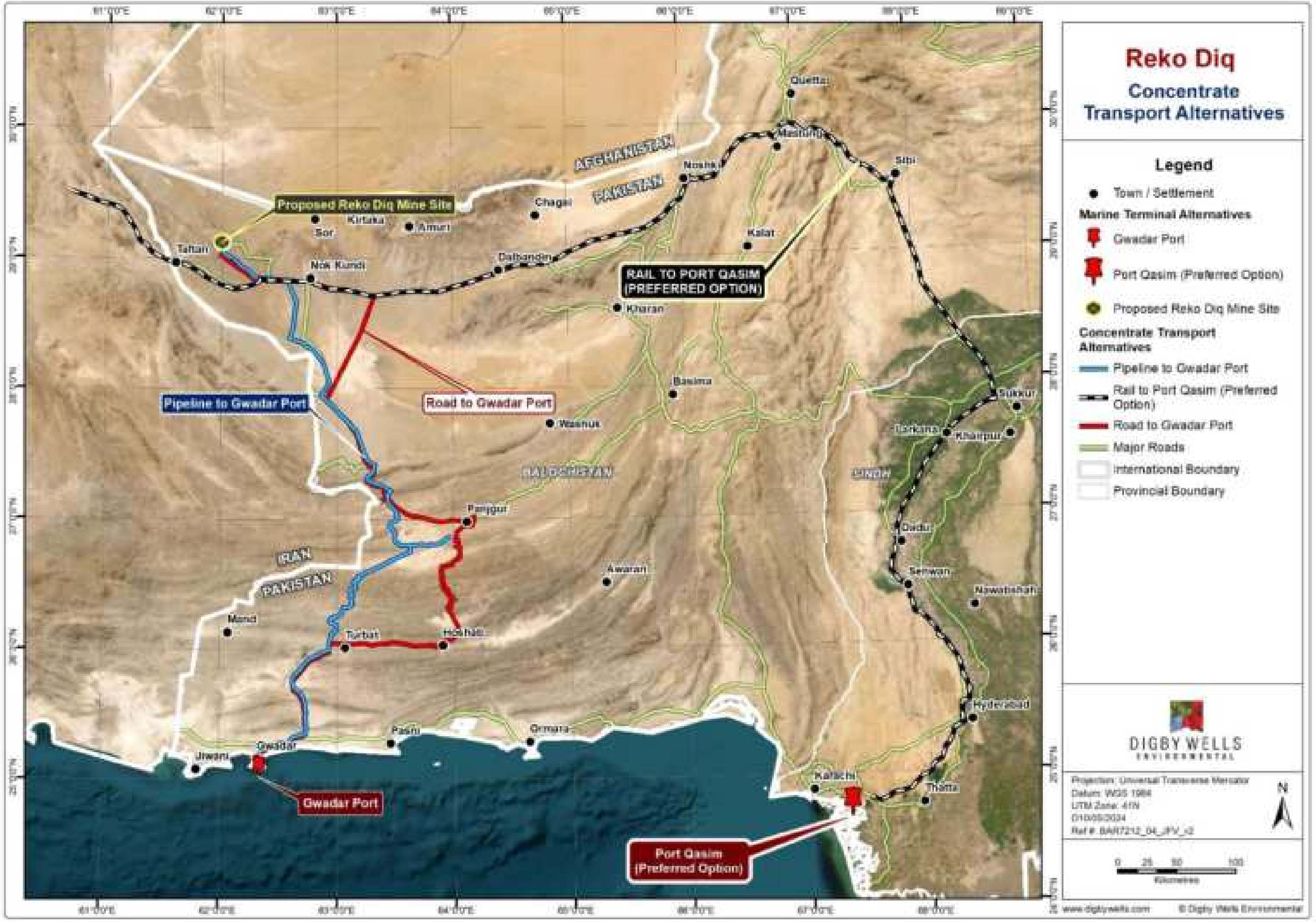


Figure 4-9: Concentrate Transport Alternatives

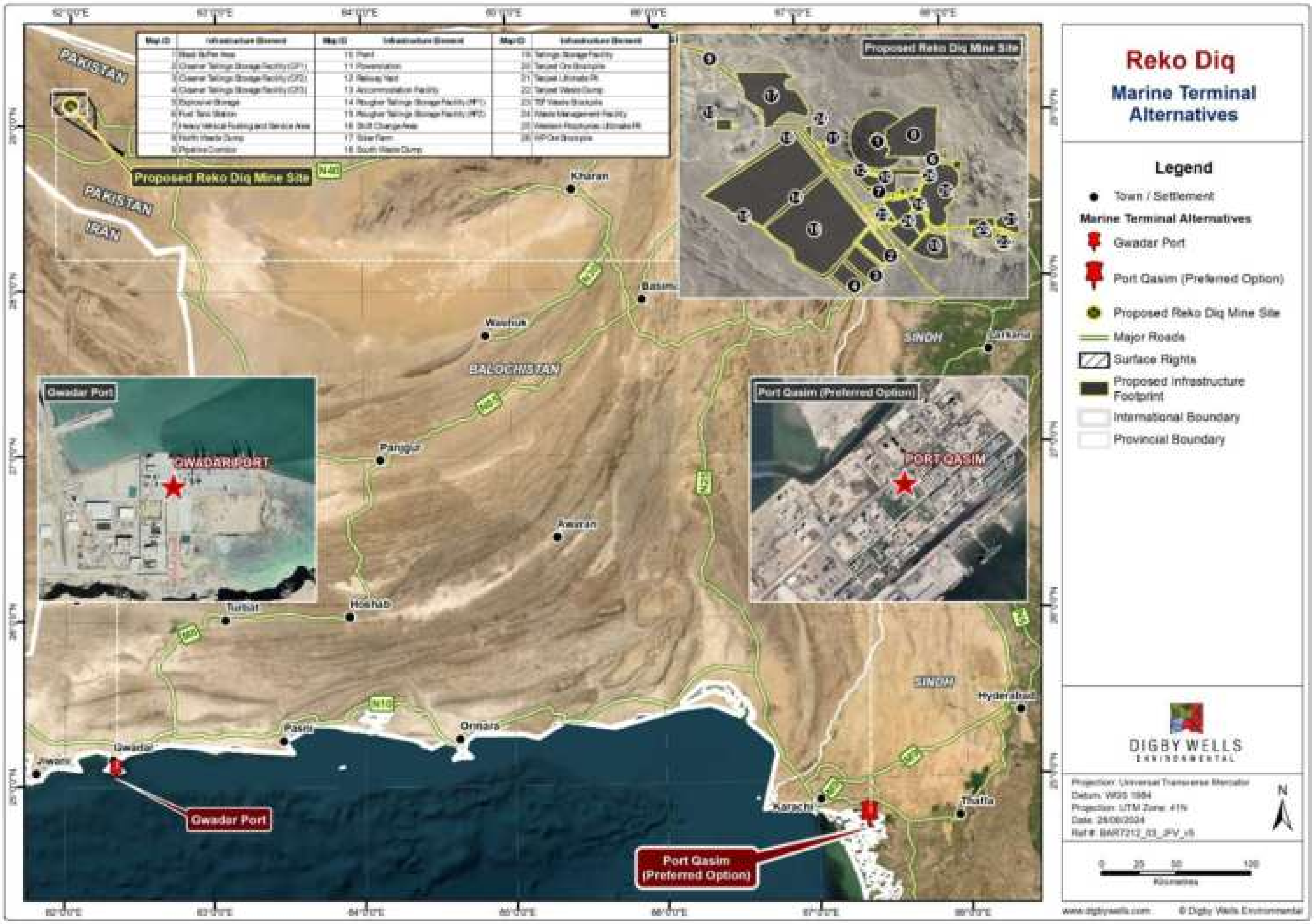


Figure 4-10: Marine Terminal Alternatives

4.8.1. Gwadar Port

The marine terminal at Gwadar Port is situated on the shores of the Arabian Sea in the city of Gwadar, which is located in the Balochistan province. It lies approximately 120 km southwest of Turbat.

The Gwadar Port Authority (GPA) is owned by the Pakistan government and plays a crucial role in overseeing the development, management, and operations of Gwadar Port. GPA is responsible for the overall development of the port, including its infrastructure. Gwadar Port is a key element of the CPEC and reflects the strong China-Pakistan relationship and aligns with China's broader Belt and Road Initiative (BRI) (Kanwal, 2018).

The GPA operates under the administrative authority of the Maritime Secretary of Pakistan and is overseen operationally by the China Overseas Port Holding Company (COPHC). COPHC, a state-run Chinese firm, under a 40-year lease from the Pakistan government which commenced in April 2017 (Kanwal, 2018).

There is existing infrastructure at the marine terminal that could be utilised however additional infrastructure would be needed to fully develop the required facilities for the Project, these include:

- A pipeline terminal;
- A concentrate dewatering plant;
- A water treatment plant;
- Sea discharge pipeline for treated water from the concentrate dewatering and concentrate storage;
- Power supply including four 1.8 MW diesel generators (three will be in operation and one for standby). The generators will include sound attenuation enclosures and exhaust sound muffler systems;
- Fuel storage in two 75,000 L tanks provided with a second containment (to contain any potential skills from the tanks) equal to 110% of one tank's volume;
- Administrative buildings, guard houses and perimeter fence; and
- Conveying and ship loading facilities.

Gwadar Port has not been selected due to the significant infrastructure requirements and the security concerns associated with the transport corridors from the mine.

RDMC will continue to investigate Gwadar Port and the associated transport routes for possible future use, should security and political risks improve.

4.8.2. Port Qasim

The selected port for the export of the concentrate is the PIBT at Port Qasim, which is a fully dedicated bulk handing terminal that operates coal unloading (import) as well as cement and clinker loading (export). PIBT has been setup as the first terminal for handling coal, clinker, and cement on a build, operate and transfer (BOT) basis at PQA.

Port Qasim is located at a distance of 50 km from Karachi, on the coastline of the Arabian Sea and handles more than 40% of Pakistan's cargo, both imports and exports, on its port terminals. Access to the PIBT terminal is via a 45 km-long navigation channel which provides safe and convenient navigation for vessels and has built capacity for handling up to 12 Mt of coal and 4 Mt of cement and clinker per year, which together can be further enhanced to ramp up to 20 Mtpa.

The existing terminal has three onshore product storage areas called Alpha, Bravo and Charlie yards (from west to east), it provides a mechanised material conveying system and has a marine jetty with two dedicated berths, one for loading cement and clinker and a second berthing position dedicated for unloading coal (PRDW, 2024).

The new facilities for concentrate storage are projected northeast of the terminal in the Charlie yard and consist of a concentrate storage shed, truck unloading building, roads, entrance and exit gates, truck scales and product handling conveyors and connection to existing conveyors for transport and transfer of product to vessels.

4.9. Accommodation Options

A qualitative assessment of the on-site vs. off-site accommodation options was conducted as part of the ESIA process. The on-site accommodation option considers prefabricated buildings providing individual, employee-only living quarters and communal facilities, including dining areas and recreational facilities. The facility will accommodate all staff, including local, national and ex-pat employees. A site within an ancient ring dyke identified a short distance from the mine and processing facilities was selected mainly for its protection from the harsh climatic conditions in the area.

The off-site accommodation option considered the construction of accommodation facilities for local personnel (i.e. not on a fly-in, fly-out roster) on the outskirts of Nok Kundi, a town located 70 km away from the Project. RDMC would provide transport to the mine and returning to the accommodation on a daily basis. RDMC have focussed efforts to work with government and existing local communities to improve social services and the general standard of living within this town and so there was careful consideration of the increased population's contribution to, and benefit from the improvements in the town. A smaller on-site accommodation camp would have also been included in this option for the ex-pat and national personnel operating on a fly-in, fly-out rotation scheme.

However, the on-site employee accommodation was selected after careful consideration of the following factors:

- *Safety and Security*: The on-site accommodation facility will be constructed for workers' accommodation and will be situated on an open land, enveloped by mountains on three sides with one side providing access to the facility Figure 4-11. This location naturally offers security making it a suitable space to accommodate people (employees and contractors). The off-site accommodation option necessitates a drive-in, drive-out workforce each day. However, the time required for travel and daily security clearance would result in exceptionally long workdays, posing safety concerns.

- Additionally, the *desert conditions* can be extreme (heat, sandstorms, etc.) and travelling in such conditions also becomes a safety issue. Furthermore, considering the remote location of the proposed RDMS and the need for workers to operate on rotating shifts, staying onsite ensures that employees remain close to their workplace at all times, regardless of the hour. Conversely, choosing off-site accommodation could raise security issues particularly for night shifts.
- *Land Requirement*: The on-site accommodation facility will be located within the Surface Rights Lease granted by the Government of Balochistan to RDMC. This eliminates the need for land acquisition procedures that would have been necessary if a site had been selected outside the designated lease area.
- *Work Efficiency*: The on-site accommodation option will minimise travel time, allowing workers to quickly access their workplace. This is crucial for mine workers who need to be on-site during shifts.
- *Cost and Logistics*: Staying on-site can be more cost-effective and efficient. The off-site accommodation may involve longer commutes, fuel costs, and extensive transportation requirements.
- *Pressure on Existing Infrastructure*: The on-site accommodation facility will not be a part of any settlement and thus will not place undue pressure on the existing infrastructure within the local settlements.
- *Environmental Conditions*: The on-site accommodation facility is located in an area generally upstream of the prevailing wind conditions minimising the risk of dust from the Project. When winds to blow towards the camp it is generally at wind speeds which are too low to mobilise material from the TSF and other work areas (see Section 6.2.1.8).

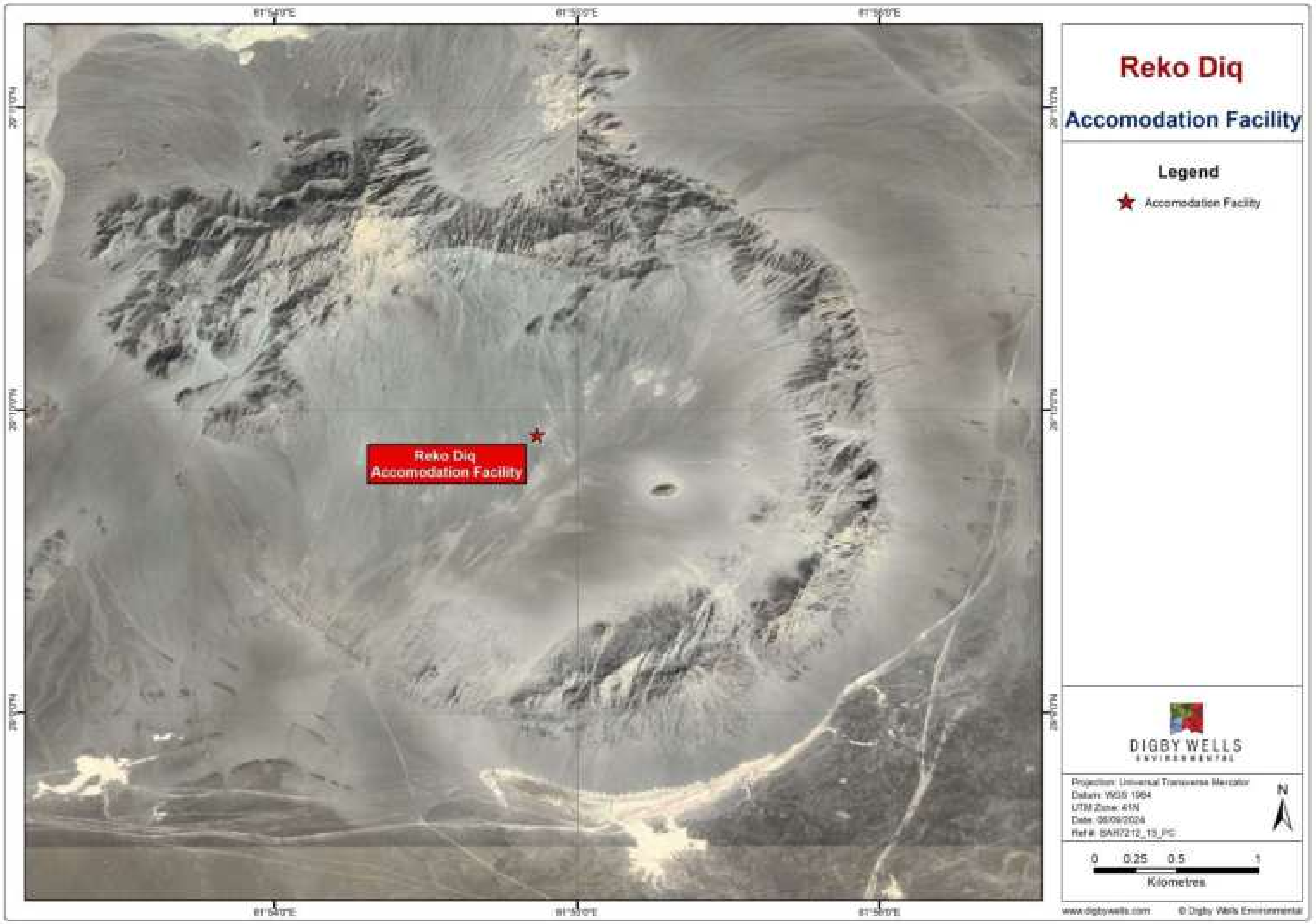


Figure 4-11: Onsite Accommodation Facility Location – Google Earth View

4.10. Project Layout/Infrastructure Alternatives

A mining operation of this magnitude requires substantial infrastructure for the mining and processing of ore and the transportation of the concentrate to market. This includes the processing plant, energy supply, administration and maintenance buildings, staff accommodation, waste dumps and TSF as well as roads and pathways linking these facilities with each other, the pit and the road network outside of the mine lease areas. The final layout of the Project facilities is detailed in Chapter 3 (Project Description) and in Figure 4-12.

The placement of these facilities within the lease areas has been selected by:

- The proximity to the ore body(ies);
- Proximity to a water source;
- Avoiding building over potential ore reserves;
- Geotechnical stability for foundations;
- Environmental and social impacts; and
- Local weather conditions.

The footprint selected for the production site was selected based on the above criteria and a number of locations of the individual buildings within this footprint were considered. The overall footprint has been designed to minimise the overall size where possible to reduce the impact on the surrounding flora and fauna.

The power plant was placed midway between the camp and process plant to minimise transmission infrastructure requirements and provide adequate distance to ensure emissions do not present a health risk for employees. The admin offices are placed near the plant for ease of access for staff.

The solar farm is placed at a distance from the main operational area to avoid direct obstruction of buildings and associated mine infrastructure and maximise the exposure to sunlight.

The TSF is also placed in reasonably close proximity to the plant to allow for the cost-effective transport of embankment construction material, and pumping of tailings and return water. The TSF placement further makes use of a ridge outcrop that can be used as a natural buttress for one side of the facility.

The location of the waste dumps considered mostly economic factors related to the distance to haul the material and where to place the material to avoid double handling and rework of these facilities in the future.

All roads on site will be constructed to ensure separation of heavy and light traffic for safety reasons.

The accommodation facilities, as described previously will be located a short distance from the production site where the selection criteria included protection from security risks but also extreme weather conditions such as sandstorms.

The current location of the onsite accommodation camp is selected to be in the northwest of the TSF and in the west of the mining facilities. This location is selected as it receives limited contribution from the Project operations. This is since the wind blows for a limited duration of less than 10% of days from mining facilities or TSF towards the onsite accommodation camp. Due to this, limited contribution is expected in elevated PM concentrations at the camp due to Project operations. Other locations, such as constructing the onsite accommodation camp in the north or east of the Project will cause severe contribution of Project at the onsite accommodation camp through a significant increase in number of annual exceedances. Similarly, locating the camp in the south will cause all of the PM concentrations from TSF to accumulate at the onsite accommodation camp as winds blow from north towards south for 80% time of the year. Therefore, constructing the onsite accommodation camp in south of the TSF will result in exceedance of PM concentration throughout the year.

In addition to the Project contribution, the onsite accommodation camp is also exposed to elevated particulate matter (PM) concentrations due to desert conditions in the background. Based on the assessment carried out in Appendix Q, the baseline PM concentrations tend to increase with increase in wind speed. The increase in baseline concentration occurs when the wind speed exceeds the threshold friction velocity of the particulates.

The current location of camp has a topographic barrier in its north (upwind direction) due to which it receives limited contribution from the wind-blown dust in the background. While the Project may construct this camp at any location in the north of Project, those locations do not have natural barriers in their upwind direction and can potentially experience elevated PM concentrations due to wind-blown dust in the background.

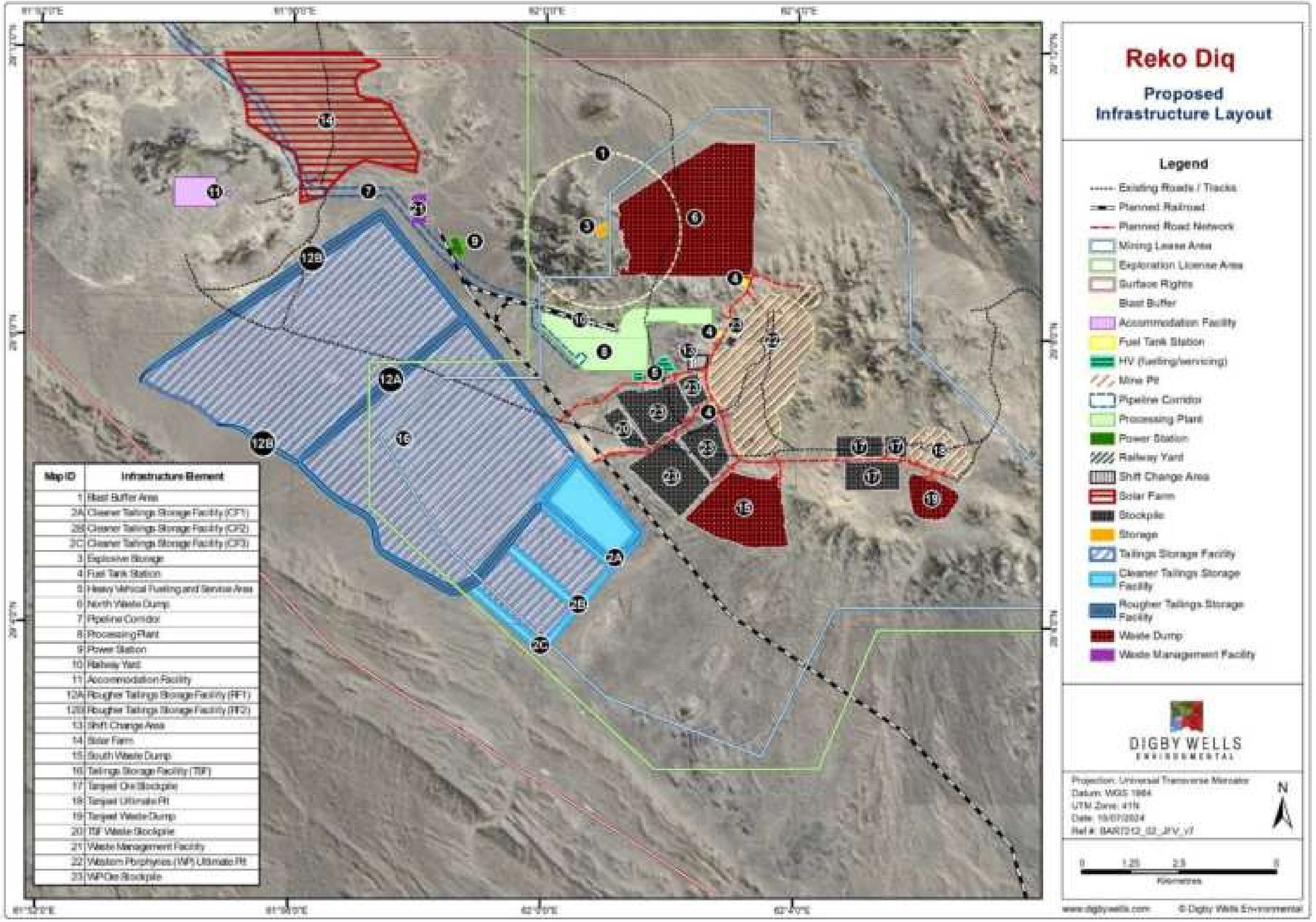


Figure 4-12: Final Project Infrastructure Layout

5. Environmental and Social Baseline Assessment

This chapter describes and summarises the existing environmental and social conditions at the various Project facilities and the Project affected area. It forms the basis of predicting potential impacts associated with the proposed activities and serves as a baseline against which future monitoring results will be compared. As listed in Chapter 1 (Introduction), a variety of specialist studies have been completed to characterise the biophysical and socio-economic environments. The specialist studies conducted and used to inform this baseline description have been appended to this report as referenced in Table 5-1.

Table 5-1: Specialist Studies and Associated Appendices

Specialist Study	Appendix Number
Socio-economic	Appendix B
Indigenous Peoples Memo	Appendix C
Noise Study	Appendix D
Traffic Study	Appendix E
Cultural Heritage	Appendix F
Biodiversity – Flora	Appendix H
Biodiversity – Fauna	Appendix I
Critical Habitat Assessment	Appendix J
Hydrology	Appendix K
Groundwater – Water Supply	Appendices L, M, N, O
Groundwater – Mine Area	Appendix P
Air Quality	Appendix Q
Soils and Sediments	Appendix R
Geochemistry	Appendix S

5.1. Topography

5.1.1. Balochistan Province

Balochistan is a continuation of the geological configuration of the Iranian plateau with rough terrain divided into basins by mountain ranges reaching heights sufficient to form obstacles to movement. It is separated from the Indus plain by the Suleiman, Kirthar, and Pab Mountain Ranges.

The Balochistan plateau is in the southwestern part of Pakistan with altitudes ranging from 600 to 3,010 mamsl. Covering a vast expanse of 347,190 km^2, this region boasts diverse and distinct natural topographical characteristics. To the north, the Chagai Hills delineate an area characterised by a true desert, marked by inland drainage and *hamuns* (playas). The easternmost part comprises the Kirthar Range (Britannica, 2024). Approximately 80% of the area of the Balochistan province is inter-mountainous. The remaining 20% consists of flood plains and coastal plains. Only 15% of the landscape is available for human settlements, farms, and roads due to this dominant mountainous terrain (Government of Balochistan, 2018).

The Reko Diq region stands as one of the several worn remnants of volcanic centres within the Chagai volcanic chain of mountains. This chain extends in an east-west direction across the Balochistan province, situated between Quetta, Taftan and the border with Afghanistan.

Gravel plains, sandy plains and shifting sand dunes are the dominant topographic features of the RDMS. The areas to the west of the proposed mine site along the Pakistan-Iran border, are at a higher elevation (>1,000 mamsl) than the areas to the east of the mine site. The elevation gently descends while moving from the northwest from the Kach Mountains and Kirtaka Hills on the Pakistan-Iran border, to the north towards the Pakistan-Afghanistan border. The Fan Sediments or Northern Groundwater System area along the Pakistan-Afghanistan border lies at an elevation ranging from approximately 450 to 1,000 mamsl (Figure 5-2).

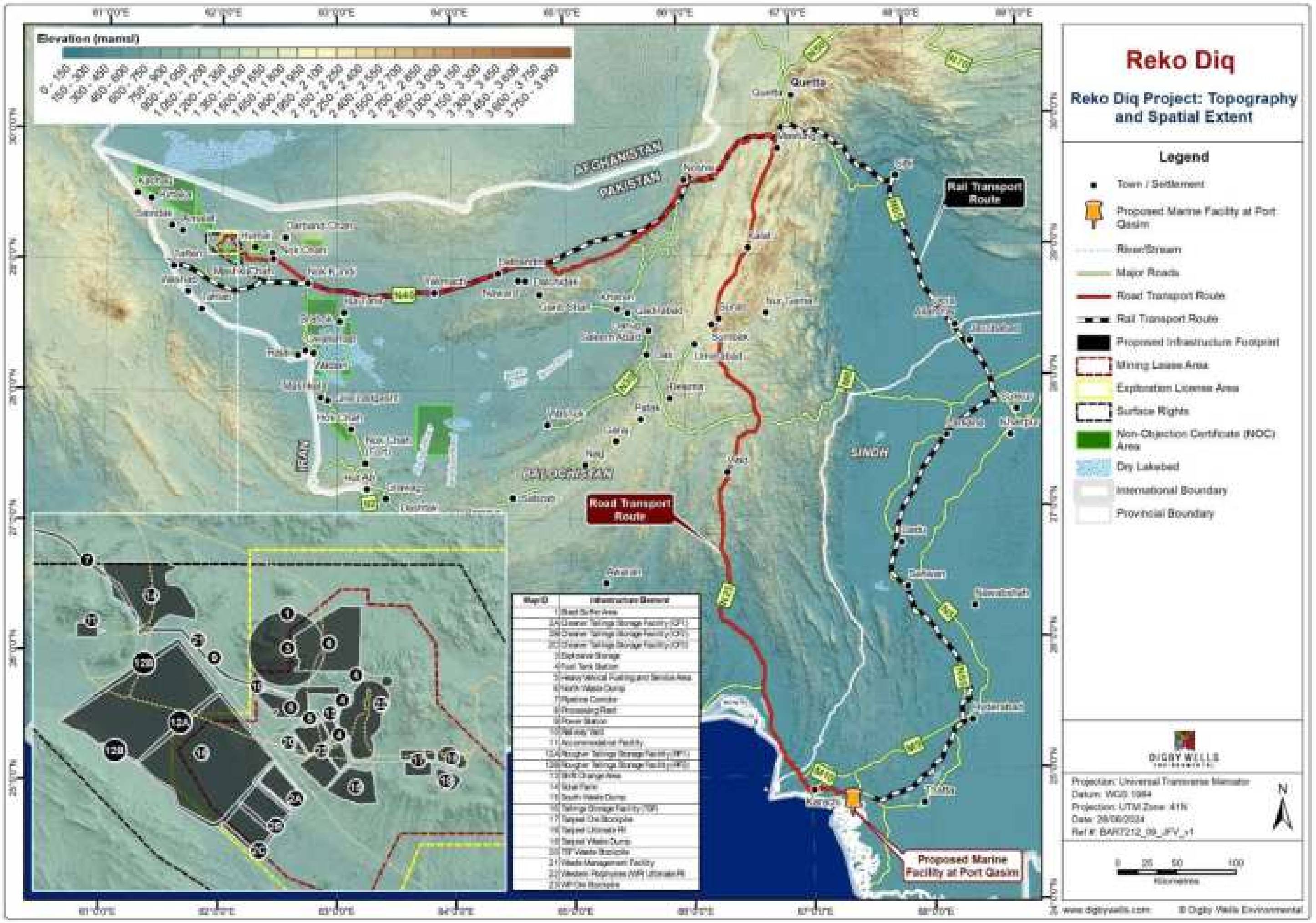


Figure 5-1: Regional Topography

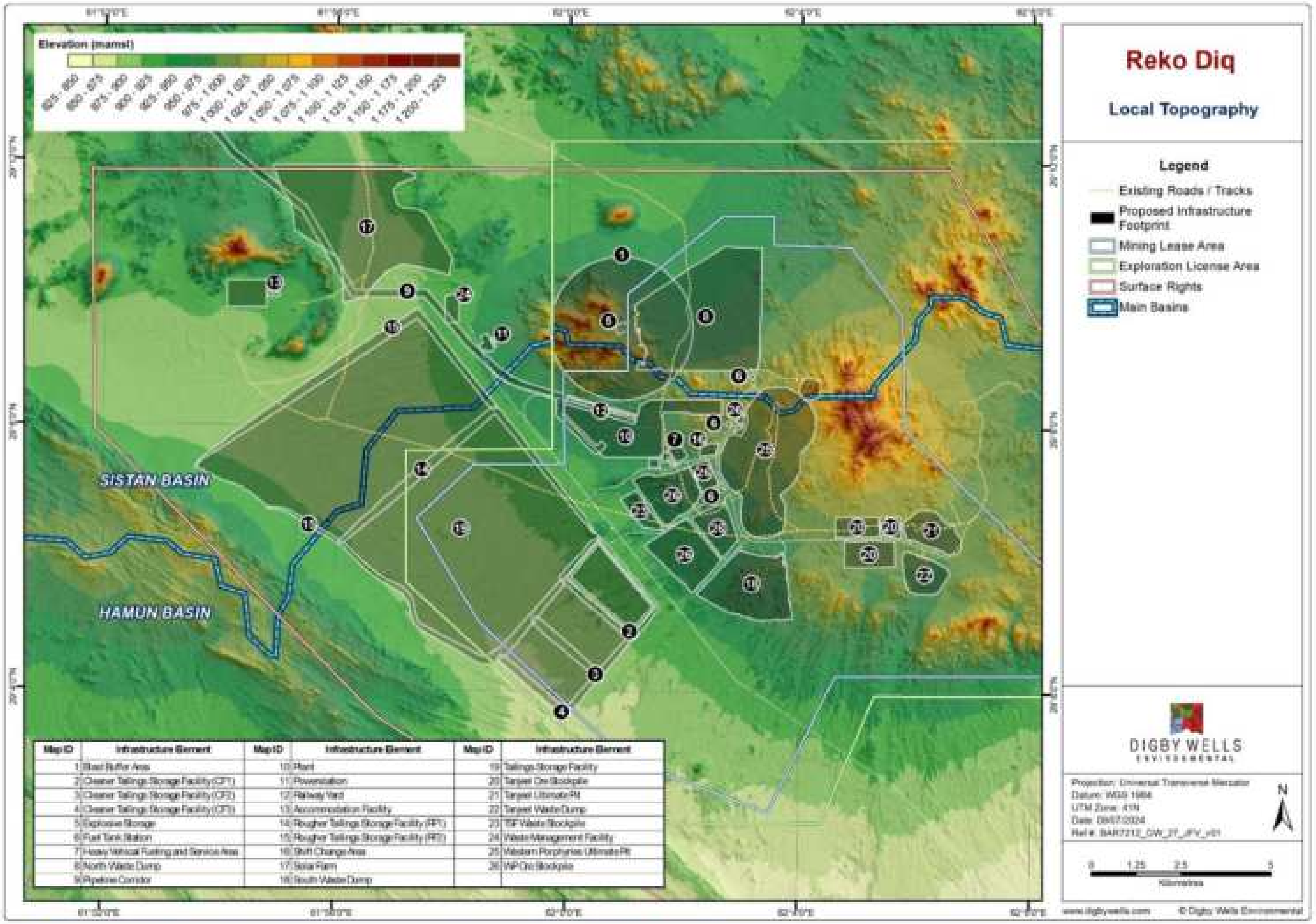


Figure 5-2: Local Topography

5.1.2. Sindh Province

Ridges, plains, and the coastal belt are the dominant topographic features of the Project facilities located in the Sindh province. The following are the details of the main topographical features:

- *Ridge and Runnel Upland in Sindh Kohistan*: This is an area of rugged topography in the north. It is an offshoot of the Kirthar mountain range and forks away in a southwest direction from the main range at the mountain knot of Gorag at an altitude of 2,126 mamsl, gradually decreasing in height as it approaches the Gadap plain.
- *Plains and Plateau of Malir-Lyari Interfluous*: The vast tract of land lying between the Malir and Lyari rivers forms the interfluous of the drainage systems of the two rivers. This area has very few natural drainage scars, due to a rocky base of alternating layers of consolidated sandstone, intervened by silt and clay beds.
- *Plains and Hills of the Coastal Belt*: The southern part of the Malir District follows the coastal strip of the Gharo and Korangi creeks, demarcating the northern boundary of the old Indus delta. The areas to the south of the east-west baseline of the triangular outline of the Karachi division subsided and were covered by the sea making a shallow basin. In the course of time, the deltaic deposits of the Indus River filled this shallow basin and the northern part of the basin, which coincided with a fault line making the coastal edge. The terrain rises gradually northward from the Arabian Sea, culminating in low, flat-topped, parallel hills. Sub-parallel ridges interrupted by wide intervening plains, categorised as marine denudation plains, sand dunes, and marine terraces, are prominent features of this area.

5.1.3. Project Areas

The topographical altitude range of the Project areas are follows:

- The altitude of the proposed RDMS lies between 500 and 1,800 mamsl, with a variation of gravel and sandy plains at lower elevations and isolated peaks.
- The topographical altitude at the Northern Borefield Area ranges from 450 up to 560 mamsl.
- The elevation levels along the Rail Transport Route in the Balochistan province up to Dera Allah Yar increases to an elevation of 2,100 mamsl.
- The topographical altitude of the Project facilities in Sindh province, including the Rail Transport Route from Dera Allah Yar to Port Qasim, as well as the rail yard and marine facility at Port Qasim along the coastline, ranges up to 57 mamsl. Meanwhile, the land bordering the intertidal delta (comprising mangroves and mudflats) within and to the east of Port Qasim has an elevation less than 5 mamsl with elevations gradually increasing towards the north.

5.2. Geology

Figure 5-3 shows the regional geology across the Balochistan and Sindh provinces as per the geological map of Pakistan. The geological layer of each Project facility is described in the subsections below.

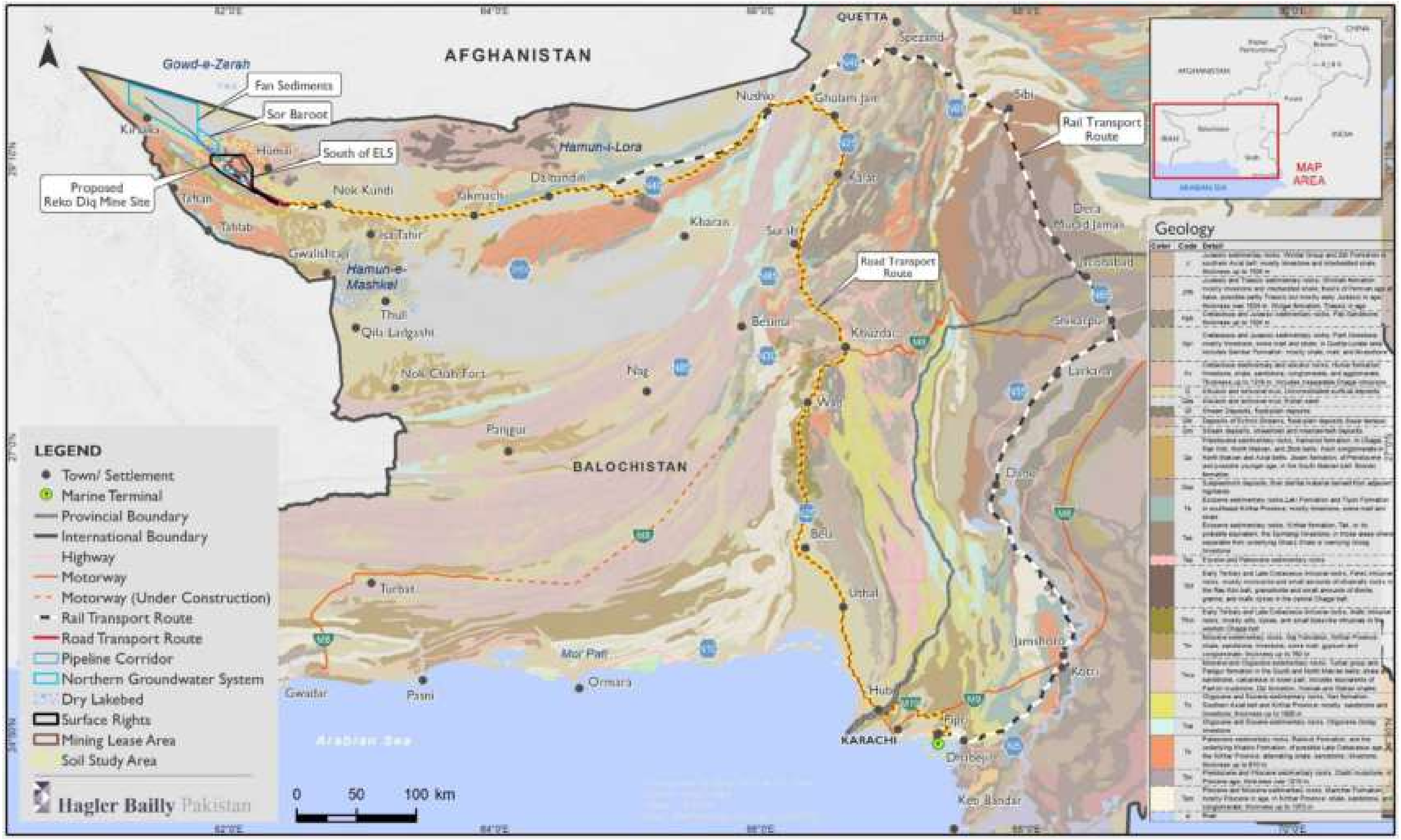
5.2.1. Balochistan Province

The Reko Diq porphyry complex is situated within the western Chagai magmatic belt in Pakistan. This magmatic belt extends over 400 km from east to west and 140 km from north to south along the border with Afghanistan and Iran. The development of the Chagai magmatic arc is attributed to the northward subduction of the Arabian oceanic plate beneath the southern edge of Eurasia (Razique and Tosdal, 2010).

Geologically, the province is divided into four main geological regions; Central Mountains Range, Chagai Hills and Ras Koh Range, Makran Mountains Range and Chagai – Kharan Basin. The hills and mountain ranges consist predominantly of folded and faulted Mesozoic to middle Tertiary limestone. Mesozoic and Tertiary sedimentary rocks mostly consist of interbedded limestone, sandstone, shale, and marls which make up the bulk of the Central Mountains Range. Similar sedimentary rocks, in addition to the Calc-alkaline and ultramafic intrusions, are found together with young quaternary volcanic rocks in the Ras Koh Range. This range is favourable for copper, iron, and sulphur deposits. The Makran Mountain Range includes central and coastal ranges and is mainly made up of a uniform sequence of tertiary and quaternary sedimentary rocks. The Chagai – Kharan Basin is mostly a desert basin partly filled with younger sedimentary rocks derived from surrounding mountain ranges.

5.2.2. Sindh Province

Sindh, situated in the southeastern part of Pakistan, lies on the northwestern edge of the Indian plate. Its geology is characterised by sedimentary minerals. The Project Area at Port Qasim covers four types of formations, including three coastal formations – these are, Coastal Sand Dune Deposits, Beach Sand Deposits, Mangrove Swamp Deposits, and Recent Alluvial Deposits, which consist of unconsolidated sand, silt, and gravel.



Source: Geological Survey of Pakistan (GSoP) and United States Geological Survey (USGS). “Geological Map of Pakistan [Scale: 1:2,000,000]” (1964)

Figure 5-3: Overview of Regional Geology

Table 5-2: Lithological Units at Project Facilities

Project Facility/ Associated Facility	Quaternary	Tertiary	Cretaceous	Jurassic
RDMS	Q (Alluvium and extrusive mud, unconsolidated surficial deposits). Qes (Alluvium and extrusive mud, Eolian sand). Qp (Pleistocene sedimentary rocks, Kamerod formation, in Chagai, Ras Koh, North Makran, and Zhob belts. Poorly consolidated shale, sandstone, and conglomerate; thickness up to 1,524 m). Qv (Pleistocene volcanic rocks, Koh-i-Sultan Volcanic Group: green, red, and purple agglomerate, tuff, and andesitic lava; may be in part Recent in age; thickness up to 1,524 m).	Te (Eocene sedimentary rocks, Washap formation, mostly limestone, and Robat limestone in western Chagai belt. Kullan formation, Erikalag limestone, and Kharan limestone in Ras Koh belt; thickness over ~305 m). Tp (Palaeocene sedimentary rocks, Juzzak formation in the western Chagai belt; thickness up to 2,438 m). Toe (Oligocene and Eocene sedimentary rocks, Pishi group, in southwest Chagai belt, and Nauroz formation in eastern Ras Koh belt: mostly shale and sandstone; thickness up to 2,438 m).	Kv (Cretaceous sedimentary and volcanic rocks, Humai formation: limestone shale, sandstone, conglomerate, and agglomerate. Thickness up to 1,219 m and includes inseparable Chagai intrusions). Cretaceous and Tertiary: TKf (Early Tertiary and Late Cretaceous intrusive rocks, Felvic intrusive rocks, mostly monzonite and small amounts of ultramafic rocks in the Ras Koh belt, granodiorite and small amounts of diorite, granite, and mafic dykes in the central Chagai belt). TKm (Early Tertiary and Late Cretaceous intrusive rocks, Mafic intrusive rocks, mostly sills, dykes, and small boss-like intrusive in the western Chagai belt).	

Project Facility/ Associated Facility	Quaternary	Tertiary	Cretaceous	Jurassic
Northern Groundwater System	Q (Alluvium and extrusive mud, unconsolidated surficial deposits). Qes (Alluvium and extrusive mud, Eolian sand). Qp (Pleistocene sedimentary rocks, Kamerod formation, in Chagai, Ras Koh, North Makran, and Zhob belts. Kech conglomerate in North Makran and Axial belts. Jiwani formation, of Pleistocene and possible younger age, in the South Makran belt. Bostan formation).			
Rail Transport Route	Q (Alluvium and extrusive mud, unconsolidated surficial deposits). Qbf (Piedmont, Sheetflood and flood-plain deposits of braided streams). Qbr (Stream Deposits, Braided-stream deposits).	Te (Ecocene sedimentary rocks, Laki Formation and Tiyon Formation in southeast Kirthar Province: mostly limestone, some marl and shale). Tek (Ecocene sedimentary rocks, Kirthar formation, Tek, or its probable equivalent, the Spintangi limestone, in those areas where separable from underlying Ghazij	Kv (Cretaceous sedimentary and volcanic rocks, Humai formation: limestone shale, sandstone, conglomerate, and agglomerate. Thickness up to 1,219 m and includes inseparable Chagai intrusions). Cretaceous and Tertiary: TKf (Early Tertiary and Late Cretaceous intrusive rocks, Felvic intrusive rocks, mostly monzonite	J (Jurassic sedimentary rocks, Windar Group and Zidi Formation in southern Axial belt: mostly limestone and interbedded shale, thickness up to 1,524 m). Triassic and Jurassic: JTR (Jurassic and Triassic sedimentary rocks, Shirinab formation: mostly limestone and interbedded shale; fossils

Project Facility/ Associated Facility	Quaternary	Tertiary	Cretaceous	Jurassic
	Qcm (Older terrace deposits, Chung formation, loess and flood-plain deposits of the middle terrace). Qes (Alluvium and extrusive mud, Eolian sand). Qf (Stream Deposits, flood-plain deposits). Qfx (Deposits of Extinct Streams, flood-plain deposits (lower terrace)). Qh (Alluvium and extrusive mud, silt, clay, and muddy sand underlying inland dry lakes (hamun) and commonly salt encrusted). Qm (Stream deposits, streambed, and meander-belt deposits).	Shale or overlying Gorag limestone). Tep (Eocene and Palaeocene sedimentary rocks). Tm (Miocene sedimentary rocks, Parkini mudstone, in the Southern Makran belt: mudstone with siltstone layers; thickness about 1,219 m. Diz formation in the central North Makran belt: shale, sandstone, and thin sandy limestone beds; thickness about 2,438 m). Tmo (Miocene and Oligocene sedimentary rocks, Turbat group and Panjgur formation in the South and North Makran belts: shale and sandstone, calcareous in lower part; includes equivalents of Parkini mudstone, Diz formation, Hoshab and Siahan shales). To (Oligocene and Eocene sedimentary rocks, Nari formation,	and small amounts of ultramafic rocks in the Ras Koh belt, granodiorite and small amounts of diorite, granite, and mafic dykes in the central Chagai belt). TKm (Early Tertiary and Late Cretaceous intrusive rocks, Mafic intrusive rocks, mostly sills, dykes, and small boss-like intrusive in the western Chagai belt).	of Permian age at base, possible partly Triassic but mostly early Jurassic in age; thickness over 1,524 m). Jurassic and Cretaceous: Kpr (Cretaceous and Jurassic sedimentary rocks, Parh limestone: mostly limestone, some marl and shale, in Quetta-Loralai area includes Sembar Formation: mostly shale, marl, and limestone). Kpb (Cretaceous and Jurassic sedimentary rocks, Pab Sandstone: thickness up to 1,524 m).

Project Facility/ Associated Facility	Quaternary	Tertiary	Cretaceous	Jurassic
	Qmx (Deposits of Extinct Streams, streambed, and meander-belt deposits). Qp (Pleistocene sedimentary rocks, Kamerod formation, in Chagai, Ras Koh, North Makran, and Zhob belts. Kech conglomerate in North Makran and Axial belts. Jiwani formation, of Pleistocene and possible younger age, in the South Makran belt. Bostan formation). Qpd (Piedmont and related deposits, Piedmont deposits, coarse detrital material derived from adjacent highlands). Qsp (Piedmont and related deposits, coarse detrital material derived from adjacent highlands). Qt (Deltaic and Tidal Deposits, tidal delta-marsh deposits).	Southern Axial belt and Kirthar Province: mostly sandstone and limestone; thickness up to 1,829 meters). Toe (Oligocene and Eocene sedimentary rocks, Pishi group, in southwest Chagai belt, and Nauroz formation in eastern Ras Koh belt: mostly shale and sandstone; thickness up to 2,438 m). Tp (Palaeocene sedimentary rocks, Ranikot Formation, and the underlying Khadro Formation, of possible Late Cretaceous age, in the Kirthar Province: alternating shale, sandstone, limestone; thickness up to 610 m). Tpm (Pliocene and Miocene sedimentary rocks, Manchar Formation, mostly Pliocene in age, in Kirthar Province: shale, sandstone, and conglomerate; thickness up to 1,372 m).		

Project Facility/ Associated Facility	Quaternary	Tertiary	Cretaceous	Jurassic
	Qtx (Older Deltaic and Tidal deposits, tidal delta-marsh deposits).			
Port Qasim	Q (Alluvium and extrusive mud, unconsolidated surficial deposits). Qfx (Deposits of Extinct Streams, flood-plain deposits (lower terrace)). Qt (Deltaic and Tidal Deposits, tidal delta-marsh deposits). Qtx (Older Deltaic and Tidal deposits, tidal delta-marsh deposits).	Tpm (Pliocene and Miocene sedimentary rocks, Manchar Formation, mostly Pliocene in age, in Kirthar Province: shale, sandstone, and conglomerate; thickness up to 1,372 m). Tm (Tertiary: Miocene sedimentary rocks, Parkini mudstone, in the Southern Makran belt: mudstone with siltstone layers; thickness about 1,219 m. Diz formation in the central North Makran belt: shale, sandstone, and thin sandy limestone beds; thickness about 2,438 m).		

5.2.3. Local Geology

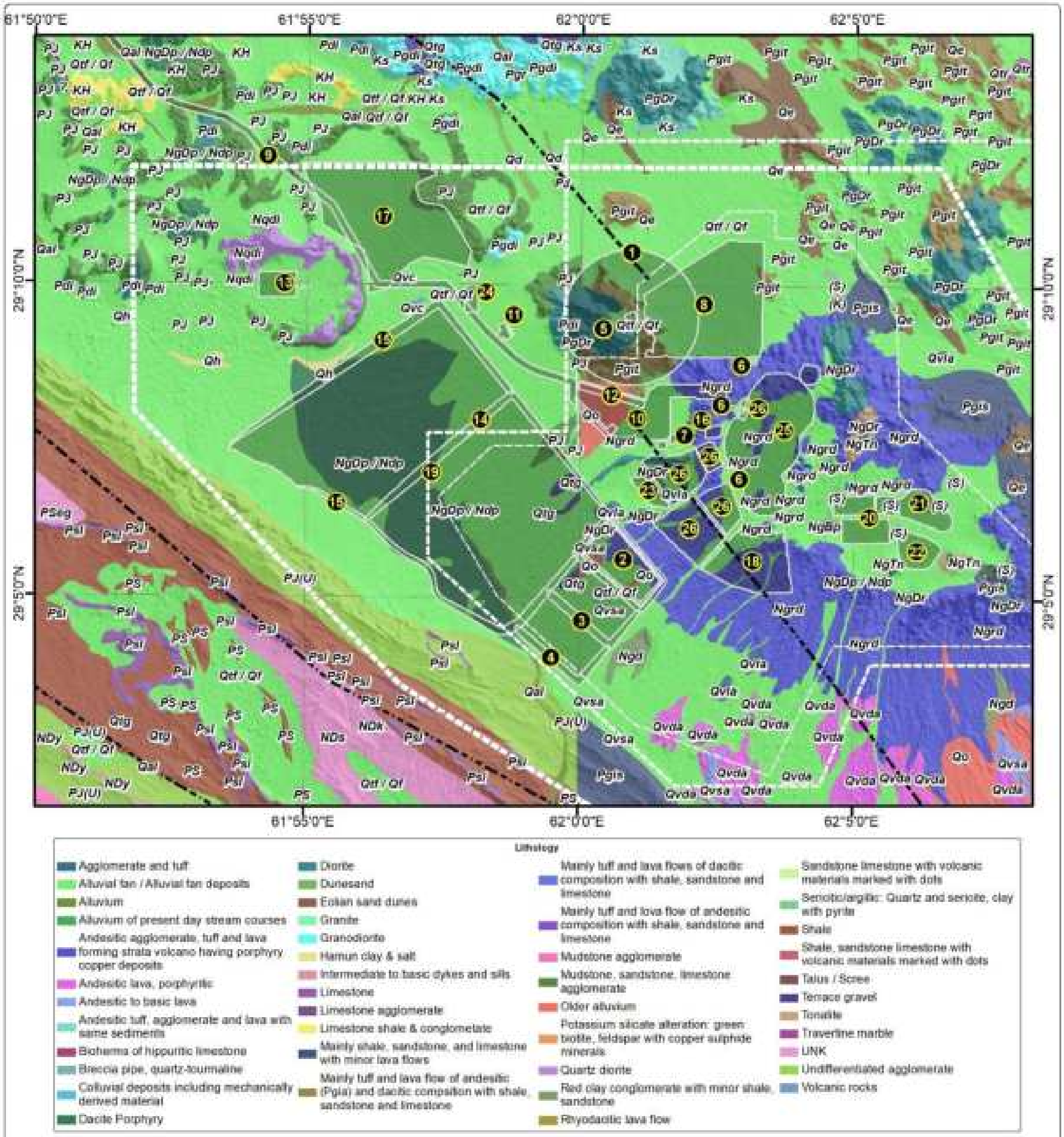
Table 5-2 details the lithological units underlying the Project and associated facilities, including the RDMS, Railway Transport Route and Port, which consist of mainly the Quaternary, Tertiary and Cretaceous. The local geology underlying the RDMS includes the Reko Diq Porphyry complex which comprises diorite, quartz diorite and granodiorite porphyry intrusions, emplaced into volcanic and sedimentary rocks of the Humai, Juzzak and Reko Diq formations (Figure 5-4) (Razique & Tosdal, 2009).

The Humai formation comprises of calcareous and clastic sedimentary rocks, which includes a massive ~300 m thick biohermal limestone unit, within the ~2 km thick sequence. The Juzzak, Saindak and Amalaf formations overly the Humai formation, and together comprise a sequence, greater than 4 km, of shallow marine to fluviatile shale, sandstone, conglomerate and shaly limestone. Lava flows of massive amygdaloidal, porphyritic andesite and basalt are present in the Juzzak and Saindak formations, whilst the Amalaf formation includes volcanic breccia and tuff, with locally imbedded massive, porphyritic and predominantly andesitic lava flows (PorterGeo, 2024).

The Reko Diq Formation comprises of ~400 m thick sequences of fine to medium grained and porphyritic andesitic lava flows which are interbedded with autoclastic volcanic breccia and pyroclastic debris. The younger poorly consolidated clastic sediments within the region comprise of buff silt, sand and fan gravel locally interbedded with ashfall tuff (PorterGeo, 2024).

Significant structural deformation has occurred in the region. Fault systems orientation vary from east-south-east through to east-northeast for lengths greater than 100 km. The fault systems are predominantly characterised with reverse motion with enough displacement to juxtapose Cretaceous and Paleogene strata over the Neogene stratigraphy. The geometry of the primary sedimentary basins is potentially controlled by these structures. Large antiformal structure folding has also been mapped in the Chagai Hills (PorterGeo, 2024).

The Reko Diq deposits are highly fractured, with structures predominantly orientated in the north-west and north-east directions (Figure 5-5). Assessments of the piezometric surface between the porphyry and surrounding country rock indicates a lack of hydraulic connection (SMEC International (Pty) Ltd, 2010).



Map ID	Infrastructure Element	Map ID	Infrastructure Element	Map ID	Infrastructure Element	Map ID	Infrastructure Element	Map ID	Infrastructure Element
1	Blast Buffer Area	7	Heavy Vehicle Fueling and Service Area	13	Accommodation Facility	18	South Waste Dump	23	TSF Waste Stockpile
2	Cleaner Tailings Storage Facility (CF1)	8	North Waste Dump	14	Rougher Tailings Storage Facility (RF1)	19	Tailings Storage Facility	24	Waste Management Facility
3	Cleaner Tailings Storage Facility (CF2)	9	Pipeline Corridor	15	Rougher Tailings Storage Facility (RF2)	20	Tanjeel Ore Stockpile	25	Western Porphyries Ultimate Pit
4	Cleaner Tailings Storage Facility (CF3)	10	Plant	16	Shift Change Area	21	Tanjeel Ultimate Pit	26	WP Ore Stockpile
5	Explosive Storage	11	Powerstation	17	Solar Farm	22	Tanjeel Waste Dump		

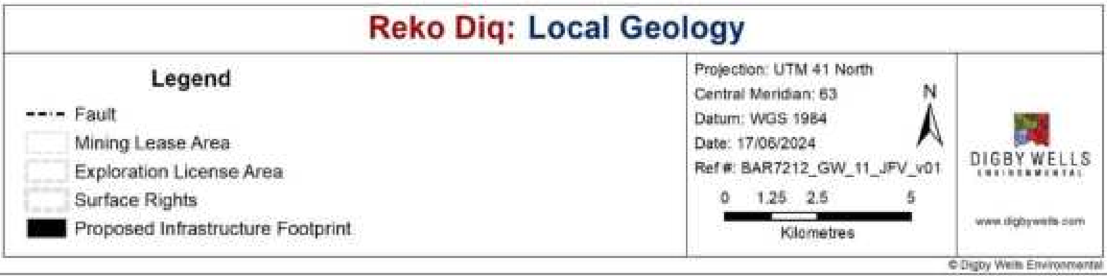


Figure 5-4: Geological Map of the Mine Site Area

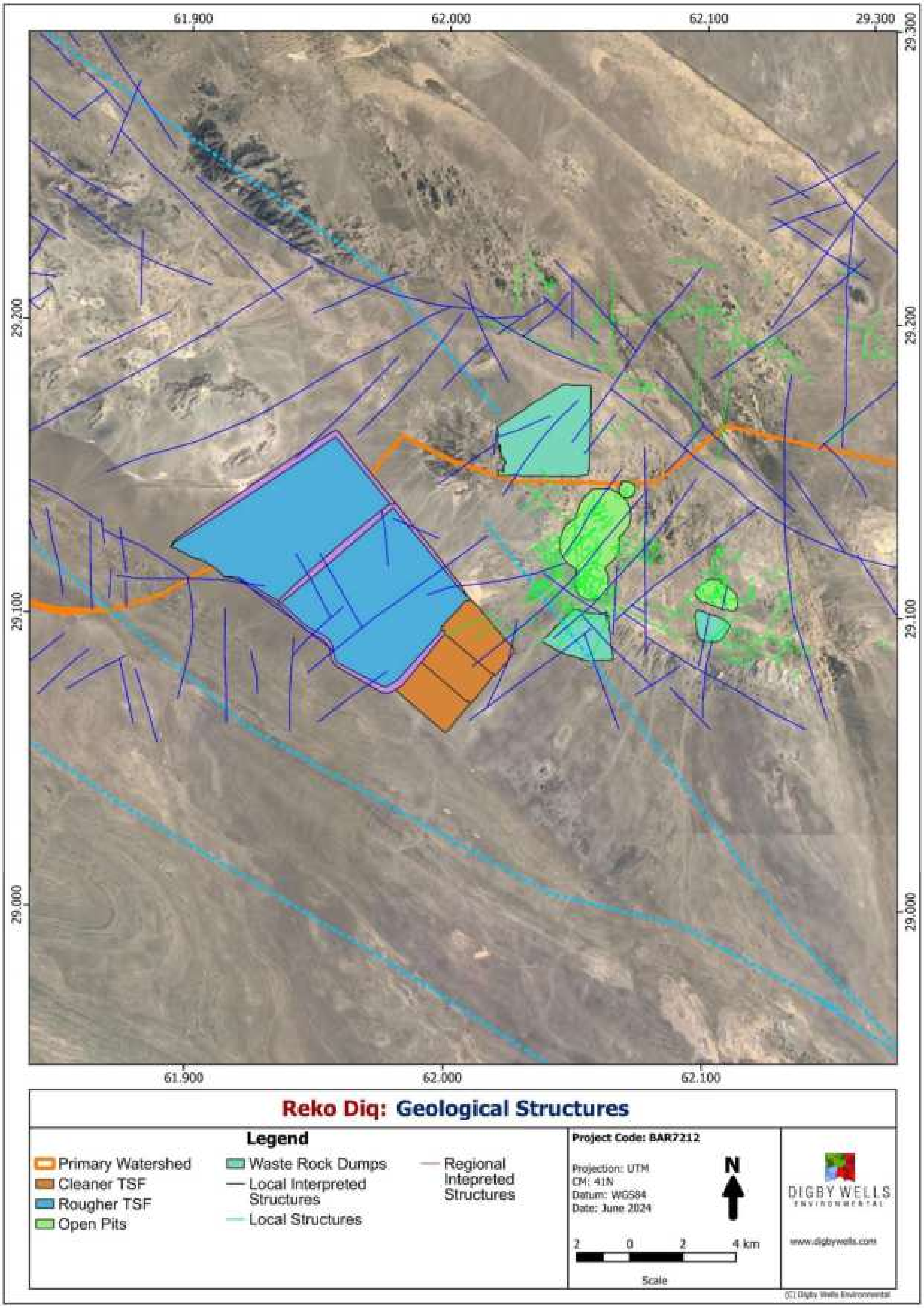


Figure 5-5: Geological Structures identified through detailed drilling

5.3. Seismicity

The Building Code of Pakistan with Seismic Provisions – 2007[9] divides Pakistan into five seismic zones. These zones are divided based on the Peak Ground Acceleration (PGA). The seismic zoning of the Balochistan and Sindh provinces which covers the Project facilities is indicated in Figure 5-6 with the details of each zone list in Table 5-3.

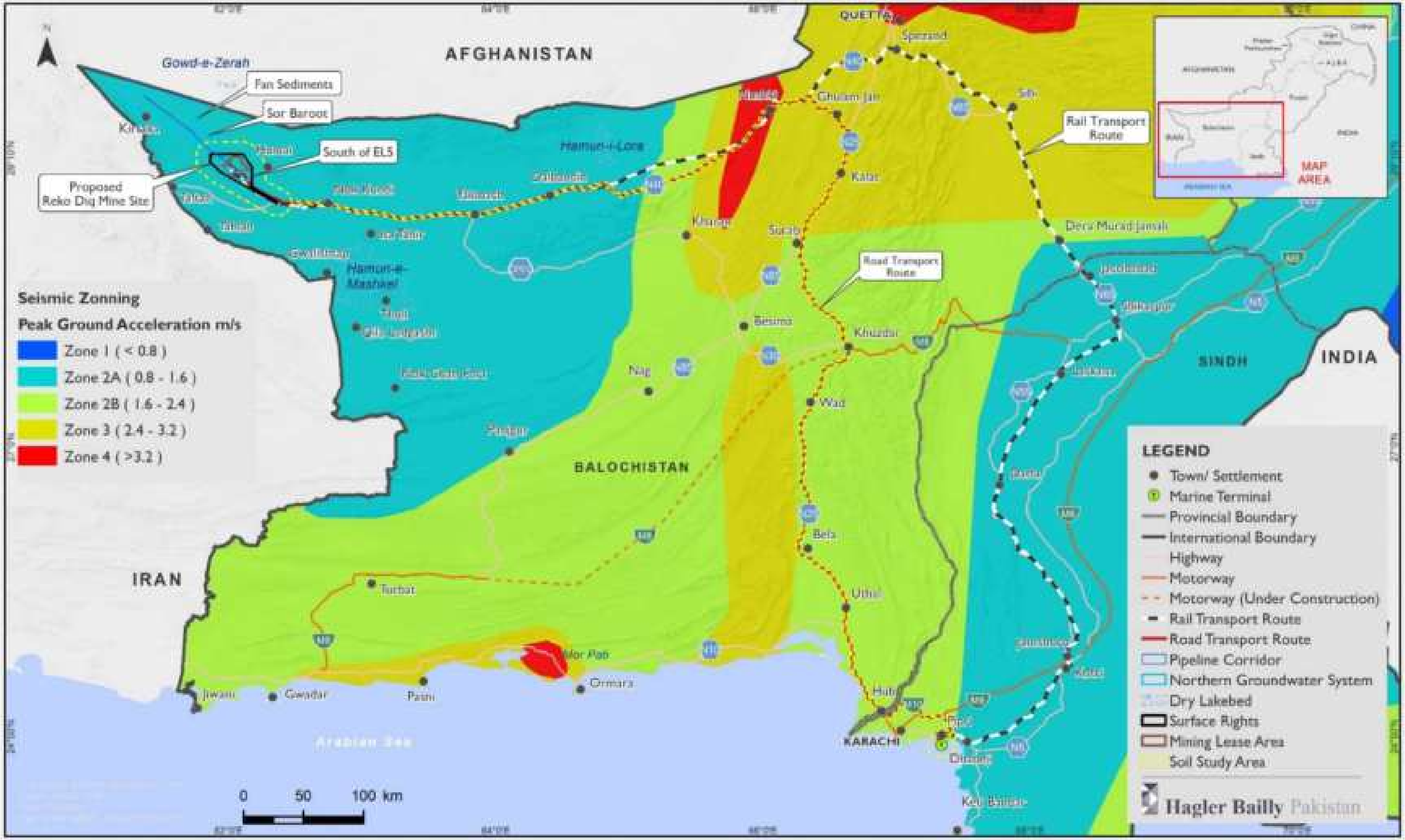
The seismicity layer of each Project facility is described in the subsections below. Figure 5-7 provides a map of the earthquake density of Pakistan.

Table 5-3: Seismic Zones and Peak Horizontal Ground Acceleration by Building Code of Pakistan – Seismic Provisions 2007

Seismic Zone	Peak Horizontal Ground Acceleration
1	0.05 to 0.08 g
2A	0.08 to 0.16 g
2B	0.16 to 0.24 g
3	0.24 to 0.32 g
4	> 0.32 g

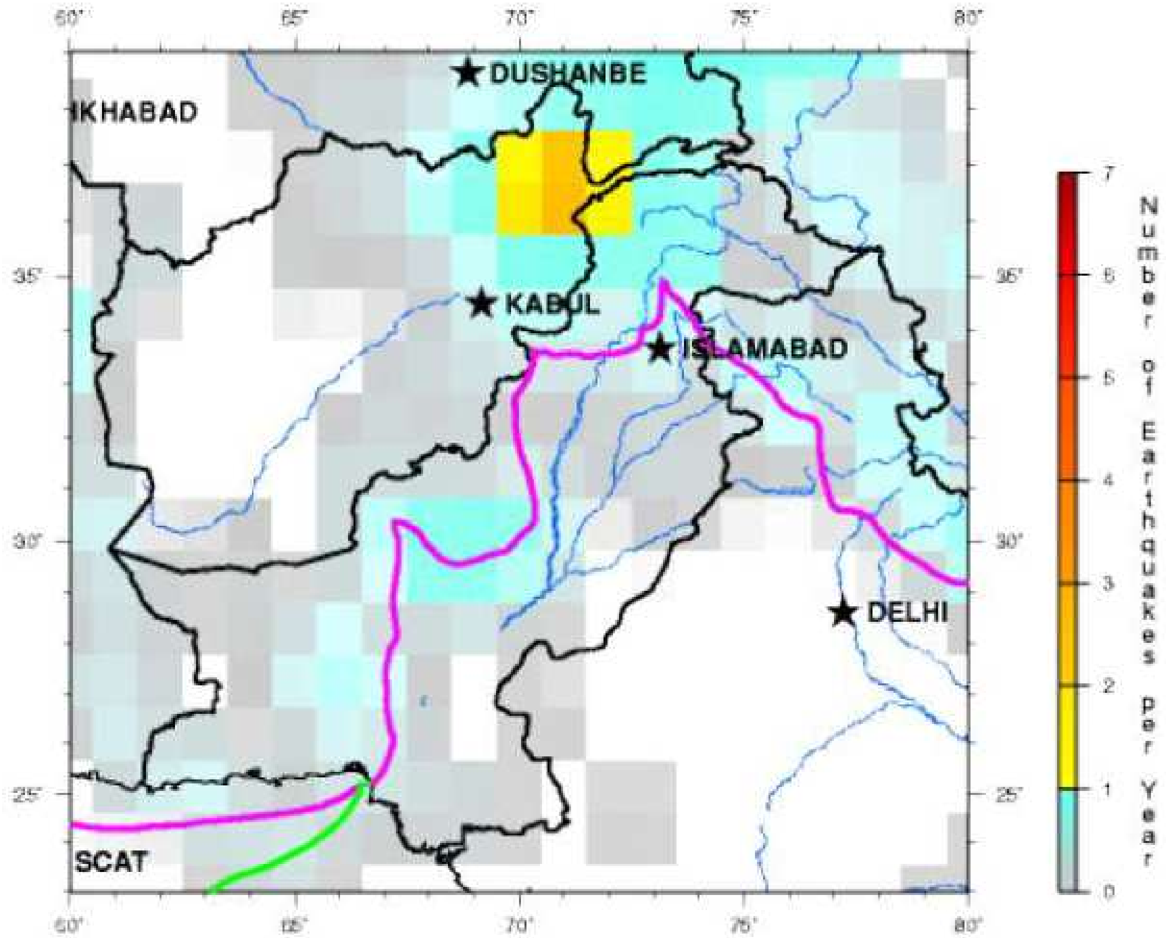
Note: "g" is the acceleration due to gravity

[9] Government of Pakistan. 2007. *Building Code of Pakistan–Seismic Provisions Islamabad*: Ministry of Housing and Works.



Source: Government of Pakistan. 2007. *Building Code of Pakistan–Seismic Provisions Islamabad*: Ministry of Housing and Works.

Figure 5-6: Seismic Zoning of the Balochistan and Sindh Provinces



Source: *"Earthquake Density of Pakistan",* United States Geological Survey (USGS).

Figure 5-7: Earthquake Density of Pakistan

5.3.1. Balochistan Province

The entire province of Balochistan lies within a seismically active region. Over the past century, the surrounding region has witnessed 21 earthquakes of magnitude (M) 6 or higher. Some events are as follows:

- An earthquake of M 5.9 occurred on 7 October 2021, approximately 100 km east of Quetta, Balochistan. According to the Provincial Disaster Management Authority (PDMA) Balochistan, 20 people were killed and more than 300 were injured (USGS, 2024).
- A M 7.1 thrust earthquake with similar faulting characteristics of the October 2021 earthquake, occurred on 27 February 1997 resulting in approximately 100 casualties. The earthquake was located approximately 40 km to the southeast of the October 2021 earthquake.
- An earthquake of M 8.6 hit Balochistan near to the Makran coast on 28 November 1945, resulting in the loss of nearly 4,000 lives.

- A M 7.5 earthquake on 30 May 1935, located 205 km southwest of the October 2021 earthquake caused widespread destruction approximately 20,000 fatalities.
- West of the Sulaiman Mountains, a M 7.2 earthquake occurred on 27 August 1931.

5.3.2. Sindh Province

Karachi is situated near the junction of three tectonic plates, Indo-Pakistan, Arabian and Eurasian Plates. The significant faults in the vicinity include the Rann of Kutch Fault in the east and the Pub-Null Fault in the west. The Rann of Kutch-Karachi fault, also known as Karachi-Jati-Allah Bund fault, passes close to the Eastern Industrial Zone of Port Qasim, where the Project will be constructed. According to one of the classifications, Pakistan has 15 seismotectonic regions. The proposed Project is in the seismotectonic region of the Kirthar Ranges, 190 km east of the triple continental junction between the Arabian, Eurasian, and Indian plates. At this location, a moderate level of seismic activity exists, while large-magnitude earthquakes are rare.

The Building Code of Pakistan places Karachi in Zone 2B corresponding approximately to Intensity VII of the Modified Mercalli Scale of 1931. The local effect of Scale VII earthquake is described as, ‘Everybody runs outdoors’. Damage is expected to be negligible in buildings of good design and construction, slight to moderate in ordinary structures, and considerable in poorly built or badly designed structures. The effect is felt in moving automobiles. The peak ground acceleration values in Zone 2 according to the Building Code of Pakistan range from 0.16 g to 0.24 g.

Port Qasim experiences an earthquake density of less than one per year (Figure 5-7). Earthquake epicentres, for magnitudes between M 3.8 and 5.5, have been recorded along the Pab fault, Hab Fault, Ornach–Nal fault, and smaller micro faults east of Karachi and in the offshore areas southwest of Port Qasim.

5.3.3. Project Areas

The PGA values of the district of Balochistan and Sindh provinces where Project components are planned to be located, is presented in Table 5-4 and Table 5-5, respectively.

The Rail Transport Route passes through the Balochistan and Sindh provinces. The section of the Rail Transport Route in the Chagai District in Balochistan and the section in Sindh from Jacobabad to Port Qasim, fall in Zone 2A (0.8 g - 1.6 g). The section which passes through the Mustang and Nushki districts of Balochistan fall in Zone 3 (2.4 g - 3.2 g), and Zone 4 (>3.2 g), respectively. This is because of the Central Brāhui Range that lies in these districts which is a southern offshoot of the Himalayas, lying in the centre of the Balochistan plateau, Pakistan.

Table 5-4: Seismic Zoning of Project Facilities in the Balochistan Province

District	Project Area in District	Seismic Zoning – Peak Horizontal Ground Acceleration (m/s^2)		
		Mostly lies in	Some parts also lie in	
Chagai	RDMS Northern Groundwater System Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)	Zone 2B (1.6 – 2.4)	
Sibi	Rail Transport Route between mine site and Port Qasim	Zone 3 (2.4 – 3.2)		
Mustang	Rail Transport Route between mine site and Port Qasim	Zone 3 (2.4 – 3.2)		
Nasirabad	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)	Zone 2B (1.6 – 2.4)	
Nushki	Rail Transport Route between mine site and Port Qasim	Zone 2B (1.6 – 2.4)	Zone 3 (2.4 – 3.2)	Zone 4 (>3.2)
Kachhi	Rail Transport Route between mine site and Port Qasim	Zone 3 (2.4 – 3.2)		
Quetta	Rail Transport Route between mine site and Port Qasim	Zone 3 (2.4 – 3.2)		

Table 5-5: Seismic Zoning of Project Facilities in the Sindh Province

District	Project Area in District	Seismic Zoning – Peak Horizontal Ground Acceleration (m/s^2)
Karachi	Rail Transport Route between mine site and Port Qasim	Zone 2B (1.6 – 2.4)
Jamshoro	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)
Larkana	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)
Jacobabad	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)
Thatta	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)
Dadu	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)

District	Project Area in District	Seismic Zoning – Peak Horizontal Ground Acceleration (m/s²)
Shikarpur	Rail Transport Route between mine site and Port Qasim	Zone 2A (0.8 – 1.6)
Malir	Marine facility at Port Qasim to handle concentrate	Zone 2A (0.8 – 1.6)

5.4. Climate

The climate of Balochistan is generally arid. The province can be divided into three broad climatic zones (Burke et al., 2005).

- *Hyper-arid* (<100 mm/year): Chagai, Makran coastal areas and south-east of Lasbela.
- *Arid* (100-250 mm/year): Northeast of Zhob, Loralai, Sibi, Kachhi, Lasbela plains, and Pab-Mor ranges.
- *Semi-arid* (250 – 400 mm/year): Sulaiman ranges covering Toba Kakari area, Marri Bugti areas, and Pab Kirthar mountain ranges and Brahui ranges.

Various sources of data have been used to describe the climatic conditions for the mine area. Rainfall data was purchased from the Pakistan Meteorological Department with historical data for other climatic parameters obtained from Lakes Environmental[10] which covers a six-year period from 2017 to 2022.

The general characteristics of the seasons are described as follows:

- *Summer (mid-April to mid-July):* characterised by high temperatures, very low rainfalls with moderate atmospheric humidity and high speed-winds that blow from northwest towards southeast.
- *Summer Monsoon (mid-June to mid-September):* characterised by high temperatures, moderate atmospheric humidity and high speed-winds that blow from northwest towards southeast.
- *Post-Monsoon summer (mid-September to mid-November):* characterised by moderate temperatures, low rainfalls and high speed-winds that normally blow from southwest towards northeast with the direction of wind changing at the end of post-monsoon summer from northwest to southeast.
- *Winter (mid-November to mid-April):* characterised by low temperatures and high speed-winds that blow from northwest to southeast.

The winter monsoon, which is caused by westerly winds (also known as western disturbances) from the Tibetan Plateau, is the predominant climatic driver of the region. This winter monsoon remains active for a short period, generally lasting no more than the one month i.e., January. The winter monsoon also causes a substantial variation in the diurnal temperature where the

[10] https://www.weblakes.com/services/met_data.html

minimum temperatures can reach as low as -9˚C. Generally, this temperature persists for a short period only with the average temperature typically remaining above the frost point, at approximately 8˚C. The weather in January can be characterised as windy with a number of wet days, high relative humidity, and low temperatures. December, and January are the wettest months during which the monthly precipitation totals ranged between 7 and 31 mm/month over the available data set.

For the remaining months, the area experiences a dry desert climate with high temperatures and low relative humidity. The region experiences very limited contribution from the South Asian Summer Monsoon (SASM), which a major climatic driver in other parts of the country. Typically, June, July, and August are the months during which a low-pressure system forms in the region. This low-pressure system results in relatively unstable atmospheric conditions, usually characterised with low relative humidity and high-speed winds, reaching a maximum wind speed of 18 m/s on several occasions. During this period, the mine area experiences a maximum precipitation of only ~6 mm/month.

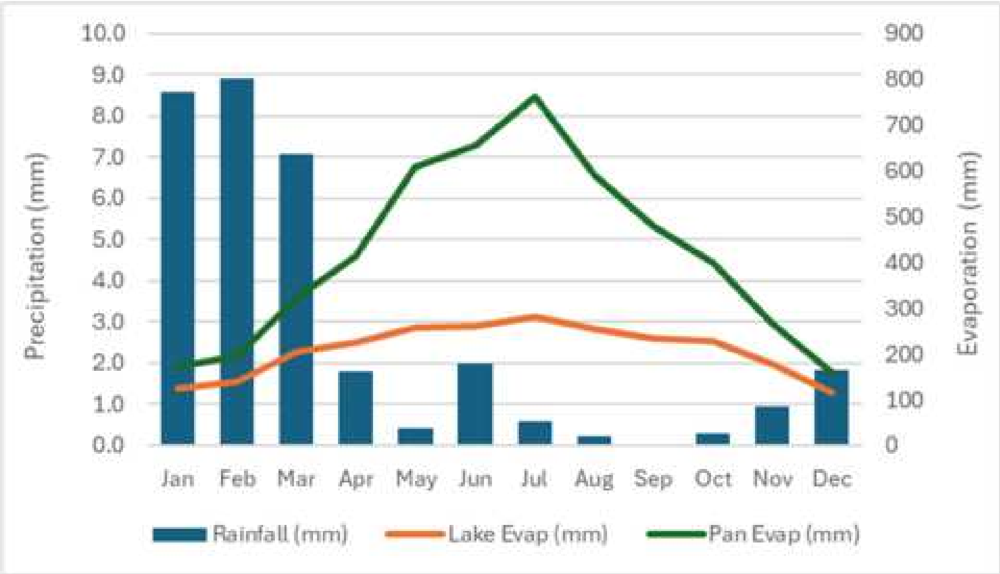
The wind directions at site remain fairly consistent throughout the year with the wind blowing predominantly from the north to northwest direction for ~80% of the time. However, minor winds of the frequency of ~3% also occur from the southeast direction. High speed winds occur during June, July and August during which most of the dust storms occur.

Rainfall is mostly received during the months of January to March (30% to 50%) with the highest monthly rainfall occurring in February and the lowest in September (Figure 5-8). The Mean Annual Evaporation (MAE) calculated from pan evaporation data was determined to be 5,026 mm, while the adjusted lake evaporation MAE was determined to be 2,505 mm. Both values are extremely high compared to the observed Mean Annual Precipitation (MAP), which confirm the very dry and extremely hot conditions for the area. As indicated in Figure 5-8, evaporation is higher during the months of April to October, a period when there is little to no rainfall. The MAP for the Project site is 32.7 mm. Table 5-6 provides a summary of the mean monthly weather parameters for the RDMS.

Table 5-6: Summary of Mean Monthly Weather Parameters for the RDMS

Month	Temperature (°C)	Relative Humidity (%)	Pressure (millibar)	Wind Speed (m/s)
Jan.	10.6	39.8	906.5	5.2
Feb.	13.6	32.6	906.5	5.1
Mar.	19.1	28.0	903.6	5.1
Apr.	25.0	21.5	902.0	4.9
May	28.7	17.0	899.4	5.7
Jun.	32.0	13.7	895.1	6.6
Jul.	32.7	19.3	892.7	5.9
Aug.	29.8	17.4	894.7	7.0
Sep.	26.8	15.5	899.6	6.2

Month	Temperature (°C)	Relative Humidity (%)	Pressure (millibar)	Wind Speed (m/s)
Oct.	21.4	21.2	904.8	6.1
Nov.	15.5	33.1	907.8	4.8
Dec.	11.5	37.2	908.7	4.8

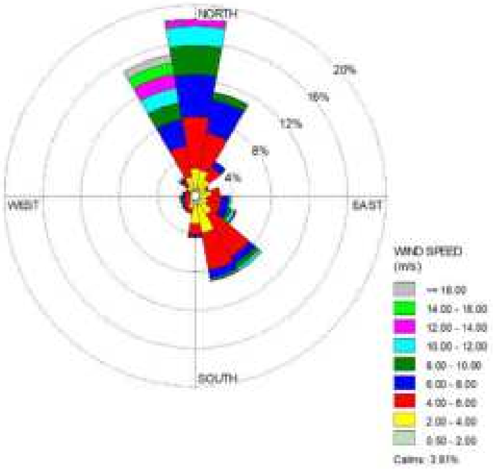


Source: Rainfall data from Pakistan Meteorological Department (average for 1983-2023)

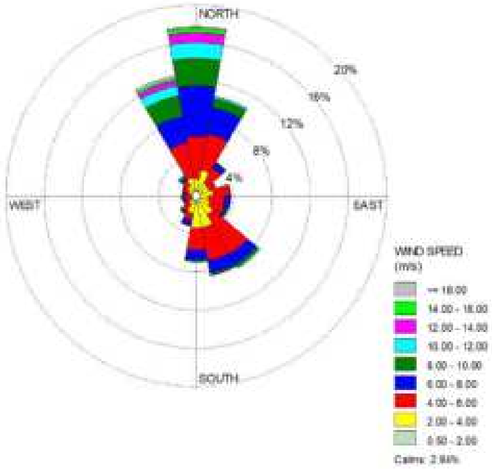
Figure 5-8: Monthly Average Precipitation and Evaporation)[11]

Figure 5-9 presents the predominant wind direction for the months of January to December for the RDMS. The data, presented in Figure 5-10 and Figure 5-11, indicates that Winds are generally from a North to North-westerly direction with the Mean Monthly Wind Speed between 5 – 7 m/s, with higher speed winds mostly in the months of June to August.

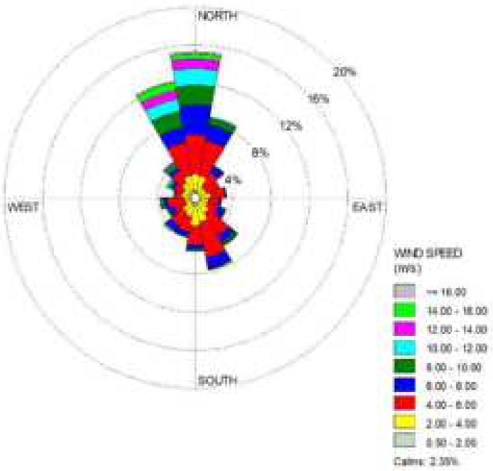
[11] Source: Rainfall data from Pakistan Meteorological Department (average for 1983-2023)



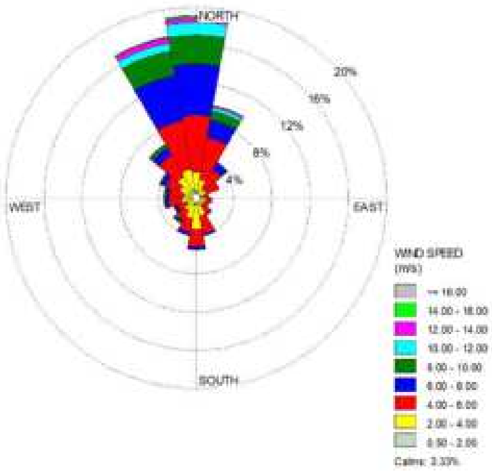
January



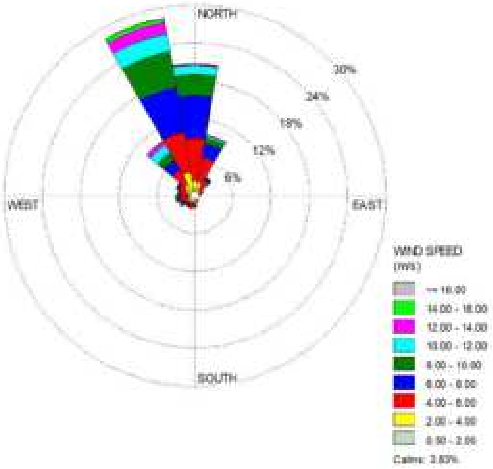
February



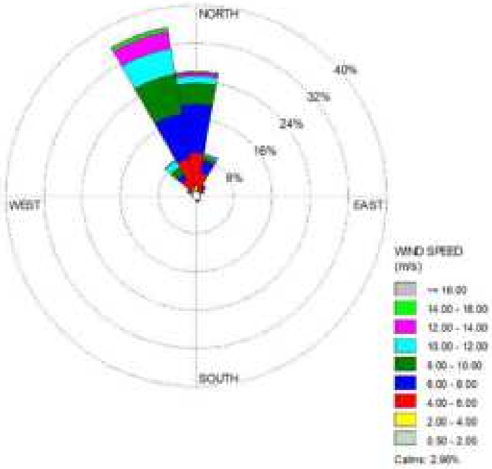
March



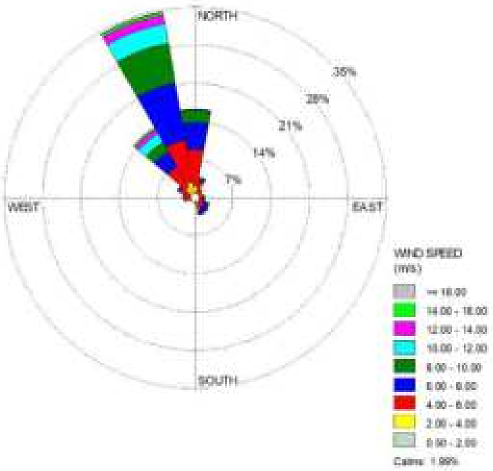
April



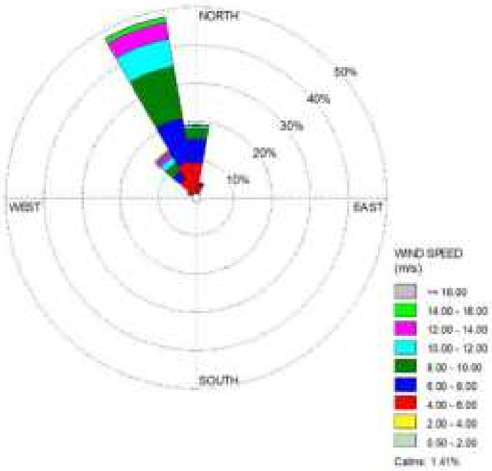
May



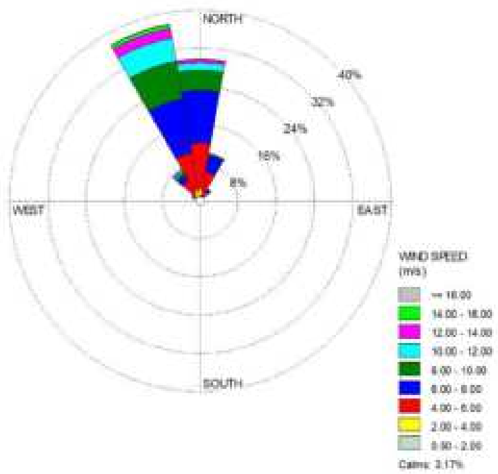
June



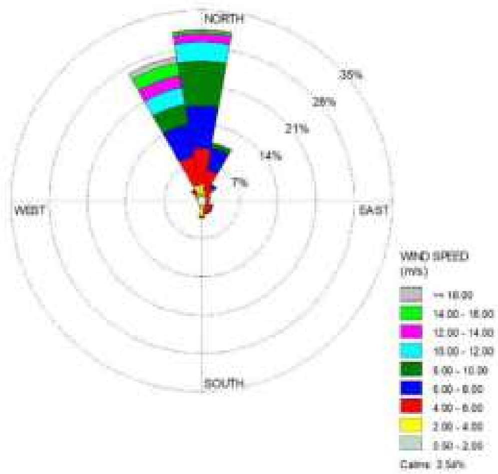
July



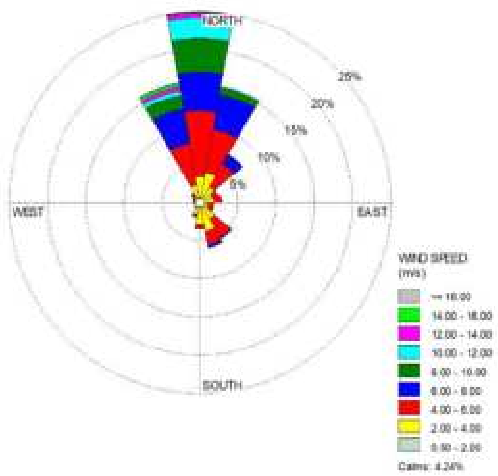
August



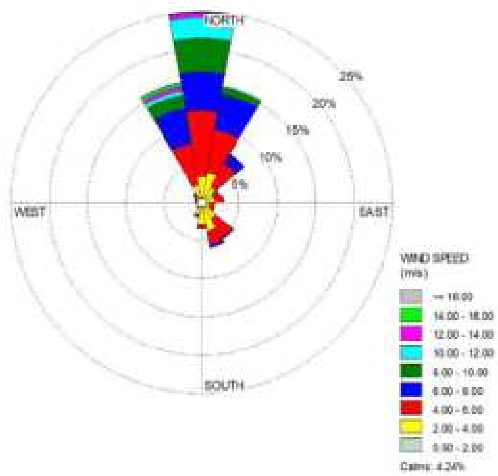
September



October



November



December

Source: Lakes Environmental (2017-2022) https://www.weblakes.com/services/met_data.html

Figure 5-9: Monthly Windrose for the RDMS

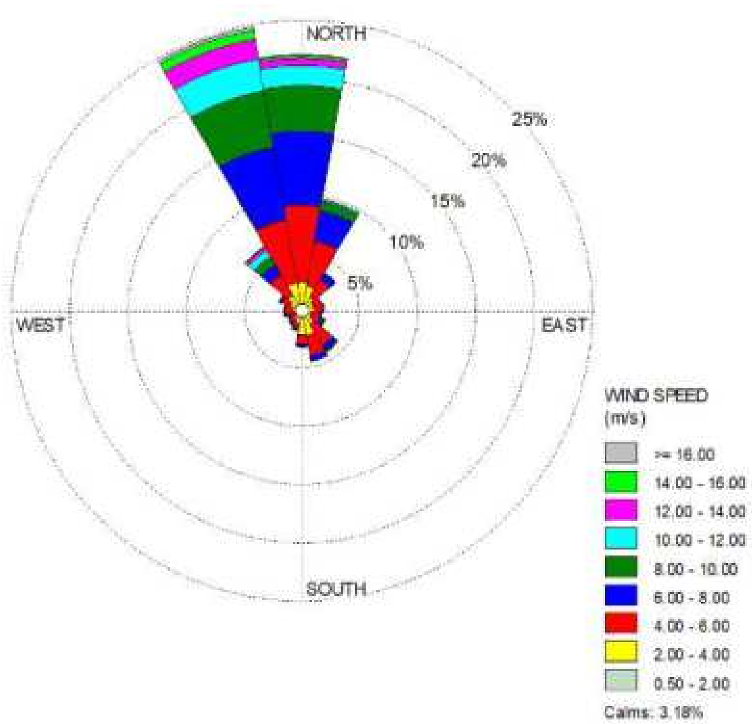


Figure 5-10: Annual Windrose for RDMS

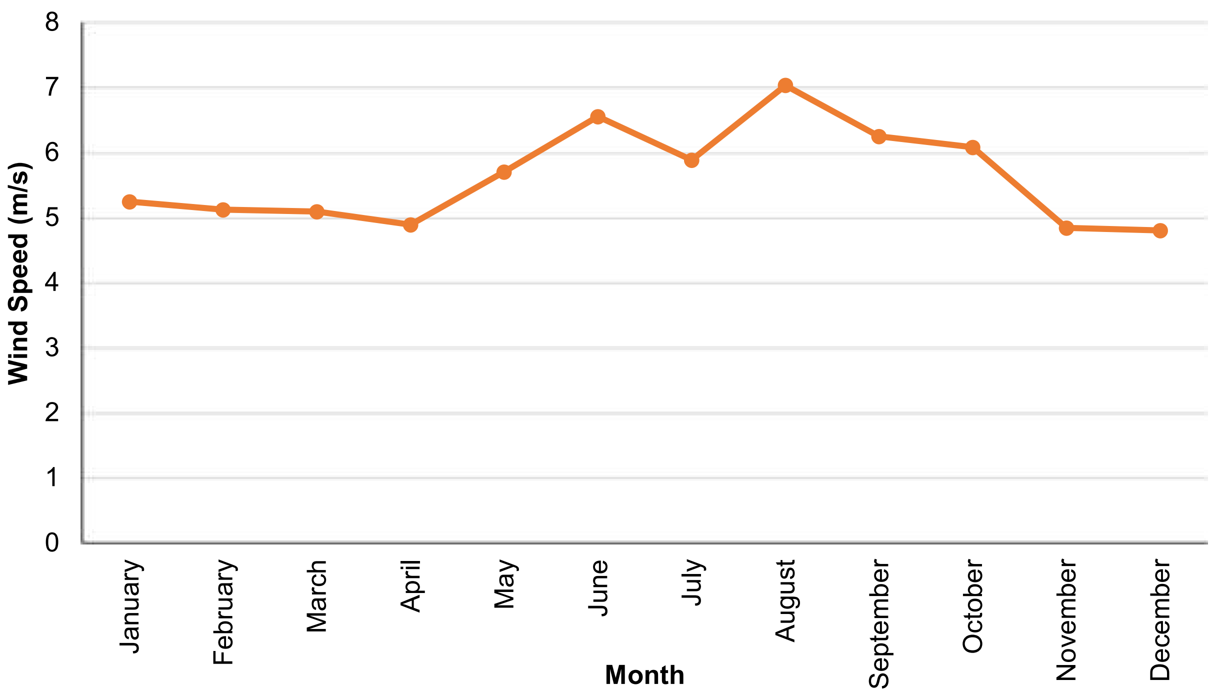


Figure 5-11: Mean Monthly Wind Speed (m/s) at the RDMS

5.5. Socio-Economic Baseline

A Socio-economic Baseline Assessment was conducted as part of this ESIA process; the detailed report is provided in Appendix B. Information on the prevailing socio-economic conditions within the settlements in the region of the RDMS, Northern Groundwater System, along the Rail Transport Route and near Port Qasim was collected through field surveys in 2022 and 2023 including household-level surveys, settlement-level surveys, and Focus Group Discussions (FGDs). Data from secondary sources was also utilised, where required, to strengthen the assessment and evaluate trends in socio-economic conditions.

The Socio-economic Study Area (Figure 5-12) considered local communities, which may be impacted positively or negatively by the Project's activities and covers 13 districts of Balochistan and seven districts of Sindh Province (Figure 5-13). The surveyed and consulted settlements were grouped according to the following Project facilities:

- **RDMS and associated infrastructure** including settlements near the Northern Groundwater System and Nok Kundi and Dalbandin, which are located within the Balochistan Province. The nearest settlement to the RDMS is Humai, which is approximately 20 km to the east, and all others are beyond 35 km away.
- **Rail Transport Route including Port Qasim**, with the railway track between Nok Kundi and Dera Murad Jamali lies within Balochistan, and from Jacobabad to Port Qasim in Sindh.

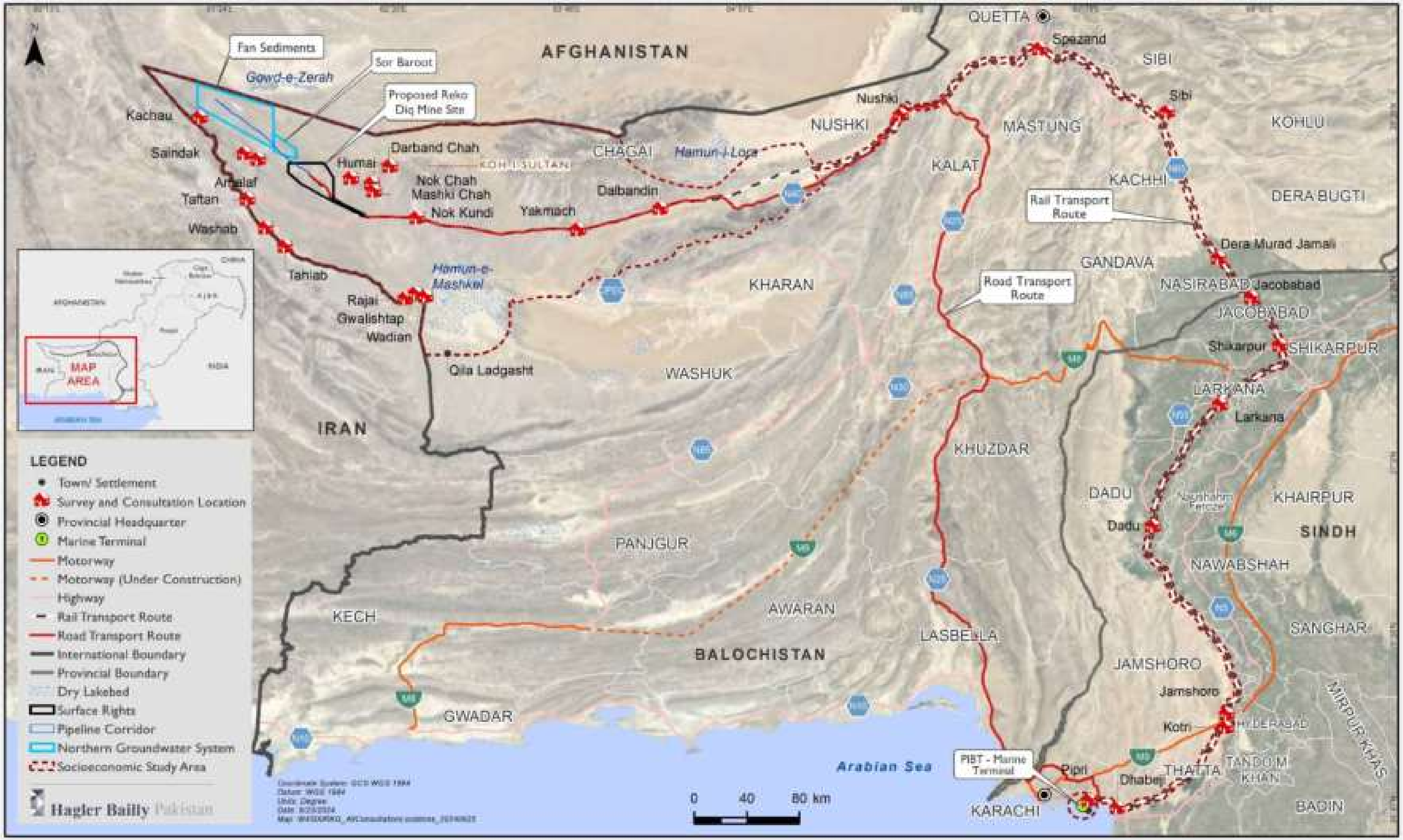


Figure 5-12: Overview of Socio-economic Study Area

Figure 5-13: Key Districts of Balochistan and Sindh Relevant to Project Activities

A total of 28 settlements were surveyed during the Study, of which 15 settlements were surveyed and consulted in the 2022 and 13 settlements were surveyed and consulted in 2023 (Table 5-7).

Table 5-7: Surveyed Settlements in 2022 and 2023

Location	Surveyed Settlements		Type of Survey
	Number	Name	
2022 Survey			
RDMS	15	Balochistan – Humai, Nok Chah, Mashki Chah, Darband Chah, – Kachau, Saindak, Amalaf, Taftan, Tahlab, Washab, Rajai, Wadian, Gwalishtap, Nok Kundi, Dalbandin	Settlement and household level surveys
2023 Survey			
Rail Transport Route and Port Qasim	13	Balochistan – Yakmach, Nushki, Spezand, Sibi, Dera Murad Jamali Sindh – Kotri, Jamshoro, Larkana, Jacobabad, Dadu, Shikarpur, Pipri, Dhabeji	Settlement-level surveys
Total	*28*		

The percentage of households included in the surveys ranged between 10% and 30% of the total households in each community, with households selected using a convenience sampling technique. Interviews were also conducted with key informants to gather information on each settlement's social and economic circumstances, with a focus on social and physical infrastructure and livelihoods. Settlement level information was obtained in discussion with groups of four to five community members including, but not limited to, the following:

- Union Council (local government) heads;
- Notables of the local community;
- Educated Persons (men and women);

- School Teachers;
- Businessmen; and
- Shopkeepers.

The following limitations were encountered as part of this Study:

- Security risks were identified along the settlements in Port Qasim and the Rail Transport Route during the 2023 survey, consequently only a settlement level survey was conducted in these settlements.
- Surveys were conducted at locations in and around other Water NOC areas in addition to those near the Fan Sediments NOC (Northern Groundwater System). While the Project is not intending to extract groundwater from these other NOC areas, these areas were surveyed under the precautionary principle, to account for other projects that may exist in the future and to inform the Project's alternative water abstraction options.

5.5.1. Balochistan Province

A brief history of the province is provided to give essential context to understanding the current governance dynamics. Balochistan declared independence after the British ceded control in 1947, however in 1948 Balochistan was acceded into Pakistan after the Pakistan Army moved into areas of the Balochistan coastal regions.

Post-independence, Balochistan was governed through a combination of tribal leaders and appointed civil officers and in 2001 the administrative system was restructured creating elected governments at the district level and allowing devolved administrative, financial, and legal powers to the district administrations.

The provincial government of Balochistan is elected by the people, and thus, it is a democratic representation of the local population and is intended to reflect the interests of the majority. While Balochistan has its provincial assembly and some degree of legislative power, many key decisions are still influenced by the federal government, particularly in areas like natural resource management.

Balochistan is the poorest and most underdeveloped province in Pakistan. It has low literacy rates, inadequate health facilities, insufficient civic amenities, poor industrial infrastructure, and low per capita income compared to other provinces of Pakistan.

Balochistan is predominantly inhabited by Baloch people (55% according to the 2023 Population Census), with other significant ethnic groups include the Pashtuns (30%) and smaller groups such as Sindhi, Punjabi, Seraiki, and Urdu speakers.

Balochistan is the largest province in terms of geographic area, constituting approximately 43% of the total land area of Pakistan with:

- **Population:** 14.8 million according to the 2023 Census;
- According to the 2023 Census, 52.1% of the population was male while 47.9% was female.
- Age Profile: According to the 2023 Census, 2.3% of the population was under the age of 1, 19.6% was under the age of 5, 36.2% was under the age of 10, 49.7% was under the age of 15, 40.3% was in the age range of 18-60, and 3.4% was above the age of 60.
- **Health Facilities**: Balochistan has 27 District Headquarter Hospitals (DHQs), 10 Tehsil Headquarter Hospitals (THQs), four Teaching Hospitals, 82 Rural Health Centres (RHCs), along with 549 Basic Health Units (BHUs); and
- **Literacy**: According to the 2017 Census, the literacy rate of Balochistan was 43.5%.[12]

Table 5-8 provides the estimated population of the 13 Districts relevant to the Project activities according to the censuses of 1998, 2017, and 2023. National census surveys do not assess population migration patterns, only population growth. However, population changes in Chagai are generally in line with regional and national trends.

5.5.2. Sindh Province

Sindh is the third-largest province in the country in terms of geographic area, and the second-largest province in terms of population size. Sindh has seven divisions, 30 districts, and 138 tehsils, with:

- **Population**: According to the 2023 Census, the population of Sindh was 55,696,147 (2023);
- Sex Ratio: According to the 2023 Census, 52.1% of the population was male while 47.9% was female.

[12] Although the 2023 Census covered regions of Balochistan in terms of population density, this census lacked coverage of literacy rates of Balochistan due to which, literacy rate of 2017 census is reported.

- Age Profile: According to the 2023 Census, 2.1% of the population was under the age of 1, 15.7% was under the age of 5, 29.9% was under the age of 10, 41.8% was under the age of 15, 47.6% was in the age range of 18-60, and 4.9% was above the age of 60.
- **Health Facilities**: Sindh has 14 DHQs, 49 THQs, 125 RHCs, and 757 BHUs; and
- **Literacy**: According to the 2023 Census, the literacy rate of Sindh was 54.57%.

Table 5-9 provides the estimated population of the seven Districts relevant to the Project activities in the province, according to the censuses of 1998, 2017, and 2023.

Table 5-8: Estimated Population of Project Related Districts - Balochistan

District	1998 Census		2017 Census		Proportion in Balochistan's Population (2017)	2023 Census		Proportion of Balochistan's Population (2023)
	000' Population	Population Density (persons per km^2)	Population (,000)	Population Density (persons per km^2)		Population (,000)	Population Density (persons per km^2)	
Chagai	203	4	226	6.	1.8%	269	5	1.8%
Kharan and Washuk	207	4	338	5	2.7%	562	7	3.8%
Kech	413	18	909	40	7.4%	1,060	48	7.1%
Sibi	579	23	964	31	7.8%	224	29	1.5%
Mustang	150	28	266	80	2.2%	313	53	2.1%
Nasirabad	1,044	73	1,661	100	13%	563	212	3.8%
Nushki	98	17	178	31	1.4%	207	36	1.4%
Quetta	774	225	2,269	658	18%	2,595	978	17%
Kachhi	288	38	309	41	2.5%	442	59	2.9%
Balochistan Province	**6,566**	**19**	**12,335**	**36**	**5.9% of Pakistan's population**	**6,235**	**43**	**6.1% of Pakistan's population**

Source: 1998 Census 2017 Census 2023 Census

Table 5-9: Estimated Population of Project Related Districts - Sindh

District	1998 Census		2017 Census		Proportion in Sindh's Population (2017)	2023 Census		Proportion of Sindh's Population (2023
	000' Population	Population Density (persons per km2)	Population (,000)	Population Density (persons per km2)		Population (,000)	Population Density (persons per km2)	
Karachi	9,856	2,794	16,025	4544	33%	20,382	5,390	36%
Jamshoro13	-	-	993	89	2%	1,117	100	2.0%
Larkana	4,210	250	6,191	407	13%	1,784	916	3.2%
Jacobabad	727	138	1,007	373	2.1%	1,174	435	2.1%
Dadu	1,106	58	1,550	197	3.2%	1,742	222	3.3%
Thatta	599	35	982	115	2.1%	1,083	127	1.9%
Shikarpur	880	350	1,234	491	2.6%	1,386	552	2.5%
Sindh Province	**30,400**	**216**	**47,800**	**340**	**23% of Pakistan's population**	**55,696**	**395**	**24% of Pakistan's population**

[13] Jamshoro declared as a district in 2004, so the 1998 Census data is not available.

5.5.3. Reko Diq Mine Site and Associated Infrastructure

The RDMS and associated infrastructure are located in the Balochistan province; a summary of the communities surveyed in 2022 can be found in Table 5-10 with photos of the respective settlements included in Figure 5-14.

Table 5-10: Data Summary and Results – RDMS Study Area (2022 Survey)

Location	Estimated Number of HHs	Estimated Population	Number of Surveyed HHs	Surveyed Population	Average Household Size in Surveyed Population
Humai	115	900	34	271	8.0
Mashki Chah	21	160	6	44	7.3
Nok Chah	14	100	4	27	6.8
Darband Chah	200	1,550	59	415	7.0
Amalaf	125	950	32	*221*	6.9
Saindak	75	570	21	*149*	7.1
Kachau	70	530	21	135	6.4
Taftan	570	4,500	53	335	6.3
Tahlab	150	1,150	47	340	7.2
Washab	60	450	18	142	7.9
Gwalishtap	50	360	16	115	7.2
Rajai	55	390	17	119	7.0
Wadian	20	150	8	52	6.5

Location	Estimated Number of HHs	Estimated Population	Number of Surveyed HHs	Surveyed Population	Average Household Size in Surveyed Population
Nok Kundi	2,000	15,000	50	350	7.0
Dalbandin	1,000	7,200	50	308	6.2
Total	4,525	33,960	436	3,023	6.9


Nok Chah Settlement


Humai Settlement


Darband Chah Settlement


Mashki Chah Settlement


Amalaf Settlement


Kachau Settlement


Tahlab Settlement


Taftan Settlement

Wadian Settlement

Rajai Settlement

Amalaf Settlement

Kachau Settlement

Tahlab Settlement

Taftan Settlement

Wadian Settlement (Patangaz and Hamun-i-Mashkel)

Rajai Settlement (Patangaz and Hamun-i-Mashkel)

Figure 5-14: Surveyed Settlements – RDMS Study Area (2022 Survey)

5.5.3.1. Demographics and Ethnicity

The surveyed settlements in the RDMS area are in a mostly rural and isolated socio-economic setting, with mostly Kutcha (constructed with mud and wood) housing structures, although some Semi-Pucca and Pucca structures were present in larger settlements such as Taftan, Saindak, Nok Kundi, and Dalbandin.

The average household size for the 15 settlements surveyed was 6.9 and varied between 6.2 to 8.0 (for the purpose of this ESIA, a household is considered either single-person or a multi-person where members can be related or unrelated, often share common resources, such as living space, meals, and finances and have no place of residence elsewhere).

The socio-economic surveys also gathered information on ethnicity and how communities self-identified into groups called 'Castes' and 'Tribes' (terms used interchangeably, as there is no nationally recognised definition for these terminologies), where Tribe informally refers to group of people who trace their descent through the male bloodline from a supposedly common tribal ancestor (Khan et al., 2021) and Caste informally refers to a hierarchical system of hereditary and endogamous social groups, often referred to as zats or quoms (Usman, 2017).

According to the 2017 census, the people of Balochistan were divided into three main ethnic groups, i.e. Baloch, Brahui, and Pashtuns and these were further divided into 27 major tribes. The data collected indicates that Syed (13.3%) was the most dominant tribe, followed by Muhammad Zai (12.9%), and Muhammad Hassani (10.8%).

The entirety of the surveyed population in the settlements in the RDMS study area identified as Sunni Muslims and the dominant languages spoken are Balochi and Brahui.

Men were typically considered the head of household with limited female input to decision making. Figure 5-15 indicates the contribution of males and females to different decision-making responsibilities within a household.

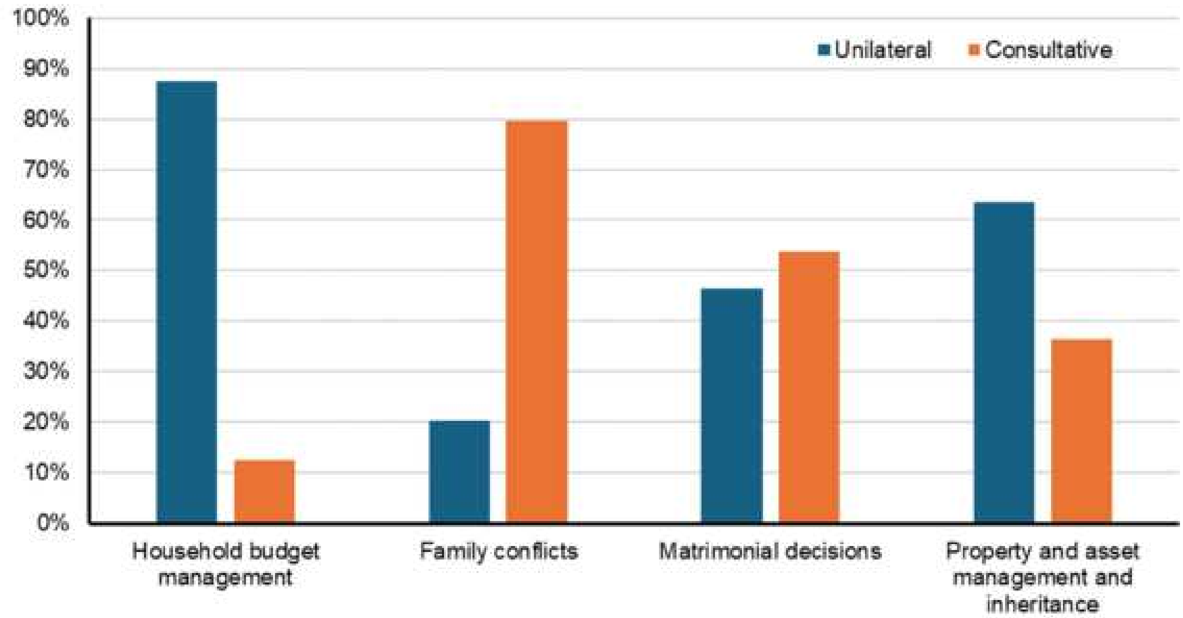


Figure 5-15: Decision Making – RDMS Study Area (2022 Survey)

5.5.3.2. Employment and Income

A substantial portion of working-age people in the settlements in the RDMS study area, were unemployed, with 26% of men and 42% of women being out of work (Table 5-11) (Trading Economics, 2024). These unemployment rates were much higher than the national rates which were reported as 5.1% and 7.7% for males and females respectively and the 9.13% unemployment rate reported for Balochistan

Table 5-11: Employment Numbers – RDMS Study Area (2022 Survey)

Surveyed Population	Male	Female
Employed Population	784	172
Unemployed Population	800	1267
Total Population	**1,584**	**1,439**

The occupation profiles of employed survey participants are shown in Table 5-12. The primary sources of income in these areas were cross-border trading, livestock rearing, and labour (both skilled and unskilled). A smaller proportion of the population was engaged in self-owned businesses or employed in private and public sector jobs. In some settlements such as Amalaf, Saindak, and Kachau, agriculture also contributed to the local economy, with farming activities supported by groundwater irrigation and spring water (Karez). However, agricultural activities were generally limited in other settlements due to the scarcity of exploitable water resources.

During the 2022 Survey, it was also reported that employment in nearby mines and quarries, including marble, iron, and pumice mining projects, had increased, which in turn had increased the incomes for those involved. Households were predominantly involved in cross-border trade of textiles, agriculture produce, livestock, and other related goods across the Afghan and Iranian borders.

Working women in these settlements were primarily involved in livestock rearing and labour work in small mining projects, such as those near the Darband Chah settlement. In settlements along the Rail Transport Route, the male unemployment rates within the working age group was reported as 32% while the female unemployment rate within the working age group was reported as high as 90%.

Table 5-12: Occupational Profiles of Employed Survey Participants – RDMS Study Area (2022 Survey)

Livelihood Sector	Male	Female	Total	Percentage
Employed in government Sector	37	8	45	5%
Employed in private Sector	74	9	83	9%
Income generating farming	47	10	57	6%
Self-employed, livestock rearing	233	113	346	36%
Self–Owned trade and business	151	5	156	16%

Livelihood Sector	Male	Female	Total	Percentage
Self–employed, working as artisans	8	0	8	1%
Working as labour (Construction) sites	54	0	54	6%
Working as labour (Mining) sites	44	11	55	6%
Working as labour (Quarrying) sites	0	0	0	0%
Working as skill and un skill labour	136	16	152	16%
Total	**784**	**172**	**956**	100%
Gender % Survey Participants	**82%**	**18%**	**100%**	

Average monthly household income for all the communities surveyed in the RDMS study area was PKR 30,219 (~US$ 108) where a notable proportion of households (up to 40% in some communities) were below the national poverty line.

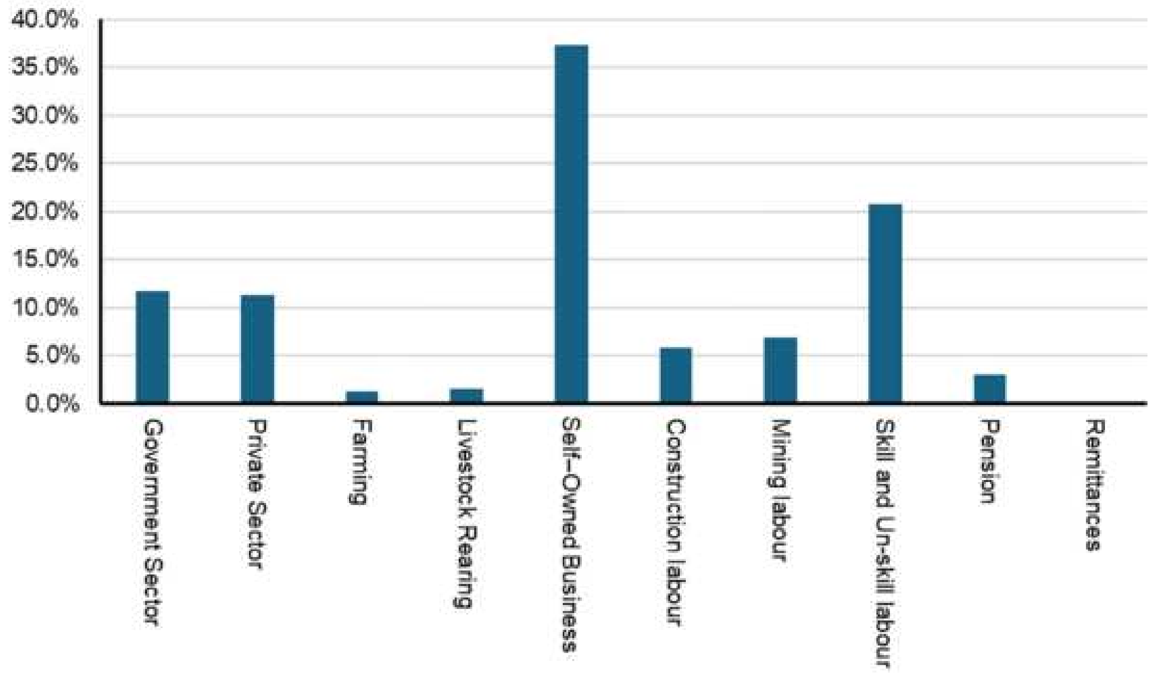


Figure 5-16: Average Monthly Income Sources – RDMS Study Area (2022 Survey)

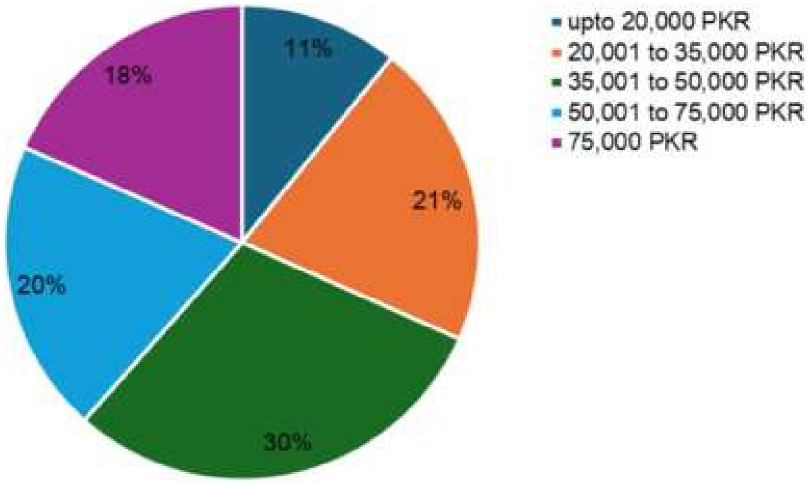


Figure 5-17: Distribution of Monthly Household Income – RDMS Study Area (2022 Survey)

5.5.3.3. Vulnerability

5.5.3.3.1. Poverty

The distribution of average income per month for each of the settlements is tabulated in Table 5-13. A significant proportion of surveyed households exist below the Pakistan defined poverty line of PKR 3,030 per person per month.

This prevalence of poverty is largely attributed to the dearth of employment opportunities and other economic activities available to residents as well as a lack of natural resources. Consequently, many individuals and families struggle to secure stable sources of income, perpetuating the cycle of poverty within the community. The majority of surveyed households were found to be spending over two-thirds of their income on food and cooking fuel.

Table 5-13: Income Level Above and Below Poverty Line – RDMS Study Area (2022 Survey)

Settlements	Income Level PKR/Person/Month			
	Up to 3,030	3,030 to 5,000	5,001 to 10,000	10,001 and above
Humai	11	22	1	0
Mashki Chah	1	3	2	0
Nok Chah	3	1	0	0
Darband Chah	26	27	6	0
Amalaf	23	6	3	0
Saindak	6	8	5	2
Kachau	15	5	1	0

Settlements	Income Level PKR/Person/Month			
	Up to 3,030	3,030 to 5,000	5,001 to 10,000	10,001 and above
Taftan	6	12	34	1
Tahlab	23	19	5	0
Washab	10	8	0	0
Gwalishtap	1	5	10	0
Rajai	4	5	7	1
Wadian	2	3	3	0
Nok Kundi	6	18	19	7
Dalbandin	3	19	21	7
Total	**140**	**161**	**117**	**18**
Percentage	**32%**	**25%**	**27%**	**4%**

5.5.3.3.2. Women

Women in the surveyed settlements in the RDMS study area had limited opportunities to work and were often confined to their houses and settlements, with minimum contribution to the household income. Most of the women were either involved in housekeeping or livestock rearing or both, with only a few involved in traditional embroidery and handicraft work. Women in the surveyed settlements in the RDMS survey area are considered economically vulnerable due to lower educational levels and restricted mobility outside of their settlements.

5.5.3.3.3. Disability Status

According to the 2022 Survey and 2023 Survey, a total of 48 people (0.1% of the total surveyed population) were categorised as having mental or physical disabilities. Most of the reported disabilities were physical, often caused by road accidents, or congenital conditions. Mental disabilities were largely unrecognised due to stigmatisation, but a few cases related to drug abuse were reported. Most people with disabilities are cared for by their immediate family members.

5.5.3.3.4. Elderly or Women-Headed Families

None of the surveyed households were headed by women. Five percent of the surveyed households were headed by elderly men of age 60-years or above. Due to factors such as poverty and large family sizes, some elderly people were reported to be working as labourers or in private jobs, such as watchmen and security guards. However, most elderly individuals are cared for by their immediate family members. Familial support systems are also extended to widows, who are often taken care of by their immediate family or blood relatives.

5.5.3.3.5. Agriculture (Livestock and Cultivated Areas)

Agricultural practices exhibited considerable diversity among the surveyed settlements. In settlements nearer the RDMS itself, there was no involvement in agriculture due to lack of water availability, although a small amount of palm trees was grown in Humai and Mashki Chah for self-consumption, irrigated by dug wells. The communities report that the proposed mine area is of little value for livestock grazing. Settlements like Kachau, Tahlab, Washab, and Taftan, however, were engaged in agriculture, cultivating wheat, maize, and fodder, with some growing vegetables and palm trees. Groundwater and spring water were used for irrigation in these areas.

Goats, camels, and chickens were the predominant form of livestock which grazed in the nearby settlements. During the field survey, it was observed that settlements further from the mine area, such as Kachau, Amalaf, and Rajai, keep their livestock in sheds located close to their residences. In the summer, the livestock are fed fresh fodder that grows during the rainy season, while in the winter, residents gather dry grass from nearby fields to sustain them. Camels are typically allowed to roam across the region. These animals are marked with special characters, such as numbers or symbols, for easy identification. Figure 5-18 shows photographs of livestock examples.

The project's land use around the RDMS is expected to have a negligible impact on ecosystem services, as the area consists mainly of dry streambeds, gravel plains, and sandy dunes, with no agricultural activity and human habitation.

Livestock near Humai Settlement


Livestock near Tahlab Settlement

Figure 5-18: Livestock observed at settlements in the study area during the 2022 Survey

Table 5-14 presents the details of cultivated land available and crops grown in the Study Area with photographs of the agricultural land, palm trees and water sources provided in Figure 5-19.

Table 5-14: Cultivated Areas – RDMS Study Area (2022 Survey)

Settlement	Cultivated Land (Kanal*)	Crops Grown	Wheat	Maize	Rice	Vegetable	Fodder	Date Palms
Humai	0	No	No	No	No	No	No	No
Mashki Chah	0	No	No	No	No	No	No	No
Nok Chah	0	No	No	No	No	No	No	No
Darband Chah	0	No	No	No	No	No	No	No
Amalaf	0	No	No	No	No	No	No	No
Saindak	0	No	No	No	No	No	No	No
Kachau	20	Yes	Yes	No	No	Yes	Yes	No
Taftan	20	Yes	Yes	Yes	No	Yes	Yes	No
Tahlab	40	Yes	Yes	Yes	No	Yes	Yes	Yes
Washab	40	Yes	Yes	Yes	No	Yes	Yes	Yes
Gwalishtap	0	No	No	No	No	No	No	No
Rajai	0	No	No	No	No	No	No	No
Wadian	0	No	No	No	No	No	No	No
Nok Kundi	0	No	No	No	No	No	No	No
Dalbandin	100	No	No	No	No	Yes	Yes	No

Note: One Kanal is equal to 0.051 ha

Dug Well for irrigation of palm trees at Humai Settlement

Palm trees near Humai Settlement

Cultivated land near Tahlab Settlement

Cultivated land near Kachau Settlement

Figure 5-19: Palm Trees and Water Sources – RDMS Study Area (2022 Survey)

5.5.3.4. Physical Infrastructure

Connections to main towns and cities in the area are facilitated by the national highway N-40, with roads to smaller communities typically being unsealed and in poor condition. Photographs of road condition examples are provided in Figure 5-20.

Un-sealed Road near Humai Settlement

Sealed Road (N 40)

Figure 5-20: Road Conditions – RDMS Study Area (2022 Survey)

Electricity is sourced either by connection to a local electrical grid or single or small solar panel arrays with heating and fuel sources for cooking mostly locally gathered wood and shrubs or

LPG gas purchased from the local markets. Table 5-15 provides the distribution of households using electricity and LPG in the surveyed settlements.

Access to grid electricity is dependent on the location of the settlement, with those households closer to Saindak mine or in larger towns such as Nok Kundi or Dalbandin able to access mains electricity. The use of solar panels in smaller communities is fairly widespread. Households often struggle to afford LPG and are therefore reliant on limited locally available wood and shrubs for cooking and heating sources.

Table 5-15: Electricity and Fuel Sources – RDMS Study Area (2022 Survey)

RDMS	Households using Electricity from Grid (%)	Households using Solar panels (%)	Households using Fuel wood and shrub from Rangeland (%)	Households using Fuel wood from Market (%)	Households using LPG (%)
Humai	0	100	80	12	8
Mashki Chah	0	100	65	15	20
Nok Chah	0	100	75	10	15
Darband Chah	0	100	90	0	10
Amalaf	100	0	40	0	60
Saindak	100	0	40	0	60
Kachau	0	100	100	0	0
Taftan	100	0	20	15	65
Tahlab	100	0	97	0	3
Washab	100	0	100	0	0
Gwalishtap	0	100	98	0	2
Rajai	0	100	97	0	3
Wadian	0	100	98	0	2
Nok Kundi	100	0	10	0	0
Dalbandin	100	0	0	0	0

Water scarcity was a significant issue in many communities with supplies limited to groundwater through dug wells with water being manually carried to homes. During the 2022 and 2023 Surveys, communities also raised concerns about the poor water quality, predominantly due to high salinity. Traditional wells were also vulnerable to contamination from human and other animal waste. Municipal Water Supply was only available in larger towns such as Nok Kundi and Dalbandin.

RDMC through their community development program have since installed potable water treatment plants in Humai, Mashki Chah and Nok Chah villages, with additional treatment plants planned for installation in the coming months.

5.5.3.5. Social Infrastructure

5.5.3.5.1. Health

Flu and fever were the most common diseases reported in the Socio-economic Study Area with no disease reported as an epidemic. Less common reported illnesses included dysentery, malaria, chickenpox, diarrhoea, jaundice, stomach and kidney problems, and high blood pressure.

At the time of the surveys, most of the settlements in the RDMS study area did not have basic health facilities within the settlements. The nearest health facility was a RHC was 67 km away in Nok Kundi. A health centre was located at Saindak Copper Mining Project and a BHU at Rajai settlement.

Primary healthcare facilities such as BHUs, RHCs, and DHQs were only available in the main towns and cities which included DHQ Dalbandin, BHU Yakmach, BHU Hoshab, BHU Kalatuk, RHC Nag, and a Teaching Hospital in Turbat.

RDMC, in partnership with the Indus Hospital and Health Network (IHHN), has embarked on delivering healthcare services across district Chagai to enhance access to healthcare services and improve the quality of life through timely provision of free healthcare services and preventive care education programs. Community health centres have been established Humai and Nok Kundi and a Mobile Health Unit has also been established to provide services to some of the smaller settlements.

Currently these health facilities are providing primary healthcare services including general medical care, maternal, neonatal and child health, and sexual and reproductive health services as well as laboratory services. In Nok Kundi, 24/7 emergency and midwifery services are also available to minimise improve accidental and maternal morbidity and mortality outcomes. In addition to the curative services, IHHN is also focusing on preventive care through its regular community education program to improve the knowledge, attitudes and practices of the communities.

Figure 5-21 provides photographs of health facilities. Table 5-16 shows the health facilities and distance (km) from the surveyed settlements in the RDMS study area as of 2022 with a map of the current available health facilities including the newly established health centre in Humai in Figure 5-22.

Rural Health Centre in Nok Kundi

Health Facility in Dalbandin

First Community Health Centre in Humai - 2023

Basic Health Unit (BHU) Taftan

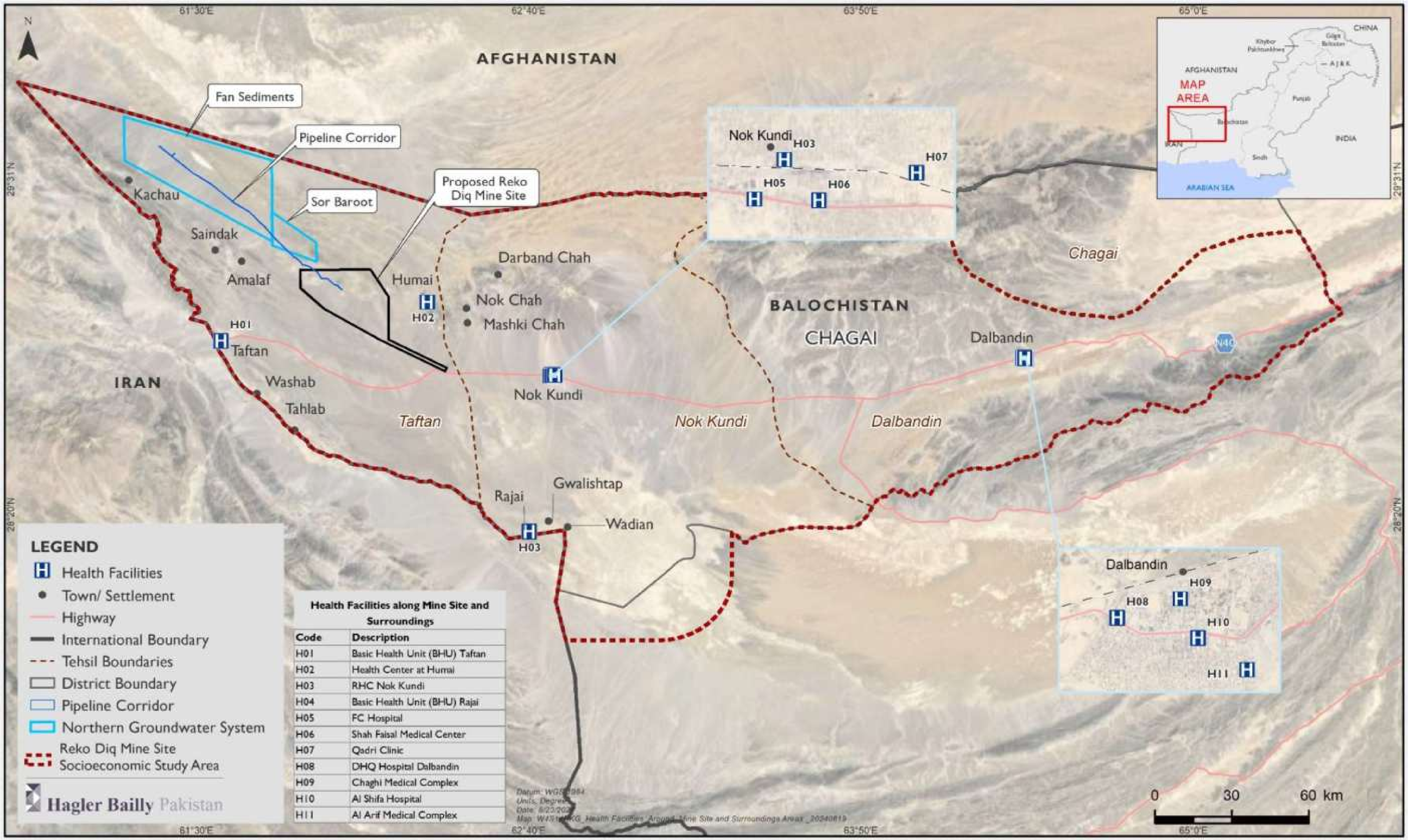
Basic Health Unit (BHU) Rajai

Figure 5-21: Health Facilities – RDMS Study Area (2022 Survey)

Table 5-16: Accessible Health Facilities – RDMS Study Area (2022 Survey and 2023 Survey)

Note that since the survey health facilities have been constructed in Humai and mobile health services made available to Mashki Chah, Nok Chah and Darband Chah.

Community	Facility	Type	Distance (km)	Location	Facility	Type	Distance (km)	Location	Facility	Type	Distance (km)	Location
Humai	Dispensary	Private	85	Nok Kundi	RHC	Public	85	Nok Kundi	DHQ	Public	270	Dalbandin
Mashki Chah	Dispensary	Private	50	Nok Kundi	RHC	Public	50	Nok Kundi	DHQ	Public	220	Dalbandin
Nok Chah	Dispensary	Private	60	Nok Kundi	RHC	Public	60	Nok Kundi	DHQ	Public	60	Dalbandin
Darband Chah	Dispensary	Private	75	Nok Kundi	RHC	Public	75	Nok Kundi	DHQ	Public	240	Dalbandin
Amalaf	Dispensary	Private	5	Saindak Mine	Health centre	Private	5	Saindak Mine	BHU	Government	35	Taftan
Saindak	Dispensary	Private	7	Saindak Mine	Health centre	Private	7	Saindak Mine	BHU	Government	36	Taftan
Kachau	Dispensary	Private	100	Taftan	BHU	Government	100	Taftan	DHQ	Government	385	Dalbandin
Taftan	Dispensary	Private	0	Taftan	BHU	Government	0	Taftan	DHQ	Government	276	Dalbandin
Tahlab	Dispensary	Private	45	Taftan	BHU	Government	45	Taftan	DHQ	Government	350	Dalbandin
Washab	Dispensary	Private	40	Taftan	BHU	Government	40	Taftan	DHQ	Government	350	Dalbandin
Gwalishtap	Dispensary	Government	8	Rajai	BHU	Government	8	Rajai	RHC	Government	60	Nok Kundi
Rajai	Dispensary	Government	0	Rajai	BHU	Government	0	Rajai	RHC	Government	55	Nok Kundi
Wadian	Dispensary	Government	15	Rajai	BHU	Government	15	Rajai	RHC	Government	65	Nok Kundi
Nok Kundi	RHC	Public	0	Nok Kundi	DHQ	Public	160	Dalbandin				
Dalbandin	DHQ	Public	0	Dalbandin								



Health Facilities along Mine Site and Surroundings

Code	Description
H01	Basic Health Unit (BHU) Taftan
H02	Health Center at Humai
H03	RHC Nok Kundi
H04	Basic Health Unit (BHU) Rajai
H05	FC Hospital
H06	Shah Faisal Medical Center
H07	Qadri Clinic
H08	DHQ Hospital Dalbandin
H09	Chaghi Medical Complex
H10	Al Shifa Hospital
H11	Al Arif Medical Complex

Figure 5-22: Health Facilities – RDMS Study Area (2022 Survey)

5.5.3.5.2. Sanitation

Most of the surveyed settlements had only simple pit latrines with slabs. The sanitation conditions were poor due to limited access to water resources. Some sewage services were available in larger towns such as Nok Kundi and Dalbandin.

5.5.3.5.3. Education and Literacy

Balochistan has the lowest literacy rate among the provinces in Pakistan with a significant gender disparity in literacy, with a much lower literacy rate in the female population.

The literacy rate of RDMS study area is reported to be 33%, lower than the reported literacy rate of Balochistan of 44%.

The literacy rate in the surveyed population varied, but overall was significantly low. Literacy rates including gender distribution of the survey participants in the study area are provided in Table 5-17.

Table 5-17: Literacy Rate – RDMS Study Area (2022 Survey)

Literacy level	Number of Persons		
	Male	**Female**	**Total**
Illiterate	337	467	**804**
Literate	315	77	**392**
Total	**652**	**544**	**1196**
Literacy Ratio %	48%	14%	33%

There were limited education facilities within the communities at the time of the survey, and where facilities exist there is a lack of resources including teachers and teaching materials. RDMC, in partnership the not-for-profit educational service provider Progressive Education Network (PEN) have a clear aim to uplift educational services in District Chagai.

To date, four primary schools have been reestablished in Humai, Durban Chah, Nok Kundi and Nok Chah, with preparations on the way for more in different tehsils (Humai primary school had been closed since 2014).

For secondary and higher secondary education, the nearest schools were available in Nok Kundi and Taftan. Figure 5-23 provides the photographs of some of the available educational facilities with a map showing their geographic location provided in Figure 5-24.

Primary School established at Humai Settlement (established by RDMC)

Primary School established at Mashki Chah (established by RDMC)

Primary School at Kachau Settlement

Primary School at Washab Settlement

Primary School at Rajai Settlement

Primary School at Tahlab Settlement

Figure 5-23: Educational Facilities – RDMS Study Area (2022 Survey)

Figure 5-24: Location of Educational Facilities – RDMS Study Area (2022 Survey)

5.5.4. Rail Transport Route including Port Qasim

A total of 13 settlements were surveyed along the Rail Transport Route in 2023, including Yakmach, Kotri, Jamshoro, Dadu, Larkana, Shikarpur, Jacobabad, Dera Murad Jamali, Sibi, Spezand, Pipri and Dhabeji. These settlements had both rural and urban settings, featuring Kutcha (constructed with mud and wood), Semi Pucca (constructed with bricks and wood) and Pucca (constructed with concrete and bricks) housing structures.

A summary of the data collected is provided in Table 5-18 with photos of some of the settlements included in Figure 5-25.

Table 5-18: Data Summary and Results – Rail Transport Route (2023 Survey)

Settlements	Estimated Number of Households	Estimated Population	Average Household Size
Yakmach	2,000	14,000	7.5
Noshki	5,000	35,000	7.0
Pipri	3,500	22,000	7.0
Kotri	8,000	47,000	6.3
Jamshoro	500	4,000	5.9
Larkana	250	2,000	8.0
Jacobabad	64,000	350,000	8.0
Sibi	10,000	68,000	5.5
Dhabe Ji	300	2,000	6.8
Spezand	2,600	10,000	6.7
Dera Murad Jamali	2,500	18,000	3.8
Dadu	8,500	55,000	7.2
Shikarpur	15,000	100,000	6.5
Total	**120,150**	**727,000**	**6.7**

Spezand Settlement

Jacobabad Settlement

Jamshoro Settlement

Larkana Settlement

Pipri Settlement

Dhabeji Settlement

Figure 5-25: Photographs of the Settlements surveyed along the Rail Transport Route (2023 Survey)

5.5.4.1. Demographics and Ethnicity

The socio-economic surveys collected information on ethnicity and how communities self-identified into groups called 'Castes' and 'Tribes'. According to 2023 Survey, Lashari (12%) was the most dominant caste, Jamot (12%) was the second most dominant caste, and Hazara (11%) was the third most dominant caste.

The population in the surveyed settlements along the Rail Transport Route is predominantly Muslim belonging to the Sunni sect. However, Christian, and Hindu communities were also observed in the Kotri, Larkana and, Shikarpur settlements. Sindhi was mostly spoken in Sindh province followed by Siraiki which was typically spoken in Pipri, Kotri, Jamshoro, and Shikarpur.

In Balochistan province, Balochi was the most commonly spoken language followed by Pashto. Urdu was understood universally across Study Area.

5.5.4.2. Decision Making

The local community communicated that they considered men to be the household heads, and women had little input to decisions relating to budget management, matrimonial decisions and property asset management. Consultative decision-making was mostly reserved for family conflicts.

5.5.4.3. Employment and Income

Table 5-19 provides details of the employment numbers in the surveyed settlements. The male unemployment rate within the working age group was reported as 32% while the female unemployment rate within the working age group was reported as 90%. These unemployment rates were much higher when compared to the national rates which are reported as 5.1% and 7.7% for men and women respectively.

Table 5-19: Employment Numbers – Rail Transport Route (2023 Survey)

Surveyed Population	Male	Female
Employed Population	145,250	20,120
Unemployed Population	222,490	339,140
Total Population	367,740	359,260

Table 5-20 provides details of occupation profiles of the employed people in the surveyed settlements along the Rail Transport Route.

Table 5-20: Occupation Profile of the Surveyed Population – Rail Transport Route (2023 Survey)

Livelihood Sectors	Male	%	Female	%
Government Sector	39,548	27	4,167	21
Private Sector	20,732	14	6,547	33
Farming	4,012	3	470	2
Livestock Rearing	22,437	15	1,530	8
Self–Owned Business	21,177	15	6,206	31
Labour	35,842	25	1,200	6
Cottage Industry	1,500	1	0	0
Total	**145,250**	**100**	**20,120**	**100**

The primary sources of income (Figure 5-26) for both men and women were private and public sector jobs, labour work in nearby industries, self-owned businesses, and livestock rearing. Most of the households in the surveyed settlements kept livestock including goats, camels, and chickens. Figure 5-27 illustrates the Average Distribution of Estimated Monthly Household Incomes.

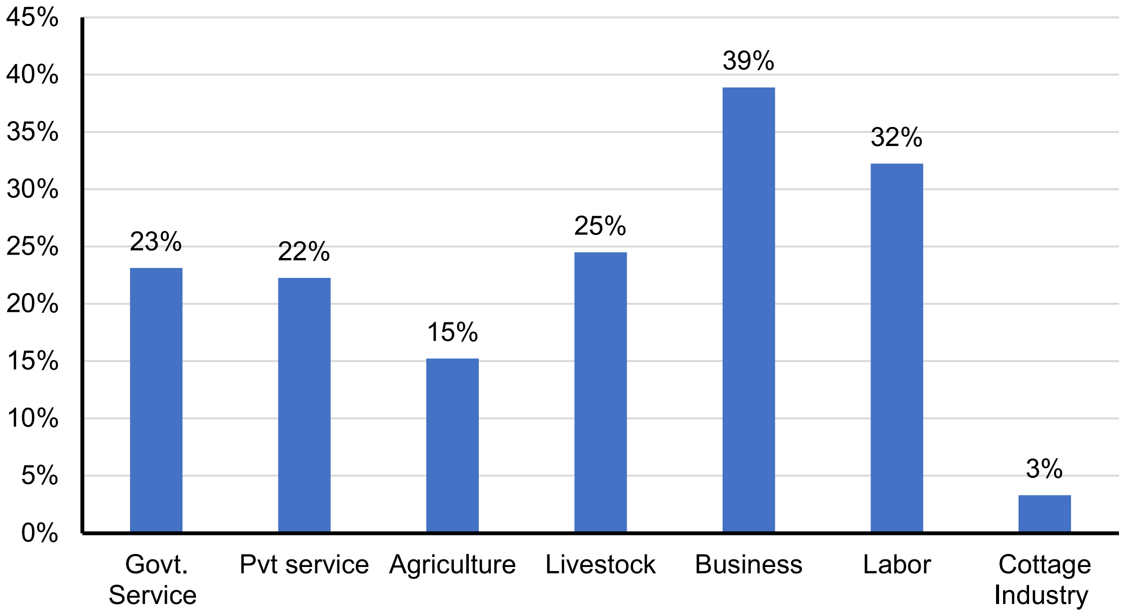


Figure 5-26: Average Monthly Income Sources of the Surveyed Households – Rail Transport Route (2023 Survey)

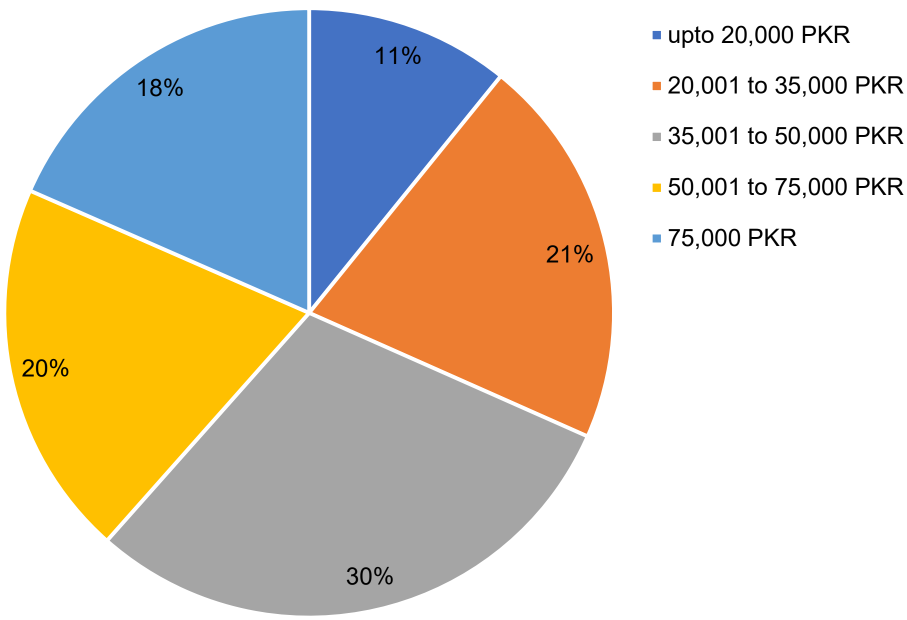


Figure 5-27: Average Distribution of Estimated Monthly Household Income – Rail Transport Route (2023 Survey)

5.5.4.4. Vulnerability

5.5.4.4.1. Poverty

Generally, the populations in the surveyed communities along the railway route were more prosperous than those of the communities in the RDMS study area, with most households living above the poverty line.

5.5.4.4.2. Women

According to the 2023 Survey, local communities reported that women were actively participating in both private and public sector jobs, indicating a lack of restrictions on working outside of the home. Furthermore, women had access to educational facilities, providing opportunities for personal and professional development.

5.5.4.4.3. Disability Status

According to the 2023 Survey, a total of 952 (0.01% of the total surveyed population) people were categorised as having mental and physical disabilities within the surveyed settlements along the Rail Transport Route. Most of the reported disabilities were physical, often caused by road accidents, or congenital conditions. Mental disabilities were largely unrecognised due to stigmatisation. Most people with disabilities are cared for by their immediate family members.

5.5.4.4.4. Elderly or Women-Headed Family

At the time of the 2023 Survey, there were 1,620 (0.02% of the total surveyed population) widows reported within the surveyed settlements along the Rail Transport Route. All were being financially supported by either their brothers or sons.

No families had women as the head of household. Due to factors like poverty and large family sizes, some elderly people were reported to be working as labourers or in private jobs, such as watchmen and security guards. However, most elderly individuals are cared for by their immediate family members.

5.5.4.5. Agriculture (Livestock and Cultivated Area)

The surveyed settlements, Nushki, Dera Murad Jamali, and Larkana had extensive agricultural land, with Dalbandin, Kotri, Jamshoro, Sibi and Dadu having smaller agricultural land parcels where they grew wheat, maize, and vegetables. Water from the Indus River was used for irrigation in settlements close to the river (i.e. between Larkana and Karachi) with all other communities relying on groundwater. Table 5-21 provides details of cultivated land and crops each for each of the surveyed settlements.

Table 5-21: Cultivated Land and Crops– Rail Transport Route (2023 Survey)

Settlements	Cultivated Land (Kanal*)	Crops Grown	Wheat	Maize	Rice	Vegetable	Fodder	Date Palms
Yakmach	0	No	No	No	No	No	No	No
Nushki	9,500	Yes	No	No	Yes	Yes	Yes	No
Jamshoro	20	Yes	Yes	No	Yes	No	No	No
Larkana	700	Yes	Yes	Yes	Yes	Yes	No	No
Jacobabad	0	No	No	No	No	No	Yes	No
Sibi	25	Yes	Yes	No	Yes	Yes	No	No
Kotri	200	No	No	No	Yes	No	No	No
Spezand	0	No	No	No	No	No	Yes	No
Dera Murad Jamali	1,200	Yes	Yes	No	Yes	Yes	No	No
Dadu	450	Yes	Yes	No	Yes	Yes	No	No
Shikarpur	0	No	No	No	No	No	Yes	No
Pipri	0	No	No	No	No	No	No	No
Dhabeji	250	Yes	No	No	Yes	Yes	Yes	No

Note: One Kanal is equal to 0.051 ha

5.5.4.6. Physical Infrastructure

This section provides information collected during the 2023 related to the physical infrastructure. The surveyed settlements along the Rail Transport Route are connected to main cities and towns through the sealed National Highways, N40, N55 and N65, and were also connected to Karachi through the National Highway N5.

The access roads in main towns and cities such as Shikarpur, Larkana, Jacobabad, Dadu, Jamshoro and Sibi were sealed and observed to be in good condition. However, community pathways and access roads within the surveyed settlements were typically unsealed and in poor condition. Photographs of the observed conditions of the road and railway infrastructure in the surveyed settlements are provided in Figure 5-28.

Un-sealed road at Kotri

Railway Track near Dadu

N-55 Highway

Railway Track near Spezand

Figure 5-28: Photographs of the Road Conditions– Rail Transport Route (2023 Survey)

The surveyed settlements along the Rail Transport Route generally had access to electricity and mains gas for domestic use. Most of the households in the Nushki settlement and some households in Yakmach settlement were using LPG for cooking and space heating.

The settlements along the Rail Transport Route also had access to groundwater, which served as the primary source for domestic, livestock, and agricultural purposes. Jacobabad, Sibi, Dera Murad Jamali, Larkana and Pipri settlements had access to public water supply with water treatment plants.

5.5.4.7. Social Infrastructure

5.5.4.7.1. Health

Primary health facilities including BHU, THQ and DHQ were available in the surveyed settlements. Lady Health Visitors/Workers (LHVs and LHWs) provided basic health services and polio vaccinations to households.

The most common illness reported for all age groups of the population was flu/fever. Other reported illnesses included dysentery, malaria, chickenpox, diarrhoea, jaundice, high blood pressure, and stomach and kidney problems. None of the diseases were reported as epidemic. Table 5-22 provides details of the available health facilities, together with the distances of these facilities from the respective settlements with photographs of some of the health facilities presented in Figure 5-29.

Figure 5-30 provides a map showing the geographic location of each of these facilities.

BHU Dhabeji

Basic Health Unit at Yakmach Settlement

Health Facility in Pipri Settlement

General Hospital in Pipri Settlement

Figure 5-29: Photographs of the Health Facility– Rail Transport Route (2023 Survey)

Table 5-22: Available Health Facilities – Rail Transport Route (2023 Survey)

Settlement	Facility	Type	Distance (km)	Location	Facility	Type	Distance (km)	Location
Yakmach	BHU	Public	0	Yakmach	DHQ	Public	57	Dalbandin
Nushki	Dispensary	Government	0	Nushki	DHQ	Government	0	Nushki
Jamshoro	Hospital	Government	3	Jamshoro				
Larkana	Dispensary	Private	0	Larkana	Chandka Hospital	Government	0	Larkana
Jacobabad	Civil Hospital	Government	0	Jacobabad				
Sibi	DHQ	Government	0	Sibi				
Kotri	Hospital	Government	0	Kotri				
Spezand	BHU	Government	0	Spezand	Civil Hospital	Government	40	Quetta
Dera Murad Jamali	Civil Hospital	Government	0	Dera Murad Jamali				
Dadu		Private	0	Dadu	Civil Hospital	Government	0	Dadu
Shikarpur	Civil Hospital	Government	0	Shikarpur				
Pipri	Dispensary	Government	2	Shah Nawaz Goth	Hospital	Government	2	Gulshan Hadeed
Dhabeji	BHU	Government	0	Dhabeji	Civil Hospital	Government	45	Makli

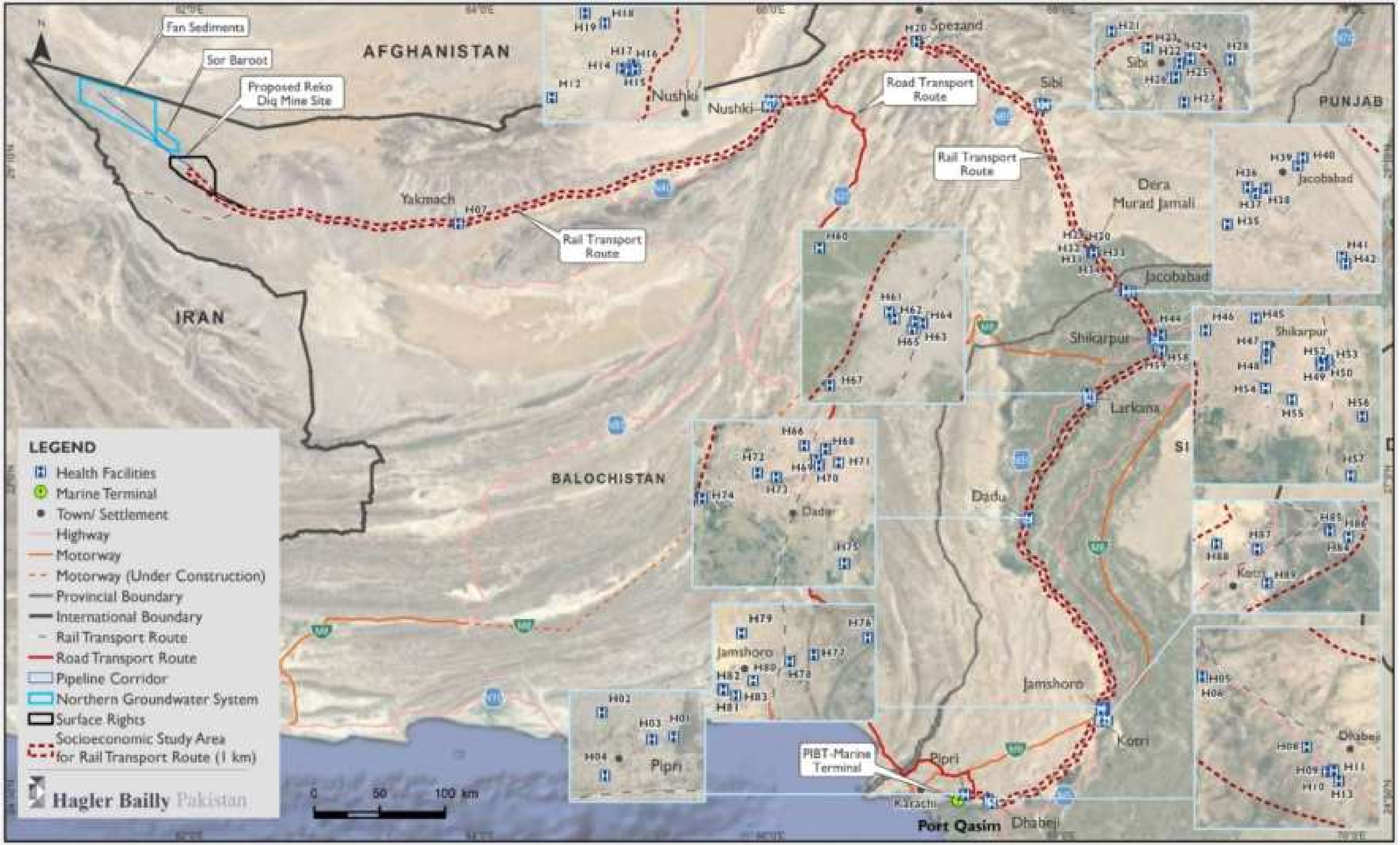


Figure 5-30: Health Facilities – Rail Transport Route (2023 Survey)

5.5.4.8. Sanitation

Most of the settlements used a mixture of pit latrines and pit latrines with slabs. Only larger towns and cities including Jacobabad, Sibi, Dera Murad Jamali, Dadu, Shikarpur, and Larkana had municipal sewage systems.

5.5.4.9. Education

Educational facilities including primary and high schools were available in the surveyed settlements and colleges and universities such as Sindh University Campus in Dadu and Shah Abdul Lateef University in Shikarpur are also accessible to the residents of those settlements. Photographs of some of the observed facilities are presented in Figure 5-31. Figure 5-32 shows the locations of the education facilities available to the surveyed communities.

Government High School Boys at Dera Murad Jamali settlement

Government Girls Primary School at Rustam Khan Domki settlement

Government Primary Girls School at Jacobabad settlement

Shaheen Vocational Training Institute at Jacobabad settlement

Government High school, Dhabeji

Government Primary School, Dhabeji

Figure 5-31: Photographs of the Educational Facilities – Rail Transport Route (2023 Survey)

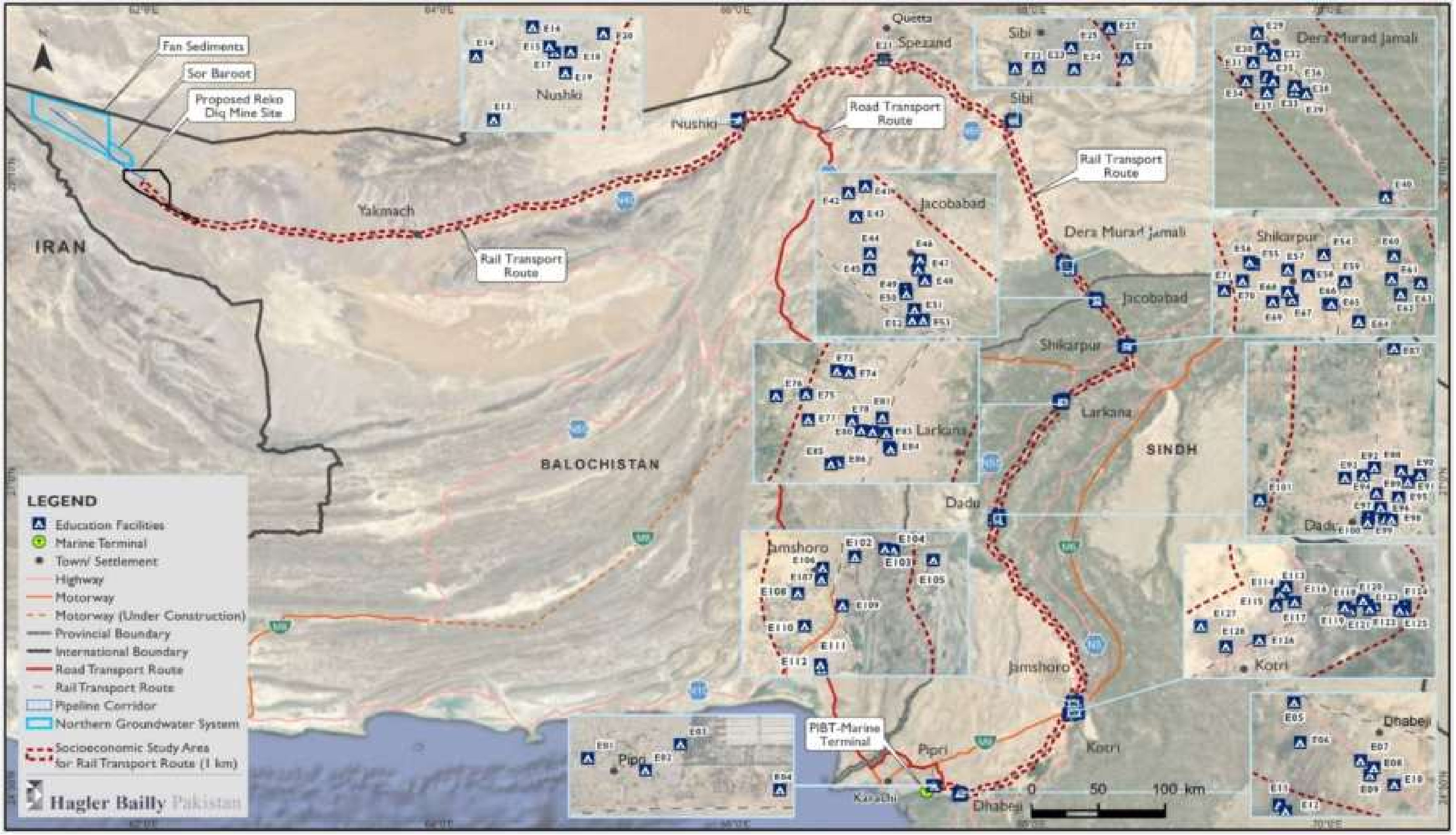


Figure 5-32: Education Facilities – Rail Transport Route (2023 Survey)

5.5.5. Indigenous People

Under the IFC PS7, projects must assess the presence of Indigenous Peoples (IPs) communities in and around a project area during the screening phase of the environmental and social risks and impacts assessment process. If IPs are identified, the project is obligated to ensure that they are not adversely impacted by the project or any of its activities and to establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) through the life of the project. An IPs screening was conducted, and full details are provided in Appendix C.

Dr Hafeez Ahmed Jamali, an independent expert on socio-cultural anthropology and with significant experience of working in the Balochistan province was engaged by RDMC to carry out an independent peer-review of the findings of the screening. The recommendations and feedback of the peer-review have been incorporated into this ESIA.

According to PS7, IPs are defined as social groups with identities distinct from mainstream groups in national societies and who, by virtue of their distinct identities, are often among the most marginalised and vulnerable segments of the population. Due to their marginalised status, their ability to defend their rights to and interests in land, natural, and cultural resources is limited, and their ability to participate in and benefit from development is restricted. As a result, IPs are more vulnerable to the adverse impacts associated with project development than non-indigenous communities. In PS7, the term “Indigenous Peoples” is used to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; and/or
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

All self-identified groups identified in the socio-economic baseline were screened against the PS7 definition. An additional layer of screening was also undertaken to determine whether groups identified as IPs in international sources and databases may exist in the Socio-economic Study Area, under the assumption that these groups may have been overlooked in the data collection.

Table 5-23 provides the details of screening. The screening concludes that no IPs groups that fulfil the IFC Definition exist in the Socio-economic Study Area which require additional consideration by the Project beyond impacts assessed in the Socio-economic Specialist Report.

The following conclusions have been drawn through the screening conduced for IPs:

- Following the United Nations (UN) principles on right of self-determination, all respondents in the socio-economic surveys were allowed to self-identify as belonging to a unique group, whether that group be an ethnicity, caste, or tribe. 54 such groups were identified in the surveys, but none have met the criteria of IPs.
- All self-identified groups identified have access to elect representatives in the local government as well as through the GoB. This system has been in place through the British-era period wherein each tribe has legal representation through a *sardar*.[14]
- IPs identified in secondary information sources either do not reside within or even near the Study Area nor was their presence observed in the socio-economic data collected. The Baloch ethnicity itself cannot be classified as IPs as suggested in secondary sources as they form an ethnic majority in the Balochistan Province. The Baloch follow tribal laws which are similar to those followed by tribes in the neighbouring KP province and neighbouring Afghanistan and do not have any unique customary or ancestral links to the natural resources of the area as a result of their tribal practices or customs.
- While no group that fulfils the criterion of IPs was identified, the Baloch can be classified as an “ethnic minority” which require additional safeguards due to their minority status and history of marginalisation. The various tribes of Balochistan have historically been involved in several conflicts and disputes with regards to their representation and legal rights. Many of the Baloch tribes presently feel that the natural resources of Balochistan, including mineral and energy resources, are exploited without any benefit or investment toward the people of Balochistan. These issues have been further exacerbated due to conflicts with state security agencies in the past which have led to armed insurgent uprisings and protests against detentions and arrests of Baloch political activists. RMDC in its stakeholder engagement will ensure that international principles on stakeholder engagement are met and that all groups that have been subject to political and social marginalisation are considered in the Project’s decision making and planning.
- RMDC will collaborate with the Government of Balochistan to ensure that the Baloch and other marginalised groups are sufficiently represented in the Project’s decision-making process.

[14] A tribal leader appointed by the collective consensus of the tribe.

Table 5-23: Assessment Criteria against IFC PS7 for all Self-Identified Groups in Socio-economic Study Area

Criteria	Reviewed Sources	Evaluation
Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others	• Data collected during the socio-economic survey and community consultations conducted in September 2022 to October 2022 and in October 2023 by Hagler Bailly. • Cultural Baseline and Study of Relationship Dynamics conducted in 2009 by Hagler Bailly.	• A total of 54 self-identified groups were recorded in the Project's socio-economic baseline. Pakistan does not have a notified list of IPs groups in the country or any legal mechanism for the protection of their rights. • Most of the 54 self-identified groups identify as Baloch or Barohi in addition to their tribal identity. A few individuals from the Hazara ethnolinguistic group were also encountered in the Port Qasim surveys.
Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories	• Data collected during the socio-economic survey and community consultations conducted in September 2022 to October 2022 and in October 2023 by HBP.	• The consultations conducted with the institutional stakeholders including the Livestock and Dairy Department, Agriculture Department, Forest Department, and the Irrigation Department confirmed that there are no unique habitats or ancestral territories in the Balochistan Province. • The Baloch people perceive that their rights to natural resources are being infringed upon by the Federal Government however no collective attachment to the land beyond concerns related to economic rights to resources of the land was observed. • Several members of the "Hazara" community, an ethnolinguistic group originating from Afghanistan, was reported working in the Port Qasim area. The Hazaras are a widely persecuted ethnic minority, however they are discriminated primarily on the basis of religious and ethnic differences from the mainstream population as opposed to unique cultural practices, traditions, or identity.[15] • No other natural resource links were identified in consultations with the local communities. Livestock herding is a common means of livelihood for many of the local communities

[15] National Commission for Human Rights Pakistan. (2018). UNDERSTANDING THE AGONIES OF ETHNIC HAZARAS. Retrieved from https://www.nchr.gov.pk/wp-content/uploads/2023/09/Understanding-the-Agonies-of-Ethnic-Hazaras.pdf.

Criteria	Reviewed Sources	Evaluation
		similar to most other rural areas in Pakistan as there are limited opportunities to participate in other economic sectors as opposed to being a traditionally or culturally valued livelihood and pastoral lands linked to livestock rearing are commonly found throughout Balochistan and other parts of Pakistan. Many of the respondents expressed a desire for higher education and employment opportunities outside the primary sector.
Customary cultural, economic, social, or political institutions that are separate from those of the dominant society or culture	• Data collected during the socio-economic survey and community consultations conducted in September 2022 to October 2022 and in October 2023 by HBP.	• The self-identified groups did not have any social, cultural, economic, or political institutions that separated them from contemporary Pakistani society besides the tribal Jirga system of law which is widely practiced throughout Balochistan. The Socio-economic Study Area included both the urban and rural communities in Sindh and Balochistan and their reported religious and cultural norms resemble those of the mainstream communities in rural and urban areas of Pakistan. • The community members reported that there is a Jirga[16] system, however this system is widely practiced by Baloch and Pashtun tribes throughout Pakistan and Afghanistan. The Jirga system is presently four-tiered. The Shahi Jirga, which is the highest body, allows for Federal-level regulation of the Balochistan Province on issues such as national security, whereas the underlying local-level, district-level and joint-level jirga systems allow the tribes to carry out their customary practices according to tribal law.17
An indigenous language, often different from the official language of the country or region	• Data collected during the socio-economic survey and community consultations conducted in September 2022 to October 2022 and in October 2023 by HBP.	• None of the self-identified groups have a unique language. All groups spoke a language which was the majority language in their respective province, such as Balochi for those surveyed in Balochistan and Sindhi for those surveyed in Sindh. The only exception is the Hazara ethnolinguistic group, which form only ~1% of the country's population. However, the Hazaras captured in the socioeconomic data reside in Port Qasim where

[16] A jirga is a traditional assembly of leaders, primarily among Pashtun tribes in Afghanistan and Pakistan, used for decision-making and dispute resolution based on customary laws. It involves elders and respected community members whose decisions are binding and respected within the community.

[17] Hagler Bailly Pakistan. (2009). D8C01RKD - Cultural Baseline and Study of Relationship Dynamics.

Criteria	Reviewed Sources	Evaluation
	• 2017 Census, Government of Pakistan	they have integrated into the local and political economy of the city and will be unaffected by the Project's activities. • While Balochi is widely understood within the Balochistan province, it has several dialects with some phonological and lexical variations. These include: Rakhshani (subdialects: Kalati, Panjguri and Sarhaddi), Saravani, Lashari, Kechi, Coastal Dialects, and Eastern Hill Balochi (Bosworth, 1988). The Rakhshani dialect is predominantly spoken and in the Chagai District (Ali et al., 2023).

5.5.6. Land Acquisition

An assessment of the Project against the requirements of IFC PS5 was undertaken. IFC PS5 applies to physical and/or economic displacement resulting from the following types of land-related transactions:

1. Land rights or land use rights acquired through expropriation or other compulsory procedures in accordance with the legal system of the host country.
2. Land rights or land use rights acquired through negotiated settlements with property owners or those with legal rights to the land if failure to reach settlement would have resulted in expropriation or other compulsory procedures.
3. Project situations where involuntary restrictions on land use and access to natural resources cause a community or groups within a community to lose access to resource usage where they have traditional or recognizable usage rights.
4. Certain project situations requiring evictions of people occupying land without formal, traditional, or recognizable usage rights.
5. Restriction on access to land or use of other resources including communal property and natural resources such as marine and aquatic resources, timber and non-timber forest products, freshwater, medicinal plants, hunting and gathering grounds and grazing and cropping areas.

Points 1, 2, and 4 are related to physical displacement (with point 4 directly leading to the physical displacement involving the eviction of individuals from their homes or land), while the points 3 and 5 are associated with economic displacement. The Project was assessed against these criteria and the findings of the assessment are as follows:

- No physical displacement will occur.
- Land access restrictions:
  - Access to the Surface Rights Lease area will be restricted with the construction of a fence line. Local communities do not currently traverse this area to travel between communities. There has previously been traffic through the area of

cross border traders travelling to and from site due to a) being close to now closed informal border crossing areas, and b) traders utilising the RDMC road (it being the only road in the area). The border crossing areas have since been closed or shifted to locations further to the east (not as a result of the Project).

- The pipeline to the Northern Borefield will be buried and will not be fenced so this will not result in access restrictions (although this area is only travelled very rarely by non-project traffic).
- Small areas of the Northern Borefield and water transfer infrastructure will be fenced (i.e. well head infrastructure and pump stations). This will not impact the ability of people to traverse the area (again non-project traffic through this area is rare).
- There will be no change to access along the existing road and rail networks, although there is some consideration of fencing along certain sections of the rail for community safety reasons.

- Surveys have not identified any sites of cultural heritage value within the Project area.
- Several houses were built close to the existing accommodation facility, and occupied by members of the Humai community who were providing services during the previous study phases before 2010 to be closer to the Reko Diq camp. The residents were provided water by the Project during that time and many residents were either employed by the Project or one of the contractors. In 2008 the then Project owner TCC determined that if allowed to remain, there was a risk of further influx so agreement was reached for the residents to relocate back to Humai. Assistance was provided in the form of building materials and in-kind support as needed.

Error! Reference source not found. provides the results of an assessment of the Project against the various livelihood types which occur across the broader study area. Please refer to Section 3.5 for land tenure details.

Table 5-24: Livelihood Impact Screening

Project Aspect	Information Source	Livelihood Source	Activity	Details/Remarks
• Mine area (including pits, waste dumps, processing plant, TSF, waste management facility, accommodation facility, rail loading/unloading infrastructure and haul and other site roads). • Mine Access Road from the N-40 Highway to the mine area. • Rail spur line from the existing rail line to the Mine area. • Water Supply Pipeline (construction and operations water pipelines) from the Northern Borefield to the Mine Area, including pump stations.	• Socio-economic surveys and other community engagement completed as part of this ESIA (refer Appendix B). • Biodiversity surveys completed by Hagler Bailly Pakistan as part of this ESIA (refer to Appendices H and I. • Biodiversity surveys completed by Hagler Bailly Pakistan as part of this ESIA	Land-based livelihoods	Agriculture	No agricultural activities within the Mine Site area or in the settlements near the Project site were recorded during the socioeconomic surveys with the exception of small-scale date palm cultivation for personal use. There are some agricultural activities in the Tahlab and Kachau settlements where water availability is greater, but the Project activities have no direct impact on these settlements. There are no agricultural activities within, or which will be impacted by, the area of the mine, mine access road, rail spur or water supply areas. The nearest plantation is a small group of date palms at Humai village some 20 km to the east of the mine area.
			Pastoral Use	The socioeconomic studies reveal that there is only minimal livestock rearing in the settlements near the Project site, but the Project area is not used for grazing purposes. Camels are set free to roam regionally so there is a possibility that the project activities may disrupt this activity, however the Project site has minimal to no grazing value and is a small part of the much larger roaming area. Roaming camels will be restricted from entering the surface rights lease due to the fencing, but movement across the water supply area will not be restricted.
			Timber and Firewood	Local communities use certain shrubs and small trees for firewood; however these do not occur within the Project area. Local communities report travelling long distances, including

• Power Transmission Line from the Northern Borefield to the Mine Area	• Remote Sensing Land Use Study (see Appendix X). • Hydrocensus (see Appendix L).			into Afghanistan to collect firewood for cooking and heating fuel given the lack of locally available resources.
			Hunting	The Mountains/Hills habitat at the Project area support a variety of animals species. However, these species are typically small mammals and reptiles are not of consumptive or commercial value and are not hunted. Hunting of larger species has occurred in the past, however these species typically inhabit mountain areas where there area available water and food sources. Past hunting practices have severely impacted the populations of some species in these areas.
			Ethnobotany	Local people were consulted as part of the flora surveys to gather information about local plant names, uses, and social and cultural values of the plants of the area. No species of ethnobotanical significance were identified within the Project area.
			Other	No other land-based livelihoods were identified during consultations and site surveys.
		Wage-based livelihoods		No wage-based activities are connected to the land being acquired by the Project. Cross border traders have in the past transited through the Project site but this has changed due to Government fencing being installed along the Pakistan border (not associated with the Project). Some local people derive wages from small mining operations in the region (marble and pumice, but these are located more than 40 km from the Project areas.
		Enterprise-based livelihoods		According to the socioeconomic studies, no businesses are being affected by the project activities. The socio-economic

			surveys completed for this ESIA indicate that enterprises are almost predominantly related to cross border trade. There are small mining operations in the region (marble and pumice, but these are located more than 40 km from the Project areas. Some local communities in the region do derive economic benefit from livestock rearing but these are predominantly closer to water source areas along the Iranian border and in the mountain areas. These areas will not be impacted by any of the Project aspects.
Road Network across Pakistan	• Socio-economic surveys and other community engagement completed as part of this ESIA (refer Appendix B). • Traffic Study (see Appendix E).	-	This is existing infrastructure owned and operated by others. The Project will result in only a negligible increase in traffic throughout the entire road transport route and as such won't impact on people who rely on the road network for their livelihood.
Existing Rail Network	• Socio-economic surveys and other community engagement completed as part of this ESIA (refer Appendix B).	-	This is existing infrastructure owned and operated by others. The Project will result in varying levels of traffic increase in different parts of the rail route. Studies completed as part of the Project Feasibility indicate that there is adequate capacity in the rail network to accommodate both existing users and the Project.

	• Detailed rail traffic and capacity studies completed as part of the Project Feasibility Study.		
Rail Loop at Port Qasim, including train loading and unloading facilities	Project Feasibility Study.	-	This is land that is within the Port Qasim Industrial Zone and has been allocated as industrial land. It is currently allocated for the purposes of Pakistan Rail and is not used for any other purpose.
Road Routes from the Port Qasim Rail Loop to PIBT	Traffic Study (see Appendix E).	-	This is existing infrastructure owned and operated by others. The Project will result in only a negligible increase in traffic throughout the entire road transport route and as such won't impact on people who rely on the road network for their livelihood.
Concentrate Storage and Handling Facilities at Port Qasim (excluding the existing PIBT Infrastructure)	-	-	The land area is currently held and operated by PIBT and is used for coal storage when required. This land will be sub-leased under agreement with PIBT.
Existing PIBT Infrastructure including existing conveyors, ship berthing and loading infrastructure	-	-	This infrastructure will continue to be owned and operated by PIBT.

5.6. Ambient Noise

An Environmental Noise Assessment was conducted as part of this ESIA process; the detailed report is included as Appendix D. Figure 5-33 presents the Noise Study Area which included a buffer area of 5 km around the proposed RDMS, a 1 km buffer along the Road Transport Route and Rail Transport Route, and a 4 km buffer around the PIBT at Port Qasim.

The following definitions, along with their descriptions, are frequently used terminologies:

- *Baseline Noise Levels (dBA):* The measured noise levels before the Project development are referred to as '*Baseline Noise Levels*'.
- *Predicted Incremental Noise Levels:* These are modelled noise levels predicted increase due to increased movement along the railway, therefore, referred to as 'Predicted Incremental Noise Levels.' These model outputs and exclude any contribution from Baseline Noise Levels.
- *Predicted Ambient Noise Levels:* Upon addition of Predicted Incremental Noise Levels to the Baseline Noise Levels, these are referred to as '*Predicted Ambient Noise Levels*'. The Predicted Ambient Noise Levels have been used for comparison with the daytime and nighttime noise limits prescribed in the applicable standards and guidelines.

No significant increase in the ambient noise levels related to the construction of the Northern Borefield or water supply pipeline to the Mine Site is anticipated as construction work is minimal and receptors are located at relatively large distances (>15 km) away. For this reason, noise levels were not monitored within the Northern Groundwater System.

The ambient noise levels were measured according to national and international guidelines where long-term continuous measurements, over a 24-hour period, were recorded at each location (with the exception of Spezand along the rail route where monitoring carried out for a reduced period of 15 hours due to security considerations).

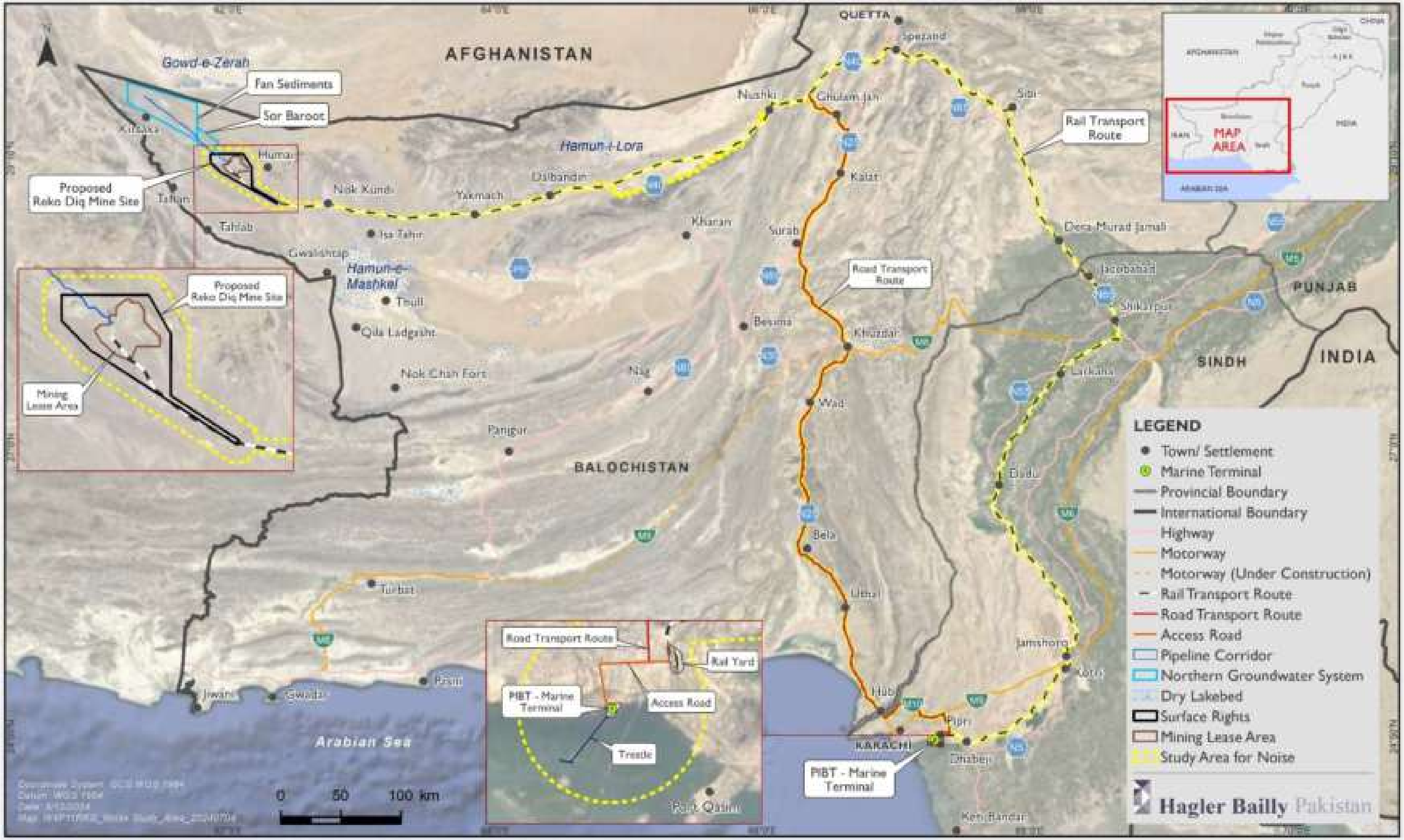


Figure 5-33: Study Area delineated for the RDMS and Project Components

RDMS (N1) | Road Transport Route (N3 – Nok Kundi)

Rail Transport Route (N14 – Spezand) | Port Qasim (N25)

Figure 5-34: Photographs of Noise Monitoring Locations

5.6.1. Data Collection

Noise surveys were conducted in August 2020, September 2022, and October 2023, at 18 pre-selected measurement locations (see Figure 5-35). Table 5-25 presents a summary of these sites:

- Nine out of 17 locations fall within the Balochistan province, and the remaining locations were within Sindh jurisdiction, including:
    - One location at the proposed RDMS (Balochistan province);

- One location along the access road to the mine site (Balochistan province);
- Two locations along the Road Transport Route (Balochistan province);
- Four locations along the Rail Transport Route (Balochistan province);
- Eight locations along the Rail Transport Route (Sindh province); and
- One location Port Qasim) (Sindh province).

Measurements were taken as the *equivalent continuous sound pressure level* (LA_{eq})[18] and are reported as *decibels A-weighted* (dBA).

LA_{eq} values were recorded over day and night-time periods, where daytime hours are designated as between 6:00 am to 10:00 pm and night-time hours are designated as between 10:00 pm to 6:00 am and were assessed against the NEQS, BEQS, and SEQS for noise. The NEQS, BEQS, and SEQS limits are the same and residential, commercial, and industrial areas limits are prescribed as follows:

- Residential daytime: 55 dBA and nighttime: 45 dBA;
- Commercial daytime: 65 dBA and nighttime: 55 dBA; and
- Industrial daytime: 75 dBA and nighttime: 65 dBA.

IFC General EHS Guidelines defined daytime hours as between 7:00 am to 10:00 pm and night-time hours as between 10:00 pm to 7:00 am. The IFC General EHS Guidelines for residential, and commercial and industrial limits are as follows:

- Residential daytime: 55 dBA and nighttime: 45 dBA; and
- Commercial and Industrial daytime: 70 dBA and nighttime: 70 dBA.

[18] Leq/LAeq - Equivalent Continuous Sound Pressure Level, is the constant noise level that would result in the same total sound energy being produced over a given period

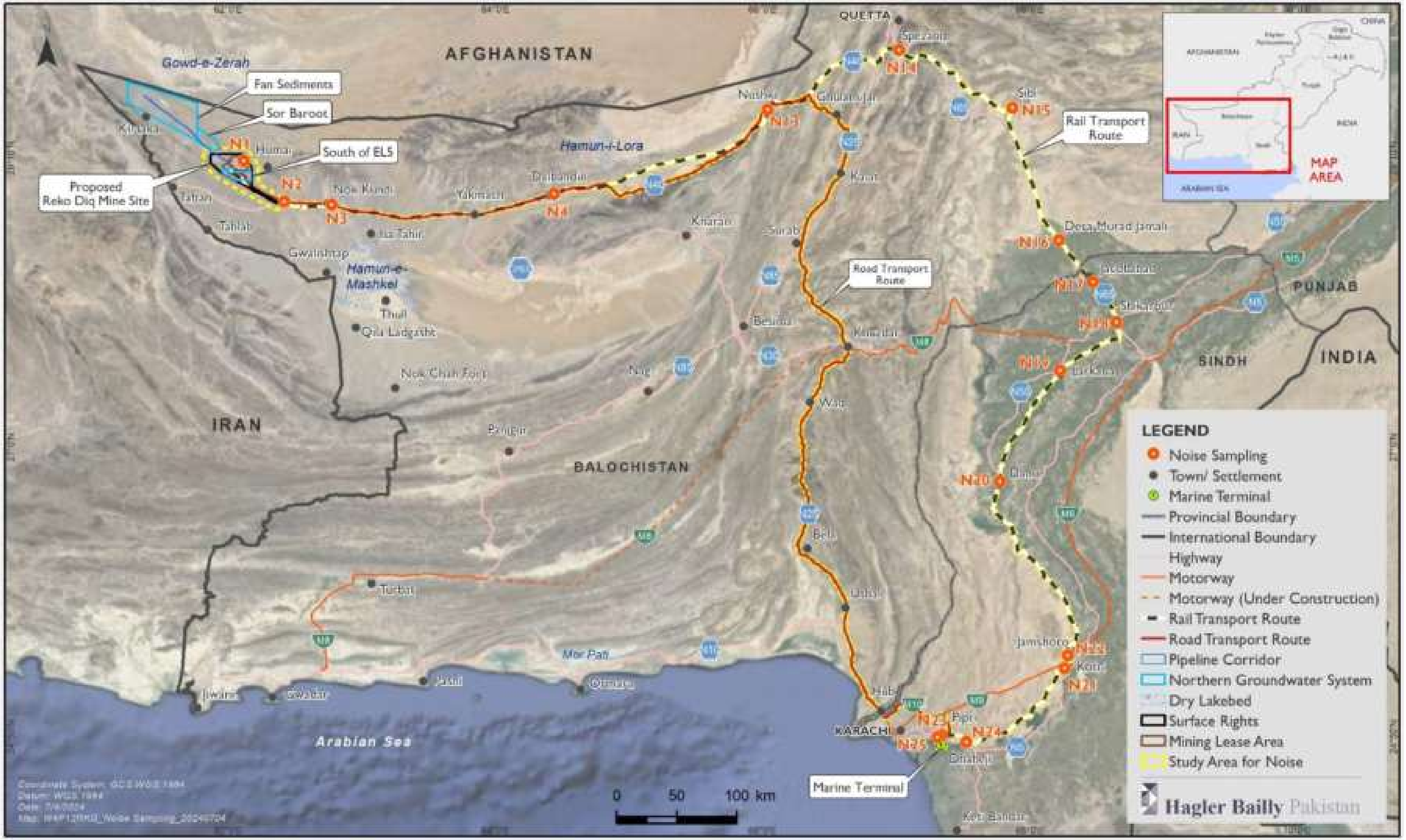


Figure 5-35: Noise Monitoring Locations

Table 5-25: Noise Monitoring Locations and Rationale for Selection

ID	Location	Project Component	Time of Survey	Monitoring Round	Coordinates	Province	Rationale for Site Selection
N1	Mine Area	RDMS	24-25 August 2020 (24 hours)	Round 1	29°08'52.40"N 62°06'49.00"E	Balochistan	To assess the baseline noise conditions at the mine area.
N2	Access Road to RDMS	RDMS	25-26 August 2020 (24 hours)	Round 1	28°50'35.20"N 62°24'57.90"E	Balochistan	At the access road to the RDMS from N-40.
N3	Nok Kundi	Road Transport Route	24-25 August 2020 (24 hours)	Round 2	28°49'06.32"N 62°46'21.54"E	Balochistan	At N-40 near Nok Kundi to assess the baseline noise levels from the traffic movement along the road that will be used for the Project–related transportation. The point was monitored simultaneously with a traffic count.
N4	Dalbandin	Road Transport Route	26-27 September 2022 (24 hours)	Round 2	28°53'59.89"N 64°26'14.43"E	Balochistan	At National Highway (N-40) near Dalbandin to assess the baseline noise levels from the traffic movement along the road that will be used for the Project–related transportation. The point was monitored simultaneously with a traffic count.
N13	Nushki	Rail Transport Route	22-23 October 2023 (24 hours)	Round 3	29°31'55.28"N 66°2'57.506"E	Balochistan	To assess the baseline noise level at Nushki settlement before the Project.

ID	Location	Project Component	Time of Survey	Monitoring Round	Coordinates	Province	Rationale for Site Selection
N14	Spezand	Rail Transport Route	21 October 2023 (15 hours)	Round 3	29°58'35.83"N 67°1'07.360"E	Balochistan	To assess the baseline noise along the Rail Transport Route that passes through Spezand before the Project. The point was monitored simultaneously with a traffic count.
N15	Sibi	Rail Transport Route	19-20 October 2023 (24 hours)	Round 3	29°32'41.20"N 67°52'12.59"E	Balochistan	To monitor the baseline noise level at Sibi along Rail Transport Route before the Project.
N16	Dera Murad Jamali	Rail Transport Route	18-19 October 2023 (24 hours)	Round 3	28°33'08.90"N 68°13'03.29"E	Balochistan	At Dera Murad Jamali to assess the baseline noise levels from the traffic movement along the railway that will be used for the Project–related transportation.
N17	Jacobabad	Rail Transport Route	16-17 October 2023 (24 hours)	Round 3	28°14'23.58"N 68°28'14.81"E	Sindh	To monitor the baseline noise level at Jacobabad along Rail Transport Route before the Project. The point was monitored simultaneously with a traffic count.
N18	Shikarpur	Rail Transport Route	16-17 October 2023 (24 hours)	Round 3	27°56'20.60"N 68°38'51.60"E	Sindh	To monitor the baseline noise level at Shikarpur along Rail Transport Route before the Project.
N19	Larkana	Rail Transport Route	13-14 October 2023 (24 hours)	Round 3	27°34'36.27"N 68°13'23.86"E	Sindh	To monitor the baseline noise level at Larkana along Rail Transport Route before the Project.
N20	Dadu	Rail Transport Route	15-16 October 2023 (24 hours)	Round 3	26°44'41.36"N 67°46'34.40"E	Sindh	To monitor the baseline noise level at Dadu along Rail Transport Route before the Project.

ID	Location	Project Component	Time of Survey	Monitoring Round	Coordinates	Province	Rationale for Site Selection
N21	Jamshoro	Rail Transport Route	13-14 October 2023 (24 hours)	Round 3	25°26'31.10"N 68°16'58.19"E	Sindh	To assess the baseline noise from the railway tracks at Jamshoro that passes between Dadu and Kotri.
N22	Kotri	Rail Transport Route	12-13 October 2023 (24 hours)	Round 3	25°20'46.99"N 68°15'32.95"E	Sindh	To monitor the baseline noise level at Kotri along Rail Transport Route before the Project.
N23	Pipri	Rail Transport Route	9-10 October 2023 (24 hours)	Round 3	24°50'43.17"N 67°20'18.05"E	Sindh	At Port Qasim Railway track in Pipri settlement to assess the baseline noise levels before the Project.
N24	Dhabeji	Rail Transport Route	10-11 October 2023 (24 hours)	Round 3	24°47'35.69"N 67°31'24.50"E	Sindh	At Port Qasim Railway track in Dhabeji to assess the baseline noise levels before the Project. The point was monitored simultaneously with a traffic count.
N25	Marine Facility – Port Qasim	Port Qasim	11-12 October 2023 (24 hours)	Round 3	24°49'41.56"N 67°18'24.56"E	Sindh	At North-Western Industrial Zone of Port Qasim to assess the baseline noise levels before the Project. The point was monitored simultaneously with a traffic count.

5.6.1. Baseline Conditions

5.6.1.1. Reko Diq Mine Site

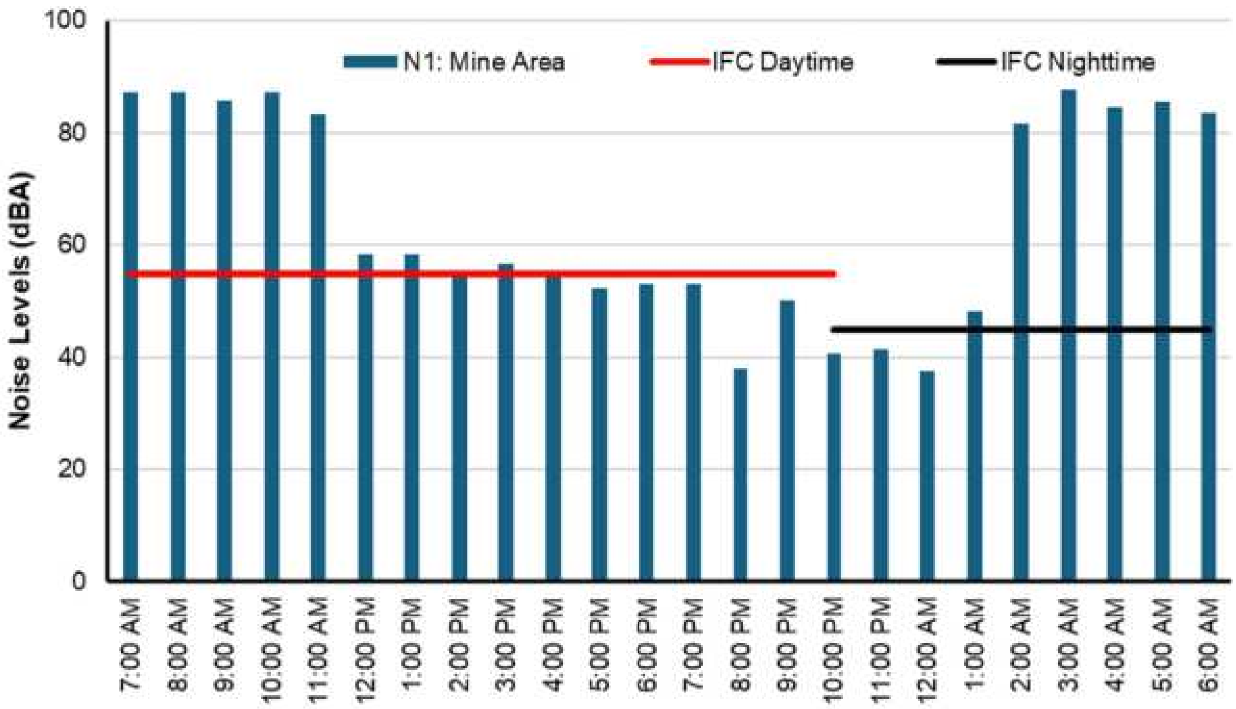
Table 5-26 presents the noise monitoring results and comparison with NEQS and BEQS for day and night-time periods and IFC General EHS Guidelines require hourly compliance.

Figure 5-36 and Figure 5-37 present hourly noise levels against the IFC General EHS Guidelines for monitoring points N1 and N2, respectively.

Table 5-26: Noise Monitoring Results (dBA) and Comparison with NEQS and BEQS

Project Component	ID	Location	LA_{eq} (Day)	LA_{eq} (Night)
NEQS/BEQS for Residential Areas			55	45
Noise Levels at the RDMS	N1	Mine area	82.0	81.0
NEQS/BEQS for Commercial Areas			65	55
Noise Levels at access road to Mine Site	N2	Access road	64.0	58.0

Note: Values exceeding the standards are shaded.
NEQS/BEQS requires LA_{eq} compliance over day and night-time periods.



IFC General EHS Guidelines require hourly compliance.

Figure 5-36: Hourly Noise Levels at N1 and Comparison with IFC General EHS Guidelines for Residential Areas

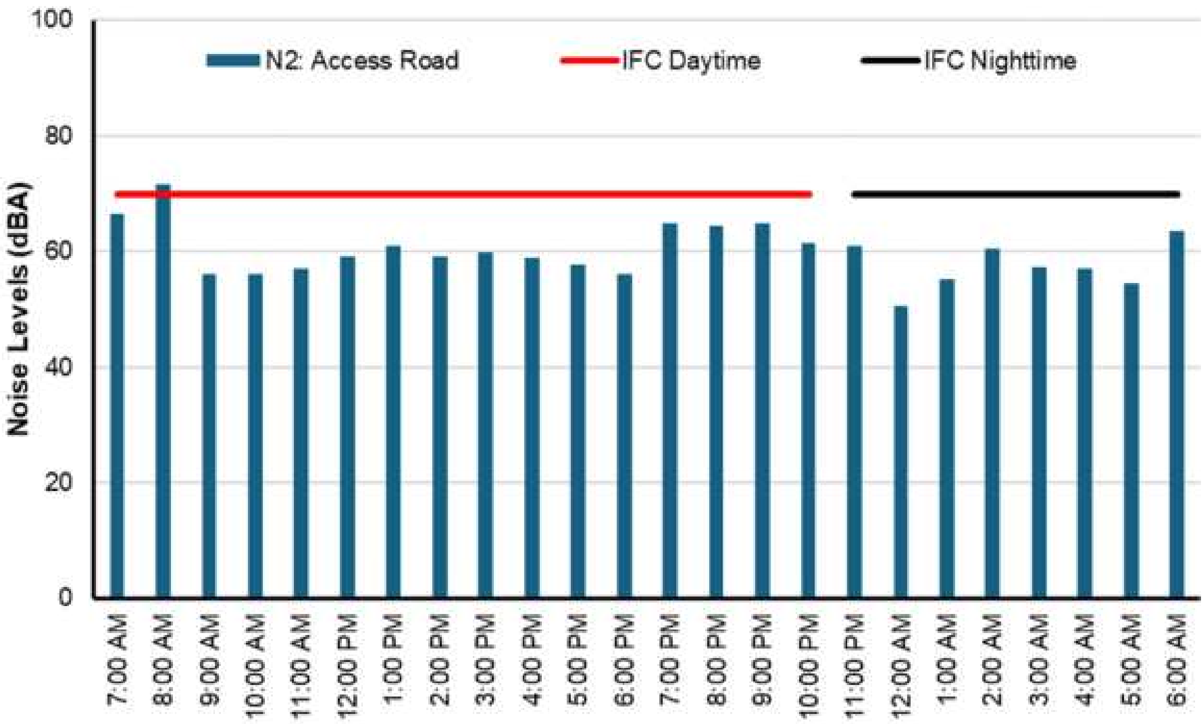


Figure 5-37: Hourly Noise Levels at N2 and Comparison with IFC General EHS Guidelines for Commercial Areas

- N1 (Mine Area):
  - Baseline noise levels at N1 exceeded the daytime (82.0 dBA) and nighttime (81.0 dBA) noise limits prescribed in the NEQS/BEQS for residential areas.
  - The noise levels at this location are primarily attributed to high-speed winds that are typically in the range of 6 to 8 meters per second (m/s). These winds are called ‘Gorek’ in local languages. The hourly noise levels at N1 also exceeded the daytime and nighttime noise limits prescribed in the IFC General EHS Guidelines for residential areas at all times.
- N2 (Access Road to the Mine Site):
  - Baseline noise levels at N2 remained within the daytime (64 dBA) noise limits prescribed in the NEQS/BEQS for commercial areas.
  - The nighttime (58 dBA) baseline noise levels monitored at this location exceeded the noise limits prescribed in NEQS/BEQS for commercial areas. The high noise levels recorded at nighttime are associated with vehicular movement and high-speed winds.
  - The hourly noise levels at N2 comply with the daytime and nighttime noise limits prescribed in the IFC General EHS Guidelines for commercial areas at all times except at 08:00 am where it was recorded to be 2 dBA above the limit, which is considered barely noticeable.

5.6.1.2. Road Transport Route

Table 5-27 presents the baseline noise monitoring results and comparison with NEQS/ BEQS for day and night-time periods and Figure 5-38 presents the hourly noise levels against the IFC General EHS Guidelines for monitoring points N3 and N4.

Table 5-27: Noise Monitoring Results (dBA) and Comparison with NEQS and BEQS

Project Component	ID	Location	LAeq (Day)	LAeq (Night)
NEQS/BEQS for Residential Areas			55	45
Noise Levels along Road Transport Route	N3	Nok Kundi	62.8	57.6
	N4	Dalbandin	66.4	60.6

Note:
Values exceeding the standards are shaded.
Daytime hours are from 6:00 am to 10:00 pm in NEQS and BEQS.
Night-time hours are from 10:00 pm to 6:00 am in NEQS and BEQS.
NEQS/BEQS requires LA_{eq} compliance over day and night-time periods.

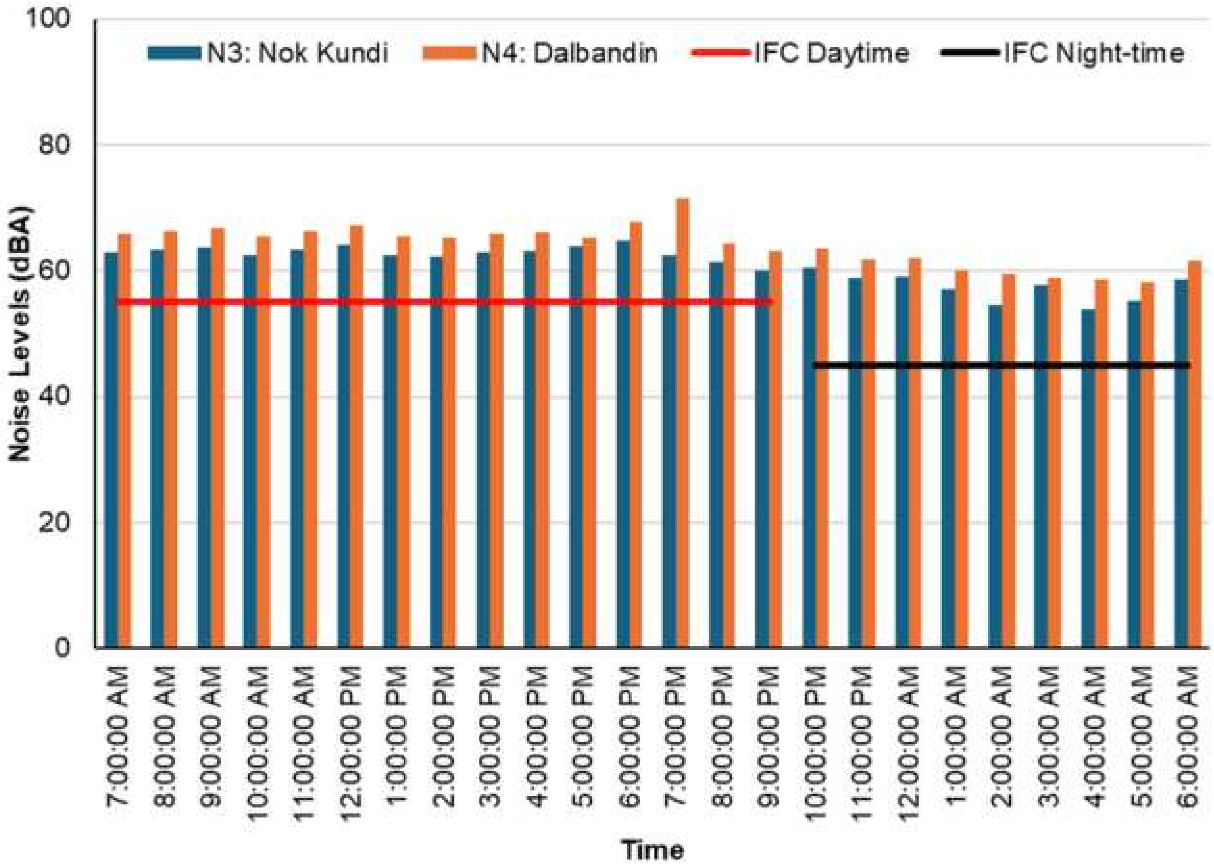


Figure 5-38: Hourly Noise Levels at N3 and N4 and Comparison with IFC General EHS Guidelines for Commercial Areas

- N3 (Nok Kundi):

- The daytime (62.8 dBA) and nighttime (57.6 dBA) baseline noise levels observed at N3 exceeded the limits prescribed by the NEQS and BEQS for residential areas.
- The baseline noise values also exceeded the daytime and night-time noise limits prescribed in the IFC General EHS Guidelines at all times. High noise levels at this location are associated with the traffic movement along the National Highway N–40, high-speed winds, unplanned urban development including construction of pucca housing structures and operation of small markets.

- N4 (Dalbandin):
  - The baseline noise levels recorded at N4 exceeded the daytime and night-time noise limits prescribed in the NEQS and BEQS for residential areas and the IFC General EHS Guidelines. As this monitoring was conducted near the Quetta–Dalbandin bypass on the N–40 highway, the exceedance in noise levels at this location is predominantly attributed with heavy vehicle movement on this road.

5.6.1.3. Rail Transport Route (Balochistan Section)

Table 5-28 presents noise monitoring results and comparison with NEQS, BEQS, and SEQS for day and night-time periods. Figure 5-39 and Figure 5-40 presents the hourly noise levels against the IFC General EHS Guidelines for the railway sections in Balochistan and Sindh, respectively.

Table 5-28: Baseline Noise Monitoring Results (dBA) and comparison with NEQS, BEQS, and SEQS

Project Component	ID	Location	LA_{eq} (Day)	LA_{eq} (Night)
NEQS/BEQS for Residential Area (Balochistan section)			55	45
SEQS for Residential Area (Sindh section)			55	45
Noise Levels along Rail Transport Route – Balochistan section	N13	Nushki	44.1	47.2
	N14	Spezand	65.2*	-
	N15	Sibi	63.1	49.1
	N16	Dera Murad Jamali	62.9	51.6
Noise Levels along Rail Transport Route – Sindh section	N17	Jacobabad	74.2	67.0
	N18	Shikarpur	59.9	53.6
	N19	Larkana	59.9	53.2
	N20	Dadu	61.4	51.2
	N21	Jamshoro	59.6	54.3

Project Component	ID	Location	LA_{eq} (Day)	LA_{eq} (Night)
	N22	Kotri	68.1	64.5
	N23	Pipri	63.0	52.0
	N24	Dhabeji	71.3	66.2

Notes: Values exceeding the standards are shaded.
Daytime hours are from 6:00 am to 10:00 pm in NEQS, BEQS, and SEQS.
Night-time hours are from 10:00 pm to 6:00 am in NEQS, BEQS, and SEQS.
NEQS, BEQS, and SEQS require LA_{eq} compliance over day and night-time periods.

**Noise monitoring was carried out for 15 hours only during the daytime.*

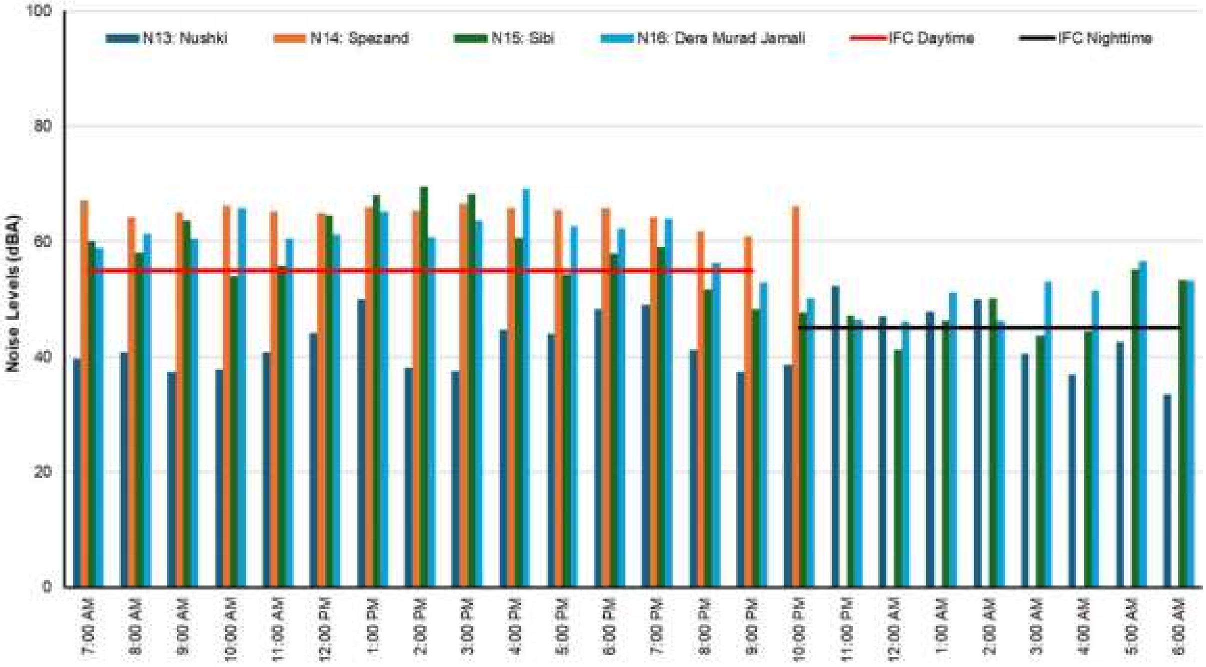


Figure 5-39: Hourly Noise Levels for the Rail Transport Route and Comparisons with IFC General EHS Guidelines for Commercial Areas (Balochistan section)

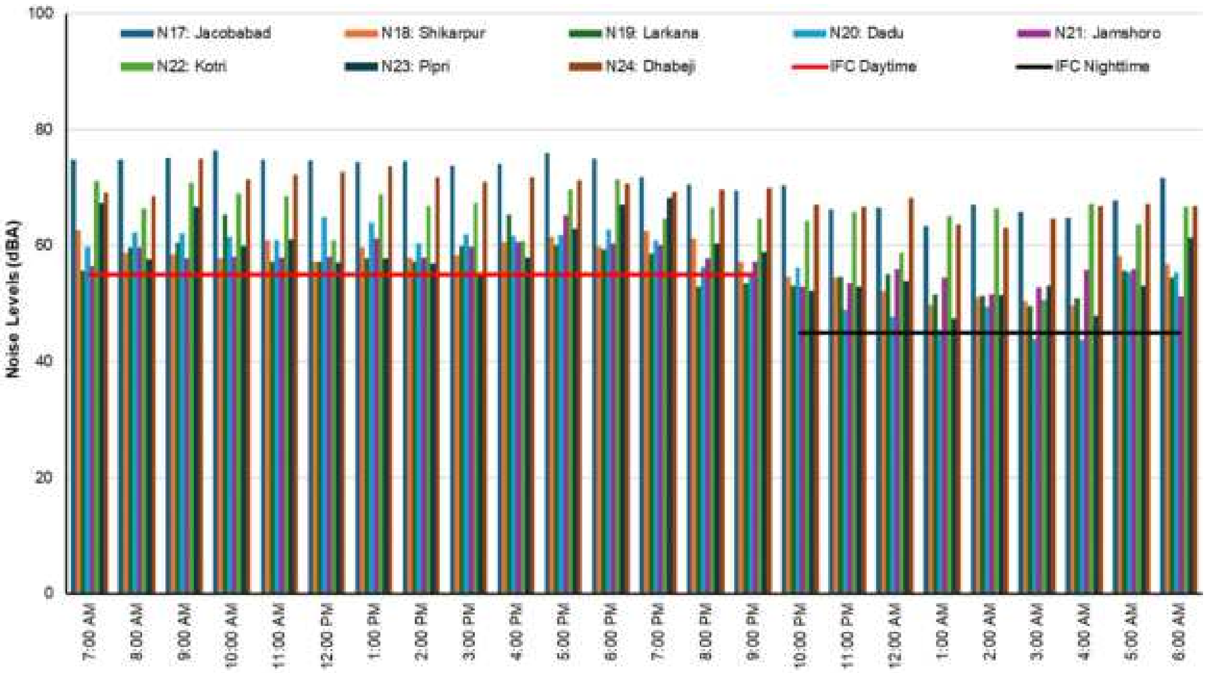


Figure 5-40: Hourly Noise Levels for the Rail Transport Route and Comparisons with IFC General EHS Guidelines for Commercial Areas (Sindh section)

- N13 (Nushki):
  - The daytime (44.1 dBA) noise levels at N13 remained within the limits prescribed in NEQS, BEQS, and IFC General EHS Guidelines for residential areas. However, the baseline noise levels at this location exceeded the nighttime (47.2 dBA) limits prescribed in NEQS, BEQS, and IFC General EHS Guidelines for residential areas.
  - Elevated nighttime noise levels at this location are primarily attributed to the movement of freight trains on the nearby railway track during the nighttime monitoring period, which was not observed during the daytime.
- N14 (Spezand):
  - The noise levels at N14 were monitored for 15-hours during the daytime. The baseline noise levels at this location (65.2 dBA) exceeded the daytime noise limits of 55 dBA prescribed in the NEQS and BEQS for residential areas. The hourly noise levels at this location also exceeded the daytime noise limits prescribed in the IFC General EHS Guidelines at all times.
- In General:
  - The daytime and nighttime baseline noise levels at all of the monitoring locations (N14, N15, and N16) exceeded the noise limits prescribed in NEQS and BEQS for residential areas except at N13 (Nushki). The noise levels at these locations also exceeded the hourly noise limits prescribed in the IFC General EHS Guidelines for residential areas at all times.

- The elevated noise levels can be attributed to the vehicular movement on the nearby roads, and movement along the railway.

5.6.1.4. Rail Transport Route – Sindh Section

- Baseline noise levels at all locations within the Sindh province (N17 (Jacobabad), N18 (Shikarpur), N19 (Larkana), N20 (Dadu), N21 (Jamshoro), N22 (Kotri), N23 (Pipri), and N24 (Dhabeji)) exceeded the daytime and nighttime noise limits prescribed in the SEQS for residential areas.
- The hourly noise levels at all locations also exceeded the daytime and nighttime noise limits prescribed in the IFC General EHS Guidelines for residential areas at all times.
- The elevated noise levels at these locations are primarily due to the close proximity of the monitoring location to the nearby national highway and railway track.

5.6.1.5. Port Qasim

Table 5-29 presents the noise monitoring results and comparison with SEQS for day and night-time periods for industrial areas. Figure 5-41 shows the hourly compliance with IFC General EHS Guidelines for industrial areas.

Table 5-29: Noise Monitoring Results (dBA) and comparison with SEQS

Project Component	ID	Location	LA_{eq} (Day)	LA_{eq} (Night)
SEQS for Industrial Area			75	65
Noise Levels at Port Qasim	N25	Port Qasim	69.1	67.3

Note: Values exceeding the standards are shaded.
Daytime hours are from 6:00 am to 10:00 pm and Night-time hours are from 10:00 pm to 6:00 am.
SEQS requires LA_{eq} compliance over day and night-time periods.

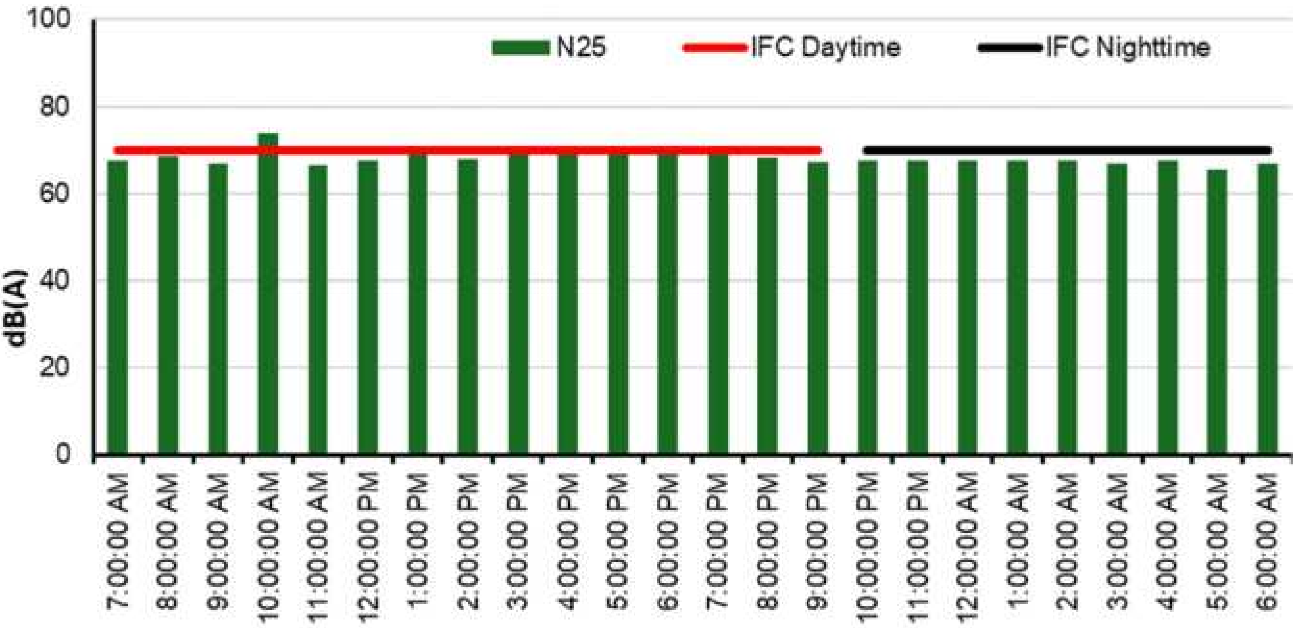


Figure 5-41: Hourly Noise Levels and Comparisons with IFC General EHS Guidelines for Industrial Areas

- N25 (Port Qasim):
  - Noise levels at N25 were monitored at the Northwestern Industrial Zone of the Port Qasim, a designated industrial area.
  - The daytime noise levels recorded at this location were within the noise limits prescribed in the SEQS for industrial areas. However, the night-time noise levels exceeded the night-time noise limits prescribed in SEQS by 2.3 dBA. The exceedances in night-time noise levels at this location was due to ongoing industrial operations and vehicular movement in Port Qasim.
  - The hourly noise levels recorded at N25 remained within the daytime and night-time noise limits prescribed in the IFC General EHS Guidelines for industrial areas, except at 10 am and 4 pm. Exceedances in baseline noise levels at these hours were primarily due to traffic noise.

5.7. Traffic

The Project will contribute to increased traffic along the routes defined as the Road Transport Corridor and Rail Transport Corridor. A Traffic Impact Study was undertaken as part of this ESIA process; the detailed report is provided as Appendix E.

The Study Areas were defined as the Road and Rail Transport Routes over which the Project's activities may adversely impact the existing traffic, and included:

- The Access Road to the RDMS;
- Road Transport Route: The N-40 Highway from the RDMS to Dalbandin; and

- Port Qasim.

5.7.1. Road Traffic

Four traffic counts were conducted in August 2020, September 2022, September 2023, and October 2023 respectively along the access road to the RDMS and Road Transport Route from the RDMS to Port Qasim (Figure 5-42). The counts were conducted to collect traffic related data (the number and types of vehicles) on the roads to be used by the Project during the construction and operational phases.

Three out of four traffic counts were conducted on the road running parallel with the Rail Transport Route from the mine site to Port Qasim. The roads in these areas will not be utilised by the Project, but the data was collected particularly for noise predictions when both road and rail traffic will be contributing simultaneously to the ambient noise levels.

At each traffic count location, two or three surveyors were stationed over a 24-hour period to independently count the daily traffic flow in various directions (Figure 5-43). The traffic count data was recorded in a pre-designed form.

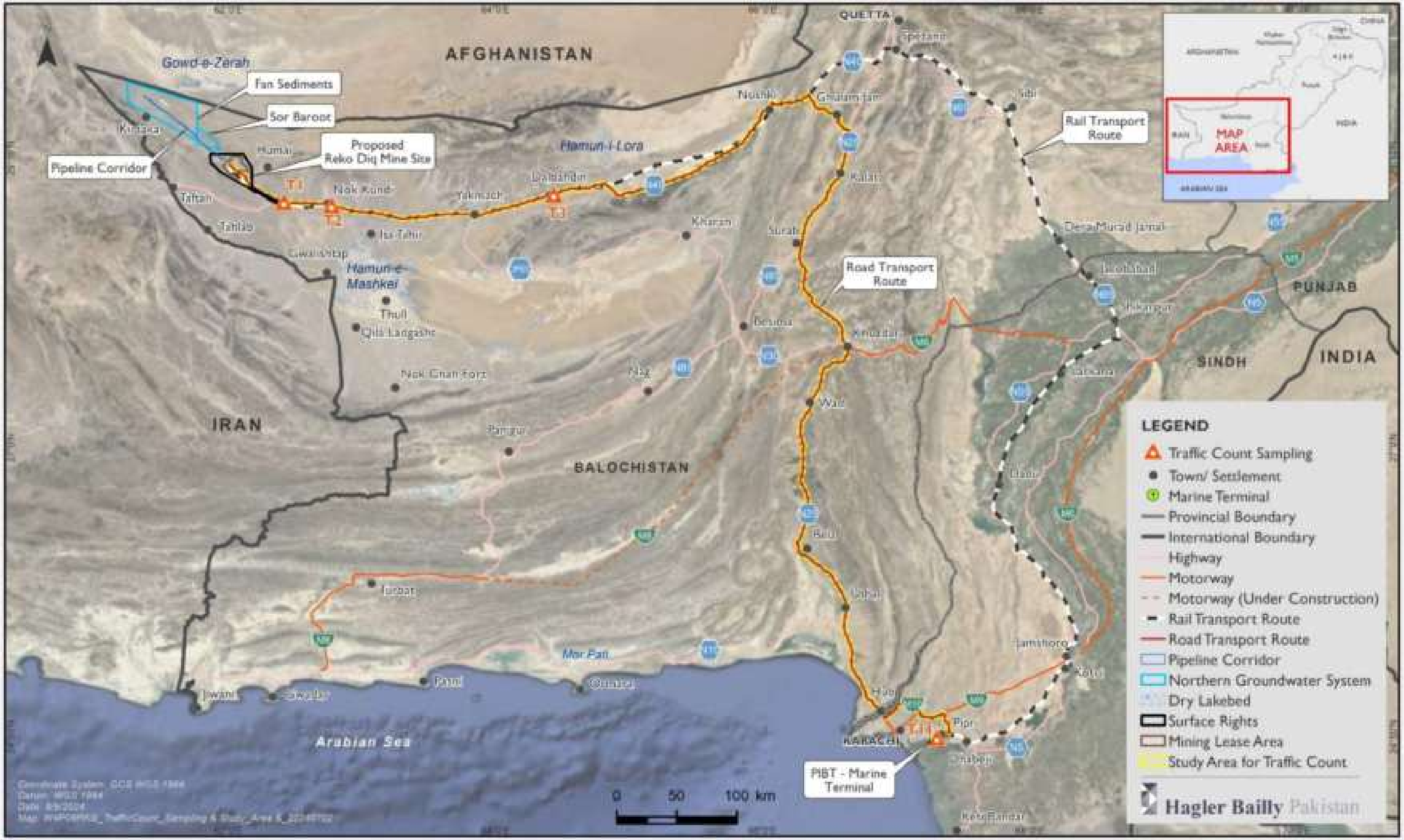


Figure 5-42: Traffic Counts locations

Road Transport Route (T2 – Nok Kundi)

Port Qasim (T11)

Figure 5-43: Photographs of selected traffic counting locations

5.7.1.1. Access Road Intersection

Figure 5-44 presents the breakdown of traffic volumes at location T1 (access road to the proposed mine site) in both directions.

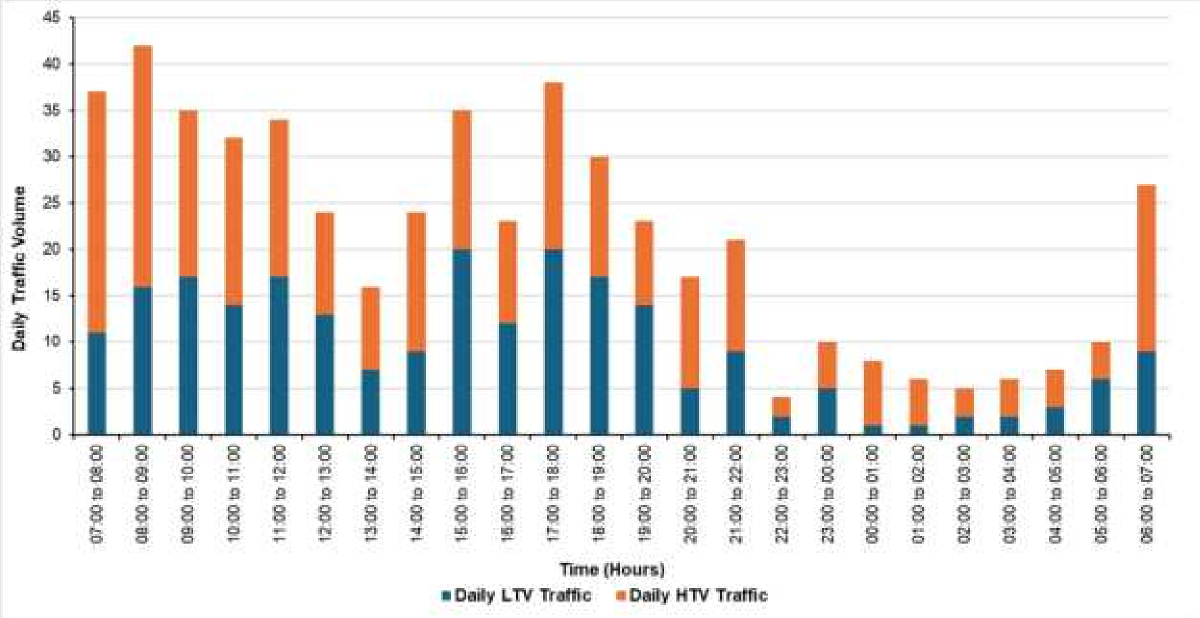


Figure 5-44: Daily Traffic Volume at T1 (Access Road to the RDMS)

- The observed traffic starts from 6:00 to 7:00 when people travel to work and tends to end between 21:00 to 22:00. There are two distinct peaks in the morning (between 07:00 and 08:00) and evening (between 17:00 and 18:00), after which the volume of traffic decreases gradually with each passing hour.
- This observed pattern is due mainly to truck and bus traffic, which have fixed schedules during these times. The traffic at peak hours represents 25% of the total traffic recorded at this location.
- Light Transport Vehicles (LTVs) formed around 45% of the daily daytime traffic and 40% of the nighttime traffic and Heavy Transport Vehicles (HTVs) accounting for the remaining volumes during these periods. HTVs are dominant in the area as the N-40 highway is mainly used for transportation of goods and fuel from Taftan at the Iranian border. For LTV vehicles, 64% of the vehicles were pickups which are either used for transportation of goods/fuel or as public transport. Moreover, there are few residential areas between Nok Kundi and Taftan which also accounts for low LTV traffic counts at this location.

5.7.1.2. N-40 Highway (Balochistan)

Traffic counts were carried out at two locations along the N-40 Highway section of the Road Transport Route at Nok Kundi and Dalbandin.

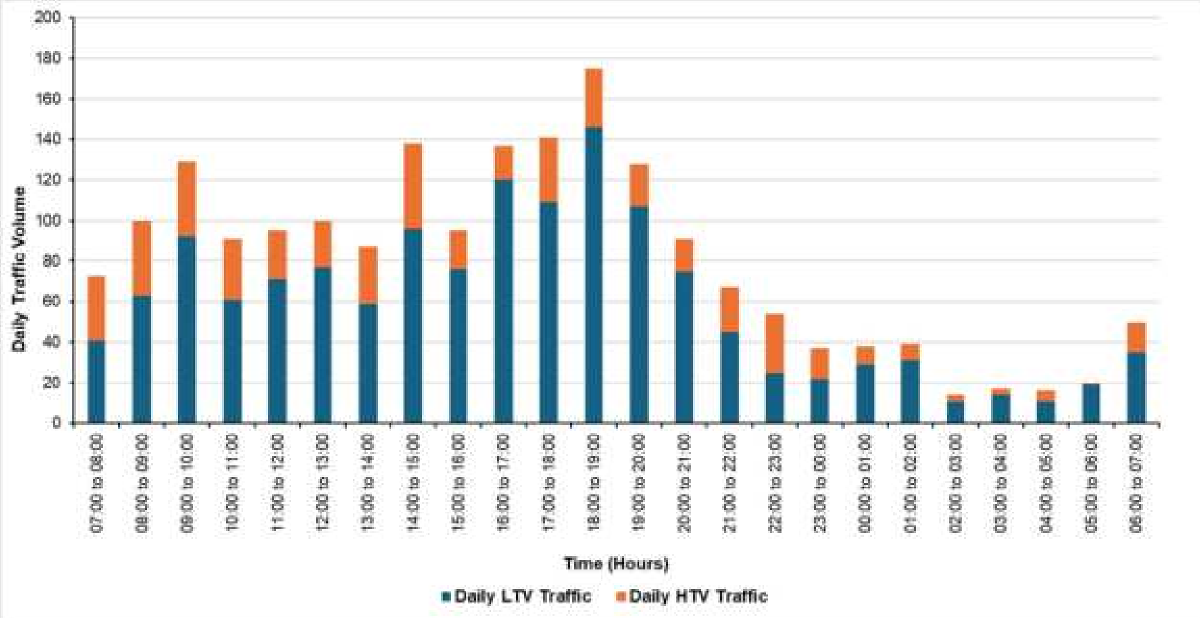


Figure 5-45: Daily Traffic Volumes at T2 (Nok Kundi)

- The daily traffic data at T2 (Nok Kundi) is plotted in Figure 5-45 and indicates that traffic starts between 6:00 and 7:00 when people commute to work and later subsides between 22:00 and 23:00 once everyone has returned home at the end of the day.
- There are also two distinct peaks between 09:00 and 10:00 and 18:00 and 19:00, after which the traffic volume decreases gradually with each passing hour. This is due to the traffic generated mainly by pickups (locally known as Zamyad and used for border trade purposes) and trucks. The traffic at peak hours represents approximately 16% of the total daily traffic.
- The daytime traffic volume was observed to be higher compared with nighttime over the 24-hour observation period due, as expected, to commuters and local traffic being more active during daytime hours.
- The traffic between Nok Kundi and Dalbandin contributes significantly to the daily traffic count at T2 (86%) whereas the traffic between Mashkel and Dalbandin represents the smallest contribution at 3% of the daily traffic volume at this location.
- LTV traffic formed about 75% of the daily daytime traffic volume and 69% of nighttime traffic volume observed during this period, with HTVs representing 25% daily daytime traffic volume and 31% of nighttime traffic volume. LTV traffic is dominant on this stretch of the N–40 highway due to the movement of a greater numbers of pickups mainly for transportation of goods and fuel from the Taftan.

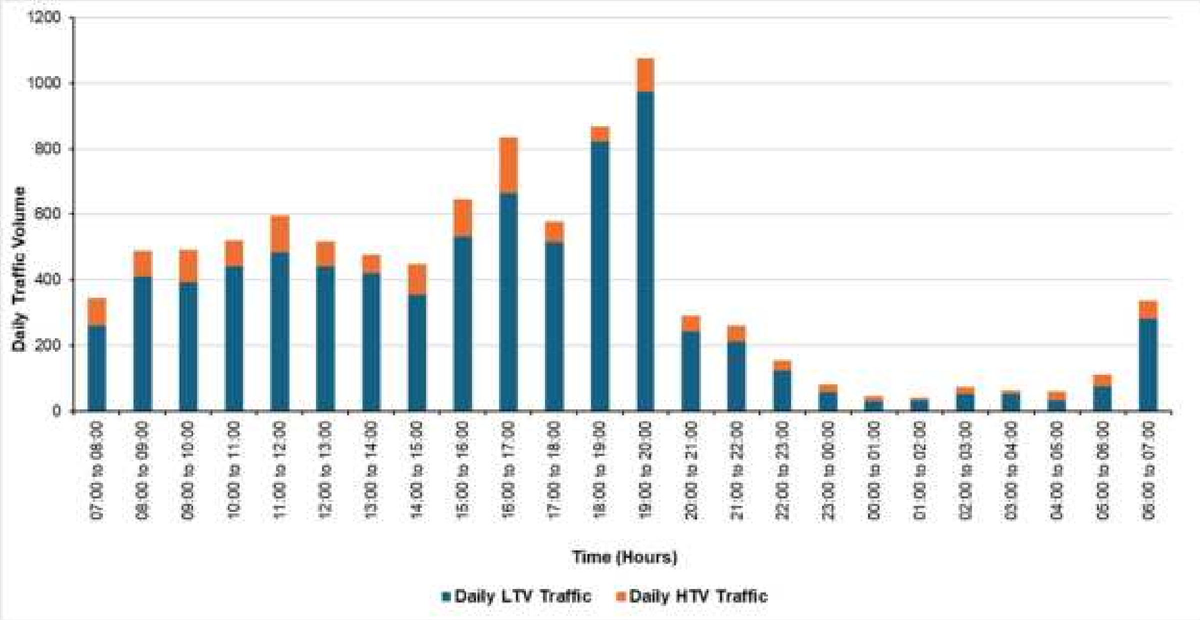


Figure 5-46: Daily Traffic Volume at T3 (Dalbandin)

- Figure 5-46 shows the recorded traffic volume at location T3 (Dalbandin) over the 24-hour period and reveals that the traffic starts from 6:00 to 7:00, when people begin their commute to work and then later subsides between 21:00 and 22:00.
- At T3, there are two distinct peaks centred around 11:00 to 12:00 and 19:00 to 20:00, after which the traffic volume steadily decreases. This is due to the traffic generated mainly by pickups, trucks and buses, the latter of which have daily schedule operations during these times. The traffic at peak hours represents approximately 18% of total daily traffic.
- Daytime traffic volume was observed to be higher when compared to nighttime traffic as commuting passengers and local traffic are more active during the daytime hours.
- LTV traffic forms about 85% of the recorded daytime traffic volume and 73% of nighttime traffic volume in comparison with HTV traffic, which forms only 15% of daily daytime traffic volume and 27% of nighttime traffic volume. LTV traffic is dominant at this location as the N-40 highway is mainly used for transportation of goods and fuel from Taftan, near the Iranian border. This is the main occupation of the residents in the area and when breaking down the type of LTV vehicles at this location, 34% of the vehicles were cars, 31% were bikes and 30% were pickups.

5.7.2. Rail Traffic

Pakistan Railways is the national, state-owned railway company of Pakistan. Founded in 1861 and headquartered in Lahore, it is responsible for an extensive network of 7,791 km of track across Pakistan. The railway system caters to both freight and passenger trains. There are currently five main lines and approximately 20 branch lines connecting cities and towns across Pakistan.

The Project will use the existing rail route from Nok Kundi to Port Qasim. This route is about 1,350 km long and passes through two provinces:

- Balochistan Province: existing rail route from Nok Kundi to Dera Allah Yaar; and
- Sindh Province: existing rail route from Dera Allah Yaar to Port Qasim.

Most of the railway lines laid as a single track and with standard gauge. According to the station master at Nok Kundi (the closest station to the mine site) consulted in September 2023, the frequency of passenger and freight trains is about once and twice in a week, respectively.

5.7.3. Port Qasim

A traffic count was conducted at one location in the Northwestern Industrial Zone of Port Qasim (T11) with Figure 5-47 illustrating the results for this survey.

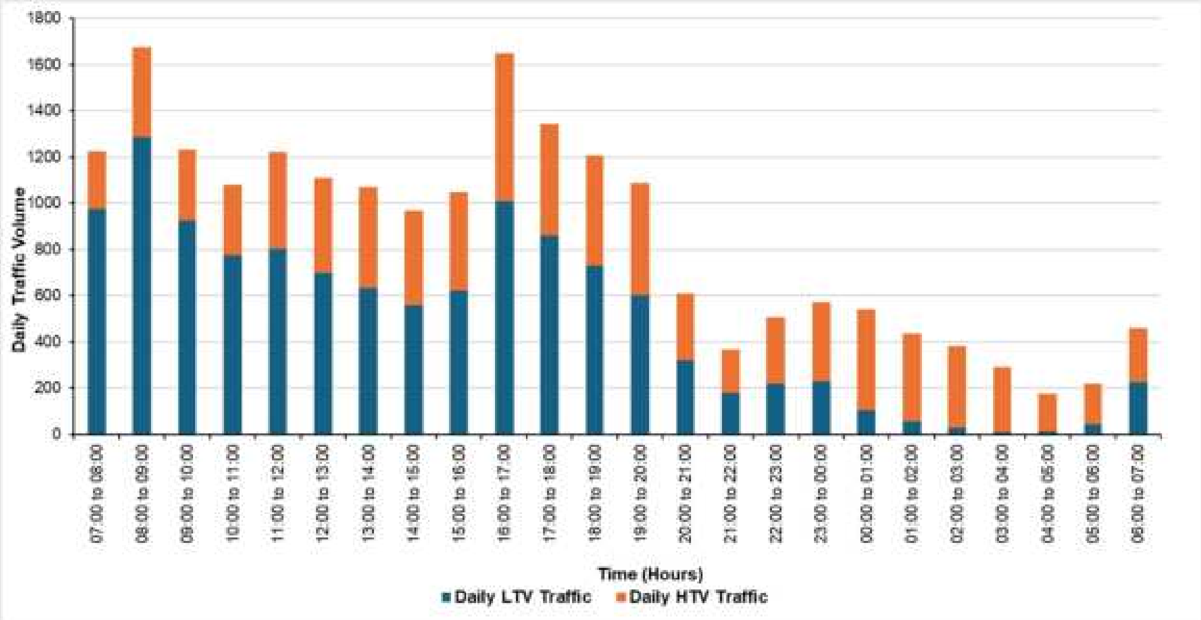


Figure 5-47: Daily traffic Volume at T11 (Port Qasim)

- Traffic typically starts to build from 6:00 to 7:00 when people commute to work and subsides between 21:00 and 22:00. Two distinct peaks, centred at 08:00 to 09:00 and 16:00 to 17:00 occur, after which the traffic volume decreases gradually. The traffic at peak hours represents 16% of total daily traffic volume observed at this location.
- The traffic volume observed during the daytime was higher compared to nighttime due to commuting passenger and local traffic operates primarily during the daytime hours.
- LTV traffic forms about 65% of the daily daytime traffic volume and 23% of nighttime traffic volume in comparison with the HTVs, which form 35% of the volume of daily daytime traffic volume and 77% of nighttime traffic volume.
- LTV traffic is dominant during the daytime due to the movement of increased numbers of passenger traffic, mainly cars and bikes, for transportation of workers commuting to and from work. The two separate peaks for LTVs are centred around 08:00 to 09:00

and 16:00 to 17:00 where, on average, the traffic during these peaks accounted for about 20% of the total daily volume of LTV traffic.

- HTV traffic accounted for 77% of the nighttime traffic observed during the monitoring period. The dominant HTV traffic is related to the movement of trucks transporting construction materials and industrial supplies. The peak hours for HTV traffic occur between 11:00 to 12:00 and 16:00 to 17:00 which accounted for 12% of the total daily HTV traffic volume.

5.8. Cultural Heritage

A Cultural Heritage Assessment was conducted as part of this ESIA process; the detailed report is included as Appendix F. The cultural heritage survey was conducted in April 2024 with the purpose of updating the cultural and archaeological baseline prepared as part of the 2010 ESIA by verifying the locations and current conditions of the archaeological sites and to assess if any change occurred during the past 14 years.

The study area comprised the Mine lease area, the Northern Groundwater System and the area immediately adjacent to the railway track along Railway Transport Route to Port Qasim.

Consistent with the methodology adopted for the 2010 survey, two categories of archaeological sites were surveyed:

- *Temporary Archaeological Sites*: These are locations where people lived briefly and produced or processed goods, such as stone tools. These sites, often found near raw material sources, served as workshops for tool manufacturing. Indicators of factory sites include raw materials, finished and unfinished tools, and debris. Many factory sites also functioned as campsites or living sites.
- *Permanent Archaeological Sites*: These are locations, large or small, where traces of long-term human occupation or activity are found. A key feature of these sites is the presence of structures built with stone boulders, mud, burnt bricks, or mud mortar lumps, indicating prolonged human settlement. These sites typically include activity areas with cultural materials such as stone tools, pottery, metal objects, precious stones, clay artifacts, and everyday utensils, often found in rubbish dumps buried in the ground.

5.8.1. Regional Overview of Cultural Heritage Resources

The earliest traces of ancient history in the region include the ruins of terraced embankments, or 'Gaurbastas,' at the foot of the Raskoh Hills, approximately 200 km west of the Project site and 50 km west of Dalbandin. Other notable heritage buildings in the area are the square-plan tombs in the western part of the district, locally known as Galuga. According to local traditions, these tombs are attributed to the Kaiauis of the Achaemenian Dynasty of Persia.

The remains of ruined forts and karezza found in various parts of the Chagai District are often assigned to the Arab period, during which the neighbouring province of Sistan in Iran reached the peak of its prosperity. However, some of these structures are also attributed to the Mughals. These historical remnants indicate a prosperous and civilised population among the Baloch and Barahvis inhabitants who currently populate the area.

5.8.2. Heritage Value of Railway Station Buildings

The British period architecture in Pakistan carries significant historical, cultural, and architectural importance. These standing structures reflect the legacy of British colonial rule and the succeeding relationship of local and Western influences.

The railway station buildings constructed between 1917 and 1920 in the Balochistan province of Pakistan exhibit distinctive features of colonial-era architecture. These structures typically showcase a blend of British and local architectural styles, incorporating elements such as burnt brick façade elevation on entrances, grand arched entrances, semi-circular arches in veranda, and decorative detailing. The design in cut-brick pattern often reflects the realistic needs of the railway system, with spacious platforms, and sometimes vaulted roofs.

Additionally, these monuments were equipped with the basic requirements of a public station including a water reservoir facility in almost all documented buildings because drinking water was not available locally and was transported from Ahmedwal Station. Details of the railway stations are provided in Appendix F. The railway stations will not be impacted by the Project.

5.8.3. Field Observations

During the survey undertaken in April 2024, there were two main areas of focus:

- *RDMS (including the Northern Groundwater System)*: All four archaeological sites (stone tool workshops) identified and marked during the 2010 Cultural Baseline Survey Report were revisited, examined, and photographed. Additionally, eleven rock features were investigated. Nine of these rock features are located within the mining area footprint and the remaining two occur near the Northern Groundwater System.
- *Rail Transport Route*: 25 railway stations constructed between 1917 and 1920 were identified along this route, however these are not expected to be impacted as a result of the Project.

The key findings of the cultural heritage survey conducted in 2024 are as follows:

- The four archaeological sites that are located within the Project footprint are temporary archaeological sites and are unlikely to have buried remains. Regardless they are assessed to potentially have value as archaeological sites and will be treated accordingly.
- Eleven distinctly human-made structures, referred to in this report as 'Rock Features' were identified. Examples of such rock features includes stone cairns, hearths, and shelters. These sites were reported to not have any existing cultural significance; communities consulted had limited knowledge and speculated that some sites may be relatively newly constructed to aid in loading camels.
- The railway stations along the Rail Transport Route have distinct features tied to the region's colonial history and have been assessed to be of tangible cultural heritage significance. Stations were spaced 15 to 20 km apart, and were constructed in a similar plan, maintaining the symmetry and local architectural traditions. Many of the railway stations are in a state of disrepair and neglect while others have been aesthetically degraded due to construction that has occurred at a later period.

Pictorial evidence, in-field observations and layout plans were collected for archaeological and other forms of cultural heritage identified in the Study Area. Consultations with the local communities were also undertaken to verify information previously collected and to gather new information about other potential cultural and heritage sites. The locations of all the sites, revisited and new, that were documented during the survey are listed in Table 5-30 with their locations shown in Figure 5-48 and in Figure 5-49.

Table 5-30: List of Cultural Heritage Sites Surveyed during 2024

Map-ID	Location	Description
Archaeological Sites at the RDMS		
RD-001	Near Mine Site access road	 Stone Tool Workshop (RD-001) on the bank of Tozghi Nawar. The temporary archaeological site or stone tool workshop is located on the southern edge of the shallow seasonal lake Tozhgi Nawar (Dry Tozhgi Lake) in the Tozghi area. Site RD-001 consists of a small collection of lithic materials limited to an area measuring 11 m by 10 m. Artifacts are derived from a single orange Chert- cobble and include flakes ranging in size from 3-12 cm in dimension. Materials found near the knapped cobblestone and flakes consist of large stream-rounded cobbles.

Map-ID	Location	Description
RD-002	Near Accommodation Building	 Stone Tool Workshop in Cheel area (RD -002) site. This temporary archaeological site or stone tools workshop of the upper Palaeolithic period is situated in the proposed mining area of the Project. The remains of the ancient period workshop fall within the Cheel Nawar area (Cheel Lake). To the north of the site, the Sheesha Koh range of mountains is located, which according to local sources, the was used to send messages through reflective mirrors to convey messages to the south side (Sheesha Koh translates to mound of the mirror). The site is 21 km northeast of the current exploration camp. The stone artefacts are sparsely scattered on the surface of a flat plain area.

Map-ID	Location	Description
RD-003	Near Accommodation Facility	 Stone Tools workshop in Cheel area, RD-003. This upper Palaeolithic era site or stone tool workshop is situated in the proposed mining area of the Reko Diq project. The site is situated on the southern margin of a dry lakebed in the Chagai District of the Balochistan Province in the desert of northwestern Pakistan. The site RD-3 is located west of RD-2 workshop and the remains also fall within the Cheel Nawar area (Nawar Lake) near the Boram bore camp for groundwater investigations. The site is 21 km northeast of the current exploration camp. The stone artefacts are sparsely scattered on the surface of a flat plain area. This site is comprised of lithic debitage, artefacts include cobbles, flakes and shatter.

Map-ID	Location	Description
RD-004	Within Project's Rougher Tailings Storage Facility (RF1)	 Stone Tools Workshop RD-4 in Cheel Plain Area. The site or stone tools workshop of the upper Palaeolithic period is situated on a plain in the Cheel area. The site is in open, windswept terrain on a gently undulating surface mantled with cobbles of various materials as well as angular spalls of volcanic rock. The stone artefacts are sparsely scattered on the surface of a flat plain area.
Previously Unrecorded Rock Features		

Map-ID	Location	Description
F-001	Northern Groundwater System	 General View of Already Reported Northern Groundwater System F-001 Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.
F-002	Northern Groundwater System	 General view of F– 002 from east Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.

Map-ID	Location	Description
F-003	RDMS	 General View from the Northeast (F-003) An asymmetrical three-sided rock structure with dry-laid walls 0.3 – 0.6 m high.
F-004	RDMS	 General View from the Southeast (F-004) Consisting of two short, parallel dry-laid rock walls up to 0.4 meter high, each 1 meter in length and separated by a distance of 1 m.

Map-ID	Location	Description
F-005	RDMS	 General View from the East (F-005) Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.
F-006	RDMS	 General View from the North (F-006) A rock circle 5 metres in diameter, built into a moderate slope with a dry-laid wall up to 0.5 meter high on the downslope side. The interior of F-006 is filled nearly to the level of the top of the encircling rock wall with sandy sediment.

Map-ID	Location	Description
F-007	RDMS	 General View from the East (F-007) Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.
F-008	Northern Groundwater System	 General View from the North (F-008) Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.

Map-ID	Location	Description
F-009	RDMS	 General View from the South (F-009) Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.
F-010	RDMS	 General view from the East (F-010) Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.

Map-ID	Location	Description
F-011	RDMS	 General View from the Northeast (F-011) Single cairns, or rock monuments, found in a collapsed state and occupy an area 1 m in diameter or smaller.

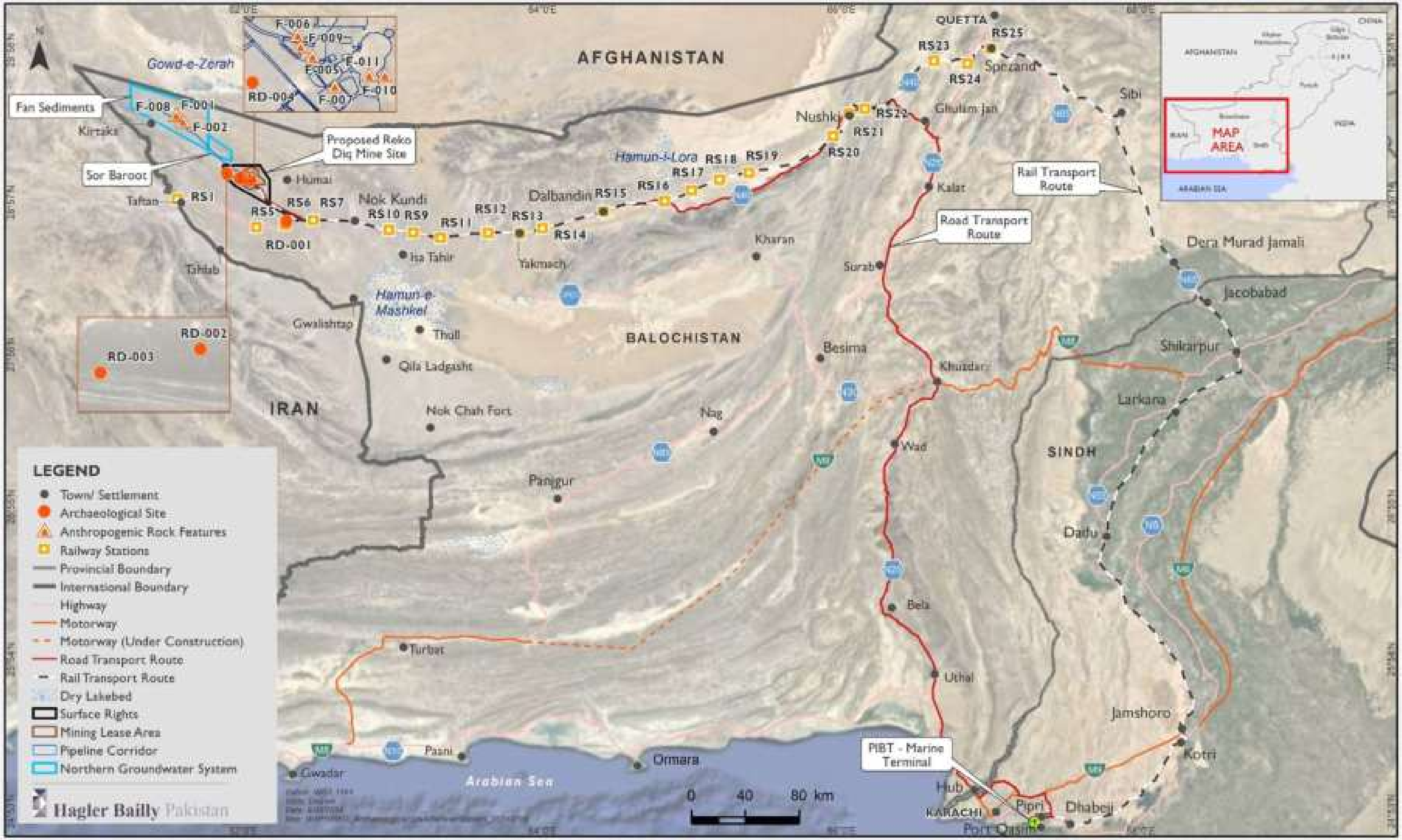


Figure 5-48: Map of Surveyed Cultural Heritage Sites

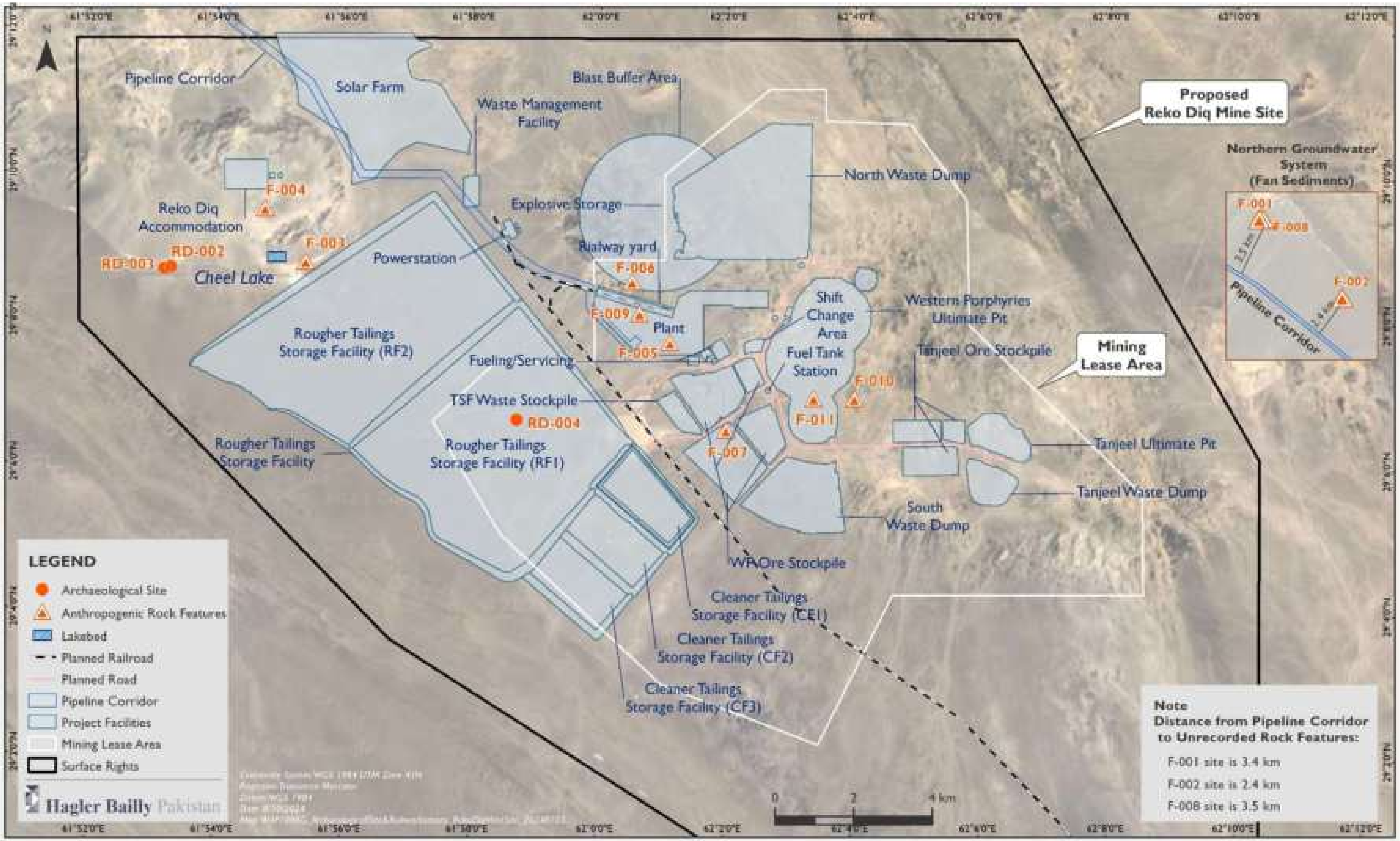


Figure 5-49: Surveyed Cultural Heritage Sites in the Mining Area

5.8.4. Intangible Cultural Heritage

Intangible cultural heritage of Baloch people is rooted in their distinct ethnic identity, shaped by shared language, customs, and a history of resistance to external forces. Key elements of their intangible heritage include tribal social organization, traditional conflict resolution practices, and a strong value system based on honor and respect for community ties, these are further described below.

5.8.4.1. Social Organization and Kinship

Baloch social structure is defined by tribal systems, where kinship plays a central role in maintaining unity. Tribal affiliations are crucial for social cohesion, ensuring solidarity, especially during times of external challenges. The cultural practices that arise from these tribal ties, such as hospitality and protection of guests, remain important aspects of Baloch culture.

5.8.4.2. Tribal Hierarchy and Authority

The traditional leadership structure within Baloch society, particularly the role of the sardar (tribal chief), is an essential part of their culture. Despite legal reforms, the sardar continues to hold symbolic power and influence, particularly in rural areas, where they serve as intermediaries between the tribe and state. This hierarchical system has shaped Baloch governance and political engagement, deeply influencing their cultural and national identity. This hierarchical system, which influences Baloch governance and political engagement, is not unique to Balochistan; similar structures are found in other regions of the country i.e., the neighbouring Khyber Pakhtunkhwa Province and Afghanistan.

5.8.4.3. Conflict Resolution Mechanisms

Traditional mechanisms such as the jirga and Med system are vital to Baloch conflict resolution. The jirga, a council of elders, resolves disputes based on dialogue and consensus, ensuring culturally appropriate solutions that are respected across the community. The Med system, in turn, focuses on restoring balance and honor within the community through formal apologies, symbolic acts, or compensations, aimed at mending relationships and preserving social harmony. The Med system is often invoked to resolve serious breaches of “honor”. Jirgas are also present in other parts of the country.

5.8.4.4. Value System and Code of Conduct

The Baloch code of honor, laj-o-mayar, remains a core cultural aspect. It defines community behaviours, focusing on principles such as bahut (protection), mehmani (hospitality), ber (revenge), and bashk (forgiveness). These codes not only govern social interactions but also shape Baloch moral and ethical conduct, making them a central part of Baloch identity.

5.8.4.5. Religious Practices and Beliefs

Religious practices, particularly Sunni Islam, play a central role in the Baloch belief system, which is aligned with the mainstream Islamic traditions practiced in Pakistan. The cultural significance of religious observances such as daily prayers, fasting during Ramadan, and communal gatherings reinforces the spiritual and social cohesion of the Baloch people.

5.8.4.6. Women's Role and Gender Norms

In Baloch society, traditional gender roles are deeply entrenched within patriarchal structures, where men dominate both public and political spheres. As observed during the community consultations, women's roles are primarily defined by their responsibilities within the household and community, with their primary functions being centred around caregiving, child-rearing, and managing domestic duties. While women's participation in the public sphere is highly restricted due to the practice of purdah, their contributions to cultural and economic activities, particularly through practices such as embroidery, wool-working, and cooking, are essential for preserving Baloch traditions.

Embroidery is a key form of artistic expression and a skill passed down through generations, where women create intricate designs that serve both practical and decorative purposes. These practices not only contribute to the household economy but also hold cultural significance, as many designs reflect family heritage, tribal affiliations, and local symbolism. Women, through such work, play a vital role in preserving Baloch culture, yet these activities remain largely undervalued in the broader social and economic context.

Gender norms in Baloch society significantly limit women's access to education and economic opportunities. Many girls face barriers to formal education, often due to conservative attitudes about women's place in society and the prioritization of male education. This limitation perpetuates the cycle of gender inequality, where women have fewer opportunities for personal and professional development.

In the political and social arenas, women's voices are largely absent. Patriarchal structures often enforce a system where women are excluded from decision-making processes, whether within the family, the community, or at the state level. While some women may hold informal influence within their families or tribes, their ability to participate in governance or public life is constrained by rigid cultural norms. These societal expectations also dictate their behaviour, dress, and interactions, with strict rules about modesty and conduct.

5.8.4.7. Traditional Crafts

Chagai and the broader Balochistan regions are known for rich handicraft traditions, particularly Balochi embroidery. These crafts, often passed down through generations, are central to the region's cultural identity.

5.8.4.8. Festivals and Celebrations in Baloch Culture

Baloch culture is rich in festivals and events that reflect the community's values, traditions, and social cohesion. These festivals often involve family gatherings, community participation, and cultural performances, strengthening the bonds within the Baloch people.

5.8.4.9. Livestock Breeding

Livestock rearing is a longstanding tradition in Chagai, with communities relying on livestock breeding for their livelihood. These practices are deeply tied to local customs and social organization, highlighting a key aspect of life in this region.

5.8.4.10. UNESCO List of the Intangible Cultural Heritage of Humanity

There are currently three distinct aspects pertinent to Pakistan in UNESCO’s List of the Intangible Cultural Heritage of Humanity. These are outlined below.

Falconry

Falconry, a practice with over 4,000 years of history, involves training and flying birds of prey, primarily falcons but sometimes eagles, hawks, and buzzards. It is a vital cultural tradition passed down through mentoring, family, and training clubs. In modern times, falconry focuses on protecting birds, wildlife, and habitats while preserving the practice itself. Despite diverse backgrounds, falconers share common values and traditions, including techniques for breeding, training, and caring for birds, the equipment used, and the deep bond formed between the falconer and their bird .

Falconry is practiced in various parts of Balochistan, but was not observed in the communities surrounding the Mine Site. Falconry is predominantly practiced by foreign nationals that are issued permits for the hunting of the houbara bustard.

Nawrouz

The New Year celebration, observed on March 21, marks the start of the year in several countries, including Afghanistan, Iran, Pakistan, and others. Known by various names such as Nauryz, Navruz, and Nowruz, it symbolizes new beginnings and prosperity. The festival involves rituals, ceremonies, and cultural events lasting about two weeks. A key tradition is gathering around a decorated table, symbolizing purity, wealth, and brightness, to share a special meal with loved ones.

Nawrouz is celebrated in various parts of Balochistan, particularly by the shia muslim community.

Suri Jagek

Suri Jagek, meaning "observing the sun," is a traditional Kalasha system of meteorological and astronomical knowledge, practiced mainly in the Hindu Kush mountains . It relies on the observation of celestial bodies like the sun, moon, and stars in relation to the local landscape. This knowledge helps the Kalasha people determine optimal times for agriculture, animal husbandry, and predicting natural events. It also plays a crucial role in organizing their calendar, guiding the dates for festivals, social events, feasts, and religious ceremonies.

Suri Jagek is not practiced in Balochistan.

5.9. Biodiversity

Biodiversity (Flora and Fauna) Assessments were conducted as part of this ESIA process and are detailed in Appendix H and Appendix I, respectively. Furthermore, a Critical Habitat Assessment was undertaken using the findings from these studies together with supplementary expert consultation/s (refer to Appendix J).

The scope of this assessment comprised the following components of the Reko Diq Project:

- The **Reko Diq Mine Site** and ancillary infrastructure (including the water supply in the northern groundwater system and the and access road infrastructure). This component of the Project was **the primary focus of the ecological studies**, as the proposed activities within this area were novel and represented potentially significant changes to the current landscape and/or natural habitat/s associated with the host communities.
- The **Road and Rail Transport Corridors (Transport Route/s)**, which are limited to existing road and rail infrastructure along an west-to-east corridor toward Quetta, and a north-south line from Pringbad toward Karachi. Due to the large extent of this area and the largely immaterial upgrades[19] and changes proposed for the existing infrastructure, the survey effort along these transport route/s was/were largely limited to a literature review and screening assessment to assess potential presence of significant biodiversity values (or potential critical habitat triggers) that may be at risk to the project acitivities over time; and.
- The **Port Qasim infrastructure** (referred to as the Port Qasim), which is limited to the rail yard and proposed loading facility at the terminal of the railway route and construction of a concentrate storage shed in an established coal export terminal at the Pakistan International Bulk Terminal (PIBT) coal storage facility. It is anticipated that the storage shed at the existing terminal was expected to be constructed under a Lease Agreement with PIBT, which is already approved by an existing IFC-level Environmental and Social Impact Assessment (ESIA) and governed by existing Environmental and Social Management System (ESMS). Subsequently, it is anticipated to yield liability in terms of material handling and export to the Port Qasim Authority (PQA) – the managing agency at Port Qasim.

  Subsequently, the survey effort was variable within these area, but supplementary efforts to asses potential marine, epipelagic and estuarine (or mangrove) sensitivities

[19] The proposed activities along the transport corridor (including road and rail) are limited solely to an access road and a rail link for the mine site, as well as ongoing maintenance/upgrades by Pakistan Rail to ensure the security and reliability of the existing railway. Consequently, it is acknowledged that the cumulative impacts upon existing sensitivities along the existing routes were likely to be negligible and limited to marginal increases in traffic and/or cadence of the logistical schedule.

and receptors[20] were pre-emptively undertaken earlier in the project design phase (as part of a Port Alternatives assessment – refer to Section 4.8), but not deemed to be directly material to the biodiversity risks associated with the proposed activities at the time of the assessment, as the infrastructure was largely established and utilised irrespective of the development of this project.

5.9.1. Approach to Study

To assess the significance of the associated potential biodiversity-related sensitivities, it is important to define the ecologically appropriate boundaries of the study area to contextualise the scale and magnitude of the overall Project and its activities.

The following sections briefly present the rationale for defining the Project AoI and Ecologically appropriate area of analysis (EAAAs), which provides a foundation for characterising the habitat condition, identifying potential species of conservation concern (SCC), and determining the presence of critical habitat.

5.9.1.1. Project Area of Influence

The Project AOI of the different aspects of the Project are discussed in the main body of the CHA report (Appendix J). The AoIs were defined as follows, in accordance with the rationale provided above:

- A **Project AoI of 10 km** was proposed for the Mine Site (incl. ancillary infrastructure), considering its location in a desert and xeric shrubland biome, which generally results in a smaller area if disturbance to surrounding biodiversity values, and any indirect impacts that may arise from the Project;
- **An AoI of 1 km** was considered along the road and railway transport route/s considering the low potential cumulative effect associated with the potential for increased of traffic along existing infrastructure – either by railway or road; and
- Due to the largely urbanised surroundings within the industrial areas surrounding the Port Qasim, an **AoI of 1 km** was assigned for the rail yard and the area surrounding the PIBT facility.

Both the associated portions of the transport route/s and Port Qasim were assessed from a screening perspective, as the potential impacts associated with these areas was considered to be largely negligible in terms of future cumulative impacts along largely pre-existing infrastructure. This further aligns with the average extent of infrastructure impacts equating to 1.3 km, as supported by a Technical Briefing note from the United Nations Environmental Programme: World Conservation Monitoring Centre (UNEP: WCMC, 2021, 2022).

[20] As per the Project Description, the concentrate will be conveyed by rail within a closed circuit and offloaded at the railway yard prior to being trucked to the proposed storage shed at the existing terminal and then loaded into transport ships through an enclosed loading chute. It was concluded that, the risks to biodiversity in terms of potential contamination / spills or any other impacts was/were considered to be negligible. Consequently, marine and estuarine (or mangrove) impacts are considered to have been assessed under the previous ESIA for PIBT and the focus of the new Reko Diq Project components (i.e. the Railway Yard and the haulage route between Offload Area and the PIBT was largely focused on the terrestrial realm.

5.9.1.2. Sampling Efforts and Seasonality

The data for the assessment of the floral and faunal ecology study were initially sourced from literature review and available spatial datasets (incl. International Biodiversity Assessment Tool, IBAT), as well as supplemented and verified through seasonal field surveys to assess the baseline conditions within the Project Area/s.

Due to the scale of the Project, it has been assessed in three separate components comprising:

- **Reko Diq Mine Site (hereafter RDMS)**: Mine site, northern groundwater system and the access road infrastructure;
- **Road and Rail Transport Route/s**; and
- **Port Qasim infrastructure** (hereafter Port Qasim, or PIBT).

The survey efforts and associated rationales are described in Table 5-31.

Table 5-31: Ecological sampling efforts for flora and fauna surveys

Project Component	Surveys / Seasons[21]	Rationale
RDMS	Post-Monsoon 2022 Spring 2023 Summer 2024	Primary focus of the biodiversity studies as the proposed construction activities are to take place within this area. The supplementary Summer 2024 survey focused on an area parallel to the Afghanistan border (including a potential movement corridor between Zangi Nawar and the Project site.
Transport Routes	None	Due to the large extent of this area and the largely immaterial upgrades and changes proposed for the existing infrastructure, data collection was limited to a literature review and screening assessment, as well as remote sensing analysis in terms of the habitat classification.
Port Qasim infrastructure	Post-Monsoon 2023	It is noted the proposed lease for the construction of a Concentrate Storage Shed at the PIBT at Port Qasim will fall under the administrative jurisdiction of the Secretary to the Government of Pakistan for Maritime Affairs and operated by the Port Qasim Authority (PQA). As per the PIBT approved ESIA by EMC (2011), the existing operational management plans will continue to guide the PIBT operations, and used for the handling and exporting of the concentrate. Therefore, the liability for

[21] Post-monsoon 2022 survey was undertaken between 13th September – 13th October 2022 | the Spring 2023 survey was undertaken between 28th April – 13th May 2023 | Post-monsoon 2023 survey was undertaken between 12th October 2023 – 26th October 2023 | Summery 2024 survey was undertaken 22nd July 2024 – 5th September 2024 to supplement collection data and to assess faunal similarities and connectivity between Reko Diq Project and Zangi Nawar Wildlife reserve.

Project Component	Surveys / Seasons[21]	Rationale
		any potential impact upon the marine environment is already assessed under the IFC's approval for the PIBT Coal Terminal and as such, the marine ecosystem was not considered for the critical habitat assessment

In addition, from a faunal survey perspective, the following table (Table 5-32) summarises the survey effort for the faunal survey/s between various seasons and/or faunal groups, while additional surveys are also due to be undertaken in April 2025.

Table 5-32: Ecological Resources Sampled in Post-Monsoon 2022, Spring 2023 and Post-Monsoon 2023 Surveys, and Summer 2024

Ecological Resource	Post-Monsoon 2022 Survey RDMS and Northern Groundwater System	Spring 2023 Survey RDMS and Northern Groundwater System	Post-Monsoon 2023 Survey Port Qasim	Summer 2024 Survey RDMS, NGWS, Access Route to RDMS, Corridor and Zangi Nawar Game Reserve)
Terrestrial Fauna				
Avifauna	√	√	√	-
Herpetofauna	√	√	√	√
Mammals	√	√	√	-
Small Mammals	√	√	–	√
Invertebrates	√	√	–	
Marine and Coastal Fauna				
Marine Benthic Invertebrate (MBIs)	–	–	√	-
Epi Pelagic Fauna	–	–	√	-
Pelagic Fish Communities	–	–	√	-

5.9.2. Reko Diq Mine Site

The proposed Reko Diq Mine occurs in **the Registan-North Pakistan Sandy Desert** located in the Persian Deserts & Mountain Woodlands Bioregion. This ecoregion stretches from eastern Iran into southern Afghanistan and western Pakistan covering all of the mine and part of the road and rail transport route/s. Furthermore, forms part of the dry **Sistan Basin** of southern Afghanistan, as well as portions of eastern Iran and southwest Pakistan. Of biological importance, several reptiles are endemic to this ecoregion, while some threatened birds (incl. Sociable Lapwing, Steppe Eagle, and Saker Falcon) and mammals (incl. Goitered Gazelle) are known to be present across the region. However, during the war, airstrip for wealthy Arabs were built to facilitate hunting, which has resulted in some of the species number dwindling and the observations being more rare (UNEP-WCMC (2020).

The region is dominated by dry sandy desert conditions, with some irrigated cropland, where water is available. The area is characterised by a **desert biome**, revealing distinct features typical of an arid environment of scant rainfall leading to limited vegetation. Drought conditions are prevalent as this region experiences low annual precipitation and high temperatures, fostering a landscape with limited vegetation adapted to survive in dry conditions. The terrain consists of sandy or gravelly surfaces, often with dunes or rocky landscapes, and the soil is well-drained, but nutrient levels are typically low. Temperature extremes are common, with hot daytime and cooler nights. The area hosts floral species that have adapted to such extreme conditions.

5.9.2.1. Protected Areas and Areas of International Biodiversity Importance

Based on the IBAT report (received from HBP, dated June 2024), there are no protected areas and KBAs within the Project Area[22]. However, there is further investigation regarding the validity, extent and status of the Saindak Community Game Reserve within the vicinity of the study area, directly to the west.

Although there are no KBAs and Ramsar Site of Wetland Importance identified within 50 km of the RDMS, there are others in the greater region. No UNESCO-defined areas of international biodiversity importance were present within the 50 km of the RDMS.

5.9.2.2. Vegetation Coverage and Habitat Classification

The RDMS Project AoI was observed to consist almost entirely of *natural habitats* with an area of 3,277.12 km^2, including mountains/hills, clayey plains, dry streambeds, gravel plains, and Sand Plains/Sand Dunes.

Overall, only 2.54 km^2 of *modified habitat* (specifically the built-up areas) was identified to occur in the Project AoI, which comprised only of the built-up areas. The habitats identified within the RDMS are discussed in detail in Table 6-8, illustrated in Figure 5-50 and Figure 5-51.

[22] Based on a more recent IBAT report (dated November 2024), the Saindak Community Game Reserve is listed within a 50 km radius directly west, but the polygon is not provided and the extent/area cannot be confirmed within the supporting documentation provided by the Balochistan Forests and Wildlife Department (BFWD). In the absence of sufficient information and pending further legal investigation regarding the legitimacy of the claimed area, as well as the permissible land uses within the reserve, especially since it is not a IUCN Management Category of concern, the reserve is only considered tentatively. Following the feedback from the legality investigation, any biodiversity-related sensitivities or receptors may need to be reassessed, where applicable.

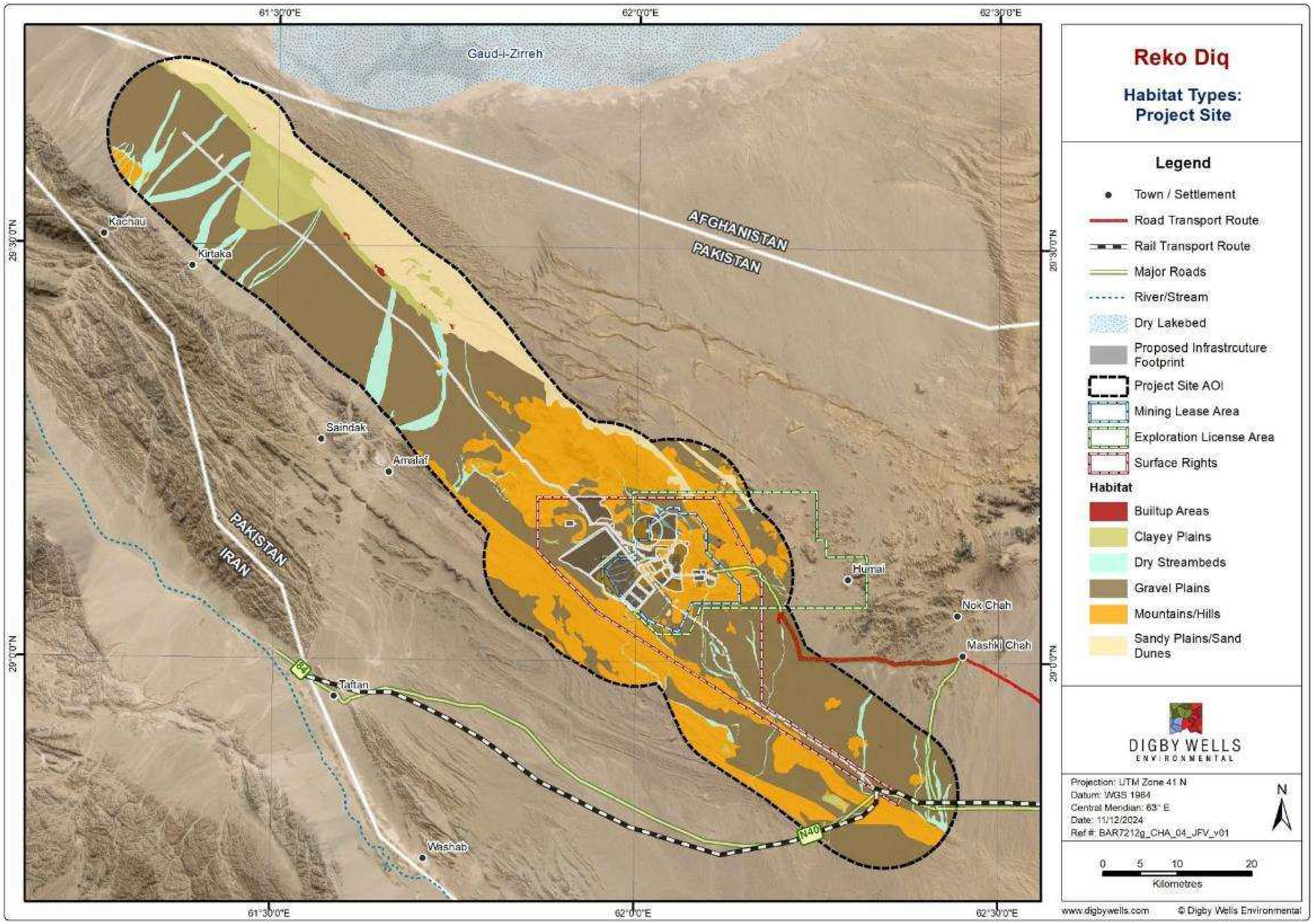


Figure 5-50: Habitat Classification at the RDMS

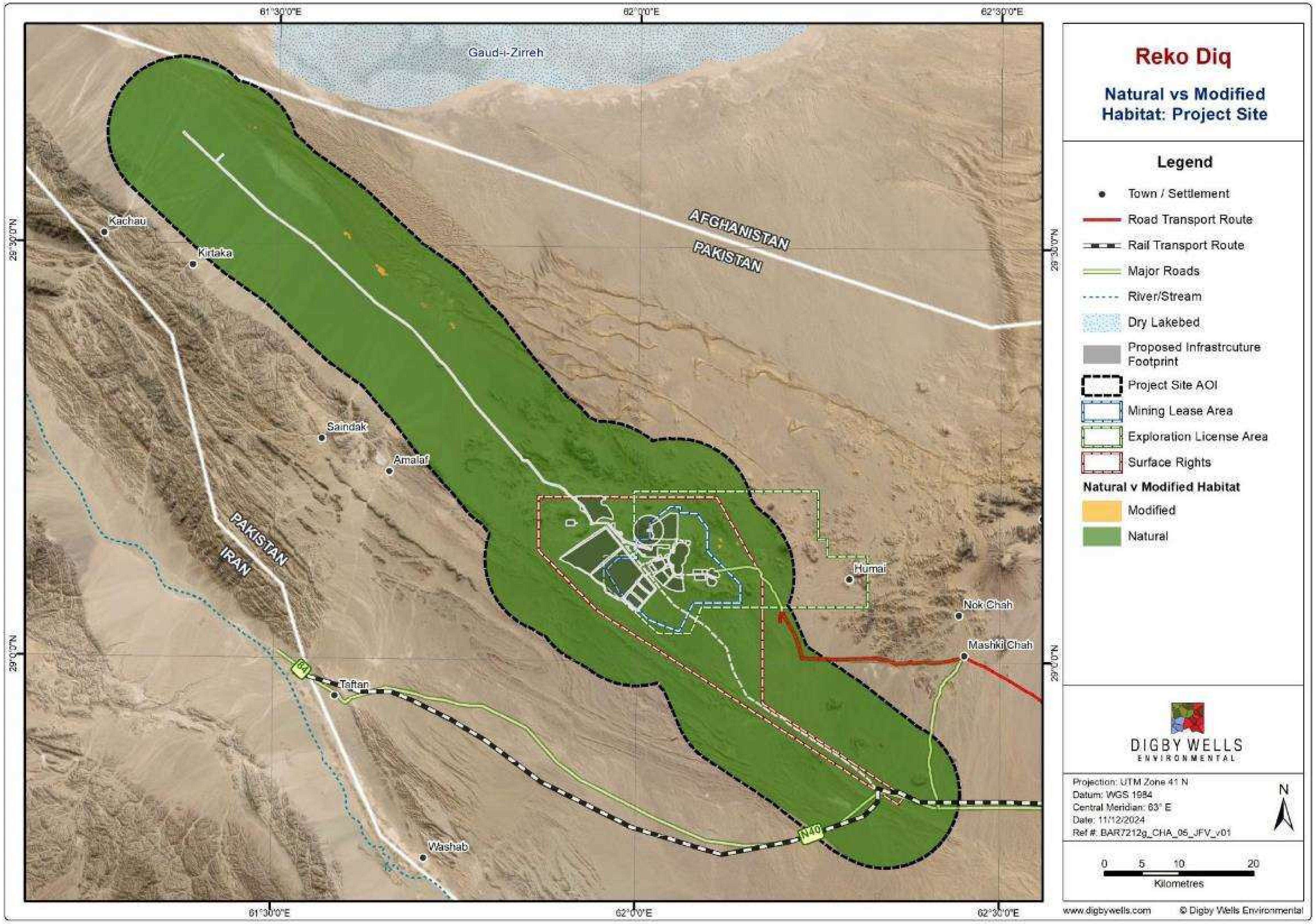


Figure 5-51: Natural and Modified Habitat identified in the Project AoI

5.9.2.3. Biological Diversity

The following sections briefly describe the findings from the baseline ecological survey/s undertaken, per floral and fauna group assessed.

5.9.2.3.1. Floral Species

The IBAT dataset reports that 78 expected floral species were expected within a 50 km buffer of the RDMS, while a literature review confirmed 55 plant species within the RDMS. None of the species reported are listed as threatened according to the IUCN Red List of Threatened Species, nor are any range restricted species present.

During the surveys, a total of 20 plant species were observed in the Post-Monsoon 2022 Survey and Spring 2023 Survey, which was relatively low in relation to the expected species, but aligned with the expected diversity within a sparsely vegetated desert environment landscape. None of the identified species are listed as threatened (i.e. Vulnerable, Endangered, or Critically Endangered) on the global IUCN Red List of Threatened Species. of Threatened species, but eighteen were observed in the Post-Monsoon 2022 Survey and 10 in the Spring 2023 Survey. Species observed post-monsoon, that were not observed in spring were predominantly herbaceous species.

One Alien Invasive Plant (AIP) species, the Honey Mesquite (*Neltuma glandulosa*), was observed. This species is well-suited to harsh conditions and possesses the potential to outcompete other species in the area. It is essential that an AIP Management Plan is implemented to prevent the spread of this species.

5.9.2.3.2. Avifaunal Species

The IBAT for the RDMS reported 171 bird species, eight of which are considered species of conservation concern (SCC), including one Critically Endangered (CR), three Endangered (EN), and four Vulnerable (VU) species. No range restricted bird species were flagged as a potential concern, but there are 145 species that are considered to be migratory.

The presence of 43 bird species in the literature indicates a range of microhabitats and resources that can support avian life within the RDMS. Of these 43 species, two IUCN Threatened species were present, the Egyptian Vulture (*Neophron percnopterus,* listed as EN) and Asian Houbara Bustard (*Chlamydotis macqueenii*, listed as Vulnerable).

During the surveys (Post-monsoon 2022 and Spring 2023), 59 bird species were observed, with two were threatened on the IUCN Red List species, including:

- Egyptian Vulture (two individuals, listed as EN); and
- Asian Houbara Bustard (1 individual, listed as VU).

Sociable Lapwing (Vanellus gregarious, listed as Critically Endangered) is a migratory bird that prefers habitats with water bodies, usually lakes. Since surface water only occurs rarely and for short periods following heavy rainfall events within the study area, there is very little probability of this species' occurrence in the area. Other Species of Conservation Concern

(SCCs) included Steppe Eagle (*Aquila nipalensis*, listed as EN), Saker Falcon (*Falco cherrug*, listed as EN), as well as Eastern Imperial Eagle (*Aquila heliaca*, listed as VU),Greater Spotted Eagle (*Clanga clanga*, listed as VU), and Yellow-eyed Pigeon (*Columba eversmanni*, listed as VU). However, none of these species were detected during the seasonal surveys.

5.9.2.3.3. Mammals

The IBAT report for the expected 45 mammalian species at the Mine Site, with three considered to be threatened, including the Marbled Polecat (*Vormela peregusna*, listed as VU globally and LC nationally within Pakistan), Goitered Gazelle (*Gazella subgutturosa*, listed as VU globally and CR nationally within Pakistan listed) and Asiatic Black Bear (*Ursus thibetanusare,sp. gedrosianus*, listed as VU globally and CR nationally within Pakistan). The Asiatic Black Bear is unlikely to occur in this area as habitat conditions are not suitable (prefers the woodland area with slightly higher altitudes), while the Marbled Polecat has not been observed at the RDMS despite its wide (yet fragmented) distribution reange.

Based on the literature review, a total of 11 species are recorded to occur, two of which are listed as VU globally, namely the Afghan Urial (*Ovis vignei*) and Goitered Gazelle (*Gazella subgutturosa*). Of these species, all but three have been observed through previous and current surveys. No range restricted mammals were reported for the RDMS.

A total of twelve species of large mammals and nine small mammals were observed (signs/sightings) in the Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024 surveys, including several SCCs. These species are listed in Table 5-33.

Table 5-33: SCC Recorded in the Surveys

Scientific Name	Common Name	IUCN Status	National Status	Location
Felis margarita	Sand Cat	LC	CR	RDMS
Gerbillus cheesmani	*Cheesman Gerbil*	LC	VU	RDMS, corridor, Taftan area and Zangi Nawar
Lepus capensis	Cape Hare	LC	VU	RDMS
Ovis vignei cycloceros	Afghan Urial	VU	VU	RDMS
Vulpes rueppellii	Sand Fox	LC	VU	RDMS
Gazella subgutturosa	Goitered Gazelle	VU	CR	RDMS
LC – Least Concern; VU – Vulnerable; CR – Critically Endangered				

Bat surveys were not undertaken and given the fact that *Rhinolophus ferrumequinum* (Greater Horseshoe Bat) is expected in the area and is listed as VU on the Pakistan Red List, it would be important to undertake targeted bat surveys, which are planned for April 2025. However, this would not be a consideration under the critical habitat criteria, so if presence or likely to be present, it will be treated as a priority biodiversity value (PBVs) within the surrounding landscape.

5.9.2.3.4. Herpetofauna

The IBAT reported 62 expected herpetofauna species within a 50 km buffer of the RDMS with no IUCN threatened species expected.

A total of 36 herpetofauna species were observed during the surveys (Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023, and Summer 2024). All species are LC according to the IUCN Red List. However, one restricted range species, the Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*) was observed along the Northern Groundwater System in Post-Monsoon 2022 Survey and at the RDMS in the Summer 2024 Survey.

Potentially Undescribed Species

Three herpetofauna species observed in the RDMS surveys are considered to be potentially new species and as such, blood and tissue samples have been collected and will need to be analysed to confirm taxonomy (Table 5-34).

Table 5-34: Undescribed Species Observed in the RDMS Surveys

Species	Location	Survey	No. Individuals and Habitat	Within Proposed Infrastructure Footprint
Eremias cf scripta	Mine Site	Summer 2024	1 gravel plains	Yes
	Access Route to Reko Diq Mine Site	Spring 2023	4 in dry streambeds	No
		Summer 2024	4 in gravel plains	No
Eremias sp.	Mine Site	Spring 2023	1 in dry streambeds 1 in clayey plains	Yes
Cyrtopodion sp.	Northern Groundwater System	Summer 2024	2 in mountains/ hills 1 in sand dunes	No

However, the specialist consultant's opinion at the time of the assessment, is that these species will be later confirmed as a new species based on distinct morphological differences from other known species, such as:

- *Cyrtopodion* sp. - The specimens collected exhibit morphological and meristic characters distinct from their closely related congeners, such as *Cyrtopodion scabrum* and *Cyrtopodion watsoni (*Figure 5-53). Key differences include:
  - Arrangement of tuberculated dorsal scales.
  - Number of scales across the mid-belly.
  - Number of intraorbital scales.
  - Arrangement of subcaudal scales.

- *Eremias* sp. - Specimens of *Eremias* sp. members of the family Lacertidae, could not be assigned to any known *Eremias* taxa (Figure 5-53). The only resemblance they show were with *Eremias lineolata* in dorsal coloration, but notable differences with known *Eremias* taxa include:
  - Smaller snout-vent length and head-to-length ratio.
  - Fewer dorsal scales across the midbody.
  - Presence of dorsolateral stripes.
  - More ventral scales across the belly, along with distinct supra- and infralabials.
- *Eremias* cf. *scripta* - These specimens closely resemble *Eremias scripta* in dorsal coloration, but differ in size and specific morphological and scalation details (Figure 5-52), such as:
  - Longer snout-vent length than *Eremias scripta*
  - More precloacal pores than *Eremias scripta*.
  - Fewer dorsal scales across the midbody and ventral scales compared to those reported for *Eremias scripta*.

For the purposes of this assessment, these three species and potential specimens are to be treated as critical habitat triggers due to the lack of information available for these taxa at the time of the assessment. In the interim, the focus will be to definitively confirm whether these species are new to science or whether there is intra-specific morphological variation, but this is unlikely considering the key differences noted above.

5.9.2.3.5. Invertebrates

A variety of invertebrates are present across Pakistan due to the seasonal variation of the country and the availability of different habitat types. However, the research on invertebrates is limited. More than 5,000 species of invertebrates are reported from Pakistan, including insects (1,000 species of true bugs, 400 species of butterflies and moths, 110 species of flies, and 49 species of termites). The total number of butterfly species likely exceeds 400, with high rates of endemism in the Satyrids, Lycaenids, and Pierids families. No studies have been conducted previously on invertebrates in the Chagai District.

The IBAT reported 62 invertebrate species at RDMS. All the invertebrate species that were identified to the species level in the surveys (Post-Monsoon 2022 and Spring 2022) are listed as LC, DD, or NE on the IUCN Red List of Threatened Species, namely *Trochorbis anastasiae* (Freshwater Snail, listed as DD).

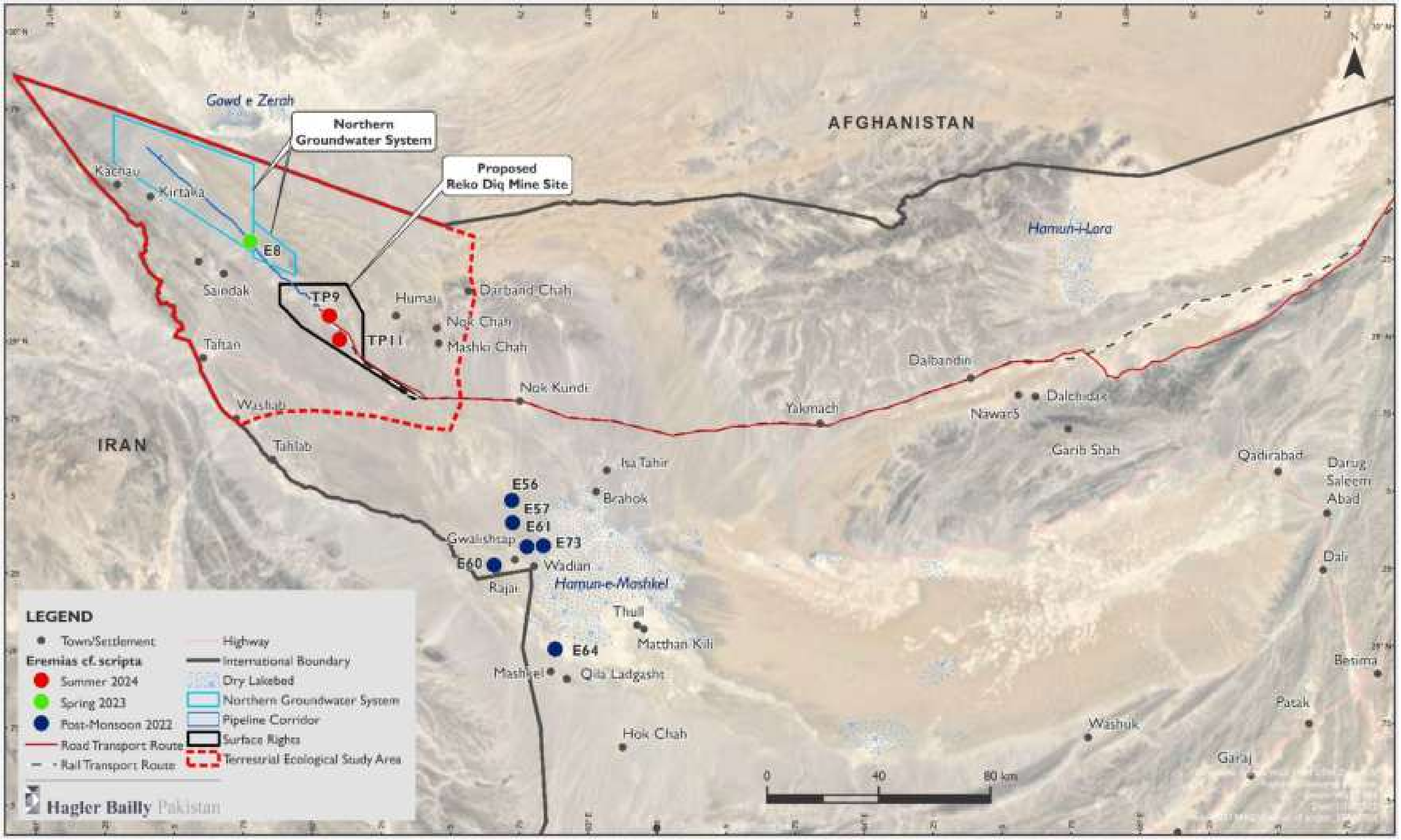


Figure 5-52: Map indicating locations of unidentified species, *Eremias cf scripta*

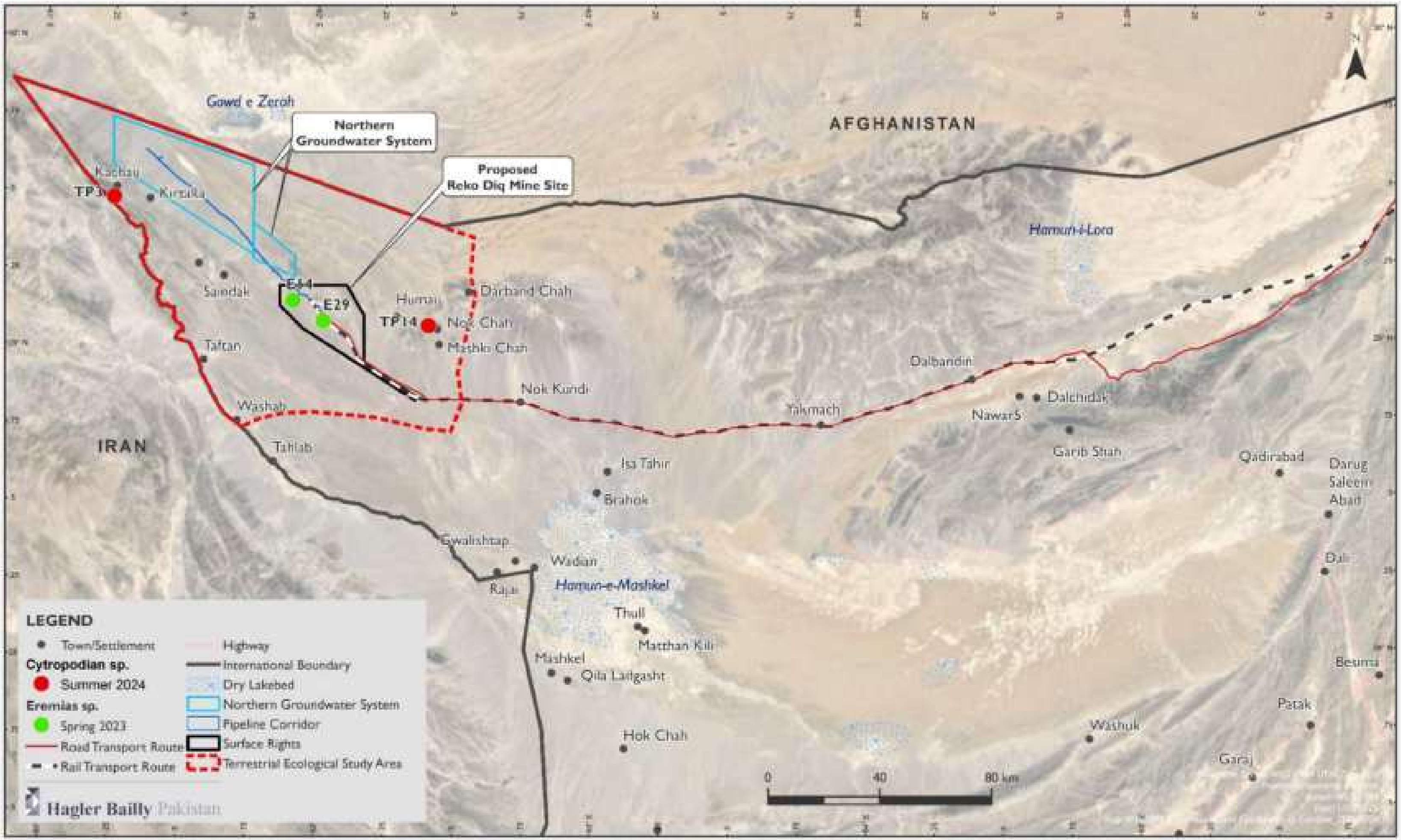


Figure 5-53: Map of potential unidentified species, *Eremias sp. and Cyrtopodion sp.*

5.9.3. Transport Route/s

In addition to the aforementioned **Registan-North Pakistan Sandy Desert (Persian Deserts & Mountain Woodlands Bioregion)**, the transport route/s traverse two other bioregions prior to terminating near Port Qasim and the coastline, namely:

- **Afghan-Balochistan Drylands, Mountain Meadows & Conifer Forests bioregion**, which is part of the Persian Deserts & Forests sub-realm of Central Asia.
  - The north-south road transport route traverses the Baluchistan Xeric Woodlands ecoregion, which is also understood to be the home of the highly threatened Baluchistan Bear (or Asiatic Black Bear), and a scattered portion of the Sulaiman Range Alpine Meadows ecoregion.
- **North Indomalayan Deserts & Scrub Forest bioregion**, which is dominated by the drylands and deserts of the Indus River and Luni River valleys.
  - The north-south railway transport route largely follows the Aravalli West Thorn Scrub Forest ecoregion, which represents the thorn scrub forests of northwestern parts of Indian sub-continent.

Considering the altitude change along the Transport route/s, the adjacent habitat along these route/s are suspected to support a variety of floral and faunal species to the Mine Site despite the harsh, desolate environment. However, it is acknowledged that these bioregions are fairly modified with several important species having already been extirpated over time (UNEP-WCMC (2020).

5.9.3.1. Protected Areas and Areas of International Biodiversity Importance

There are several protected areas overlap with the AoI for the transport route/s, as shown in Table 5-35. Of these areas, four are designated Habitat/Species Management Areas (IUCN Management Category IV and the remainder are not designated under IUCN Management Category.

Table 5-35: Protected areas located within the AoI of Transport Corridor/s

Name	Designation	Designation	IUCN Category
1 km			
Keenjhar Lake (Kalri, Malik Lake)	Wildlife Sanctuary	National	IV
Dhoung Block	Wildlife Sanctuary	National	IV
Kachau	Wildlife Sanctuary	National	IV
Shashan	Wildlife Sanctuary	National	IV
Khurkhera	Wildlife Sanctuary	National	Not Reported
Sumbak, Surjan, Eri, Naree and Hothiano (Kohistan Track)	Game Reserve	National	Not Reported
Duzdara and Koh-e-Surkho	Game Reserve	National	Not Reported
Baran Lakh	Community Game Reserve	National	Not Reported
Gut	Wildlife Sanctuary	National	Not Reported

Interestingly, two KBAs overlap with the AoI of the proposed transport route/s, including **Hazarganji Chiltan National Park**[23] **and Kinjhar Wildlife Sanctuary** - the Kinjhar Wildlife Sanctuary is also noted to be a Ramsar Wetland of Importance. There are more KBAs, as well as other Ramsar sites, further away from the transport corridor, as shown in Figure 5-54, Figure 5-55, Figure 5-56.

Given that the proposed transport route/s use existing infrastructure, it is **not anticipated that any biodiversity risk will extend across the protected areas and KBAs** and as such, they are not included in the delineation of the aforementioned EAAAs.

[23] The boundary for the KBA does not correlate with the boundary of the national park, situated to the east and classified under the IUCN Management Category V, despite the same naming convention. According to the KBA datasets, the park was assessed in 2004 and includes triggers for threatened species, namely Egyptian Vulture and Saker Falcon.

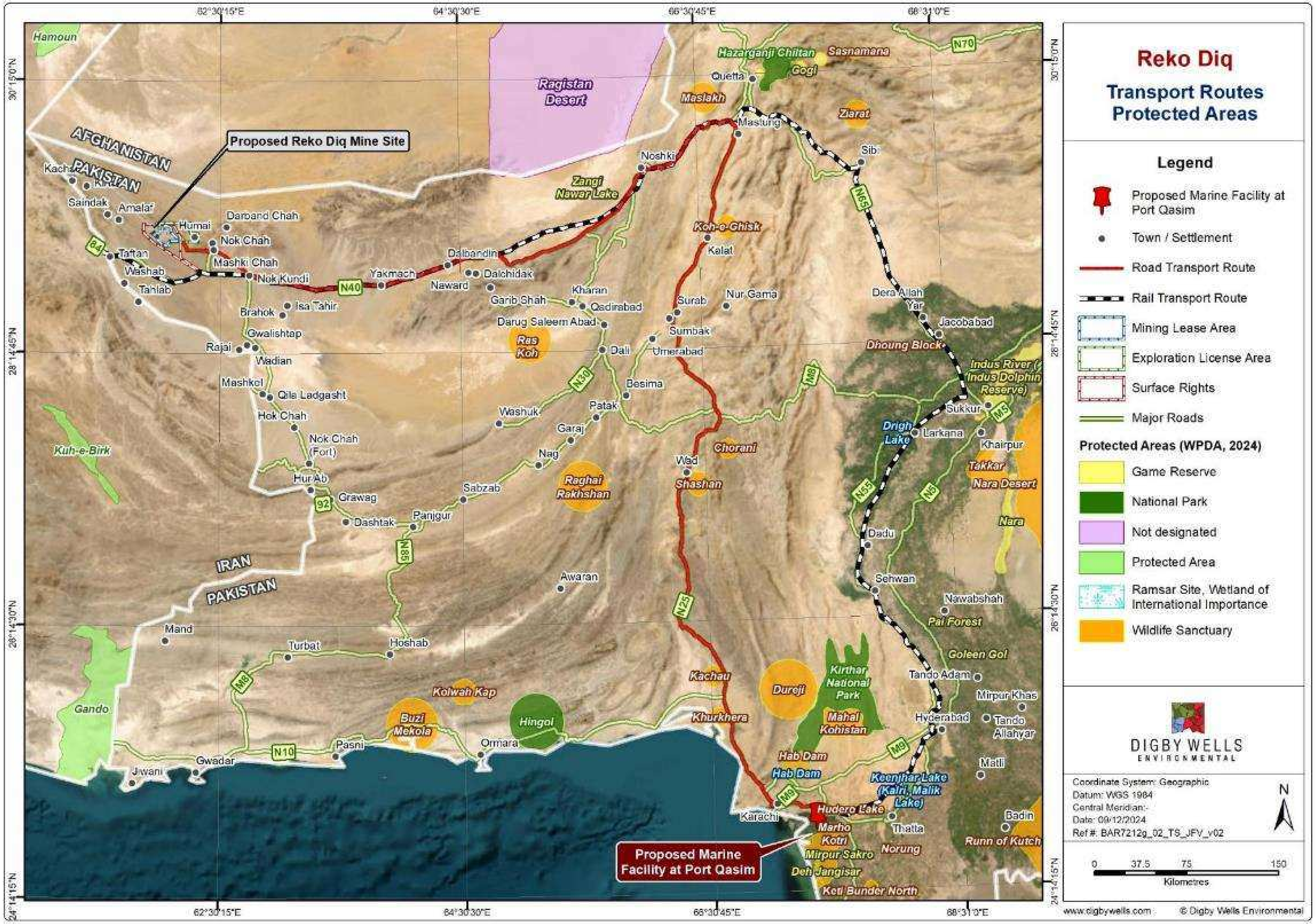


Figure 5-54: Protected areas in the greater region

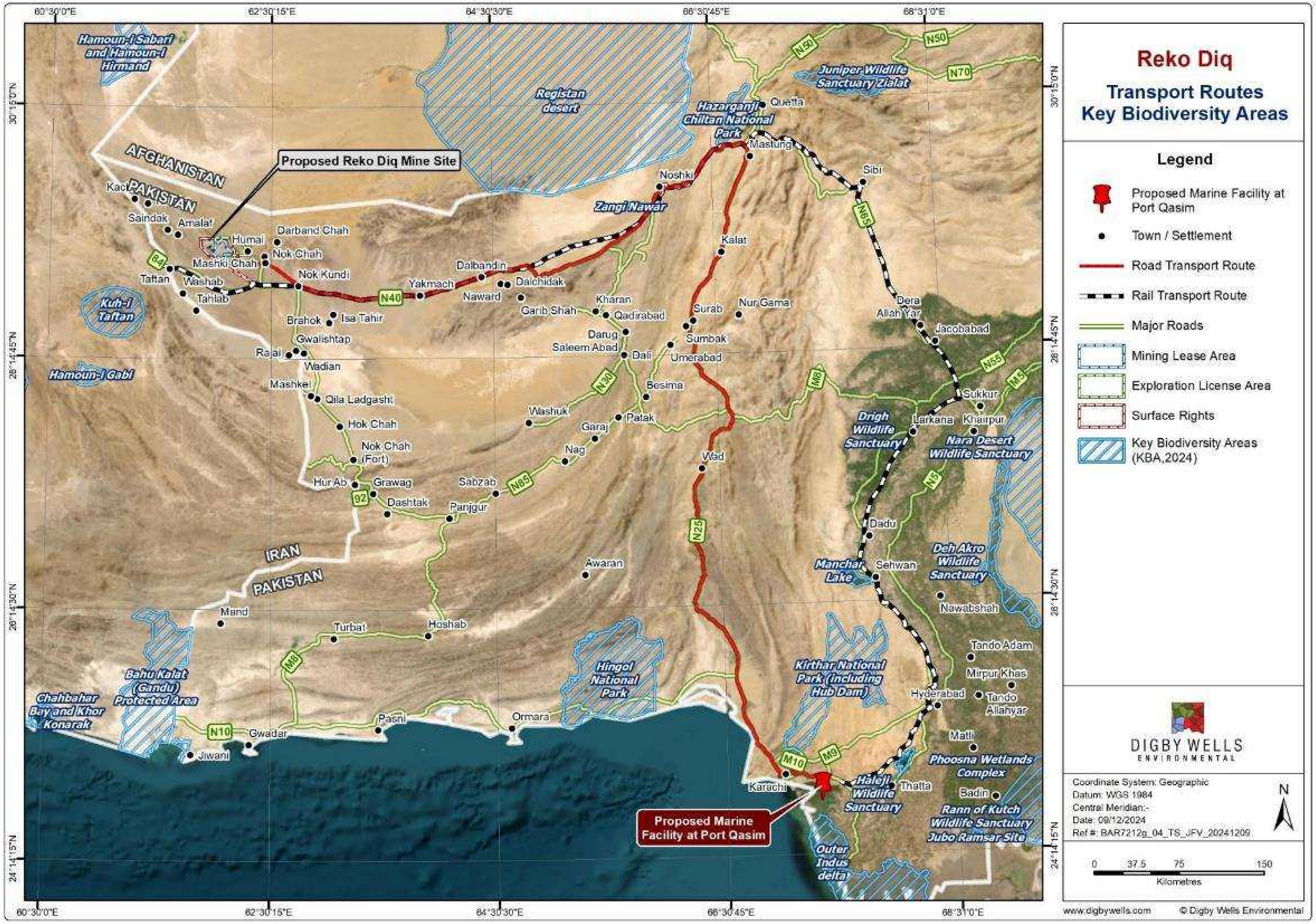


Figure 5-55: KBAs in the greater region surrounding the Transport Routes

Figure 5-56: Ramsar Wetlands in the region surrounding the Transport Routes

5.9.3.2. Vegetation Coverage and Habitat Classification

Although the transport route/s were not assessed in the field, both literature reviews and desktop-based screening was undertaken along the route to assess vegetation type (or habitats).

A desktop-derived land cover map along the servitude and the AoI of the transport route/s are provided in Appendix A of the Fauna Report (Figure 5-57, Appendix I). Similarly, the land cover classes identified along the transport route/s largely correlate to the aforementioned vegetation types described at the Mine Site, but there is an increased presence of agricultural activities along closer to Quetta on the west-east line and along the north-south line along the railway route (i.e. within the aforementioned scrub forests (refer to Section 5.9.3) and more wetland/waterbodies become apparent along the Indus River corridor.

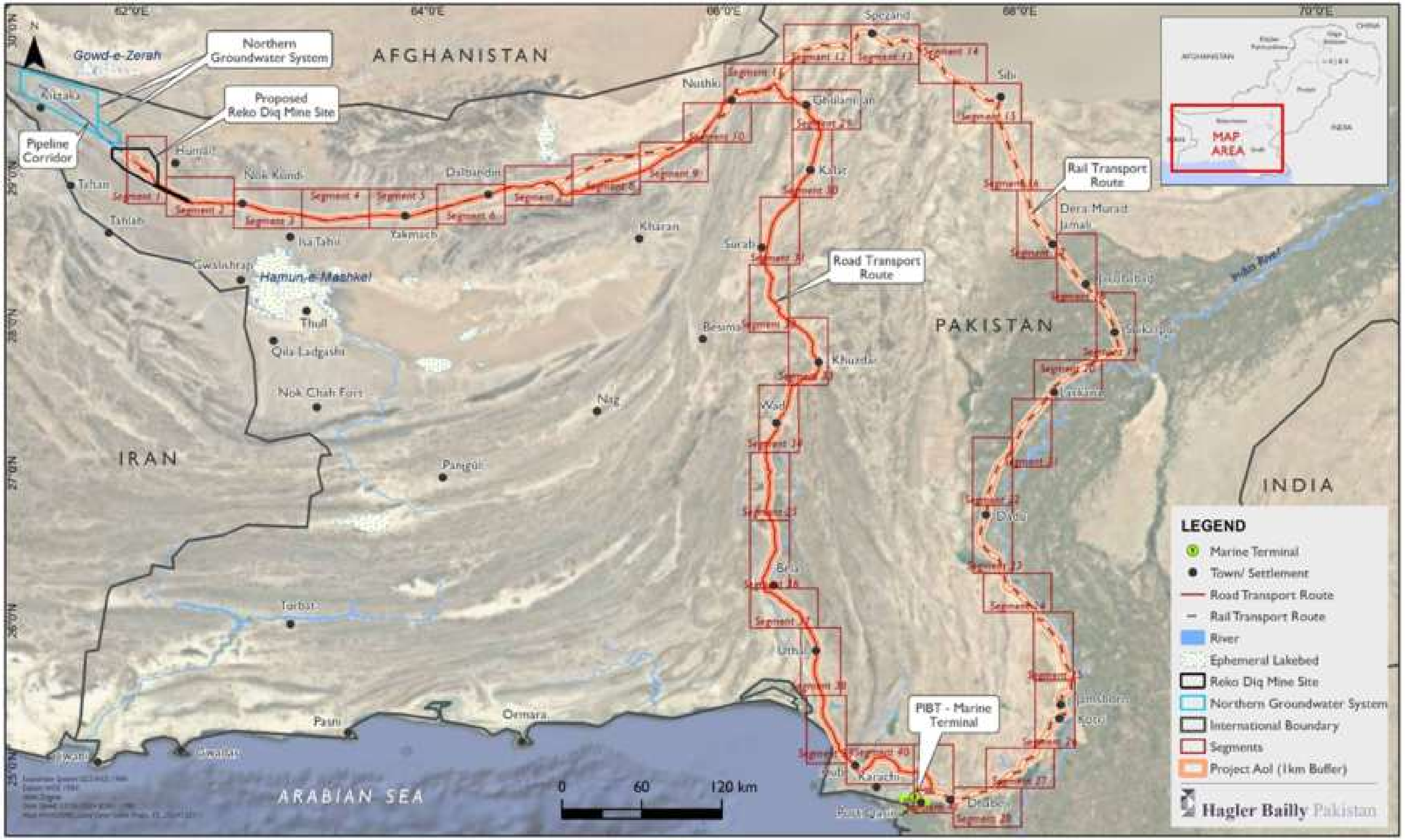


Figure 5-57: Habitat Classification along the Transport Route

5.9.3.3. Biological Diversity

No physical survey were undertaken, so the observation herein are based solely on literature review and available spatial datasets (incl. IBAT).

5.9.3.3.1. Floral Species

The Transport Route was not surveyed as existing infrastructure will be utilised. Nevertheless, a literature review was conducted, reporting 530 species, while the IBAT[24] reported 158 species.

Dominant species included Gum Arabic Tree (*Acacia nilotica*), Giant Reed (*Arundo donax*), Bohay Madran (*Achillea welhemsii*), Mazhmonk (*Amygdalus brahuica*), Arabian Primrose (*Arnebia hispidissima*), Jowari (*Avena sativa*), Zralga (*Berberis baluchistanica*), Moninga Riza (*Bunium persicum*), Fire Bush (*Calligonum comosum*), Aak (*Calotropis procera*), Bhang (*Cannabis sativa*), Foxtail Buffalo Grass (*Cenchrus ciliaris*) and multiple AIP species, indicating these areas are currently impacted to some extent.

Among the floral species reported in these assessments, several SCC listed on the IUCN Red List of Threatened Species were noted. These species include:

- *Commiphora wightii* (CR);
- *Commiphora stocksiana* (EN);
- *Tecomella undulata* (EN);
- *Dactylorhiza hatagirea* (EN); and
- *Conocarpus lancifolius* (VU).

There is a likely presence of *Tecomella undulata* and *Commiphora stocksiana* along the Rail and Road Route Corridor as the distribution ranges and specimens collected of these species overlap with the area, but their presence can only be confirmed through field verification. Nonetheless, both these species are not expected meet sub-criterion 1(a), as the wide distribution range of *Tecomella undulata* suggests that it is not a significant population, while the available information for *Commiphora stocksiana* population estimates are inadequate to assess a whether it overlaps with the relatively small AoI, which is not expected to be affected.

In addition, 10 species expected along the Transport Route are considered endemic. These species include *Abutilon pakistanicum, Asparagus gharoensis, Asparagus dumosus, Atriplex stocksii, Berberis balochistanica, Caragana ambigua, Commiphora stocksiana, Heliotropium ophioglossum, Heliotropium ulophyllum, and Seriphidium quettense and Gagea quettica.* However, after consulting online datasets of Global Biodiversity Information Facility (GBIF), International Union for Conservation of Nature (IUCN) Red List of Threatened Species, Flora of Pakistan, and Plant of the World Online, it is concluded that only *Heliotropium ulophyllum*,

[24] within a 50 km buffer of the Transport Route

and *Caragana ambigua* are endemic to Pakistan, but not expected to meet the threshold for sub-criterion 2, while *Asparagus gharoensis* is likely extinct from the area.

In addition, the aforementioned threatened and endemic species of plants are reported within sparse literature to be present within the region and along the transport route/s, but there are no references to the distribution ranges of these species – only a regional reference. According to GBIF, many of these species are associated with northern Baluchistan and not directly associated with the proposed activities and since they are plants they are not at risk of being impacted by any increase in traffic along the road and/or railway route/s. For the purposes of the assessment, considering the paucity of the data for these species, these species are treated as PBVs along the transport route/s and will need to be mitigated, where needed.

Importantly, *Gagea quettica* (Quetta Star Lily, listed as NE), is recognised as a range-restricted species. In the Critical Habitat Assessment (Digby Wells Environmental, 2024). *Gagea quettica* was assessed as to whether it triggers CH Criterion 2. However, as it was not detected by GBIF or through recent surveys, it was not considered to be a CH trigger, but it should be treated as a Priority Biodiversity Value (PBV), as the extent of occurrence is not understood, but it is believed to be present near Noshki / Quetta along the transport route/s.

The desktop assessment also reported the presence of several AIP species which include *Prosopis juliflora, Eucalyptus camaldulensis, Xanthium strumarium, Cenchrus ciliaris, Cannabis sativa*, *Jacaranda mimosifolia* and *Conyza canadensis*. The spread of AIPs along the transport Route and to the RDMS and Port will need to be managed through an AIP Management Plan to reduce the risk of spread.

5.9.3.3.2. Avifauna

For the Transport Route and Port Qasim, IBAT reported 422 bird species including five CR species, eight EN and 13 VU species. There were 294 migrant species noted. The Transport Route encompasses several notable protected areas which provide important habitats for a diverse range of resident and migratory bird species, significantly contributing to the region's biodiversity.

As such the literature for the Transport Route reports 509 bird species, with many Threatened IUCN Red List species present. Their presence in relation to nesting, foraging and migratory paths was not considered as part of this assessment, as the infrastructure is already established and no further disturbance was anticipated at this stage of the project.

5.9.3.3.3. Mammals

A total of 73 mammal species have been reported in the literature for the Transport Route, 19 of which are considered as SCC. Ten species are Threatened on the IUCN Red List and 19 are Threatened on the Pakistan Red List.

The Baluchistan Pygmy Jerboa (*Salpingotulus michaelis*) was the only range restricted species expected to occur along the Transport Route, but it was observed at the Zangi Nawar Game Reserve. Since this is outside of the AoI and the EAAA for the transport route/s and as such, although the thresholds are met, the AoI does not overlap with the area of analysis at this stage, so it is recommended that this species also be treated as a PBV, so that mitigation measures can be considered in relation to the increased traffic along the pre-existing transport route/s.

5.9.3.3.4. Herpetofauna

The IBAT along the Transport Route and Port Qasim reported 144 herpetofauna species, including one CR species, six EN species and seven VU species.

These were also included in the screening assessment for potential critical habitat trigger species along the route/s.

5.9.4. Port Qasim

Although the rail yard terminates in the **Aravalli West Thorn Scrub Forest ecoregion**, the PIBT terminal at Port Qasim is closely associated with the **Indus River Delta-Arabian Sea Mangroves ecoregion**, which is represented by several disjunct patches that line the shorelines of the Indus River Delta and the Gulfs of Kutch and Khambhat. It is further recognised to support numerous species of fishes and shellfishes, as a spawning ground and nursery for the larvae and juveniles, as well as . It is typically known to support mangrove vegetation (dominated by a single species, *Avicennia marina*) with a dense canopy and an undergrowth of seedlings and saplings from the canopy trees. It is also recognised as an important flyover and staging area for numerous migratory birds that arrive from Serbia in the winter.

Nonetheless, considering the existing state of the PIBT complex and the controls stipulated within the Standard Operating Procedures (SOPs) under the Port Qasim Authority, the mangroves were not considered as a SCC, nor under threat at this stage of the project.

5.9.4.1. Protected Areas and Areas of International Biodiversity Importance

No protected areas overlap with the 5 km buffers (or EAAA) of the PIBT terminal and the Railway Yard, but there are other protected areas further afield, including the Marho Kotri Wildlife Sanctuary, which is 18 km away.

There are no internationally recognised areas overlapping with the EAAA with the Port Qasim, but other internationally recognized areas of biodiversity importance are present within the wider region (Figure 5-58, Figure 5-59 and Figure 5-60).

It is acknowledged that the marine biome (including the mangroves forests) was not going to be the focus of the study, as the railway yard and the transport were transferring concentrate in sealed units from the offload area at the storage shed at the PIBT, which effectively implied that any liabilities associated with the export of the concentrate will be managed under the management plans already in-place at the PIBT.

As a result, the protected areas, internationally recognised areas and marine biome were not factored into defining the EAAA of the Port facilities.

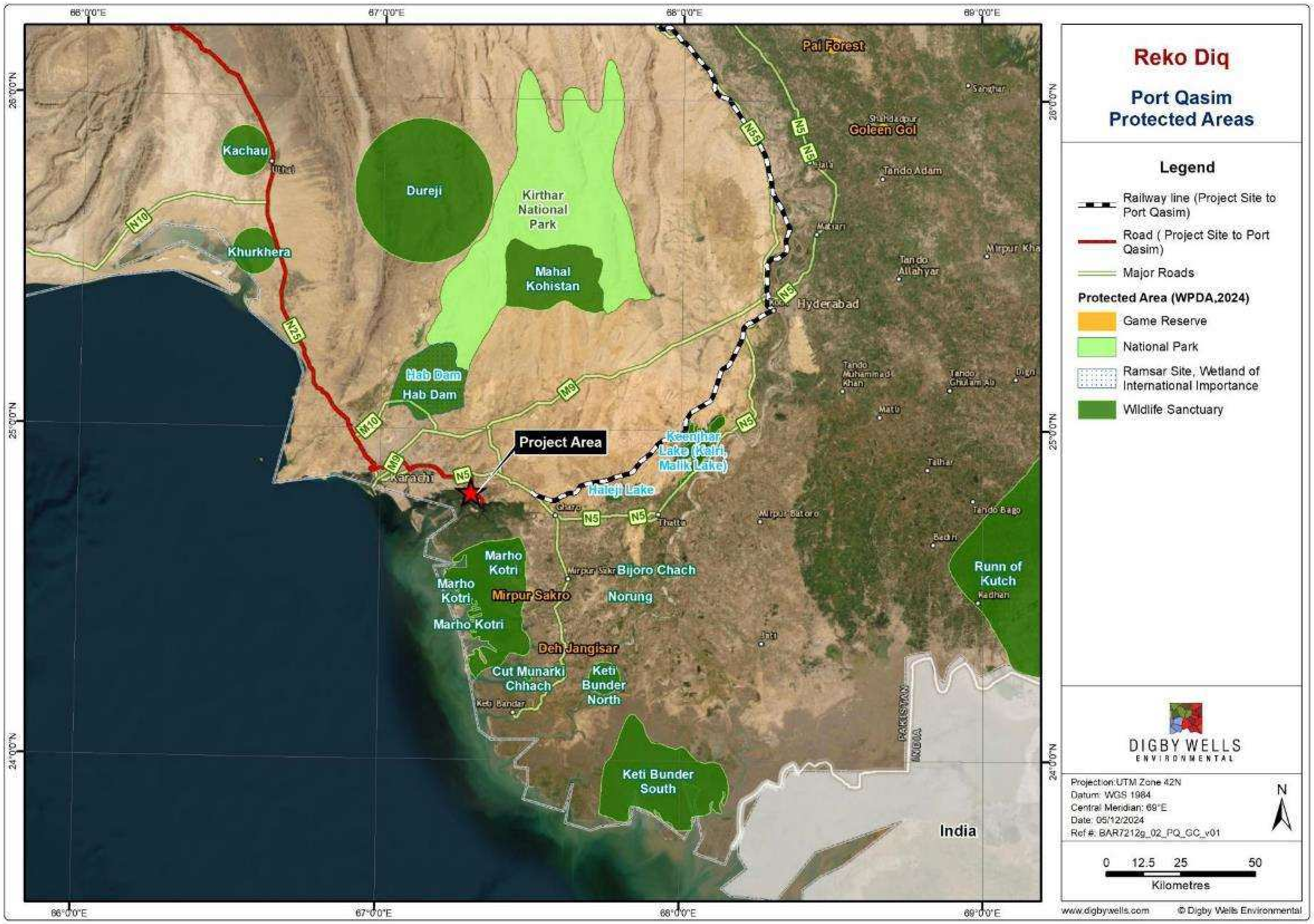


Figure 5-58: Protected areas in the greater region

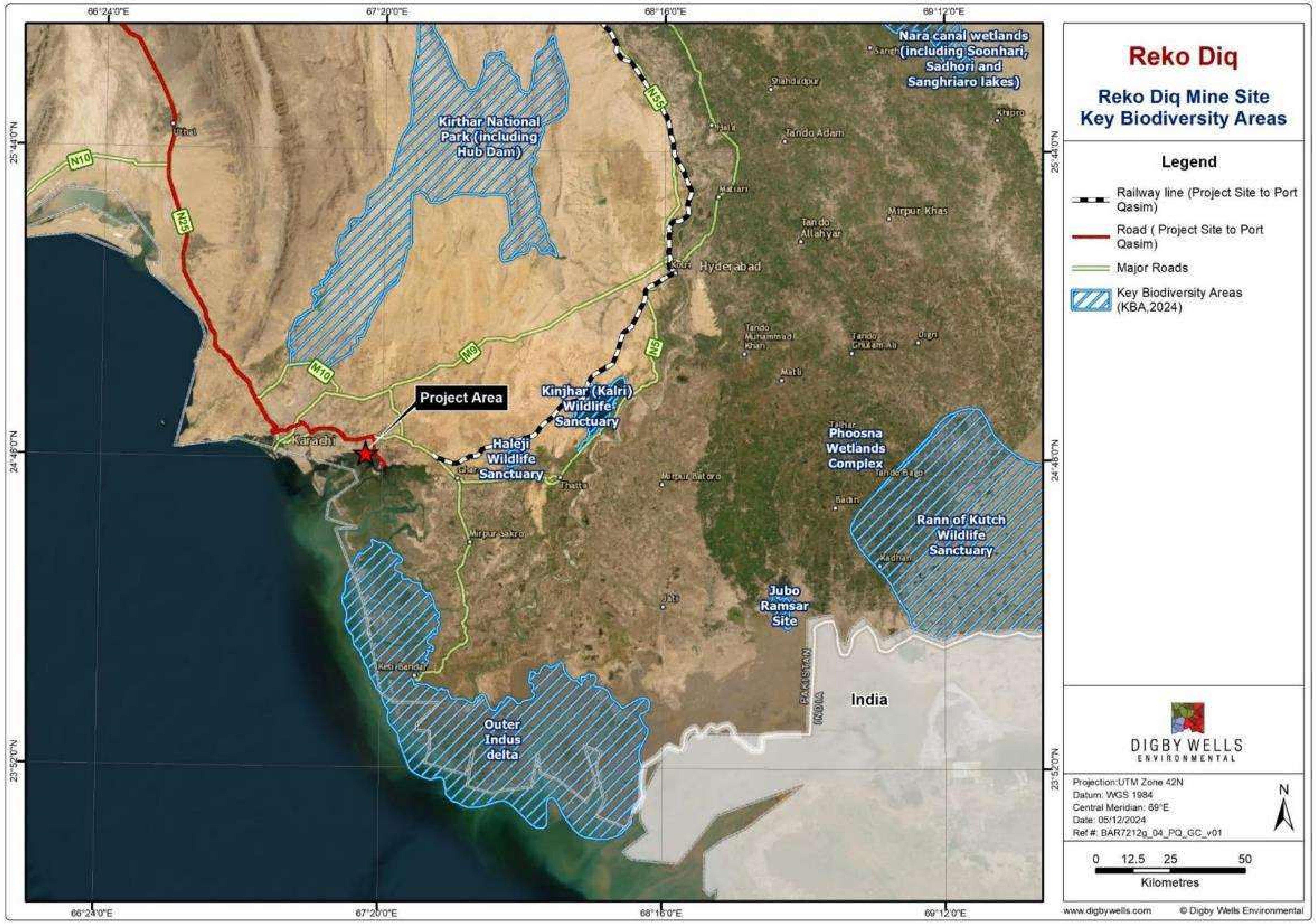


Figure 5-59: KBAs in the greater region surrounding Port Qasim

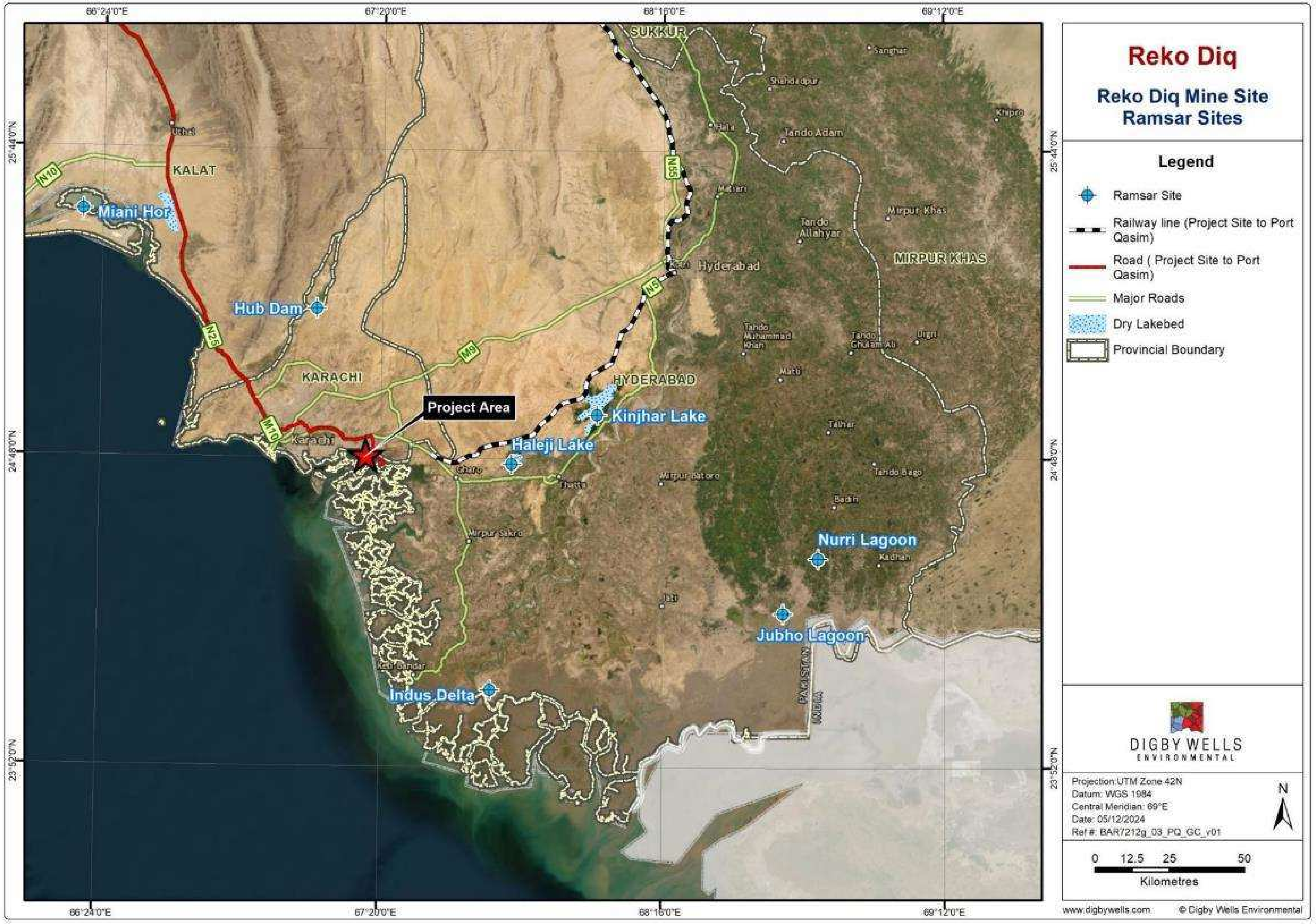


Figure 5-60: Ramsar Wetlands in the region surrounding Port Qasim

5.9.4.2. Vegetation Coverage and Habitat Classification

Port Qasim falls within the broader context of the **Indus Delta Ecoregion**, which is situated in the Sindh Province, specifically the southeastern coastal areas. The Indus Delta Ecoregion is characterized by a complex network of tidal channels, mudflats, and mangrove forests. It is influenced by the freshwater inputs from the Indus River, creating a unique and dynamic ecosystem.

The flora of the delta is not very diverse, with dominance by the mangrove species, *Avicennia marina* and *Rhizophora mucronata*, and select salt-tolerant plant species that can survive the severe conditions of heat and salinity in this region. This area is characterized by high temperatures and high humidity, supporting the growth of mangrove forests in coastal areas. However, the habitats surveyed at Port Qasim are highly modified; the dominant habitat is considered to be Vegetation Clusters, which mostly consist of AIPs such as mesquites that may spread in the coastal area following the transportation of project material and could reduce the regrowth of indigenous vegetation over time.

The remaining land is occupied by industrial units, roads, and other infrastructure, with some land and demarcated industrial plots that are unutilized. The terrestrial habitats identified within Port Qasim are discussed in detail in Table 5-36, and illustrated in Figure 5-61 and land cover classes are shown in Figure 5-62.

Table 5-36: Terrestrial Habitats within Port Qasim

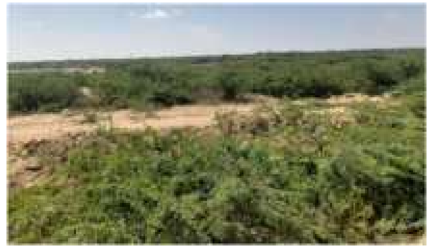
Example	Photo	Description	Dominant Species	Sensitivity	AoI (ha)
Vegetation cluster		Vegetation clusters are defined by a heterogeneous mix of plant species, including native vegetation, alongside the alien-invasive *Prosopis juliflora*, which dominates much of the area. The diverse vegetation supports various biodiversity groups by offering structural complexity, cover, and essential resources such as food and microhabitats	*Abutilon indicum, Aerva javanica, Calotropis procera, Capparis decidua, Saccharum munja, Salvadora oleoides,* and *Senna italica,*	Low	110 (48.4%)
Industrial Areas		The industrial areas are highly modified by anthropogenic activities and are mainly dominated by AIP species such as *Phragmites karka, Prosopis juliflora*, and cultivated species like *Sesbania grandiflora*. Due to its proximity to the coastline, the area also provides foraging and nesting opportunities for various bird species that feed on stored grains and use built-up structures for shelter.	*Phragmites karka, Prosopis juliflora*, and like *Sesbania grandiflora.*	Low	40 (18.6%)
Barren Land/ Open Plot		This habitat type is predominantly characterized by sparse vegetation, primarily consisting of plant species such as *Calotropis procera* and *Prosopis juliflora*. The ecological productivity of this habitat is limited, supporting a modest assemblage of fauna. This habitat is least sensitive and has modest potential to support ecological resources.	*Calotropis procera* and *Prosopis juliflora*	Low	40 (17.1%)
Road/Railway Lines		Largely modified due to anthropogenic activities.	-	Low	40 (18.6%)

Figure 5-61: Habitat Classification at Port Qasim (Terrestrial)

Figure 5-62: Landcover classes present in the Port Qasim AoI

5.9.4.3. Biological Diversity

The marine fauna was not the focus of the study, however was added through supplementary surveys to ensure a comprehensive baseline, as part of the port alternative study earlier in the project design phase. The Port is already in use and additional impact to marine fauna is expected to be negligible.

It is noted the proposed lease for the construction of a concentrate Storage Shed at the PIBT at Port Qasim will fall under the administrative jurisdiction of the Secretary to the Government of Pakistan for Maritime Affairs and operated by the Port Qasim Authority (PQA). As per the PIBT approved ESIA by EMC (2011), the existing operational management plans will continue to guide the PIBT operations, and used for the handling and exporting of the concentrate. Therefore, the liability for any potential impact upon the marine environment is already assessed under the IFC's approval for the PIBT Coal Terminal and as such, the marine ecosystem was not considered for the critical habitat assessment.

The following sections briefly describe the findings from the baseline ecological survey/s undertaken, per floral and fauna group assessed.

5.9.4.3.1. Terrestrial Floral Species

Literature reviews indicate that a total of 150 plant species are reported for Port Qasim with several of these species having medicinal importance but also facing local threats due to excessive use and habitat destruction. A total of 18 plant species were observed during the Post-Monsoon 2023 Survey. As with the literature and IBAT report, none of these are listed as Threatened on the IUCN Red List of Threatened Species.

Furthermore, four AIPs have also been reported in the vicinity of Port Qasim, namely Giant Reed (*Arundo donax)*, Honey Mesquite (*Prosopis glandulosa)*, Mesquite (*Neltuma (Prosopis) juliflor*a), and Red-river Gum (*Eucalyptus camaldulensis).* Native plant species reported at Port Qasim are listed as either DD, NE or LC in the IUCN Red List of Threatened Species. Three AIP species were observed during the survey; namely Mesquite (*Prosopis juliflora*), Alien Giant Reed (*Arundo donax*) and Cotton of Sodom (*Calotropis procera*) were observed, which were found in all habitats (aside from *Arundo donax* which was only observed in the Industrial Units).

5.9.4.3.2. Marine Floral Species

A total of 24 specimens belonging to two species of mangroves were observed at Port Qasim during the Survey. These species include Grey Mangrove (*Avicennia marina*) and Red Mangrove (*Rhizophora mucronata*). The Grey Mangrove was observed in dense patches at all sampling locations, ranging from 1 to 4 plants per 10 m^2 while *Rhizophora mucronata* densities ranged from 0 to 2 per 10 m^2.

As expected, the reference site at Keti Bandar was observed to have higher *A. marina* density per unit area compared to the other sampling locations. Mangrove vegetation was sparse at location M2, and the mangrove growth appeared stunted due to the presence of abundant pollutants at this location.

All the mangrove species are listed as Least Concern in the IUCN Red List of Threatened Species. The mangrove ecosystem at Port Qasim is a unique ecosystem in view of diversity they support and their importance as breeding areas for fish which are of socioeconomic value and according the IUCN Red List of Threatened Ecosystem, it is listed as Vulnerable.[25]

No endemic or range restricted species were recorded in Port Qasim.

5.9.4.3.3. Avifauna

Port Qasim (and the mangrove areas to the south) are an important area for bird species, providing suitable habitat and food resources along the coastal region. Literature reviews of the Port report 153 bird species, comprising both native and migratory bird species, as well as shore birds.

Four reported species are considered threatened, namely the Great Knot (*Calidris tenuirostris* , listed as EN), Black Bellied Tern (*Sterna acuticauda*, listed as EN*),* Pochard (*Aythya* farina, listed as VU), and River Tern (*Sterna aurantia,* listed as VU).

5.9.4.3.4. Mammals

No specific mammals noted to be directly associated with the Port Qasim, as the habitat is believed to be significantly modified in recent years.

5.9.4.3.5. Herpetofauna

The literature does indicate presence of four IUCN Red List species at Port Qasim however none of these were observed in the baseline surveys. These comprised one EN species, the Green Sea Turtle (*Chelonia mydas japonica*) and three VU species, the Afghan Tortoise (*Testudo horsfieldii*), Indian Spiny–tailed Lizard (*Saara hardwickii*), and Mugger Crocodile (Crocodylus palustris).

The possibility for the presence of Afghan Tortoise (*Testudo horsfieldii*), Indian Spiny–tailed Lizard (*Saara hardwickii*), and Mugger Crocodile (*Crocodylus palustris*) at Port Qasim is unlikely, as the habitat is largely modified, and specific environmental conditions for these species are not available. However, the Green Sea Turtle (*Chelonia mydas japonica*), which is a marine species, could be present as the area still has the potential to host this species.

5.9.4.3.6. Marine Invertebrate Diversity

The diversity of marine benthic invertebrates at Port Qasim is a result of the region’s complex habitats, nutrient-rich environment, stable conditions, and intricate biotic interactions. These factors, combined with human influences, create a dynamic ecosystem that supports a wide range of benthic invertebrate species. Various studies have reported varying species

[25] Red List of Mangrove Ecosystem, Available at: [Red List of Mangrove Ecosystems | IUCN](), Accessed on December 18, 2024.

abundance ranging from 21-26. The mangroves support species that fall into the families Grapsidae, Ocypodiadae, Xanthidae, and Portunidae. Swimming Crabs (*Scylla senata*) (family Portunidae), can be seen darting for safety under the root cover of mangroves or the holes of the trunks of mangroves.

During the Post-Monsoon 2023 Survey, a total of 93 specimens belonging to nine species were collected from the 13 sampling locations located at Port Qasim. All MBI species were identified at the family level, therefore, their conservation status could not be assessed according to the IUCN Red List of Threatened Species.

5.9.4.3.7. Epipelagic Fauna

The high diversity of epipelagic fauna at Port Qasim is due to its location near the Indus River delta, which brings nutrient-rich waters into the Arabian Sea. These nutrients support the growth of phytoplankton, forming the base of the marine food web for epipelagic fauna. The region encompasses a variety of habitats, including mangroves, mudflats, and estuarine areas. Each habitat supports different communities of epipelagic fauna. Mangrove forests and other coastal habitats provide shelter and breeding grounds for these species, contributing to higher biodiversity.

Literature reviews show that the study conducted near Port Qasim reported 21 species of Epi-Pelagic Fauna. Dominant communities include the Fiddler Crab (*Uca sp.)*, Pinnotherid Crabs, Mud Skippers (*Boleophthalmus sp.),* and (*Telescopium telescopium*) assemblages as well as annelid (Polychaete) worms, bivalve molluscs such as (*Cerithidea cingulatus), (Natica lamarkii), (N. didyma), (Nodilittorina leucosticta), (N. picta)* and freshwater snail species and (*Cerithium sp.).* The epipelagic fauna identified in previous studies to species level reported at Port Qasim are listed under Data Deficient, Not Evaluated, or Least Concern in the IUCN Red List of Threatened Species.

During the Post-Monsoon 2023 Survey, a total of 178 specimens belonging to nine species were observed from the five sampling locations at the Port Qasim study area. All epipelagic fauna were identified to the genus level; therefore, their conservation status could not be assessed according to the IUCN Red List of Threatened Species. Similarly, the literature review also reported no SCC.

5.9.4.3.8. Pelagic Fish Communities

The Karachi coastal area features diverse ecosystems with a wide variety of pelagic fish species. However, migration over long distances in response to changing environmental conditions, makes it challenging to accurately inventory their diversity. Despite these difficulties, some limited ichthyological studies have been conducted along the Karachi Coast. A study conducted in coastal areas of Keti Bandar reported a total of 48 species, while another study reported 40 finfish collected from Fish Harbor Trawl station of Manora Channel, Northern Arabian Sea, and Karachi Coast. In addition, a study conducted in the Karachi coastal area, reported a total of 20 fish species.

Most of the pelagic fish species reported from the coastal area near Port Qasim are listed as DD, NE, or LC. Two fish species, namely the Shortfin Mako (*Isurus oxyrinchus)* and Sliver Pomfret (*Pampus argenteus*), are listed as EN and VU, respectively, in the IUCN Red List of Threatened Species.

During the Post-Monsoon 2023 Survey, pelagic fish sampling was conducted at three sampling locations, located in Korangi Fish Harbor, Gharo Creek near Port Qasim, and Keti Bandar, respectively. A total of 12 specimens belonging to eight species were captured from three sampling locations. Fish species captured were the Picnic Seabream (*Acanthopagrus berda)*, Shortnose Gizzard Shad (*Anodontostoma chacunda)*, Dory Snapper (*Lutjanus fulviflamma)*, Flathead Mullet (*Mugil cephalus)*, Banded Grunter (*Pomadasys furcatus)*, Olive Grunt (*Pomadasys olivaceus)* and Tiger Perch *(Terapon jarbua),* all of which are LC aside from the Toli Shad (*Tenualosa toli)*, which is listed as VU.

5.9.5. Findings from the Critical Habitat Assessment

The Project spans a relatively large areas across Pakistan, extending from the northwest portion of the country bordering Afghanistan and Iran to Port Qasim near Karachi and connected by two Transport Route/s. Consequently, a staged approach was undertaken, which focused initially on the Mine Site, as this area had the best available survey data at the time of the assessment, followed by screening-level assessment/s along the Transport Corridor/s and the infrastructure in close proximity of Port Qasim. The lower survey efforts along the Transport Corridor and/or at Port Qasim is due to the fact that vast majority of the infrastructure is already in place and as such, no material changes are anticipated within these project components, excluding some maintenance/upgrades and the construction of a concentrate storage shed on the existing Pakistan International Bulk Terminal (PIBT), which is also already authorised and in operation following the acceptance of the IFC-aligned ESIA.

<u>Mine Site</u>

The Mine Site area is located within a remote portions of semi-arid desert environment, known as the Registan-North Pakistan Sandy Desert ecoregion, where there are no protected areas or internationally recognised areas, excluding the Saindak Community Game Reserve[26]. Of 443 species expected to occur according to IBAT, a total of 147 species (including 67 species that were detected through the literature review and/or observed during the field survey/s) were identified as potential candidate critical habitat-trigger species, as per the definitions provided for Criterion 1, Criterion 2 and Criterion 3 in Guidance Note 6 (GN70-GN78). In reference to the significance of the global population[27] of each respective candidate trigger species being present within the AoI, each species was screened against a tailored EAAA to determine a percentage of the landscape that may support this respective species (or sub-

[26] As noted above, a legal review of the legitimacy of the allegedly designated Saindak Community Game Reserve is underway. In the absence of sufficient information and pending further legal investigation regarding the legitimacy of the claimed area, as well as the permissible land uses within the reserve, the reserve is only considered tentatively. Following the feedback from the legality investigation, any biodiversity-related sensitivities or receptors may need to be reassessed, where applicable.

[27] As per GN65, expert opinion and/or surrogates for population size (e.g. extent of occurrence (EOO), estimates of total area of known sites, etc.), in combination of a spatially appropriate area of analysis (referred to EAAA) will be essential to determine the presence of potential critical habitat.

species) and the thresholds prescribed under each of the criteria (and/or sub-criteria) within the IFC PS6.

Of these candidate species, four species were identified as triggering critical habitat. Two of these species were identified as triggering critical habitat under Criterion 1, namely *Felis margarita* (Sand Cat) and *Gazella subgutturosa* (Goitered Gazelle). One species, *Phrynocephalus euptilopus (*Alcock's Toad-headed-Agama), was identified as triggering critical habitat under Criterion 2. One was identified as triggering critical habitat according to Criterion 3, namely *Passer moabiticus* (Dead Sea Sparrow). Similarly, three species of Squamata (incl. Geckos/Racerunners), namely the *Cyrtopodion sp*., *Eremias sp*. and *Eremias* cf. *scripta*, are tentatively considered as potential critical habitat triggers pending further morphological and genetic analysis. For the sake of assigned a habitat proxy, these species will be managed as part of any management and mitigation objectives set out for the confirmed trigger, the Alcock's Toad-headed Agama.

Considering the largely intact *natural habitat* within the Mine Site area, the mitigation hierarchy should be diligent and proactively applied to ensure that the residual impact upon these habitat and supporting PBVs are supporting during the construction and operational phase of the Project. Many of the PBVs are large birds/raptor (incl. Steppe Eagle, Egyptian Vulture, Asian Houbara, Eastern Imperial Eagle, Saker Falcon, and Greater Spotted Eagle and as such, an avifaunal monitoring programme will be important to manage at the outset of the project. Although the powerline is relatively small capacity, and at a low altitude and trajectory, mitigation measures to increase visibility of this infrastructure will be important to mitigate any potential impacts relating to collisions and electrocution. In addition, there are a few smaller birds that need to be considered in terms of potential risks of disturbance, but not enough information is known about these species within the study area at the moment, so further investigation should be undertaken for the Dead-Sea Sparrow, the Yellow-eyed Pigeon and the Sociable Lapwing, but they are on the threshold of qualifying at critical habitat and PBVs due to their wintering habits in the study area.

While other CH-triggers and PBVs are fairly well adapted to the harsh desert conditions, it will be important to continue to monitor for the presence of these species within the study area and specifically within the operational area, so that mitigation can be implemented to avoid/minimise impacts upon these Species of Conservation Concern.

<u>Associated Export Facilities</u>

Of a total of 237 expected species, selected species reliant on both freshwater and marine ecosystems were excluded from the list for the purposes of this assessment, as the proposed AoI does not affect the or include any material changes to the freshwater and/or marine habitat/s. Following this filtering process, the following candidate Critical Habitat triggers are presented in Table 5-3 of Appendix J, including:

- 25 Criterion 1 candidate trigger species, including avifauna, mammals, and reptiles.
- 4 Criterion 2 candidate trigger species, and

- 137 Criterion 3 candidate species, including numerous migratory birds, a volant mammal, and an insect.

One species was considered to trigger Critical habitat under Criterion 2, namely *Bufotes zugmayeri* (Baloch Green Toad, listed as NT) and some management required around the distribution and presence of the endemic Baloch Green Toad, in close proximity to the Quetta along the road and railway route. Additionally, the Hazarganji Chiltan National Park, a Category II protected area and KBA, and the Kinjhar (Kalri) Wildlife Sanctuary, which is a protected area, Ramsar site and KBA, is considered as likely critical habitat under Criterion 4.

Selected threatened and endemic species were noted to be potentially present within the AoI, but the lack of information available for these species and the fairly wide distribution of others suggest that these species do not meet thresholds for critical habitat, but should be considered from a precautionary perspective and treated as PBVs.

Regarding the presence of critical habitat in respect to the Port Qasim facilities, no triggers were found. Although many migratory species were detected, the small, terrestrial EAAA of the area and its modified nature resulted in none of the critical habitat criteria thresholds being reached.

In terms of the outputs from the CH-triggers and the PBVs, which are largely associated with the potential presence of endemic and threatened plant species within the Baluchistan region, it will be important to undertake supplementary survey or walk-downs of areas that are earmarked for upgrades along the transport route/s, so that a rescue and relocations process can be established and initiated. This is acknowledged to be highly unlikely considering the current proposed activities, as the roads and railways are already in-place and utilised, so this may only be applicable if the project design changes in terms of export routes.

In addition, while it is flagged that the Baluchistan Pygmy Jerboa is present within the area, but unlikely to affected by the current Project activities, a focus on further data collection to understand this species distribution within the region would be helpful in the event that further construction needs to be undertaken within the vicinity of the transport route/s.

In all area, AIPs were recorded, reiterating the necessity to implement an AIP Management Plan to prevent further spread of these species, particularly *Neltuma gladulosa* around the Mine Site Area.

From a faunal perspective, the following table summarises some of the key critical habitat triggers and PBVs associated with both critical and natural habitat proxies, and infers there perceived sensitivity and direct loss associated with the proposed activities for the Reko Diq Project (Table 5-37).

Table 5-37: Key Critical Habitat-trigger and PBVs associated within critical and natural habitat proxies within the mine site area

Description	Fauna	Sensitivity
Gravel Plains		
This habitat is characterised by hard surfaces and small gravel particles, with very little to no vegetation in. The sparse vegetation is present at the interface of this habitat with other habitats providing favourable conditions for different species.	*Vulpes rueppellii / Lepus capensis / Felis margarita* *Eremias cf scripta / Eremias sp. / Cyrtopodion sp. (?)*	Low to moderate
Mountains/Hills		
Low, barren rocky outcrops with sparse vegetation.	*Ovis vignei / Capra aegagrus / Felis margarita* *Neophron percnopterus* *Eremias cf scripta / Eremias sp. / Cyrtopodion sp. (?)*	Moderate to high
Sandy Plains/Dunes		
This habitat type is characterized by various types of wind-blown sand formations, including shifting sand dunes, low tracts of permanent sand dunes, and high tracts of permanent sand dunes. The shifting sand dunes, with very little vegetation, are largely unsuitable for ecological resources due to their active and unstable nature.	*Felis margarita* *Salpingotulus michaelis / Phrynocephalus euptilopus* *Eremias cf scripta / Eremias sp./ Cyrtopodion sp. (?)*	High
Dry Streambeds		
These are seasonal water channels that remain dry for most of the year but play a critical role during rainfall in desert and semi-desert areas by regulating water flow and retaining moisture for extended periods. This retained moisture creates favourable conditions for plant growth, making dry streambeds the most promising and sensitive habitat type for supporting various ecological resources.	*Gazella subgutturosa / Felis margarita* *Vanellus gregarius / Chlamydotis macqueenii / Passer moabiticus*[28] *Eremias cf scripta / Eremias sp. / Cyrtopodion sp. (?)*	High
Clayey Plains		
This habitat consists of flat or gently undulating terrains with fine-textured, clay-dominated soils, characteristic of arid and semi-arid regions. These soils retain water effectively but have poor drainage, often forming surface cracks during dry periods.	*Gazella subgutturosa / Felis margarita* *Chlamydotis macqueenii* *Eremias cf scripta / Eremias sp. / Cyrtopodion sp. (?)*	Moderate to high
*(?) - The three potential new species of reptiles listed in each of the habitats is included on a precautionary basis, as their ecological preferences are not understood at the time of the assessment and further investigation / studies are necessary.		

[28] Based on the IUCN Red List for Threatened Species, the "species inhabits riverine or lacustrine areas with trees or scrub, and irrigated semi-desert with flushes of annual grasses." This species was not observed on-site during the various seasonal surveys undertaken and in the absence of sufficient water, it is unlikely to occur on-site, but may be present in the broader study area.

5.10. Hydrology

Surface drainage lines or varying degrees of visible definition at the RDMS are typically dry due to the very low rainfall (average annual precipitation is 32.7 mm based on climate records for the period 1983 to 2023 at Nok Kundi). Following high intensity storm events surface water may flow for a short distance and time before usually either evaporating or infiltrating to the ground, however large but infrequent flooding events will drain into the playas.

The RDMS is located on a catchment divide between the Hamun-i-Mashkel Basin to the south and the Sistan Basin to the north. The Hamun-i-Mashkel Basin is the largest hydrological unit in Balochistan (catchment area of about 126,500 km^2) and is fed by the Baddo Rud, Tahlab, Rakhshan and Mashkel rivers. It is a closed inland system containing a playa, which acts as a groundwater discharge zone for the catchment. The Hamun-i-Mashkel playa is mostly dry although some water inundation of the playa occurs periodically and takes two to five months to evaporate and/or infiltrate, depending on the extent of initial flooding.

Occasionally, following high intensity storm events flooding occurs which can carry massive sediment loads to downgradient areas. The hydrological setting of the Project area is presented in Figure 5-63.

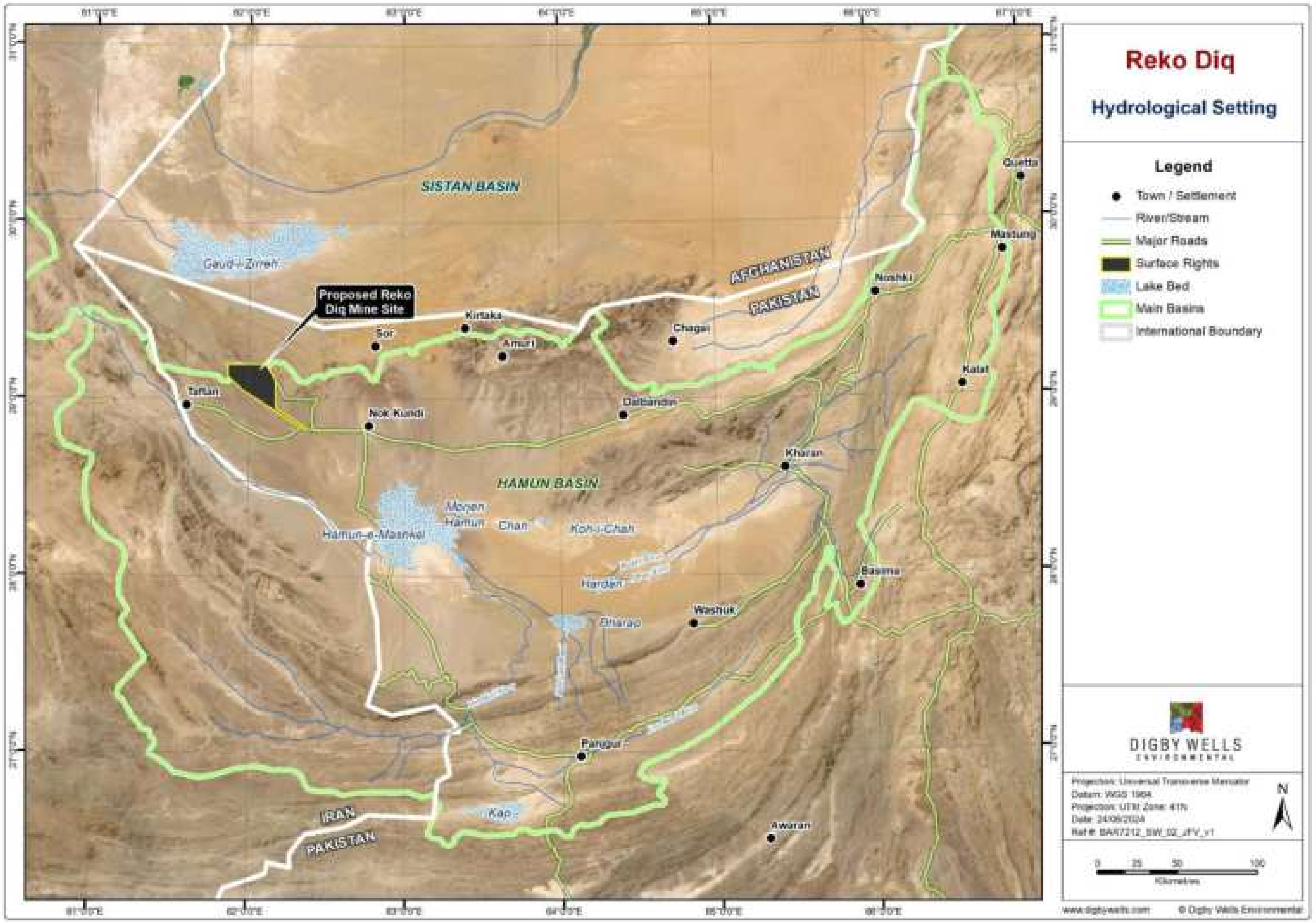


Figure 5-63: Hydrological Setting

5.11. Groundwater

Extensive hydrogeological investigations have been completed to identify and characterise a project water supply and to understand the hydrogeological setting of the mine area. Study reports are provided in Appendices M, N, O and P together with the hydrocensus report in Appendix L. This section describes the conditions for the following primary Study Areas:

- Northern Groundwater System (Project water supply area); and
- RDMS.

5.11.1. Hydrocensus

A detailed regional hydrocensus has been undertaken to support development of hydrogeological understanding ensure a comprehensive understanding of community water sources and use, and potential environmental receptors.

The hydrocensus covered a broad area, well outside of the project area of influence. A total of 19 settlements were surveyed, including:

- Settlements near and to the east of the RDMS including: Humai, Mashki Chah, Nok Chah, Darband Chah and Nok Kundi.
- Settlements near the Northern Groundwater System including: Kachow, Tang Kachow Bore Chah, Kirtaka, Maki and Beeduk;
- Settlements to the south of the RDMS near to the Hamun-i-Mashkel area including: Patangaz, Rajai, Wadian and Gwalishtap.

Data collected included (where possible):

- Physical details (i.e. location, well type, construction, depth etc.);
- Water levels;
- Field water quality including pH, EC, dissolved oxygen, turbidity and temperature;
- Laboratory water quality analysis for major ions and anions, and metals.

The following types of water sources were identified across the study area:

- Dug Wells: A dug well is created by manually digging a hole into the ground to access shallow groundwater aquifers. Dug wells are often shallow, usually no deeper than 30 feet (10 m), and with a large diameter. The walls of a dug well are often lined with materials like stones, bricks, or concrete to prevent collapse and contamination from surface runoff.
- Boreholes: These are the holes that are drilled and constructed by machines with a solid protective well structure and casing.
- Springs/Karez: These are where groundwater surfaces naturally. Karez are an ancient methodology for further accessing and channelling spring water.

- Artesian Boreholes: An artesian borehole is a type of hole in which water can flow to the surface naturally due to the intersected aquifer being under pressure.

An overview of the survey locations is provided in Figure 5-64 and sample photographs of community water sources are provided in Figure 5-65.

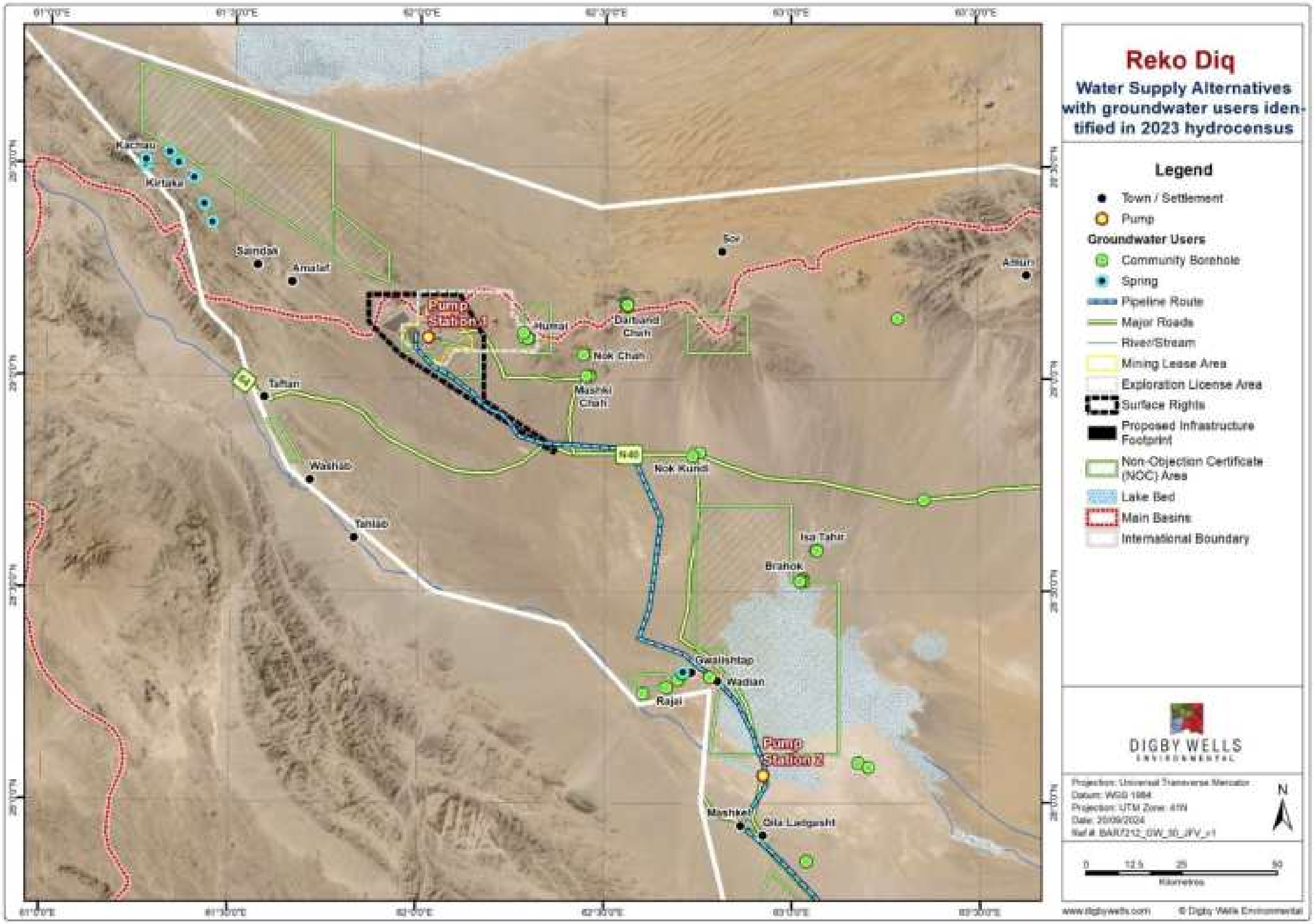


Figure 5-64: Hydrocensus Survey Locations with NOC permits highlighted

Borehole at W1 – Humai

Dug well at W4 – Humai

Team doing on-site parameters testing at dug well W13– Mashki Chah

Team collecting water sample from Dug well at W12 – Mashki Chah

Dug well at W16 – Nok Chah

Borehole at W18 – Darband Chah

Borehole at NK-FC – Nok Kundi

Water sample collection from the borehole at NK-Botig – Nok Kundi

Dug well at IT1– Isa Tahir

Spring at IT5 – Isa Tahir

Dug well at B2– Brahok

Dug well at SW2– Matthan (Killi Saleem)

Dug well at W41– Qila Ladgasht

Borehole at RW1 – Patangaz

Borehole at W54 – Rajai

Dug well at W56 – Wadian

Spring/Karez at Beeduk

Spring/Karez at Kirtaka

Spring/Karez at Maskin

Spring/Karez at PZ-AB

Borehole at SW4 – Matthan (Killi Saleem)

Dug well at TW1– Thul

Spring/Karez at Bore Chah

Ghulam Qadir water spring

Figure 5-65: Selected Photographs of Community Water Sources

5.11.1.1. Hydrocensus Results

5.11.1.1.1. Settlements near and to the east of the RDMS

Thirty five community water supply points were identified across the settlements to the east of the RDMS. Groundwater in this area is typically restricted to discrete shallow alluvial units and deeper fracture zones of limited extent. There is no connection to the hydrogeological system at the project site.

The measured water levels ranged between 0.3 mbgl and 74 mbgl, with an equivalent range between 839 mamsl and 1,155 mamsl. Groundwater is typically neutral (pH ~ 7) and brackish with TDS values ranging between 1,100 mg/L and 5,100 mg/L.

5.11.1.1.2. Settlements near the Northern Groundwater System

There are no settlements within the Northern Groundwater System itself, but there a several settlements located in the Mirjawa hills to the south close to the Iranian border in areas that are disconnected from the Northern Groundwater System. A mix of water sources were surveyed including boreholes, springs and karez.

The water levels range between artesian and 115 mbgl, with an equivalent range between 473 mamsl and 1,296 mamsl. Groundwater is generally slightly alkaline (pH ~ 8), and ranging between fresh and brackish with TDS values between ~400 mg/L and 2,500 mg/L.

5.11.1.1.3. Settlements to the south of the RDMS near to Hamun-i-Mashkel

Fifty-five community water sources were identified across the region to the south of the RDMS.

The water levels range between artesian and 77 mbgl, with an equivalent range between 453 mamsl and 980 mamsl. Groundwater is typically moderately alkaline, with pH values in the order of 8-9 with highly variable salinity between fresh (TDS values as low as 500 mg/L) and saline (TDS values over 11,000 mg/L). Generally, though, groundwater is brackish.

5.11.2. Northern Groundwater System

Water supply for the Project will come from the Northern Groundwater System. The following describes the current conceptual understanding for this aquifer system.

5.11.2.1.1. Geological Setting

The Northern Groundwater system occurs at the southwestern margin of the Sistan Depression. The aquifer system is bound along the southwestern margin by the Tozgi Fault, which marks a sharp contact with the highly deformed Saindak (Eocene) and Juzzak (Palaeocene) Formations, which have been thrust-uplifted to form the Mirjawa Hills. A second fault, the Drana Koh, representing a possible back-thrust feature striking sub-parallel to the larger Tozgi Fault, at the southern end of the system, is largely covered by the Fan Sediment deposits. Movement along these faults is assumed to be the controlling factor for the local basement geometry and depositional characteristics.

Three main sedimentary deposit types have been identified within the Northern Groundwater System area:

- Predominantly fine-grained, shallow sediments derived from erosion of volcanic deposits, north of Sor Baroot, and covering the southern extent of the system.
- Mountain outwash sediments, comprising elevated colluvial fan deposits that form a slope of erosional debris extending 35 km or more along the base of the Mirjawa Hills. These unconsolidated colluvial and alluvial sediments are known to be up to 500 m thick and extend 15 to 20 km in a north-eastly flow direction towards the Afghanistan border and Gaud-i-Zirreh. The sediments generally consist of poorly sorted, coarse, sandy-gravel to gravelly sands with cobbles, and fine to coarse sand. The cobbles and gravel are angular to sub-rounded and can be matrix supported. In general, colluvial sediments tend to be coarser towards the lower reaches of the fan.
- At the toe of the colluvial fan deposits, approximately 15 km from the hills, the land levels out and aeolian sand dunes have been deposited over the piedmont plain and finer-grained lacustrine/fluvial deposits. Drilling along the Afghanistan border shows the deposits are at least 400 m thick, and consist of fine- to coarse-grained sand, silty sands, silty clays, and clays with some gravel. The sediments are poorly to moderately sorted, and sub-angular to sub-rounded. The occurrence of gravels decreases to the northeast, particularly in the upper 160 m. The clays are brown to yellow-brown, sticky, and interbedded with sand layers, typical of deposition in lacustrine environments. In closer proximity to Gaud-i-Zirreh, the sediments are likely to be derived material transported via the Helmand River system, with a transition zone interfingering with the Mirjawa Hills colluvial fan deposits.

The depositional environments identified are consistent with sedimentation patterns expected for internally draining basins, with coarser, immature sediments deposited near the edge of the basin and finer-grained, more-mature sediments deposited at lower elevations.

5.11.2.2. Hydrogeology

The understanding of the site hydrogeology for the Northern Groundwater System has been developed as part of the feasibility study, including the hydrogeological drilling program and geophysical characterisation, and supporting investigations relating to the regional setting. The current conceptual model for the site hydrogeology is presented in Figure 5-66 and described below.

5.11.2.2.1. Aquifer Characteristics

The Northern Groundwater System is unconfined within the colluvial fan deposits, transitioning to confined conditions to the northeast beneath the sand dunes, where interbedded lacustrine clays become more common. Artesian conditions are observed to exist at the Afghanistan border.

Aquifer parameters, including hydraulic conductivity, specific yield, and storage coefficients for the groundwater system have been derived directly from pumping tests and hydraulic testing (injection and air-lift recovery tests) and indirectly from laboratory analysis of permeability, porosity and grain size on core samples collected from various depths within the colluvial fan deposits. Hydraulic parameters are observed to decrease with depth, which can be attributed to a combination of changes in depositional environment and diagenetic processes, and/or possibly representing a transition to older sedimentary formations such as the Kamerod Formation. Spatially, four distinct zones of varying hydraulic conductivity and specific yield have been noted in the test results (Figure 5-67), which are applicable to the upper 300 m or so of the aquifer. The zones generally correspond to the depositional environments defined in the geological conceptual model, and are as follows (K is permeability of the strata, Sy is specific yield which is defined as the volume of water released from storage from an unconfined aquifer):

- Zone 1, predominantly fine-grained, shallow deposits south of Sor Baroot: K = 0.001 to 0.1 m/d, Sy = 0.1% to 3%;
- Zone 2, transition between Sor Baroot and higher permeability sediments in Zone 3, and the upper reaches of the colluvial fan sediments: K = 0.1 to 1 m/d, Sy = 0.1% to 3%;
- Zone 3, an area of higher permeability associated with coarse grained sediments in the lower reaches of the colluvial fan sediments: K = 0.5 to 4 m/d, Sy = 1% to 5%; and
- Zone 4, the area to the northeast, beneath the sand dunes and towards Gaud-i-Zirreh, where the proportion of fine sediments increase: K = 0.1 to 1 m/d, Sy = 1% to 5%.

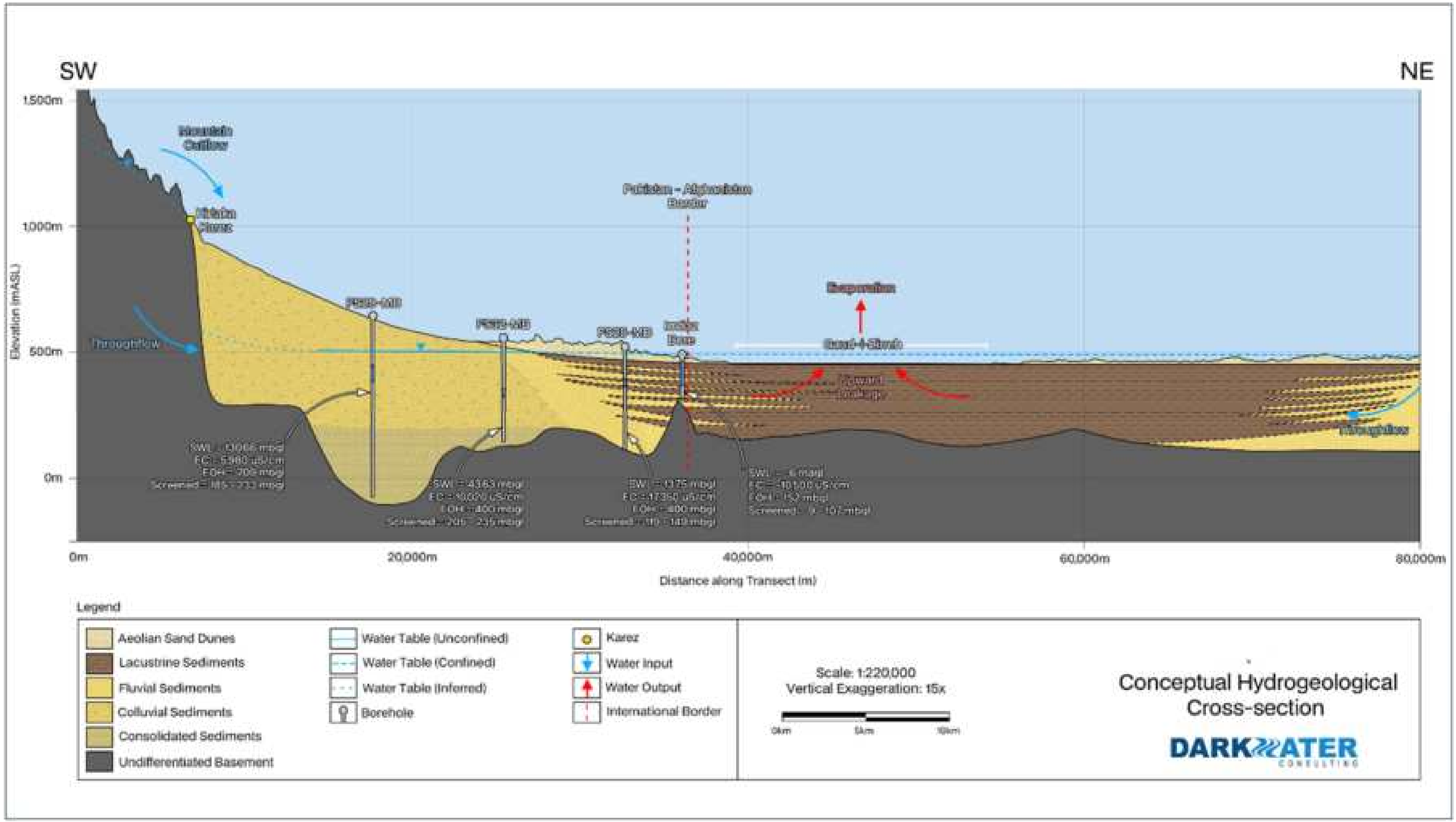


Figure 5-66: Schematic Conceptual Hydrogeological Cross Section for Northern Groundwater System

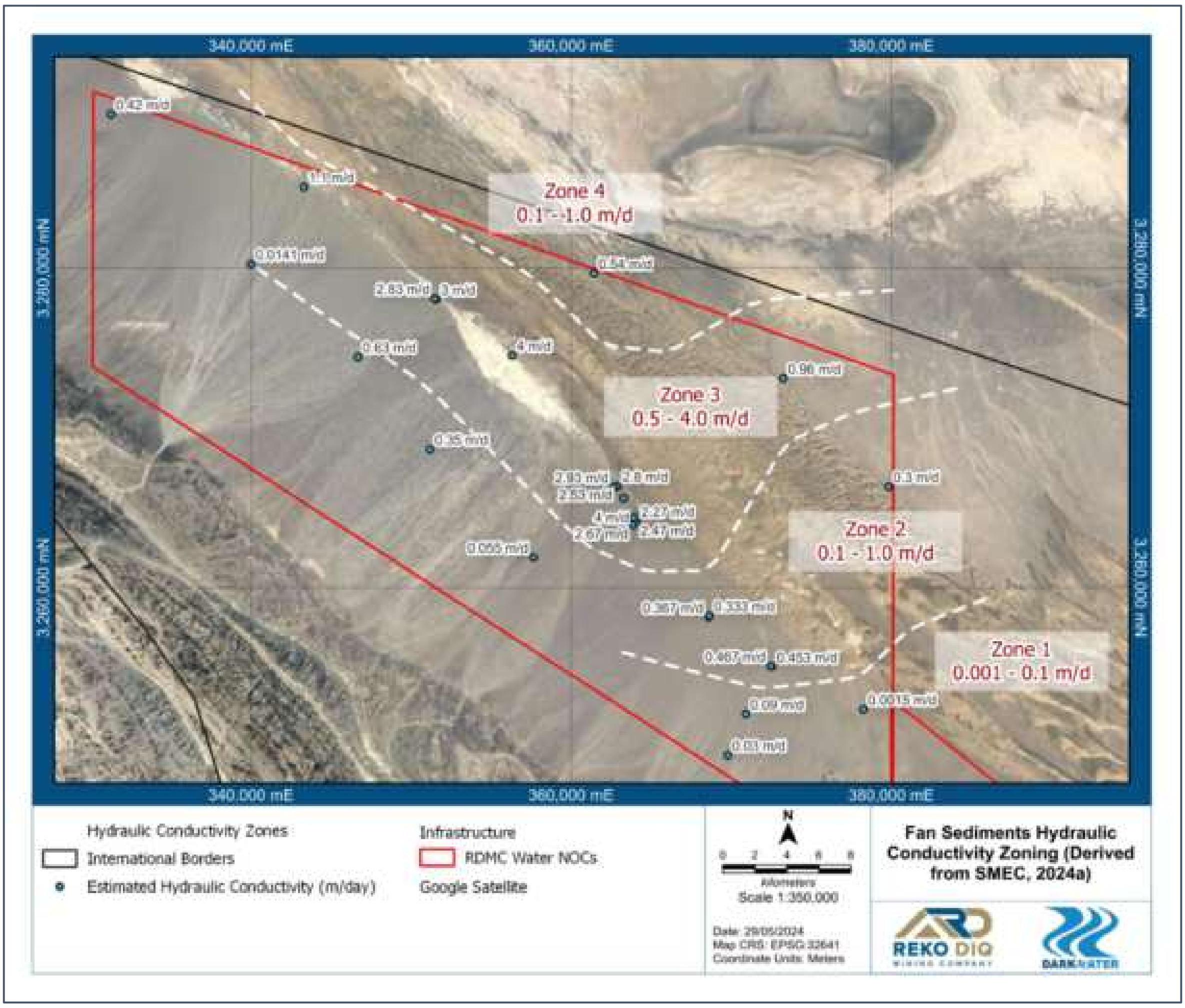


Figure 5-67: Hydraulic Conductivity Zoning

5.11.2.2.2. Recharge and Discharge

Given the arid nature of the climate, recharge to the groundwater system is limited, and is thought to occur via a combination of:

- Infiltration of rainfall runoff from sub-catchments in the Mirjawa Hills following high rainfall or spring snow-melt events, contributing episodic recharge along the south-western margin of the groundwater system;
- Minor groundwater inflows via bedrock along the Mirjawa Hills at the south-western margin of the groundwater system; and
- Groundwater inflows from the Sor Baroot area, along the south-eastern margin of the groundwater system.

Groundwater discharge is inferred to be via Gaud-i-Zirreh, with artesian groundwater pressures resulting in upward leakage of groundwater to shallower depths, where it evaporates and is removed from the system. Vertical leakage rates are understood to be insufficient to sustain surface water at Gaud-i-Zirreh, as demonstrated in remote sensing assessments, and numerous reports dating back to the 1960's noting usually dry conditions.

5.11.2.2.3. Groundwater Levels and Flow Characteristics

The depth to water table generally ranges from about 50 to 150 m below ground level (mbgl) beneath the colluvial fan deposits, depending on the ground surface elevation, shallowing to the north beneath the lower-lying land. Where the aquifer is confined, the potentiometric surface rises above ground level near the Afghanistan border.

Groundwater elevations within the Groundwater System, as measured in January 2024, range from 533 mamsl in the south, to 496 m in the north, with groundwater flowing in a northly and north easterly direction, away from the inferred recharge areas, towards Goud-i-Zirreh. Groundwater level contours (Figure 5-68) reflect the observed variations in aquifer hydraulic conductivity, with higher gradients occurring in the south, where hydraulic conductivity is lowest, and very low gradients occurring across the high-permeability zone of the lower colluvial fan sediments.

The flat groundwater gradient across the Groundwater System reflects a groundwater system in steady state, with low recharge rates, relatively high permeability, and no notable anthropogenic abstraction.

The 460 m difference in groundwater-level elevation between groundwater expressions in the Mirjawa Hills settlements (>960 mamsl) and the sedimentary groundwater system (~500 mamsl) indicates no direct hydraulic connection between these two groundwater systems.

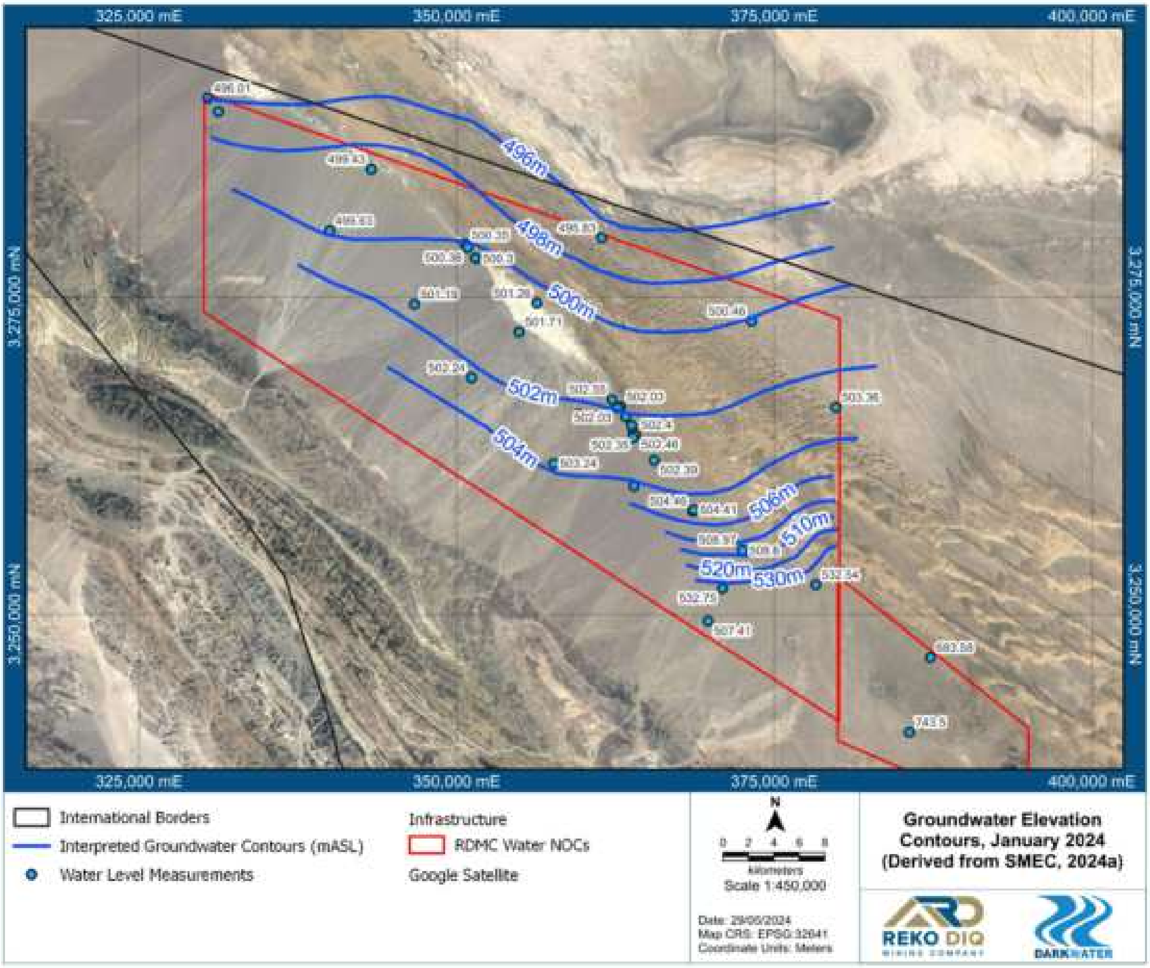


Figure 5-68: Groundwater Elevation Contours, January 2024

5.11.2.2.4. Groundwater Quality

Groundwater in the Fan Sediments aquifer is moderately to highly saline, with field EC ranging from 3,990 µS/cm to 25,000 µS/cm (~2,000 – 12,500 mg/L Total Dissolved Solids (TDS)) (Figure 5-69). Groundwater salinity generally increases from the west to the east, consistent with recharge occurring along the Mirjawa Hills escarpment, and groundwater flow through the aquifer towards Gaud-i-Zirreh. Higher groundwater salinity is also present in the south near Sor Baroot, where groundwater occurs in finer-grained sediments, or weathered bedrock, and flow is likely inhibited, and to the north of the sand dunes. The least saline groundwater occurs to the west and northwest, within the colluvial fan sediments.

Groundwater sampled is generally of a sodium-chloride type, with the proportion of chloride tending to increase with distance from the Mirjawa Hills. Groundwater sampled in the hills consistently has a higher proportion of bicarbonate likely reflecting greater recharge and/or a different aquifer lithology.

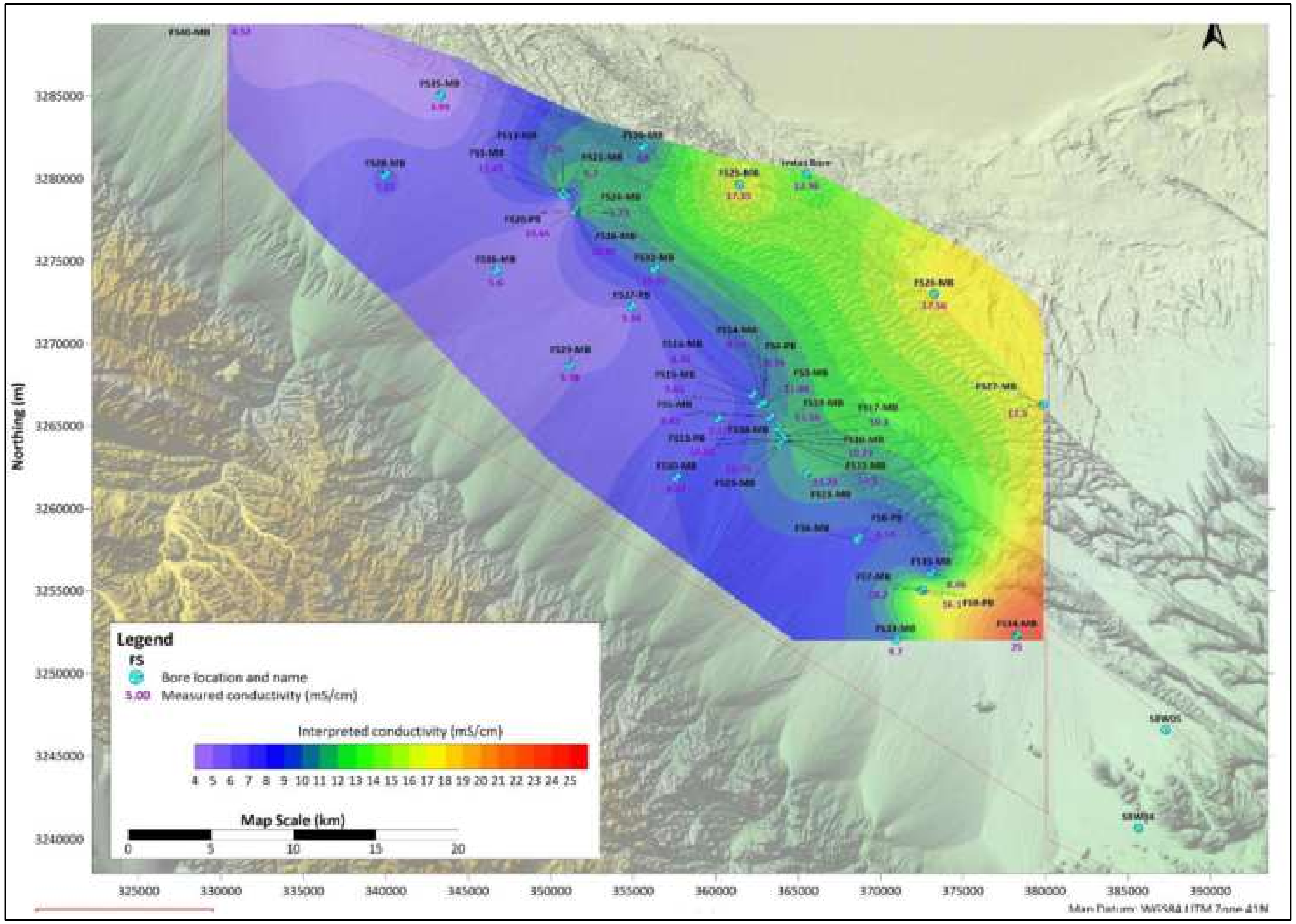


Figure 5-69: Groundwater Salinity from Field EC Measurements, February 2024

5.11.2.2.5. Aquifer Interconnection with Social and Environmental Receptors

While the regional extent of the sediments, hydraulic interconnection and aquifer characteristics in neighbouring countries are unknown, some inferences can be made:

- The colluvial fan sediments extend along the foot of the Mirjawa Hills to the northwest into neighbouring Afghanistan and Iran. The total depth of the sediments to the north is unknown, however, and possible hydraulic boundaries arising from structural features such as faults or shallow basement cannot be assessed.
- The Northern Groundwater System is probably in hydraulic connection with the sediments underlying Gaud-i-Zirreh, however these are likely to be fine-grained in nature, with significant aquifer layers, if present, occurring at depth.
- The Northern Groundwater System is disconnected from the groundwater system accessed by nearby settlements in the Mirjawa Hills.
- An irrigation district, Lavar Ab / Rig Chah, has been identified in Iran, approximately 50 km to 70 km to the northwest of the proposed borefield area, which may be utilising groundwater from colluvial fan deposits at that location. The degree of hydraulic interconnection along the fan sediments aquifer system is unknown, although it is unlikely to be significant over the large distance involved.
- Interconnection with Gaud-i-Zirreh is unlikely to have a significant influence on the surface water characteristics at that location, as groundwater leakage is insufficient to sustain a surface water body. It is possible that more saline groundwater from beneath the playa lake system could be drawn to the proposed borefield over time.

5.11.3. Mine Site Hydrogeology

Groundwater within the mine area is generally hosted in isolated pockets of fractured rock. Interconnection with the regional aquifer systems is inferred to be minimal, with no significant groundwater resources reported in the mining area.

The area is underlain by a thin cover of Quaternary gravels and aeolian sands unconformably overlying volcanic and sedimentary units of the Humai, Juzzak and Reko Diq formations, with Miocene-age porphyry intrusions outcropping in the area. The sedimentary and volcanic units are sub-horizontal with minor tilt to the southwest; they are cut by near vertical intrusives. A schematic southwest-northeast cross section through the Western Porphyry deposit is provided in Figure 5-70.

The Reko Diq Formation extends to about 400 m depth and comprises thick sequences of fine to medium grained porphyritic andesitic laver flows interbedded with autoclastic volcanic breccia and pyroclastic debris. The younger, poorly consolidated clastic sediments within the region comprise buff coloured silt, sand and fan gravel locally interbedded with ashfall tuff.

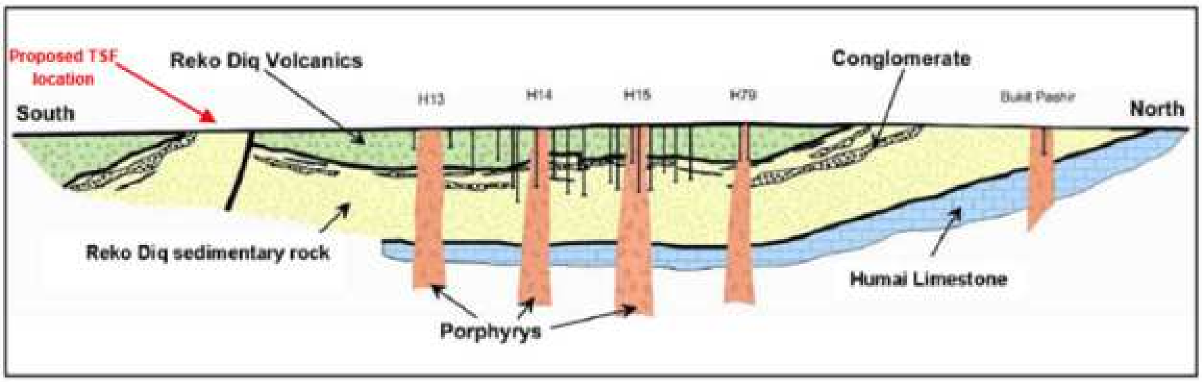


Figure 5-70: Schematic Geological Cross Section through the Western Porphyry

The area is crossed with numerous SW-NE, NW-SE trending structures, including several regional-scale faults. Linear fractures tend to be infilled with secondary mineralisation. Assessments of the piezometric surface between the porphyry and surrounding country rock indicates a lack of hydraulic connection.

The Tanjeel deposit is a supergene deposit comprising quartz, feldspar porphyry, felsic volcanics and intermediate volcanics, with some dykes and breccias present. The pit will be mined to 165 mbgl. As the water table lies approximately 60 mbgl (Figure 5-71) dewatering will be required. Groundwater inflow is likely to be limited by the localised nature of the fracture systems.

The Western Porphyry deposit is an intrusive deposit, comprising multiphase porphyritic diorite and tonalite intrusions, emplaced with extensive hydrothermal alteration, veining and copper sulphide mineralisation. Andesitic dykes and late-stage quartz veins occur throughout the area. The deposit extends to more than 800 mbgl. Away from the ore bodies, the Reko Diq Volcanic Group overlies an undifferentiated sequence of sedimentary sandstone, conglomerate and limestone rock at about 250 to 280 m depth. Groundwater at the deposit does not appear to be hydraulic connection with the regional groundwater system, but rather is compartmentalised and of finite extent (as evidenced by the highly variable piezometric surface across the deposit and the elevated groundwater salinity). Groundwater levels in the vicinity of the proposed Western Porphyry pit lie between 24.1 and 95.4 m depth (Figure 5-72), with and an average value of 59.6 mbgl. The volume of water contained within the intrusives is likely to be small, and inflow rates of 0.1 to 0.2 L/s per metre of exposed pit face have been estimated.

The proposed TSF is located approximately 5 to 10 km west of the pits on a gravel plain. Groundwater levels at this location range between 4.8 and 23.1 mbgl (Figure 5-72), with average depth to water around 15 mbgl, significantly shallower than in the pit areas. The nature of the groundwater system in this area is unclear but water quality results suggest it is localised within weathered bedrock.

5.11.3.1. Groundwater Levels and Flow Directions

In the proposed pit areas, average groundwater levels are around 60 mbgl, compared to an average mine-lease depth to water of 22.5 mbgl. Comparison between groundwater levels measured in 2023 to 2024 and those measured between 2004 to 2011 show little to no change in groundwater levels over this time.

Groundwater elevation at the mine site ranges from around 870 mamsl at the proposed TSF location to around 920 mamsl in the proposed pit areas. Regional groundwater flow at the mine site generally follows the regional topography, with groundwater north of the water divide flowing north-west towards Gaud-i-Zirreh and groundwater south of the water divide flowing south-east towards Hamun-i-Mashkel.

Locally, where adequate hydraulic connection occurs, groundwater flow directions might deviate depending on the orientation and permeability of the shallow bedrock and local structures.

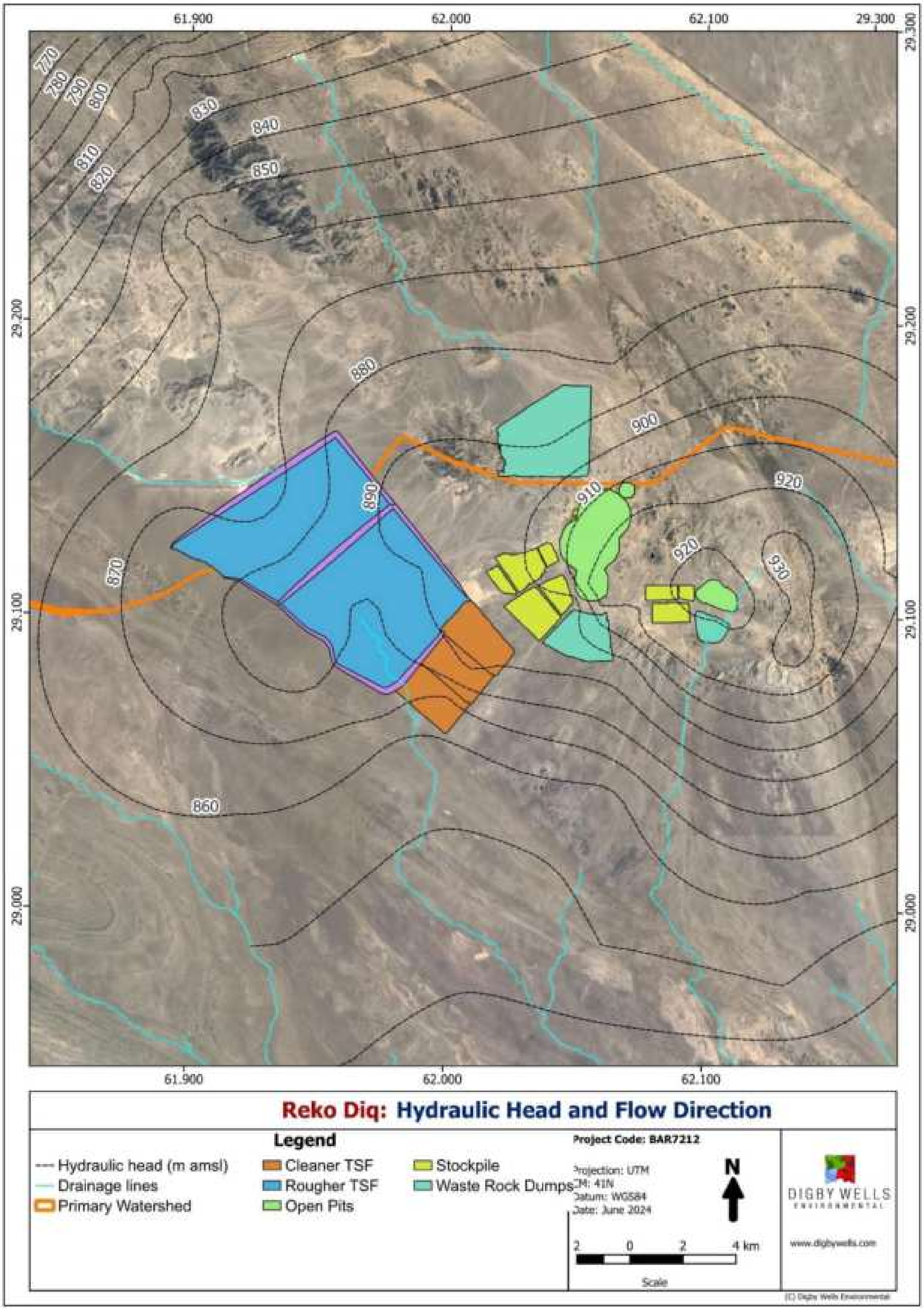


Figure 5-71: Hydraulic Head and Groundwater Flow Direction

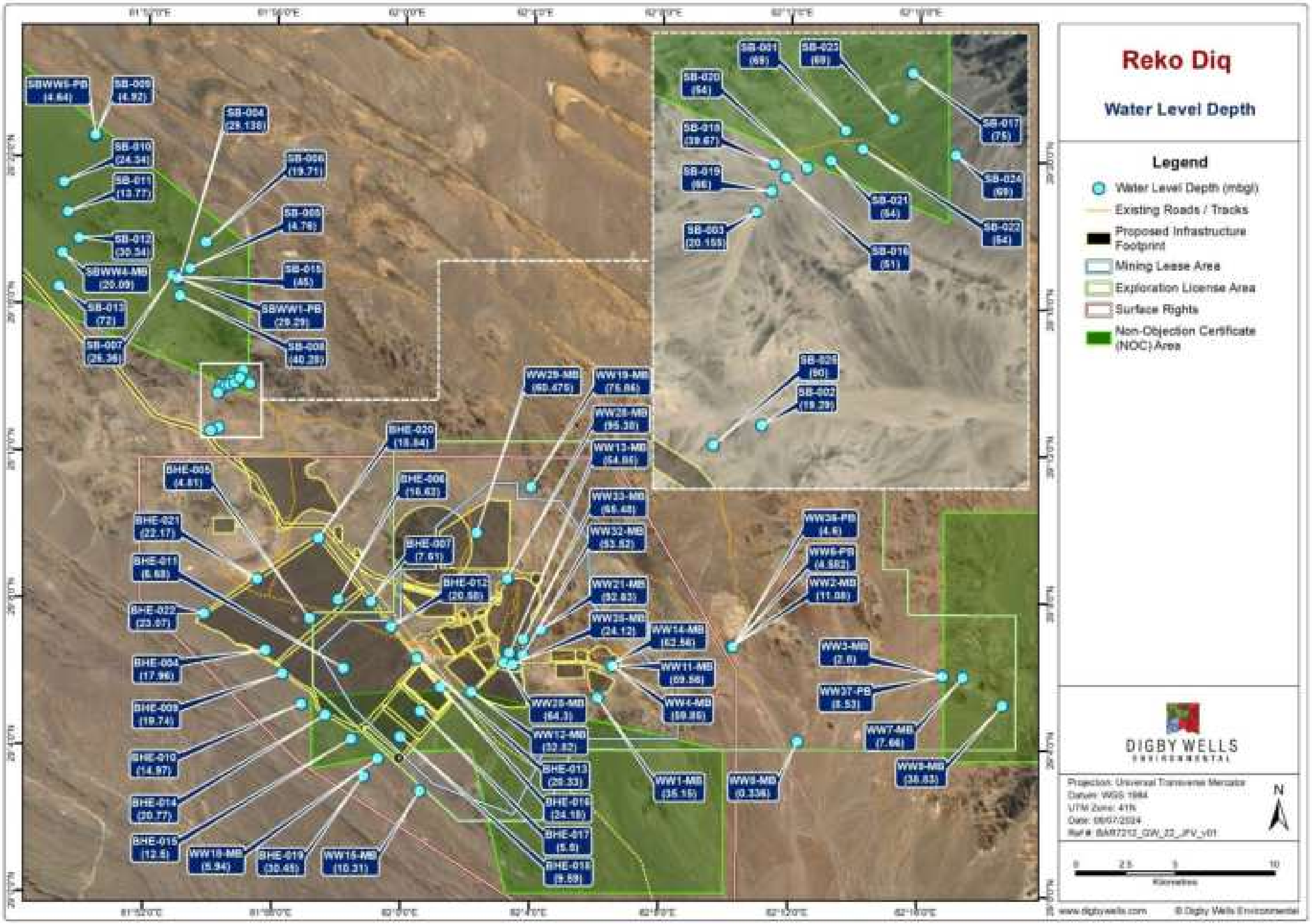


Figure 5-72: Water Levels recorded on the Reko Diq Mine Site

5.11.3.2. Groundwater Recharge and Discharge

Groundwater recharge at the site is via direct rainfall infiltration and infiltration of rainfall runoff following significant rainfall events. Given the very low average precipitation rates (32.3 mm/a) and very high annual evaporation rate (2,800 mm), recharge from rainfall is expected to be insignificant most years. Radiocarbon dating of the groundwater confirms the low recharge to the aquifer, with groundwater in the Tanjeel pit area being approximately 14,000 years old, and groundwater at the Western Porphyry pit area being approximately 16,000 years old. An average recharge rate of 0.42 mm/a, or 1.8% of the average annual rainfall, has been estimated for the Project site.

Once mining commences, infiltration of seepage from the TSF is expected to contribute to groundwater recharge. There are no known groundwater discharge sites, or groundwater users in the immediate mine-site area.

5.11.3.3. Natural Groundwater Quality

The natural groundwater is saline in nature with TDS in the Project area typically more than 10,000 mg/L (Figure 5-73):

- In the TSF area, the TDS ranges between 15,600 mg/L and 180,000 mg/L with an average of 43,400 mg/L.
- At the Western Porphyry and Tanjeel deposits, the concentration is slightly better at 11,500 mg/L and 16,600 mg/L.
- In the vicinity of the northern WRD, it is 16,000 mg/L.

The main constituents contributing to the high TDS are sodium and chloride, which is typical of groundwater that has had a long residence time within an aquifer and receives little to no recharge. This Na+Cl signature is displayed in the form of Stiff Diagrams in Figure 5-75.

The pH of the groundwater is neutral except at Tanjeel where it ranges between 3.2 and 3.7 (Figure 5-74). This is due to the supergene depositional environment of the Tanjeel ore, where sulphide minerals are oxidised in the process.

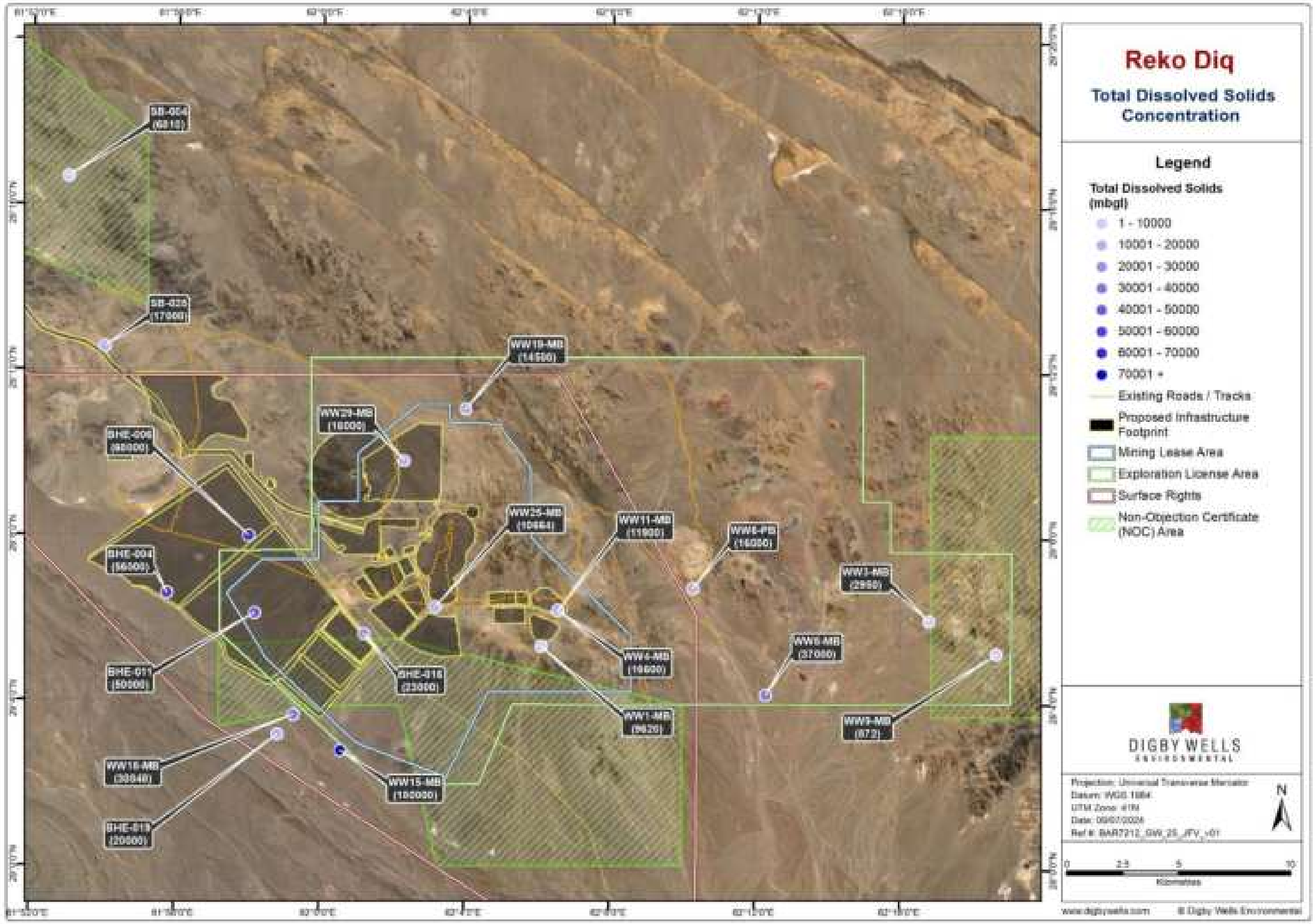


Figure 5-73: TDS concentration (mg/L) recorded for groundwater samples at the RDMS

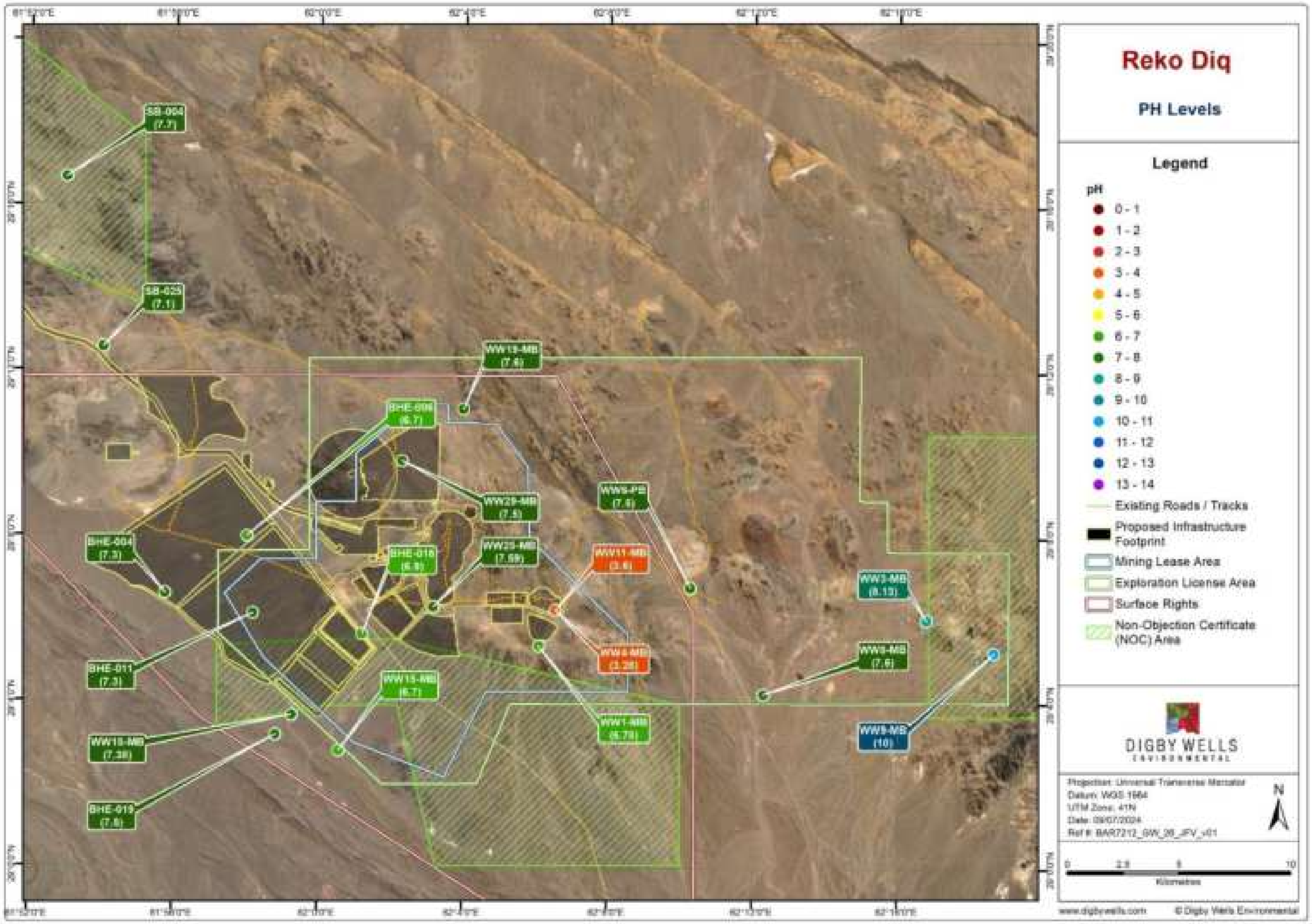


Figure 5-74: pH Levels recorded for groundwater samples taken at the RDMS

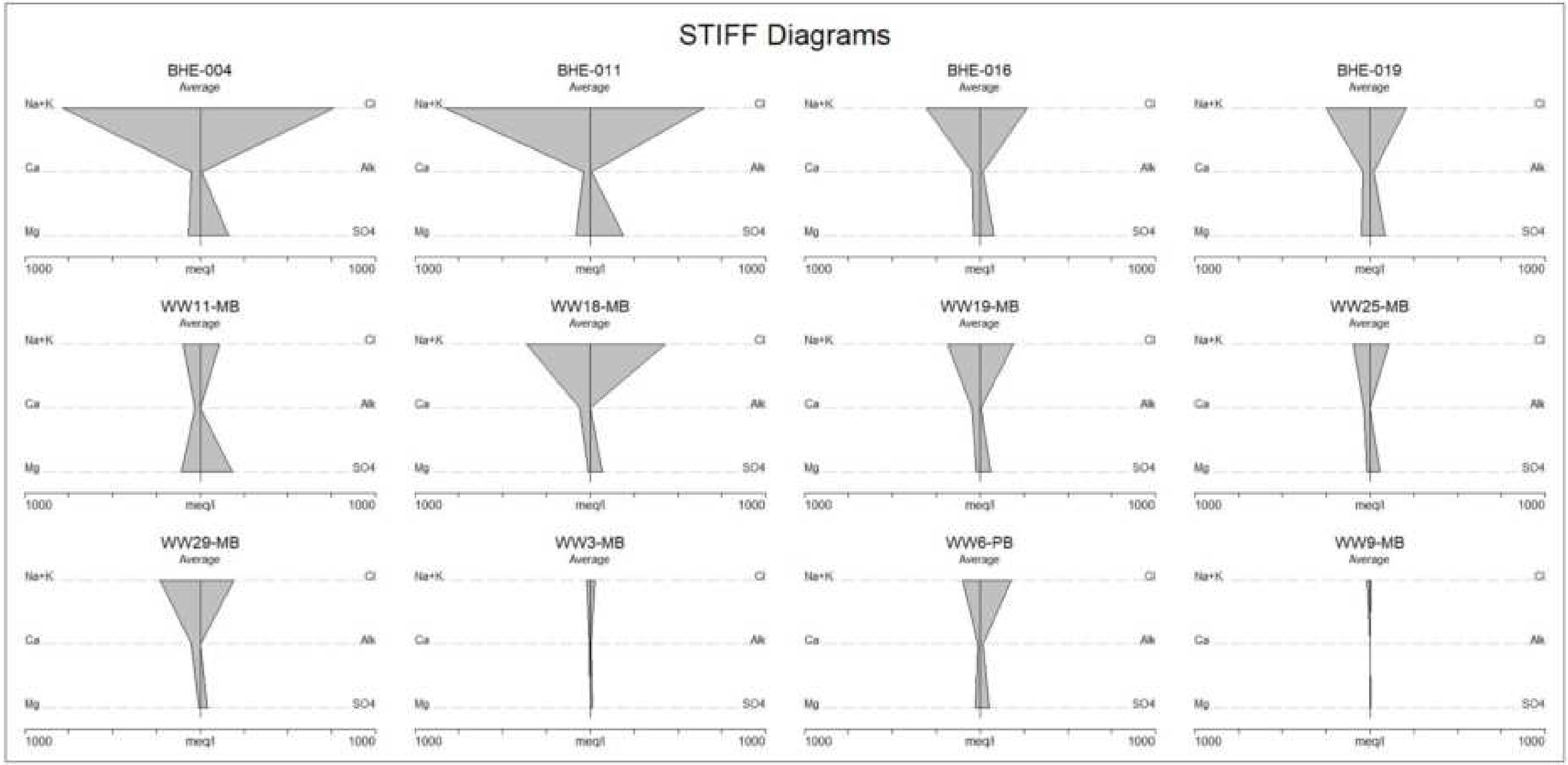


Figure 5-75: STIFF Diagrams

5.12. Air Quality

An Air Quality Assessment including Air Dispersion Modelling was conducted as part of this ESIA process; the detailed report is included as Appendix Q. The Study Area, which includes an area of 20 km around the RDMS and 1 km along the Road Transport Route, is presented in Figure 5-76. Sample locations were selected based on the prevailing wind conditions to account for the pollutant source, Table 5-38 provides a description of air quality sampling locations and their rationale for selection.

The air quality sampling was not conducted at the following locations:

- The **Northern Groundwater System** due to the localised and temporary nature of the impacts associated with the installation of pipelines and pumping stations.
- The **Rail Transport Route** due to its negligible impact during concentrate transportation and the short exposure duration of nearby dwellings by trains.
- The **Port Qasim** designated industrial estate, where air quality is expected to be already degraded due to existing industrial activities. The Project's activities including unloading concentrate from trains and transport to and storing the concentrate at PIBT, are not expected to result in significant contribution to air emissions.

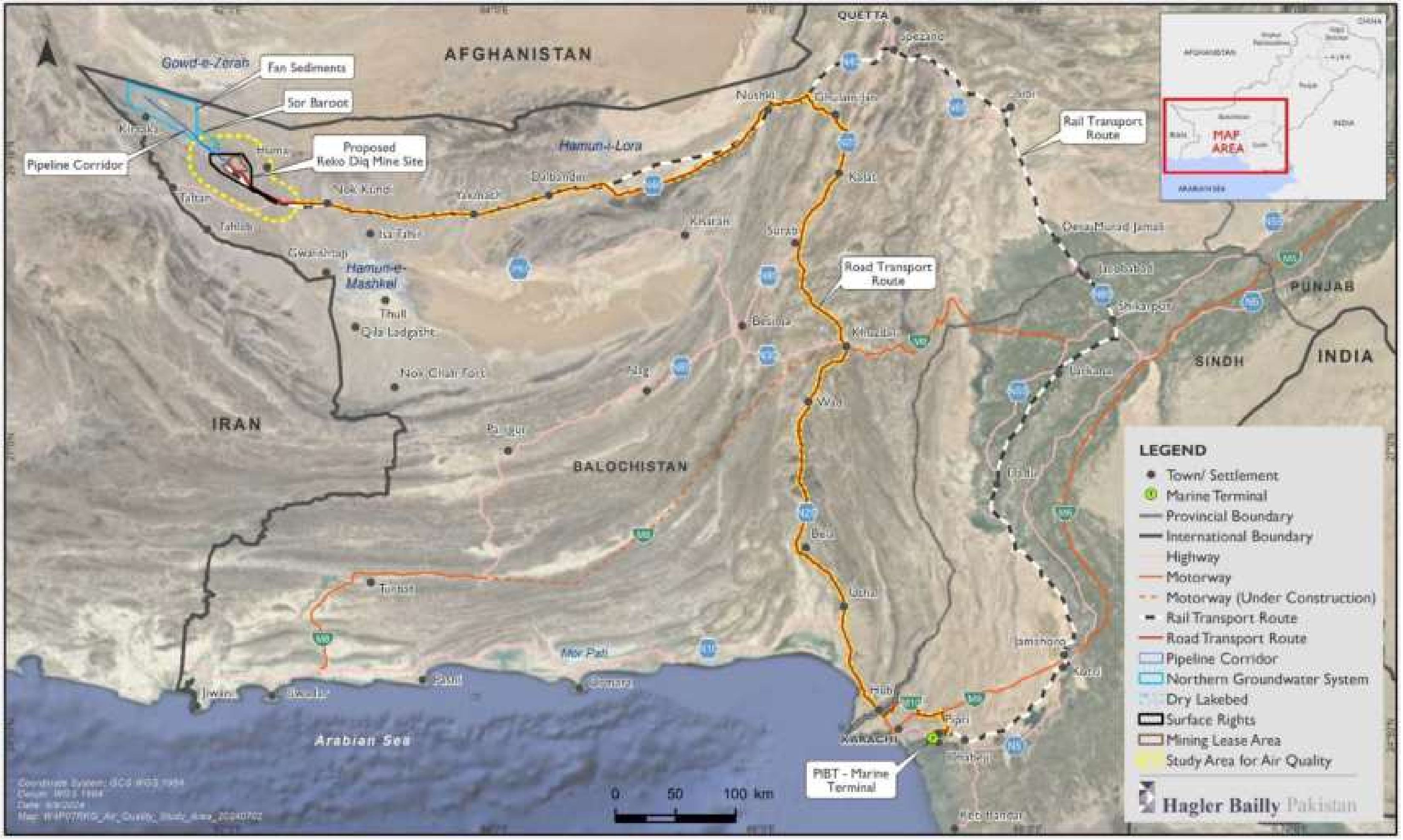


Figure 5-76: Study area including the RDMS and Road Transport Route

5.12.1. Data Collection

The air quality sampling was conducted using the following active and passive sampling techniques:

- Active air quality sampling was conducted using an air quality monitor capable of continuous monitoring of Particulate Matter (PM_{10} and $PM_{2.5}$) and gaseous pollutants (NO_2 and SO_2) installed at the Reko Diq exploration camp. A weather station was also installed in conjunction with this to record key weather parameters which can potentially impact the recorded concentrations of PM_{10} and $PM_{2.5}$. The data included in this assessment was recorded from 1 October 2023 to 15 April 2024.
- Diffusion tubes were used as passive samplers for the measurement of gaseous pollutants (NO_2 and $SO_2$and O_3) and photos of their placement on site are shown in Figure 5-77. The diffusion tubes were installed at various monitoring locations (RDMS, Humai settlement and N-40 highway) and replaced with new samplers every two to four weeks. This exercise of passive air sampling was carried out from 24 October 2023 to 15 April 2024.

The results of these sampling activities were compared with NEQS 2010, BEQS 2020 and IFC General EHS Guidelines.

Diffusion tubes installed at RDMS **Diffusion tubes installed at Humai**

Figure 5-77: Photographs of Air Quality Sampling using Diffusion Tubes

Table 5-38: Air Quality Sampling Locations and their Rational for Selection

ID	Location	Project Component	Coordinates	Time of Survey	Monitoring Round	Pollutants Sampled	Rationale for Site Selection and Sampling Equipment Used
A1-20	RDMS	RDMS	29°08'52.40"N 62°06'49.00"E	6 -22 October 2020 (~2 weeks)	Round 1	SO_2 NO_2	• To assess the baseline ambient air quality of the proposed RDMS before Project activities. • The sampling of SO_2 and NO_2 at this location was carried out using diffusion tubes.
A3-20	Humai Settlement	RDMS	29°04'58.80"N 62°18'35.90"E	6 -22 October 2020 (~2 weeks)	Round 1	SO_2 NO_2	• To assess the baseline ambient air quality of the settlement (downwind of Project facilities). • The sampling of SO_2 and NO_2 at this location was carried out using diffusion tubes.
A1-23	RDMS	RDMS	29°08'21.60"N 62°06'47.20"E	24 October 2023 to 28 April 2024*	Round 2	PM_{10} $PM_{2.5}$ NO NO_2 NOx SO_2 O_3	• To assess the baseline ambient air quality at the proposed RDMS. • At this location, PM_{10} and $PM_{2.5}$ were sampled following the active air quality sampling approach using ECO Environmental PRAXIS/OPCUBE air quality monitor. The sampling of gaseous pollutants including SO_2, NO, NO_2, NOx, and O_3 at this location was carried out using diffusion tubes.
A2-23	Humai Settlement	RDMS	29°05'44.00"N 62°17'37.80"E	24 October 2023 to 24 April 2024*	Round 2	NO NO_2 NOx SO_2 O_3	• To assess the baseline ambient air quality of the settlement east of the proposed RDMS before Project activities (downwind of Project facilities).

ID	Location	Project Component	Coordinates	Time of Survey	Monitoring Round	Pollutants Sampled	Rationale for Site Selection and Sampling Equipment Used
							• The sampling of gaseous pollutants including SO_2, NO, NO_2, NOx, and O_3 at this location was carried out using diffusion tubes.
A2-20	Nok Kundi	Road Transport Route	28°49'23.00" N 62°44'25.30" E	6 – 22 October 2020 (~2 weeks)	Round 1	SO_2 NO_2	• To assess the baseline of the nearest major town. Moreover, all the construction machinery and transportation will be done through this road. • The sampling of SO_2 and NO_2 at this location was carried out using diffusion tubes.

The sampling location ID as AX-Y defines sampling location and year of sampling. In this ID, 'X' represents the air quality sampling location and 'Y' represents the year of sample collection. An ID of A1-20 represents that the sample was collected at location A1 in year 2020.

Air Quality Sampling in Round 1 was conducted in 2020 as part of the 2020 ESIA (HBP, 2020).

*During Round 2, the air quality sampling was carried out following passive air sampling technique over a period of 6 months. Diffusion tubes were installed for a period of 2-4 weeks at a time at selected locations. After completion of the recommended exposure period, each set was replaced with a new set for the next exposure period. The methods for data collection and analysis used for the exposed set of diffusion tubes are detailed in the Air Quality report in Appendix Q.

5.12.2. Baseline Conditions

5.12.2.1. *Particulate Matter (PM_{10} and $PM_{2.5}$)*

This sub-section provides the description of the PM_{10} and $PM_{2.5}$ baselines and their comparison with the applicable limits. These sub-sections also describe the sources of particulate matter concentrations recorded at the Reko Diq Mine Site along with a comparison with prevailing weather conditions. The complete dataset for both PM_{10} and $PM_{2.5}$ concentrations recorded at the onsite air quality monitoring station can be found in Appendix Q.

Table 5-39 the PM_{10} and $PM_{2.5}$ concentrations recorded at A1-23 (RDMS) and their comparison with the NEQS and IFC General EHS Guidelines.

Table 5-39: Baseline Concentrations of PM_{10} and $PM_{2.5}$ at A1-23

Description	A1-23	
	PM_{10}	$PM_{2.5}$
	µg/m³	
NEQS/BEQS (24-hour interval)	**150**	**35**
IFC General EHS Guidelines (24-hour interval – Guideline)	**50**	**25**
IFC General EHS Guidelines (24-hour interval – Interim Target-1)	**150**	**75**
Minimum concentration (24-hours interval)	13	4
Average concentration (24-hours interval)	39	12
Maximum concentration (24-hours interval)	116	38
Number of 24-hours exceedances from NEQS	0%	1% (1-day)
Number of 24-hours exceedances from IFC General EHS Guidelines (Guideline Value)	**17 %**	**1%**
Number of 24-hours exceedances from IFC General EHS Guidelines (Interim Target 1)	0%	0%

Notes:
As the Project is located in desert environment, background concentrations of particulate matter are expected to be elevated. Therefore, Interim Target 1 of IFC General EHS Guidelines is taken as reference for comparison instead of the guideline value (50 µg/m³ for PM_{10} and 25 µg/m³ for $PM_{2.5}$) to assess exceedances in the background concentrations.

PM_{10}: For the 24-hour averaging period, the recorded concentrations of PM_{10} remained within the limit of 150 µg/m³ prescribed in the NEQS, BEQS, and IFC General EHS Guidelines. In comparison with the IFC General EHS Guideline limit of 50 µg/m³, the reported concentration of PM_{10} exceeded the limit for 17% time of the total monitoring duration or 27-days. The reported concentrations of PM_{10} ranged between 13 µg/m³ and 116 µg/m³ with an average concentration of 39 µg/m^3. Higher concentrations recorded above the average concentration of 39 µg/m^3 were primarily attributed to high-speed winds between 6 m/s and 18 m/s blowing from the northeast towards southwest.

$PM_{2.5}$: The reported concentration of $PM_{2.5}$ for a 24-hour averaging period exceeded the limit of 35 µg/m^3 prescribed in NEQS and BEQS for ambient air quality for 1% (1-day) of the total days monitored. In comparison with the IFC General EHS Guidelines limit of 25 µg/m^3, the $PM_{2.5}$ concentrations exceeded the limit for 1% of the time which corresponded to 2-days, However, the concentrations remained within the limit of 75 µg/m^3, as prescribed in the IFC General EHS Guidelines. The reported concentrations of $PM_{2.5}$ for the 24-hour averaging period ranged between 4 µg/m^3 and 38 µg/m^3 with an average concentration of 12 µg/m^3 respectively.

5.12.2.1.1. Sources of Particulate Matter at the RDMS

A high variability in the PM_{10} and $PM_{2.5}$ concentrations was observed which may be a result of either natural sources (such as wind erosion, gusting, dust storms, etc.) or anthropogenic activities such as movement on unpaved roads, construction activities, burning of fossil fuels or industrial activities, etc.

As the wind was primarily blowing from a northeast to southwest direction during the monitoring period, contribution of PM_{10} and $PM_{2.5}$ concentrations from nearby industrial and domestic sources at the RDMS was highly unlikely.

The nearby communities are located with east or south of the RDMS, therefore, particulate movement from these sources due to winds blowing from a northeast direction is also unlikely.

Similarly, the nearest industrial activities are being carried out at Saindak Copper-Gold Project which is more than 50 km to the west of the RDMS and the prevailing winds during the monitoring period were not from this direction. Therefore, the particulate matter concentrations recorded at the RDMS can be primarily attributed to natural sources.

Figure 5-78 and Figure 5-79 indicate an increasing pattern in PM concentrations with increasing wind speeds. The simulated background PM_{10} and $PM_{2.5}$ concentrations depict biases of less than 10% when compared with the PM_{10} and $PM_{2.5}$ concentrations recorded at the RDMS for wind speeds ranging between 6 m/s and 10 m/s. Therefore, a bias correction is not necessitated for the background PM_{10} and $PM_{2.5}$ concentrations.

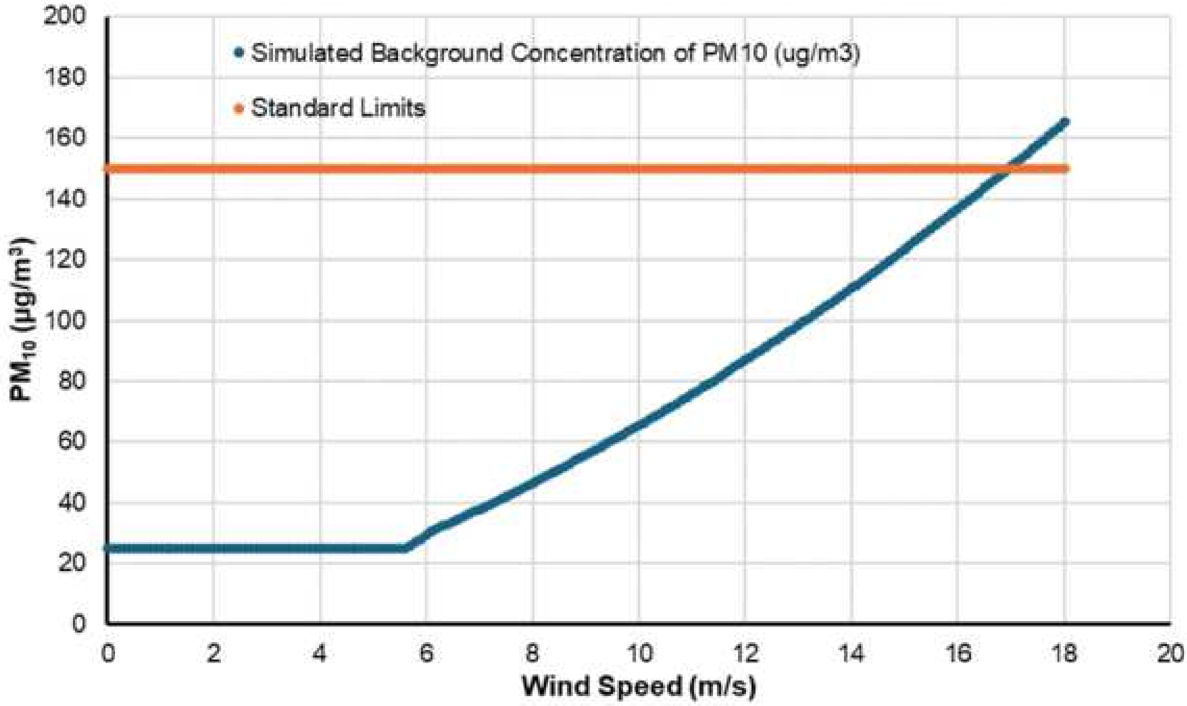


Figure 5-78: Simulated background PM_{10} concentrations as function of wind speed

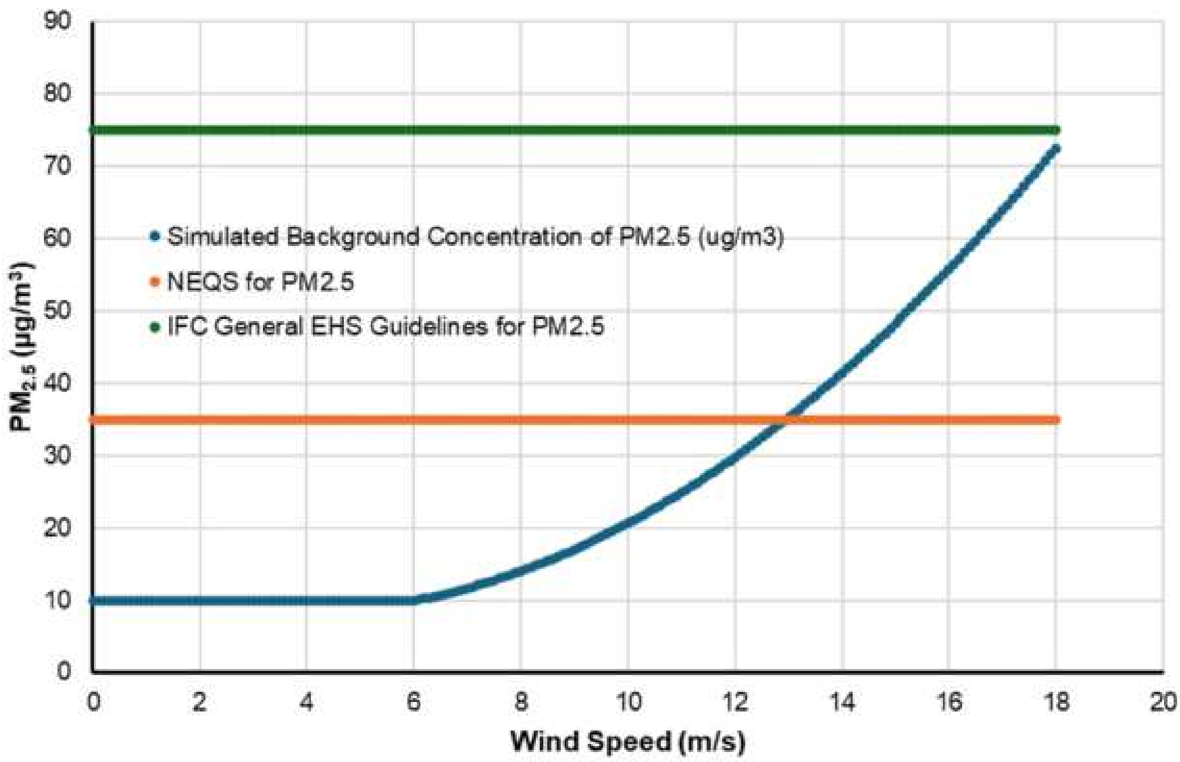


Figure 5-79: Simulated background $PM_{2.5}$ concentrations as function of wind speed

A summary of this relationship, with a comparison with the limits prescribed in NEQS for ambient air quality and IFC General EHS Guidelines, is provided below.

PM_{10}: The background concentrations of PM_{10} remain within the limit of 150 µg/m^3 prescribed in NEQS and BEQS for ambient air quality and IFC General EHS Guidelines (Interim Target 1) when the wind speeds are less than 16.5 m/s. A maximum concentration of 165 µg/m^3 is anticipated when the wind speeds reach 18 m/s.

$PM_{2.5}$: The background concentrations of $PM_{2.5}$ indicates that concentrations remain within the limit of 35 µg/m^3 prescribed in NEQS and BEQS for ambient air quality when the wind speeds are less than 12.5 m/s. For high-speed winds in the range of 12.5 m/s to 18 m/s, the background concentrations of $PM_{2.5}$ range between 35 µg/m^3 and 72 µg/m^3. However, the background concentration remained within the limit of 75 µg/m^3 prescribed in IFC General EHS Guidelines at all wind speeds below 18 m/s.

5.12.2.2. Oxides of Nitrogen, Sulphur Dioxide and Ozone

5.12.2.2.1. RDMS

Table 5-40 and Table 5-41 summarise the results of the baseline monitoring for oxides of Nitrogen, Sulphur Dioxide and Ozone along with their comparison with NEQS and IFC-EHS Guidelines. The laboratory results from the field monitoring are included in Appendix Q. A brief discussion of each of the pollutant concentration along with their sources is provided below:

- *Oxides of Nitrogen (NO)*: The NO concentrations remained within the limits prescribed in the NEQS for the annual averaging period.[29] The recorded concentrations ranged between 0.9 µg/m^3 and 6.70 µg/m^3 at all sampling locations during the 2023 Surveys.
- *Oxides of Nitrogen (NO_2)*: The measured concentrations of NO_2 were within the limits prescribed in the NEQS, BEQS, and IFC General EHS Guidelines for the annual averaging period at all sampling locations in the 2020 and 2023 Surveys with concentrations ranging between 0.6 µg/m^3 and 11.30 µg/m^3.
- *Oxides of Nitrogen (NO_x)*: The measured concentrations of NO_x ranged between 1.1 µg/m^3 and 11.30 µg/m^3 at all sampling locations during the 2023 surveys.[30]
- *Sulphur Dioxide (SO_2)*: The measured concentration of SO_2 remained within the limits prescribed in the NEQS, BEQS, and IFC General EHS Guidelines for annual averaging period at all sampling locations in the 2020 and 2023 Surveys. The measured concentrations of SO_2 during these surveys ranged between 1.32 µg/m^3 and 9.81 µg/m^3 respectively.
- *Ozone (O_3)*: The ozone concentrations remained within the limits prescribed in NEQS and BEQS for the 1-hour averaging period. However, the maximum concentration of ozone exceeded the limits prescribed in IFC General EHS Guidelines for the 8-hours averaging period. The measured concentrations of ozone ranged between 31.50 µg/m^3 and 113.6 µg/m^3 during the 2023 Surveys.

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[29] IFC General EHS Guidelines do not prescribe limits for NO.

[30] NEQS and IFC General EHS Guidelines do not prescribe limits for NO_x.

Table 5-40: Results of Ambient Air Quality sampling - Round 1 – RDMS

Sample ID	NO_2 (µg/m³)	SO_2 (µg/m³)
A1-20 (near RDMS in 2020)	<0.6	<2.32
A3-20 (Humai settlement in 2020)	4.4	3.62
NEQS/BEQS (24-hour)	**80**	**120**
NEQS/BEQS (Annual average)	**40**[a]	**80**[a]
IFC General EHS Guidelines (24-hour) – Interim 1	–	**125**[b]
IFC General EHS Guidelines (24-hour)	–	**20**[b]
IFC General EHS Guidelines (annual average) – Interim 1	–	–
IFC General EHS Guidelines (annual average)	**40** [a]	–

Notes:

a. Annual limits for NO_2 have been considered for comparison purposes due to a sampling period of 2 weeks during 2020 and 4 weeks during 2023 survey, and direct comparison with the 1-hour limit for NO2 was not possible. No interim targets for NO_2.

b. There are no annual limits for SO_2.

c. Annual limits do not apply to PM_{10} and $PM_{2.5}$ as these were 24-hours reading. Therefore, 24-hour limits were provided for comparative purposes.

d. The WHO Interim Target 1 is used in this comparison as it sets out a staged approach for compliance with the guideline value.

A brief discussion on the trends and sources of the emissions based on the above-mentioned description is provided below:

- The concentrations of oxides of nitrogen (NO_2, and NO_x), sulphur dioxide (SO_2), and ozone (O_3) were reported to be comparatively higher at sampling location A2-23 (Humai Settlement) than those recorded at A1-23 (RDMS), most likely due to natural variations.
- The maximum concentration of NO was reported to be 6.70 µg/m³ at sampling location A1-23 (RDMC) most likely due diesel usage in vehicles and generators.
- The maximum concentration of NO_2 recorded was 5.0 µg/m³ 2023 at A2-23 (Humai Settlement) in 2023 while the minimum concentration was recorded as 0.6 µg/m³ at A1-20 (RDMC) in 2020.
- SO_2 concentrations were comparatively lower (less than 1.70 µg/m³) at both sampling locations in the 2023 Survey as compared to 2020 Survey during which the concentrations were reported between 2.32 µg/m³ and 3.62 µg/m³ respectively.

Table 5-41: Results of Ambient Air Quality sampling - Round 2 – Reko Diq Mine Site

Pollutant ID	*Description*	A1-23 (µg/m³)	A2-23 (µg/m³)	NEQS/BEQS (µg/m³)			IFC General EHS Guidelines (µg/m³)			
				1-Hour	24-Hours	Annual Average	1-Hour	8-Hour	24-Hours	Annual Average
Nitrogen Oxide (NO)	Minimum	<0.90	<0.90	-	40	40	-	-	-	-
	Average	3.30	2.15							
	Maximum	6.70	4.40							
Nitrogen Dioxide (NO_2)	Minimum	<0.70	<0.90	-	80	40	200	-	-	40
	Average	4.68	3.50							
	Maximum	6.80	11.30							
Oxides of Nitrogen (NO_x)	Minimum	<4.90	<1.1	-	-	-	-	-	-	-
	Average	7.42	4.25							
	Maximum	10.10	11.30							
Sulphur Dioxide (SO_2)	Minimum	<1.65	<1.23	-	120	80	-	-	20	-
	Average	4.38	5.01							
	Maximum	8.62	9.81							
Ozone (O_3)	Minimum	<35.88	<31.50	130	-	-	-	100	-	-
	Average	60.78	67.33							
	Maximum	90.10	113.60							

Note: The concentrations of oxides of nitrogen (NO, NO_2, and NOx), sulphur dioxide (SO_2), and ozone (O_3) were measured through passive air sampling which is usually carried out for a period of 2-4 weeks. In the absence of limits for such periods, an indicative comparison is made with the hourly, daily, and annual limits prescribed in NEQS, BEQS, and IFC General EHS Guidelines. The comparison provided here is for indicative purpose and should not be used to assess compliance or form basis for assessing need for implementation of mitigation measures.

'-' indicates that the limits are not prescribed in the standard or guideline.

For parameters which have limits prescribed in both NEQS, BEQS and IFC General EHS Guidelines, the stringent of the two has been taken as reference to assess exceedance.

5.12.2.2.2. Nok Kundi

Table 5-42 summarises the results of the monitoring undertaken at Nok Kundi along with their comparison with NEQS, BEQS, and IFC-EHS Guidelines. The laboratory results from the field monitoring are included in Appendix Q.

Table 5-42: Results of Ambient Air Quality Sampling – Nok Kundi

Sample ID	NO_2 (µg/m³)	SO_2 (µg/m³)
A2-20 (Nok Kundi in 2020)	1.7	2.78
NEQS/BEQS (24-hour)	80	120
NEQS/BEQS (Annual average)	40 [a]	80 [a]
IFC General EHS Guidelines (24-hour)	–	125
IFC General EHS Guidelines (annual average)	40 [a]	–

a. Annual limits for NO_2 and SO_2 were considered for comparison purposes due to a sampling period of 2 weeks during Round 1.

A brief discussion of each of the pollutant concentration along with their sources is provided below:

- The measured concentrations of NO_2 and SO_2 were within the limits prescribed in the NEQS, BEQS, and IFC General EHS Guidelines for the annual averaging period. The NO_2 concentration was reported to be 1.7 µg/m³ while the SO_2 concentration was 2.78 µg/m³ at the sampling location.
- As witnessed during the field visits, anthropogenic activities were the primary source of NO_2, and SO_2 concentrations at Nok Kundi. These activities included vehicular emissions from the national highway N-40, and ongoing construction activities. This location also received limited contribution of pollutants from the burning of fuelwood which is a source for heating and cooking in local households.

5.12.2.3. Baseline Condition at PIBT, Port Qasim

The port facilities for export of Concentrate will be located in Port Qasim, Karachi, which is a designated industrial zone. Based on assessments conducted by HBP (2016) and GEMS (2017),(HBP, 2016) the baseline PM_{10} concentration in the Port Qasim ranged between 140 µg/m³ and 147 µg/m³. Similarly, the $PM_{2.5}$ concentrations at this location usually range between 20 µg/m³ and 45 µg/m³ respectively (HBP, 2016) (GEMS, 2017). Therefore, the $PM_{2.5}$ concentrations are already expected to exceed the applicable limit of 35 µg/m³ prescribed in Sindh Environmental Quality Standards (SEQS) for ambient air quality.

The storage area for concentrate export will be constructed at an existing terminal at the PIBT and will involve the addition of facilities for the purpose of the Project. The expansion activities are, however, expected to be of relatively small spatial scale and will last for a short duration not lasting more than few months. Due to this, the Project's impacts on the ambient air quality will be temporary and will remain for short durations, not lasting after completion of the construction phase of the Project. The extent of Project's expansion activities will be small as the PIBT site already has established port facilities such as facilities for ship loading and unloading, roads for transportation of materials etc. The intensity of these impacts will also be minor as the baseline air quality is already very high and Project's contribution will be relatively negligible.

5.13. Soils and Sediments

A Soils and Sediments Assessment was carried out as part of this ESIA process; the results are detailed in Appendix R. The Study Area in which the Project's activities may impact the soils and sediments was delineated as follows:

- *Reko Diq Mine Site*: An area of 10 km around the proposed Reko Diq Mine Site;
- *Road Transport Route*: An area of 500 m either side of the road and rail corridor was selected.
- *Port Qasim*: An area of 10 km was selected for marine sediment sampling to ensure a wide spatial dataset given the known existing contamination in the area.

Soil samples were collected from 19 pre-selected locations between 2020 and 2023 (Figure 5-80). To ensure accuracy, quality control samples were also collected where appropriate.

The monitoring locations were selected to assess the baseline soil quality conditions at:

- Five locations at the proposed RDMS (Balochistan province);
- One location at the Northern Groundwater System (Balochistan province);
- Three locations along the Road Transport Route (Balochistan province); and
- Ten (10) locations at Port Qasim.

Sediment sampling was also carried out at Port Qasim with Figure 5-81 indicating the locations of the sample sites.

Soil and sediment samples were analysed using internationally accepted methods by national and international ISO 9001:2015 certified and accredited laboratories.

Currently there are no local guidelines or standards that can be used for comparison therefore international guidelines such as Alberta Guidelines and Dutch Standards were used to assess soil viability for agriculture and compare the pre-Project soil quality with the recommended values to assess any preexisting anthropogenic contamination. Table 5-43 presents a summary of all soil sampling locations and Table 5-44 provides a summary of the sediment sampling conducted at Port Qasim.

Table 5-43: Summary of Soil Sampling Locations for the Reko Diq Minig Project

Sample ID	Location	Project Component	Sampling Round	Coordinates	Province	Rationale for Selection
S1-20	Near abstraction point	Northern Groundwater System	Round 1	29°31'13.40" N 61°34'33.60" E	Balochistan	At the Northern Groundwater System to evaluate the soil quality at the water extraction point.
S2-20	RDMS	Mine Site	Round 1	29° 06' 09.8" N 62° 05' 40.9" E	Balochistan	At RDMS to evaluate baseline soil quality prior to construction of the Project. This site serves as a reference point.
S3-20	RDMS	Mine Site	Round 1	29° 05' 46.6" N 62° 06' 17.04" E	Balochistan	At RDMS to evaluate baseline soil quality prior to construction of the Project. This site serves as a reference point.
S4-20	RDMS	Mine Site	Round 1	29° 06' 35.4" N 62° 06' 29.5" E	Balochistan	At RDMS to evaluate baseline soil quality prior to construction of the mine site. This site serves as a reference point.
S5-20	RDMS	Mine Site	Round 1	29° 07' 15.9" N 62° 07' 13.8" E	Balochistan	At RDMS to evaluate baseline soil quality prior to construction of the mine site. This site serves as a reference point.
S6-20	Near existing camp	Mine Site	Round 1	29°08'47.70" N 62°06'52.90" E	Balochistan	This site serves as a reference point.
S7-20	Duplicate Sample	Mine Site	Round 1	29°08'47.70" N 62°06'52.90" E	Balochistan	Duplicate of S6, as a QC sample.
S1-22	Qadirabad	Road Transport Route	Round 2	28° 34' 04.45" N 65° 31' 20.72" E	Balochistan	An agricultural area which will be impacted on along the road route near Qadirabad to evaluate the soil quality and fertility before the Project. This site serves as a control location.

Sample ID	Location	Project Component	Sampling Round	Coordinates	Province	Rationale for Selection
S2-22	Nok Kundi	Road Transport Route	Round 2	28° 46' 42.50" N 62° 40' 44.90" E	Balochistan	At a gravel plain near Nok Kundi to assess the soil quality before the construction of the Project.
S3-22	Garib Shah	Road Transport Route	Round 2	28° 39' 52.43" N 64° 47' 11.19" E	Balochistan	At a mountain hill along the road route near Garib Shah to evaluate the soil quality before the Project. This site serves as a control location
SS1	At Korangi Fish Harbor	Port Qasim	Round 3	24°48'36.00" N 67°11'47.93" E	Sindh	At Korangi Fish Harbor to assess the soil quality at this location which will not be impacted by the Project. This site serves as a reference point.
SS2	At PIBT Coal Terminal Jetty	Port Qasim	Round 3	24°47'45.60" N 67°16'41.97" E	Sindh	At PIBT Coal Terminal Jetty to assess the soil quality before the Project. The Project will utilise the jetty if the PIBT site is selected for the marine facility.
SS3	At PIBT site north boundary	Port Qasim	Round 3	24°48'46.80" N 67°17'31.31" E	Sindh	At PIBT site north boundary to assess the pre-Project soil quality.
SS4	At Port Qasim Road	Port Qasim	Round 3	24°48'57.60" N 67°18'05.40" E	Sindh	At Port Qasim Road in the Northwestern Industrial Zone Port Qasim going towards PIBT.
SS5	Near to PIBT	Port Qasim	Round 3	24°48'46.80" N 67°17'57.77" E	Sindh	Near roadway within Port Qasim.
SS6	At the existing rail route	Port Qasim	Round 3	24°50'06.61" N 67°18'57.60" E	Sindh	Along the existing Rail Transport Route below Pipri and adjacent to Northwestern Industrial Zone.
SS7	At the existing rail route	Port Qasim	Round 3	24°48'10.80" N 67°19'30.61" E	Sindh	Along the existing Rail Transport Route going towards Southwestern Industrial Zone.
SS8	At existing rail in the Southwestern Industrial Zone	Port Qasim	Round 3	24°47'37.21" N 67°20'09.60" E	Sindh	At existing rail in the Southwestern Industrial Zone to assess the pre-Project soil quality.

Sample ID	Location	Project Component	Sampling Round	Coordinates	Province	Rationale for Selection
SS9	At Southwestern Industrial Zone	Port Qasim	Round 3	24°47'06.00" N 67°20'26.74" E	Sindh	At Southwestern Industrial Zone along the Port Qasim Road.
SS10	Keti Bandar	Port Qasim	Round 3	24°08'35.31" N 67°27'07.20" E	Sindh	At Keti Bandar which serves as a control location.
SS11	Duplicate Sample	Port Qasim	Round 3	24°48'57.60" N 67°18'05.40" E	Sindh	Duplicate of SS4, as a QC sample.

Table 5-44: Summary of Sediment Sampling Locations

Sample ID	Location	Project Component	Sampling Round	Coordinates	Province	Rationale for Selection
SD1	Korangi Fish Harbor	Port Qastim	Round 3	24° 48' 10.39" N 67° 12' 20.94" E	Sindh	At Korangi Fish Harbor to assess the sedimentation contamination due to the discharge of effluents particularly from Korangi Industrial Area.
SD2	Jhari Creek	Port Qastim	Round 3	24° 46' 15.71" N 67° 13' 36.77" E	Sindh	Jhari Creek in the extended navigation channel near Government Marine Terminal.
SD3	Kadiro Creek	Port Qastim	Round 3	24° 47' 05.63" N 67° 14' 57.44" E	Sindh	Kadiro Creek inside the channel near Marine Terminal Location 1.
SD4	At PIBT site – Marine Terminal Location 1	Port Qastim	Round 3	24° 47' 24.79" N 67° 16' 30.78" E	Sindh	At PIBT site to assess the pre-Project sediment contamination at PIBT Jetty.
SD5	At PIBT site – Marine Terminal Location 1	Port Qastim	Round 3	24° 48' 15.02" N 67° 17' 10.08" E	Sindh	At PIBT site to assess the pre-Project sediment contamination at PIBT Jetty.
SD6	Near FOTCO Oil Jetty	Port Qastim	Round 3	24° 46' 51.65" N 67° 17' 23.33" E	Sindh	Near FOTCO Oil Jetty.
SD7	Chara Creek in the extended channel	Port Qastim	Round 3	24° 45' 53.03" N 67° 16' 50.16" E	Sindh	Chara Creek in the extended channel.
SD8	West of Government Marine Terminal	Port Qastim	Round 3	24° 46' 25.99" N 67° 18' 27.97" E	Sindh	West of Government Marine Terminal near Iron Ore and Coal Terminal Jetty.
SD9	Southwest of Government Marine Terminal	Port Qastim	Round 3	24° 45' 50.67" N 67° 19' 04.99" E	Sindh	Southwest of Government Marine Terminal close to the Southwestern Industrial Zone of Port Qasim.

Sample ID	Location	Project Component	Sampling Round	Coordinates	Province	Rationale for Selection
SD10	At Marine Terminal Location 2	Port Qastim	Round 3	24° 45' 56.99" N 67° 20' 16.94" E	Sindh	At Marine Terminal Location 2 to assess the pre-Project sediment quality.
SD11	At Isaro Creek	Port Qastim	Round 3	24° 46' 06.42" N 67° 21' 36.83" E	Sindh	At Isaro Creek inside the channel east of the Government Marine Terminal,
SD12	At Gharo Creek in the extended navigation channel east of the Marine Terminal Location 2	Port Qastim	Round 3	24° 44' 52.23" N 67° 20' 42.16" E	Sindh	At Gharo Creek in the extended navigation channel east of the Government Marine Terminal.
SD13	At Keti Bandar	Port Qastim	Round 3	24° 07' 09.05" N 67° 27' 23.40" E	Sindh	At Keti Bandar which serves as a control location.
SD14	Duplicate Sample	Port Qastim	Round 3	24° 47' 24.79" N 67° 16' 30.78" E	Sindh	Duplicate of SD4, as a quality control sample.

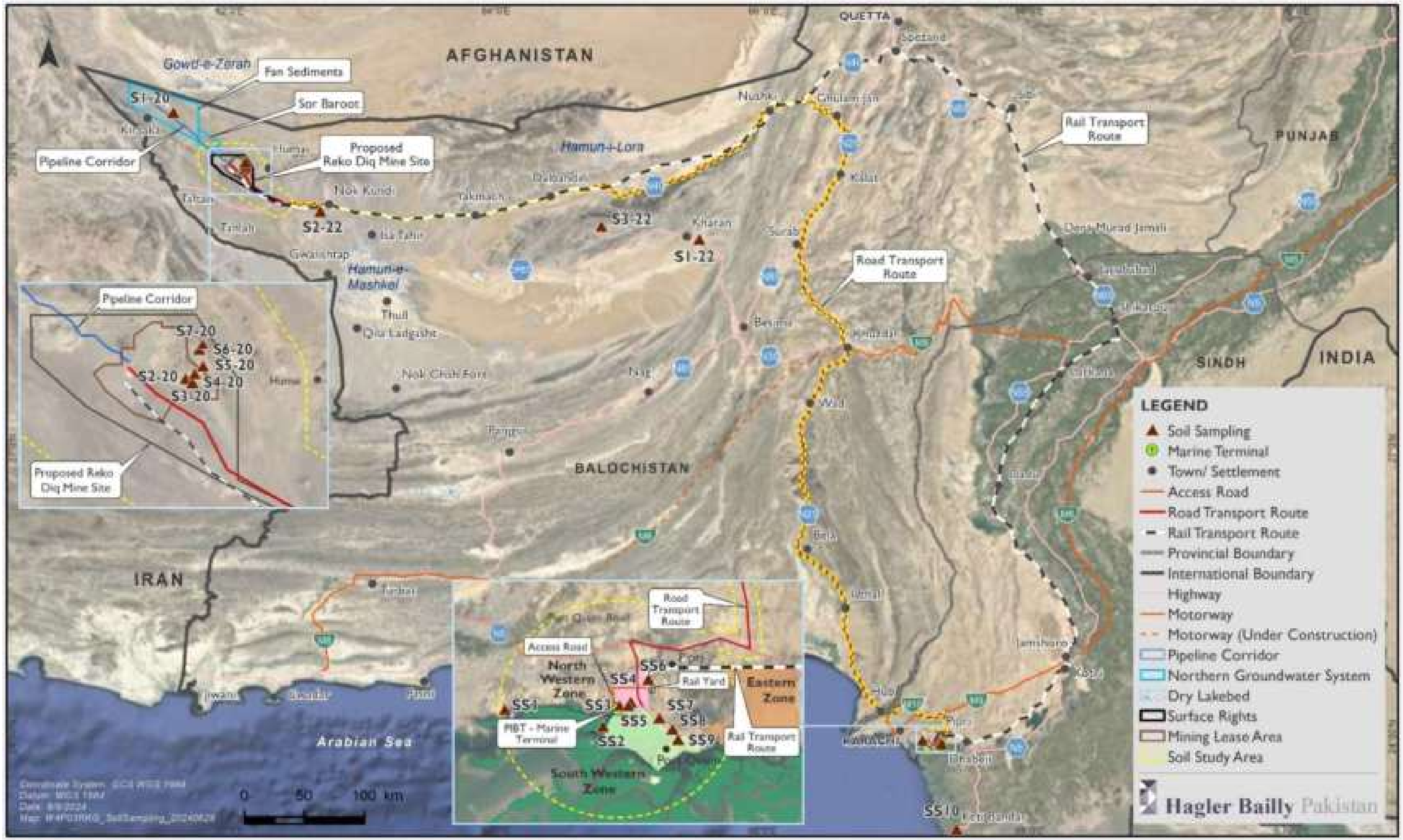

Figure 5-80: Soil Sampling Locations

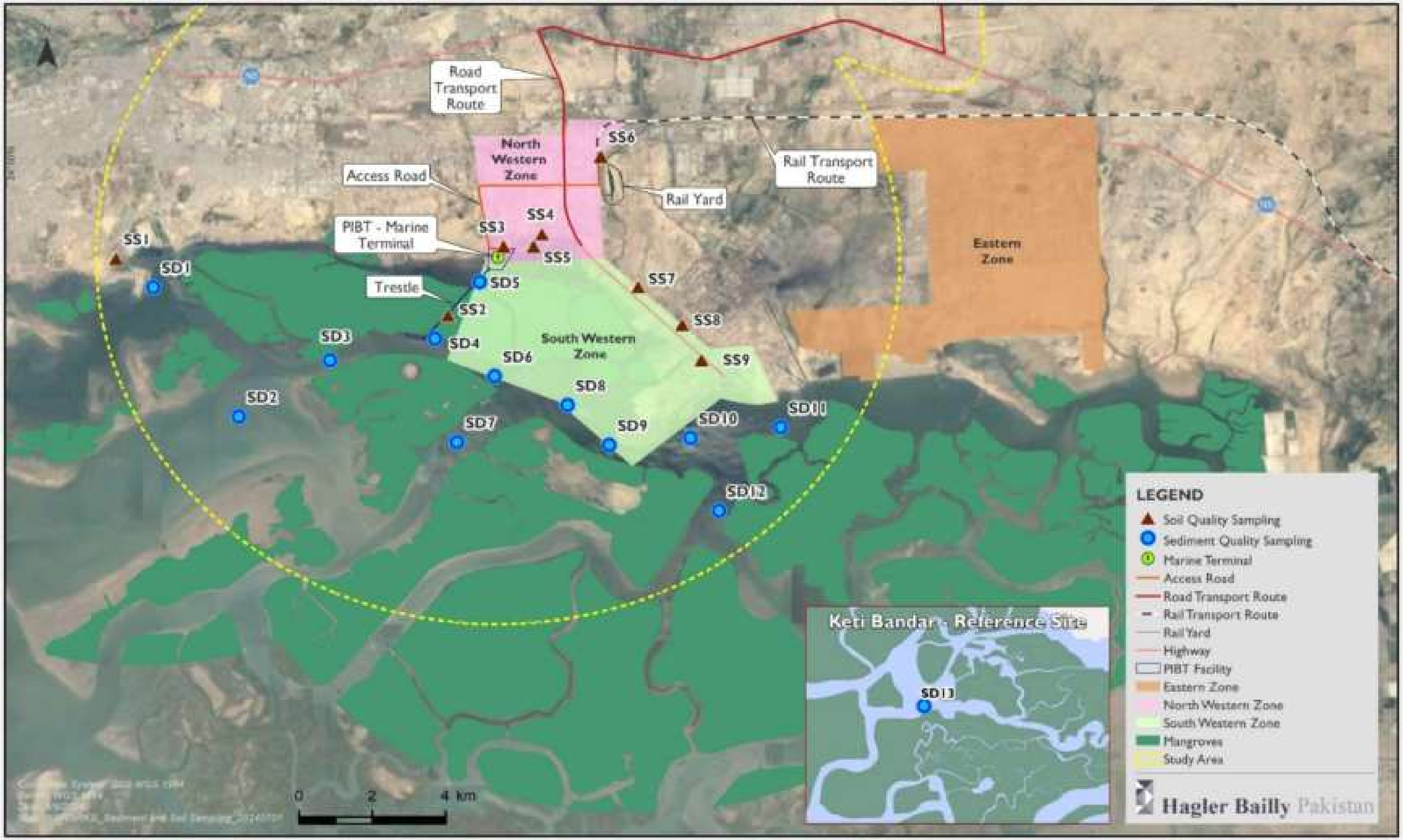

Figure 5-81: Sediment Sampling Locations at Port Qasim

5.13.1. Soil Forms

Soil forms are conceptual generalisations based on specific soil properties. Each soil form consists of soil horizons, uniquely combined and integrated. The soils are classified according to the World reference base for soil resources as defined by the Food and Agricultural Organisation (FAO) of the United Nations, 2015 (FAO, 2014).

The dominant soil in Balochistan has a homogenous porous structure invariably calcareous in nature. The lime content of the soil varies from 5% to 30% and is uniformly distributed in most soil textures, resulting in highly alkaline soils. Where there is a high lime content (>15%), the soil is hard when dry and friable which will prevent root penetration, decrease water infiltration and result in increased runoff. This can result in increased risk of flash floods during heavy precipitation.

The organic matter content is generally low, in order of 0.3% to 0.5%. Most of the surface of mountains and hills slopes are bare rock without soil cover (about 70%). Small patches contain shallow, strongly calcareous, gravelly, and stony loams. The soil in the Piedmont plains is very deep, well drained, homogeneous, silty, and strongly calcareous with 18% to 20% lime content uniformly distributed.[31] The soil in the saline basins (playas) is characterised as strongly hygroscopic, gypsiferous and saline with local sodicity and pH value of 8.6 – 10.0.

The loess plains have brown silt loams or very fine sandy loams and are strongly calcareous containing about 22% calcium carbonate, while the sandy plains are extremely homogeneous. The lime content ranges between 5% and 10%.[32] The soils at the proposed mine area are shallow (less than 1 m deep in most places) and consist largely of sands and gravels with fines (silt and clay material) comprising an average of 10% to 30% of the total weight. A large proportion of the soil fraction has undergone aeolian (wind) transport and is still variably mobile depending on the soil fraction.

5.13.2. Soils Chemical and Physical Analysis

The results are derived from the laboratory chemical analysis and lithological understanding and discussed below.

5.13.2.1. Reko Diq Mine Site

- The pH for all samples ranged between 7 and 8.
- The carbonates are generally presumed to be geogenic in nature.
- Antimony, Cadmium, Selenium, and Lead were recorded below detection limits.
- Arsenic, Copper, Barium, Nickel, Zinc and Mercury were detected but the concentrations were below the limits prescribed in the Alberta Guidelines and Dutch Standards.

[31] Environmental Profile, Balochistan (LARUS-IT, Enschede: Netherland, 1992)
[32] Ibid

- Chromium was detected above the Alberta Guidelines limit. Site investigations did not identify anthropogenic sources, so is presumed to be geogenic (Chromium can naturally occur up to 100 mg/kg in certain soils (Chrysochoou et al. (2016)).
- Calcium, Potassium, Sodium, Chloride and Phosphorus were detected above the Alberta Guideline limits, and these elevated mineral levels are considered geogenic and not associated with anthropogenic sources.
- As a further basis for interpreting the data, Soil Screening Values (SSV) and soil fertility guidelines were assessed. Where thresholds were not available, other sources were accessed to determine the chemical characteristics of the soils. Table 5-45 provides a comparison of the baseline soil quality against recommended mineral content ranges for the growth of wheat and date palms (Havlin et al, 2013) and Zaid & Arias, 2002). It can be observed that exceedances occur for all recommended values, limiting the suitability of these soils for use in agriculture.
- There is presently minimal vegetation at the RDMS, and the land is not of economic value for the local communities, of which the nearest is situated approximately 20 km from the mine site.

Table 5-45: Soil Chemistry results compared with Soil Suitability for Agriculture

Parameter	Wheat	Dates	S2-20	S3-20	S4-20	S5-20	S6-20
Calcium	600 –1000	400 – 600	37,564	35,904	33,167	35,557	33,108
Potassium	150 – 250	150 – 250	3,864	1,358	1,251	2,567	2,139
Sodium	< 50	< 200	2,569	1,029	1,156	1,841	1,143

5.13.2.2. Northern Groundwater System

- The pH of the sample was 7.46.
- Carbonates were not detected at this location.
- Antimony, Cadmium, and Lead concentrations were below detection limits.
- Chromium, Arsenic, Copper, Barium, Nickel, Selenium, Zinc and Mercury were detected but found to be below the limits prescribed in the Alberta Guidelines and Dutch Standards.
- Calcium, Potassium, Sodium, Chloride, Phosphorus and Boron were detected above the Alberta Guideline limits. The elevated mineral levels are geogenic and not associated with anthropogenic sources.

5.13.2.3. Road Transport Route

- The maximum pH of 8.85 was observed at S2-22 (Nok Kundi). A high pH can affect nutrient availability for agriculture however, several crops can persist and grow at this level.

- The parameters calcium, sodium, potassium, and phosphorous exceed the Alberta Guidelines at all sampling locations. High sodium in the soil can cause soil structure deterioration and problems with water infiltration. Similarly, high levels of calcium, magnesium and potassium can also cause imbalances and induce nutrient deficiencies. The elevated mineral levels are geogenic and not associated with anthropogenic sources.
- The maximum total organic carbon was observed at S1-22 (Qadirabad) which was 2.25% of the total soil content, suggesting that this area would be more suitable for agriculture.
- The organic content in soil should be greater than 0.86% to have a favourable effect upon physical properties of soils and growth of vegetation. The total organ carbon values at most soil sampling locations are close to this value, except for at S3-22 (Garib Shah) where it is significantly lower.
- Other parameters such as magnesium, carbonates, and ammonia were either not detected or detected in amounts that are below the limits prescribed in the Alberta Guidelines and Dutch Standards.
- The metals Arsenic, Barium, Copper, Lead, Nickel, and Zinc were detected at all monitoring locations; however, the concentrations are within the limits in the Alberta Guidelines and Dutch Standards.
- Boron was detected at all the locations and exceeded the limits prescribed in the Alberta Guidelines. The elevated mineral levels are geogenic and not associated with anthropogenic sources.
- Chromium was detected at all locations. The concentration of Chromium exceeds the limits prescribed in the Alberta Guidelines at S1-22 (Qadirabad) and S2-22 (Nok Kundi) but are below the limits prescribed in the Dutch Standards.

5.13.2.4. Port Qasim

- The pH of the collected samples ranged between 7.7 and 8.2.
- Cadmium, Mercury, and Selenium were not detected at any of the sampling locations except at SS1 (Korangi Fish Harbour) where only Cadmium was detected, and the detected levels comply with Alberta Guidelines and Dutch Standards. The elevated levels of Cadmium are associated with contamination from the existing port facilities and port freight traffic.
- Antimony, Arsenic, Barium, Boron, Chromium, Copper, Lead, Nickel, and Zinc were detected at all locations, but the detected levels were within the Alberta Guidelines and Dutch Standards.

5.13.3. Sediments – Sampling and Analysis

General findings of the sediment sampling exercise are presented below:

- The reference location (SD13: Keti Bandar) generally showed lower levels of contaminants compared to other samples, indicating relatively cleaner sediment conditions.
- The sediment sample collected from SD1 (Korangi Fish Harbor) stands out with significantly higher moisture content and petroleum and metal contamination compared to other samples, indicating potential differences in sediment properties or environmental conditions at this location.
- The metals, Antimony, Bismuth, Mercury, Silver, Selenium, and Thallium were recorded to be below detection limits at all locations. Boron was detected at all sampling locations.
- BTEX family (benzene, toluene, ethylbenzene, and xylene) levels were also below detection limits at all sampling locations.
- The TPH (Total Petroleum Hydrocarbons) levels were below detection limits at all sampling locations except at three sampling points; SD1 (Korangi Fish Harbor), SD4 (PIBT Terminal) and SD5 (PIBT Jetty) with the maximum levels observed at Korangi Fish Harbor point. This is possibly because the location receives the industrial discharges from Korangi Industrial Zone. Moreover, the activities at the harbour include the fuelling of boats and ships for fishing and possible spills during fuel transfer operations may contribute to these levels at this location.

5.14. Geochemistry

An Environmental Geochemical Assessment was conducted as part of this ESIA process; the detailed report is included as Appendix S. This study included the results of a previous geochemistry study by SRK (2010), which included static test work carried out on 413 samples from the Western Porphyry and Tanjeel prospects to assess the potential for acid generation and metal leaching from stockpiled ore, waste rock, and tailings for the proposed Project. Further to this an additional 62 waste rock samples (22 from Western Porphyry and 40 from Tanjeel) were collected and analysed in 2023/2024 and subjected to static tests such as Acid Base Accounting (ABA) and Contact Leach tests.

The results have been interpreted using the criteria tabulated in Table 5-46 from AMIRA International Limited (2002) below.

Table 5-46: Criteria for interpreting ABA Results (AMIRA International Limited, 2002)

Classification	NAPP	ANC/MPA	NAG-pH
Potentially Acid Generating (PAG) or Acid Generating (AG)	NAPP is positive	ANC/MPA < 1	NAG-pH <4.5
Uncertain and requires further characterisation	NAPP = 0	ANC/MPA = 1	NAG-pH <4.5 and NAG-pH >4.5

Classification	NAPP	ANC/MPA	NAG-pH
Potentially Acid Neutralising (PAN)	NAPP is negative	ANC/MPA > 1	NAG-pH >4.5

5.14.1. Western Porphyry

The geochemical test work indicates that the majority (more than 90%) of extracted rock is predicted to be Potentially Acid Forming (PAF). The current results indicate that the paste pH of Western Porphyry waste rock and pit wall samples ranges from neutral to alkaline, with 11% classified as LNAG and 88% as Highly Potentially Acid Generating (HPAG). The waste rock and pit wall samples exhibit low acid neutralisation capacity for both major and minor lithologies.

However, the encapsulated nature of sulphides at Western Porphyry suggests that this potential impact will take a considerable amount of time to manifest, likely in the order of four decades. Although it is a long process, it may occur within the 40-year life of mine. The slow reactivity is further compounded by the region's low humidity and high evaporation conditions indicating that the potential for environmental impacts to soils and groundwater will remain low.

To determine the leaching characteristics, a 3:1 contact leach test using deionised water was conducted on 13 Western Porphyry and 24 Tanjeel waste rock samples. The leachate concentrations were compared to the Background Groundwater Quality (BGWQ).

The Western Porphyry waste rock leachate pH ranges from acidic to neutral (pH 6.58 – 7.28). The pH values for VFL SCC and VFL PHY lithologies fall below the minimum BGWQ pH level of 7.20, while other lithologies are within the acceptable range. Several parameters, such as aluminium, antimony, barium, cobalt, copper, iron, potassium, manganese, thorium and thallium, exceed BGWQ levels.

The leachate pH from the Western Porphyry pit wall waste rock samples is acidic (pH 4.91 – 5.23). VFL SCC and VFL PHY lithologies have leachate pH values below the minimum BGWQ level. The parameters of concern include aluminium, antimony, barium, cobalt, copper, iron, potassium, manganese, thorium thallium and nitrates.

5.14.2. Tanjeel

In contrast to Western Porphyry, the material at Tanjeel exhibits a more oxidised nature, with greater exposure of Sulphides in waste rock, pit walls, and stockpiled ore. This increases the potential for acid generation.

Additionally, groundwater at Tanjeel utilises the same fractures as the mineralisation, resulting in in-situ partial oxidation. Consequently, the material displays a higher reactivity, even though its total potential for acid generation is lower when compared to Western Porphyry.

The current waste rock classification showed that the pH of Tanjeel waste rock and pit wall samples demonstrate mildly acidic to alkaline with waste rocks indicating 98% of samples

HPAG and 2% LNAG. The pit wall samples are 100% HPAG. Like Western Porphyry, the samples demonstrated low Acid Neutralisation Capacity.

The Tanjeel waste rock sample results show that leachate pH ranges from 4.16 to 8.58. PFQ PHY, PQF PHY, and VIN PHY samples have pH values below the minimum BGWQ level. Multiple parameters, such as low pH, Sulphate, aluminium, antimony, barium, cadmium, cerium, chromium, cobalt, copper, iron, manganese, lead, scandium, strontium, thorium, thallium, yttrium, and zinc, BGWQ levels.

The Tanjeel pit wall waste rock samples show leachate pH ranging from 5.07 to 6.24, with PFQ PHY falling below the minimum pH BGWQ level. Additionally, several parameters, including low pH, antimony, barium, cadmium, cerium, cobalt, copper, manganese, scandium, thorium, thallium, yttrium, and zinc, exceed BGWQ levels.

5.14.3. Tailings

The geochemical characteristics of the tailings are variable depending on the fraction of the tailings. Cleaner tailings contain between 6% and 23% sulphide have a high potential for acid generation and are characterised by concentrations of leachable metals above comparative water quality and risk assessment guidelines. The cleaner tailings are also characterised by very high Sulphate concentrations (above 2 g/L) and a low leachate pH (pH ~2).

Rougher tailings typically contain less than 0.5% Sulphide and as such have negligible acid-generating potential. The rougher tailings also have negligible buffering, so appear to be potentially acid forming in NNP, but are better classed as inert. Leachable metals are generally below comparative water quality guidelines and risk assessment guideline values. Sulphate values are generally below 500 mg/L, and the pH is mildly acidic to circum-neutral (pH 6).

6. Assessment of Environmental and Social Impacts and Risks

This chapter presents the environmental and social impacts which are expected to occur as a result of the Project with consideration of the biophysical and socio-economic baseline (presented in Chapter 5 of this ESIA Report and the specialist studies provided in the Appendices). Potential impacts associated with the proposed activities were identified through a systematic process whereby the activities were assessed for all phases (construction, operation, decommissioning and closure) of the Project.

It should be noted that despite a numerical methodology being utilised for the assessment of impacts (as detailed in Section 6.1), the process to determine environmental and social significance is inherently subjective. The purpose of the ESIA process is thus not to provide an incontestable rating of the significance of various aspects, but rather to identify and evaluate the likely significance of potential impacts on key receptors and resources.

The potential impacts have been assessed in terms of their significance pre- and post-mitigation, where post-mitigation significance ratings aim to show the effectiveness of the proposed mitigation and management measures. The results of this analysis form the basis for the mitigation measures and therefore the ESMMP described in Chapter 9 and the Biodiversity Management Plan (BMP) which will developed as a stand-alone document.

The Assessments for each aspect of the Project are detailed in the respective specialist studies included in the Appendices to this ESIA report.

6.1. Impact Assessment Methodology

The impact assessment methodology used for the Project involves two phases, namely impact identification and impact assessment. The Impact identification phase was performed through the use of an input-output model, whereby Project activities (included in Chapter 3) were superimposed onto the environmental and social baseline characteristics (as described in Chapter 5) for the proposed Project area. The impact assessment phase generated assessment outputs in the form of instances of potential positive or negative biophysical and socio-economic changes to the environment.

A numerical assessment of the significance of potential Project-induced impacts was carried as follows:

Significance = Consequence x Probability

Whereby

Consequence = Type of Impact x (Intensity + Spatial Scale + Duration)

And

Probability = Likelihood of an Impact Occurring

In addition, the formula for calculating consequence:

Type of Impact *(Nature) =* ***+1*** *(Positive Impact) or* ***-1*** *(Negative Impact)*

The weight assigned to the various parameters for positive and negative environmental, social and cultural heritage impacts is provided for in the formula and presented in Table 6-1. The probability consequence matrix for the identified impacts is displayed in Table 6-2 with the impact significance ratings described in Table 6-3.

Table 6-1: Impact Assessment Parameter Rating

Rating	Intensity		Spatial scale	Duration (duration of an impact without mitigation)	Probability (over the life of the project)
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
5	Significant impact on the environment. Irreparable and irreplaceable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable and irreplaceable damage to highly valued items of great cultural significance or complete breakdown of social order.	Significant improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of the receiving environment.	<u>Global</u> Contribute to global impact	<u>Inter -Generational</u> >20 years	<u>Certain / Definite</u> There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)
4	Serious long-term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of significance.	On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment. Average to intense social benefits to some people. Average to intense environmental enhancements.	<u>Regional</u> Will affect the entire province or region. A broad geographical area distinguished by similar features.	<u>Long term</u> 5-20 years	<u>Likely</u> The impact may occur (50-90%)

Rating	Intensity		Spatial scale	Duration (duration of an impact without mitigation)	Probability (over the life of the project)
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
3	Moderate (high), short-term effects but not affecting ecosystem function. On-going social issues. Damage to items of significance.	Average, on-going positive benefits, not widespread but felt by some.	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	Medium term 2 to 5 years	Probable Has occurred here or elsewhere and could therefore occur (20-50%)
2	Moderate (low), short-term effects but not affecting ecosystem function. On-going social issues. Damage to items of significance.	Average, on-going positive benefits, not widespread but felt by some.	Local Extending across the site and to nearby settlements. Sub-division of a district.	Short term Up to 2 years	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)

Rating	Intensity		Spatial scale	Duration (duration of an impact without mitigation)	Probability (over the life of the project)
	Negative Impacts (Type of Impact = -1)	Positive Impacts (Type of Impact = +1)			
1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Functions and processes not affected	Low positive impacts experience by very few of population.	Site Specific Limited to the site and its immediate surroundings.	Immediate Hours to weeks but less than 1 month	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures (1-5%).

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Table 6-2: Probability Consequence Matrix for Impacts

		Significance																									
Probability	5	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75
	4	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60
	3	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45
	2	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30
	1	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15
		-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15
		Consequence																									

Table 6-3: Significance Threshold Limits

Score	Description	Rating
57 to 75	A very beneficial impact which may be sufficient by itself to justify implementation of the Project. The impact may result in permanent positive change.	Major (positive)
39 to 56	A beneficial impact which may help to justify the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Moderate (positive)
20 to 38	An important positive impact. The impact is insufficient by itself to justify the implementation of the Project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	Minor (positive)
3 to 19	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	Negligible (positive)
-3 to -19	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment. The impacts are reversible and will not result in the loss of irreplaceable aspects.	Negligible (negative)
-20 to -38	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	Minor (negative)
-39 to -56	A serious negative impact which may prevent the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects. The impacts may result in the irreversible damage to irreplaceable environmental or social aspects should mitigation measures not be implemented.	Moderate (negative)
-57 to -75	A very serious negative impact which may be sufficient by itself to prevent implementation of the Project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts will be irreplaceable and irreversible should adequate mitigation and management measures not be successfully implemented.	Major (negative)

6.2. Identified Potential Impacts

Table 6-5 presents a summary of the impacts identified for the Project, including the RDMS, Northern Groundwater System, Transport Routes (Rail and Road Transport Routes), and the Port Facility. Impacts which are applicable to all phases of the project (construction, operation and closure) have been defined as General Impacts and impacts which are applicable to only one project phase are classified as such.

The findings of the various specialist baseline assessments were used to inform the impact assessment; however, impacts may have been adapted based on the assessment practitioner's holistic evaluation of the significance of impacts to the baseline biophysical and social environments.

Detailed analyses of the various environmental and social aspects are provided in the appended specialist reports and the subsections below provide a summary of quantification and description of each impact.

Impact matrix abbreviations used are provided in Table 6-4.

Table 6-4: Impact Matrix Abbreviations

Abbreviation	Definition
D	Duration
E	Extent
I	Intensity
P	Probability

Table 6-5: Summary of Impacts during Various Phases of the Project

Impacts Identified	Project Phase
Impact 01: Direct, indirect, and induced employment at the local level for men and women resulting in increased prosperity and wellbeing (Positive Impact).	Life of Project
Impact 02: Disputes over the distribution (real and perceived) of Project employment and other benefits within and between the local community near the Project facilities.	Life of Project
Impact 03: Investment into community development initiatives (social development projects resulting in improved infrastructure, health and education outcomes and general economic uplift) (Positive Impact).	Life of Project
Impact 04: Increase in the stock of skilled human capital due to the transfer of knowledge and skills from the Project resulting in enhanced productivity of local labour (Positive Impact).	Life of Project
Impact 05: Increase in population due to the in-migration of people seeking employment and other economic opportunities leading to pressure on social infrastructure and services in communities.	Life of Project
Impact 06: Increase in social ills such as crime, illicit substance distribution and use etc. due to population influx and increased Project induced traffic through communities.	Life of Project
Impact 07: Real or perceived increase in prices of basic commodities and the cost of living due to the economic activities generated by the Project.	Life of Project
Impact 08: Disturbance of soil due to construction and operation of the mine.	Life of Project
Impact 09: Improper Management of Chance Finds.	Life of Project
Impact 10: Impacts on Archaeological Sites.	Life of Project
Impact 11: Impacts on Intangible Cultural Heritage.	Life of Project
Impact 12: Terrestrial habitat loss due to land clearing and disturbance and resultant impacts on abundance and diversity of terrestrial flora and fauna.	Construction

Impacts Identified	Project Phase
Impact 13: Fragmentation and loss of movement corridors at RDMS.	Life of Project
Impact 14: Impacts to Critical Habitat of the Sand Cat.	Life of Project
Impact 15: Impacts to Critical Habitat of the Goitered Gazelle.	Life of Project
Impact 16: Impacts to Critical Habitat of the Dead Sea Sparrow.	Life of Project
Impact 17: Impacts to Critical Habitat of the Alcocks Toad Headed Agama.	Life of Project
Impact 18: Impacts to habitat of the potentially undescribed reptilian species, *Eremias sp., Eremias cf scripta* and *Cyrtopodion sp*.	Life of Project
Impact 19: Introduction and spread of AIPs to the RDMS and Port Qasim due to Project-related transportation and vehicular movement.	Life of Project
Impact 20: Increased noise, dust, and light generated from construction, operation and decommissioning of RDMS.	Life of Project
Impact 21: Increased wildlife mortality/injuries from vehicle and train collisions along the Transport Route.	Life of Project
Impact 22: Wildlife mortality/injuries from vehicle collisions and other infrastructure at RDMS.	Life of Project
Impact 23: Direct mortality/injuries from powerline collisions or electrocutions.	Life of Project
Impact 24: Nuisance at receptors due to noise generated from construction, operations and decommissioning of mine.	Life of Project
Impact 25: Increase in vehicular movement on local roads can cause elevated noise levels.	Life of Project
Impact 26: Increase in traffic volumes due to Project-related transportation resulting in increased congestion, road wear and increased community safety risks.	Life of Project
Impact 27: Increased movement of sediment to drainage lines resulting from erosion of disturbed soils during construction and operation of mine.	Life of Project

Impacts Identified	Project Phase
Impact 28: Increase in the concentration of PM due to mine development including the construction, mining and decommissioning activities.	Life of Project
Impact 29: Impact on visual amenity due to mining activities and Project facilities.	Life of Project
Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase.	Construction Phase
Impact 31: Disturbance of soil due to construction and excavation of the water supply pipeline from Northern Groundwater System Area to Mine Site.	Construction Phase
Impact 32: Alteration of flow paths patterns and channel geometry leading to increased erosion.	Construction Phase
Impact 33: Terrestrial habitat loss due to temporary infrastructure.	Construction Phase
Impact 34: Impacts to flora and fauna during the upgrade of the Transport Route.	Construction Phase
Impact 35: Nuisance to local communities due to impulse noise generated from blasting activities.	Operation Phase
Impact 36: Nuisance to local communities due to elevated noise levels from railway movement.	Operation Phase
Impact 37: Discontent over the absence of passenger trains available to communities while the Project's transportation trains operate.	Operation Phase
Impact 38: Loss of income upon conclusion of the operations phase of the Project.	Decommissioning Phase

6.2.1. General Impacts

General impacts are those that that will endure over the life of the project (i.e. applicable to all project phases).

6.2.1.1. Socio-economic

6.2.1.1.1. Impact 01: Employment Opportunities Provided by the Project – Positive Impact

There are limited opportunities for employment in the areas where the proposed Project facilities are to be located. Unemployment is a common issue reported by the stakeholders consulted for the ESIA with socio-economic studies completed for this ESIA identifying unemployment rates of up to 50%. Most of the residents in these areas are engaged in livestock rearing and various forms of labour, ranging from semi-skilled to unskilled work. Additionally, some are employed as mining labourers for the existing Saindak Copper Gold Project.

The Project's activities are expected to generate indirect and direct economic activity in the surrounding communities such as through the improvement of road infrastructure, outsourcing of contracts for various services to local vendors, and employment opportunities by the Project.

In local communities, 40% of the surveyed households were below the poverty line with the average household income being around Pakistani Rupee (PKR) 25,000 per month. The Project is likely to contribute to increased incomes through direct and indirect employment which can lead to improved nutritional status, better housing, access to education, and an improvement in the overall well-being of the local communities.

The Project is anticipated to generate significant employment opportunities across all project Phases, including:

- A predicted workforce of over 10,000 during the construction phase with RDMC and contractors, a significant portion of which will be available to local people (approximately half of all RDMC and contractor roles are expected to be available for local people). The Project will provide important on the job training across a variety of skills; and

- Approximately 6,000 jobs during peak operations during Phase 2 with RDMC and contractors. During this period the intent is for approximately 90% of the total workforce to comprise local people.

The Project will, through direct employment and induced indirect mechanisms (such as more economic activity resulting from improved infrastructure along the Project facilities), stimulate economic activity in the region, thereby contributing to poverty alleviation and improvements to community well-being.

The Project will not be able to provide direct employment for everyone who wants it, and while benefits are likely to be more significant in communities nearest to the RDMS, the flow on effects are likely to extend across the region through economic development stimulated by the project. The Project has and will continue to develop a local procurement strategy to further enhance employment opportunities across the region.

As best practice, the Project will strive to ensure that employment opportunities are equitable and inclusive of women and other vulnerable groups.

<table>
<tr><th colspan="4">Impact 01: Employment Opportunities Provided by the Project</th></tr>
<tr><th colspan="4">Phase: Life of Project</th></tr>
<tr><td colspan="4"><u>Impact Description</u>: Direct, indirect, and induced employment at the local level for men and women resulting in increased prosperity and wellbeing.</td></tr>
<tr><td colspan="4">Prior to Enhancement/Management Actions</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter-Generational - >20 years
Will start from construction and until the life of Project.</td><td rowspan="5">Major (positive)
+ 60</td></tr>
<tr><td>Extent</td><td>3</td><td>Sub-regional
Generation of employment opportunities will benefit local communities in the Project vicinity and beyond due to its vast scope.</td></tr>
<tr><td>Intensity</td><td>4</td><td>On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment.
Many employment opportunities will be generated throughout the construction and operational phase of the Project.</td></tr>
<tr><td>Probability</td><td>5</td><td>Certain / Definite
A local workforce will be required for the Project.</td></tr>
<tr><td>Nature</td><td>Positive</td><td>+</td></tr>
<tr><td colspan="4">Enhancement/Management Actions</td></tr>
<tr><td colspan="4">Ensure preferential recruitment of local candidates, with consideration of vulnerable individuals, provided they have the required skills and qualifications.
Develop and implement local employment and procurement strategies including establishing specialist HR teams and career and job guidance services in Nok Kundi and other communities.
Clearly define and publicise recruitment policies.
Include promotion of local, female and youth employment within employment policy.
Monitor subcontractors in terms of local employment numbers and include specific local employment targets in contracts where appropriate.</td></tr>
</table>

<table>
<tr><th colspan="4">Impact 01: Employment Opportunities Provided by the Project</th></tr>
<tr><td colspan="4">
Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training.
Implement a structured stakeholder engagement process and grievance mechanism, as well as direct communication channels to surrounding communities.
Monitor and enforce local employment targets for contractors.
Coordinate recruitment efforts with contractors.
Determine and apply what is ‘fair and transparent’ in recruitment, including the distribution of jobs between different community groups, in consultation with local communities and their leaders.
Continued use and improvement of the current registry for jobseekers to document relevant qualifications/experience.
Continue to implement local training and skills development programs.
Continue to implement and expand specific training and business and employment opportunities for women in site and non-site roles.
Continue program of sharing stories of existing female employees to attract female applicants.
Continue program of site tours for local women and their families to understand site living and working arrangements.
</td></tr>
<tr><td colspan="4">Post-Enhancement/Management Actions</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter-Generational - >20 years
Construction phase will last for 5 years and operations phase will last 48 years.</td><td rowspan="4">Major (positive)
+ 65</td></tr>
<tr><td>Extent</td><td>4</td><td>Regional
Generation of employment opportunities will benefit local communities in the Project vicinity and beyond due to its vast scope, and implementation of the management actions will ensure that these benefits are realised throughout the wider region.</td></tr>
<tr><td>Intensity</td><td>4</td><td>On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment.
Many employment opportunities will be generated throughout the construction phase of the Project.</td></tr>
<tr><td>Probability</td><td>5</td><td>Certain / Definite
There are sound evidence-based reasons to expect that the impact will definitely occur (probability 90-100%).
A local construction workforce will be required for the Project.</td></tr>
</table>

Impact 01: Employment Opportunities Provided by the Project			
Nature	Positive	+	

6.2.1.1.2. Impact 02: Unmet Community Expectations (Real or Perceived)

A potential source of discontent or conflict with local communities is the real or perceived inequitable access to Project opportunities, including employment and indirect economic opportunities.

Through engagement during the socio-economic surveys and formal Stakeholder Engagement, nearby communities have also shared their expectations with respect to increased community development initiatives and general uplift of the local communities.

It is also expected that there will be substantial financial gains to RDMC as a result of the Project. In contrast, a significant proportion of the local settlements are impoverished and lack the necessities of life, and this may inadvertently create discontent among the local populace as the monetary gain derived from the Project may not adequately trickle down to the communities (real or perceived).

Grievances can be expected from community members if the distribution of jobs and access to development initiatives among local communities is perceived to be unfair. Objections may arise if individuals from outside the settlements affected by the Project facilities, are seen to be taking opportunities that local community residents feel they are entitled to, this may lead to the following issues:

- ***Community Discontent:*** Unmet expectations can lead to dissatisfaction and disappointment within the community, resulting in negative sentiments towards the Project;
- ***Social Tensions:*** High expectations for jobs that do not materialise might provoke tension amongst community members, causing conflicts or divisions within the community;
- ***Loss of Trust:*** Failing to meet employment expectations can erode trust between the Project and the local community, hindering future collaboration or support;
- ***Increased Opposition:*** Disappointment from unmet expectations may fuel opposition to the mining Project, leading to protests, activism, or legal challenges against the company's operations; and
- ***Long-term Community Impact:*** Unfulfilled job expectations can have lasting effects on community well-being, socio-economic stability, and the perception of future development projects in the area.

Proactive measures are required to manage this perception, and ensure the equitable distribution of benefits, especially for vulnerable and marginalised groups. In response, the Project has developed a SEP that captures community perceptions and concerns and includes a comprehensive Grievance Redress Mechanism (GRM) to enable the potential grievances and concerns of the local communities to be addressed. Additionally, the Project will also prioritise women and vulnerable individuals for any community development initiatives. The Grievance Redress Mechanism at minimum will include:

- Provisions for information sharing, disclosure
- Management responsibilities
- Mechanisms for collection of anonymous grievances and at publicly accessible locations
- Localization into Urdu and Balochi
- Assignment of relevant personnel including Community Liaison Officers (CLO)
- Time limits for resolution and collection of feedback

The Project will continue to implement a Local Employment Policy to offer preferential employment to local community members.

As noted above, significant employment opportunities are expected to be generated, through direct employment with RDMC and contractors, and though economic development stimulated through local procurement and other social development strategies. Through the RDMC CDC program, communities are empowered and encouraged to make their own decisions with regards to infrastructure and social development to directly address social and infrastructure challenges in their communities.

Impact 02: Unmet Community Expectations and Negative sentiments			
Phase: Life of Project			
Impact Description: Disputes over the distribution (real and perceived) benefits of Project employment and other benefits within and between the local community near the Project facilities.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Will start from constructions and until the life of Project.*	Moderate (negative) -44
Extent	3	Sub-regional *Generation of employment opportunities will benefit local communities in the Project vicinity and beyond due to its vast scope.*	
Intensity	3	On-going social issues. Damage to items of significance.	

Impact 02: Unmet Community Expectations and Negative sentiments			
		Employment opportunities and development initiatives will be executed throughout Project.	
Probability	4	Likely *In-migration of workers is expected throughout the Project.*	
Nature	Negative	-	
Mitigation/Management Actions			

- Implement a Stakeholder Engagement Plan including:
  - Maintaining regular and effective communication with local communities and other stakeholders;
  - Maintaining a grievance procedure and encourage and facilitate stakeholders to use the mechanism to express concerns (with consideration of current cultural norms for women to raise concerns);
  - Providing sufficient resources to the community relations officers to enable them to monitor perceptions to ensure issues can be addressed in a timely manner; and
  - Implement comprehensive socio-economic monitoring.
- Ensure women and vulnerable groups are engaged and that community development initiatives consider these groups.
- Continue to implement local training and skills development programs. Encourage contractors to recruit locally through the Reko Diq training centre(s).
- Provide local employees with confirmation of employment documents for work undertaken and certificates of completion of training.
- Continue to monitor community perceptions and concerns through regular engagement, feedback and other monitoring activities.

  Complete a needs assessment for the surrounding communities. A two phase assessment has already commenced in partnership with Islamic Relief Pakistan (IRP). The, first phase is primarily focusing on identifying strategic-level gaps and challenges with the involvement of stakeholders. Initially, IRP will facilitate stakeholder dialogues at the district and provincial levels, engaging relevant departments and stakeholders. These discussions will revolve around identifying key strategic gaps in areas such as water supply, electricity/power supply, road and transport infrastructure, social services (including health and education), land allocation and management, town administration and management, sanitation, and disaster risk management. During the first phase key informant interviews will also be conducted with designated stakeholders. After receiving departmental endorsements on the identified gaps, IRP will organize an interim review session with stakeholders and RDMC to present the findings related to strategic-level gaps and challenges. The second phase will be designed to collect the information at the community level data through Focus Group Discussions and In-depth Interviews to draw out the exact picture of the needs existing at the community level and the status of the service delivery with respect to the identified needs. .
- Continue to advance the CDC program to ensure that communities are empowered and encouraged to directly address social infrastructure and services challenges.

Impact 02: Unmet Community Expectations and Negative sentiments			
• Adoption of social, economic, environmental, and cultural considerations into the community development programme. • Formalise the preferential hiring policy. • Continue to implement a Local Employment Policy including: • Provisions for preferential employment for vulnerable groups and nearby communities. • Guidelines for a clear, fair, and accessible recruitment process. • Mechanisms for regular updates on job opportunities, application timelines, and progress to manage expectations and maintain trust.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Construction phase will last for 5 years and operations phase will last 48 years.*	Negligible (negative) -18
Extent	2	Local *The impact is expected primarily in the vicinity of the Mine Site but is also expected elsewhere close to the Project's activities to a varying degree.*	
Intensity	2	On-going social issues. Damage to items of significance. *Employment opportunities and development initiatives will be executed throughout the Project, however, the mitigation measures suggested above are likely to decrease the intensity of the impact.*	
Probability	2	Unlikely *In-migration of workers is expected throughout the Project, however, the mitigation measures suggested above will be significant to reduce the probability.*	
Nature	Negative	-	

6.2.1.1.3. Impact 03: Social Development and Uplift – Positive Impact

The Project has committed to a significant community development program. These initiatives will primarily focus on enhancing local infrastructure and services, with particular emphasis on health, education, water supply, food security and economic development. RDMC has been, and will continue to, work with communities and government to identify their needs and implement initiatives accordingly.

Community Development activities will be focused on communities located closest to the Mine Site during the construction phase.

<table>
<tr><td colspan="4">Impact 03: Social Development and Upliftment</td></tr>
<tr><td colspan="4">Phase: Life of Project</td></tr>
<tr><td colspan="4"><u>Impact Description</u>: Social development projects resulting in improved infrastructure, health and education outcomes and general economic upliftment.</td></tr>
<tr><td colspan="4">Prior to Enhancement/Management Actions</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter-Generational - >20 years
Will start from constructions and until the life of Project.</td><td rowspan="5">Minor (positive)
+36</td></tr>
<tr><td>Extent</td><td>3</td><td>Sub-regional
Development initiatives will benefit local communities in the Project vicinity and beyond due to its vast scope.</td></tr>
<tr><td>Intensity</td><td>4</td><td>Serious long term environmental effects. Environmental damage can be reversed in less than a year.
On-going serious social issues. Significant damage to structures / items of significance.
Social development initiatives will be undertaken throughout the operations phase of the Project.</td></tr>
<tr><td>Probability</td><td>3</td><td>Probable
Has occurred here or elsewhere and could therefore occur (20-50%).
Social development initiatives have been implemented by the Project prior to the start of the construction phase so it is likely that such initiatives will continue during the life of the Project.</td></tr>
<tr><td>Nature</td><td>Positive</td><td>+</td></tr>
<tr><td colspan="4">Enhancement/Management Actions</td></tr>
<tr><td colspan="4">• Formulate, implement and maintain a Community Development Programme including:
◦ Conducting a needs assessment of the local communities across Chagai area (see details in Impact 2).
◦ Provisions for continual engagement with the local community stakeholders to involve them in the planning and decision-making processes of the social development projects to ensure project outcomes are reflective of community needs.
◦ Tailoring development projects to the needs of the communities in the respective Project facilities.
◦ A system to monitor and evaluate the progress and effectiveness of social development projects.</td></tr>
</table>

Impact 03: Social Development and Upliftment			
• Prioritise sustainable infrastructure development that aligns with the long-term needs of the community. • Ensure consideration of women and vulnerable groups for planned social development projects. • Establish partnerships with educational institutions and local NGOs to enhance the quality of education and promote skills development. • Involve local community members in the planning and decision-making processes of social development projects to ensure project outcomes are reflective of community needs. • Implement a monitoring and evaluation system to track the progress and effectiveness of social development projects. • The Project will ensure that the upgraded or newly constructed healthcare and educational infrastructure account for the increased flood-related risks. • The Project will consider CSR-related funding toward the drainage and flood management infrastructure of local communities. • The Project will commit 1% of CAPEX into community development and initiatives, as per the Mineral Agreement.			
Post-Enhancement/Management Actions			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Construction phase will last for 5 years and operations phase will last 48 years.*	Major (positive) +60
Extent	4	Regional *Development initiatives will benefit local communities in the Project vicinity and beyond due to its vast scope.*	
Intensity	5	Serious long term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of significance. *Social development initiatives will be undertaken throughout the construction and operations phase of the Project.*	
Probability	4	Likely *Social development initiatives have been implemented by the Project prior to the start of the construction phase so it is likely that such initiatives will continue.*	
Nature	Positive	+	

6.2.1.1.4. Impact 04: Skill Development – Positive Impact

The Project has and will continue to implement training programmes to enhance employment. The training programmes will focus on maximising the participation of members from local communities in the Project.

The knowledge and skills acquired by the local community will increase their employability increasing their access to future opportunities when seeking employment in any project. The presence of highly trained workers, qualified in multiple skills, will also benefit the local economy, thereby having a positive ripple effect on the overall socio-economic landscape. These training programmes will not only equip individuals with specific job-related skills but also foster a culture of continuous learning and professional development within the local workforce.

Impact 04: Skill Development			
Phase: Life of Project			
Impact Description: Increase in the stock of skilled human capital due to the transfer of knowledge and skills from the Project resulting in enhanced productivity of local labour.			
Prior to Enhancement/Management Actions			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Will start from constructions and until the life of Project.*	Major (positive) +60
Extent	3	Sub-regional *Training opportunities will benefit local communities in the Project vicinity and beyond due to its vast scope.*	
Intensity	4	On-going and widespread positive benefits to local communities which improves livelihoods. *Skill development initiatives will be undertaken throughout the life of the Project.*	
Probability	5	Certain / Definite *Employment opportunities will directly impact the training opportunities, hence since the probability of the former is definite, the probability of the latter is also likely.*	
Nature	Positive	+	
Enhancement/Management Actions			
The Project will: • Assist local communities, especially vulnerable groups having practical skills but lacking qualifications to further increase training and employment opportunities. • Support initiatives promoting a culture of learning in local communities.			

Impact 04: Skill Development			
• Continue to implement local training and skills development programs. Encourage contractors to recruit locally through the Reko Diq training centre(s). • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion of training. • Continue to implement and expand specific training and business and employment opportunities for women in site and non-site roles .			
Post- Enhancement/Management Actions			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Operations phase will last 48 years.*	Major (positive) +70
Extent	4	Regional *Training opportunities will benefit local communities in the Project vicinity and beyond due to its vast scope.*	
Intensity	5	Significant improvement to livelihoods and living standards of a large percentage of population. *Skill development initiatives will be undertaken throughout the construction phase of the Project*	
Probability	5	Certain / Definite *Employment opportunities will directly impact the training opportunities, hence since the probability of the former is definite, the probability of the latter is also likely.*	
Nature	Positive	+	

6.2.1.1.5. Impact 05: Pressure on Social Infrastructure due to Increase in Population

The Project will likely attract an influx of people seeking direct employment or other economic opportunities. This influx of workers may place added pressure on already underdeveloped infrastructure and services in local communities.

Influx of people may lead to heightened risks such as the spread of communicable diseases, unplanned development, social tensions, law and order issues and conflict.

To reduce the burden on local infrastructure, the Project is committed to community development, however this is a multistakeholder issue that will need to be led by various levels of Government, RDMC will support where appropriate.

The Project will continue to implement the grievance process and ensure a properly resourced community engagement team to address community concerns.

Impact 05: Pressure on Social Infrastructure due to Increases in Population			
Phase: Life of Project			
Impact Description: Increase in population due to the in-migration of people seeking employment and other economic opportunities leading to pressure on social infrastructure and services in communities.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Will start from constructions and until the life of Project.*	Minor (negative) -36
Extent	2	Local *The Mine Site and its surrounding areas will see an influx in population due to the location of the Project Site here.*	
Intensity	2	Moderate impacts including on-going social issues. *Influx of jobseekers and associated increase in population will remain throughout the construction phase of the Project.*	
Probability	4	Likely *The probability of influx of population at the Mine Site is definite due to which an associated pressure on infrastructure is also likely which will be mitigated to a degree by the measures suggested below.*	
Nature	Negative	-	
Mitigation/Management Actions			

- .
- Develop an in-migration management plan:
  - Complete needs assessment as details in Impact 2 to understand current deficiencies in infrastructure and Government services.
  - Engage Government planners and services managers at local, district and provincial level to understand current plans and ensure consideration of population growth risks.
  - Provide support Government at local, district and provincial level as appropriate in their development and implementation of Infrastructure Development Plans.
  - Continue to implement point of hire policies (i.e. transport to site is currently provided from point of hire only).
  - Ensure ID checks are completed for prospective employees to ensure they are designated as local (the Mineral Agreement defines local as a native or resident of Balochistan).

Impact 05: Pressure on Social Infrastructure due to Increases in Population			
• Maintain policy of staff residing on site rather than in local communities. • Continue to implement the GRM with consideration of existing cultural norms for women raising concerns. • Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand the extent of population growth and any problems that it may cause. • Ensure the community development programmes consider the monitored changes in the social landscape. • Carry out awareness campaigns in the surrounding communities in relation to in-migration related risks and impacts. • Continue to implement a Local Employment Policy. • Include provisions for Cultural Sensitivity training and training related to community health and safety in training plans.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Operations phase will last 48 years.*	Negligible (negative) -16
Extent	2	Local *The Mine Site and its surrounding areas will see an influx in population due to the location of the Project Site here.*	
Intensity	1	Minor medium-term social impacts on local population. Mostly repairable. Functions and processes not affected. *Influx of jobseekers and associated increase in population will remain throughout the operations phase of the Project.*	
Probability	2	Unlikely *The probability of influx of population at the Mine Site is definite due to which an associated pressure on infrastructure is also likely which will be mitigated to a degree by the measures suggested below. Increase in population is definite, however, impact on social infrastructure is improbable with the adoption of mitigation measures.*	
Nature	Negative	-	

6.2.1.1.6. Impact 06: Increase in Social Ills due to Population Influx

With the influx of workers, and others seeking opportunities, and an increase in traffic through communities there is a potential risk of an increase in social ills such as crime rates, illicit substance distribution and use and other illicit activities.

The presence of a transient workforce can create an environment conducive to the use of drugs and harmful substances. Additionally, the stress and isolation associated with remote working environments may exacerbate underlying vulnerabilities to substance abuse among some individuals.

Further to this, the introduction of a large number of outsiders to the community may increase the risk of illicit activities such as drug trafficking, theft, and other criminal behaviour. These activities not only pose direct threats to community safety but undermine social cohesion and trust within the community.

Population influx is difficult to predict but is a typical occurrence for mining projects around the world, particularly in developing countries. Managing the impacts of population influx is the responsibility of a range of stakeholders, including different levels of Government, the project developer and the communities themselves. At this stage, the largest level of likely influx is considered to be at Nok Kundi, with influx issues at other smaller settlements likely to be largely manageable. It is also considered to be unlikely that new settlements would be established at the mine gate other areas near the project due to lack of water and other necessary resources.

To mitigate the risks relating to population influx and uphold the social and cultural fabric of the communities, the Project will work in partnership with Government agencies and community groups around education and awareness programs and other community development. These initiatives will be captured in an Influx Management Plan which will be developed, again in partnership with the relevant Government agencies and community groups.

Impact 06: Increase in Social Ills due to Population Influx			
Phase: Life of Project			
Impact Description: Increase in social ills such as crime, illicit substance distribution and use etc. due to population influx and increased Project induced traffic through communities.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Will start from constructions and until the life of Project.*	Minor (negative) -30
Extent	3	Sub-regional *The Project's activities will be spread over a larger area at the Mine Site and its surrounding areas.*	

Impact 06: Increase in Social Ills due to Population Influx			
Phase: Life of Project			
Intensity	2	On-going social issues. Damage to items of significance. *Project's activities will continue throughout the operations phase of the Project.*	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%).	
Nature	Negative	-	
Mitigation/Management Actions			

- Develop an in-migration management plan:
  - Complete needs assessment as details in Impact 2 to understand current deficiencies in infrastructure and Government services.
  - Engage Government planners and services managers at local, district and provincial level to understand current plans and ensure consideration of population growth risks.
  - Provide support Government at local, district and provincial level as appropriate in their development and implementation of Infrastructure Development Plans.
  - Continue to implement point of hire policies (i.e. transport to site is currently provided from point of hire only).
  - Ensure ID checks are completed for prospective employees to ensure they are designated as local (the Mineral Agreement defines local as a native or resident of Balochistan).
  - Maintain policy of staff residing on site rather than in local communities.
- .
- The Project will provide recreational facilities, fitness programmes, and mental health resources to support the physical and emotional health of Project personnel, including sub-contractors.
- Conduct community awareness sessions as part of the SEP to educate community members about the dangers of drugs and other harmful substances, encouraging them to refrain from their use.
- Continue to advance the RDMC community development program and ensure that influx management is given due consideration during the CDC decision making process.
- Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand the extent of population growth and any problems that it may cause.

Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance

Impact 06: Increase in Social Ills due to Population Influx			
Phase: Life of Project			
Duration	5	Inter-Generational - >20 years *Operations phase will last 48 years.*	Negligible (negative) -18
Extent	3	Sub-regional *The Project's activities will be spread over a larger area at the Mine Site and its surrounding areas.*	
Intensity	1	Minor medium-term social impacts on local population. Mostly repairable. Functions and processes not affected. *Project's activities will continue throughout the operations phase of the Project.*	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	

6.2.1.1.7. Impact 07: Increase in Cost of Living

The Project is expected to stimulate economic activity in the region. As the Project progresses, there will be an influx of workers, in turn leading to an increased demand for goods and services. Given the current reliance on imported goods and the limited presence of locally produced products this surge in demand could significantly impact local markets. The heightened demand for commodities could potentially drive price increases, particularly if shop owners exploit the situation by hoarding goods. This scenario could exacerbate the existing cost of living challenges faced by the local community in the area, potentially leading to financial strain and social conflict. Even if price increases are not directly linked to the Project, people may attribute any increases to the Project, leading to negative sentiments.

The Project, as part of its SEP, will monitor perceptions related to price increases, and explore initiatives to alleviate price increases should they occur.

Impact 07: Increase in Cost of Living			
Phase: Life of Project			
Impact Description: Real or perceived increase in prices of basic commodities and the cost of living due to the economic activities generated by the Project.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Operations phase will last 48 years.*	Minor (negative) -30

<table>
<tr><th colspan="4">Impact 07: Increase in Cost of Living</th></tr>
<tr><td>Extent</td><td>2</td><td>Local
The Project and its associated activities will be focused on the Mine Site and the surrounding areas.</td><td rowspan="4"></td></tr>
<tr><td>Intensity</td><td>3</td><td>On-going social issues. Damage to items of significance.
Project activities will continue throughout the operations phase.</td></tr>
<tr><td>Probability</td><td>3</td><td>Probable
Increase in cost of living is probable due to the expected economic activity.</td></tr>
<tr><td>Nature</td><td>Negative</td><td>-</td></tr>
<tr><td colspan="4">Mitigation/Management Actions</td></tr>
<tr><td colspan="4">Engage with business owners and local government groups with respect to cost-of-living concerns.
Conduct regular community consultations to inform the local community about the factors contributing to inflation, to clarify the Project’s role in the local economy, and to address any misconceptions or attributions of price increases to the Project.
Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand changes in conditions.</td></tr>
<tr><td colspan="4">Post-Mitigation</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter-Generational - >20 years
Operations phase will last 48 years.</td><td rowspan="5">Minor (negative)
-20</td></tr>
<tr><td>Extent</td><td>2</td><td>Local
The Project and its associated activities will be focused on the Mine Site and the surrounding areas.</td></tr>
<tr><td>Intensity</td><td>3</td><td>Moderate impacts including on-going social issues.
Project activities will continue throughout the operations phase.</td></tr>
<tr><td>Probability</td><td>2</td><td>Unlikely
Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)
Increase in cost of living is probable due to the expected economic activity, however, the impact will be significantly reduced due to the suggested mitigation measures.</td></tr>
<tr><td>Nature</td><td>Negative</td><td>-</td></tr>
</table>

6.2.1.2. Soils and Sediments

6.2.1.2.1. Impact 08: Disturbance of Soil due to Mine Site Activities

The Project will result in significant land disturbance which can significantly impact local soils through erosion, compaction, and loss of structure, which can alter natural drainage patterns, leading to flooding or waterlogging and exacerbate further reduced soil fertility and water infiltration.

There is presently minimal vegetation, and the land is not of economic agricultural value for local communities. Table 6-6 provides a comparison of the baseline soil quality against recommended mineral content ranges for the growth of wheat and date palms (Havlin et al, 2016) (Zaid & Arias, 2002).

Table 6-6: Suitability of Soil for Agriculture in Comparison to Soil Samples

Parameter	Wheat	Dates	S2-20	S3-20	S4-20	S5-20	S6-20
Calcium	600 –1000	400 – 600	37,564	35,904	33,167	35,557	33,108
Potassium	150 – 250	150 – 250	3,864	1,358	1,251	2,567	2,139
Sodium	< 50	< 200	2,569	1,029	1,156	1,841	1,143

Erosion related risks due to the modification of the site topography are also low as topsoil coverage is minimal. Thus, any erosion related modifications will have no impacts beyond some loss of visual amenity. Additionally, the Project will manage storm water flows to ensure that no long-term waterlogging occurs at the Project site due to modification of the topography.

The Project will implement several mitigation measures, including the planning of construction activities to minimise disturbance to the soil. Additionally, the Project will develop a Ground Disturbance Control Plan, which will include adequate provisions for:

- Excavation areas;
- Management of backfill; and
- Measures for rehabilitation of the landscape.

Impact 08: Disturbance of Soil due to Mine Site activities.			
Phase: Life of Project			
Impact Description: Disturbance of soil due to construction and operation of the mine.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years Will start from constructions and until life of Project.	Moderate (negative) -40
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	2	Moderate effects on receptors.	

Impact 08: Disturbance of Soil due to Mine Site activities.			
		Soil erosion and improper management of stockpiles and result in siltation and blocking of stormwater channels, in addition to being a visual nuisance and source of dust.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	-	Negative	
Mitigation/Management Actions			

- Limit the movement of heavy machinery to designated pathways to prevent widespread soil compaction.
- Use diversion channels or berms to redirect clean water away from disturbed soils and reduce erosion risk.
- Plan construction activities to minimise the area of soil disturbance.
- The Project has implemented a Ground Disturbance Procedure which includes:
  - A ground disturbance approval process to ensure environmental or social aspects are identified and addressed before the disturbance occurs (i.e. community engagement, pre-disturbance surveys for flora, fauna or heritage sites, runoff management etc.);
  - Identification of post disturbance actions such as rehabilitation measures if necessary.
  - Pre and post disturbance registration of the disturbance type and area.
  - Closeout inspections and signoff.

Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Minor (negative) -35
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Minor effects on biological or physical environment. *The mitigation measures will minimise erosion related impacts.*	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	-	Negative	

6.2.1.3. Cultural Heritage

6.2.1.3.1. Impact 09: Improper Management of Chance Finds

Chance finds can occur during the construction and development of the Project.

The mine area is a naturally deflated surface that provides little potential for buried remains and it is unlikely that architectural features are present in the area beyond the materials already recorded on the surface. Archaeological sites may be present in areas of the Project that were not subjected to direct archaeological inspection however, their numbers are expected to be low. It is likely that all such sites would fall into the “temporary” category and would be of similar in size and general character to those recorded in the baseline.

The Project has developed and implemented a Chance Finds Procedure which will be shared with all contractors to ensure that immovable and movable finds are evaluated for their heritage value before site clearance, and that all movable finds are appropriately stored and transported to the Archaeology Department. The Chance Finds Procedure is included in Appendix G to this Report.

Impact 09: Improper Management of Chance Finds			
Phase: Life of Project			
Impact Description: Damage/destruction to previously unidentified heritage resources			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years Will start from constructions and until life of Project.	Negligible (negative) -16
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	2	On-going social issues or reputational issues. Damage to items of significance. *Potential thefts or damage to chance find artefacts.*	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	
Mitigation/Management Actions			
The Project will maintain a Chance Find Procedure.			
Post-Mitigation			

Impact 09: Improper Management of Chance Finds			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Negligible (negative) -7
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Insignificant effect on aspects of cultural heritage concern. *Potential impacts on chance find artefacts minimised through appropriate management practices.*	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low because of design, historic experience, or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.1.3.2. Impact 10: Impacts on Archaeological Sites

The archaeological sites identified during the cultural heritage survey, were considered against the following categories, with all sites identified as Category B:

- **Category A**: Can be disturbed or destroyed without further survey or authorisation.
- **Category B**: Sites which can likely be disturbed but will require clearance from the relevant authorities.
- **Category C**: Sites which cannot be disturbed under any circumstance.

Several archaeological sites were located within the Project area, Table 6-7 provides an action plan for site clearance by RDMC.

Table 6-7: Action Plan for Clearance of Sites

Site	Situated within Project Footprint?	Category	Actions
Archaeological Sites			

Site	Situated within Project Footprint?	Category	Actions
RD-001	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
RD-002	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
RD-003	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
RD-004	Yes	B	Inform the Balochistan Directorate of Archaeology & Museums prior to site clearance. Establish STPs and test excavation. Clear site.
Rock Features			
F-001	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
F-002	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
F-003	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
F-004	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
F-005	Yes	B	Inform the Balochistan Directorate of Archaeology & Museums prior to site clearance.
F-006	Yes	B	Inform the Balochistan Directorate of Archaeology & Museums prior to site clearance.
F-007	Yes	B	Inform the Balochistan Directorate of Archaeology & Museums prior to site clearance.
F-008	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
F-009	Yes	B	Inform the Balochistan Directorate of Archaeology & Museums prior to site clearance.

Site	Situated within Project Footprint?	Category	Actions
F-010	No	B	Not currently required to be disturbed. If disturbance is required in the future engagement with the Balochistan Directorate of Archaeology & Museums will be required.
F-001	Yes	B	Inform the Balochistan Directorate of Archaeology & Museums prior to site clearance.

The Pakistan Archaeology Department will be informed prior to the disturbance of any identified site to ensure proper assessment and clearance. All other requirements listed within the RDMC Ground Disturbance Approval Procedure will be adhered to.

Impact 10: Impacts on Archaeological Sites			
Phase: Life of Project			
Impact Description: Damage/destruction of surface and subsurface archaeological sites			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Negligible (negative) -14
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Insignificant effect on aspects of cultural heritage concern.	
Probability	2	Unlikely *It is presently unknown whether the rock features are of archaeological significance, although the likelihood is low owing to the site features.*	
Nature	Negative	-	
Mitigation/Management Actions			
The Project will ensure proper clearance of archaeological sites in consultation with the Balochistan Directorate of Archaeology & Museums.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Negligible (negative) -7
Extent	1	Site Specific Limited to the site and its immediate surroundings.	

Impact 10: Impacts on Archaeological Sites			
Intensity	1	Insignificant effect on aspects of cultural heritage concern.	
Probability	1	Rare / improbable *Additional investigative work will confirm whether there are buried artifacts or if any of the rock features are also of archaeological significance.*	
Nature	Negative	-	

6.2.1.3.3. Impact 11: Impacts on Intangible Cultural Heritage

Impacts on intangible cultural heritage can occur if there is an influx of workers to the Project area which restricts or interferes with practices or customs linked to intangible cultural heritage.

Presently no cultural or religious practices linked to cultural identity will be adversely affected by the Project. In terms of religiosity, the Baloch are largely similar to other ethnic groups of Pakistan, with purdah generally being observed by women, strict observance of prayers and religious practices associated with Islam such as fasting in the month of Ramadan. These religious aspects, much like other ethnic groups of Pakistan, are strongly tied to Baloch cultural practices and self-identity. As such, it is not expected that worker influx will significantly affect the prevailing cultural and religious norms of the local communities. Additionally, as all workers will be housed at on-site accommodations, mixing with local communities will be limited.

One potential concern is the proliferation of alcohol to the site, due to the presence of foreign workers. The presence of Chinese Nationals and workers in Balochistan for example, has led to widespread proliferation of alcohol products in local markets .

Additionally, the Project will ensure that there are no restrictions on practice of religious or cultural holidays. Local norms and customs will be respected, and women will be permitted to practice head covering in-line with existing purdah related practice. No other cultural practices linked to intangible cultural heritage besides those linked to religious beliefs, beside practice of the Nawrouz festival, were identified as pertinent to the Project. Holidays for Nawrouz along with other religious observances such as Holi for the Hindu minority communities will be granted on an individual case basis.

Impact 11: Impacts on Intangible Cultural Heritage			
Phase: Life of Project			
Impact Description: Adverse effects (loss of oral traditions and languages etc and disruption of traditional practices) on practices lined to intangible cultural heritage.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Minor

Impact 11: Impacts on Intangible Cultural Heritage			
Extent	3	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	(negative) -30
Intensity	2	Minor impacts on intangible cultural heritage and practices.	
Probability	3	Probable *Alcohol proliferation may be triggered which may conflict with local norms and traditions.*	
Nature	Negative	-	
Mitigation/Management Actions			
• The Project will ensure that there are no restrictions on religious expression and observance. • The site will remain dry, and inspections on entry will be completed to ensure people are not bringing alcohol to site. • Develop influx management plan.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Negligible (negative) -9
Extent	3	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	
Intensity	1	Negligible Impact	
Probability	1	Rare/Improbable *Mitigation measures will ensure that ongoing cultural practices and religious norms are not affected.*	
Nature	Negative	-	

6.2.1.4. Biodiversity (Flora and Fauna)

6.2.1.4.1. Impact 12: Terrestrial habitat loss due to land clearing and disturbance resultant impacts on abundance and diversity of terrestrial flora and fauna.

During the Construction Phase of the Project there will be extensive ground clearing and construction of infrastructure including the HFO and solar PV plants, processing plant, accommodation facility and related roads and buildings. These construction activities will result in the loss of approximately 13,967 ha of habitat (**Error! Reference source not found.**). The extent of the impact is considered to be **sub-regional** as the areas to be cleared are large and there is high connectivity to surrounding protected areas. Furthermore, there is the presence of migratory species that utilise this area, such as Goitered Gazelle and Afghan Urial were identified, both listed as VU on IUCN Red List, indicating that the impacts to these species will not be site specific.

Construction of the RDMS will result in the complete loss of Gravel Plains (9,355 Ha), Mountains/Hills (3,666 Ha), Dry Stream beds (764 Ha), Sandy Dunes (0.04 Ha), Clayey Plains (181.45 Ha) which will lead to the loss of plants and displacement of animals in the area, with permanent modification of mostly Natural land (**Error! Reference source not found.**) within the Project footprint. These habitats have been recorded to support a variety of PBV and CH triggers and as such, the intensity is expected to be **serious.** The probability of the loss of habitat is **definite** as all vegetation will be removed and project facilities constructed in their place. Even with mitigation measures in place, the impact is still **definite** and the duration still **intergenerational** as the land is being cleared and will remain as such for the duration of the Project life and for a period of years after rehabilitation has taken place. However, the intensity of the impact can be reduced to **moderate** through recommended mitigation measures.

Habitats in the area of the mine site are currently of a believed to be very high quality (i.e. highly intact) (Table 6-8). Prior to any clearance/grading, a quantitative system will be developed for scoring habitat quality/condition, and measurements undertaken to identify the quality/condition of habitats to be impacted. Prior to those efforts, on a precautionary basis, those habitats are considered to be near-pristine and allocated a condition of '1' (100% quality).

Table 6-8: Habitats within the RDMS

Habitat Type	Photo	Description	Dominant Species	Sensitivity	Direct loss (ha/Habitat Hectares)
Gravel Plains		This habitat is characterized by hard surfaces and small gravel particles, with very little to no vegetation. The sparse vegetation is present at the interface of this habitat with other habitats providing favourable conditions for different species.	*Haloxylon persicum, Haloxylon salicornicum, Aeluropus lagopoides* and *Calligonum comosum*.	Low to moderate	9,355.08
Mountains/Hills		This habitat is characterized by low, barren rocky outcrops with sparse vegetation.	*Haloxylon salicornicum, Haloxylon persicum, Salsola stocksii, Cornulaca monacantha, Anabasis setifera,* and *Tribulus terrestris*	Moderate to high	3,666 .39
Sandy Plains/Dunes		This habitat type is characterized by various types of wind-blown sand formations, including shifting sand dunes, low tracts of permanent sand dunes, and high tracts of permanent sand dunes. The shifting sand dunes, with very little vegetation, are largely unsuitable for flora due to their active and unstable nature.	Species that do survive, include *Calligonum spp.* and *Salsola stocksii*	High	0.04
Dry Streambeds		These are seasonal water channels that remain dry for most of the year but play a critical role during rainfall in desert and semi-desert areas by regulating water flow and retaining moisture for extended periods. This retained moisture creates favourable conditions for plant growth, making dry streambeds the most promising and sensitive habitat type for supporting various ecological resources.	*Salsola stocksii, Haloxylon persicum, Haloxylon salicornicum, Calligonum comosum,* and *Panicum turgidum.* Dominant vegetation provides essential refugia and shelter for reptiles, small mammals, and bird species.	High	763.66
Clayey Plains		This habitat consists of flat or gently undulating terrains with fine-textured, clay-dominated soils, characteristic of arid and semi-arid regions. These soils retain water effectively but have poor drainage, often forming surface cracks during dry periods.	This habitat is dominated by *Alhaji maurorum, Tribulus terrestris,* and *Citrullus colocynthis*, which are well adapted to the harsh conditions.	Moderate to high	181.45

Impact 12: Terrestrial habitat loss during construction phase.			
Phase: Construction			
Impact Description: Terrestrial habitat loss due to land clearing and disturbance and resultant impacts on abundance and diversity of terrestrial flora and fauna.			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Major (negative) - 60
Extent	3	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	
Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	
Mitigation/Management Actions			

Construction:

- A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area.
- Project footprint will be minimised, and work sites and other areas will be delineated and restricted.
- Disturbance to, or movement of, soil and vegetation will be minimised.
- Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible.
- Implement measures such as fencing and signage to prevent unauthorised access and disturbance to wildlife.
- Implement a ‘find and relocate’ procedure prior to clearing areas.

Operation:

- Utilise designated routes for the movement of vehicles and machinery.
- Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading.
- Solid and liquid wastes will only be disposed of at designated sites, and a WMP will be developed and implemented.
- Implement adaptive management strategies based on findings from the management programs.

• Education and awareness of staff, contractors and communities. Closure and Rehabilitation • Rehabilitation of disturbed areas, where relevant and possible, with native species.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -55
Extent	3	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	
Intensity	3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	

6.2.1.4.2. Impact 13: Fragmentation and Loss of Movement Corridors at RDMS

Construction of the Project facilities will lead to habitat loss and likely habitat fragmentation, which in turn can result in loss of food and shelter for terrestrial fauna, especially small mammals and reptiles. Accidental deaths of individuals may also occur, although mobile species such as large mammals and birds are expected to move away from the area. The presence of the fencing throughout the life of the Project at the RDMS may present a barrier to the movement of different wildlife species. Herpetofauna and small mammal species will be likely to be able to pass through fenced areas while birds will be able to fly over physical barriers. Large mammals such as Goitered Gazelle and Afghan Urial were identified, both listed as VU on IUCN Red List, indicating that these species could be impacted by fencing.

As the fencing will be in place throughout the life of mine and habitat within that unavailable for passage and use, the duration will be **inter-generational**. The large mammal species are migratory and so impacts will be **sub-regional**. As these species have been noted to use the area and were identified during surveys the impact is **likely** to occur. However, due to the location of the Project being relatively isolated, with mainly natural habitat surrounding it, the intensity will be **moderate (low)** as large tracts of land are available adjacent to the mine that fauna can move through. With mitigation measures, such as reducing fencing, adjusting the type of fencing and facilitating corridors for movement, the intensity of the impact can be reduced to **minor** while the probability of loss of movement can be reduced to **probable**. The duration and extent of these impacts will however not be reduced.

Impact 13: Fragmentation and Loss of Movement Corridors at RDMS
Phase: Life of Project

Impact Description: Fragmentation and loss of movement corridors at RDMS			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -40
Extent	3	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	
Mitigation/Management Actions			
Construction: • Reduce fencing where possible to allow movement of species. • Ensure fencing that is required for restricting human access only, has large enough wire openings to allow movement of small animals. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. Operation: • Develop protocols for the removal of animals trapped in fencing. • Implement 'wildlife-friendly fencing' where possible which includes sections with adjustable heights or openings, allowing movement of smaller fauna such as herpetofauna and small mammals while restricting human access. • Use camera traps and remote sensors to monitor wildlife movement near infrastructure. Analyse this data to identify critical hotspots and adaptively manage operations. • Use directional and shielded lighting to minimise light spill into surrounding areas, particularly nocturnal habitats. Implement motion-activated lighting to reduce unnecessary illumination. Closure and Rehabilitation • Develop protocols for the removal of animals trapped in fencing. • Ensure rehabilitation is undertaken in such a way to reduce fragmentations • Rehabilitation of disturbed areas, where relevant and possible, with native species.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Minor (negative) - 27
Extent	3	Sub-regional Will affect the sub-regional / commune area e.g. district level/ areas within the region with similar features	

Intensity	1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

6.2.1.4.3. Impact 14: Impacts to Critical Habitat of the Sand Cat.

The construction and operation of the Project will lead to loss of habitat of the Sand Cat **intergenerationally**. Associated with habitat loss, are impacts to behaviour, breeding, feeding and increased risk of mortality, whether that is through altered behaviour or through entrapment/collisions. Literature states that their hearing is important for breeding and thus the noise pollution generated by the RDMS could potentially impact their reproductivity. As they are nocturnal/crepuscular, risk of collision is higher at night and during dawn and dusk. Due to its size (similar to that of a domestic cat) they may be less impacted by fencing with larger gaps. They are not considered to be good climbers however they are adept at digging. Furthermore, the Sand Cat is listed as CR on the Pakistan Red List. As such, the impact intensity is **serious**.

There is scarce availability on data associated with the Sand Cat, its distribution, movements and ecological requirements. Importantly, there is evidence that the species has large home ranges, varying from 13 to 50 km², and can travel over 10 km in a single night, as such the impact is not site specific, but rather **local.**

Signs of the Sand Cat's presence were noted in multiple habitats, including the Mountains/Hills, Clayey Plains and Dry stream beds (Table 6-9). Although presence is based on tracks/scat, with no direct observations yet, due to the CR listing on the Pakistan Red List, a precautionary approach was followed. This necessitates a **definite** probability of the Sand Cat being impacted by the Project. Ratings may be adjusted once this information is available.

Although through mitigation measures, such as reducing noise, avoiding collisions and facilitating continued movement of the species through areas, the intensity can be reduced to **moderate (high)** and the probability to **probable**. Notably, the mitigation measures outlined for habitat loss and nuisance impacts will assist in reducing the impact on the Sand Cat.

The Sand Cat occurs in Gravel Plains, Mountains/Hills, Sandy Plains/Dunes, Dry Streambeds and Clayey Plains (Table 5-37), so the direct residual Project habitat impacts for this species are currently precautionarily considered (in line with Table 6-8) to total ~13,967 Habitat Hectares. Further studies will be undertaken to attempt to refine the scale of residual impacts on this species' habitat.

Note:

This rating was undertaken based on a precautionary approach thus the intensity is currently rated as significant due to the high biodiversity value of the Sand Cat (CR and CH Criterion 1 trigger). Barrick will need to verify actual presence, and population estimates of these species through targeted surveys.

Table 6-9: Survey Data on the Sand Cat

Species	Location	Survey	No. Individuals and Habitat
Sand Cat	Mine Site	Post-Monsoon 2022	Mountains/Hills (1)*
	Mine Site	Spring 2023	Clayey Plains (1)* Mountains/Hills (1)*
	Northern Groundwater system		Dry Streambeds (2)* Mountains/Hills (1)*
	Access Route		Dry Streambeds (1)*
*Indicates presence was assessed on signs (scat) and not actual sightings			

Impact 14: Impacts to Critical Habitats of the Sand Cat			
Phase: Life of Project			
Impact Description: Impacts to Critical Habitat of the Sand Cat			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -55
Extent	2	Local Extending across the site and to nearby settlements.	
Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	
Mitigation/Management Actions			

Construction:

- Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions.
- Implement genetic sampling to confirm the presence of this species within the AoI and the surrounding EAAA,
- Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat.
- Develop a monitoring Plan and incorporate into the BAP/BMP

Operation:

<table>
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- Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat.
- Develop and implement an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team.

<u>Closure and Rehabilitation:</u>

- Remove fencing as soon as it becomes unnecessary, and the area is deemed safe.
- Rehabilitation of disturbed areas, where relevant and possible, with native species.

</td></tr>
<tr><td colspan="4">Post-Mitigation</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter-Generational - >20 years</td><td rowspan="5">Minor (negative) - 30</td></tr>
<tr><td>Extent</td><td>2</td><td>Local
Extending across the site and to nearby settlements.</td></tr>
<tr><td>Intensity</td><td>3</td><td>Moderate (high), short-term effects but not affecting ecosystem function.</td></tr>
<tr><td>Probability</td><td>3</td><td>Probable
Has occurred here or elsewhere and could therefore occur (20-50%)</td></tr>
<tr><td>Nature</td><td>Negative</td><td>-</td></tr>
</table>

6.2.1.4.4. Impact 15: Impacts to Critical Habitat of the Goitered Gazelle.

The construction and operation of the Project will lead to loss of habitat of the Goitered Gazelle **intergenerationally**. Associated with habitat loss, are impacts to behaviour, migration, breeding, feeding and increased risk of mortality, whether that is through altered behaviour or through entrapment/collisions.

They form small family groups during summer, but in winter, they gather in larger herds, migrating to less harsh valleys. Their winter migrations can span 10-30 km per day (Animalia 2024), as such the impact is not site specific, but rather **regional**. Fencing would therefore pose a risk to this species. Goitered gazelles are active during the day but can become nocturnal in areas with hunting pressure, thus in the Project Area, increased human activity could make them a collision risk at all times of the day.

Signs of the Goitered Gazelle's presence were noted in Dry stream beds[33] (Table 6-10). Although presence is based on tracks, with no direct observations yet, the VU listing on the IUCN Red List and the fact that it is a CH trigger, a precautionary approach was followed. This necessitates a **definite** probability of the Goitered Gazelle being impacted by the Project and the impact intensity is **serious**. Ratings may be adjusted once this information is available.

[33] AS per the IUCN Red List Assessment for Goitered Gazelle, the species is known to ascend into foothills and penetrate mountain valleys in Central Asia. Due to this potential preference for other habitats, it was also expected within the clayey plains, where available foraging material would be able to support their feeding requirements.

Although through mitigation measures, such as reducing fencing, avoiding collisions and facilitating continued movement of the species through areas, the intensity can be reduced to **moderate (high)** and the probability to **probable**. Notably, the mitigation measures outlined for habitat loss and nuisance impacts will assist in reducing the impact on the Goitered Gazelle.

The Goitered Gazelle is potentially believed to occur at the mine site within Clayey Plains and along Dry Streambeds (Table 5-37), so direct residual Project habitat impacts for this species are currently precautionarily considered (in line with Table 6-8) to total ~945 Habitat Hectares. Further studies will be undertaken to attempt to refine the scale of residual impacts on this species' habitat.

Note:

This rating was undertaken based on a precautionary approach thus the intensity is currently rated as significant due to the high biodiversity value of the Goitered Gazelle (VU and CH trigger). Barrick will need to verify actual presence, and population estimates of these species through targeted surveys. Ratings may be adjusted once this information is available.

Table 6-10: Survey Data on the Goitered Gazelle

Species	Location	Survey	No. Individuals and Habitat
Goitered Gazelle	Northern Groundwater system	Spring 2023	Dry Streambeds (2)*
*Indicates presence was assessed on signs and not actual sightings			

Impact 15: Impacts to Critical Habitat of the Goitered Gazelle			
Phase: Life of Project			
Impact Description: Impacts to Critical Habitat of the Goitered Gazelle			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Major (negative) - 65
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	

Mitigation/Management Actions
Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Develop a monitoring Plan and incorporate into the BAP/BMP. • Avoid unnecessary fencing. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Operation: • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Closure and Rehabilitation: • Remove fencing as soon as it becomes unnecessary, and the area is deemed safe. • Rehabilitation of disturbed areas, where relevant and possible, with native species.

Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Minor (negative) - 36
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	3	Moderate (high), short-term effects but not affecting ecosystem function.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

6.2.1.4.5. Impact 16: Impacts to Critical Habitat of the Dead Sea Sparrow

The Dead Sea Sparrow (CH Criterion 3 trigger) has a partially fragmented distribution range with the eastern population supported by resident areas in southern Afghanistan and breeding areas in north-western Pakistan, directly associated with the Mine Site AoI. This sub-population may support another clade of species and as such, its extent impacts are rated as **regional**. This species migration won't be impacted by fencing, but it is at low risk of collision and electrocution by powerlines. It was not observed on site, although is likely to occur in the area. This species was not observed on-site during the various seasonal surveys undertaken and in the absence of sufficient water, it is unlikely to occur on-site, but may be present in the broader study area. As such, the intensity was deemed **moderate (low)** with **unlikely** probability of occurring**.** It will also be impacted **intergenerationally** as the infrastructure will be in place throughout the LoM. With mitigation measures, the impact intensity is reduced to **minor**.

Impact 16: Impacts to Critical Habitat of the Dead Sea Sparrow			
Phase: Life of Project			
Impact Description: Impacts to Critical Habitat of the Dead Sea Sparrow			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Minor (negative) - 22
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	
Mitigation/Management Actions			
Construction: • Install avian deterrents such as bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks. Operation: • Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. Closure and Rehabilitation: Remove Powerlines as soon as they become redundant.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Negligible (negative) -10
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.1.4.6. Impact 17: Impacts to Critical Habitat of the Alcocks Toad Headed Agama

Alcock's Toad-headed-Agama (CH Criterion 2 Trigger) was observed in both the 2022, and 2024 surveys outside the areas previously reported through the IUCN. There is very little data for this species, much of it outdated, with only a few species observed in the Sand Dunes/ Sandy Plains habitat. As such, without comprehensive surveys across the border in Afghanistan and potentially Iran (which at this stage are not possible) only very coarse estimates of range can be made and a determination of the percentage of population that may exist within the Project disturbance area cannot be made. This rating was undertaken based on a precautionary approach thus the intensity is currently rated as significant Barrick will need to verify actual presence, and population estimates of these species through targeted surveys.

Alcock's Toad-headed Agama is believed to occur at the mine site only in Sandy Plains/Dunes (Table 5-37), so direct residual Project habitat impacts for this species are currently precautionarily considered (in line with Table 6-8) to total 0.04 Habitat Hectares. Further studies will be undertaken to attempt to refine the scale of residual impacts on this species' habitat.

Ratings may be adjusted once this information is available. As the EAAA is mostly outside of the infrastructure footprint, the likelihood of impact is **unlikely**. As with the other CH species, the impact will remain throughout the LoM (with or without mitigation measures) and as such the duration of impact is **intergenerational**. However, due to the lack of data on this species and its restricted range, the intensity of impact, if it is to occur, would be **significant** and would potentially impact its **global** presence**.** As this species is proven to be highly range restricted, and it is avoided by the footprint then the extent of impact would be **site specific** and if other mitigation measures are implemented effectively the intensity would reduce to **moderate (high).**

<table>
<tr><th colspan="4">Impact 16: Impacts to habitat critical to the Alcocks Toad Headed Agama.</th></tr>
<tr><th colspan="4">Phase: Life of Project</th></tr>
<tr><td colspan="4">Impact Description: Impacts to habitat critical to the Alcocks Toad Headed Agama.</td></tr>
<tr><td colspan="4">Prior to Mitigation/Management</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter-Generational - >20 years</td><td rowspan="5">Minor (negative) - 30</td></tr>
<tr><td>Extent</td><td>5</td><td>Global - Contribute to global impact</td></tr>
<tr><td>Intensity</td><td>5</td><td>Significant impact on the environment. Irreparable and irreplaceable damage to highly valued species, habitat or ecosystem. Persistent severe damage.</td></tr>
<tr><td>Probability</td><td>2</td><td>Unlikely
Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)</td></tr>
<tr><td>Nature</td><td>Negative</td><td>-</td></tr>
<tr><td colspan="4">Mitigation/Management Actions</td></tr>
</table>

Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Develop a Monitoring Plan and incorporate into the BAP/BMP. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Implement a 'find and relocate' procedure prior to clearing areas. Operation: • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Consider reptile-friendly culverts under roads or other barriers. These should be wide enough to allow light and airflow, encouraging their use. • Control invasive or unnatural predator species (e.g., stray dogs or feral cats) that may exploit Agama populations near operational areas. • Restrict vehicle movement to pre-designated pathways to avoid disturbing or fragmenting Agama habitats. • Implement speed limits. Closure and Rehabilitation: • Rehabilitation of disturbed areas, where relevant and possible.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Negligible (negative) -18
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	3	Moderate (high), short-term effects but not affecting ecosystem function.	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	

6.2.1.4.7. Impact 18: Impacts to habitat of the potentially undescribed reptilian species, Eremias sp., Eremias cf. scripta and Cyrtopodion sp.

Three herpetofauna species observed in the surveys are considered to be potentially new species. *Eremias sp.* and *Cyrtopodion sp.* (Figure 6-2) appear to be new species, while *Eremias cf scripta* (Figure 6-1) closely resembles *Eremias scripta,* but exhibits distinct morphological differences for *Eremias sp.scripta*, suggesting it may represent a few new species. Blood and tissue samples were collected and these will need to be tested to confirm taxonomy. Pending further examination, a taxonomist was consulted, and it is in the taxonomist's opinion, with high confidence, that these species are still to be discovered in this region and due to the security restraints and the cross-border trade, there has been little opportunity to document these species, there are likely to be a few additional discoveries in the future. Nonetheless, to address the current uncertainties for these species confirmed within the baseline studies, gaps in this data should be addressed and proactively investigate the potential significance of these findings.

To date, knowledge of the habitat associations of the aforementioned species is limited at this stage of the assessment due to the further genetic assessment being undertaken (Table 5-37), so they are precautionarily considered to potentially occur in all natural habitats, and direct residual Project habitat impacts for this species are thus precautionarily considered (in line with Table 6-8) to total up to ~13,967 Habitat Hectares. Further studies will be undertaken to attempt to refine the scale of residual impacts on these species' habitats.

The impact will remain throughout the LoM (with or without mitigation measures) and as such the duration of impact is **intergenerational**. However, due to the lack of data on these species and the fact that there is no data on their distribution it should be considered range restricted and as such the intensity of impact, if it is to occur, would be **serious** and would potentially impact its **global** presence**.** The impact would also then be **likely** to occur**.** If the habitat of this species is proven to be highly range restricted, and it is avoided by the footprint then the extent of impact would be **site specific** and if other mitigation measures are implemented effectively the intensity would reduce to **moderate (high).**

Impact 18: Impacts to habitat of the potentially undescribed reptilian species.			
Phase: Construction			
Impact Description: Impacts to habitat of the undescribed reptilian species, *Eremias sp., Eremias cf scripta* and *Cyrtopodion sp.*			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -56
Extent	5	Global - Contribute to global impact	
Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	
Mitigation/Management Actions			
Construction:			

• Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Implement a 'find and relocate' procedure prior to clearing areas. • Develop a Monitoring Plan and incorporate into the BAP/BMP. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. <u>Operation:</u> • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. <u>Closure and Rehabilitation:</u> • Restore soil quality and loosen compacted areas to facilitate burrowing and natural behaviours of the reptiles. • Spread fine, loose sand across rehabilitated areas for *Eremias sp.* and *Eremias cf scripta*, as the genus depends on sandy substrates for movement and burrowing. • If feasible, reintroduce individuals from these species into restored habitats. Conduct this gradually and in synchrony with the rehabilitation timeline. Establish soft release areas with adequate cover and food sources to support the survival of reintroduced individuals. • Control populations of invasive or unnatural predators (e.g., feral cats, rats) that may exploit reptile populations in the rehabilitated area. •			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Minor (negative) - 27
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	3	Moderate (high), short-term effects but not affecting ecosystem function.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

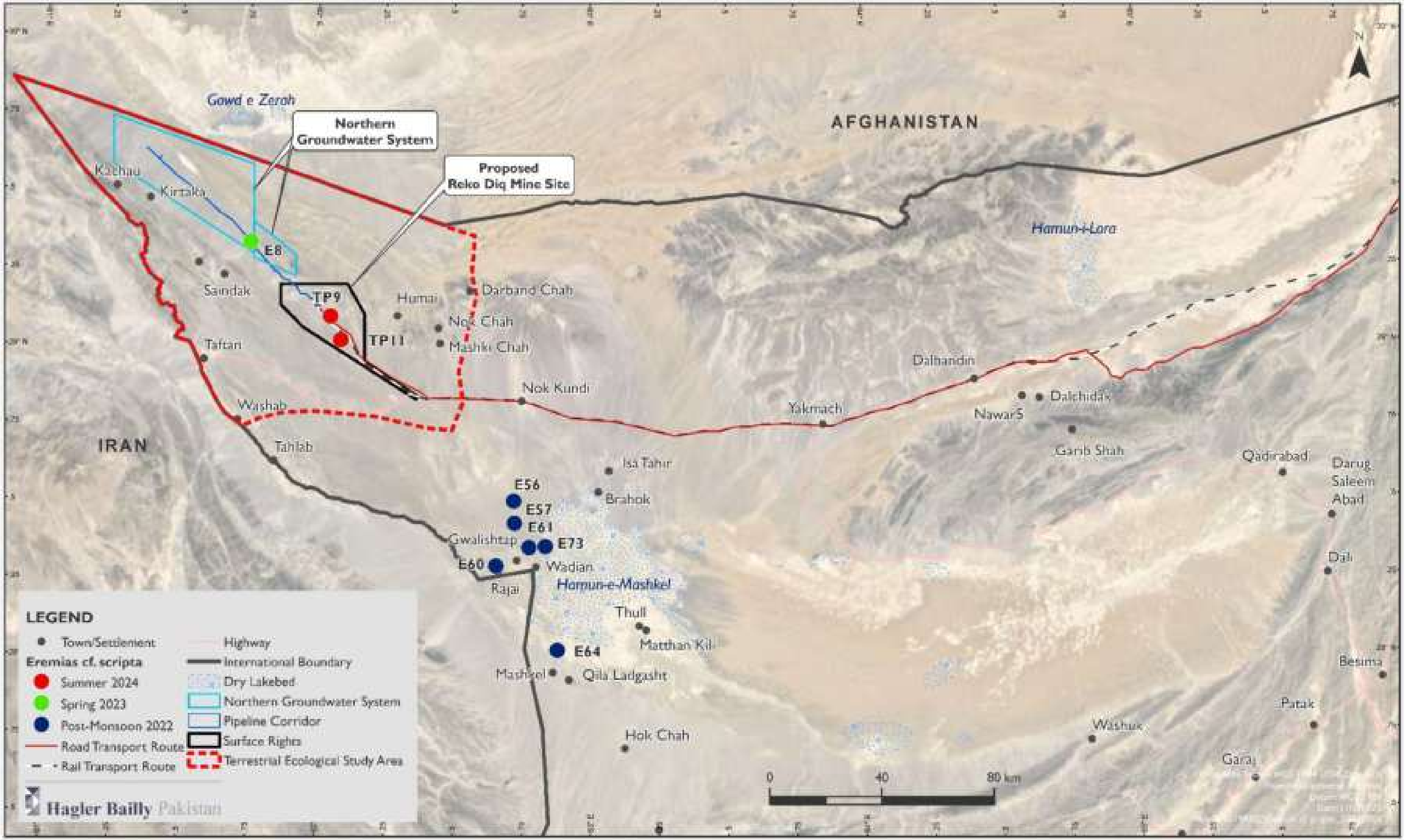


Figure 6-1: Survey Locations of Observed *Eremias cf scripta* Individuals

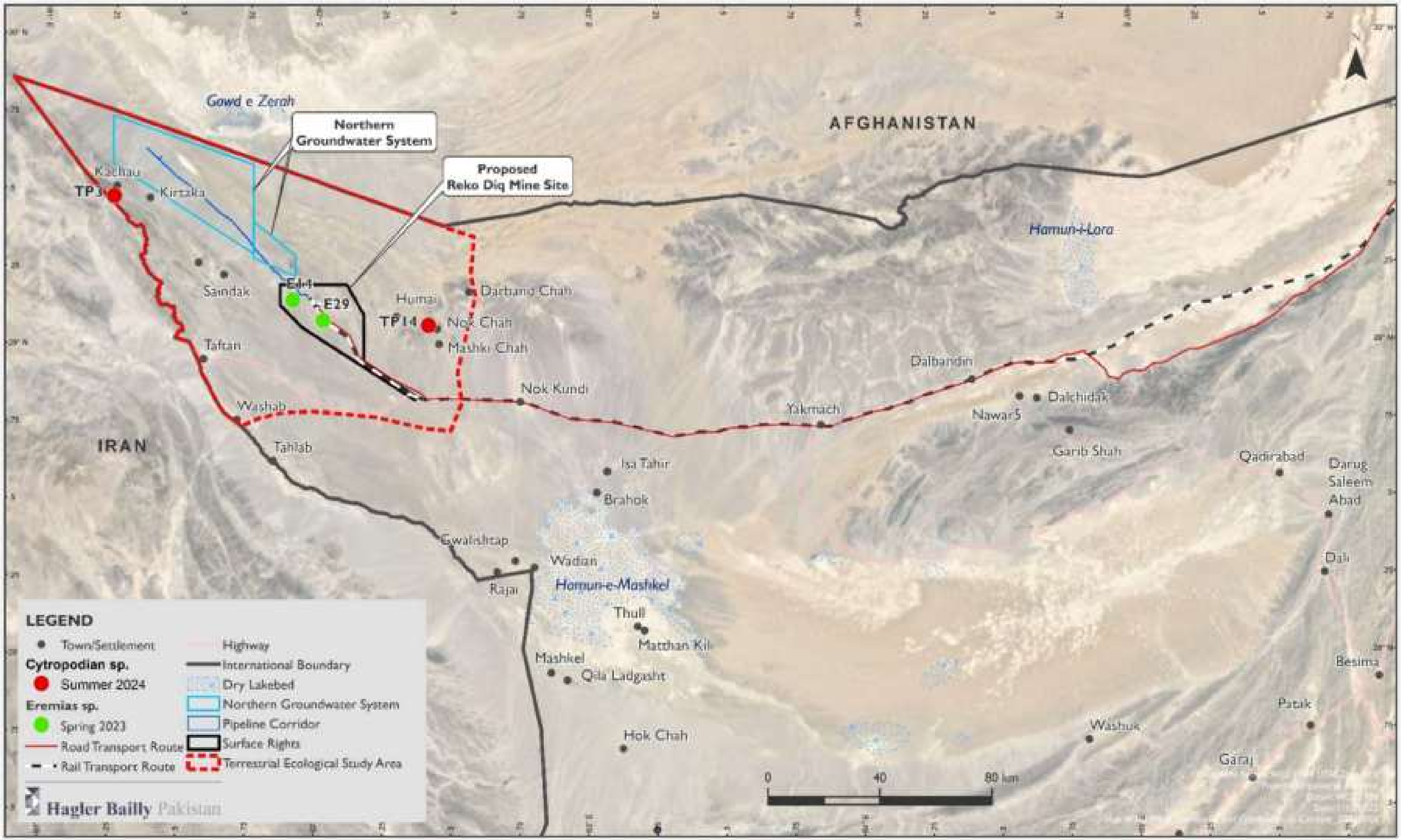


Figure 6-2: Survey Locations of Observed *Eremias sp.* and *Cytropodian sp.* Individuals

6.2.1.4.8. Impact 19: Introduction and spread of AIPs to the RDMS and Port Qasim due to Project-related transportation and vehicular movement.

Invasive species change habitat structure, which can disrupt natural ecological processes such as nutrient cycling, pollination, and seed dispersal. Invasive plants may exhibit different flowering and fruiting times compared to native plants, affecting the availability of resources for native pollinators and seed dispersers. This disruption can have cascading effects throughout the entire ecosystem leading to **serious** impacts. The Project activities at the RDMS pose a potential threat for the introduction of AIS as a result of vehicular movement, where species can be transported on site unintentionally. There is a potential risk of the introduction of the *Prosopis glandulosa* and hydrophilic *Arundo donax*, species that are known to occur in the surrounding areas and are able to survive in the harsh environmental conditions in the region. *Prosopis* spp. were introduced in Pakistan for sand dune stabilisation, especially in the desert environment; once introduced in an area, it outcompetes the native flora at an accelerated rate.

The following are the risks which can lead into introduction of AIPs and pose a **regional** threat:

- *Contaminated Vehicles and Equipment:* Vehicles and equipment can carry seeds, spores, in mud, dirt, or plant matter stuck to tires, undercarriages, and other parts.
- *Material Transport*: Construction materials sourced from different locations can introduce AIPs. For example, gravel, sand, or other fill materials may contain seeds or insects.
- *Movement of Personnel:* Workers moving between different sites can carry AIPs on their clothing, tools, and personal equipment.

If unmitigated, the spread of AIPs will continue in perpetuity and was therefore rated as **inter-generational**. As there are already AIPs in some of these areas, means that the continued spread is **likely**. With mitigation however, AIP species can be controlled and limited to **site specific** area through effective implementation of AIP management plans, rendering the spread to be **unlikely** and any impacts to be only a **moderate** severity.

The Transport Route has been excluded as it is not the liability of Barrick. There are many AIPs along this route and these could be spread to the RDMS and Port Qasim, however this will be covered by AIP management processes. Furthermore, AIPs at the RDMS and Port Qasim will be subject to removal and as such should not facilitate spread along the route.

Impact 19: Introduction and Spread of AIPs			
Phase: Life of Project			
Impact Description: Introduction and spread of AIPs to the RDMS and Port Qasim due to Project-related transportation and vehicular movement.			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -52
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	

Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	
Mitigation/Management Actions			

Construction:

- Develop and implement AIP management.
- Develop and maintain robust early detection and monitoring programs to promptly identify signs of AIPs within or near the mining Project area.

Operation:

- Establish strict guidelines for the disposal of waste materials and wastewater, ensuring they are managed in a manner that prevents the introduction and spread of AIPs.
- Provide comprehensive education and training to Project personnel, emphasising the risks associated with AIPs introduction and instructing them on how to recognise and report potential invasive species.

Closure and Rehabilitation:

- Use native species for landscaping, reclamation, and restoration efforts to reduce the likelihood of introducing non-native species that could outcompete native flora and fauna.

Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Negligible (negative) -16
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function.	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	

6.2.1.4.9. Impact 20: Increased noise, dust and light generated from construction, operations and decommissioning of RDMS

Increased noise, dust, and light pollution can result in **moderate (high)** impacts to fauna and flora. The noise and vibrations generated during mine operations can also disturb wildlife, causing stress, altering behaviour patterns, and potentially leading to habitat abandonment. Over time, these disruptions may result in species moving out of the affected area. Construction and operational activities will also result in 24-hour illumination at the RDMS. Nocturnal/crepuscular animals, including many insects, some bird species, and mammals (such as Ruppell's Fox – VU and Sand Cat – CR), are particularly vulnerable to light pollution. Artificial lights can disrupt their natural behaviours, interfere with navigation and communication, and disturb sleep patterns, which can result in decreased foraging efficiency, disrupted breeding and mating behaviours, and increased susceptibility to predation. Over time, these disruptions can lead to reduced animal abundance and a decline in the diversity of species present in the affected area. while increased human presence and activities lead to further disturbances, habitat degradation, and increased risks for wildlife. Increased dust deposition on vegetation reduces the photosynthetic capacity of plants and may limit growth and reproductive capacity, leading to a decrease in population sizes and potential loss of species. However, due to the high background dust levels in the receiving environment and the low density of vegetation in the area, the vegetation is likely to be well-adapted to dust, and it is unlikely to represent a significant impact.

The increased nuisance elements would be throughout the life of the project and rehabilitation phase **(intergenerational)** and would **likely** impact fauna and flora although this would mostly be confined to the **local** area.

With mitigation, the likelihood of flora and fauna being impacted can be reduced to probable with intensity reduced to **moderate (low)**, while the duration and extent will remain unchanged.

This impact does not extend to the Transport Route and Port Qasim as activities are already occurring in that area and as such the baseline noise level and disturbance will not impact flora and fauna significantly.

Impact 20: Increased noise, dust and light pollution from construction, operation and decommissioning of RDMS.			
Phase: Life of Project			
Impact Description: Increased noise, dust and light pollution generated from construction, operation and decommissioning of RDMS.			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -40
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	3	Moderate, short-term effects but not affecting ecosystem function.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	
Mitigation/Management Actions			
Construction: • Use vibration reduction technologies and regularly monitor vibration levels to ensure they are kept within thresholds that minimize disturbance to wildlife. • Install shielded lighting to minimize light spills and disruption to nocturnal wildlife. Operation: • Regularly monitor vibration levels.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	

Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	Minor (negative) - 27
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

6.2.1.4.10. Impact 21: Increased wildlife mortality/injuries from vehicle and train collisions along the Transport Route.

Direct faunal mortalities as a result of collisions with additional trains and vehicles along the transport route associated with the Project. The anticipated rail traffic that the Project will contribute to this route is four trains in each direction (4 up and 4 down) during Phase 1, increasing to eight trains (each way) per day during Phase 2, transporting copper gold concentrate to Port Qasim, and fuel and reagents to site. There is a significant amount of existing rail traffic along the north-south section of the route between Port Qasim and Jacobabad, with a reported 35 to 45 trains per day. The increased traffic resulting from the Project along this section is considered to be very low. Conversely, the section between Spezand and Taftan currently only sees a reported one or two trains per week and rail traffic along this section has been low for a long time. Assuming there is no other change in traffic, the project will have a significant contribution to the overall traffic volumes along this route thereby increased the chance of collisions with fauna.

A maintenance and upgrade programme is planned for this section of the railway to support the anticipated increased traffic related to the project and this will also have the benefit of enabling more passenger and freight traffic along this route. A report by PRACS (2024) has indicated that trains operated by Pakistan Railways on this section at the beginning of Phase 1 operations will include:

- 2 Passenger Train per day (1 Up & 1 Down)
- 2 Freight Train per day (1 Up & 1 Down)
- Water & Emergency Train 2 per day (1 Up & 1 Down)

Total number of Trains operated by will be six per day.

The traffic will be increased for the duration of the life of the Project (**intergenerational**). The length of the Transport Route covers the **region** with species that are migratory but high numbers of collisions are **unlikely** and impact intensity will be **moderate (low)** for species. Implementing mitigation measures such as educating drivers amd reducing speed will make collisions **rare**.

Impact 21: Increased wildlife mortality along the Transport Route			
Phase: Life of Project			
Impact Description: Increased wildlife mortality from vehicle and train collisions along the Transport Route.			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Minor (negative) - 22
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function..	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	
Mitigation/Management Actions			
Operation: • All vehicles must adhere to a speed limit to avoid unnecessary collisions with susceptible species.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Negligible (negative) -10
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants..	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.1.4.11. *Impact 22 Wildlife mortality/injuries from vehicle collisions and other infrastructure at the RDMS.*

The use of the roads to haul ore/waste rock could result in direct faunal mortalities (especially of nocturnal fauna). Wildlife could also become trapped in excavations, fencing or in tailings material leading to **moderate (low)**, **site-specific** impacts on fauna populations. Without mitigation measures, these are **probable** occurrences that could occur throughout the Project life (**intergenerational).** Through implementing effective mitigation measures to reduce collision and entrapment, the probability can be reduced to **unlikely**, while reduced mortalities would lessen the intensity of the impacts to fauna populations to **minor**.

Impact 22: Wildlife mortality/injuries from vehicle collisions and other infrastructure at the RDMS.			
Phase: Life of Project			
Impact Description: Wildlife mortality/injuries from vehicle collisions and other infrastructure at the RDMS.			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Minor (negative) - 24
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	
Mitigation/Management Actions			

Construction:

- Install physical barriers such as fencing around open excavations and hazardous areas to prevent wildlife entry.
- All vehicles must adhere to a speed limits to avoid unnecessary collisions with susceptible species.
- Incorporate wildlife-friendly design features, such as escape ramps in excavations, to facilitate the safe exit of trapped animals.
- Train staff to recognise and address wildlife entrapment issues, and raise awareness about the importance of wildlife protection.

Operation:

- Conduct regular monitoring of open excavations and infrastructure to identify and rescue trapped wildlife.
- Monitor the established wildlife crossings or corridors to allow safe passage for animals and reduce the risk of collisions.

- All vehicles must adhere to a speed limits to avoid unnecessary collisions with susceptible species. - Work with local wildlife conservation organizations to develop and implement measures to protect wildlife and reduce entrapment risks. - Develop protocols for the removal of animals trapped in fencing/excavations.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Negligible (negative) -14
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	

6.2.1.4.12. Impact 23: Direct mortality/injuries from powerline collisions or electrocutions

Operational activities related to power generation may heighten the risk of wildlife collisions. Birds, in particular, are vulnerable to such collisions as they navigate through areas with powerlines and which may not always be easily visible or detectable. Given the various avian PBVs such as the Steppe Eagle, Egyptian Vulture, Asian Houbara, Saker Falcon, Greater-spotted Eagle, Long-legged Buzzard, Short-toed Snake-eagle, Common Kestrel, this is important to consider. This elevated risk can result in injuries or fatalities, impacting their populations and disrupting local ecosystems. The impact will be **intergenerational** in duration as the powerline will be in place throughout the LoM and will remain that level of impact regardless of mitigation measures. As many of the PBV avian species are migratory, the impact to their populations could be **regional** in extent. To apply the precautionary approach and because expert consultation on the Asian Houbara Bustard (VU) highlighted that there is uncertainty to the presence of a breeding population in the Project area, it would be significant to the species if there was and as such the intensity of the impact could be **serious** to the species. With mitigation measures such as bird deterrents, the impact intensity can be reduced to **moderate (low**) and the probability of collisions occurring could be **rare**.

Note:

Expert opinion suggests that these deterrents are not effective in reducing bird collisions for the Asian Houbara. The success of these deterrents would need to be monitored and adjusted if they prove to be ineffective.

Impact 23: Direct mortality/injuries from powerline collisions or electrocutions.			
Phase: Life of Project			
Impact Description: Direct mortality/injuries from powerline collisions or electrocutions.			
Prior to Mitigation/Management			
Duration	5	Inter-Generational - >20 years	Moderate (negative) -48
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	
Mitigation/Management Actions			
Construction: • Install avian deterrents such as bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks. Operation: • Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. Closure and Rehabilitation: • Remove Powerlines as soon as they become redundant.			
Post-Mitigation			
Duration	5	Inter-Generational - >20 years	Negligible (negative) -11
Extent	4	Regional Will affect the entire province or region. A broad geographical area distinguished by similar features.	
Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function.	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or	

		implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.1.5. Noise

6.2.1.5.1. Impact 24: Noise Generated from Mine Development

This section describes the noise generated during the construction, operation and decommissioning phases of the Project where the impact will start during construction and remain continuous throughout the LoM.

Construction Activities

Depending on the construction equipment used and its distance from receptors, they may be exposed to intermittent and variable noise levels. A change in the sound level of 3 dB is a just noticeable difference, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as a doubling or halving of sound level.

The Project construction phase will involve the operation of construction equipment and vehicles, resulting in an overall incremental increase in the ambient noise levels. Although these noise levels can attenuate over distances, the resultant noise levels can cause nuisance to receptors if the overall increment in the ambient noise levels is high enough.

A comprehensive inventory of construction equipment developed by the United States' Federal Highway Authority (FHWA) was used as a reference for equipment noise levels. Table 6-11 provides the selected list of equipment and associated noise specifications.

Table 6-11: Equipment List and Reference Noise Levels

Equipment	Model	Acoustic Usage Factor (%)[34]	Sound Pressure Level (dBA) Specified by Manufacturers, Lmax at 50 ft (15m)	Quantities
Batch Plant	-	15%	83	1
Concrete Mixers	-	40%	85	1
Water Bowser	789D SC	40%	80	3
Loader	CAT 980	40%	84	1
Trailer	-	16%	80	2
Crane	North-western 8	16%	85	2
Excavator	-	40%	85	2
Tractor/Trolley	-	40%	80	2
Bulldozers	-	40%	85	1
Paver	-	50%	85	1
Compactor	-	20%	80	2
Pumps	-	50%	77	1
Generators	-	50%	82	2
Vibrator	-	20%	101	1
Drilling Machines	-	10%	55	1
Compressors	-	40%	80	1
Dump Truck	-	40%	84	5
Roller	-	20%	85	1
Welding Machines	-	40%	73	2
Fork Lifter	-	40%	85	1
Face Shovel	PC7000	40%	116	1
Large Front-End Loader	WE2350-2	40%	79	1
Haul Truck	980E-5	75%	88	5
Track Dozer	D11T	40%	87	4
Wheeled Dozer	854K	40%	83	2
Grader	24M	40%	111	4

[34] Acoustic usage factor presents the time for which an equipment remains operational within 24-hours. 50% acoustic usage factor indicates that the equipment will remain operational for 12-hours in one day.

Equipment	Model	Acoustic Usage Factor (%)[34]	Sound Pressure Level (dBA) Specified by Manufacturers, Lmax at 50 ft (15m)	Quantities
Small Excavator	390DL	40%	81	2
Water Truck	789D SC	40%	80	3
Service Truck	789D WC	40%	121	3
Production Drill	EPIROC PV271XC LP	20%	91	4
Presplit Drill	EPIROC SmartROC D65LF	20%	96	2
Grade Control Drill	-	20%	85	2

Source: HEP (2006)
'-' indicates that model information was not available at the source.

The construction noise was estimated following an empirical approach using the sound levels at the source, acoustic usage factor and quantities of the construction phase equipment. Based on the equipment noise, their quantities, and acoustic usage factor, the incremental increased in noise levels is estimated to be 122.7 dBA at a distance of 15 m. The noise levels at the nearby receptors have been estimated using the empirical approach by following equation. This equation estimates noise levels using the inverse square law for noise attenuation at distances.[35] Table 6-12 provides the resultant noise levels at the nearest human receptor during daytime and night-time.

$$LP2 = LP1 - 20xlog\frac{R2}{R1}$$

Where;

LP1 (dBA) = sound pressure level at the reference distance from the noise source

LP2 (dBA) = sound pressure level at the receptor

R1 = reference distance of where the sound pressure level of the noise producing unit measured/referenced

R2 = distance between the source and receptor

[35] This equation assumes that the noise levels will attenuate only through increase in distance. This increase in distance estimates the linear reduction in noise pressure levels. It should be noted that noise levels calculated through this equation overestimate the actual onsite conditions as it does not account for any noise barriers within the areas. Therefore, this equation provides worst case noise levels in the absence of noise barriers.

Table 6-12: Resultant Daytime and Noise Levels (dBA) at Nearest Receptor Without Mitigation

Location	Baseline Noise (dBA)	Resultant Ambient Noise (dBA)	NEQS	Increase (dBA)	Interpretation
Onsite Accommodation Camp – Day	82	82.14	55	0.14	Not perceptible
Onsite Accommodation Camp – Night	81	81.18	45	0.18	Not perceptible
Humai – Day	82	82.02	55	0.02	Not perceptible
Humai – Night	81	81.02	45	0.02	Not perceptible
Nok Kundi – Day	62.8	62.96	55	0.16	Not perceptible
Nok Kundi – Night	57.6	58.10	45	0.50	Not perceptible

Note: Noise levels were not monitored at Humai. Therefore, the noise levels monitored at N1 (Mine Area) have been used to assess increment in baseline noise levels due to construction activities.

Based on the analysis made in Table 6-12, the construction activities of the Project will not result in a perceptible increase over the ambient noise levels at the receptor during daytime or night-time.

<u>Operational Activities</u>

The operational phase will involve the operations of crushing, grinding, screening, tailings and water pumping equipment, the HFO power plant and the regular movement of large vehicles. As these activities remain in constant operation, this can cause an overall incremental increase to the ambient noise levels. Although these noise levels can attenuate over distances, the resultant noise levels can cause nuisance to receptors if the overall increment in the ambient noise levels is high enough.

To assess the overall noise levels of the operations phase, the noise levels of the equipment and vehicles are taken as in conjunction with the acoustic usage factor[36]. Equipment specific noise levels have been used based on the manufacturer specifications as well as via publicly published literature. Table 6-13 provides the list of operations phase equipment and their associated noise levels.

Based on this analysis, the noise generated from the Project due to operations of the mining equipment and vehicles is 136 dBA and is exclusive of the impulse noise generated from

[36] The acoustic usage factor represents the percentage of time that a particular equipment is assumed to be running at full power.

blasting. The impulse noise is of shorter durations, not lasting for more than 1-2 minutes. Due to very low acoustic usage factor (0.069%), the contribution of blasting in the daytime or night-time noise levels is expected to be negligible.

The estimated noise levels from the Project operations (Table 6-14) consider that all of the equipment will be placed in open environment without implementation of mitigation measures. These noise levels can be considered as representative of the worst-case scenario.

Table 6-13: Operations Phase Equipment List and Reference Noise Levels

Source	Model	Max Quantity	Acoustic Usage Factor (%)	Sound Pressure Level (dBA) specified by Manufacturers, Lmax at 50 ft (15m)	Source
Mobile Sources					
Rope Shovel	4100 XPC	8	20%	93	Transportation (2017)
Face Shovel	PC7000	4	40%	116	Transportation (2017)
Large Front-End Loader	WE2350-2	3	40%	80	Transportation (2017)
Haul Truck	980E_5	127	75%	88	Transportation (2017)
Track Dozer	D11T	22	40%	87	Transportation (2017)
Wheeled Dozer	854K	3	40%	83	Transportation (2017)
Grader	24M	16	40%	111	Transportation (2017)
Small Excavator	390DL	5	40%	81	Transportation (2017)
Water Truck	789D SC	12	40%	80	Transportation (2017)
Service Truck	789D WC	12	40%	121	Transportation (2017)
Production Drill	EPIROC PV271XC LP	14	20%	91	Transportation (2017)
Presplit Drill	EPIROC SmartROC D65LF	4	20%	96	Transportation (2017)

Source	Model	Max Quantity	Acoustic Usage Factor (%)	Sound Pressure Level (dBA) specified by Manufacturers, Lmax at 50 ft (15m)	Source
Grade Control Drill	-	6	20%	85	Transportation (2017)
Primary Crushing					
Conveyors	-	15	50%	105	Brown (2004)
Gyratory Primary Crusher	Metso 60 x 89 Mk III Eq.	4	75%	110	Metso (2022)
Secondary Crushing					
Conveyors	-	15	50%	105	Brown (2004)
Screen Feeder	Vibrating Feeder	7	50%	95	Viilo (2011)
Coarse Ore Screen	Vibrating Multi-slope, Double Deck	7	50%	95	Viilo (2011)
Secondary Crusher	Metso MP1250 or Eq.	8	75%	110	Metso (2022)
High-Pressure Grinding Roll (HPGR)					
Conveyors	-	15	50%	105	Brown (2004)
HPGR	Polycom 26/18 or Eq.	7	75%	89	K. Leśniak (2019)
Fine Ore Screen	Wet Vibrating Multi-slope, Double Check	13	50%	95	Commission (2012)
Milling					
Ball Mill	Reverse Close Circuit Ball Mill	2	75%	85	Joergensen (2020)
Regrinding					
Regrind Mill Stage 1	HIG700 or Eq.	7	75%	125	Welding (2023)
Regrind Mill Stage 2	HIG15000	7	75%	125	Welding (2023)
Cleaner Floatation					
1st Cleaner Flotation	e70 or Eq.	7	75%	100	T. Thai (2021)

Source	Model	Max Quantity	Acoustic Usage Factor (%)	Sound Pressure Level (dBA) specified by Manufacturers, Lmax at 50 ft (15m)	Source
1st Cleaner Scavenger Flotation	e70 or Eq.	7	75%	100	T. Thai (2021)
2nd Cleaner Flotation	e20 or Eq.	7	75%	100	T. Thai (2021)
3rd Cleaner Flotation	OK8 or Eq.	7	75%	100	T. Thai (2021)
Concentrate Dewatering					
Concentrate Trash Screen	Single Deck Vibrating Screen	1	75%	110	Environmental (2023)
Tails Dewatering and Transfer					
Promotor 1	Aero 3894	1	60%	95	Syensqo (2024)
Promotor 2	Aero MAXGOLD 900	1	60%	95	Syensqo (2024)
Promotor 3	Aero 7249	1	60%	95	Syensqo (2024)
Frother 1	MIBC	1	60%	95	Africa (2024)
Frother 2	Kemtec F160-05	1	60%	95	Africa (2024)
Power Generation					
HFO Power Plant	Wärtsilä W 18V50DF D	2	75%	91	Shelledy (2013)

‘-’ indicates that model information was not available at the source.

The onsite accommodation camp is ~9 km from the proposed location of mineral processing plant and is more susceptible to noise from Project operations as compared to Humai settlement which is located at ~25 km to the east of the plant. Modelling indicates that the elevated noise levels will be barely perceptible at the onsite accommodation camp and imperceptible at the Humai settlement. Furthermore, as the increment in noise levels at both receptors is within 3 dBA from the baseline, it can be considered within the acceptable limits as specified in IFC General EHS Guidelines.[37] The noise levels estimated do not consider the

[37] According to IFC General EHS Guidelines, an exceedance of 3 dBA from the baseline is permissible if the baseline noise levels are exceeding the applicable limits.

implementation of control measures, therefore the overall increment in baseline noise levels is expected to be even lower for the nearby sensitive receptors. Worker accommodation rooms are to be constructed using insulated wall panels to reduce noise. Table 6-14 provides the resultant noise levels at the receptors during Project operations.

Table 6-14: Resultant Daytime and Noise Levels (dBA) at Nearest Receptor Without Mitigation

Receptor	Baseline Noise Levels		Incremental Noise Levels at Receptors from Project Operations	Ambient Noise Levels with Project Contribution		Increment Over Baseline Noise Levels		Interpretation at Human Receptors
	Day	Night		Day	Night	Day	Night	
Onsite Accommodation Camp	82	81	81	84	84	2	3	Barely perceptible
Humai Settlement	82	81	72	82	81	0	0	Not perceptible

Note: Noise levels were not monitored at Humai settlement. Therefore, the noise levels monitored at N1 (Mine Area) have been used to assess increment in baseline noise levels due to Project operations.

Decommissioning Activities

The sources of elevated noise levels during the decommissioning phase will include operation of equipment and vehicles for demolition and removal of structures, making safe the open-pit, closure of the TSF, and disposal of the debris.

The noise levels estimated for the construction phase are used for assessing noise level impacts during the decommissioning phase in absence of a detailed decommissioning plan at the time of writing this report. The noise levels are expected to be much lower as compared with the construction phase due to reduced number of vehicles and equipment such as batch mixers, and drills etc., not being used for decommissioning.

Based on the analysis in Table 6-14, the decommissioning activities of the Project will not result in a perceptible increase over the ambient noise levels at receptors during daytime or night-time with a lower increment in the daytime and night-time noise levels, in the range of 0.02 dBA to 0.5 dBA at the location of receptors.

Impact 24: Noise Generated due to Mine development.			
Phase: Life of Project			
Impact Description: Nuisance at receptors due to noise generated from construction, operations and decommissioning of mine.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Minor (negative) - 36
Extent	2	Local Extending across the site and to nearby settlements.	
Intensity	2	Moderate, short-term effects. On-going social issues.	
Probability	4	Likely The impact may occur (50-90%)	
Nature	Negative	-	
Mitigation/Management Actions			
• The Project will develop and implement a Noise Management Plan. • Monitor and maintain noise producing units to manufacturing specifications, to reduce noise levels to the lowest possible extent. • Consider installing visual alarms instead of or in addition to audible alarms to the extent possible. • Installation of noise abatement devices around noise producing equipment such as mufflers and silencers will reduce noise at the source wherever feasible.			

Impact 24: Noise Generated due to Mine development.			
• Prioritise use of new equipment and vehicles over older equipment to ensure that the noise levels do not exceed the prescribed limits at reference distances. • Periodically monitor instantaneous and 24-hours continuous noise levels at the Mine Site boundary and at receptors to ensure compliance with applicable standards. • Worker accommodation rooms are to be constructed using insulated wall panels to reduce noise.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Minor (negative) - 27
Extent	2	Local Extending across the site and to nearby settlements.	
Intensity	2	Moderate, short-term effects. On-going social issues.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

6.2.1.5.2. Impact 25: Elevated Noise Levels from Road Transportation

Increased vehicular movement on the roads can cause elevated noise levels from engines and the use of horns, which can cause a nuisance for receptors if exposed for long durations.

A primary transport route for the project during construction and operations will be via road from Karachi to the RDMS. The Road Transport Route transits past inhabited areas located at distance of <500 m from the road and the increase of traffic over baseline levels due to the Project can cause elevated noise levels, especially within zones where baseline noise levels are low.

Based on the analysis of traffic (Appendix E), the Project's contribution to the existing traffic levels is considered to be less than 1% and subsequent contribution to noise levels will be very low.

Impact 25: Elevated Noise Levels from Road Transportation
Phase: Life of Project
Impact Description: Increase in vehicular movement on local roads can cause elevated noise levels.
Prior to Mitigation/Management

Impact 25: Elevated Noise Levels from Road Transportation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	>20 years	Negligible (negative) - 24
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	2	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. On-going social issues. Damage to items of significance.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	
Mitigation/Management Actions			
• Regularly maintenance of vehicles according to the manufacturer specifications. • Implement policies to prohibit use of horn (except in emergency situations) in areas where human dwellings or receptors are close to the Road Transport Route. • Minimise vehicular movement during peak congestion hours where possible to reduce contribution in elevated noise levels. • Comply with speed limits at all times.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	>20 years	Negligible (negative) - 21
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Functions and processes not affected.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

6.2.1.6. Traffic

6.2.1.6.1. Impact 26: Increased Road Traffic due to Project Activity

The Project will result in increased traffic levels along the existing road network due to the movement of fuel, machinery, materials, and other equipment. A total of 4,900 truck trips per annum over a 5-year period inclusive of Phase 1 and Phase 2 of the construction scheduling, which are expected to last 2 and 3 years respectively[38] is predicted, and whilst Project related road traffic during operations is expected to be less than this, an increase from current the baseline levels is still anticipated.

The baseline traffic information was used to estimate the predicted increase in traffic at the access road to the Mine Site where the incremental impact of traffic is expected to be highest.

Information on traffic counts along the Road Transport Route was collected as part of the baseline surveys. Table 6-15 provides the predicted traffic at the intersection of the N40 highway with the mine access road(where the incremental impact of traffic is expected to be highest), adjusted for Passenger Car Units (PCU).

Table 6-15: Estimation of Peak Traffic Increase during LoM

Time Period	Baseline Traffic (PCU adjusted)	Predicted Traffic	% increase
07:00 to 08:00	105	106	0.5%
08:00 to 09:00	137	138	0.4%
09:00 to 10:00	166	167	0.3%
10:00 to 11:00	121	122	0.5%
11:00 to 12:00	119	120	0.5%
12:00 to 13:00	123	124	0.5%
13:00 to 14:00	115	116	0.5%
14:00 to 15:00	180	181	0.3%
15:00 to 16:00	114	115	0.5%
16:00 to 17:00	154	155	0.4%
17:00 to 18:00	173	174	0.3%
18:00 to 19:00	204	205	0.3%
19:00 to 20:00	149	150	0.4%
20:00 to 21:00	107	108	0.5%

[38] Project Description Document, 20240527 BAR7212_Reko_Diq_Project_Description_V01_DC

Time Period	Baseline Traffic (PCU adjusted)	Predicted Traffic	% increase
21:00 to 22:00	89	90	0.6%
22:00 to 23:00	83	84	0.7%
23:00 to 00:00	52	53	1.1%
00:00 to 01:00	47	48	1.2%
01:00 to 02:00	47	48	1.2%
02:00 to 03:00	17	18	3.3%
03:00 to 04:00	20	21	2.8%
04:00 to 05:00	21	22	2.7%
05:00 to 06:00	21	22	2.7%
06:00 to 07:00	65	66	0.9%
Total	2,429	2,442	0.6%

The increased traffic is less than 1% of observed baseline levels in both scenarios and is considered negligible. To ensure that other traffic-related impacts such as traffic incidents and degraded quality of roads do not occur, the Project will ensure that contractors employed will implement a Traffic Management Plan.

Impact 26: Increased Road Traffic due to Project Activity			
Phase: Life of Project			
Impact Description: Increase in traffic volumes due to Project-related transportation resulting in increased congestion, road wear and increased community safety risks.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter -Generational >20 years	Moderate (negative) - 45
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	2	Minor effects on physical environment or on receptors.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	

Impact 26: Increased Road Traffic due to Project Activity			
Nature	-	Negative	
Mitigation/Management Actions			
The Project will implement a Traffic Management Plan which will include provisions for the following: • Provisions for the use of alternative routes. • Timing for HTV movement accounting for rush hour timings (where practicable). • Speed limits. • Training programmes for safe driving practices including vehicle maintenance, drug and alcohol use and managing security risks. • Checklists for vehicle inspection. • Traffic management at the intersection of the N40 intersection (i.e. stop signs, ensuring adequate visibility). The Project has will continue to implement the following: • Verification and competency and licence checks for all RDMC and contractor drivers. • Regular vehicle maintenance and third-party inspections. • Verification of licences of truck drivers who deliver to site.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter -Generational >20 years	Moderate (negative) - 40
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	1	Minor effects on physical environment or on receptors.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	-	Negative	

6.2.1.7. Surface Water

6.2.1.7.1. Impact 27: Increased movement of sediment

It is important to note that sedimentation naturally occurs in this area, however, anthropogenic activities associated with the Project may result in an increased rate of sedimentation of nearby drainage lines.

<table>
<tr><th colspan="4">Impact 27: Increased Movement of Sediment</th></tr>
<tr><th colspan="4">Phase: Life of Project</th></tr>
<tr><td colspan="4"><u>Impact Description</u>: Increased movement of sediment to drainage lines resulting from erosion of disturbed soils during construction and operation of mine.</td></tr>
<tr><td colspan="4">Prior to Mitigation/Management</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter -Generational
>20 years</td><td rowspan="5">Moderate (negative) -40</td></tr>
<tr><td>Extent</td><td>2</td><td>Local: Extending across the site and to nearby settlements. Sub-division of a district.</td></tr>
<tr><td>Intensity</td><td>3</td><td>Moderate, short-term effects but not affecting ecosystem function.</td></tr>
<tr><td>Probability</td><td>4</td><td>Likely: The impact may occur (50-90%)</td></tr>
<tr><td>Nature</td><td>-</td><td>Negative</td></tr>
<tr><td colspan="4">Mitigation/Management Actions</td></tr>
<tr><td colspan="4">• Minimise the disturbance of soils to the footprint when construction and demolition of infrastructure will be taking place.
• Movement of machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance and subsequent erosion.
• Maintain sediment and erosion control measures to minimise entry of sediment into nearby drainage lines.
• Landscape re-profiling to be undertaken to rehabilitate disturbed sites and to allow free drainage that promotes the desired post mining land use after decommissioning.
• Detailed site drainage plans to be developed during detailed design phases.</td></tr>
<tr><td colspan="4">Post-Mitigation</td></tr>
<tr><td>Duration</td><td>5</td><td>Inter -Generational
>20 years</td><td rowspan="3">Minor (negative)
-21</td></tr>
<tr><td>Extent</td><td>1</td><td>Site Specific: Limited to the site and its immediate surroundings.</td></tr>
<tr><td>Intensity</td><td>1</td><td>Minor effects on biological or physical environment.</td></tr>
</table>

Impact 27: Increased Movement of Sediment			
Probability	3	Probable: Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

6.2.1.8. Air Quality

6.2.1.8.1. Impact 28: Impact on Air Quality due to Project Activity

This section describes the impact on air quality during the construction, operation and decommissioning phases of the Project where the impact will become evident during construction and remain continuous throughout the LoM.

The Project construction and decommissioning activities will impact the air quality of the Project Area and surroundings through emissions of gaseous pollutants and particulate matter. However, the scale of these impacts will be relatively small as most of the human receptors are located at larger distances from the Project activities. The pollutants are expected to disperse before reaching these receptors and will result in a very low contribution towards the ambient concentrations. Since no impacts are expected on any receptors, air dispersion modelling was not required to be carried out.

Construction and Operational Activities

Construction and operations at the mine can cause elevated concentrations of particulate matter including PM_{10} and $PM_{2.5}$ and gaseous pollutants including NO_2 and SO_2 from activities such as blasting and drilling, movement of Run-of-Mine (RoM) ore and waste rock from the open-pit, and waste rock dumps, milling and crushing of the RoM ore, vehicular movement on haul roads, explosives detonation, and power generation.

In terms of receptors, human receptors are generally located substantial distances from the RDMS. Therefore, the Humai settlement (located at ~30 km to the east of the western porphyries) and onsite accommodation facility (located at ~8.9 km to the west of the open-pit) have been considered as primary receptors. However, the modelling was also carried out for the operational areas such as Western Porphyries, Explosives Storage Buffer, Tanjeel Open-Pit, and North Waste Rock Dump.

The air dispersion modelling for the mine operations was carried out for the two scenarios, Ultimate Footprint and Year 2050 when the LoM will be completed by 50%. In these scenarios, the actual emission rates estimated during the Project operations depending on the ongoing capacities for the time of scenarios were used to model Project footprint on ambient air quality. The controlled emissions have been taken for areas where dust control measures were found effective and can reduce emissions rates from the sources. The rest of the areas (i.e. waste rock dumps and pit operations) assume uncontrolled emissions. Further details on the effectiveness of emission control measures and the model inputs and set up are provided in Appendix Q.

- Scenario 1 – Ultimate Footprint: This scenario presents the ultimate footprint of the Project upon completion of the LoM and presents maximum emissions from each source. The pollutants modelled in this scenario include PM_{10}, $PM_{2.5}$, NO_2, and SO_2.
- Scenario 2 – Year 2050: This scenario presents Year 2050 or Stage 22 of the TSF at which TSF will reach 50% of its designed capacity. To ensure alignment with actual Project conditions in year 2050, this scenario assumes length of haul roads to be 7.56 km instead of 10 km of its ultimate length and does not include emissions from Tanjeel open-pit or from any of its facilities, except wind erosion at its waste rock dump.[39] Particulate matter (PM_{10} and $PM_{2.5}$) was modelled in this scenario.[40]

A staged approach has been deployed for assessing the Project exceedance from the Interim Target 1 and Guideline limits prescribed in the IFC General EHS Guidelines. This is done to reduce emissions while ensuring resource efficiency of the Project. The number of exceedances per year for the pollutants has been assessed against the applicable host country standards (NEQS/BEQS).

A brief discussion on the outputs of air dispersion modelling is provided below.

- *Humai Settlement*: The Predicted Ambient Concentrations of NO_2 and SO_2 remained within the applicable limits in Scenario 1 (Table 6-16). The Predicted Ambient Concentrations of PM_{10} and $PM_{2.5}$ remained within the applicable limits prescribed in NEQS/BEQS for Ambient Air Quality and IFC General EHS Guidelines for both 24-hours and annual averaging periods Scenario 1 and Scenario 2 (see Table 6-16 and Table 6-17). This receptor is towards the east of the RDMS and receives contributions from the Project activities when the predominant winds blow from the west, which occurs between 1% and 7% of the time in a year (Figure 6-5). During this period when the winds blow from the RDMS towards Humai settlement, the wind speeds range between 4 m/s and 10 m/s. Lower contribution of Project at this receptor can be attributed to its larger distance from the Project boundary which causes particulate to decay before reaching this receptor.
- *Onsite Accommodation Facility*: The Predicted Ambient Concentrations of gaseous pollutants (NO_2 and SO_2) at this location remained within the applicable

39 Operations at Tanjeel are expected to get initiated in year 2037 and conclude in 2046, therefore, contribution from its facilities is not expected to last till year 2050, except from wind erosion.

40 Gaseous pollutants are excluded from this scenario as their emissions rates are expected to remain somewhat similar with limited variation after year 2033 till completion of LOM. Therefore, emissions of gaseous pollutants modelled in Scenario 1 will be somewhat similar in Scenario 2 and do not require additional modelling.

limits for both 24-hours and annual averaging periods in Scenario 1 (see Table 6-16). In terms of PM, the annual averaged Predicted Ambient Concentrations of PM_{10} and $PM_{2.5}$ are expected to remain within the applicable limits prescribed in NEQS for ambient air quality and IFC General EHS Guidelines at this receptor for Scenario 1 and Scenario 2 (see Table 6-16 and Table 6-17). For the Predicted Ambient Concentrations of the 24-hours averaging period, the PM_{10} and $PM_{2.5}$ concentrations exceeded the applicable limits in Scenario 1 and Scenario 2 (see Table 6-16 and Table 6-17). The following conclusions can be drawn for this location regarding the exceedances:

- Scenario 1: Both PM_{10} and $PM_{2.5}$ exceeded the applicable limits prescribed in NEQS and Interim Target-1 for a period of 6 days and 11 days per year in Scenario 1 – Ultimate Footprint, respectively (see Table 6-20).
- Scenario 2: In scenario 2, these exceedances are relatively lower and expected to occur for 4 days per year for PM_{10} and 6 days per year for $PM_{2.5}$ (see Table 6-21).
- The number of exceedances in PM_{10} and $PM_{2.5}$ concentrations at onsite accommodation facility are shown in Figure 6-3 and Figure 6-4, respectively.

- *<u>Contribution of Elevated Baselines at Receptors:</u>* Periods having high wind speeds (>6 m/s) occur for ~47% time of the year. During this period, high PM_{10} and $PM_{2.5}$ concentrations are expected to be experienced at Humai settlement and onsite accommodation facility.
  - PM_{10} baseline concentrations for 24-hours averaging period exceeded the applicable limits prescribed in NEQS for a period of 51 days per year at Humai and onsite accommodation facility (see Table 6-20).
  - $PM_{2.5}$ baseline concentrations for 24-hours averaging period exceeded the applicable limits prescribed in NEQS for a period of 10 days per year at Humai and onsite accommodation facility (see Table 6-20).

  These high concentrations, exceeding the applicable ambient air quality limits, occur due to wind erosion from desert in the upwind direction. These high-speeds winds, blowing from the north and northwest direction can potentially cause elevated concentrations of particulates at the receptors.

- *<u>Operational Areas</u>*: The Predicted Ambient Concentrations of gaseous pollutants and particulate matter in the operational areas of the Project remained within the applicable OHS limits for 8-hour averaging periods (see Table 6-18 and Table 6-19). The maximum Predicted Ambient Concentrations are expected to occur at the western porphyries, Tanjeel open pit, and north waste rock dump.

- *Impacts of Tailing Storage Facility at the Receptors:* The onsite accommodation camp or the operational areas do not experience an exceedance in the particulate matter concentrations due to TSF. This is since the emissions of the TSF occur when the wind speeds exceed 5 m/s (USEPA, 2006). As the high-speed winds over 5 m/s blow from northwest towards southeast for 80% time of the year (see Figure 6-5), the emissions from TSF are expected to emit in the southeast direction and disperse before reaching the nearest human dwelling (Nok Kundi town). Therefore, the impacts of TSF emissions are expected to be minimal in relation to the onsite accommodation camp and the operational areas. Contribution of TSF in concentrations at Humai settlement is expected to be minimum since the particulates tend to decay before reaching at larger distances.

The air dispersion modelling was conducted by considering the final footprints of the open-pit and the TSF as well as when the LoM is 50% completed. The predicted impacts therefore represent the impact of the Project on air quality, which will occur when the 50% and the maximum storage capacity of the TSF are achieved. The emissions are expected to be relatively lower during the initial phases of the Project operations, when the open-pit and TSF will be relatively small and their associated emission rates will be much lower in comparison to those anticipated for peak operations. This will allow the Project to investigate alternative dust reduction options for the TSF based on emerging advancements in the dust reduction technologies. Therefore, the Project is expected to have the opportunity to further reduce the footprint considered in the final footprint scenario.

Detailed descriptions of the methodology, results and contour maps of the Predicted Ambient Concentrations are provided in Appendix Q.

Since the occurrence of PM at the proposed Project location is predominantly associated with natural sources, the Project related mitigation measures will not be able to reduce the naturally occurring emissions. However, during the high wind speeds, the Project will implement adequate mitigation measures, such as mandatory use of respiratory masks, along with continuous monitoring of the gaseous pollutants and PM to ensure that the onsite personnel remain unaffected. The Project will ensure sprinkling at the haul roads along with reduction in vehicle speed when the wind direction will be towards the onsite accommodation camp. These mitigation measures will be implemented to reduce overall Project emissions and reduce the number of exceedances at the accommodation facility. The Project will also install wind breaks in the northwest of the TSF to further reduce its emissions and corresponding exceedances at the onsite accommodation facility and in operational areas.

Table 6-16: Predicted Ambient Concentrations of Gaseous Pollutants (NO_2 and SO_2) and PM (PM_{10} and $PM_{2.5}$) at Sensitive Receptors in Scenario 1 – Ultimate Footprint

Pollutant	Averaging Period	Baseline Concentration	Predicted Incremental Concentration (Maximum)	Predicted Ambient Concentration	Prescribed Limits	
					NEQS/ BEQS	IFC General EHS Guidelines
		µg/m³				
Nitrogen Dioxide (NO_2)						
Onsite Accommodation Facility	1-hour	6.8	78	85	-	200 (Guideline)
	24-hours	6.8	6	12	80	-
	Annual	6.8	1	7	40	40 (Guideline)
Humai Settlement	1-hour	6.8	79	86	-	200 (Guideline)
	24-hours	6.8	5	11	80	-
	Annual	6.8	0.4	7	40	40 (Guideline)
Sulphur Dioxide (SO_2)						
Onsite Accommodation Facility	1-hour	8.6	78	86	-	-
	24-hours	8.6	6	14	120	125 (Interim Target-1) 20 (Guideline)
	Annual	8.6	1	9	80	-
Humai Settlement	1-hour	8.6	81	90	-	-
	24-hours	8.6	5	14	120	125 (Interim Target-1) 20 (Guideline)
	Annual	8.6	0.4	9	80	-
Particulate Matter 10 (PM_{10})						

Onsite Accommodation Facility	24-hours	25	174	199*	150	150 (Interim Target-1) 50 (Guideline)
	Annual	32	16	48	120	70 (Interim Target-1) 20 (Guideline)
Humai Settlement	24-hours	25	23	48	150	150 (Interim Target-1) 50 (Guideline)
	Annual	32	2	34	120	70 (Interim Target-1) 20 (Guideline)
Particulate Matter 2.5 ($PM_{2.5}$)						
Onsite Accommodation Facility	24-hours	10	39	49**	35	75 (Interim Target-1) 25 (Guideline)
	Annual	10	4.7	14.7	15	35 (Interim Target-1) 10 (Guideline)
Humai Settlement	24-hours	10	4	14	35	75 (Interim Target-1) 25 (Guideline)
	Annual	10	1	11	15	35 (Interim Target-1) 10 (Guideline)

Notes: For pollutants which have multiple applicable limits, the stringent of the 3 limits is taken as reference for assessing compliance status.
"-" indicates that limits are not prescribed in the reference standards or guidelines.
The predicted incremental concentration for various averaging periods are the absolute maximum/peak values and are not applicable to every exceedance.
* The exceedance of PM_{10} above limit of 150 µg/m^3 occurs for 6 days per year. Rest of the 359 days of years are expected to remain within this limit.
** The exceedance of $PM_{2.5}$ above limit of 35 µg/m^3 occurs for 11 days per year. Rest of the 354 days of years are expected to remain within this limit.
NEQS = National Environmental Quality Standards
BEQS = Balochistan Environmental Quality Standards

Table 6-17: Predicted Ambient Concentrations of PM at Sensitive Receptors in Scenario 2 – Year 2050

Pollutant	Averaging Period	Baseline Concentration	Predicted Incremental Concentration (Maximum)	Predicted Ambient Concentration	Prescribed Limits	
					NEQS/ BEQS	IFC General EHS Guidelines
		μg/m³				
Particulate Matter 10 (PM_{10})						
Onsite Accommodation Facility	24-hours	25	168	193*	150	150 (Interim Target-1) 50 (Guideline)
	Annual	32	14	47	120	70 (Interim Target-1) 20 (Guideline)
Humai Settlement	24-hours	25	17	42	150	150 (Interim Target-1) 50 (Guideline)
	Annual	32	1	33	120	70 (Interim Target-1) 20 (Guideline)
Particulate Matter 2.5 ($PM_{2.5}$)						
Onsite Accommodation Facility	24-hours	10	32	42**	35	75 (Interim Target-1) 25 (Guideline)
	Annual	10	4	14	15	35 (Interim Target-1) 10 (Guideline)
Humai Settlement	24-hours	11	3	14	35	75 (Interim Target-1)

						25 (Guideline)
	Annual	10	1	11	15	35 (Interim Target-1) 10 (Guideline)

Notes: For pollutants which have multiple applicable limits, the stringent of the 3 limits is taken as reference for assessing compliance status.

"-" indicates that limits are not prescribed in the reference standards or guidelines.

The predicted incremental concentration for various averaging periods are the absolute maximum/peak values and are not applicable to every exceedance.
Only PM10 and PM2.5 concentrations were modelled in Scenario 2.
* The exceedance of PM_{10} above limit of 150 µg/m^3 occurs for 4 days per year. Rest of the 361 days of years are expected to remain within this limit.
** The exceedance of $PM_{2.5}$ above limit of 35 µg/m^3 occurs for 6 days per year. Rest of the 359 days of years are expected to remain within this limit.

Table 6-18: Predicted Ambient Concentrations of Gaseous Pollutants at Maxima Locations in Scenario 1 (Ultimate Footprint) – Operational Areas

Operational Area	Averaging Period	Baseline Concentration	Predicted Incremental Concentration	Predicted Ambient Concentration	OSHA Standards
		µg/m³			
Nitrogen Dioxide (NO_2)					
Western Porphyries	1-hour	6.8	3,616	3,623	9,000
Explosives Storage Buffer	1-hour	6.8	1,071	1,078	9,000
Tanjeel Open-Pit	1-hour	6.8	1,391	1,397	9,000
North Waste Rock Dump	1-hour	6.8	851	858	9,000
Sulphur Dioxide (SO_2)					
Western Porphyries	1-hour	8.6	11,437	11,446	13,000
Explosives Storage Buffer	1-hour	8.6	2,249	2,258	13,000
Tanjeel Open-Pit	1-hour	8.6	389	397	13,000
North Waste Rock Dump	1-hour	8.6	2,324	2,333	13,000

Notes: Limits prescribed in OSHA Standard 1910.1000 for Air Contaminants are for 8-hour averaging period while the Predicted Ambient Concentrations are of 1-hour averaging period. The concentrations are considered as compliant as 8-hour limits are relatively much stringent as compared to 1-hour limits. Therefore, if Predicted 1-hour Ambient Concentration of a pollutant is within limits prescribed for 8-hour averaging period, its 8-hour weighted average will also remain within the 8-hour limits prescribed in OSHA 1910.1000. This approach is taken as reference from the Canadian Air Dispersion Modelling Guideline (Ontario Regulation 419/05: Air Pollution – Local Air Quality).

Table 6-19: Predicted Ambient Concentrations of Respirable Dust at Maxima Locations – Operational Areas

Operational Area	Averaging Period	Baseline Concentration	Predicted Incremental Concentration	Predicted Ambient Concentration	OSHA Standards
		μg/m³			
Scenario 1 – Ultimate Footprint					
Western Porphyries	24-hour	35	2,331	2,366	5,000
Explosives Storage Buffer	24-hour	35	32	67	5,000
Tanjeel Open-Pit	24-hour	35	380	415	5,000
North Waste Rock Dump	24-hour	35	353	388	5,000
Scenario 2 – Year 2050					
Western Porphyries	24-hour	35	1,992	2,027	5,000
Explosives Storage Buffer	24-hour	48	26	74	5,000
Tanjeel Open-Pit	24-hour	41	76	117	5,000
North Waste Rock Dump	24-hour	35	318	353	5,000

Notes: The model was simulated for NO_2, SO_2, PM_{10} and $PM_{2.5}$. As the OSHA Standard does not segregate the respirable dust into PM_{10} and $PM_{2.5}$, the respirable is taken as the sum of PM_{10} and $PM_{2.5}$.

The AERMOD does not allow modelling of $PM_{2.5}$ for averaging periods of less than 24-hours. Therefore, the compliance for respirable dust is assessed through comparison of Predicted 24-hours Ambient Concentrations with 8-hour limits prescribed in OSHA Standard. In case where the Predicted 24-hours Ambient Concentration is less than 73% of the prescribed limit, a compliant status is assigned. If the exceedance is more than 73% of the prescribed limit, the Predicted 24-hours Ambient Concentration is taken as non-compliant. This approach is taken as reference from the Canadian Air Dispersion Modelling Guideline (Ontario Regulation 419/05: Air Pollution – Local Air Quality).

Table 6-20: Number of Days Exceeded per Year for PM_{10} and $PM_{2.5}$ at Sensitive Receptors in Scenario 1 – Ultimate Footprint

Receptor	Averaging Period	Applicable Limits (µg/m³)	Reference Standard/Guideline	No. of Exceedances per Year in Baseline	No. of Exceedances per Year due to Project	No. of Total Exceedances per Year*	Permitted Exceedances per Year
Particulate Matter (PM_{10})							
Onsite Accommodation Facility	24-hours	150	NEQS/IFC Interim Target 1	51	6	57	-
	24-hours	50	IFC Guideline Limit	84	46	130	35
Humai Settlement	24-hours	150	NEQS/IFC Interim Target 1	51	0	51	-
	24-hours	50	IFC Guideline Limit	84	0	84	35
Particulate Matter ($PM_{2.5}$)							
Onsite Accommodation Facility	24-hours	75	IFC Interim Target 1	0	0	0	-
	24-hours	35	NEQS	10	11	21	-
	24-hours	25	IFC Guideline Limit	28	21	49	-
Humai Settlement	24-hours	75	IFC Interim Target 1	0	0	0	-
	24-hours	35	NEQS	10	0	10	-
	24-hours	25	IFC Guideline Limit	28	0	28	-

Notes:

'-' in the permitted exceedances per year indicates that yearly permitted exceedances are not prescribed in the European Commission Air Quality Standards.

*Number of total exceedances is sum of number of exceedances per year in baseline and number of exceedances per year due to Project.

Table 6-21: Number of Days Exceeded per Year for PM_{10} and $PM_{2.5}$ at Sensitive Receptors in Scenario 2 – Year 2050

Receptor	Averaging Period	Applicable Limits (µg/m³)	Reference Standard/Guideline	No. of Exceedances per Year in Baseline	No. of Exceedances per Year due to Project	No. of Total Exceedances per Year*	Permitted Exceedances per Year
Particulate Matter (PM_{10})							
	24-hours	150	NEQS/IFC Interim Target 1	51	4	55	-

Onsite Accommodation Facility	24-hours	50	IFC Guideline Limit	84	41	125	35
Humai Settlement	24-hours	150	NEQS/IFC Interim Target 1	51	0	51	-
	24-hours	50	IFC Guideline Limit	84	0	84	35
Particulate Matter ($PM_{2.5}$)							
Onsite Accommodation Facility	24-hours	75	IFC Interim Target 1	0	0	0	-
	24-hours	35	NEQS	10	6	16	-
	24-hours	25	IFC Guideline Limit	28	17	45	-
Humai Settlement	24-hours	75	IFC Interim Target 1	0	0	0	-
	24-hours	35	NEQS	10	0	10	-
	24-hours	25	IFC Guideline Limit	28	0	28	-

Notes:

'-' in the permitted exceedances per year indicates that yearly permitted exceedances are not prescribed in the European Commission Air Quality Standards.

*Number of total exceedances is sum of number of exceedances per year in baseline and number of exceedances per year due to Project.

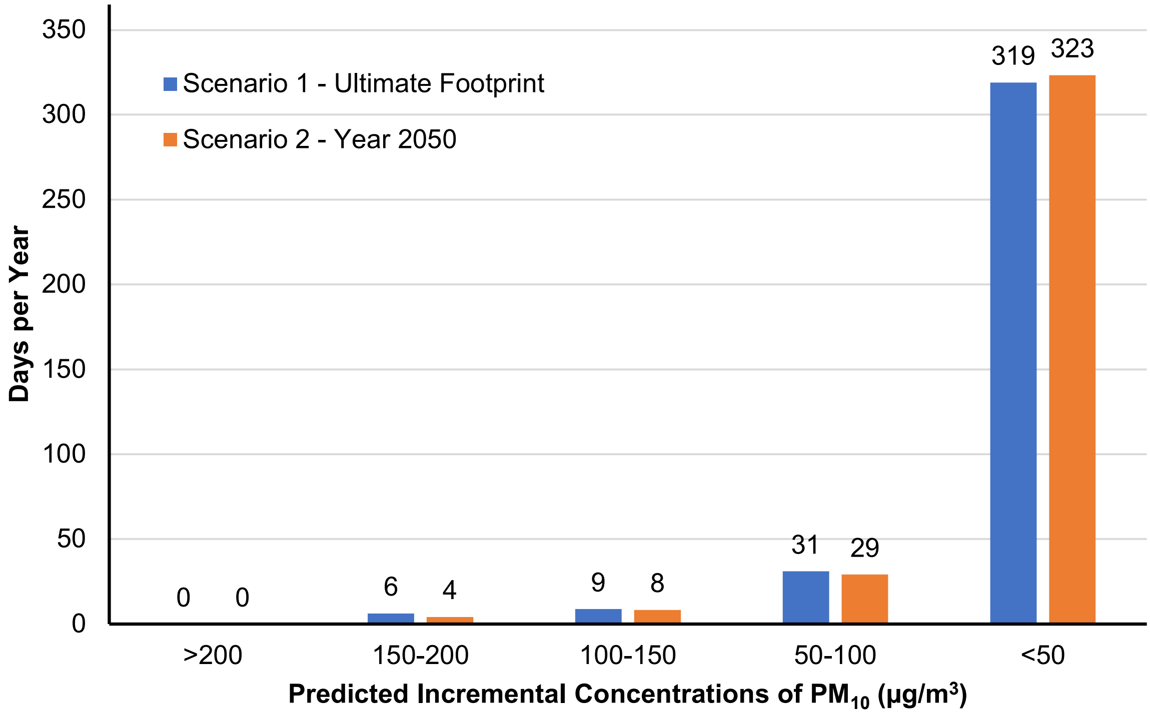


Figure 6-3: Number of Exceedances per Year of PM_{10} at Onsite Accommodation Facility – Project Contribution

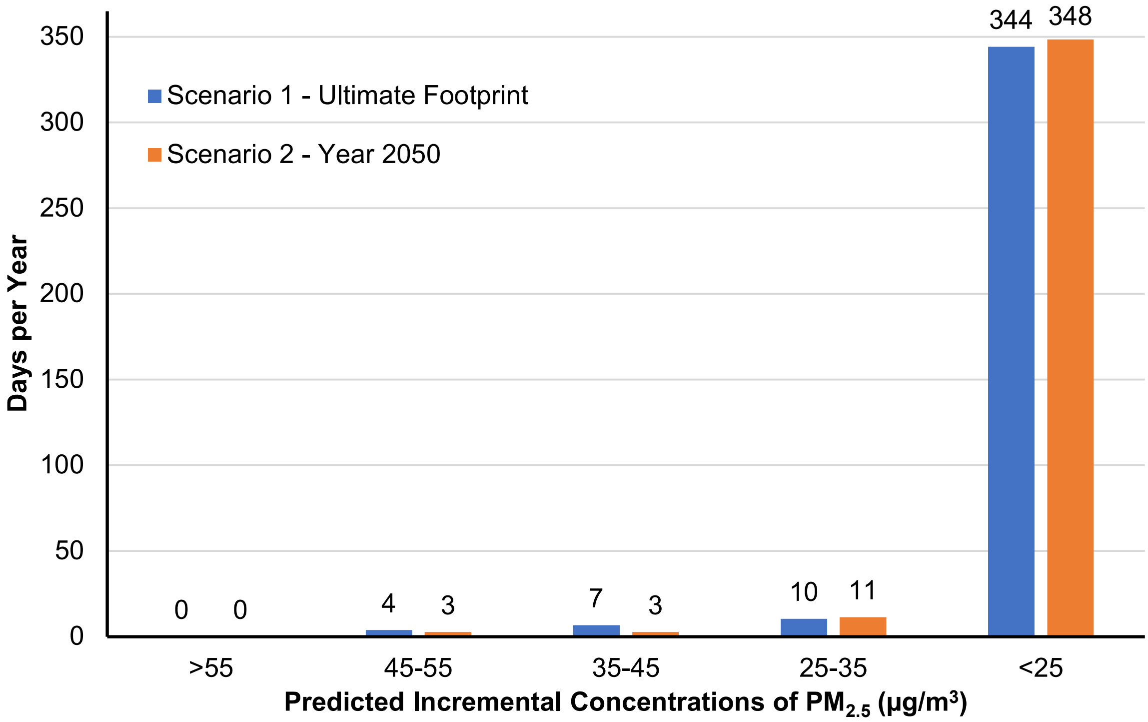


Figure 6-4: Number of Exceedances per Year of $PM_{2.5}$ at Onsite Accommodation Facility – Project Contribution

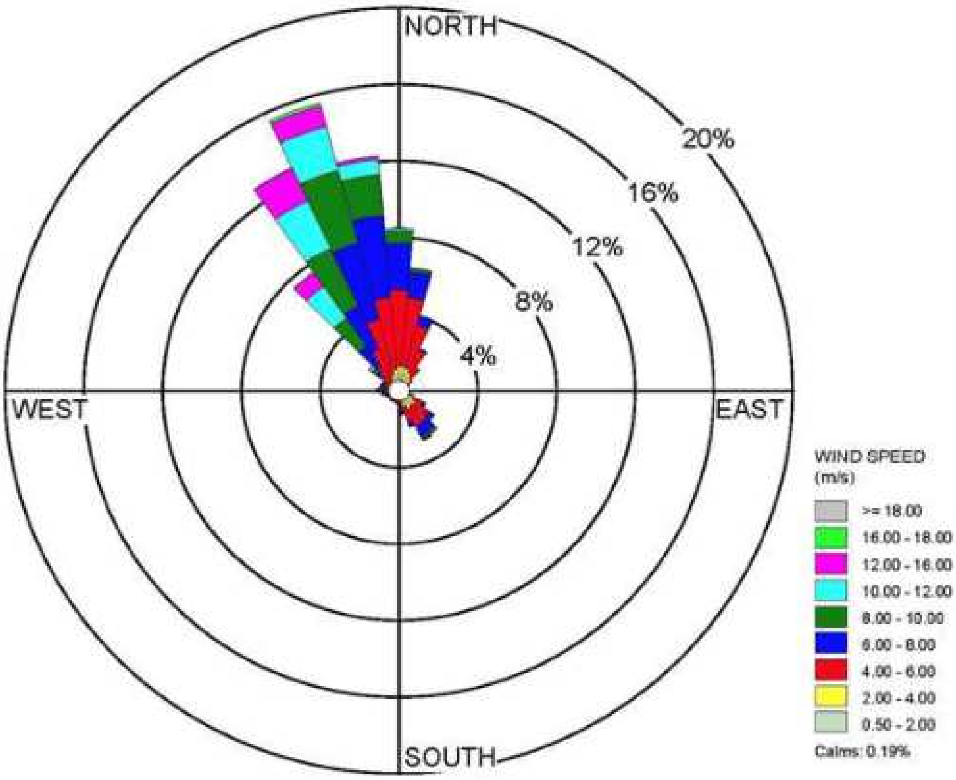


Figure 6-5: Wind Rose of the Mine Site

The sulphur content of the available HFO fuel in Pakistan is up to 3.5%, but is typically 2-3%. As a result, sulphur dioxide emissions at the point of discharge at the power station are anticipated to exceed the World Bank EHS Guidelines for Thermal Power Plants. An exceedance of the guidelines limits for particulate matter at the point of discharge is also predicted. Despite this, modelling suggests no exceedance of any environmental air quality standards for sulphur dioxide at any of the receptors given the distance to receptors and the level of dispersion following discharge. Maximum possible discharge emissions are provided in Table 6-22.

Table 6-22: Maximum Possible Power Station Emissions at Point of Discharge

Parameter	Performance Guarantee [mg/Nm^3]	IFC Emissions Limit [mg/Nm^3]
Particulate Matter (PM)	125	50
Sulphur Dioxide (SO_2)	2,100 (at 3.5% sulphur content)	585 (at 3.5% sulphur content)
Nitrogen Oxides (NO_x)	1,850	740

Note: World Bank EHS Guidelines for Thermal Power Plants (IFC Emissions Limit for Liquid Fuels ≥300 MWth).

A number of emissions control technologies have been considered in relation to the power station emissions, these however will not be included at this stage for the reasons outlined below:

- **Flue Gas Desulphurization (FGD):** Captures SO_2 emission by scrubbing the exhaust gas with a limestone slurry.
    - Very high consumption of clean water (~1 m^3/MWh or 220 m^3/hr). Actual water consumption would be higher than this due to the need for desalinated water, however brine from desalination could be directed into the process plant.
    - Capital cost of approximately US$100M, plus additional capex for water desalination unit.
    - Long delivery and construction time: minimum of two years.
    - Operational considerations:
        - Reagent consumption (limestone/$CaCO_3$): 22.5 kg/MWh or 4200 kg/h.
        - Increased electrical power requirement: 1.5% of plant output (3 MW), plus increased power associated with water desalination.
        - Impacts to operational costs including increased fuel demand and cost of reagents.
        - Reduces exhaust temperature to approximately 60 °C causing worse plume dispersion in close proximity to plant.
        - Unavailability of 1.5% Sulphur HFO in Pakistan: The required volumes of 1.5% Sulphur HFO are not available in the Pakistan market. Dependence on imported fuel would create significant supply chain challenges, jeopardizing the reliability of power generation.
        - Supply Chain Risks and Energy Security: Relying on imports for 1.5% Sulphur HFO introduces risks of delays, fluctuating global supply conditions, and geopolitical instability, all of which could disrupt fuel availability and compromise the consistency of power generation.
        - Higher Cost of Imported 1.5% Sulphur HFO: The cost of importing 1.5% Sulphur HFO is higher due to international pricing, shipping, and associated logistics.
        - Established Local Supply Chain for 3.5% Sulphur HFO: The local market in Pakistan has a well-established supply chain for 3.5% Sulphur HFO, ensuring consistent and cost effective availability without reliance on imports.
        - Alignment with Local Regulations: Pakistan's environmental regulations and standards currently allow the use of 3.5% Sulphur HFO for power generation.

- **Electrostatic precipitator (ESP):** Filter less device that captures fine particles from a flowing gas using the force of an induced electrostatic charge.
  - Capital cost of approximately US$42M.
  - Long delivery and construction time: minimum of two years.
  - Operational considerations:
    - Increased electrical power requirement: ~1,200 kW.
    - Moderate abatement efficiency. Cannot achieve low PM levels.
- **Selective catalytic reduction (SCR):** Converts NO_X emissions into N_2 and water using a catalyst and a reagent (urea or ammonia).
  - Capital cost of approximately US$15.5M.
  - Operational considerations:
    - High operational costs associated with reagent costs.
    - Reduced plant efficiency of 1-2%.
    - Safety risks associated with reagent transport, handling and storage.

The baseline measurements indicate that the ambient levels of critical heavy metals such as arsenic, manganese, nickel, cadmium and lead are significantly lower than the established guideline limits. Analysis of the tailings samples provides the metal content of tailings on a mass basis:

- Arsenic (As) <1.5 mg/kg;
- Cadmium (Cd) 2 mg/kg;
- Manganese (Mn) 187 mg/kg;
- Nickel (Ni) 23 mg/kg; and
- Lead (Pb) 35 mg/kg.

As shown in Table 6-23, these levels are not sufficiently high to elevate heavy metals levels above the guideline limits at the receptor locations. The exception to this is the cadmium, as baseline levels are already above the guideline limits.

Table 6-23: Predicted increase in metal levels (ng/m^3) for the base case scenario

	As	Cd	Mn	Ni	Pb
Guideline Limit (ng/m^3)	6	5	150	20	1,000
Tailings content (mg/kg)	1.5	2	187	23	35
Baseline Level – Metals (ng/m^3)					
Mine Village	Not measured				

Exploration camp	1.6	<3.0	81.4	8.5	8.8
Weather station	1.4	<3.0	75.5	9.2	11.8
Predicted increase in Metal Levels (ng/m^3)					
Mine village	0.00	0.00	0.09	0.01	0.02
Exploration camp	0.00	0.00	0.07	0.01	0.01
Siah Reg	0.00	0.00	0.07	0.01	0.01
Total Metals (Baseline + Incremental) (ng/m^3)					
Mine village	1.4	<3.0	75.6	9.2	11.8
Exploration camp	1.6	<3.0	81.5	8.5	8.8
Siah Reg	1.6	<3.0	81.5	8.5	8.8

Decommissioning

The sources of air emissions during the decommissioning phase include contouring the waste rock dumps, demolition of permanent and temporary structures, making the open-pit safe and closure of the TSF, disposal of the debris, and rehabilitating wind erosion on exposed surfaces and stockpiles. Other activities which can cause degraded air quality include the consumption of liquid fossil fuels in the decommissioning equipment, and other vehicles.

Impact 28: Impacts on air quality due to Project activity.			
Phase: Life of Project			
Impact Description: Increase in the concentration of PM due to mine development including the construction, mining and decommissioning activities.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Major (negative) -60
Extent	2	Local Extending across the site and to nearby settlements.	
Intensity	5	Significant impact on the environment.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	
Mitigation/Management Actions			

• Installation of dust control measures to reduce dust emissions from the mining equipment including hoppers, conveyors and other equipment. • Progressive closure of the cleaner cells of the TSF to prevent dust generation and release of other pollutants from the impoundment. • Installation of windrows along haul and other roads, and at other traffic locations such as laydown yards to minimise wind erosion. • Setting of speed limits along all site roads. • Regular maintenance of vehicles as per manufacturers specifications to ensure that the exhaust emissions do not exceed the prescribed limits. • Use of respiratory masks and other appropriate PPE – and ensure PPE is readily available. • Continual monitoring of air quality at the camp. • Install and regularly clean/maintain filtration on air-conditioning units at accommodation and other buildings. • Maintain window and door seals in accommodation rooms. • Investigate options for reduction in haulage speed to reduce haul road emissions. • Gravel the top surface of haul roads for reduction in emissions during haulage. • Consider installation of wind breaks in the northwest of TSF for further reduction in particulate emissions.

Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Moderate (negative) -40
Extent	1	Site-specific	
Intensity	2	Moderate short-term effects but not affecting ecosystem function.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	

As there are currently no human receptors within 500 m of the decommissioning area, the interpretation of the degraded air quality in terms of visible dust by the human receptors is unlikely. This will have to be reassessed at the time of closure.

The Project will ensure that the particulate emissions are significantly reduced through implementation of mitigation measures to ensure that the ambient air quality of the area remains within the limits prescribed in NEQS/BEQS.

6.2.1.9. Visual

6.2.1.9.1. Impact 29: Visual nuisance due to mining and project facilities

Impacts on visual amenity due to the mine pit itself have been screened out as there is little to no likelihood of additional settlements developing near the Mine Site pit in the future. No impacts are expected along the road route and railway corridor as no significant expansion or upgrading of these networks is expected, and the baseline visual amenity near these areas are already degraded due to unplanned urban expansion along these networks.

The RDMS will result in a permanent alteration of the landscape, and subsequent impact on visual amenity. Viewshed modelling was carried out based on LiDAR coverage and supplemented with the AW3D30 dataset. Figure 6-6 provides the viewshed modelling results for daytime which shows the RDMS will only be visible from the Humai settlement (primarily a portion of the TSF will be visible at some point during the LoM).

Figure 6-7 presents the areas where light will be visible from the site during nighttime before any emitted light is blocked by waste dumps or the TSF, Figure 6-8 presents the visible light from the Project at the final LoM footprint; a 30 m vertical offset was used to account for the halo effect. Based on the modelling, light from the Project will not be visible by any of the communities in the area at any stage of the project.

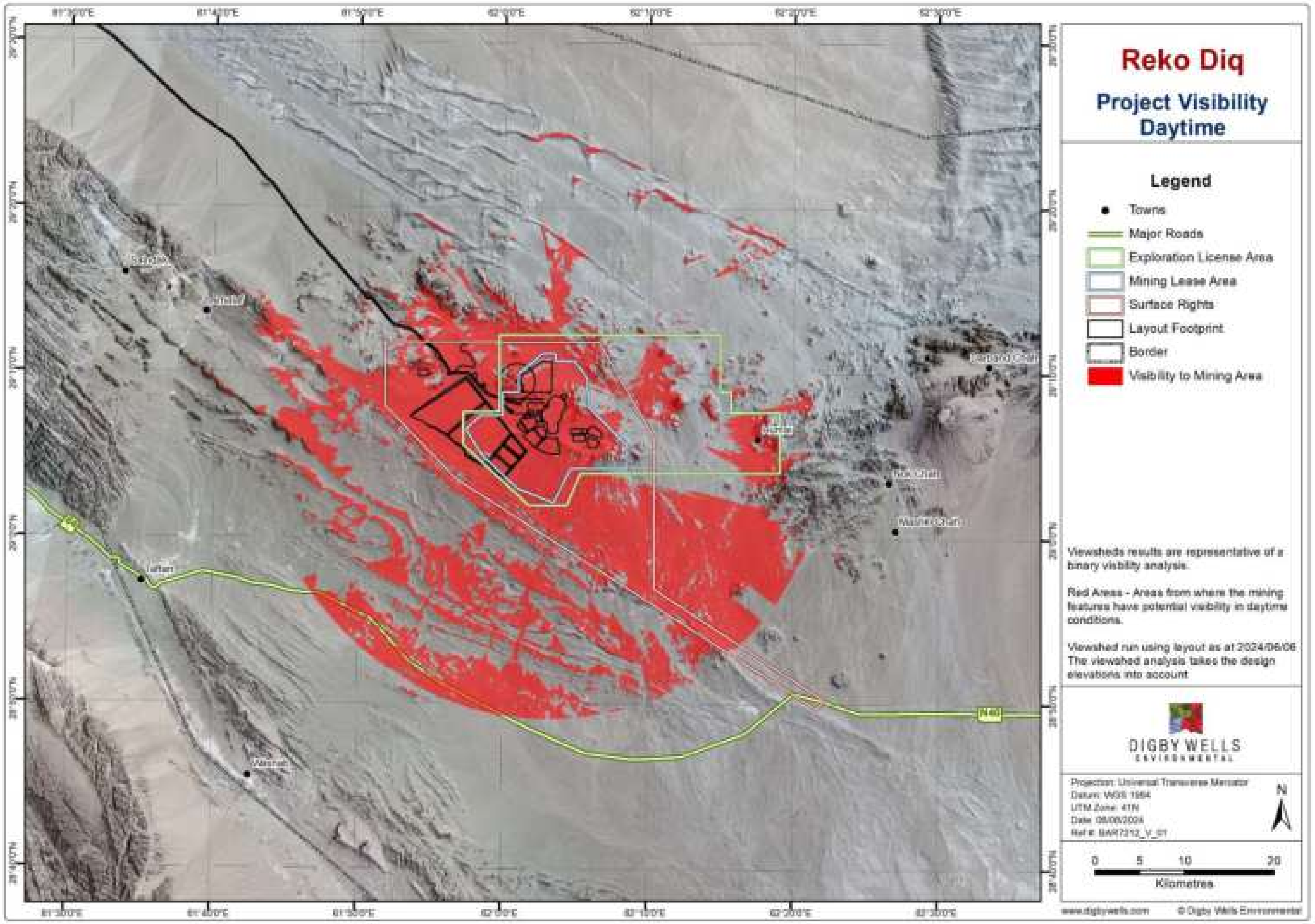


Figure 6-6: Results of Daytime Viso Modelling for RDMS

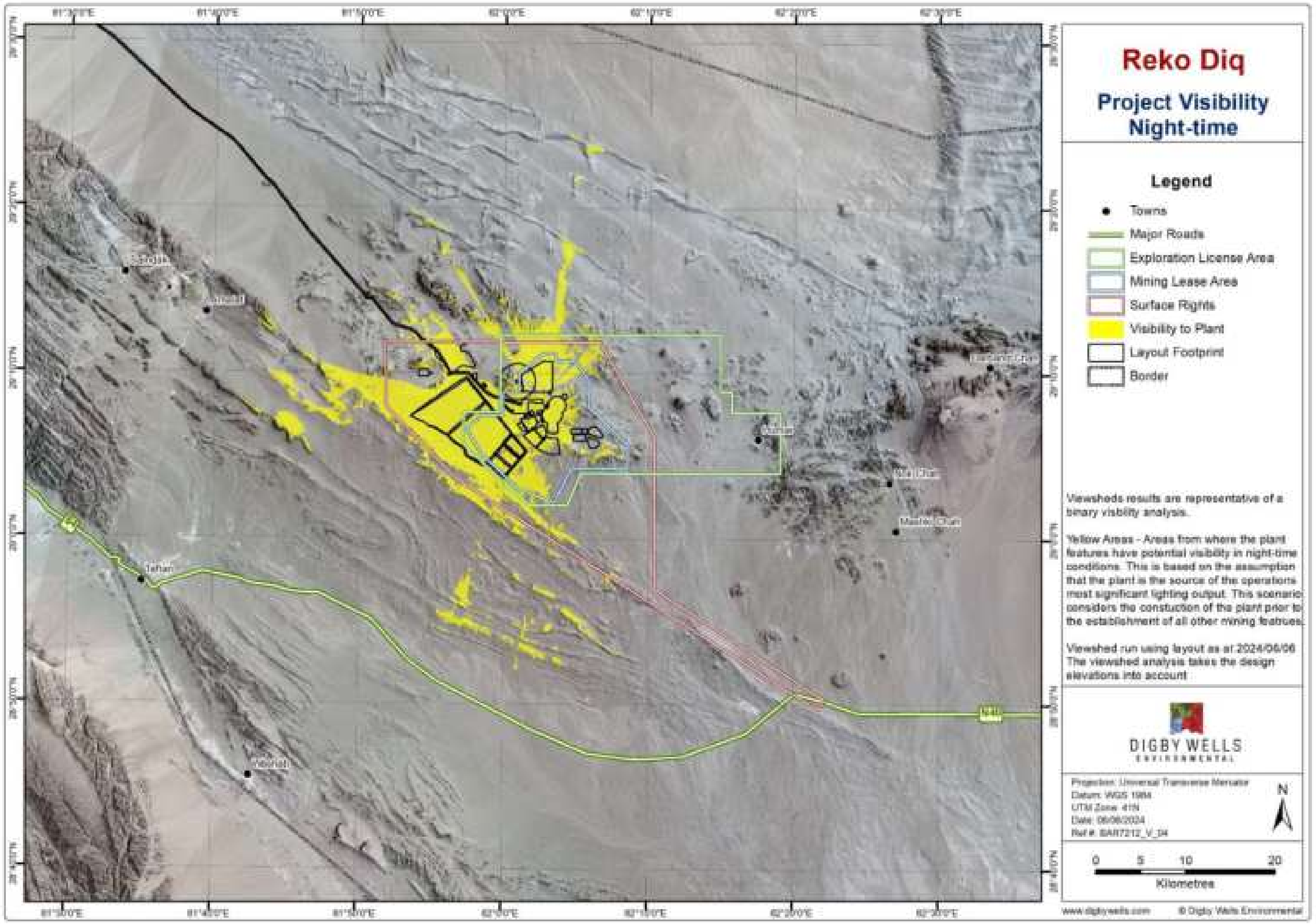


Figure 6-7: Results of Nighttime Viso Modelling for RDMS – Plant Only

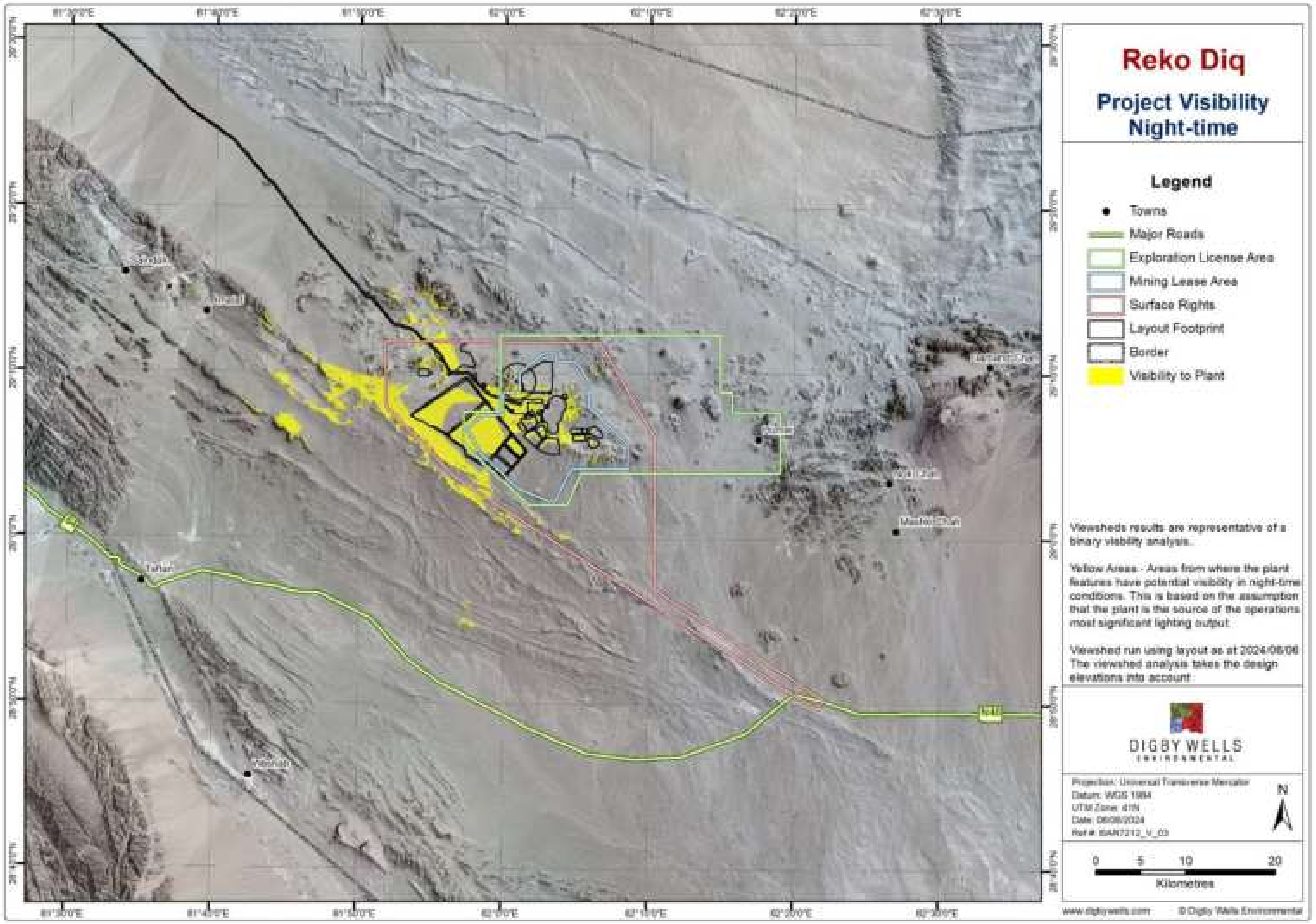


Figure 6-8: Results of Nighttime Viso Modelling for RDMS – Final Footprint

No internationally valued landscapes such as World Heritage sites or nationally valued landscapes such as game reserves or national parks are present near the mine area either.

Table 6-24 provides an assessment checklist that evaluates whether the landscape around the site can be considered as valued landscape.

Table 6-24: Assessment Checklist for Determination of Valued Landscapes

Aspect	Description	Significance
Landscape Quality	A measure of the physical state of the landscape. It may include the extent to which typical character is represented in the individual areas, the intactness of the landscape and the condition of individual elements.	The development of mines and access roads is not considered detrimental to the landscape quality by the local communities. These developments are instead associated with economic uplift and potential for poverty alleviation.
Scenic Quality	The term is used to describe landscapes that appeal primarily to the senses (primarily but not wholly the visual sense).	Landscape is not associated with scenic significance or is associated with recreation.
Rarity	The presence of rare elements or features in the landscape or the presence of a rare Landscape Character Type.	Landscape is not considered rare.
Conservation Interests	The presence of features of wildlife, earth science or archaeological or historical and cultural interest can add to the value of the landscape as well as having value in their own right.	The desert landscape in itself is not considered to be of conservational interest.
Recreational Value	Evidence that the landscape is valued for recreational activity where experience of the landscape is important.	The landscape is not considered to be of significant recreational value.
Perceptual Aspects	A landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity.	No strongly associated perceptions were observed in the stakeholder consultations.
Associations	Some landscapes are associated with particular people, such as artists or writers, or events in history that contribute to perceptions of the natural beauty of the area.	No notable cultural associations were identified in the stakeholder consultations.

Using the assessment checklist, the landscape is not classified as a valued landscape based on information and perspectives observed during the socio-economic consultations. The Project will however attempt to rehabilitate the landscape to the extent feasible.

Impact 29: Visual nuisance due to mining and project facilities.			
Phase: Construction and Operations			
Impact Description: Impact on visual amenity due to mining activities and Project facilities.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years The impact on visual amenity due to permanent facilities will persist throughout the life of the Project	Moderate (negative) -40
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	1	Minor effects on the biological or physical environment. No nearby receptors or significant value associated with landscape.	
Probability	5	Certain/ Definite There are sound evidence-based reasons to expect that the impact will occur (90-100%)	
Nature	Negative	-	
Mitigation/Management Actions			
• The Project will investigate options for rehabilitation to match the landscape to the extent possible. • The Project will investigate any perceptual concerns as part of its ongoing stakeholder consultation process. • The Project will investigate options for limiting lighting impacts to within the mine site that conform to operational illumination requirements.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years. The visual impact will remain for the full Life of Project.	Minor (negative) -35
Extent	1	Site Specific Limited to the site and its immediate surroundings. The mitigation measures will ensure that impacts remain localised to areas near the Mine Site and do not extend to receptors such as local communities.	
Intensity	1	Minor effects on the biological or physical environment. Environmental damage can be	

Impact 29: Visual nuisance due to mining and project facilities.			
		rehabilitated internally with/ without the help of external consultants	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will occur (90-100%)	
Nature	Negative	-	

6.2.2. Construction Phase Impacts

6.2.2.1. Socio-economic

6.2.2.1.1. Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase

The Project's construction activities will bring significant benefits to the local community. By engaging local individuals and businesses, the Project aims to create employment opportunities and foster ongoing partnerships with nearby enterprises.

Employment opportunities created during the construction phase will provide increased income sources and foster a sense of inclusion and participation in the Project's development. Additionally, local businesses are predicted to benefit from contracts and partnerships with RDMC. The Project operations phase however will not require the same amount of manpower as the construction phase and as a result some people may lose jobs once construction is completed.

The Project will retain as many local employees as possible as the Project transitions from construction to operation. Importantly, the Project will develop training plans to ensure skills obtained during Project construction are formalised to give employees no longer required by the Project the best chance for finding employment elsewhere. The Project will also develop a Retrenchment Plan to ensure that the impacts are minimised.

Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase			
Phase: Construction			
Impact Description: Loss of livelihood due to retrenchment upon the conclusion of the construction phase.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	2	Short term Up to 2 years	Minor (negative) -28
Extent	2	Local *The labour hired during the construction phase will*	

Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase			
		primarily be from the Mine Site and its surrounding areas	
Intensity	3	Moderate impacts including on-going social issues. *Retrenchment will have a significant impact on those employed by the Project if their jobs are lost.*	
Probability	4	Likely *Retrenchment of a large contingent of the construction labour force will occur upon conclusion of the construction phase*.	
Nature	Negative	-	
Mitigation/Management Actions			
• Develop a training plan to assist in the transitioning of employees from construction to operations phases of the Project. • Develop and implement a retrenchment plan well in advance of the completion of construction and ensure employees are kept informed. • Develop and implement local employment and procurement strategies. • Develop local employment and retention targets for Contractors. • Clearly define and publicise recruitment policies. • Include promotion of local, female and youth employment within employment policy. • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training to assist in seeking alternative employment once construction is complete. • Implement a structured stakeholder engagement process and GRM, as well as direct communication channels to surrounding communities.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	2	Short term Up to 2 years	Negligible (negative) -14
Extent	2	Local *The labour hired during the construction phase will primarily be from the Mine Site and its surrounding areas.*	
Intensity	3	Moderate impacts including on-going social issues. *Retrenchment will have a significant impact on those employed by the Project if their jobs are lost.*	
Probability	2	Unlikely	

Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase			
		Retrenchment can occur upon conclusion of the construction phase, however; the probability will be reduced due to the suggested mitigation measures as the workforce will have additional skills and experience to make them more employable as they move on.	
Nature	Negative	-	

6.2.2.2. Soils and Sediments

6.2.2.2.1. Impact 31: Disturbance of Soil due to Construction of Water Supply Pipeline

The pipeline construction will impact soils and may further erosion, compaction, and loss of structure, which reduces soil fertility and water infiltration. Construction activities can alter natural drainage patterns, leading to flooding or waterlogging, and disturb habitats, harming local flora and fauna.

According to the land-use map provided in Figure 6-9, where excavation activities are expected to occur, there is minimal vegetation, and the land is not of economic value to local communities. The pipeline will not cross or disturb any water courses, springs, or surface water bodies and only scattered vegetation of minimal ecological diversity exists along the planned pipeline route.

Erosion related risks as a result of modification of topography are minimal as excavation is minimal with backfill to occur immediately following installation of the pipeline.

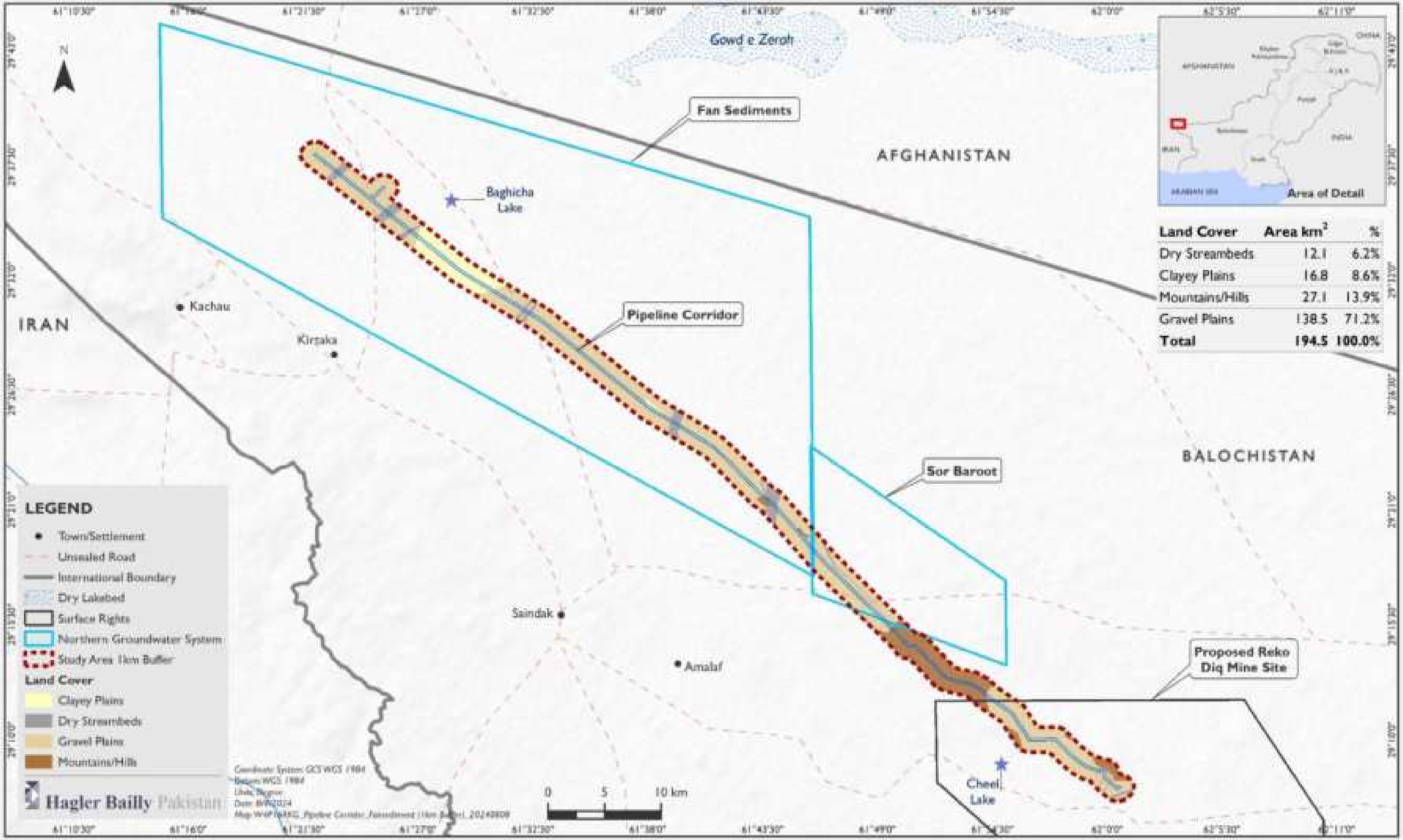


Figure 6-9: Land Use 1 km around the Planned Water Supply Pipeline

<table>
<tr><th colspan="4">Impact 31: Disturbance of Soil due to Construction of Water Supply Pipeline.</th></tr>
<tr><th colspan="4">Phase: Construction</th></tr>
<tr><td colspan="4"><u>Impact Description</u>: Disturbance of soil due to construction and excavation of the water supply pipeline from Northern Groundwater System Area to Mine Site.</td></tr>
<tr><td colspan="4">Prior to Mitigation/Management</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>3</td><td>Medium term
2 to 5 years</td><td rowspan="5">Negligible (negative) -15</td></tr>
<tr><td>Extent</td><td>1</td><td>Site Specific
Limited to the site and its immediate surroundings.</td></tr>
<tr><td>Intensity</td><td>1</td><td>Minor effects on biological or physical environment.</td></tr>
<tr><td>Probability</td><td>3</td><td>Probable
Has occurred here or elsewhere and could therefore occur (20-50%).</td></tr>
<tr><td>Nature</td><td>Negative</td><td>-</td></tr>
<tr><td colspan="4">Mitigation/Management Actions</td></tr>
<tr><td colspan="4">

Plan construction activities to minimise the area of soil disturbance.
The Project has implemented a Ground Disturbance Procedure which includes:

A ground disturbance approval process to ensure environmental or social aspects are identified and addressed before the disturbance occurs (i.e. community engagement, pre-disturbance surveys for flora, fauna or heritage sites, runoff management etc.);
Identification of post disturbance actions such as rehabilitation measures if necessary.
Pre and post disturbance registration of the disturbance type and area.
Closeout inspections and signoff.

</td></tr>
<tr><td colspan="4">Post-Mitigation</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Interpretation of Rating</td><td>Significance</td></tr>
<tr><td>Duration</td><td>3</td><td>Medium term
2 to 5 years</td><td rowspan="4">Negligible (negative) -5</td></tr>
<tr><td>Extent</td><td>1</td><td>Site Specific
Limited to the site and its immediate surroundings.</td></tr>
<tr><td>Intensity</td><td>1</td><td>Minor effects on biological or physical environment.</td></tr>
<tr><td>Probability</td><td>1</td><td>Rare / improbable
Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design,</td></tr>
</table>

Impact 31: Disturbance of Soil due to Construction of Water Supply Pipeline.			
		historic experience or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.2.3. *Surface Water*

6.2.2.3.1. *Impact 32: Alteration of Flow Path Patterns Resulting in Increased Erosion*

Site clearance and excavation for infrastructure construction and pipeline installation will disturb soils and alter the natural topography and drainage patterns within the project area, as well as likely increase the likelihood of erosion.

Impact 32: Alternation of Flow Path Patterns Resulting in Increased Erosion			
Activity and Interaction: Vegetation clearance, topsoil removal, excavation and land preparation for construction of infrastructure.			
Impact Description: Alteration of flow path patterns and channel geometry leading to increased erosion.			
Prior to Mitigation/Management			
Dimension	Rating	Motivation	Significance
Duration	3	Medium term: 2 to 5 years	Minor (negative) - 21
Extent	2	Local: Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	2	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	
Probability	3	Probable: Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	
Mitigation/Management Actions			
• Minimise the footprint of disturbance, as far as practicable. Demarcate the proposed areas for land clearance and earthworks to minimise the unnecessary expansion of the footprint of disturbance. • Provide suitable sanitary facilities and remove waste to an appropriate waste facility. • Clearing of vegetation and excavations must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones. • Disturbed areas remaining after construction activities should be rehabilitated in a timely manner as much as practically possible.			

Impact 32: Alternation of Flow Path Patterns Resulting in Increased Erosion			
• Due to the dry nature of the Project area monitoring of Total Suspended Solids (TSS), TDS and turbidity in surface water resources in close proximity to the project site may not be practically possible. However, when conditions permit such monitoring is recommended upstream and downstream of construction areas to facilitate the prompt implementation of remedial actions, if necessary. • Detailed site drainage plans will be developed during the detailed design phase.			
Post-Mitigation			
Duration	2	Short term: Up to 2 years.	Negligible (negative) -8
Extent	1	Site Specific: Limited to the site and its immediate surroundings.	
Intensity	1	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	
Probability	2	Unlikely: Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	

6.2.2.4. Biodiversity (Flora and Fauna)

6.2.2.4.1. Impact 33: Terrestrial habitat loss due to temporary infrastructure

Construction of the temporary infrastructure such as borrow pits will result in the complete loss of habitat which will lead to the loss of plants and displacement of animals in the area, with permanent modification of land within the Project footprint. Habitat within the footprint will be lost due to Project activities which will lead to the loss of plants and displacement of animals in the area, with permanent modification of mostly Natural land within the Project footprint. As with the previous impact, the intensity will be **serious**, however the extent of this infrastructure is less and therefore is expected to have **local** impacts only. The probability of the loss of habitat is **definite** as all vegetation will be removed and project facilities constructed in their place. Rehabilitation of this infrastructure will take place sooner and as such it is rated as **medium term**.

Even with mitigation measures in place, the impact is still **definite** and the duration still **medium term** as the land is being cleared and will remain as such for the duration of the usage of the infrastructure and for a period of years after rehabilitation has taken place. The extent of the impact will remain **local** as the footprint area will not be reduced. However, the intensity of the impact can be reduced to **moderate (high)** through recommended mitigation measures.

Impact 33: Terrestrial habitat loss due to temporary infrastructure			
Phase: Construction			
Impact Description: Terrestrial habitat loss due to temporary infrastructure.			
Prior to Mitigation/Management			
Duration	3	Medium term 2 to 5 years	Moderate (negative) -45
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	
Mitigation/Management Actions			

Construction:

- A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area.
- Project footprint will be minimised, and work sites and other areas will be delineated and restricted.
- Disturbance to, or movement of, soil and vegetation will be minimised.
- Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible.
- Implement measures such as fencing and signage to prevent unauthorised access and disturbance to wildlife.
- Implement a 'find and relocate' procedure prior to clearing areas.
- Use directional and shielded lighting if works are implemented at night to minimise light spill into surrounding areas. Implement motion-activated lighting to reduce unnecessary illumination.
- Encourage drivers and local communities to report wildlife sightings or collisions, enabling timely management responses.

Operation:

- Utilise designated routes for the movement of vehicles and machinery.
- Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading.

- Solid and liquid wastes will only be disposed of at designated sites, and a WMP will be developed and implemented. - Implement adaptive management strategies based on findings from the management programs. - Education and awareness of staff, contractors and communities. <u>Closure and Rehabilitation</u> Rehabilitation of disturbed areas as soon as possible, with native species.			
Post-Mitigation			
Duration	3	Medium term 2 to 5 years	Minor (negative) -35
Extent	1	Site-specific Extending across the site, but planned proposed footprint of permanent infrastructure.	
Intensity	3	Moderate (high), short-term effects but not affecting ecosystem function.	
Probability	5	Certain / Definite There are sound evidence-based reasons to expect that the impact will definitely occur (90-100%)	
Nature	Negative	-	

6.2.2.4.2. Impact 34: Impacts to flora and fauna during the upgrade of the Transport Route

Upgrades to the Transport Route and Port Qasim will only result in negligible impacts, as the area impacted is predominantly in areas where there is existing infrastructure and will remain **site- specific**. Impacts will include edge effects from increased activities in these areas such as people and vehicles moving in the area, increased dust, noise potential pollution from hydrocarbon leaks from vehicles and potential collisions with fauna with the increased construction activities. The intensity is **moderate (high)** as there are portions of the Transport Route that pass-through CH (Figure 6-10) and activity may result in the death, altered behaviour of fauna and loss of flora species. The impacts are **probable** as edge effects are common with construction activities, however with mitigation measures, spills, leaks and collisions can be lessened, reducing the probability to **unlikely**. The intensity is reduced to **moderate (low)** by mitigating impacts from noise and light pollution through the recommended mitigation measures.

Impact 34: Impacts to Flora and Fauna during the upgrade of the Transport Route.
Phase: Construction
<u>Impact Description:</u> Impacts to flora and fauna during the upgrade of the Transport Route.
Prior to Mitigation/Management

Duration	2	Short term Up to 2 years	Negligible (negative) - 18
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	3	Moderate (high), short-term effects but not affecting ecosystem function.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	

Mitigation/Management Actions

Construction:

- A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area.
- Project footprint will be minimised, and work sites and other areas will be delineated and restricted.
- Disturbance to, or movement of, soil and vegetation will be minimised.
- Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible.
- Implement measures such as fencing and/or signage to prevent unauthorised access and disturbance to wildlife.
- Implement a ‘find and relocate’ procedure prior to clearing areas.
- Use directional and shielded lighting if works are implemented at night to minimise light spill into surrounding areas. Implement motion-activated lighting to reduce unnecessary illumination.
- Incorporate speed bumps and signage to enforce speed limits in high-wildlife areas. Install wildlife crossing alerts to prevent roadkill incidents.
- Encourage drivers and local communities to report wildlife sightings or collisions, enabling timely management responses.

Closure and Rehabilitation

- Rehabilitation of disturbed areas, where relevant and possible, with native species.

Post-Mitigation

Duration	2	Short term Up to 2 years	Negligible (negative) - 10
Extent	1	Site Specific Limited to the site and its immediate surroundings.	

Intensity	2	Moderate (low), short-term effects but not affecting ecosystem function.	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%)	
Nature	Negative	-	

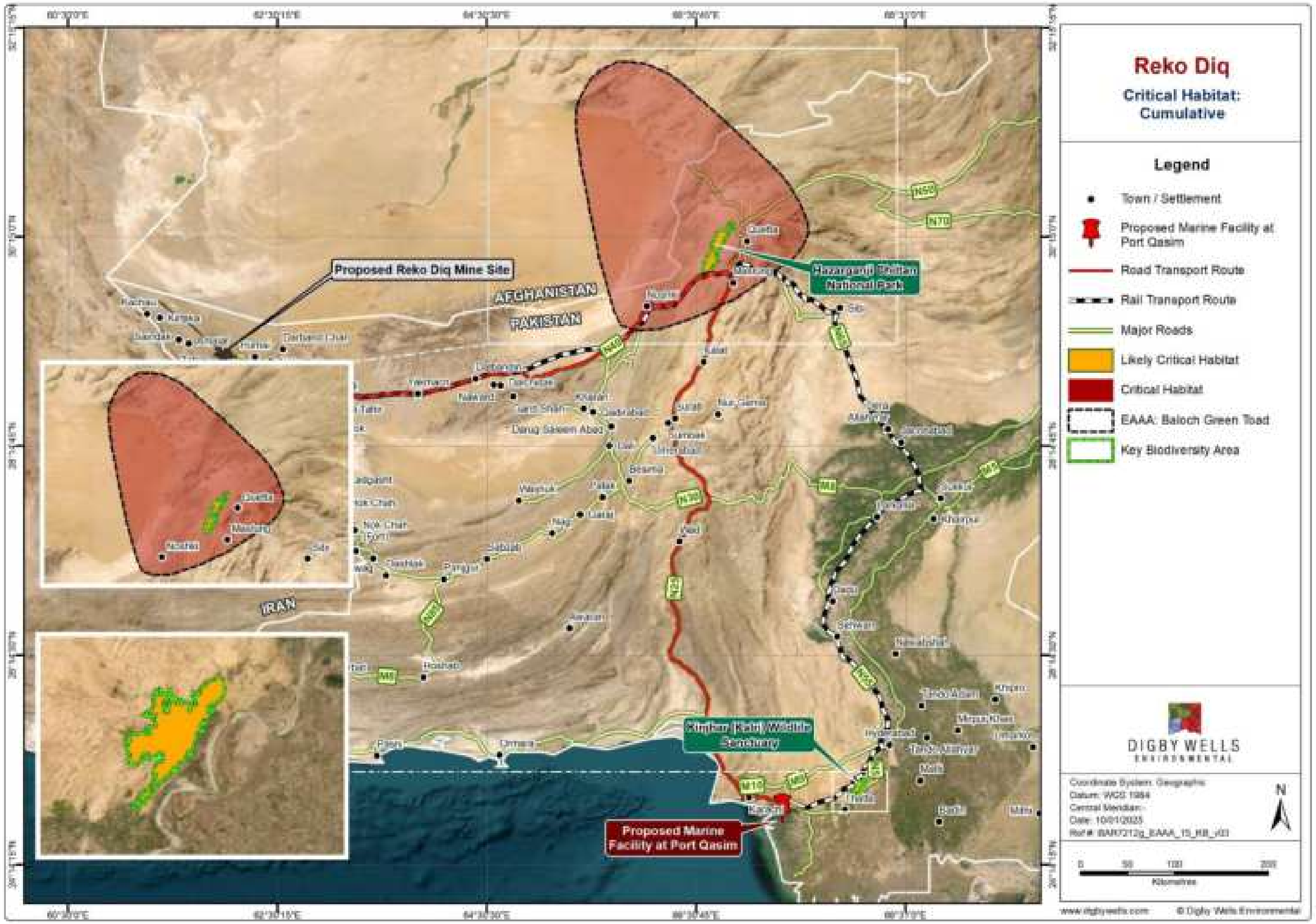


Figure 6-10: Critical Habitat along the Transport Route and Port Qasim

6.2.3. Operations Phase Impacts

This section discusses the impacts associated with the operational phase of the Project.

6.2.3.1. Noise and Vibration

6.2.3.1.1. Impact 35: Impulse Noise and Vibrations Generated from Blasting

Noise

The Project will use a blend of Ammonium Nitrate Fuel Oil (ANFO) and a water-based emulsion to carry out blasting for excavation of ore from the pit during the operational phase. At present there are no legal limits for impulse noise in Pakistan, however, the noise generated can be a significant source of nuisance for local communities, particularly if occurring at night or without warning.

For a single blast, ~190 tonnes of ANFO will be used where blasting will be an intermittent activity carried out depending on the requirement. Therefore, the noise generated from the blasting activity will be impulse in nature and its impact on the overall weighted noise averages will be low. The low contribution is due to very small acoustic usage factor (0.069%) of impulse noise. The impulse noise generated from blasting is therefore compared with instantaneous peak noise limit of 140 dB(C) prescribed in IFC General EHS Guidelines.

For estimation of impulse noise from blasting, trinitrotoluene (TNT) equivalent factor is used for ANFO and water-based emulsified (cumulative 0.48 TNT factor consisting of 0.25 for ANFO and 0.7 for emulsifier). Thus, 1,000 kg of ANFO has a similar explosive energy yield as ~250 kg of TNT (Specialty, 2020).

Similarly, 1,000 kg of emulsifier has a similar explosive yield energy of 700 kg of TNT (Simoens, Lefebvre, & Minami, 2011).

Using the formula provided by the International Ammunition Technical Guidelines (IATG), the distance at which 140 dB(C) of impulse noise would be generated if the mass of the explosives can be calculated via:

$$Distance\ (m) = 215\ x\ [Mass\ of\ Explosives\ (kg)]^{1/3}$$

The impulse noise is estimated to be 140 dB(C) at a distance of ~4,500 m from the blasting site. The noise levels can be determined at the nearest receptor, the Humai settlement, using the following equation:

$$LP2 = LP1 - 20xlog\frac{R2}{R1}$$

An impulse noise of 125 dB(C) is estimated at the Humai settlement, assuming no ground barriers and energy losses. While this value is within the Occupational Safety and Health Administration (OSHA) threshold of 140 dB(C) above which cause hearing loss, this noise value may still cause a significant nuisance for local community residents at night or if it occurs without warning.

This impulse noise is expected to substantially reduce with increasing depth of the open-pit and RDMC will implement mitigation measures centred around scheduling and prior notice to local communities.

It is important to note that the equation above does not account for barrier effects and ground absorption of the impulse. Thus, the magnitude of impact on receptors may be lower than predicted via these calculations.

Ground Vibrations

lasting is a critical process in hard rock mining, used to fragment rock for easier extraction. Blasting for mining operations results in noise as well as ground vibrations and fly rock that cannot be confined to the site. The primary operation in open-pit mines is rock blasting. In blasting, only 20%–30% of the energy produced by the explosives is converted into mechanical energy to fragment and displace the rock mass. The remainder of the explosive energy is wasted in the form of blast disturbances, such as rock vibrations, noise, and fly rock, among others. Understanding these impacts and adhering to international limits is essential for safe and sustainable mining operations.

Ground vibrations from blasting are caused by the rapid release of energy from explosives, which generates seismic waves. These waves can travel significant distances, potentially affecting structures and people far from the blast site. In the case of ground vibrations, the level of vibration is measured by the Peak Particle Velocity (PPV) with units of millimetres of movement per second, which indicates the maximum speed at which particles in the ground move due to the blast.

Ground vibrations from blasting activities can cause both cosmetic and structural damage to buildings. Various international standards provide guidelines to ensure that these vibrations remain within safe limits (Table 6-25).

- Cosmetic damage typically refers to minor, non-structural damage such as hairline cracks in plaster or drywall.
- Structural damage refers to more significant damage that affects the integrity of the building.

The nearby receptors of the mining site include the Humai settlement which is about 20 km away from the mine site. The below sections provides an high-level assessment of the blasting-induced vibration risks.

Table 6-25: Summary of International Limits for Ground Vibrations (PPV)

Standard	Cosmetic Damage Limit	Structural Damage Limit	Reference
USBM	12.7 mm/s	50 mm/s	(United States Bureau of Mines, 1980)
BS 7385	15-20 mm/s	50 mm/s	(British Standards Institution, 1993)
DIN 4150	5 mm/s	20 mm/s	(Deutsches Institut für Normung, 1999)

Calculation of Ground Vibrations for Nearest Receptor

The PPV is directly related to the size of the blast and the distance from the blast - the closer to the blast the greater the vibration. PPV is calculated as follows:

$$PPV = K*(D/\sqrt{Q})^{-e}\text{ , where:}$$

- PPV = peak particle velocity (mm/s);
- K = site constant = 1140;
- D = distance to point of concern (m) = 10,000 (for accommodation camp);
- Q = maximum instantaneous charge weight (kg) = 1000;
- e = rock properties constant = 1.6.

Impact on Structures and Receptors

- **Humai (20 km away):** The impact on Humai settlement is expected to be minimal. People at Humai will not be affected by vibrations but may hear the blast if the wind is towards them. Noise and blasting disturbances will occur throughout operations and are not reversible. However, the magnitude may reduce over time as people become accustomed to the impacts.

Fly Rock Impact

When blasting operations are carried out, the rock gets fragmented and the fragmented material is moved forward to make mucking of the fragmented mass easier and less costly. In addition to this desirable displacement of broken fragments in case of surface mine blasting, some stone piece can get torn and travel to very large distance, this unexpected projection of stone is termed as “Fly rock”. The cause of Fly rock is basically liberation of blast energy through a narrow path of least resistance in rock mass.

Fly rock, the fragments of rock propelled by the force of an explosion, can travel significant distances from the blast site, posing risks to safety and property. The distance fly rock can travel depends on several factors, including the type and amount of explosives used, the blast design, confinement and the geological conditions.

Typical Distances

- **General Safety Guidelines:** Fly rock can travel up to 700 meters (approximately 2,300 feet) from the blast site (Huffman, 2014). This distance is often considered a safe exclusion zone to prevent injuries and damage.

- **Maximum Distances:** In some cases, fly rock has been known to travel as far as 1,000 meters (approximately 3280 feet) or more (Esen, 2016). This is more likely in situations where the blast design is not optimized, or the geological conditions are particularly conducive to long-distance projection.

Impact on Structures and Receptors

- **Humai (20 km away):** The nearest settlement Humai is at 20 km from the mine site. The settlement at 20 km is unlikely to be affected by fly rock.

- **Closer Distances:** The negative impact of fly rock will be most severe for structures and people within 1,000 m from blasting, but with mitigating measures in place, there will be no impact at distances further than 500 m (significance will be Low). Open pit blasting will be conducted using standard mining industry practices and procedures for securing personnel and equipment. This includes evacuating the blast area to a distance of at least 500 m to avoid any damage from fly rock. The nearest structures to the pit are the primary crushers, workshops and offices, which are outside the 500 m protective blasting buffer zone.

<u>Good Practice Measures</u>

- Schedule blasting outside of hours when people are most disturbed by noise (such as at night).

- Inform local communities of blasting timetable in advance and provide adequate notice of when blasts are required outside of the planned schedule.

- The recommended maximum level for ground vibration is PPV of 5 mm/s. the PPV level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

- Blasting should generally take place no more than once per day. This requirement would not apply to minor blasts such as for clearing crushers, feed chutes, etc.

Impact 35: Impulse Noise and Vibrations Generated from Blasting			
Phase: Operations			
Impact Description: Nuisance to local communities due to impulse noise, vibrations and fly rock generated from blasting activities.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Minor (negative) -21
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Minor effects on the biological or physical environment.	
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	
Mitigation/Management Actions			
• The Project will develop and implement a Noise Management Plan. • Blasting times will be posted in advance. • Blasting will not be carried out during night-time hours (10:00 pm to 06:00 am).			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years	Negligible (negative) -7
Extent	1	Site Specific Limited to the site and its immediate surroundings.	
Intensity	1	Minor effects on the biological or physical environment.	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during the lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.3.1.2. Impact 36: Elevated Noise Levels due to Additional Rail Traffic

The Project will use freight trains for transportation of concentrate from the RDMS to Port Qasim. The Project's contribution to the railway traffic will consist of between 4 and 8 train passes each day (both directions with some at night and some during the day), with each train comprising of one locomotive and twenty wagons. Between the railway section of Nushki and Kishinghi, and Abigum and Kolpur, an additional locomotive will be added to assist with navigating the steep gradient.

As there are a number of residential receptors along the railway tracks, the movement of trains will result in an incremental change in the passer-by noise levels. The train movement will also cause an incremental increase in the daytime and night-time noise levels as train movements will remain active over a 24-hour period.

To assess the increase, empirical estimations and deterministic modelling has been carried out at three different segments of the Rail Transport Route. The detailed methodology of railway noise estimations is provided in Appendix D.

The Predicted Ambient Noise Levels are compared with the daytime and nighttime noise limits prescribed in NEQS and IFC General EHS Guidelines for residential areas. At the time of this writing, the noise limits were not prescribed in the local or national legislations for train pass-by events therefore, the noise levels were compared with the limits prescribed by the US Federal Railroad Administration (49 CFR 201.12 (b)). Table 6-26 provides the noise levels recorded during a train pass-by event and their comparison with 49 CFR 201.12 (b).

Table 6-26: Noise Levels (dBA) During Train Pass-by Event

Segment	Railway Speed (km/h)	Noise Levels at 1 m	Noise Levels at 30 m	49 CFR 201.12 (b) Limit at 30 m
Segment 1 - Nok Kundi	40	101.0	71.5	88
Segment 2 - Nushki	40	101.8	72.3	88
Segment 3 – Sibi	65	104.9	75.4	88
Maximum Speed	80	106.6	77.1	93
Maximum Speed with Horn	80	116.0	86.5	93

Therefore, the noise levels during a pass-by event are expected to remain within the FRA noise limits prescribed in 49 CFR 201.12 (b) in all segments. Table 6-27 provides the levels of perception of Predicted Ambient Noise Levels based on increment from the Baseline Noise Levels.

Table 6-27: Perception of Increment in Noise Levels (dBA) to Humans

Segment	Baseline Noise Levels		Predicted Ambient Noise Levels		Increment Over Baseline Noise Levels		Interpretation to Human Receptors
	Day	Night	Day	Night	Day	Night	
Segment 1 – Nok Kundi	62.8	57.6	63.02	58.20	0.22	0.60	Not perceptible

Segment	Baseline Noise Levels		Predicted Ambient Noise Levels		Increment Over Baseline Noise Levels		Interpretation to Human Receptors
	Day	Night	Day	Night	Day	Night	
Segment 2 – Nushki	44.1	47.2	60.01	59.56	15.91	12.36	Doubling in loudness during train pass by events only
Segment 3 – Sibi	63.1	49.1	66.31	62.98	3.21	13.88	Doubling in loudness during train pass by events only

The comparison of Baseline Noise Levels and Predicted Ambient Noise Levels in Table 6-26 demonstrates that the Predicted Ambient Noise Level in Segment 1 will not be perceptible to human receptors due to a lower level of increment over the Baselines Noise Levels.

However, the increment over Baseline Noise Levels in Segments 2 and 3 is significantly higher, ranging between 12.36 dBA and 15.91 dBA as a result, the Predicted Ambient Noise Levels in these segments will be perceived as doubling in loudness due to the railway movement.

The railway movement will be intermittent throughout the day, with the addition of 20 trains to the baseline daily train traffic. As a result, daytime and nighttime noise levels may not accurately reflect the conditions experienced by receptors. These averaging periods are appropriate for assessing compliance when noise levels are continuous or when receptors are exposed to noise for extended durations.

However, continuous exposure to rail traffic is unlikely, as receptors will be exposed to elevated noise levels only during brief pass-by events, which typically last less than one minute depending on the train's speed and length. For this reason, impacts on receptors have been assessed based on these pass-by events alone.

Although Table 6-26 indicates that noise levels during Project train pass-by events will remain within applicable limits, RDMC will conduct continuous noise monitoring periodically, over a weekday and weekend, to assess on-ground noise levels and their impact on receptors once rail operations commence. This noise monitoring will be conducted in areas where an increment of more than 3 dBA is estimated over the baselines at Nushki, and Sibi.

Since changes to infrastructure within the railway track's right of way are beyond the Project’s scope and jurisdiction, RDMC will explore collaboration with Pakistan Railways mitigation or control measures, as deemed necessary, in areas where the impact due to increase in noise levels is attributed to the Project's railway traffic.

Overall, the impact of noise from the Project's railway traffic on receptors is predicted to be relatively low, as the railway track is already in use for freight trains operated by Pakistan

Railways. Additionally, the acoustic usage factor of the train movement is 2%, resulting in a minimal contribution to the overall noise levels.

Impact 36: Elevated Noise Levels due to Rail Traffic			
Phase: Operations			
Impact Description: Nuisance to local communities due to elevated noise levels from railway movement.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter -Generational >20 years	Minor (negative) -36
Extent	2	Local Extending across the site and to nearby settlements.	
Intensity	2	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation can be done in less than a month. On-going social issues.	
Probability	4	Likely The impact may occur (50-90%).	
Nature	Negative	-	
Mitigation/Management Actions			
• Conduct continuous 24-hours noise monitoring periodically over a weekday and weekend at nearest receptors where the Predicted Ambient Noise levels with Project railway shows an increase of more than 3 dBA over the baselines. This will assist the Project to assess incremental noise levels as well as their perception by the receptors. • In case of any impacts due to increase in noise levels from Project's railway traffic, collaborate with Pakistan Railway for implementation of mitigation and control measures. • Periodic engagement with communities along the rail route to monitor cumulative impacts.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter -Generational >20 years	Minor (negative) -36
Extent	2	Local Extending across the site and to nearby settlements.	
Intensity	2	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation can be done in less than a month. On-going social issues.	
Probability	4	Likely The impact may occur (50-90%).	

Impact 36: Elevated Noise Levels due to Rail Traffic			
Nature	Negative	-	

6.2.3.2. Socio-economic

6.2.3.2.1. Impact 37: Discontent over Absence of Passenger Trains for General Public

The Project will utilise trains for the transport of concentrate to Port Qasim, utilising the existing railway tracks within the Rail Transport Route. However, it is important to note that currently, very few passenger trains operate on these tracks, resulting in limited access to passenger transportation services for local communities.

The absence of these services may already be a source of frustration and grievance among communities relying on public transportation in Balochistan leaving them feeling neglected or marginalised due to the lack of accessible transportation options for commuting, visiting family members, or accessing essential services.

With the Project's trains primarily serving their transportation needs for resource movement, there is a risk of exacerbating existing grievances within the local community who may perceive that the tracks are being utilised solely for the benefit of the Project while their own transportation needs are being neglected.

Some indirect benefits are expected from improvements to the railway track, and other users such as businesses entities and other transportation contractors may benefit, but it is unlikely that the rail will facilitate public transport needs.

To address these concerns, the Project will include consultations with communities situated near the Rail Transport Route as part of its SEP along with relevant government institutions such as the Ministry of Railways. In turn, expectations and perceptions will be monitored and appropriate measures to address these concerns will be implemented.

Impact 37: Discontent over Absence of Passenger Trains for General Public			
Phase: Operations			
Impact Description: Discontent over the absence of passenger trains available to communities while the Project's transportation trains operate.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Operations phase will last 48 years.*	Negligible (negative) -18
Extent	2	Local *The impact will be perceived in the vicinity of the Rail Transport Route*	
Intensity	2	Moderate impacts such as on-going social issues.	

Impact 37: Discontent over Absence of Passenger Trains for General Public			
		The Project's activities along the Rail Transport Route will continue throughout the operations phase of the Project.	
Probability	2	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur (5-20%).	
Nature	Negative	-	
Mitigation/Management Actions			
• Engage with local communities to understand their transportation needs, concerns, and priorities. • Engage with relevant government institutions such as the Ministry of Railways to share potential concerns of the communities.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Inter-Generational - >20 years *Operations phase will last 48 years.*	Negligible (negative) -9
Extent	2	Local *The impact will be perceived in the vicinity of the Rail Transport Route*	
Intensity	2	Moderate impacts including on-going social issues. *The Project's activities along the Rail Transport Route will continue throughout the operations phase of the Project.*	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.4. Decommissioning Phase Impacts

The decommissioning activities will primarily involve making safe open pits, demolition and removal of mining infrastructure, backfill of foundations and site rehabilitation. The decommissioning phase for the various facilities are not expected to have adverse impacts.

- *Northern Groundwater System:* The pipeline will remain buried therefore no decommissioning phase impacts are expected for this Project component.
- *Transport Routes (Rail and Road Transport Routes):* The Project will not change any existing rail and road networks. The responsibility of upgrading and maintaining these networks will remain with the Ministry of Railways and National Highway Authority (NHA), respectively. Therefore, no decommissioning phase Project impacts are expected for Transport Routes.
- *Port Qasim (Marine Terminal):* The Project will use the existing facilities at PIBT with the exception of the construction of a concentrate storage shed. The structure will remain in situ after the cessation of operations therefore there are no associated decommissioning impacts.

6.2.4.1. Impact 38: Retrenchment upon Conclusion of the Operational Phase

The Project's anticipated economic activity around the RDMS is poised to bring significant benefits to the local community. By engaging local individuals and businesses, the Project aims to create employment opportunities during its operations and foster ongoing partnerships with nearby enterprises.

However, this economic uplift will significantly slow down once the operational phase concludes, and decommissioning activities commence. The cessation of the mining operation poses retrenchment related reputational risks.

The Project will enhance the local infrastructure such that the local communities are less reliant on employment offered by the Project at the time of decommissioning and are able to pursue employment opportunities of equivalent or better income elsewhere. A social closure plan should be developed and implemented in the years before closure to address impacts and risks associated with this phase of the project. Additionally, the Project will develop a Retrenchment Plan prior to any retrenchment activities commencing.

Impact 38: Retrenchment upon Conclusion of the Operations Phase			
Phase: Decommissioning			
Impact Description: Loss of income upon conclusion of the operations phase of the Project.			
Prior to Mitigation/Management			
Dimension	Rating	Interpretation of Rating	Significance
Duration	5	Medium term 2 to 5 years	Minor (negative) -30
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	3	Moderate impacts including on-going social issues.	

Impact 38: Retrenchment upon Conclusion of the Operations Phase			
Probability	3	Probable Has occurred here or elsewhere and could therefore occur (20-50%)	
Nature	Negative	-	
Mitigation/Management Actions			
- Implement comprehensive training initiatives aimed at equipping the local community with the skills needed for transitioning from the operations phase. - Develop a retrenchment plan well in advance of mine closure. - Conduct regular stakeholder consultations between Project stakeholders, including local communities and businesses to identify potential challenges and develop solutions. - Invest in infrastructure Projects that enhance the area's connectivity, such as road improvements or access to utilities, to facilitate economic development independently of the Project's activities. - Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training, in order to seek alternative employment. - Offer continued employment opportunities during decommissioning to members of the local communities. - Implement a structured stakeholder engagement process and GRM, as well as direct communication channels to surrounding communities.			
Post-Mitigation			
Dimension	Rating	Interpretation of Rating	Significance
Duration	2	Short term Up to 2 years	Negligible (negative) -7
Extent	2	Local Extending across the site and to nearby settlements. Sub-division of a district.	
Intensity	3	Moderate impacts including on-going social issues.	
Probability	1	Rare / improbable Conceivable, but only in extreme circumstances and / or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate mitigation measures (1-5%).	
Nature	Negative	-	

6.2.5. Abstraction from Northern Groundwater System

Water for the Project will be sourced from the Northern Groundwater System, a sedimentary groundwater system located approximately 70 km to the northwest of the Reko Diq mining area.

Abstraction from the Northern Groundwater System will drawdown groundwater levels and create a zone of influence which will extend some distance away from the borefield.

Water in the system is moderately to highly saline and challenging to access. As such, it is not suitable for human consumption or most agricultural or industrial uses without significant treatment and abstraction infrastructure. Independent, international best-practice environmental and social impact assessment and hydrogeological studies, using physical surveying and remote sensing techniques, have demonstrated that there are no surface expressions of the groundwater system and no dependent biodiversity.

There are currently no planned developments or nearby users of the target groundwater system, and although numerical groundwater modelling does show significant drawdown of water levels over time as a result of abstraction, the scope of the Project does not preclude future use of the broader basin by others.

The Northern Groundwater System is considered capable of enabling development and sustaining operation of the Project, although alternative contingent options continue to be explored as detailed in Chapter 4 – Project Alternatives. These options will continue to be studied throughout the Project should they be required.

6.2.5.1. <u>Groundwater Studies</u>

Extensive studies were undertaken to ensure any possible environmental or social impacts were identified, including:

- Hydrocensus of social and environmental water users (details provided in Chapter 5 – Environmental and Social Baseline and Appendix L);
- Remote sensing surveys to investigate areas which are not accessible, including across the Afghan border (Appendix X); and
- Extensive field surveys, including geophysical surveys, drilling and aquifer testing (Appendix M).

To predict possible extents of aquifer drawdown, a numerical groundwater model was developed by Darkwater Consultants Pty Ltd (Darkwater, 2024b) using very conservative assumptions and a stochastic approach to identify a wide range of possible outcomes using input parameters determined through field investigations (Appendix N).

The model was constructed in January 2024, to include data from the most recent phase of field hydrogeological investigations (Appendix O).

A four-layer geological model representing the above conceptualisation was constructed using LeapFrog Geo, which was then used as a basis for the numerical groundwater model. The numerical model was simulated as a four-layer, unconfined to confined aquifer contained within unconsolidated sediments, overlain by a confining clay-layer in the northeast, and underlain by impervious basement or consolidated sedimentary rock (Figure 6-11).

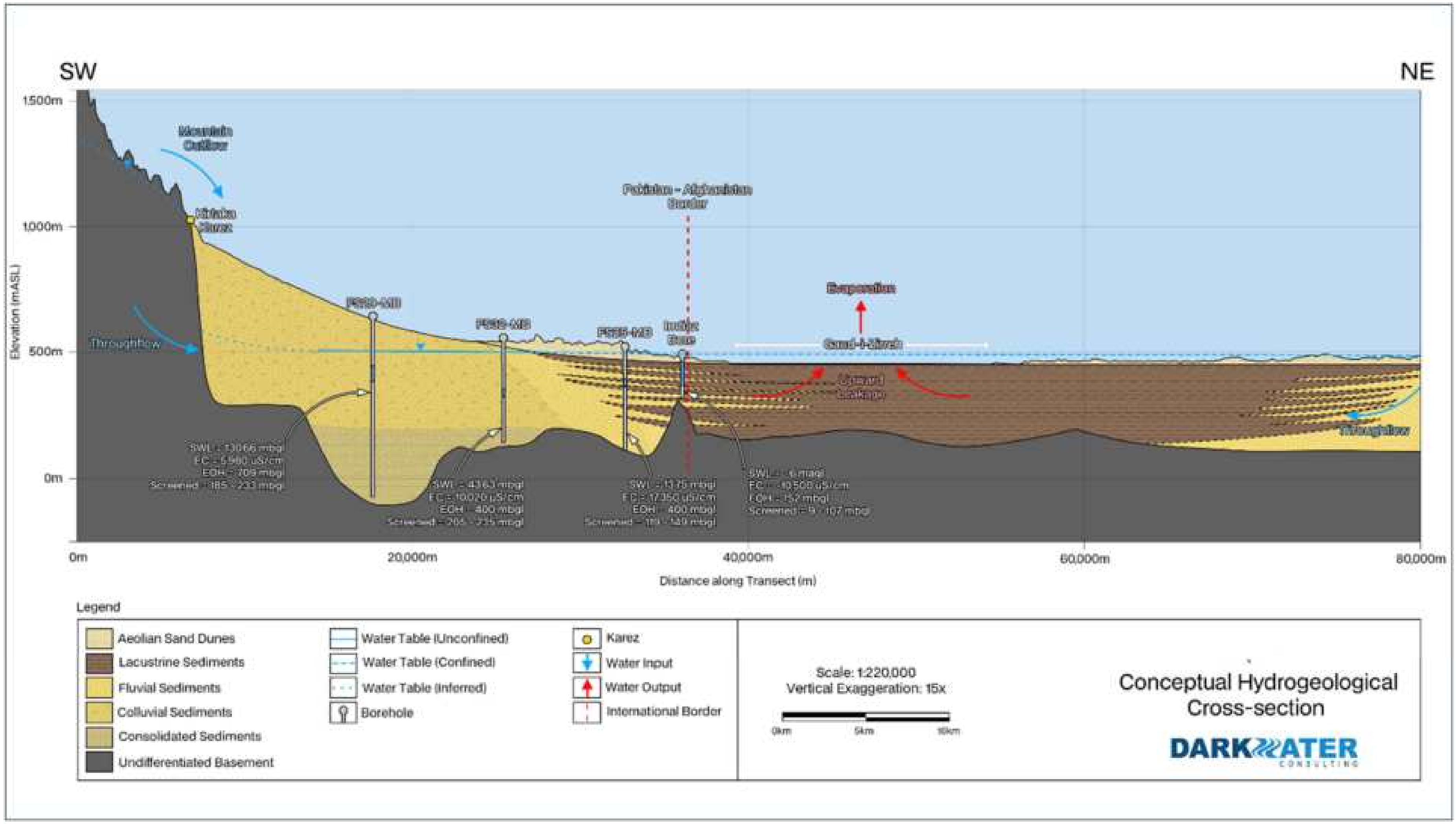


Figure 6-11: Northern Groundwater System Conceptual Model (Darkwater, 2024b)

A stochastic approach was used to assesses a large number of parameter distributions within a set parameter range to generate probabilistic modelling outputs showing statistical distributions of simulated values for groundwater drawdown based on specified abstraction volumes.

The modelling objectives included assessment of the ability of the Northern Groundwater System to meet the Project water demand, and to evaluate the range of drawdown over time which may result from abstraction.

A total of 142 models, sufficiently calibrated to steady-state water levels, were assessed. Modelling results indicate that across all 142 model runs, the Northern Groundwater System was able to sustain the Project water demands. Hydraulic head distributions from these runs were used to produce probabilistic drawdown outputs for impact assessment purposes. The spatial distribution of drawdown at the end of the Project (assuming all Projct water supplies are abstracted from the Northern Groundwater System) at a P50 probability is provided in Figure 6-12 (where P50 indicates the 50th percentile (mean) drawdown value at each cell across the 142 model runs).

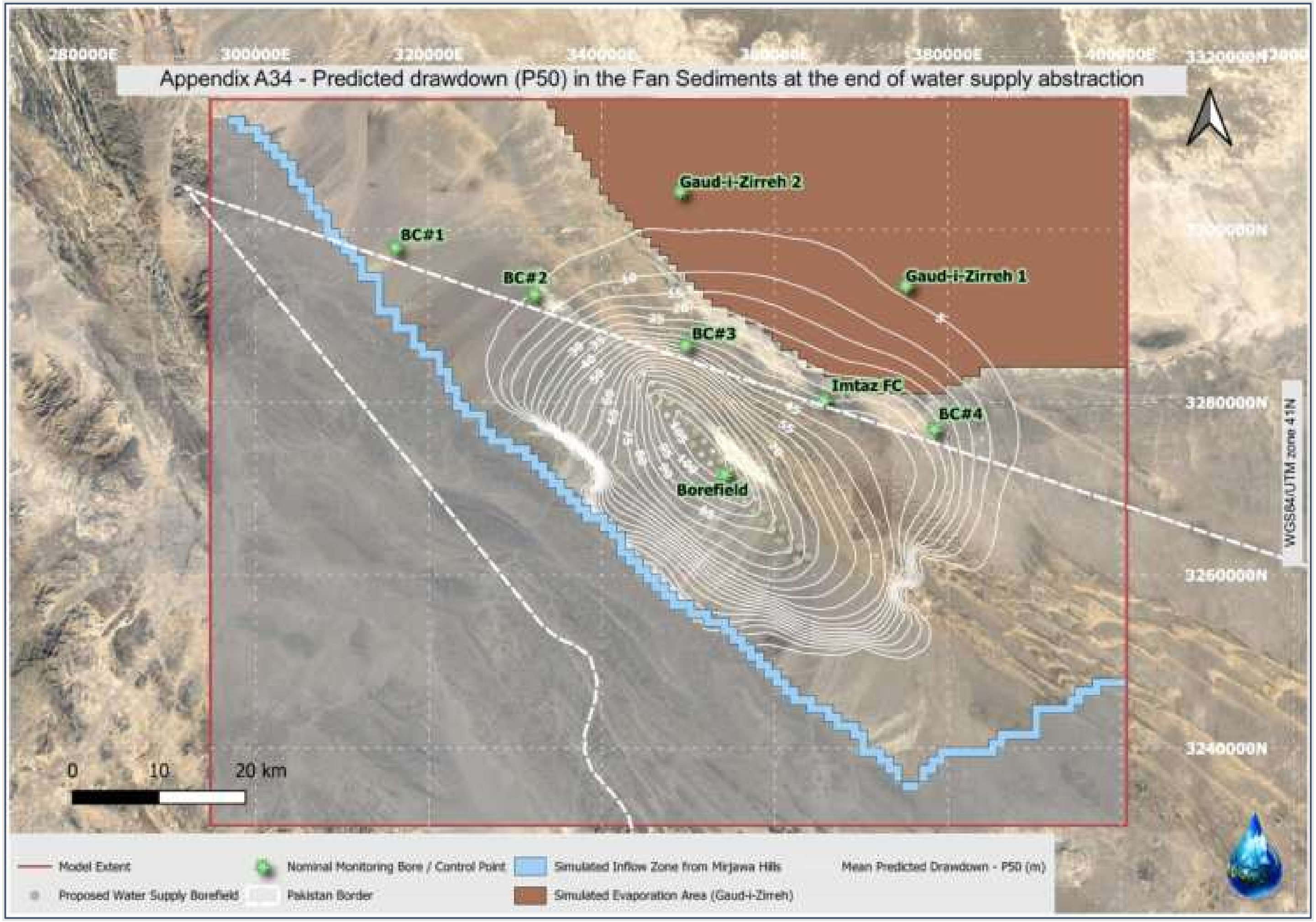


Figure 6-12: Predicted P50 Drawdown in the Northern Groundwater System at the End of Water Supply Abstraction (Darkwater, 2024b)

There are no environmental or social receptors within the predicted area of drawdown, however, the observed groundwater flows towards the Afghanistan border, potential transboundary drawdown impacts are introduced, which will need to be managed during operation of the borefield. Should ongoing monitoring indicate that drawdown is likely to extend across into the Afghan border, RDMC will notify the Government of Balochistan and Pakistan who may then undertake to notify the Government of Afghanistan will occur.

6.2.6. Geochemical Analysis

The typical impact assessment methodology does not directly apply to geochemical aspects. The distinction arises because the geochemical assessment is primarily concerned with characterising the source of potential contaminants, rather than the pathway or receptor involved in the environmental impact (see 6.4.6 Other Risks).

The data gathered from the geochemical risk assessment related to the source terms are integrated into the surface and groundwater impact assessment to understand the potential effects of the identified contaminants on the environment.

Despite this differentiation in approach, geochemical studies identify potential geochemical risks and recommend mitigation and management measures. The recommendations are important in informing the development of the environmental management plan and monitoring program ensuring the protection and preservation of the environment.

6.2.6.1. *Western Porphyry and Tanjeel Pits*

Acidic metal drainage will occur within the Western Porphyry pit and waste rock dump. However, due to the encapsulated nature of sulphides at Western Porphyry, this process will take decades, especially in the low humidity and high evaporation environment. Although acidic metal drainage will occur within the Western Porphyry pit, the low humidity, high evaporation environment, the depth to groundwater and groundwater chemistry, and low reactivity of the material will limit the potential for ARD/ML to impact this site.

The pit-lake water balance modelling confirms that the pit will remain a hydraulic sink, even during extreme wet periods, including a 1-in-100-year rainfall event over 24 hours. This ensures that no contaminants will migrate away from the pit due to the persistent inward hydraulic gradient.

The project area is characterised by a hot desert climate with year-round warm temperatures and extremely low mean annual precipitation of 32 mm. Despite the arid conditions, rare but extreme rainfall events have been recorded, including:

- 66 mm in Nok Kundi on 28 June 1973 and again on 28 June 2007.
- 71 mm at the Reko Diq mine site on 8 December 2008.

Knight Piesold (2024) conducted a daily precipitation analysis for the mine site’s climatology, estimating a 1-in-100-year 24-hour rainfall event at 125 mm. This extreme scenario has been incorporated into the updated water balance model to evaluate the pit’s hydraulic behaviour during wet period.

If a 125 mm rainfall occurs within 24 hours, the amount of water directly intercepted by the pit will depend on the pit area. At closure, the pit surface area is expected to reach approximately 7.1 Mm^2, which has been used for the post-closure water balance calculations.

The following assumptions have been made whereby:

- All rainfall within the pit rim is treated as inflow to the pit lake, with no losses from infiltration or runoff along pit walls.
- Surface runoff from areas outside the pit is assumed to be diverted using berms to prevent additional inflow into the pit.

Under these conditions, a 125 mm rainfall event would result in the accumulation of 872,557 m^3 of water in the Western Porphyry Pit. This volume corresponds to a pit lake elevation of 206 mamsl, a lake surface area of 49,536 m^2 and a lake depth of 26 m.

The regional hydraulic head in the pit area is consistently measured at 900 mamsl, which is significantly higher than the projected maximum pit lake elevation of 206 mamsl, even during extreme rainfall events. This substantial gradient ensures that:

- Groundwater flow will consistently be directed towards the pit.
- The pit will function as a hydraulic sink in perpetuity, drawing water inward.
- The persistent inward hydraulic gradient ensures that contaminants will remain contained within the pit, regardless of pit lake water quality.
- The region’s high evaporation rate of 2,505 mm/year ensures rapid water loss. Modelling indicates that even with the temporary lake formed by the 1-in-100-year rainfall event, complete evaporation would occur within approximately 7 years under normal climatic conditions.
- The pit’s hydraulic sink status will remain unaffected, with no risk of remobilising precipitated salts or contaminants during extreme wet periods.

At Tanjeel, the more oxidised nature of the material and greater exposure of sulphides in the pit wall result in a higher potential for acid generation. Additionally, groundwater flows through the same fractures as the mineralisation, leading to partial in-situ oxidation. This makes the material more reactive, even though it has a lower overall potential for acid generation compared to the Western Porphyry material types. Again, due to the extremely low infiltration rates predicted from hydrogeological modelling, the depth of groundwater across the site and the highly mineralised, saline nature of groundwater, there is little potential for ARD/ML impact to groundwater. Additionally, there are no groundwater receptors at risk at this site.

6.2.6.2. Hydrogeology of the TSF Area

A total of 22 geotechnical holes were drilled in June 2024 in the proposed TSF footprint area by Knight Piesold for geotechnical assessment (Figure 6-13). The holes were 25 m deep except for two that were drilled to 150 m for deeper aquifer characterisation. This is in addition to the 14 geotechnical holes that were drilled and packer tested by Knight Piesold in 2008.

Additionally, three percussion holes were drilled in the TSF area for aquifer characterisation (SMEC, 2010). However, none of these boreholes were aquifer-tested due to the poorly developed aquifer system, though they provided valuable insights into the limited extent of the aquifer.

The packer test results of the geotechnical holes are summarised in Figure 6-13 and shows the distribution of hydraulic conductivity which can be summarised as follows:

- Higher conductivities (1.5×10^{-3} m/d) in the upper 25 m, likely due to fractures and weathering.
- Decreased conductivities with depth: 4.1×10^{-4} m/d (25–80 m) and 6.5×10^{-4} m/d (below 80 m).

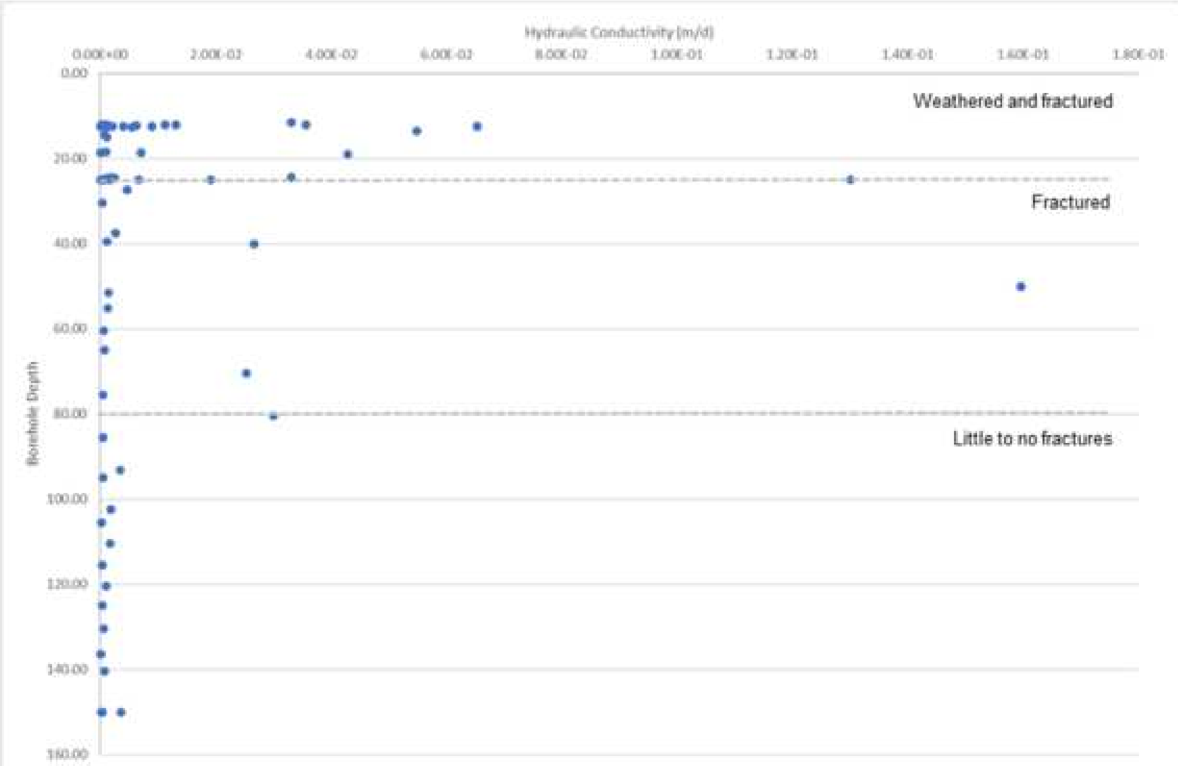


Figure 6-13: Knight Piesold Packer Test Hydraulic Conductivity Distribution

There is a good correlation of 92% between topography and hydraulic head elevation whereby the groundwater elevation mimics topography. The watershed divide between the Sistan and Mashkhel Basins is also an approximate location of a groundwater divide, and therefore the overall groundwater flow direction is to the northwest towards Gaud-i-Zirreh and to the southeast towards Hamun-i-Mashkhel. The interpolated hydraulic head and flow direction is displayed in Figure 5-71.

Although the overall flow direction is towards the northwest and southeast, it could be different on a local scale, depending on the orientation and permeability of local structures.

The groundwater levels measured within the mine lease range between 0.3 and 64.3 mbgl (839 – 949 mamsl), with an average of 22.5 mbgl (Figure 5-71 and Figure 5-72).

6.2.6.2.1. Contaminant Pathway and Impact Assessment

It is important to note that the area is not classified as an aquifer. The groundwater storage and aquifer permeability of the hydrostratigraphic units within the TSF footprint is low, as demonstrated by the packer tests and limited aquifer test data.

- Current data suggest that groundwater in this area occurs only in discrete fracture zones, which are of limited extent and permeability. Additionally, the absence of identified receptors within proximity to the TSF and WRDs, suggests that there is no anticipated environmental impact from the proposed operations.tThe seepage model confirms negligible seepage from the lined TSF (~1% of slurry water) and limited seepage through the WRDs (~4.8 mm/year).

6.2.6.3. Waste Rock Dumps

The groundwater report contains substantial hydrogeological data near the TSFs, including permeability testing and water level measurements. While the WRDs are sited in areas similar to the TSF footprint in terms of geological and hydrogeological characteristics, additional hydrogeological data will be collected as part of planned geotechnical investigations. These surveys will further refine the understanding of subsurface conditions in the WRDs area.

However, of the 33 percussion boreholes that were drilled by SMEC (2010) and Coffey (2005), 5 were within 500 m radius of the WRDs (Figure 6-14). However, none of these were aquifer tested as they were either completely dry or almost dry and therefore testing was not possible.

Geological logs indicate predominantly sandstone layers with low permeability as the grain size ranges from very fine to medium with intercalation of shale and siltstones. A representative example of a geological log is that of borehole WW29-MB that was drilled in the central area of the Northern WRD (Figure 6-15).

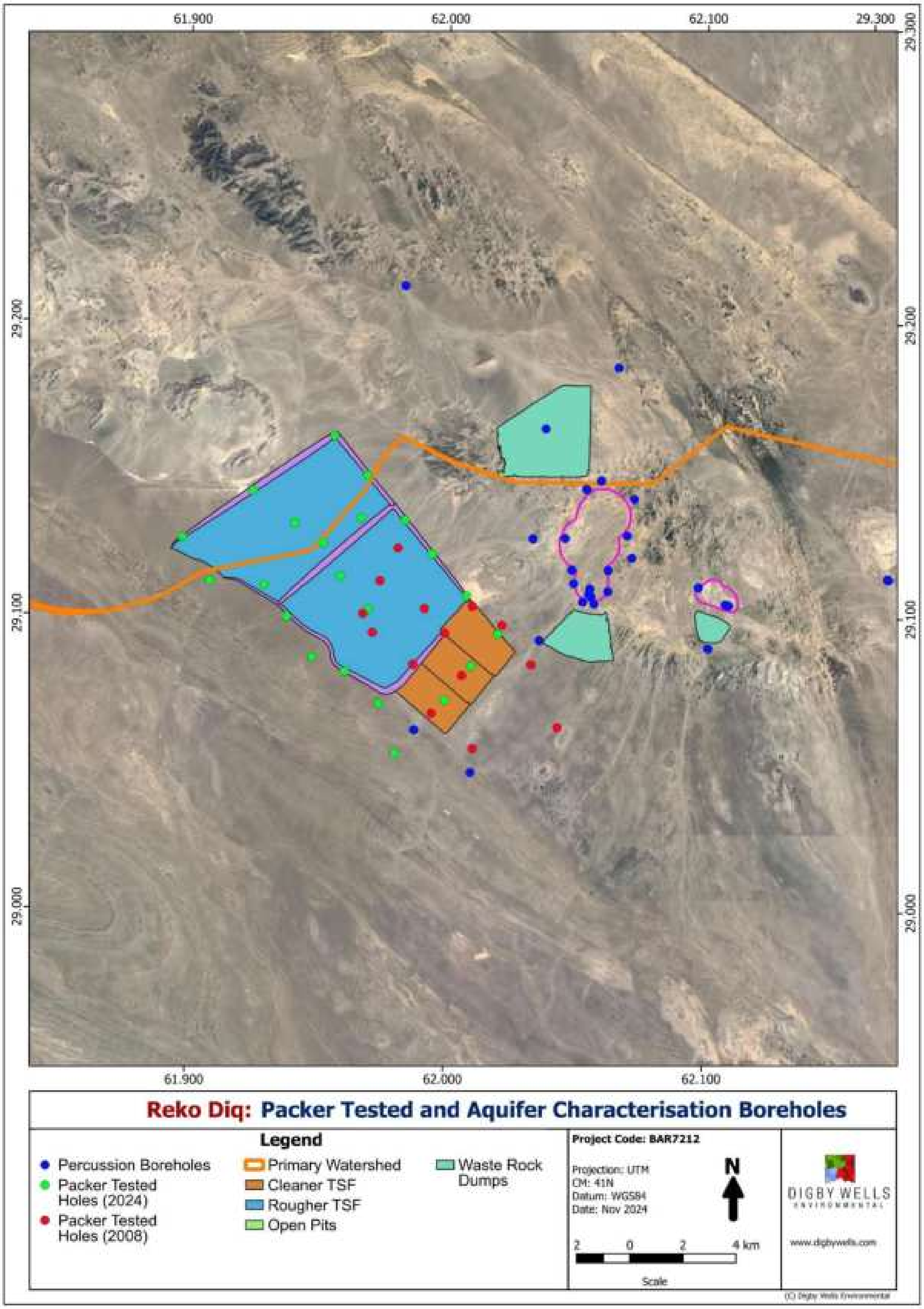


Figure 6-14: Locations of the packer tested geotech holes and percussion-drilled boreholes

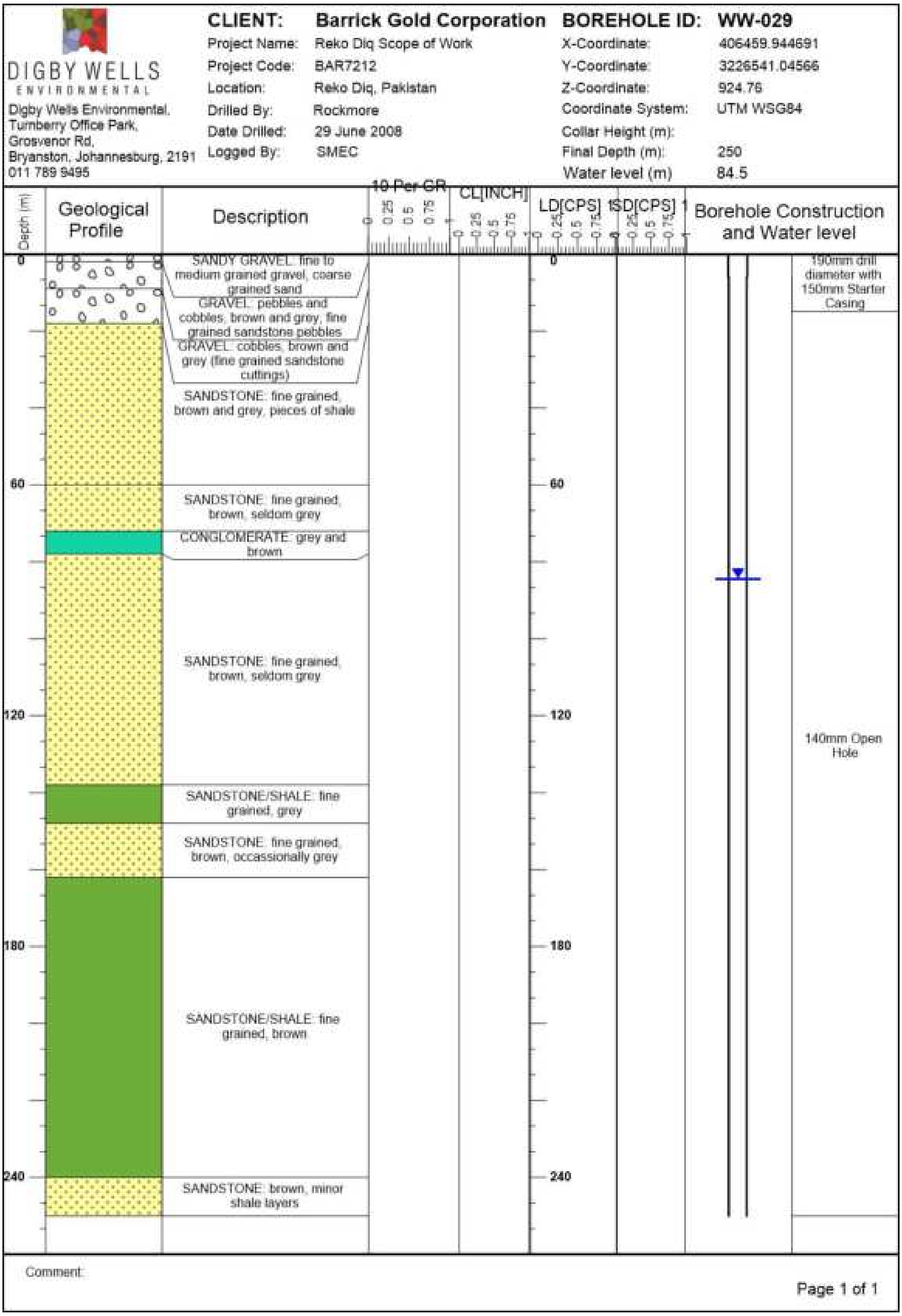


Figure 6-15: Geological log of Borehole WW29-MB, drilled in the central area of the Northern WRD

In addition, a study was undertaken by Zhan, J. (2009) on the potential WRD water balances and expected time for percolation and potential groundwater seepage concluded the following:

- Modelling results demonstrated that due to the material characteristics and climate (high evaporation), deep percolation into the dumps will likely not occur at a high rate (± 8.5 mm/year);
- The original ground surface on which the dumps will be placed is relatively flat and the hydraulic conductivity of underlying pediments is higher than the expected percolation rates;
- To simulate deep percolation on a 60 m column of waste rock would require 1.75 m of water (well above the precipitation depths experienced on site) and take approximately 204 years to reach the base; and
- Any lateral movement of water daylighting on the dump edges or at the toes will be of negligible amounts and evaporate.

Further hydrogeological investigations are planned for the Western Porphyry WRDs.

6.2.6.4. Tailings Storage Facility

The geochemical characteristics of the tailings are variable depending on the fraction of the tailings.

6.2.6.4.1. Rougher Tailings

The rougher tailings typically contain less than 0.5% Sulphide, resulting in negligible acid-generating potential. Although they have minimal buffering capacity and appear potentially acid forming in Net Neutralisation Potential (NNP), they are more accurately classified as inert. Leachable metal concentrations are generally below comparative water quality and risk assessment guideline values. Sulphate values are typically below 500 mg/L, and the pH ranges from mildly acidic to circumneutral (around pH 6).

The potential for environmental impacts to groundwater from rougher tailings is low due to extremely low infiltration rates predicted by hydrogeological modelling, the depth of groundwater across the site, and the highly mineralised, saline nature of the groundwater. Additionally, there are no groundwater receptors at risk at this site. Therefore, a liner is not necessary for the deposition of these tailings, and no specific Acid Rock Drainage and Metal Leaching (ARDML) management measures are required.

6.2.6.4.2. Cleaner tailings

Cleaner tailings, which contain between 6% and 23% Sulphide, have a high potential for acid generation. They are characterised by leachable metal concentrations that exceed comparative water quality and risk assessment guidelines. Additionally, these tailings exhibit very high Sulphate concentrations (over 2 g/L) and a low leachate pH (around pH 2).

Natural weathering of these tailings will produce acidic drainage, with concerning constituents including low pH, high electrical conductivity, sulphate, copper, lead, manganese, molybdenum, strontium, and uranium. These substances may be mobilised during operations and could impact groundwater quality. Therefore, installing an impermeable HDPE liner (as currently planned) is recommended to control and manage seepage from the TSF.

6.2.7. Greenhouse Gas Emissions

A summary of the Project-generated GHG emissions is presented in Table 6-28 and discussed below. A complete assessment is detailed in Appendix T which provides the data and emission factors used, source of the information and year-wise GHG emissions (scope 1, 2 and 3 emissions).

6.2.7.1. Estimated GHG Emissions

Estimated GHG emissions emitted as a result of the Project were calculated through a GHG Assessment. This considered scope 1 (direct emissions), scope 2 (indirect emissions), and anticipated material scope 3 categories (value chain emissions). As the project is located in a desert, land clearing emissions were considered negligible.

- The average annual estimated scope 1 and 2 GHG emissions are just over 1.3 million tonnes of carbon dioxide equivalent (tCO_2e) per year. 75% of these GHG emissions are scope 1 emissions from the consumption of diesel and HFO. The scope 1 GHG emissions during construction originate from the consumption of fossil fuels onsite as well as from transporting material to site. This is also applicable for the operation phase. The lifetime scope 1 and 2 GHG emissions are just over 53 million tCO_2e. Across the LoM, the total scope 1 GHG emissions are larger than the total scope 2 GHG emissions. Only after 2060, near the end of LoM, do the annual scope 2 GHG emissions exceed the annual scope 1 GHG emissions. The average annual GHG emissions are >1 million tCO_2e. Thus, the project will need to calculate and publicly disclose its scope 1 and 2 GHG emissions on an annual basis during its operational life. This is in line with Barrick's current disclosure practices.

- The national annual emissions for Pakistan were just over 520 million tCO_2e in 2022 (Our World in Data, 2024). Based on this, the Project's average annual scope 1 and scope 2 GHG emissions will increase the annual national emissions by approximately 0.26%.

- Based on similar copper mines operated by Barrick, it is estimated that the project will emit around 0.63 $kgCO_2e$ per USD of revenue generated.

Overall, the project could increase Pakistan's national GHG emissions by up to 0.26%. It is important to consider that the mine is extracting copper, a crucial metal in the electrification of the local and global economy as well as the rollout of renewable energy technologies. Thus, the broader impact of the project would allow for a reduction of GHG emissions in other sectors of the economy not accounted for here.

Project GHG emission reductions should be considered from the planning phases to illustrate responsible corporate governance and awareness of the Project's contribution to global emissions. Furthermore, a wide range of stakeholders are increasingly expecting companies to have robust plans to reduce their GHG emissions, to take swift, early and meaningful steps to action these plans, including transitioning to renewable energy sources, and to build resilience against the adverse impacts of climate change. A lower emissions footprint through reduced resource consumption, increased renewable energy components, lower energy consumption and improved operational efficiencies, can improve productivity and provide environmental benefits such as improved local air quality.

The majority of the Project's annual operational emissions emanate from fossil fuel consumption. GHG emission reduction and avoidance opportunities are constrained by technological availability and cost. These opportunities are discussed in Appendix T and will be reliant on future successful proof of concept and/or economic viability, and will be re-visited by RDMC accordingly.

Table 6-28: Estimated GHG Emissions.

Scope	Construction (tCO_2e)	Operation (tCO_2e)	LoM (tCO_2e)	Operation - Average (tCO_2e/y)
1	166,411	39,947,507	40,113,918	1,024,295
2	-	13,255,014	13,255,014	339,872
3	36,089	118,504,413	118,540,502	3,038,575
Total Scope 1 and 2	**166,411**	**53,202,521**	**53,368,932**	**1,364,167**
Total Including Scope 3	**202,500**	**171,706,934**	**171,909,434**	**4,402,742**

6.2.7.2. Good Practice Measures

- Low-sulphur diesel fuel or alternative cleaner fuels such as biodiesel or synthetic diesel to reduce carbon emissions will be explored and used to the extent feasible.
- Energy efficient practices including optimizing generator loading will be considered to enhance fuel efficiency and reduce overall GHG emissions per unit of energy produced.
- The best available high efficiency generators will be used.
- A regular maintenance schedule will be established to ensure engines operate at peak efficiency, reducing fuel consumption, and GHG emissions.

6.3. Summary of Cumulative Impacts

A CIA has been conducted for the Project and is detailed in Appendix U. The purpose of the CIA was to identify the cumulative impacts of existing and planned developments on environmental and social receptors, referred to as VECs.[41] The CIA also informs a management strategy to monitor and manage the cumulative impacts and suggests an institutional framework for collaboration between the mining companies, government authorities, local communities, and other key stakeholders to implement the actions informed by the management strategy.

The temporal boundary of the CIA was considered equivalent to the LoM. The temporal boundary of the CIA was considered to over a time horizon of 48 years, equivalent to the LoM of the Project and accounting for 5 years of construction and 5 years for closure, which is the duration for which the Project's impacts are expected to occur. The biggest concern would be recharge and the post closure impacts related to groundwater are not expected as the existing temporal scale already takes an additional 5 years of closure into account over the LoM. Different temporal boundaries have been defined for different VECs. The most critical of these is the water drawdown, based on the water drawdown contours based on modelling. No receptor falls within the modelled extent of drawdown.

The spatial boundaries of the CIA (also mentioned as the 'CIA Study Areas') were defined as the areas within which the cumulative impacts of the Project in conjunction with other developments may occur. The extent of CIA Study Area was based on the following key aspects:

- Groundwater impacts including aquifer drawdown. The CIA Study Area extends into Afghanistan only on account of the extension of 1 m drawdown contour across the border from Pakistan;
- Transport routes including the Road and Rail Transport Routes;
- Mineral resources in Chagai Magmatic Arc in which the Project is located. The Chagai Magmatic Arc is included in the CIA Study Area as other mining projects that may impact infrastructure and ecological resources in the area may be developed in this arc in future;
- Urban centres of the region such as Nok Kundi, Taftan and Dalbandin. The urban centres of Taftan, Nok Kundi, Dalbandin are included in the CIA Study Area as the development of mining and other projects will enhance the growth of these urban centres in future creating stress on the municipal resources;
- Ecological resources are likely to be marginally impacted at a cumulative level within the broader region and bioregion, as these areas are largely unpopulated and the current impacts are limited to a small area of agriculture in the north-west of the Mine Site, some ad-hoc hunting by various hunter and Arabs that are understood to fly in

[41] Good Practice Handbook—Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, IFC 2013

and hunt for Goitered Gazelle, Houbara Bustard, as well as some potential smuggling of endemic reptiles and sought-after prey for falconry (e.g. Houbara Bustard and Sakar Falcon).

- Although there are Critical Habitat triggers within the vicinity of the proposed operations, these many of these species are seemingly understudied and more permanent commercial presence in the region may help to stabilise the region and facilitate adding to the body of knowledge for scientific literature, where possible; and
- Other considerations including GHG emissions and air and noise emissions.

This section provides an assessment of impacts on VECs expected under the CIA Scenarios which includes Baseline, Business as Usual and Enhanced Management Scenarios.

6.3.1. Safe and Uncongested Road Networks

The road network in the CIA Study Area will be used by the Project and the other mining developments for construction and operations phases, subject to the viability of the Rail Transport Route and other Project alternatives. The increased transport activity over these road networks can result in congestion, degradation of roads and adversely affect road safety.

6.3.1.1. Baseline

A review of secondary sources indicates that road accidents occur regularly, owing to congestion on the road, degraded road conditions and unsafe driving. Along the N-25 highway, one of the roads that will be partially used for the Projects for all traffic, roughly 800 traffic accidents took place in 2019 In the Balochistan province, 275 people were killed while more than 16,000 were injured in reported accidents on major highways between October 2019 and June 2021, with an estimated 20 road accidents per day.

Often, healthcare facilities are situated at large distances from points of accidents, resulting in the injured persons being unable to receive timely medical assistance. Figure 6-16 shows a map of health facilities along both the Road Transport Route and Rail Transport Route. It can be observed that health facilities are completely absent along certain segments of these routes and situated more than 50 km apart in most cases.

Additionally, pictorial evidence shows that the roads are missing safety provisions such as dividers, barricades and streetlights. This results in the movement of traffic at high speeds with fatal accidents often occurring.

6.3.1.2. Business as Usual Scenario

The condition of the road network is expected to deteriorate significantly in the Business as Usual (BAU) scenario. The assumed developments include four additional mining developments in addition to the Project, Saindak Copper Gold Project and Siah Diq Project. The impact during the construction phase of the projects will be insignificant as it is unlikely that all projects will enter construction over the same period. However, using the road network for the transport of product to the ports, and import of fuel and other materials will significantly degrade the roads, resulting in increased congestion and reduced road safety.

It is unlikely that measures to improve safety will be implemented in the BAU scenario. The average width of the highways in the Balochistan provinces is only 7.5 m compared to the national average of 15 m. There are presently no plans for upgrading the N-40 highway, roads construction as part of CPEC, or for the development of new limited-access roads in the CIA Study Area. The N-85 highway, which was constructed as part of the CPEC, is also a dual-carriage highway with no segregation between the traffic lanes or controlled access for traffic or streetlights. Figure 6-17 provides a map of the planned CPEC Western Alignment route under which the N-85 has been constructed. It can be observed that no additional highway expansions are planned within the CIA Study Area.

Figure 6-16: Health Facilities along Road and Rail Transport Routes

Source: Ministry of Planning Development & Special Initiatives. (n.d.). Highways Network Of CPEC. Retrieved from https://cpec.gov.pk/map-single/1

Figure 6-17: Map of the Planned CPEC Western Alignment Route

Based on estimates derived from the Project's ESIA, an incremental traffic equivalent to 4,900 truck trips per annum equivalent to 13 additional PCU day at the N-40 Highway near Nok Kundi. The contribution from the Project will be less than 1% increase over the baseline traffic levels.

The business-as-usual scenario assumes a total of 194 Mtpa of copper mining, or 215% of the Project. Extrapolating the incremental traffic over a 5-year period, an increase in 29 truck trips or 1.2% of the baseline is expected. While the increase in terms of road congestion may be negligible, it can still cause increased degradation of the road conditions and adversely affect traffic safety.

6.3.1.3. Enhanced Management Scenario

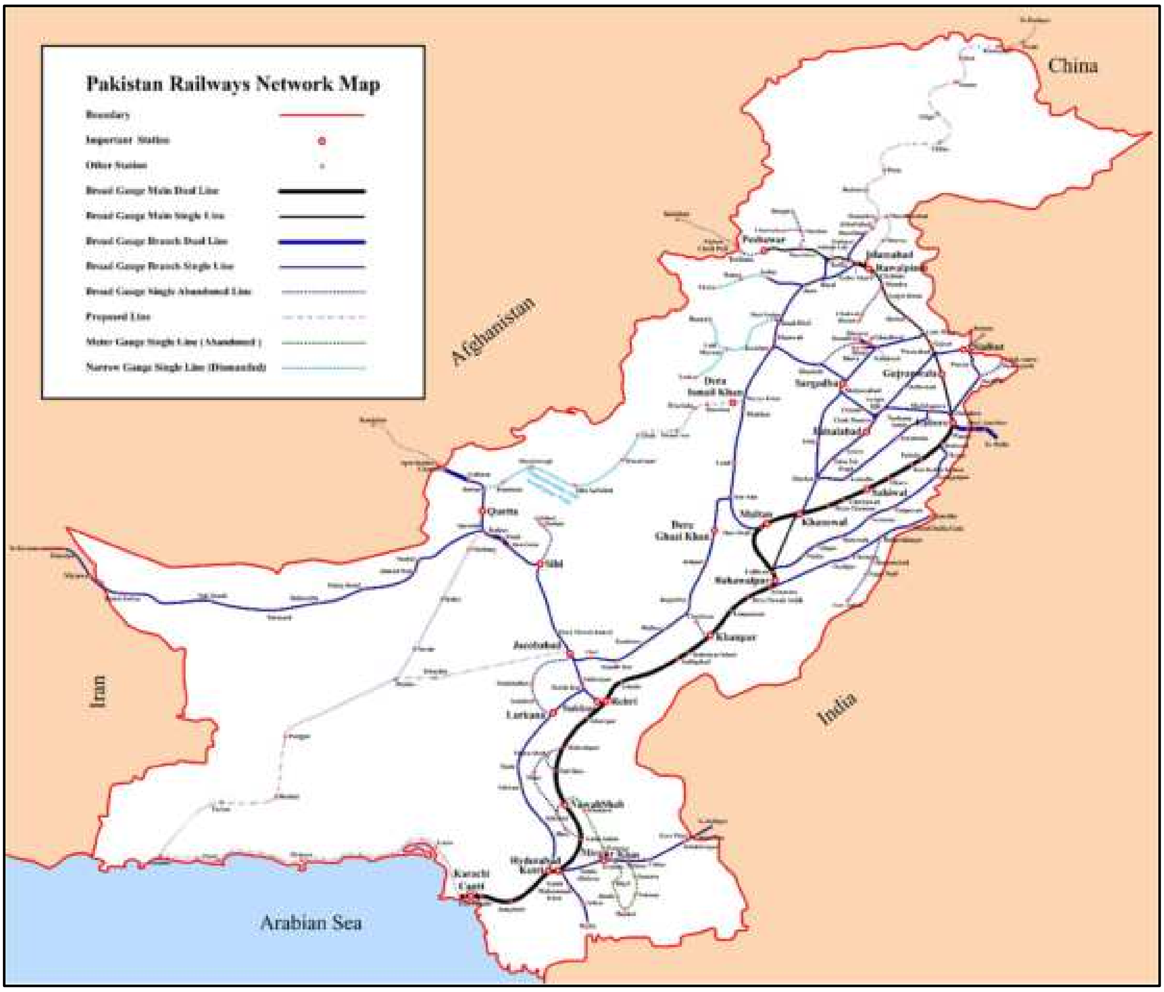
Improved management of the road network, including improved maintenance and expansion of the road's carrying capacity, will ensure that the impacts of reduced road safety and increased congestion are minimised. In the Enhanced Management (EM) Scenario, significant road network expansion in the CIA Study Area is unlikely. It may not be financially feasible for the government to add highways or limited-access routes to support the mining projects. Thus, in the EM Scenario, the mining projects will consider alternatives for transporting their product to the port facilities. The benefits envisioned under each of these alternatives are outlined below.

- *Rail Network*: An expanded railway network will allow mining projects to offset traffic and ship the product directly to Port Qasim. Shipments to Gwadar Port may also be an option subject to completion of the planned railway route. Figure 6-18 provides a map of the planned railway route to Port Qasim.

- *Slurry Pipeline to Gwadar Port*: Using slurry pipelines can significantly reduce the impact of traffic on the road network. The disadvantage of this alternative is that the use of slurry pipelines involves the hydrometallurgical process; thus, projects which intend to produce blister copper via the pyrometallurgical process as used by the Saindak Copper-Gold Project will not be able to adopt this option. A feasibility study was previously done by the Reko Diq Project to investigate this option. Although not feasible at the time of writing, evolving technology and country context may change in the future to allow this option to be feasible.

- *Enhanced Safety on Roads*: Collective investment by the projects and the government toward the road network by ensuring that streetlights, traffic dividers and roadside fencing are in place can significantly enhance safety. In addition, the projects will train their staff in safe driving and adherence to speed limits. This option, on its own, while improving safety, will likely be insufficient to prevent congestion and traffic.

If 50% of the additional forecasted mining capacity, corresponding to 40 Mtpa, shifts to slurry pipelines or rail transport, a reduction of 6 PCU per day can occur. This in addition to reducing road congestion will ensure that road conditions do not become extensively degraded and that traffic casualties are minimised.



Source: WFP. Logistics Cluster. (2022). Pakistan Railway Assessment. Retrieved from https://dlca.logcluster.org/24-pakistan-railway-assessment

Figure 6-18: Railway Route to Port Qasim

6.3.2. Sustainable Urban Centres

The cumulative development of mining projects will result in increased business opportunities and economic growth in the CIA Study Area and in the wider region. Much of this growth will be in urban centres such as Nok Kundi and Taftan. However, in the absence of urban planning economic growth can result in unplanned development of these centres.

6.3.2.1. Baseline

The baseline conditions derived from GIS imagery, secondary sources and consultations carried out as part of the early works ESIA suggest that developments in the CIA Study Area are largely unplanned.

6.3.2.2. Business as Usual Scenario

The unplanned development will result in reduced road safety, encroachment around transportation routes and deteriorating security conditions. Based on the population growth rate in the BAU Scenario, the population in the Nok Kundi is expected to increase to ~40,000 residents[42] by 2028.

As more mining projects become operational, the town of Nok Kundi will experience increased traffic and roadside congestion as seen in the GIS imagery of the baseline conditions. Figure 6-19 provides an overview of the land-use in and near the towns of Nok Kundi and Taftan between 2013 and 2023.

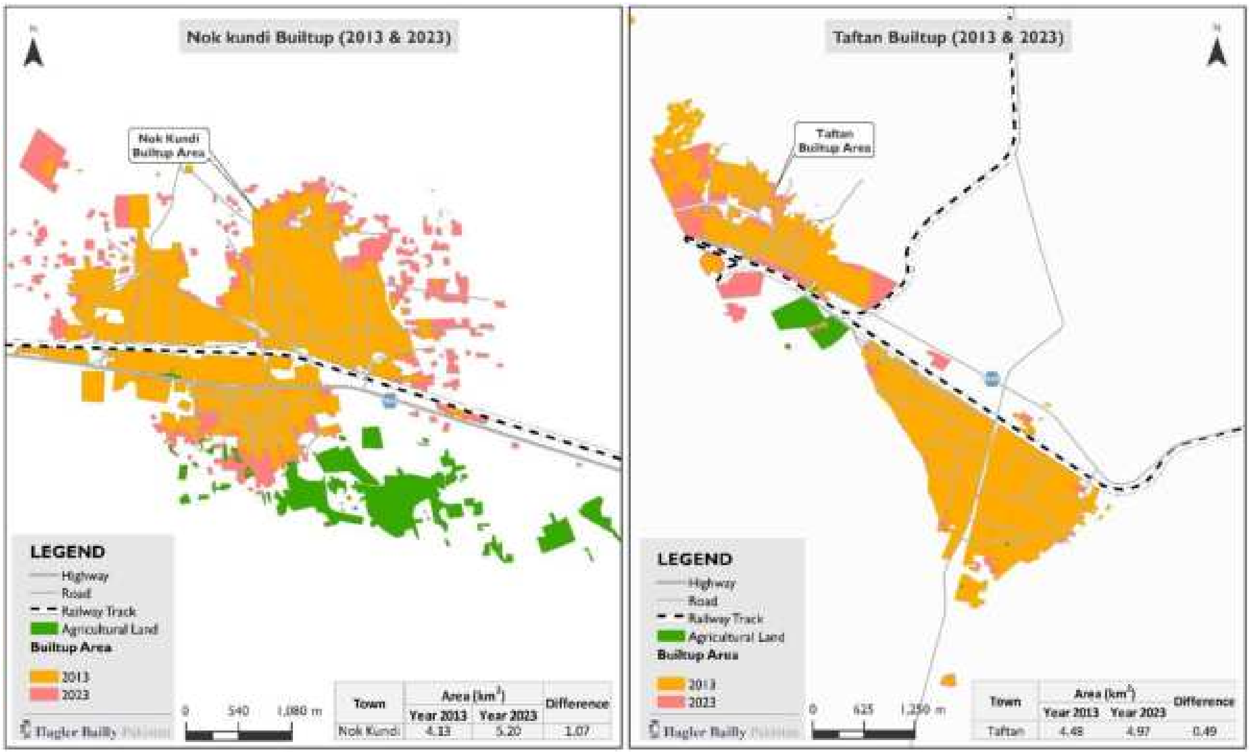


Figure 6-19: Land use in Nok Kundi and Taftan (2013 and 2023)

Several land-use features, and development patterns associated with unplanned urban development have been identified in GIS imagery which will persist through into the BAU scenarios. The following is a description of features and patterns that can be observed:

- *Absence of public spaces*: The land-use and satellite imagery indicate that attention to development of public spaces has been minimal in the past, and no parks and public spaces with the exception of one cricket ground were observed in the town of Nok Kundi and Taftan which have a combined population of ~40,000. It is likely that development of these public spaces will not be prioritised in the BAU scenario. Figure 6-20 provides imagery of Taftan and Nok Kundi which illustrates this phenomenon.

[42] Based on 2017 census data that places the population at 22,283 residents, projected to increase at 6.4% over a 10 period year by the time the Reko Diq Project comes into operations in 2028.

Nok Kundi Settlement: No parks or recreational spaces are observed. Some undeveloped space has been allocated for a local school (outlined in red) is situated near a busy road.

Taftan Settlement: A complete absence of parks and public spaces can be observed with the exception of one cricket ground (outlined in red).

Figure 6-20: Images identifying Public Spaces in Taftan and Nok Kundi Settlement

- *Absence of arterial roads*: Arterial roads are few in the towns of Nok Kundi and Taftan, and most households are connected via unpaved dirt tracks which greatly prohibit unrestricted and safe movement of traffic. Comparison between 2013 and 2023 imagery for Nok Kundi shows that arterial roads have not been expanded and have remained largely in similar condition, despite expansion of the settlement. In the BAU this trend is likely to continue, resulting in traffic congestion throughout the settlement and limiting public transport options such as buses. Figure 6-21 provides an overview of arterial roads in the Nok Kundi settlement, and comparison with past imagery which shows little no improvements in the local roads.

Nok Kundi Settlement (2013 imagery): The roads connecting the community to the highway which runs through the settlement are unpaved, with minimal 4-way intersections and dead-ends

Nok Kundi Settlement (2023 imagery): The condition of roads is largely unchanged from 2013

Figure 6-21: Comparison of Arterial Roads in Nok Kundi

- *Informal settlements and absence of zoning*: Settlements in the towns in the CIA Study have not been planned in line with zoning laws, as evidenced by uneven spacing, unequal plot sizes and minimal spacing between the walls of housing and the roads. When imagery over the past 10 years is compared, it is apparent that these settlements will continue to develop near the outskirts of the towns in the BAU scenario. Figure 6-22 provides imagery of the Nok Kundi outskirts, showing the emergence of scattered settlements likely to continue in the BAU Scenario.

Nok Kundi Settlement (2013 imagery): Only a few houses can be observed in the outskirts of the settlement.

Nok Kundi Settlement (2023 imagery): The number of houses has increased significantly. The houses are connected via unpaved roads and have unequal plot sizes and minimal spacing from the roads.

Figure 6-22: Comparison of GIS Imagery

6.3.2.3. Enhanced Management Scenario

Enhanced management of the sustainable urban centres will ensure that development will occur sustainably as opposed to the BAU Scenario. The benefits envisioned are described below.

- *Public spaces:* An increase in the number of public spaces, in addition to improving the quality of life of the local communities will also enhance their overall perception of the mining projects and associated developments in the province.
- *Arterial roads:* Enhancement of arterial roads will ensure that traffic disruption is minimised, which will enhance the quality of life of the local communities in addition to a reduction in GHG emissions due to efficient transportation routes. Furthermore, the enhancement will pave the way for public transportation options such as buses, which will result in a further reduction of emissions and improve the living standards of the local communities.
- *Informal settlements:* Proper planning and appropriate zoning for settlements will reduce the overall land footprint of the settlements, which in addition to reducing the environmental impact associated with urban development will also reduce the cost of housing and land relative to the BAU scenario. The option to shift to mixed-use zoning will also reduce travel times for the local community residents and reduce their dependency on transport, thus enhancing their living standards and reducing GHG emissions.

6.3.3. GHG Emissions

The cumulative developments in the CIA Study Area, particularly the mining developments, will need to develop additional energy infrastructure to support their operations. Energy production can be a GHG intensive process and can significantly contribute to climate change.

6.3.3.1. Baseline

The existing and planned mining projects rely on HFO for energy production. While the Reko Diq Project intends to develop a solar field to offset its HFO use[43], it is unlikely that none of the other mining developments will use wind or solar energy to offset their energy demand, which can significantly reduce the net GHG emissions.

6.3.3.2. Business as Usual Scenario

In the absence of a connection with the national power grid that can provide backup power, it may not be financially attractive for the other mining projects to install solar PV and wind-based generation capacity in the foreseeable future. Thus, the mining projects will continue to use HFO or fossil fuels for energy production under this scenario. This is expected to result in roughly 3 Mt CO_2-eq emissions per annum from energy production alone, which is a 0.6% increase over the annual national emissions of Pakistan during that time or 13% increase from the mineral processing sector.

[43] The Reko Diq Project intends to develop a 150 MW solar field at the time of writing. This is expected to fulfil 20% of the Project's energy requirements.

6.3.3.3. Enhanced Management Scenario

Under Enhanced Management Scenario, the mining projects will offset some or all their energy demand by using solar PV or wind power. If 30% of the energy demand of the mining projects is met this way, a reduction in roughly 1 Mtpa of CO_2-eq emissions over the BAU can be expected. Additionally, the use of renewables will also result in a decrease in the air pollution resulting from fossil fuel use for power generation.

The mining projects will also consider alternatives for shifting to rail transport, which will result in a decrease of ~140,000 tons CO_2-eq/annum of emissions if 50% of the additional forecasted developments corresponding to about two mining projects opt for this option[44,45].

6.3.4. Social Acceptance of Mining Projects

Mining projects can face reactions from the local communities and other stakeholders if their activities are perceived to contribute to infringe on the rights of the local communities associated with tighter security controls that restrict local movement. The local communities can also feel alienated if they perceive that they are not getting their due share in employment and training opportunities. A transparent and equitable stakeholder engagement process can help in managing the expectations and perceptions and create a positive environment for development of mining industry in the region.

6.3.4.1. Baseline

A review of secondary sources suggests that the social acceptance of the mining developments in the Balochistan province has wavered in the past, with protests from local communities and the Balochistan government, who have alleged that the mining projects do not equitably benefit the province's populace (Bhutta, 2015)

6.3.4.2. Business as Usual Scenario

This scenario assumes the continuation of the Reko Diq Project's stakeholder engagement and CSR activities. The other mining companies in this scenario will carry out their stakeholder engagement independently and without a comprehensive regional forum for stakeholder engagement.

Some mining projects are carrying out their stakeholder engagement and CSR activities in communities near their mine sites. Details of the activities undertaken thus far are provided below.

- *Reko Diq Project*: The Project has established CDC comprised of members from local communities. The CDCs main tasks are to identify, evaluate, and select investment projects that improve the well-being and economic status of the local communities. The

[44] Based on a difference of 157,397 tons CO2-eq between Scenario 1 and Scenario 2 calculated for the Reko Diq Project. Scenario 1 assumes that all movement of material between Port Qasim and the Mine Site is done via the Road Transport Route and Scenario 2 assumes that all such transport is done via the Rail Transport Route.

[45] Difference in Road and Rail emissions scenario for Reko Diq interpolated for 80 MPTA of additional mining expansions in BAU Scenario.

Project has completed several CSR initiatives to develop healthcare and education, and clean water related infrastructure focusing on local communities such as Humai and Mashki Chah and in Nok Kundi. The Project has also established a training centre in Nok Kundi to provide vocational and technical skills training (Figure 6-23).

- *Saindak Copper Gold Project*: The project has been actively engaged in CSR initiatives aimed primarily at benefiting the people of Saindak with a total expenditure of upwards of PKR 660 million. These initiatives include the construction of health facilities like the Basic Health Unit at Taftan and a 20-bed hospital at Saindak, the provision of free eye camps, scholarships for students, the establishment of technical training centres, installation of power and water supply systems, and road construction projects and COVID-19 relief.
- *Siah Diq Project*: The project has yet to disclose its roadmap of planned activities publicly, but it is likely that, similar to the other two projects, it will focus its activities within its area of influence while overlooking the broader social acceptance of mining projects in the CIA Study Area.

The approach of all mining projects focusing only on the nearest communities will compromise the political visibility and acceptance of the projects if cities such as Taftan and Dalbandin are excluded entirely from the CSR-related benefits brought on by the mining projects. It is highly likely under the BAU Scenario that the social acceptance of the mining projects will lessen as other cumulative impacts of the mining developments become more evident to stakeholders, and mining projects delegate responsibilities for management of a broader social perspective to one another.

First Community Health Centre at Humai (East of the Reko Diq Mine Site and nearest settlement) in 2023

Primary school by RDMC at Humai settlement (East of the Reko Diq Mine Site)

First Mobile Medical Unit by RDMC-IHHN at Nok Kundi settlement (Road Route) in 2023

Primary school by RDMC at Darband Chah settlement (East of the Reko Diq Mine Site)

Figure 6-23: CSR Initiatives completed by the Reko Diq Project

6.3.4.3. Enhanced Management Scenario

The complex socio-economic and broader regional issues impacting the mining industry fall beyond the scope of RDMC's existing community development programs. Several issues, such as labour rights violations, safety hazards, and challenges related to worker registration and training, require a collective multi-stakeholder intervention at the CIA level.

The EM Scenario assumes the development and successful implementation of a Stakeholder Engagement Framework that will acknowledge and address stakeholder management at a regional level. This framework will also outline strategies and initiatives aimed at mitigating challenges faced by the mining industry in Balochistan, including those related to labour rights, safety hazards, and community development. The benefits envisioned under Enhanced Management are provided below:

- *Improved Stakeholder Confidence*: A more extensive coverage of stakeholders under the framework will assure stakeholders that the benefits of mining developments in the CIA Study Area have been distributed equitably. This approach will also improve investor confidence and lower the potential reputational risks for other mining developers in the future, further improving local livelihoods and standard of living.

- *Improved Political Visibility*: In line with the approach adopted by RDMC, the framework will include local government representatives and focal persons from the local communities, which will enhance the overall political acceptability of the mining projects, particularly to the Balochistan government, which has alleged on several occasions that the mining projects do not benefit the province's populace.

6.3.5. Income from Mining Developments Dependent on Groundwater

Water is a critical resource for development of the mining industry in the Chagai belt. The projects are presently extracting water from the Hamun-i-Mashkel Basin and may extract water from Goud-i-Zirreh Basin; both regional aquifers are transboundary. The income from mining projects can be impacted depending on availability of sufficient groundwater. As more mining projects become operational, depletion of the regional aquifers may force the projects to consider costly alternatives such as desalination of sea water and supply pipelines from the coast to meet their demand for water.

6.3.5.1. Baseline

The existing and planned developments are not presently constrained by groundwater resources. For the time being, the Saindak Copper Gold Project and the Reko Diq Project expect that the supply from aquifers will be sufficient to meet demand for water by the projects.

6.3.5.2. Business as Usual Scenario

The forecasted mining developments in this scenario will likely put significant pressure on the supply from groundwater sources, as exploratory work undertaken by the Project suggests that the supply from the Northern Groundwater System will meet the needs of the Project. This will prompt other mining projects to carry out exploratory work on the Hamun-i-Mashkel or Nok Chah areas, and other prospective groundwater sources.

6.3.5.3. Enhanced Management Scenario

Adoption of technologies that achieve high efficiency of water use will result in a net reduction of 30% to 50% of the water use by all users in the CIA Study area, including mining developments, local communities, and irrigated agriculture.

While the possibility of eventual aquifer depletion cannot be ruled out in this scenario, it will enhance the income of the mining projects by allowing them to exploit the shared groundwater resource more efficiently and reducing the rate at which the aquifer depletion will occur before which the mining projects will need to investigate alternatives.

6.4. Environmental and Social Risks

In addition to predicted impacts, environmental and social risks have been identified to ensure appropriate mitigation measures are developed and implemented. As opposed to impacts which are defined as an event which will occur, risks are events which could occur if appropriate mitigations and management actions are not implemented.

6.4.1. Human Rights Risks

Barrick have a zero-tolerance policy for any human rights violations committed by employees, affiliates or any third parties acting on our behalf or linked to any part of our operations.

Responsible mining can deliver positive, long-term value and drives socio-economic upliftment. Community development investments in improving access to water, education and healthcare also deliver an improvement to a community's fundamental human rights.

However, the positive benefits of mining can only be truly s which is informed by the expectations of:

- The UN Guiding Principles on Business and Human Rights (UNGPs).
- The OECD Guidelines for Multinational Enterprises.
- The Voluntary Principles on Security and Human Rights (VPs).

This is further augmented and embedded through the Barrick Code of Business Conduct and Ethics, Anti-Bribery and Anti-Corruption Policy, and Social Performance Policy. Barrick expects the same standards from our suppliers which similarly must incorporate human rights provisions.

A Human Rights Assessment (HRA) has been completed for the Project by Avanzar LLC. This section summarises the key findings of the assessment. The objective of the HRA is to assess the company's level of risk exposure as defined by its human rights obligations or expectations, actual or perceived; the positive contributions that the site has made towards respecting human rights; and the progress made in reducing the risk of infringing upon individuals' human rights. These obligations can be legally required (by national law, lenders, etc.).

The HRA considers a range of indicators which were created based on a review of the major international Human Rights Covenants and Declarations and other Human Rights protocols such as Rights and Democracy's Human rights assessment, and the Danish Institute for Human Rights template. The indicators relate to the following categories of rights:

- Labour and Working Conditions (including safety and health);
- Indigenous Peoples Rights;
- Community Cultural, Social and Economic Rights;
- Community Environment and Health and Safety;
- Land Rights;
- Security; and
- Anti-corruption.

Table 6-29 presents a summary of the human rights aspects and controls which have or will be implemented.

Table 6-29: Human Rights Risks

Actual/Potential Human Rights Impact	Current Controls
Right to just and favourable conditions of work (Actual and Potential impacts).	• RDMC has adopted Barrick's Human Rights Policy, Global Harassment Standard, and Code of Business Conduct and Ethics; • A comprehensive health and safety management system has been implemented. • Ensuring rosters that allow sufficient time for in-country and out of country workers to spend time with family; • Promoting diversity in the workplace with a strong commitment to hiring female workers; and • Ensuring compliance with national and provincial labour laws.
Right to just and favourable conditions of work. Right to freedom from slavery. Right of the child to be protected from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development.	• Adoption of a manpower Contractor Management Standard; • Implementation of a system to conduct labour audits of contractors; • Requirements for contractors to comply with all applicable labour laws in contracts; • Vendor onboarding procedure which considers human rights compliance; and • Checking of identification documents for all workers to ensure no workers below the age of 18 are provided access to the site.
Right to freedom from discrimination.	• Zero tolerance for discrimination on or off site (clearly communicated through various means, including the Employee Handbook); and • Implementation of fair hiring policies.
Right to a standard of living adequate for the health and well-being of himself and of his family, including housing.	• Accommodation is being designed in line with the requirements of the IFC/EBRD Workers' accommodation: processes and standards.
Right to Security of Person.	• The ESIA includes an assessment of the possibility of an influx of workers causing an increase in crime and violence/social disturbance in the area and putting pressure on housing, local infrastructure and public services in in local communities; • Development of an Influx Management Plan;

Actual/Potential Human Rights Impact	Current Controls
	• A cultural orientation presentation is given to all people who visit site to ensure ongoing respect for local culture and customs; and • RDMC has established MOUs with the Levies and Frontier Corps to provide added security to the area, with an increase in officers during construction and operations.
Right to water.	• Detailed studies of water across the region have been undertaken to ensure project activities will not unduly impact community water sources.
Right to life, liberty and security of person. Right to freedom of peaceful assembly and association.	• RDMC has also incorporated VPSHR related requirements in agreements with the provincial government of Balochistan and the federal government of Pakistan for the provision of security services by public security forces; the Levies and the Frontier Corps; • Implementation of a program to provide training to private and public security forces on human rights and the VPSHR; and • Development of programs to provide oversight and monitoring of security forces against the requirements of the agreements.
Right to freedom from harassment and discrimination.	• Thorough diligence carried out prior to selection of private security contractors including assessing their ability to comply with VPSHR criteria; • Human rights and international law enforcement principles training program for private security forces implemented; • Screening of security contractor employees.
Funds paid by RDMC to the government for public security services could be misused, diverted, or allocated to unrelated military operations that result in human rights violations.	• A verification process has been established to ensure that payments for security equipment for public security forces are legitimate; • As per the agreement, RDMC will periodically confirm and verify that the Government Parties have distributed payments and support to the applicable Security Forces deployed to the Project; and • Request records and documentation regarding expenditures related to the provision of support prior to making payments.

6.4.2. Climate Change Risk and Vulnerability Assessment

The IPCC stated that the continuous release of GHG emissions into the atmosphere is likely to lead to increased global temperatures that will reach 1.5°C above pre-industrial levels by the middle of the century (IPCC, 2021). These increased global temperatures will lead to irreversible melting of polar ice caps, rising sea levels, and increased frequency and severity of extreme weather events such as heat waves, droughts and heavy precipitation (IPCC, 2021). These global climatic changes will impact earth and atmospheric systems, how humans interact with nature as well as the functioning of global economies.

Climate change impacts also pose significant risks to human health. The WHO stated that climate change is already causing adverse health impacts to communities and individuals, leading to injuries, illnesses and even death. These impacts are caused by increased severe and frequent extreme weather events (WHO, 2021), which include heatwaves, floods, droughts, storm events, increased vector-, food- and water-borne diseases (GFDRR, 2020).

Climate change additionally poses significant social and economic risks which all impact livelihoods, business operations, agriculture, tourism, transportation, and access to equitable healthcare and social support (The World Bank, 2024; WHO, 2021). Climate risks and impacts disproportionately impact disadvantaged and vulnerable communities and groups such as children, women, poor communities, ethnic minorities, older populations, and displaced people (WHO, 2021). Climate change therefore has the potential to adversely impact local and global sustainable development.

Pakistan is ranked #150 out of 185 for climate vulnerability, with higher rankings equating to higher vulnerability of climate change (ND-GAIN Index, 2021). This means the country is vulnerable to various acute and chronic physical climate risks such as wildfires, epidemics, floods, droughts and extreme weather events or storms (The World Bank, 2024; GFDRR, 2020).

6.4.2.1. Climate Change Risk Assessment Methodology

To assess projected trends in climate and adequately assess future climate risk, it is necessary to look at global climate models such as the Coupled Model Intercomparison Project Phase 6 (CMIP6). CMIP6 is overseen by the World Climate Research Program and informs the World Bank's (2024) climate projections, as well as IPCC Assessment Reports. The CMIP6 dataset considers five Shared Socio-economic Pathways (SSPs), each representing different potential emissions scenarios in relation to different global climate change responses. The SSPs, with their varied development paths, mitigation efforts, and defined emission trends are detailed in Table 6-30.

Further climate analysis for the Project were determined using SSP2-4.5 and SSP5-8.5.

Table 6-30: SSP Emissions Pathways and Temperature Increases (IPCC, 2021)

Name	Scenario	Emissions	Projected Temperature Increase by 2050	Projected Temperature Increase by 2100
SSP1-1.9	Sustainable development resulting in radiative forcing of 1.9 Wm^{-2} by 2100.	CO_2 emissions cut to net zero by 2050 (meets Paris Agreement).	1.6	1.4
SSP1-2.6	Sustainable development resulting in radiative forcing of 2.6 Wm^{-2} by 2100.	Low emissions but not cut as fast as SSP1-1.9. CO_2 emissions cut to net zero around 2075.	1.7	1.85
SSP2-4.5	Middle-of-the-road development resulting in radiative forcing of 4.5 Wm^{-2} by 2100.	Intermediate emissions. CO_2 emissions around current levels until 2050, then falling but not reaching net zero by 2100.	2.1	2.8
SSP3-7.0	Regional rivalry resulting in radiative forcing of 7 Wm^{-2} by 2100.	High emissions. CO_2 emissions double by 2100.	2.2	3.7
SSP5-8.5	Fossil-fuel led development resulting in radiative forcing of 8.5 Wm^{-2} by 2100.	Very high emissions: CO_2 emissions triple by 2075.	2.5	4.5

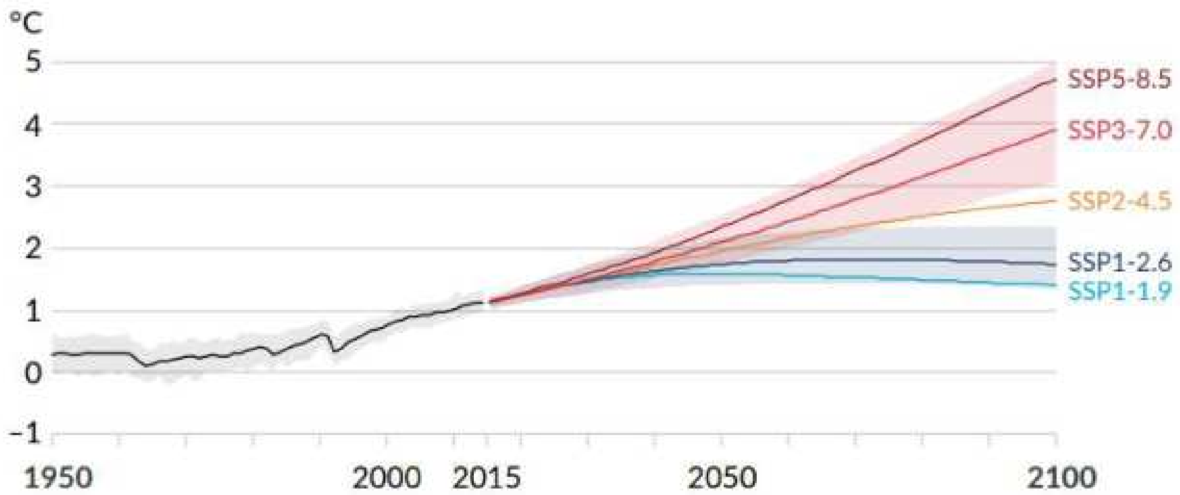


Figure 6-24: Global Surface Temperature Changes Under Different SSP Scenarios
(IPCC, 2021)

When reviewing emissions scenarios, the 'climate time lag' must be considered. The climate time lag refers to delays between the time when emissions are released into the atmosphere and when the Earth's temperature responds to those emissions (Mulhern, 2020). The climate time lag is influenced by processes that regulate the earth's temperature such as ice sheets and the movement of heat in oceans.

It is important to note that due to the 'climate time lag' within the atmosphere, temperature changes over the coming decades are a result of historic emissions, and therefore current and future emissions associated with the five SSP scenarios only begin diverging over the longer-term in approximately 2050 (Figure 6-24) (Mulhern, 2020). This delay therefore means the difference between the scenarios is minimal in the beginning of the Project but becomes increasingly noticeable towards 2050 and thereafter. Two scenarios were selected during this analysis to provide a scale of potential changes the Project may face. Projected rates are calculated through 2070 to account for a 38-year LoM, while projections are also provided through the end of the century consider any variance in the LoM and the existence of permanent infrastructure such as TSFs. The SSP2-4.5 scenario represents a similar emissions path to what is currently taking place across the globe, while the SSP5-8.5 is based on a high emissions pathway, providing a worst-case scenario to ensure the Project is prepared for the majority of potential risks.

6.4.2.2. Materiality

A climate change risk or opportunity is considered material for the Project based on a Double Materiality assessment considering both financial and impact materiality.

Based on results from the GHG assessment and National Climate Commitment (NCC) Compatibility Review, the Project is compatible with national climate commitments, therefore it is not considered to have any significant impact materiality. Thus, only financial materiality is considered below.

In line with Barrick's internal risk procedures, financial materiality is based on the potential financial cost an impact could have. Barrick considers any impact > USD100,000,000 to have a substantive impact on the company. This is roughly 0.7% of Barrick's current group-wide revenue. Applying this same approach from the group-wide level to a project-specific level, a material impact would be one that has the potential to impede operations for three or more days.

Physical events that could have an impact on the project can occur multiple times within a year. Thus, the potential impact from single events are considered as well as the cumulative potential impact from repeat events. For example, a severe sandstorm could impact or shut down operations for several days at a time, whilst smaller sandstorms, which occur more frequently, could have a collective impact in excess of three days operation.

Transition events, including shifts in national and international policies and regulations, changing stakeholder concerns, and technological advances leading stranded assets or equipment phase-out, that may result in costs equal to three days of lost revenue were considered.

Thus, the initial list of risks considered is outlined below. It is important to note that this list is not exhaustive as it only contains risks that are projected to be exacerbated by climate change. Furthermore, any risks whose hazard score is <1 is excluded from further consideration in this section.

List of risks considered:

- Physical Risks:
  - Extreme heat days;
  - Heavy rainfall and flooding events;
  - Landslides and slope failure;
  - Retaining/pit wall failure;
  - Droughts;
  - Sea Level Rise;
  - Storm Surges;
  - Cyclones;
  - Sand and Dust Storms; and
  - Chronic climatic changes and extreme weather events.
- Transition Risks:
  - Carbon taxes;
  - GHG-related trade tariffs;
  - Stranded assets and phase-out of equipment before pay-off periods; and
  - Reputational concerns.

6.4.2.3. Physical Climate Change Risks

Project specific risks and the impacts thereof on worker health and safety, operations and the value chain are outlined and discussed in Table 6-31. Detailed designs are still underway so risks are quantified using two adaptive capacity scenarios where relevant, showcasing risks levels with and without adaptation and mitigation measures.

The LoM is projected to be 38 years. To allow for construction years and assess risks into the decommissioning phase, hazard data is presented as a change from the historic baseline to a time horizon covering 2070. Additional details on the justification and source of each quantitative hazard score can be found in Appendix T.

6.4.2.4. Transition Climate Change Risks and Opportunities

Annual project emissions are expected to exceed 100,000 tCO_2e per year (Appendix T). Therefore, according to the Equator Principles, transition risks as outlined by the TCFD (policy and legal risk, reputational risk, technology risk and market risk) should also be considered (Table 6-32). Transition opportunities are also discussed in Table 6-33. Transition risks and opportunities are identified based on political, technological, market-based, and reputational changes associated with a low-emissions scenario such as SSP1-2.6 and the IEA Net Zero Emissions by 2050 guidance (IEA, 2021).

Table 6-31: Project Specific Physical Climate Change Risks

Hazards		Hazard Score (0-10)		Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score	
		SSP2-4.5 RCP4.5	SSP5-8.5 RCP8.5					SSP2-4.5 RCP4.5	SSP5-8.5 RCP8.5
Infrastructure Damage and Increased Operating Costs									
Heavy rainfall and flooding events	Mine Site	9	10	1	1	0	At minimum, heavy rainfall can lead to higher operational expenses from increased pumping activities. The Project may also experience lost production due to road closures which cause the delay of goods, resources, and services to and from the mine and within the mining license. Damage to power transmission lines coming from the on-site power plant can also lead to production delays if generators are unable to keep up with operational power needs. Moderate impacts of extreme rainfall include damage to mining infrastructure and equipment, incurring higher costs to repair damage. Complete failure of pumping equipment, pipelines, diversion channels and water storage ponds due to floods or an extreme precipitation event can lead to production stoppages. *Key risks: operational and maintenance costs, lost production*	9	10
		50-year flood intensity is projected to increase by ~86% under RCP4.5 and ~155% under RCP8.5 by 2070.		Exposed infrastructure is vulnerable to damage during extreme rainfall and flooding. This includes linear infrastructure (access roads, pipelines, conveyor belts, fences and power transmission lines) as well as administrative and accommodation buildings. Pits and TSFs will require additional pumping during heavy rainfall periods, while stormwater infrastructure and water storage facilities may overflow.	Extreme precipitation and flooding can cause upstream and on-site infrastructure breakdowns and damages that can halt production.	No consideration for extreme precipitation and floods.			
						0.5		4.5	5
						Extreme precipitation and flooding events considered in stormwater management, site and infrastructure planning.			
	Railway	4	3	1	1	0	Damage or flooding of rail infrastructure can lead to both increased operational costs and delays to shipment of copper concentrate for export or supplies for import to the mine site. For proposed portions of the railway from the mine site to Nok Kundi, damage to railways will incur higher costs to the Project to repair damage. Damage to portions of the railway under control of Pakistan Rail from Nok Kundi to PIBT will be subject to operational delays as damages are repaired and flood water is drained. Reports from the recent railway study show various periods of railway closures lasting between 3 and 8 months due to flooding (PRACS, 2024). *Key risks: operational and maintenance costs, operational delays*	4	3
		50-year flood intensity is projected to increase by ~33% under RCP4.5 and by ~23% under RCP8.5 by 2070.		Extreme rainfall and flooding can cause damage to bridges and embankments, as well as overtopping of rail tracks.	Rail infrastructure breakdowns and damages during extreme precipitation and flooding events can increase costs and halt production.	No consideration for extreme precipitation and floods.			
						0.5		2	1.5
						Railway repairs and upgrades made to increase resilience to flooding.			

Hazards		Hazard Score (0-10) SSP2-4.5 RCP4.5	Hazard Score (0-10) SSP5-8.5 RCP8.5	Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score SSP2-4.5 RCP4.5	Projected Change in Risk Score SSP5-8.5 RCP8.5
	PIBT at Port Qasim	5	4	1	1	0	At a minimum, heavy rainfall can lead to higher operational expenses and operational delays due to damage to port infrastructure. Closed access roads from the rail loop can lead to delays of copper concentrate shipment for export, or to goods and services to and from the mine site. Moderate impacts of extreme rainfall include damage to stormwater management infrastructure, incurring higher costs to repair damage. Complete failure of stormwater management channels due to floods or an extreme precipitation event can lead to operational stoppages. *Key risks: operational and maintenance costs, operational delays*	5	4
		50-year flood intensity is projected to increase by ~50% under RCP4.5 and ~37% under RCP8.5 by 2070.		Exposed infrastructure is vulnerable to damage during extreme rainfall and flooding. This includes linear infrastructure such as fencing, bridges, gates, conveyor belts and access roads from the rail loop. Administration buildings, as well as material handling equipment such as cranes and trucks, are also vulnerable to damage.	Infrastructure breakdowns and damages during extreme precipitation and flooding events can increase costs and halt production.	No consideration for extreme precipitation and floods.			
						0.5		2.5	2
						Extreme precipitation and flooding events considered in stormwater management, site and infrastructure planning.			
Contamination and Reputational Risks									
Heavy rainfall and flooding events	Mine Site	9	10	1	1	0	Increased rainfall increases discharge of excess water into stormwater management systems, potentially leading to environmental damage and reputational risks from sedimentation of surrounding waterways. Failure of pumping equipment and stormwater management infrastructure can lead to seepage into the local environment. Increased rainfall can lead to runoff of sulphides from waste rock dumps (WRDs) and stockpiles, leading to acid rock drainage. Damage to pipelines and conveyor belts can also spill waste into the environment. Contamination leads to environmental risks and fines, health and safety risks, as well as reputational risks and risks to the Project's social license to operate. Increased water content in the TSF could lead to additional leaching of contaminants into surface and groundwater resources. *Key risks: health and safety, environmental damage, reputational risks*	9	10
		50-year flood intensity is projected to increase by ~86% under RCP4.5 and ~155% under RCP8.5 by 2070.		Exposed infrastructure holding mining materials and waste such as existing slurry pipelines, conveyor belts, dirty water storage ponds, stormwater diversion channels, and TSFs are vulnerable to damage or overtopping during extreme rainfall and flooding.	Infrastructure damage and overtopping can lead to seeps and spillage.	No consideration for extreme precipitation and floods.			
						0.5		4.5	5
						Extreme precipitation and flooding events considered in stormwater management, site, and infrastructure planning.			
	Rail	4	3	1	1	0		4	3

<table>
<tr><th rowspan="2">Hazards</th><th rowspan="2"></th><th colspan="2">Hazard Score (0-10)</th><th rowspan="2">Exposure (0-1)</th><th rowspan="2">Sensitivity (0, 0.5,1)</th><th rowspan="2">Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)</th><th rowspan="2">Risk</th><th colspan="2">Projected Change in Risk Score</th></tr>
<tr><th>SSP2-4.5 RCP4.5</th><th>SSP5-8.5 RCP8.5</th><th>SSP2-4.5 RCP4.5</th><th>SSP5-8.5 RCP8.5</th></tr>
<tr><td rowspan="6"></td><td rowspan="3"></td><td colspan="2" rowspan="3">50-year flood intensity is projected to increase by ~33% under RCP4.5 and by ~23% under RCP8.5 by 2070.</td><td rowspan="3">Extreme rainfall and flooding can cause damage to bridges and embankments, leading to accidents and spills of fuel or copper concentrate.</td><td rowspan="3">Infrastructure damage that leads to seeps and spillage can lead to fines and reputational risks.</td><td>No consideration for extreme precipitation and floods.</td><td rowspan="3">Damage to railway infrastructure can lead to accidents on the railway, causing potential spills of copper concentrate, fuels, or any hazardous materials being transported to site. Loss of copper concentrate increases costs of cleanup and potential lost profits.
Spills or leakages of chemicals and fuel can spread through the environment more easily with additional rainfall. Contamination leads to environmental harm and reputational risks, as well as environmental fines if spills occur on the portion of the railway under the control of the Project.

Key risks: health and safety, environmental damage, reputational risks</td><td></td><td></td></tr>
<tr><td>0.5</td><td rowspan="2">2</td><td rowspan="2">1.5</td></tr>
<tr><td>Railway repairs and upgrades made to increase resilience to flooding.</td></tr>
<tr><td rowspan="3">PIBT at Port Qasim</td><td>5</td><td>4</td><td>1</td><td>1</td><td>0</td><td rowspan="3">Spills or leakages of copper concentrate, chemicals, sewage, and fuel can spread through the environment more easily with additional rainfall.
Increased sedimentation from heavy rainfall leads to increased dredging costs, lower visibility, impeded access to berths, and navigation difficulties within the port, leading to operational delays and damage to infrastructure.
Contamination and sedimentation lead to damage of marine ecosystems, environmental risks and fines, health and safety risks, as well as reputational risks

Key risks: health and safety, environmental damage, reputational risks</td><td>5</td><td>4</td></tr>
<tr><td colspan="2" rowspan="2">50-year flood intensity is projected to increase by ~50% under RCP4.5 and ~37% under RCP8.5 by 2070.</td><td rowspan="2">Increased rainfall can lead to increased spread of contaminants if fuel oil or other chemicals are spilled.
Exposed sewage pipelines are vulnerable to damage during extreme rainfall and flooding.</td><td rowspan="2">Infrastructure damage can lead to seeps and spillage, while sedimentation can lead to additional costs and safety risks.</td><td>No consideration for extreme precipitation and floods.</td><td></td><td></td></tr>
<tr><td>0.5
Extreme precipitation and flooding events considered in stormwater management, site, and infrastructure planning.</td><td>2.5</td><td>2</td></tr>
<tr><td colspan="10">Structural Instability and Slope Failure</td></tr>
<tr><td rowspan="3">Extreme rainfall and flooding events</td><td rowspan="3">Mine Site</td><td>9</td><td>10</td><td>1</td><td>1</td><td>0</td><td rowspan="3">Minor slope failure of TSFs and other earthworks from heavy rainfall or flooding could damage infrastructure and equipment, disrupting operations while repairs are made.
Complete slope failures or critical structural instability could lead to production stoppages, environmental contamination risks and fines, reputational risks, injury, or death.</td><td rowspan="2">9</td><td rowspan="2">10</td></tr>
<tr><td colspan="2" rowspan="2">50-year flood intensity is projected to increase by ~86% under RCP4.5 and ~155%</td><td rowspan="2">Infrastructure with steep slopes such as TSF walls, embankments, stockpiles, and WRDs can be susceptible to erosion and slope failure.</td><td rowspan="2">Extreme rainfall events can lead to slope failure, placing infrastructure and workers at risk, and disrupting operations.</td><td>No infrastructure in place to reduce likelihood of slope collapse, erosion, or flooding.</td></tr>
<tr><td>0.5</td><td>4.5</td><td>5</td></tr>
</table>

Hazards		Hazard Score (0-10) SSP2-4.5 RCP4.5	Hazard Score (0-10) SSP5-8.5 RCP8.5	Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score SSP2-4.5 RCP4.5	Projected Change in Risk Score SSP5-8.5 RCP8.5
		under RCP8.5 by 2070.				Reduce gradient of slopes of TSFs and earthworks, ensure stormwater infrastructure can withstand large and more frequent flooding events.	*Key risks: operational and maintenance costs, lost production, health and safety, environmental damage, reputational risks*		
	Railway	4	3	1	1	0	As seen during heavy rainfall in 2022, flash flooding can cause erosion and breach of the embankments supporting portions of the railway (PRACS, 2024). These breaches may cause operational delays as copper concentrate cannot reach the port, and goods traveling to the mine site via the railway can also be delayed. Slope failure on the proposed portions of the railway from the mine site to Nok Kundi will incur higher costs to the Project to repair damage. *Key risks: operational delays, operational costs*	4	3
		50-year flood intensity is projected to increase by ~33% under RCP4.5 and by ~23% under RCP8.5 by 2070.		Embankments supporting railway are susceptible to erosion and slope failure.	Extreme rainfall events can lead to slope failure, damaging railway infrastructure and disrupting transport of copper concentrate and supplies.	No infrastructure in place to reduce likelihood of erosion or slope failure.			
						0.5		2	1.5
						Embankments have been raised and strengthened to protect against erosion and failure.			
	PIBT at Port Qasim	5	4	1	1	0	Minor slope failure of stockpiles from heavy rainfall or flooding could damage infrastructure and equipment, disrupting operations while repairs are made. Berths built on backfilled foundations are at risk of erosion from increased rainfall. Complete slope failures or instability of berth foundations could lead to operational stoppages, injury, or death. Subsidence caused by flooding may result in damage to infrastructure and equipment resulting in operation costs and delays and risks to health and safety. *Key risks: operational and maintenance costs, health and safety*	5	4
		50-year flood intensity is projected to increase by ~50% under RCP4.5 and ~37% under RCP8.5 by 2070.		Infrastructure with steep slopes such as stockpiles, as well as critical structural foundations such as berths are susceptible to erosion and instability.	Extreme rainfall events can lead to slope failure and erosion of foundational infrastructure, placing infrastructure and workers at risk, and disrupting operations.	No infrastructure in place to reduce likelihood of slope collapse, erosion, or flooding.			
						0.5		2.5	2
						Ensure gradient of stockpile slopes are designed with climate change in mind, ensure stormwater infrastructure can withstand large and more frequent flooding events.			

Hazards		Hazard Score (0-10) SSP2-4.5 RCP4.5	Hazard Score (0-10) SSP5-8.5 RCP8.5	Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score SSP2-4.5 RCP4.5	Projected Change in Risk Score SSP5-8.5 RCP8.5
Operational Efficiency and Increased Costs									
Extreme heat days	Mine Site and Railway	4	5	1	0.5	0	Engines and generators use air for cooling and combustion. At 40°C, the density of air reduces, leading to a 10% reduction in the mass of air available for generator cooling and combustion (Inoplex, 2022). Less air available for combustion reduces combustion efficiency: for every 3°C rise over 20°C in air intake temperature, engine power is reduced by 1% (Rakopoulos et al., 2004). Therefore, when ambient temperatures exceed 35°C, fuel consumption increases by 5% during those hot periods, leading to operational efficiency losses during construction, operational, and rail transport activities. Steel components of railways can reach temperatures greater than the ambient air temperature, causing them to buckle. Rail transport with therefore slow or be delayed during extreme heat periods, and damage to railways will need to be repaired, causing additional stoppages. *Key risks: operational costs*	2	2.5
		Extreme heat days will increase from the historic baseline of ~112 days by ~31% under the SSP2-4.5 scenario to ~146 days, and by ~48% under the SSP5-8.5 scenario to ~166 days by 2070.		Haul trucks, excavators, generators, and rail transportation will be expected to continue operating during extreme heat conditions.	During extreme heat days, ambient air pressure drops, reducing the mass of air available for combustion in engines as well as the mass of air available for cooling systems.	No consideration for extreme heat events.			
						0.5		0	0
						Increase operational activity during the cooler hours of the day.			
	PIBT at Port Qasim	2	3	1	0.5	0	Engines and generators use air for cooling and combustion. At 40°C, the density of air reduces, leading to a 10% reduction in the mass of air available for generator cooling and combustion. Less air available for combustion reduces combustion efficiency: for every 3°C rise over 20°C in air intake temperature, engine power is reduced by 1% (Rakopoulos et al., 2004) Therefore, when ambient temperatures exceed 35°C, fuel consumption increases by 5% during those hot periods, leading to operational efficiency losses for vehicles, cranes, and ship loaders. *Key risks: operational costs*	1	1.5
		Extreme heat days will increase from the historic baseline of ~187 days by ~19% under the SSP2-4.5 scenario to ~222 days, and by ~28% under the SSP5-8.5 scenario to ~240 days by 2070.		Material handling equipment such as haul trucks, cranes and ship loaders will be expected to continue operating at these conditions.	During extreme heat days, ambient air pressure drops. This reduces the mass of air available for combustion in engines as well as the mass of air available for cooling systems.	No consideration for extreme heat events.			
						0.5		0	0
						Increase operation activity during the cooler hours of the day.			
Worker Health and Safety									
Extreme heat days	Mine Site and Railway	4	5	1	1	0	Extreme heat days could lead to more workplace incidents such as fatigue, dehydration, heat stroke, respiratory and cardiovascular disorders, and increased hospital admissions if not managed responsibly.	4	5
		Extreme heat days will increase from the historic baseline of		Staff working outdoors will be expected to continue working during extreme heat periods.	Mine and railway workers are susceptible to heat	No consideration for extreme heat events.			
						0.5		2	2.5

Hazards		Hazard Score (0-10) SSP2-4.5 RCP4.5	Hazard Score (0-10) SSP5-8.5 RCP8.5	Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score SSP2-4.5 RCP4.5	Projected Change in Risk Score SSP5-8.5 RCP8.5
		~112 days by ~31% under the SSP2-4.5 scenario to ~146 days, and by ~48% under the SSP5-8.5 scenario to ~166 days by 2070.			induced stress and issues.	PPE, sunscreen, aircons, urine chart, taking regular breaks during extreme heat periods.	Excessive heat can also lead to increased operator error, resulting in additional safety incidents. *Key risks: health and safety*		
	PIBT at Port Qasim	2	3	1	1	0	Extreme heat days could lead to more workplace incidents such as fatigue, dehydration, heat stroke, respiratory and cardiovascular disorders, and increased hospital admissions if not managed responsibly. Excessive heat can also lead to increased operator error, resulting in additional safety incidents. *Key risks: health and safety*	2	3
		Extreme heat days will increase from the historic baseline of ~187 days by ~19% under the SSP2-4.5 scenario to ~222 days, and by ~28% under the SSP5-8.5 scenario to ~240 days by 2070.		Staff working outdoors will be expected to continue working during extreme heat periods.	Port workers are susceptible to heat induced stress and issues.	No consideration for extreme heat events.			
						0.5		1	1.5
						PPE, sunscreen, aircons, urine chart, taking regular breaks during extreme heat periods.			
Solar Derating									
Extreme heat days	Mine Site	4	5	1	0.5	0	Solar panels are generally developed and tested at 25°C and experience a decrease in energy output for each 1°C increase in the temperature of the solar cells, known as their temperature coefficient. This decrease ranges between models, with some major solar panel models losing between 0.26% to 0.41% output for each 1°C increase over 25°C. Solar cells often reach temperatures higher than the ambient air temperature. Therefore, solar output will decrease during extreme heat days, leading to increased costs from purchasing electricity through the grid or use of generators. *Key risks: operational costs*	2	2.5
		Extreme heat days will increase from the historic baseline of ~112 days by ~31% under the SSP2-4.5 scenario to ~146 days, and by ~48% under the SSP5-8.5 scenario to ~166 days by 2070.		Proposed 150MW solar installation will continue operating on extreme heat days.	During extreme heat days, high temperatures will increase temperature of solar cells.	No mitigation feasible for solar installation.			
Safe Storage of Chemicals, Explosives, and Hazardous Waste									
Extreme heat days	Mine Site	4	5	1	1	0	High temperatures can increase reactivity of stored chemicals and hazardous wastes, leading to potential leaks and chemical storage failure. Chemical spills can cause health and safety risks to employees, and spills that leach into the surrounding	4	5
		Extreme heat days will increase from the historic baseline of ~112 days by ~31% under the SSP2-4.5		Chemicals used in processing plant, explosives used for mining, and hazardous wastes stored on site may be reactive to high heats.	Extreme heat can cause chemicals and explosives to increase in reactivity.	Hazardous materials stored without temperature stability considerations.			
						0.5		2	2.5

Hazards		Hazard Score (0-10)		Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score	
		SSP2-4.5 RCP4.5	SSP5-8.5 RCP8.5					SSP2-4.5 RCP4.5	SSP5-8.5 RCP8.5
		scenario to ~146 days, and by ~48% under the SSP5-8.5 scenario to ~166 days by 2070.				Chemical, explosive, and waste storage method ensures stability of temperature.	environment will cause contamination of water resources and local habitats, leading to reputational risks and potential fines. Explosives that are stored on site are also susceptible to deterioration or autoignition at high temperatures. *Key risks: health and safety, environmental damage, reputational risks*		
Increased Operational Costs									
Droughts	Mine Site	2	1	1	0.5	0	A drought could impact operations on multiple levels. First, lack of rainfall reduces groundwater recharge, decreasing water available for operational activities. Drought periods combined with increased temperatures will increase evaporation in raw water pond, decreasing the quality of water as impurities become concentrated. This could lead to increased water processing costs. Lack of sufficient water for processing operations can also lead to extended periods of downtime, as well as potential increased operational costs and delays in the up-stream value chain due to increased water prices, water shortages, or product delivery delays. *Key risks: lost production, increased costs*	1	0.5
		The number of dry spells is projected to increase by ~11% under SSP2-4.5, and by ~2% under SSP5-8.5 by 2070.		Access to water is required for various activities on site. Water from the raw water pond, fed by water abstracted from the Fan Sediments borefield, is used for earthworks, dust suppression, processing, cement, and fire water. Raw water is also treated to provide potable water for accommodation and office facilities.	Without sufficient water for operations, dust suppression and other uses, operations may halt and potable water may need to be purchased.	No system in place to reduce groundwater reliance.			
						0.5		0	0
						Increase water efficiency considerations, increasing the range of water sources that can be used.			
	PIBT at Port Qasim	4	3	1	0.5	0	Increased drought periods may lead to competition for local water resources, leading to decreased potable and industrial water. Decreased potable water supply may lead to increased operational costs due to the need to purchase water elsewhere. Insufficient water for dust suppression and environmental protection can lead to potential increased operational costs and delays in the up-stream value chain due to increased water prices, water shortages, or product delivery delays. *Key risks: increased operational costs, delays*	2	1.5
		The number of dry spells is projected to increase by ~31% under SSP2-4.5, and by ~22% under SSP5-8.5 by 2080.		Access to water is required for activities like dust suppression, fire protection, and potable purposes.	Without sufficient water supply, water used for dust suppression and other uses may need to be purchased.	No system in place to reduce water use.			
						0.5		0	0
						Increase water efficiency considerations, increasing the range of water sources that can be used.			
Reputational Risks									
Droughts	Min	2	1	1	0.5	0		0.5	0.5

Hazards		Hazard Score (0-10) SSP2-4.5 RCP4.5	Hazard Score (0-10) SSP5-8.5 RCP8.5	Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score SSP2-4.5 RCP4.5	Projected Change in Risk Score SSP5-8.5 RCP8.5
		The number of dry spells is projected to increase by ~11% under SSP2-4.5, and by ~2% under SSP5-8.5 by 2070.		Decreased rainfall impacts water availability in local surface water sources.	Water scarcity increases competition for water resources with surrounding communities.	No system in place to reduce water reliance. 0.5 Increase water efficiency considerations, increasing the range of water sources that can be used.	If the Project consumes large quantities of water while the surrounding communities lack water access, pressure from surrounding communities to conserve water can increase, risking the Project's social license to operate This could lead to inter- and intra-community conflict, making the Project area hostile and difficult to operate in. *Key risks: reputational risks*	0	0
Qualitative Risk Assessments									
Infrastructure Damage and Failure to Operate									
Sea Level Rise	PIBT at Port Qasim	Increasing Hazard Sea level is projected to increase at PIBT.		Exposed Areas of the Project footprint will be below tideline.	High Sensitivity Flooding of the Project area due to sea level rise could cause the project to cease to be operational.	No Adaptive Capacity No consideration for rising sea levels. Medium Adaptive Capacity Infrastructure is elevated above projected tideline.	If the area is inundated operations will be impacted resulting in delays and this will have high-cost implications. Increased sea levels will necessitate adaptations to design and operation. *Key risks: increased operational costs, delays*	Increased Risk Increased Risk	
Infrastructure Damage and Operational Delays									
Storm Surges and Cyclones	Railway and PIBT at Port Qasim	Continued Hazard Wind velocity and coastal flooding from tropical cyclones and storm surges are projected to increase near PIBT under SSP5-8.5.		Exposed Port and Railway infrastructure such as berths, conveyor belts, access roads, rail tracks, and administrative buildings will be exposed to storm surges from the sea.	High Sensitivity On-site infrastructure damages will cause operational stoppages.	No Adaptive Capacity Storm surges not accounted for in site design. Medium Adaptive Capacity Storms and flood risks considered in site planning.	While climate change projections are uncertain regarding projected cyclone frequency, cyclone intensity is projected to increase due to changes in precipitation and temperature. Cyclones and storm surges can lead to operational delays as storm conditions make it unsafe to continue operations of the railway and port. Damage to infrastructure during storm surges can also incur higher repair costs. Operating during storm periods may also cause health and safety risks to workers who operate machinery during inclement weather. *Key risks: operational and maintenance costs, lost production, health, and safety*	Continued or Increased Risk Continued Risk	
Operational Delays and Health and Safety Hazards									
	All Sit	Continued Hazard		Exposed	High Sensitivity	No Adaptive Capacity			

Hazards		Hazard Score (0-10) SSP2-4.5 RCP4.5	SSP5-8.5 RCP8.5	Exposure (0-1)	Sensitivity (0, 0.5,1)	Adaptive Capacity (0, 0.5, 1) Recommended adaptation where applicable (0, 0.5, 1)	Risk	Projected Change in Risk Score SSP2-4.5 RCP4.5	SSP5-8.5 RCP8.5
Sand and Dust Storms		Climate change and drought are known to exacerbate sand and dust storms (UNCCD, 2023). As drought conditions increase in the Project areas, conditions for sand and dust storms are also likely to increase.		Reko Diq Mine Site, railway, and Port Qasim are located in Provinces prone to sand and dust storms.	Operations at all sites may need to pause due to decreased visibility and safety concerns.	No mitigation possible to prevent visibility issues from sand and dust storms.	Sand and dust storms cause decreased visibility, causing operational delays while production is forced to pause. Sand and dust may also cause damage to infrastructure or require areas to be cleared of sand before being usable, leading to increased maintenance and repair costs. Severe risks from sand and dust storms include health and safety risks from inhalation of particles, or accidents caused by reduced visibility. *Key risks: operational and maintenance costs, lost production, health, and safety*	Continued or Increased Risk	
						Medium Adaptive Capacity		Continued Risk	
						Policies are in place to ensure production stops and PPE is available to protect workers from health hazards.			
Health and Availability of Workers									
Chronic climatic changes and extreme weather events	All Sites	Increasing Hazard		Exposed	High Sensitivity	No Adaptive Capacity	The Project may be at risk of losing available workers due to adverse weather conditions that might not be conducive to a safe and healthy living environment for people. Extreme weather event frequency and severity can create reduced food availability, impacting worker and community nutrition. This will increase socio-economic stress and can lead to community unrest, and lead to migration of the workforce. Projected increases in the prevalence of Malaria, as well as the influence of climate change on diarrheal deaths may impact the health and availability of workers (WHO, 2021). *Key risks: lost production*	Increased Risk	
		Combination of changes in temperature and rainfall can lead to extreme weather events and chronic changes to weather in the project area.		Mine workers and their families are exposed to changing climate conditions seeing as they live in the region.	As certain areas become unhabitable due to projected extreme weather events, a Project area may become at risk to in-migration or adversely can become at risk of migration as areas become unsuitable for human activities like farming. Workers will be at risk of diseases that are projected to increase due to climate change.	Mine cannot control the impact, extent and duration of extreme weather events and changing weather patterns in surrounding communities			

Table 6-32: Project Specific Climate Change-related Transition Risks

Risk Group	Risk Type	Risk Description
Policy & Legal	Policy	While Pakistan does not currently have legally binding climate change policies, targets and objectives set out in various strategy and policy documents indicate that legislation regarding climate change will be likely in the future. These policies and potential implications include: • The National Sustainable Development Strategy outlines the need to identify climate change risks and hazards and promote resiliency to climate change. By completing this CCRVA and implementing recommendations to reduce climate change risks, Barrick will maintain aligned with this policy. • In Pakistan's Updated 2021 NDC, the government outlined an emissions reduction target ranging from 35-50% reduction of projected emissions by 2030. The document also includes plans for 60% of all energy produced in the country to be from renewable sources by 2030. Barrick therefore needs to ensure planned emissions are kept as low as possible, and that on-site energy production incorporates renewables. • The National Climate Change Policy outlines mitigation policies that will impact the industrial sector, including policies around energy efficiency, emissions calculations and reductions, and carbon capture and storage. Barrick will need to show that resource efficiency has been planned for in the Project design and prepare for additional policies surrounding emissions reductions and removals. • Pakistan's National Action Plan on SDG 12 sets targets to implement cleaner technologies in the industrial sector and enhance the capacity of industry to conserve resources and promote environmental compliance. Therefore, the Project should be designed to limit environmental impact wherever possible, or risk potential future impacts. Impact Mechanism: Failure to comply with current and future policies may lead to potential fines.
	Legal/Compliance	• Barrick is listed on the NYSE and TSX. More stringent regulatory, compliance and disclosure requirements in terms of sustainability and Environmental and Social Governance (ESG), can pose risks to Barrick if the organisation does not continue to track performance, maintain compliance, and actively work to reduce adverse impacts of operations. • Enhanced emissions-reporting obligations under different regulatory and investor frameworks can lead to increased operational costs for resourcing required to conform. • The management of climate risks is increasingly becoming a legal obligation for companies. Regular assessments of the transition and physical climate risks of a project is likely to become mandatory for some investors and reporting standards like IFRS. • Similarly, to be aligned with the recommendations of the GRI, the consideration of material financial risks and conducting double materiality assessments may become mandatory. Barrick will need to continue conducting these activities regularly and thoroughly. • Failures of a TSF or damaged infrastructure due to extreme weather events such as extreme rains or flooding can lead to damages/contamination to the environment and surrounding community, which could lead to stakeholders undertaking legal action against the mine for not considering climate change risks and impacts and also risks the mine's social license to operate. Impact Mechanism: Failure to comply with legal and regulatory requirements may lead to impacts to funding availability and revenue based on reputational risks.
	Tax	• While Pakistan authorities are considering implementing a Carbon Levy on fossil fuels (Haider, 2024), an economy-wide carbon tax is not yet a consideration by the Pakistani Government. The possibility does exist that a tax on carbon emissions for non-fossil fuel industries can be applied in future. A tax on carbon emissions will increase operational production costs. For example, if a low carbon tax is to be applied, such as that of South Africa at R190/tonne CO_2, (c.$10.15 / tonne CO_2[46]), based on the average annual Scope 1 GHG emissions calculated for the Project's baseline scenario, Barrick would pay an additional $10.4 million in taxes each year. Impact Mechanism: Failure to prepare for carbon pricing by implementing emissions reduction initiatives can lead to increased operational costs.
Technology	Transition to low carbon economy	• National and global commitments and targets for a transition to a low carbon economy means that Barrick needs to reduce operating carbon emissions. This means that investments into new technologies and processes to reduce emissions will be required. A risk is that the substitution of existing equipment with lower emissions options may result in write-offs, early retirement of assets thereby increasing capital costs. To mitigate the risk and to maximise investment opportunities, low emissions technologies (equipment and processes) should be considered in Project design and construction to avoid construction and planning of a mine that would need to replan and invest in new technologies in a few years' time to keep up with global climate change commitments. Impact Mechanism: Failure to implement emissions reduction initiatives in Project design can lead to increased capital costs and write-offs in the long term.

[46] Calculated using an average exchange rate of R1 to $0.53 USD based on daily exchange rates from January 1 through June 27, 2024 (ExchangeRates.org, 2024) and updated 2024 Carbon Tax Rate of R190 (Ernst & Young, 2024).

Risk Group	Risk Type	Risk Description
	Electric Vehicles (EV)	• There will be significant advances in EV technologies for light duty vehicles in the short term and for heavy duty vehicles in the medium term. Improvements in EV technologies will make fleet replacement more realistic and affordable in future. Replacing fleet vehicles with EVs before they are realistic and affordable (provided they can be charged with renewable electricity) can lead to high capital expenses that are not emissions efficient. Impact Mechanism: Poorly timed adoption of EV technologies can lead to increased capital expenses.
	Stranded Asset	• Technological advances in the medium-term can lead to stranded assets if mine planning and development does not consider lower emissions intensive technologies. These include items such as HFO generators, some diesel-based earth moving equipment and diesel-powered locomotives. This is dependent on the resale value of these assets, as there could still be other applications for these assets. • Stranded assets lead to wasted capital expenses should high emission assets be repriced/depreciate. Impact Mechanism: Failure to implement emissions reduction initiatives in Project design can lead to increased capital costs from stranded assets.
Market and Reputation	Customer, investor and supplier requirements	• Customers, suppliers and investors can demand more sustainable practices and lower emissions products from mining companies, which could require costly operational changes to comply with the demands of these stakeholders. • If Barrick does not drive continued progress to reduce absolute emissions and GHG intensity of copper, its position as a preferred copper supplier to markets will be in jeopardy. Impact Mechanism: Failure to meet stakeholder expectations may lead to impacts to funding availability and revenue based on reputational risks.
	Value chain emissions	• Barrick might need to change its upstream supplier due diligence processes to ensure that it sources goods and services from lower emissions suppliers to help reduce value chain emissions. Impact Mechanism: Failure to lower supply chain emissions may lead to impacts to funding availability and revenue based on reputational risks.

Table 6-33: Transition Opportunities

Risk	Opportunity
Policy and Legal Opportunity	• Pakistan's National Climate Change Policy outlines the potential for future economic incentives for emissions reductions. By incorporating renewable energy production and planning for resource efficiency in Project design, Barrick may be well positioned to take advantage of economic incentives in the future. • In Pakistan's Updated 2021 NDC, the government outlined a commitment to developing nature-based solutions and carbon sequestration programmes. Progress towards this can be seen through the Green Pakistan Programme (formerly known as the 10 Billion Trees Tsunami Project), in which Pakistan has committed to plant an additional 100 million indigenous tree species. In addition, Pakistan is building capacity in their forest departments to meet REDD+ requirements, leading the way for REDD+ incentives to be established. This provides an opportunity for Barrick to participate in REDD+ carbon sequestration projects in the future, leading to economic and emissions reduction benefits. Impact Mechanism: Engagement with economic incentives may lead to lowered capital expenses when implementing emissions reduction projects and increased reputational value.
Technology Opportunity	• Improvements in the manufacture of biofuels in the near to medium term will also increase their availability and reduce the cost of using biofuels. Biofuels can directly replace the fossil fuel derived counterparts in internal combustion engines. Pakistan's National Climate Change Policy includes plans for increased biofuel crop production and research into biofuel technologies, so local availability of biofuels is likely to increase during the Project lifespan. Impact Mechanism: Greater technological opportunities may reduce capital costs when implementing emissions reduction projects.
Market conditions	• Copper is utilised in low-carbon technologies such as electric vehicles and renewable power technologies. As the transition to low-carbon technologies increases, demand for copper is projected to increase. The Project is well positioned to take advantage of increases in demand, presenting opportunities for continued growth. Impact Mechanism: Increased demand for transition metals may lead to increased revenue and market reputation.

6.4.2.5. Risk Management Recommendations

Climate change impacts and risks have increased significantly over recent years and will continue to increase in severity if projections based on emissions trajectories are accurate (The World Bank, 2024; IPCC, 2022). It is also important to consider that climate change impacts will also affect all ecosystem drivers and services, this means communities that are already facing high vulnerability to climate change impacts will become more vulnerable (IPCC, 2022).

Table 6-34 outlines high-level risk management recommendations for consideration in the construction of future phases, operation, and closure of the Project based on the identified climate-related risks outlined in the above sections. Due to the uncertain and variable nature of climate change, it is recommended that climate change risk assessments, site design, policies, and management plans, are updated every 3-5 years to account for changes in climate and as updated climate change projections become available.

At the time of writing, the Project detailed design and management plans were in the drafting process. Climate change projections and identified risks have been provided to specialists and design teams to ensure climate considerations are incorporated into impact assessments, management plans, and relevant site designs. Therefore, risk management recommendations below are focused on the long-term monitoring and updating of policies and plans to ensure changes in physical and transition risks continue to be accounted for throughout all phases of the Project.

Table 6-34: High-Level Risk Management Recommendations

Risk	Recommendations to Manage and Adapt to Risks
Extreme rainfall, flooding, and storm surges	• Continuously review update maintenance policies to ensure regular maintenance of potentially vulnerable infrastructure, stormwater and drainage channels to flooding events as well as safe water drainage and channelling; • Ensure that frequent and thorough maintenance is conducted as per maintenance policies for roads, railways, drainage channels and vulnerable areas on site to safeguard structural integrities and ensure effective water drainage and flood control; • Perform continuous monitoring, especially after extreme weather events, to ensure there is no contamination of surrounding environment from potential spills and seepage of waste, fuels and wastewater; • Ensure that sedimentation controls at the Mine Site and PIBT are monitored regularly; • Continuously review and update emergency site evacuation plans. To ensure the safety of all workers on site, it is pivotal that all site evacuation and emergency response plans can be implemented effectively during

Risk	Recommendations to Manage and Adapt to Risks
	flooding events and that other built infrastructure on site is designed to be resilient towards projected flood levels; • Ensure that the Mine Site and PIBT's stormwater management plans are continuously reviewed to ensure they have capacity to safely manage more frequent and intense flooding events as climate change progresses; • Continuously review and update site design and layout planning which considers the potential for increased extreme precipitation events that could lead to soil saturation and potential compromised slope stability; and • Investigate the potential for desert-appropriate progressive rehabilitation to reinforce slope stability.
Increased Temperatures	• Ensure health and safety management plans which consider extreme heat are continuously reviewed and updated as climate change progresses. Potential measures to review include: • Training on identification of dehydration in staff – urine charts, behaviours to look out for etc.; • Existence of hot day procedures; • Identified temperature thresholds at which certain procedures should be implemented; • Availability of water stations; • Provision of frequent heat rest breaks on hot days; • PPE and clothing provides sufficient protection from heat stress; and • control of cabins of vehicles that are used for long periods of time, for example in haul trucks, excavators, and transport trucks.
Sea Level Rise	• Infrastructure that has been designed to withstand projected sea level rise should be monitored as sea levels change over time.
Chronic Climatic Changes and Extreme Weather Events	• Continuously review and update malaria procedures on site (relevant to Port Qasim), including: • Provision of mosquito repellent, nets, full coverage clothing for employees, and prophylaxis medication; • Education on malaria risks and transmission for employees and contractors; and • Spraying and fumigating on-site buildings using formulas with proven local efficacy. • Ensure programmes to support health, food, and water security for local communities are reviewed and updated as climate changes occur.
Transition Risks	• Conduct regular monitoring of policy and legal developments in Pakistan to ensure compliance with polices, targets, and objectives.

Risk	Recommendations to Manage and Adapt to Risks
	• Monitor for technological advances and changes in energy and fuel pricing to continue to adapt to changing energy markets and prioritise low-carbon solutions. • Ensure Project design prioritises energy efficiency and GHG reduction initiatives, and continuously monitor for improvement opportunities throughout operational phase. • Continue to align with Barrick's group-wide GHG reduction targets and disclosure of environmental and climate-related performance. • Review and update climate change transition and physical risk assessments for the Project every 3-5 years. • Maintain compliance with Barrick's internal carbon pricing strategy. • Consider low emissions technologies (equipment and processes) in Project design and construction to avoid stranded assets. • Diversify supply chain to protect against potential disruptions, and continuously monitor for low-emissions suppliers. • Maintain accurate ESG data collection to ensure disclosures are verifiable and complete.

6.4.3. Gender Related Risks

Pakistan placed 145th out of 146 countries on the World Economic Forum's 2022 Global Gender Gap Index and 161st out of 191 countries on the Human Development Report's 2022 Gender Inequality Index. Balochistan has patriarchal norms that influence every aspect of life, from family dynamics to societal structures (Ostby, 2023) These norms dictate traditional roles for men and women, often resulting in unequal opportunities and limited freedoms for women.

Tribal customs and traditions in Balochistan often prioritise male authority and control, leading to the discrimination of women in decision-making processes and public spaces. It was recorded in the 2022 baseline survey that, on average, only 38% of households include women in household decision making processes. Additionally, strict codes contribute to the seclusion of women (*purdah*) and restrict their participation in social and economic activities and early and arranged marriages also undermine women's autonomy and create unequal power dynamics within families. Although efforts have been made to improve access for girls, Balochistan still faces challenges such as lack of infrastructure, cultural barriers, and societal attitudes that prioritise boys' education over girls (Anees, 2020).

While the Project is expected to bring significant economic benefits, it has limited leverage in addressing broader gender issues in Balochistan. Purdah is common cultural practice and mixing between the workforce and women from the local communities will be unlikely as it is seen as a violation of local customs and norms. Gender-based violence, gender seclusion, discrimination in decision-making, and other systemic challenges require comprehensive strategies that go beyond the scope of the Project.

The Project will implement a Gender Action Plan to ensure that women are represented to the extent possible in the Project workforce. The Project will also ensure that the Worker's Code of Conduct protects women from workplace harassment and gender-based discrimination.

6.4.4. Community Safety Risks – Road Transportation

6.4.4.1. *Project-related Road Traffic*

The Project will result in increased traffic levels along the existing road network and the access road to the mine site due to the movement of fuel, machinery, materials, and other equipment. As discussed in Impact 17, the increased traffic is less than 1% of observed baseline levels. The existing road network from Port Qasim/Karachi comprising the M10 Northern Bypass, N-25 and N-40 Highways handles a large quantity of road vehicles and this percentage increase is considered negligible. The baseline traffic information was used to estimate the predicted increase in traffic at the intersection of the N40 highway and the access road to the Mine Site where the incremental impact of traffic is expected to be highest. However, there are no nearby receptors/settlements at this location.

6.4.4.2. *Road Safety and Management*

Injuries and fatalities as a result of traffic accidents is a significant public health issue for Pakistan, with young and middle-aged people being the primary demographic (Zaman et al., 2024). Key information and statistics compiled by Zaman et al. (2024) include:

- Deaths due to road accidents is one of the leading causes of death in Pakistan;
- Generally road accidents and subsequent death and injury rates have increased over time due to rapid motorisation and expansion of the road network.
- A higher proportion of accidents, injuries and deaths occurs in rural areas over urban areas.
- The majority of accident victims are aged between 16 and 30 years of age, with women representing only 16% of all accident victims.

In 2023 a total of 969 accidents were reported across Balochistan (including 794 deaths and 2078 injuries), but it is thought the number is likely higher due to non-reporting. The Quetta to Karachi highway is a particular accident hotspot due to lack of dividing lanes and absence of medical centres for large distances.

The Medical Emergency Response Centre (MERC) Program (Rescue 1122) Balochistan was mandated to establish Medical Emergency Response Centres along all highways of the province. Areas / hotspots were prioritised regarding the vulnerability to accidents after surveying each highway. So far 19 Emergency Response Centres have established and made functional on other highways of Balochistan. All centres are equipped with trained emergency personnels, emergency supplies and basic life-saving ambulances. Due to the lack of budget and funding, the MERC Balochistan have not been able to establish further MERCs along N-40 highway. Within the socio-economic survey area for this ESIA it was identified that a significant proportion of disabilities were as a result of traffic accident injuries (note that in the study area there is a lot of cross border traffic that utilises unsealed roads or cross-country driving).

To ensure that other traffic-related impacts such as traffic incidents and degraded quality of roads do not occur, the Project will implement a Traffic Management Plan.

6.4.5. Rail Safety Risk Assessment

A Rail Safety Risk Assessment has been completed as part of the Project feasibility by Digby Wells and VECTURIS. The existing railway route runs through Sindh and Balochistan provinces and includes Main Line Sections ML-1, ML-2 and ML-3. The discussion on the main lines and possible upgrades/repair works required along the existing rail route by Pakistan Railways for the smooth transportation of Project-related rail traffic are discussed in Section 3.3.3.

6.4.5.1. Project-related Rail Traffic

The project will result in an increase in the number of trains travelling along the proposed railway route using the existing railway line from Nok Kundi to Port Qasim. Although the rail is, and will continue to be, owned and operated by Pakistan Railways, the Project will give due consideration to the potential increased risk to the safety of communities which have settled along the railway line over time.

The anticipated rail traffic that the Project will contribute to this route is four trains in each direction (4 up and 4 down) during Phase 1, increasing to eight trains (each way) per day during Phase 2, transporting copper gold concentrate to Port Qasim, and fuel and reagents to site.

There is a significant amount of existing rail traffic along the north-south section of the route between Port Qasim and Jacobabad, with a reported 35 to 45 trains per day. The increased traffic resulting from the Project along this section is considered to be very low. Conversely, the section between Spezand and Taftan currently only sees a reported one or two trains per week and rail traffic along this section has been low for a long time. Assuming there is no other change in traffic, the project will have a significant contribution to the overall traffic volumes along this route.

A maintenance and upgrade programme is planned for this section of the railway to support the anticipated increased traffic related to the project and this will also have the benefit of enabling more passenger and freight traffic along this route.

A report by PRACS (2024) has indicated that trains operated by Pakistan Railways on this section at the beginning of Phase 1 operations will include:

i. 2 Passenger Train per day (1 Up & 1 Down)

ii. 2 Freight Train per day (1 Up & 1 Down)

iii. Water & Emergency Train 2 per day (1 Up & 1 Down)

Total number of Trains operated by will be six per day.

6.4.5.2. Rail Accidents

Train accidents in Pakistan have become a recurring and ongoing issue, manifesting as derailments, collisions and other incidents causing substantial damages and infrastructure costs and loss of human life.

- In 2019, over 100 train-related incidents took place. In addition, 111 incidents of engine failure while travelling along a track were reported within the first five months of 2019.
- From January to May 2020, 64 accidents, such as derailment and accidents of passenger and goods trains at manned or unmanned level crossings, were also reported.

Poorly maintained or damaged railway tracks have been identified as one of the primary causes of derailments and other incidents, underscoring the need for regular inspections and maintenance protocols. Moreover, human error, stemming from inadequately trained operators, signalmen and other railway personnel, has also been a contributing factor, necessitating a stringent focus on training and adherence to safety protocols. The failure of essential equipment, such as brakes on trains or signalling systems, further exacerbates the situation, calling for stringent maintenance and reliable equipment standards.

Addressing the issue of overcrowding in trains is equally vital, as operating within capacity limits is crucial to ensuring passenger safety.

Collisions with vehicles or obstacles at level crossings are also a significant risk to the safety of rail traffic, emphasising the necessity for well-designed crossings and clear tracks.

Several measures have been undertaken by Pakistan Railways in an attempt to prevent accidents, including the closing down of 2,886 unauthorised passages on the track and under the track. Vehicles with high roofs have been stopped so that only small vehicles can pass through underpasses. According to Railway Officials in 2021, “Up to 199 cases were registered against the people for breaching rules. In addition, 73 unmanned level crossings were also closed. There are another 70 unmanned crossings that will be upgraded soon.” These actions were reported to have reduced rail related accidents by 23% from January to May 2021.

Pakistan Railways have launched a mass awareness campaign at a national level to raise awareness on the importance of safety when using the railway as well as safety around the trailway tracks and interaction with trains.

6.4.5.3. Rail Safety Risks Assessment and Management

To better understand the potential risks associated with the Project rail traffic, Digby Wells, together with VECTURIS were tasked with evaluating the potential interaction of trains with communities along the Rail Transport Route.

Various vector and raster based spatial datasets were utilised to identify areas of potential sensitivity, with information including opensource settlement data, road networks and agricultural activity areas. As part of the desktop analysis, the Google Earth platform was utilised to conceptualise and verify areas of potential sensitivity. These identified areas were demarcated in the GIS environment along with cartographic representations of the findings that are presented in this study.

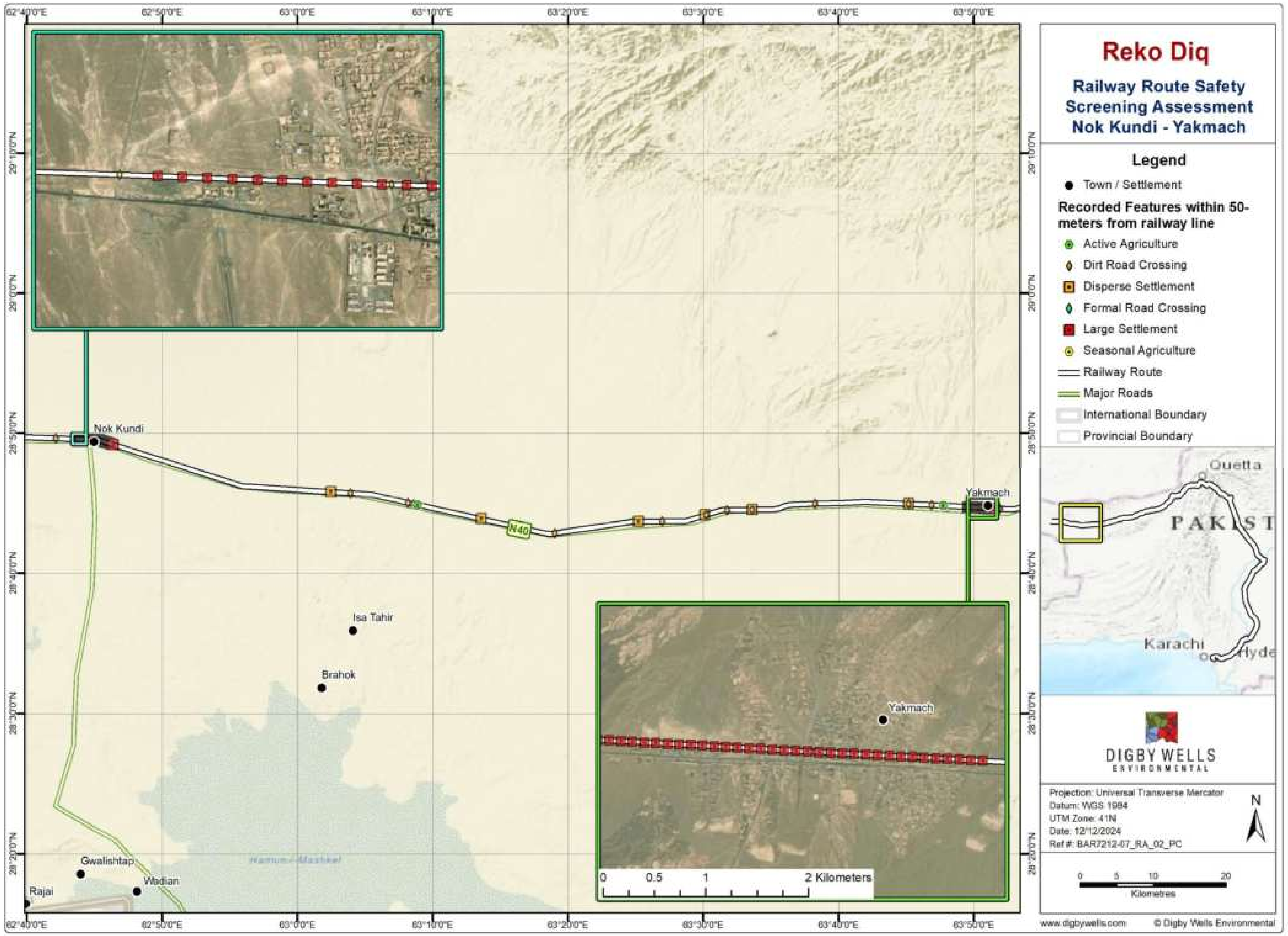
The focus of the assessment was understanding the potential safety concerns between the RDMS and Sukkur, the Project is anticipated to significantly contribute to increased rail traffic along this section of the Rail Transport Route.

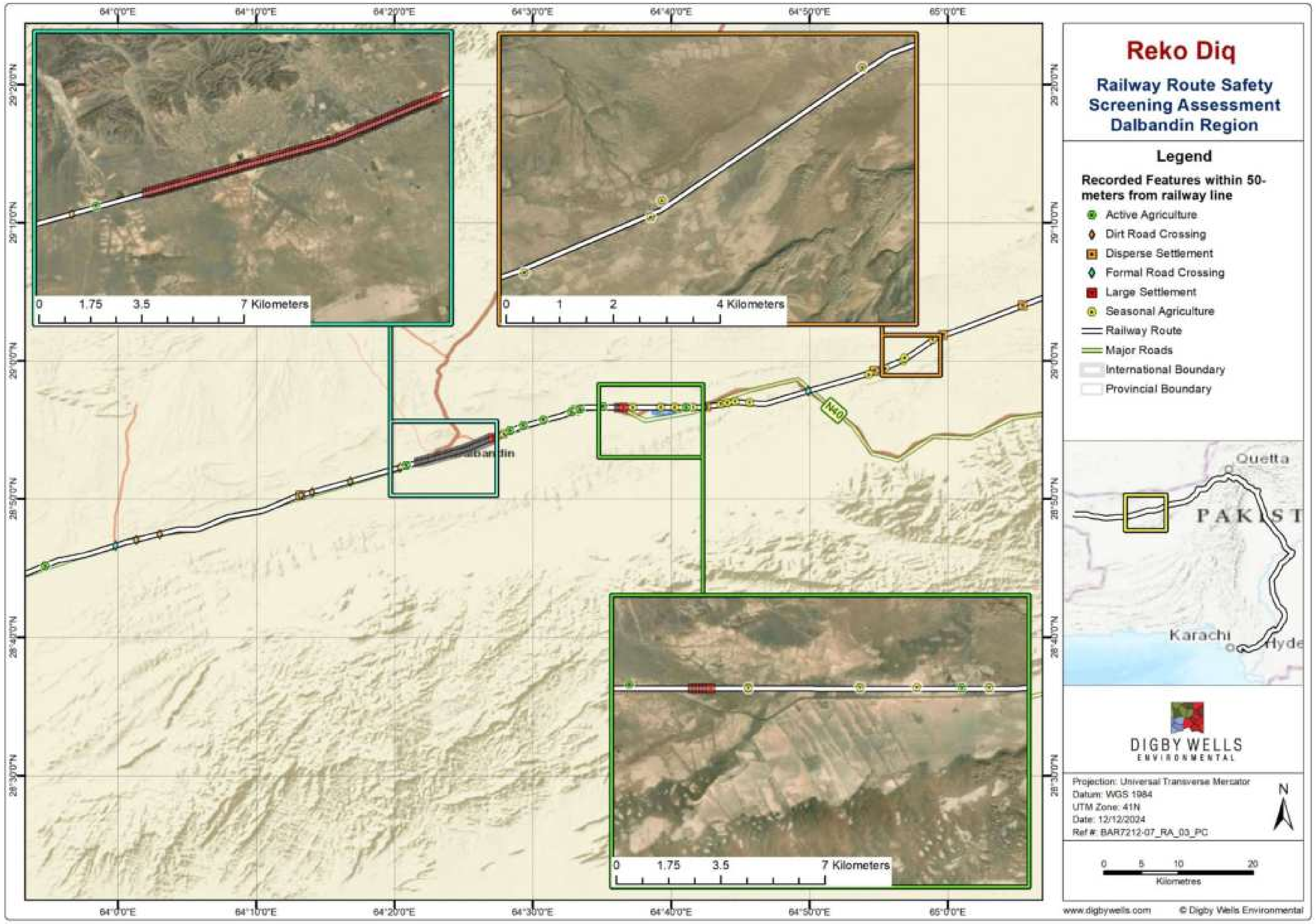
The section between Sukkur and Quetta is well established, with the railway route well entrenched into the landscape and rail servitudes and operation thereof is well maintained and well respected.

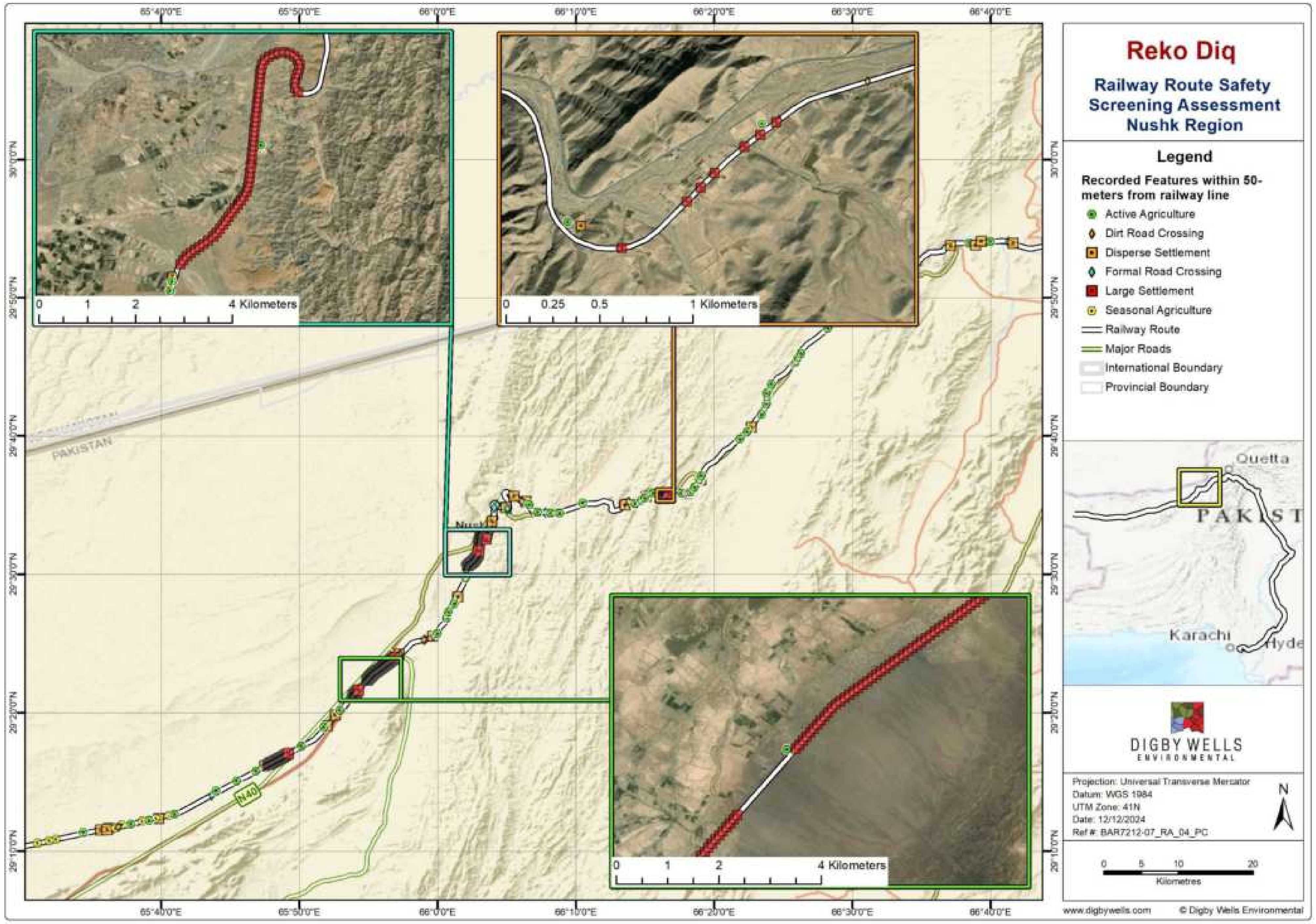
The screening assessment broken divided the railway into smaller sub-sections for analysis and observations are recorded in Table 6-35. These sub-sections are:

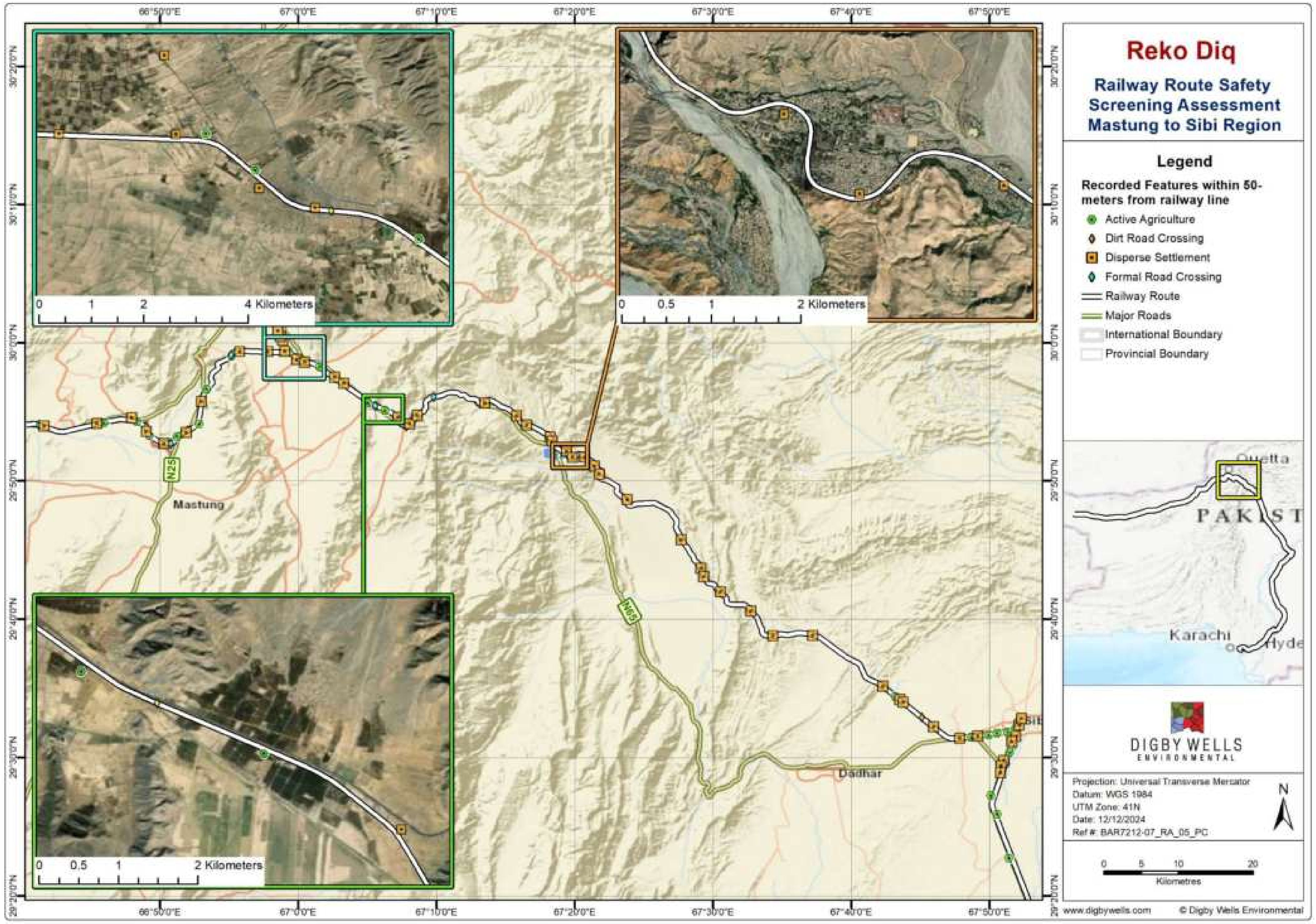
- Nok Kundi to Yakmach Region;
- Dalbandin Reion;
- Nushk Region;
- Mastung to Sibi Region;
- Sibi to Bhag Region; and
- Jacobadad to Sukkur Region.

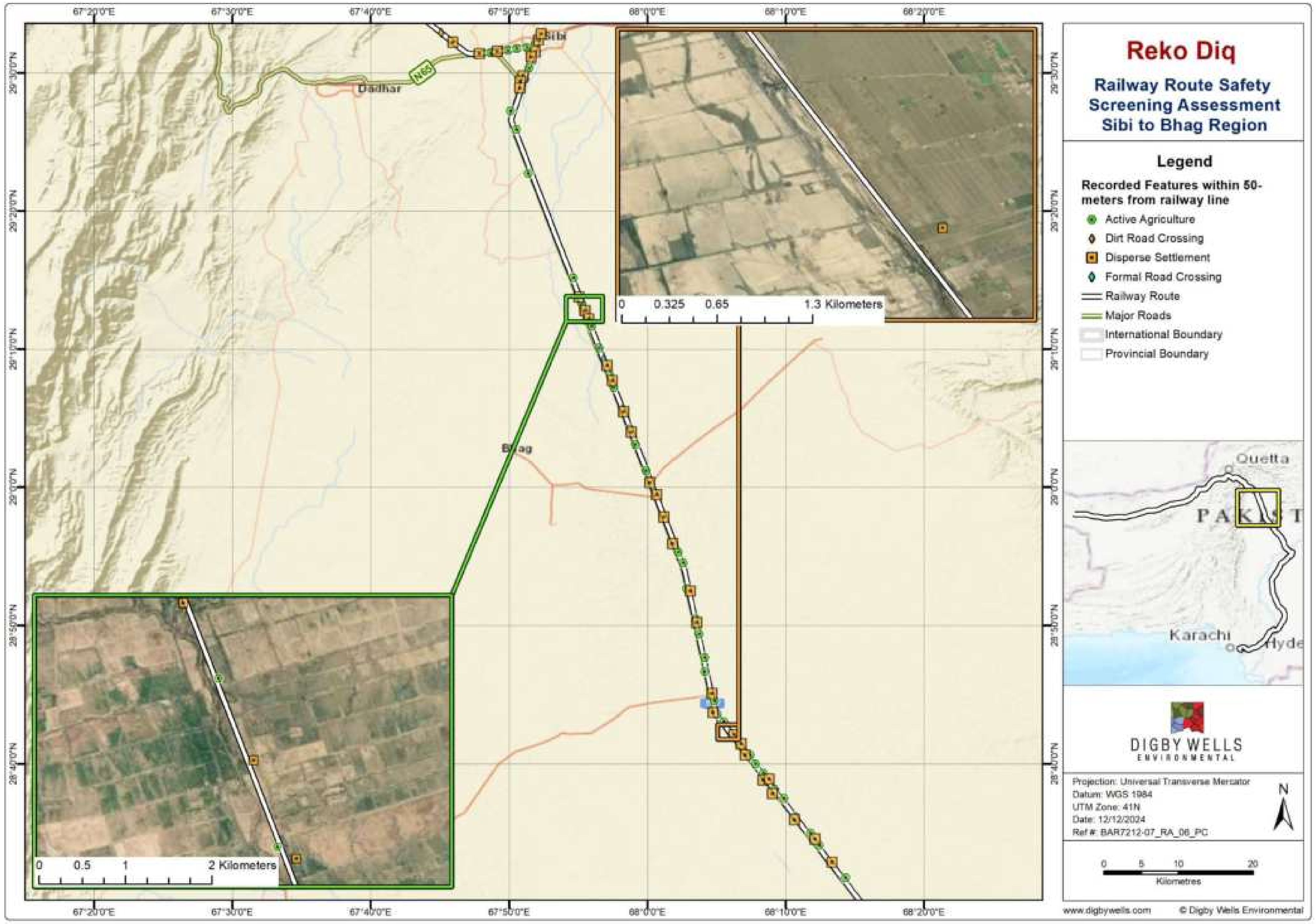
Table 6-35: Railway Route Safety Screening Assessment

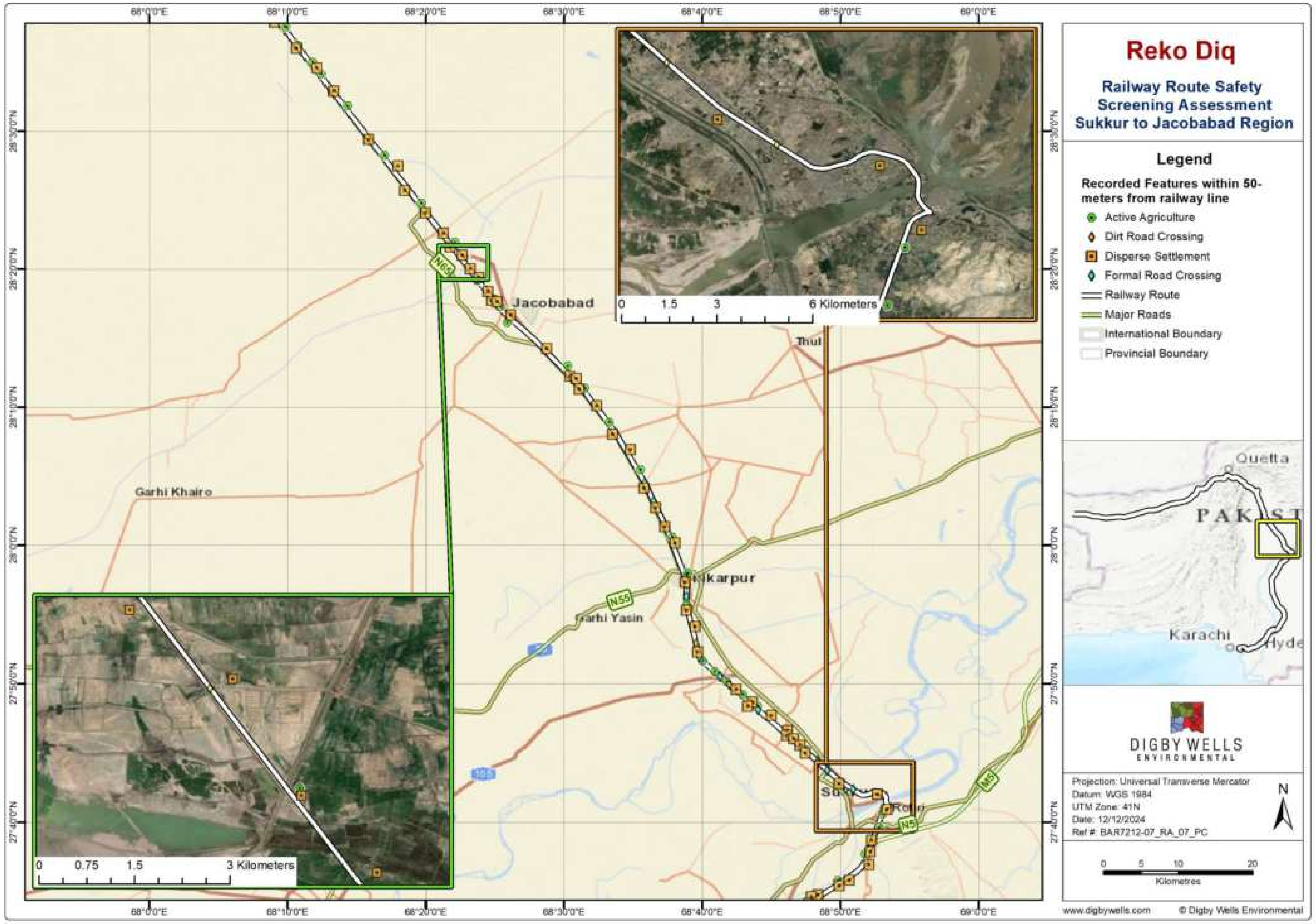
Observation Stretch	Findings	Pictorial Evidence from Screening Assessment
Nok Kundi – Yakmach Region	The rail section from the RDMS, heading in an Eastward direction towards the Mastung region crosses areas of dispersed agricultural activity and human settlements. Notable towns/settlements in this section include Nok Kundi and Yakmach, which have disperse settlement structures that are located in close proximity (in some cases within 10 metres of the railway tracks. There are also numerous dirt road crossings connecting areas of of the town/settlement located on both sides of the railway line.	

Dalbandin Region	Continuing along the railway in an easterly direction from Yak Mach, Dalbandin is the next significant settlement encountered. This is considered a main town in the region, largely composed of human settlements on either side of the railway line with disperse agricultural plantations. There are numerous informal, dirt as well as formal road connections that cross the railway line passing through the town. The screening assessment would suggest that the railway servitude appears to be well respected, with no structures observed within 10-metres of the railway line.	

Nushk Region	Continuing Easterly along the track from Dalbandin, Nushk is the next relatively large settlement with the surrounding area characterised by steep topography and tight bends in the railway route. The recorded observations indicate a mix of human settlements and agricultural in the region, along with various road crossings that connect dispersed settlements located within the region. As a result of the steep topography, settlements do appear to be close to the railway servitude in certain areas. Ground truthing will be required to confirm the nature and proximity of the buildings to the railway line.	

Mastung – Sibi Region	From Nushk the railway continues along the section in the Mastung to Sibi region, with the direction changing to an increasing southerly direction. Relatively large settlements were recorded along the meandering railway route, with records of agricultural areas and road crossings.	

Sibi – Bhag Region	There were continued settlements and agricultural observations as the railway line passing through the Sibi to Bhag and Jacobabad to Sukkur regions and with increasing frequency when compared to the above-mentioned areas. The railway route appears to be well respected in these regions, with the rail being well-entrenched into the and landscape and land use appears to observe a safe distance from the railway line.	

Sukkur – Jaccobabad Region		

The right of way along the Rail Transport Route is generally well maintained and respected by those living near and regularly crossing the railway line. In the ML-3 sections of the Route, VECTURIS did not identify specific areas of concern regarding the presence or concentration of people near the railway tracks during their inspections along the railway. Overall, the corridor appears to provide adequate space to minimise human activity within proximity to the tracks, reducing potential safety risks.

The potential risks associated with Project traffic along the Rail Transport Route, together with mitigation options are presented in Table 6-36. Mitigation options are dependent on further investigations and determinations and negotiations between RDMC and Pakistan Rail.

Table 6-36: Risks related to Rail Transportation and Mitigation Options

Risk	Mitigation Options
Low Traffic on ML-3: Current volumes of traffic have been low on the ML-3 section of the Rail Transport Route, particularly from Nok Kundi to Spezand for a long period of time. The risk associated with a sudden and significant increase in traffic is that local communities may no longer be accustomed to regular train movements, increasing the risk of accidents associated with pedestrians and vehicles.	Together with Pakistan Railways, develop and conduct awareness campaigns targeted at settlements located along this section of the railway and inform these communities of the planned ramp-up in railway operations and the associated risks.
Proximity of Houses (Abi-Gum to Kolpur) to tracks along ML-3:  In the double-track section between Abi-Gum and Kolpur, houses are constructed directly below the railway track due to the mountainous terrain and limited space in the pass. There is an increased risk of injury or loss of life and/ or damage to property in the event of a derailment, product spill, fire, or explosion.	Additional risk assessment to be carried by Pakistan Rail and RDMC, evaluating current safety measures. Adhere to railway regulations including speed limits, weight carrying limits and ensure appropriate emergency response plans are in place.
Petroleum Product Trains:	Implement strict safety protocols and emergency response plans prior to the

High risk associated with the transportation of fuel (diesel and HFO) for the construction and operation of the Project due to their flammable nature.	commencement of operations to ensure an effective response to potential incidents. Ensure that containers transporting flammable liquids are properly maintained and sealed, do not exceed their capacity, and the required freeboard is maintained.
Level Crossings: Level crossings, both official and unofficial, are critical points with increased risk of accidents. There are numerous level crossings with varying levels of safety and traffic significance. Specifically, there are 82 level crossings on the Rohri–Sibi section, 14 on the Sibi–Spezand section, and 37 on the Spezand–Alam Reg section.	Pakistan Railways to assess and, where required, enhance safety measures at level crossings as well as conduct regular maintenance and monitoring. RDMC will encourage and support these measures through engagement with Pakistan Railways.
Frequent Collisions (Sukkur Division): Collisions involving road vehicles are relatively frequent in the Sukkur division (from Rohri to Sibi) according to the accident statistics obtained from Pakistan Railway. These incidents occur at both official and unofficial level crossings.	RDMC will engage with Pakistan Railways to enhance safety measures and monitoring at level crossings.

Rail safety options will continue to be explored with Pakistan Railways and may broadly include:

- Modernisation of railway infrastructure including engineering controls such as fencing, controlled rail crossings, signage and signalling;
- The use of spotters, both on the train and on the ground;
- Regular inspections and maintenance;
- Training of drivers in safe driving and adherence to speed limits, safety regulations and railway crossing rules ensuring public safety; and
- Community education and awareness programmes.

6.4.6. Other Risks

The risks that have been identified as a result of the Project and the recommended mitigation measures to manage the risks are presented in Table 6-37.

Table 6-37: Other Identified Risks during Life of the Project

Aspect	Risk description	Proposed Mitigation Measures
Excavation and establishment of the Western Porphyry and Tanjeel pits	The generation of acidic, metal-laden pit water can pose significant risks to surface water, groundwater quality and soils. The potential constituents of concern include low pH, Sulphate, aluminium, antimony, barium, cadmium, cerium, cobalt, chromium, copper, iron, manganese, lead, scandium, thorium, thallium, zinc and nitrates. However, he contaminated pit water will be confined within the drawdown area, restricted to the boundaries of the development site. This is considered to be a low risk as there will be no pit water because evaporation rates are much higher than groundwater inflow rates.	The goal is to minimise the volume of mine contact water generated during operations and with the regional climatic conditions showing low precipitation and high evaporation, the volume of mine water will primarily depend on groundwater ingress. The following management measures should be implemented: • Segregate Mine Contact Water and Clean Water: Separate mine contact water from clean surface water. • Control Seepage and Runoff from Existing WRDs: Install surface drains to redirect runoff from the WRDs away from the pit during rainfall events. • Regular Water Quality Monitoring: Continuously monitor pit water quality to assess its suitability for various purposes. The monitoring program should include the identified potential constituents of concern.
Establishment and operation of all WRDs	The release of acidic, metal-laden seepage and runoff from the WRD can pose significant risks to surface water, groundwater quality and soils. The constituents of concern include low pH, Sulphate, aluminium, antimony, barium, cadmium, cerium, cobalt, chromium, copper, iron, manganese, lead, scandium, thorium, thallium, zinc and nitrates. This risk is reduced due to high evaporation rates and low annual rainfall.	The goal is to minimise the potential generation of contaminated water from the waste rock dumps during rainfall events. To achieve this, the following measures should be implemented: • Continuous Monitoring: Maintain ongoing monitoring of toe seepage, surface water, and groundwater, focusing on the constituents of concern as outlined in the respective monitoring plans. • Regular Inspection and Maintenance: Regularly inspect the WRDs and monitoring systems to identify issues or areas of concern. Ensure proper maintenance and timely repairs to maintain the effectiveness of the measures. • Rehabilitate WRDs: Rehabilitate the waste rock dumps from operation to closure as required in the Mine Closure Plan. • Long-Term Site Closure Plans: Integrate waste rock management into long-term site closure plans to ensure the stability and safety of the WRDs after mining activities have ended. • By implementing these measures, the project aims to proactively manage potential environmental impacts and ensure responsible and sustainable management of waste rock and its associated water concerns throughout its operational and closure phases
Establishment and operation of the cleaner tailings TSF	The release of acidic, metal-laden seepage and runoff from the TSF can pose significant risks to surface water and groundwater quality. Cleaner tailings exhibit very high sulphate concentrations, surpassing 2 g/L, and have a low leachate pH, typically around pH 2. There is a potential for seepage water and runoff to affect the quality of both soil and groundwater. Contaminated seepage and runoff will be contained within the waste rock footprint areas extending only as far as the development site area therefore limited to the site and its immediate surroundings.	The goal is to minimise the potential generation of contaminated water from the TSF. The following measures should be implemented: • Liner: Install an impermeable HDPE liner in the TSF to reduce seepage. • Capture seepage where possible for reuse at the plant. • Divert Clean Surface Water: Use runoff control channels to divert clean surface water away from the TSF during rainfall events. • Continuous Monitoring: Maintain ongoing monitoring of toe seepage, surface water, and groundwater, focusing on the constituents of concern as outlined in the monitoring and management plan in Section 12. • Rehabilitate TSF: Progressively close the TSF by covering the cells with waste rock from Western Porphyry to reduce dust emissions and improve stability. • Regular Inspection and Maintenance: Conduct routine inspections of the TSF and its monitoring systems to identify any issues or areas of concern. Perform necessary maintenance and timely repairs to ensure the continued effectiveness of the measures. • Long-Term Site Closure Plans: Incorporate tailings management strategies into the long-term site closure plans to ensure the stability and safety of the TSF after mining activities have ceased.

Aspect	Risk description	Proposed Mitigation Measures
Health and safety	Risk of exposing workers to occupational health and safety hazards.	• Continue implementation of the Occupational Health and Safety Management System.
Soils and Groundwater/Surface Water	Contamination of soil and water resources due to accidental spills and releases of fuels, solvents, oils, and chemicals, and improper disposal of waste.	• The stormwater management plan must be implemented so that contaminated runoff from dirty catchment areas is contained in the stormwater holding ponds. • Runoff from dirty areas should be directed to the stormwater management infrastructure and should not be allowed to flow into the natural environment. • Minimise as much as possible, the footprint or catchment of the dirty area and maximise the clean areas within the site to ensure that the generated on-site runoff has minimal impact of on water quality. • General and other forms of waste must be collected and disposed of into clearly marked skip bins that can be collected by approved contractors for disposal to appropriate disposal sites. • Overall housekeeping and maintenance of stormwater infrastructure (including berms, de-silting of dams and clean-up of leaks) must be adhered to throughout the life of mine. • Fuel and hazardous material storage areas must be located on hard standing (paved or concrete surface that is impermeable) and bunded facilities. This will prevent mobilisation of leaked hazardous substances. • Training of mine personnel and contractors in proper hydrocarbon and chemical waste handling procedures is recommended; and implementing an effective surface water management. • Relevant monitoring should continue to detect any potential sources of pollution. • Develop and implement suitable spill response procedures. • Maintain vehicles at designated workshops or service bays which are designed to contain any spills of hydrocarbons or grease into oil separation traps. • Wash vehicles at designated wash bays which are designed to contain any oil and grease. • Spill containment kits must be located at workshops and hydrocarbon storage facilities. The spill kits must be maintained in good working order and stock replenished if used. The condition of the spill kits must be included in the annual audit checks. • Waste must be discarded in designated waste storage areas. • Hydrocarbons and chemicals must be stored in designated storage areas. • Hydrocarbon and chemical storage areas and facilities must be located on a hard standing (paved or concrete) impermeable area which is bunded to contain the volume and a half of the stored hydrocarbon or chemical substances. • Equip vehicles with spill containment equipment such as drip trays and absorbent materials. Drip trays or plastic sheeting must be used when vehicles break down outside of designated workshop or service areas. • Oil and grease collection traps need to be cleaned and emptied to prevent overflow and need to be maintained in good working order. The condition of the oil and grease collection traps must be included in the annual audit checks. • Chemical and hazardous waste must be disposed of at an appropriate waste facility designed to handle and storage the specific waste material being disposed of. • Train mine personal and contractors to use the proper site methodology in reporting, handling and disposing of hydrocarbon and chemical waste according to the Safety Data Sheets (SDS) guidelines. • Install secondary containment (e.g., bunds or liners) around hazardous substance storage and transfer areas to capture any spills. • Conduct frequent inspections and maintenance of pipelines, storage tanks, and other containment systems to identify and repair leaks early. • Utilise advanced leak detection technologies to monitor pipelines and storage tanks for early signs of leakage.

Aspect	Risk description	Proposed Mitigation Measures
		• Ensure regular maintenance and inspection of vehicles to prevent leaks and spills. • Keep spill response kits readily available at key locations and on vehicles to address spills promptly.
	Spills and resultant contamination of marine habitat at Port Qasim.	• The Project will consult the PQA on potential remedial measures for accidental spills. • All existing management plans at PIBT will be implemented to the extent applicable. • Monitoring of water quality and marine habitats for early detection of contamination. • Implementation of strict waste management practices for proper disposal of hazardous and other materials. • Collaboration with regulatory agencies and stakeholders to ensure compliance with environmental regulations and standards. • Develop comprehensive spill prevention plans that outline procedures for safe handling, loading, and transport of concentrate. This includes proper storage, and regular equipment maintenance to minimise the risk of spills. • Conduct regular risk assessments to identify potential hazards and vulnerabilities in the transportation process. • Develop and implement emergency response plans that outline procedures for immediate containment, cleanup, and mitigation of spills in the event of an accident or spillage. Ensure that appropriate equipment, materials, and personnel are readily available to respond effectively to spill incidents. • The BMP prepared for the Project will support the conservation of biodiversity in the area. • Emergency Preparedness and Response Plan including Spill Prevention Plan.
Marine biodiversity at Port Qasim	RDMC will operate a large concentrate storage facility at PIBT and there is a potential risk, due to several possible events (known and unknown) of a large spill of concentrate into the local marine environment. The release of copper and ore metals into seawater can directly harm marine life, including fish, invertebrates, and plankton. Toxic effects may include impaired reproduction, growth abnormalities, and even mortality in sensitive species as well as threatened species.	• Monitoring of water quality and marine habitats for early detection of contamination will protect the conservation concern species at PBIT. • Provide training to personnel involved in the handling and transportation of copper and gold concentrate to ensure they are aware of proper procedures and best practices for spill prevention and response. • Provide awareness to local workers regarding the wildlife fauna and its conversation. • Conduct regular risk assessments to identify potential hazards and vulnerabilities in the concentrate transportation process.
Wildlife exploitation	Risk of wildlife exploitation due to influx for the construction and operations of the project. Although influx is expected to be low due to the site specifics, Asian Houbara is particularly at risk of trade.	• Implement a controlled access system to restrict entry to the mine site, with security personnel monitoring and patrolling the area. Install surveillance cameras and conduct regular inspections. • Provide education and training for mine employees and local communities on the importance of wildlife conservation, the legal consequences of poaching, and ethical practices. • Develop and support community-based conservation initiatives and alternative livelihoods that reduce dependence on wildlife resources. Offer training in sustainable practices and support economic development projects. • Collaborate with local law enforcement agencies, conservation organizations, and wildlife protection units to enforce wildlife protection laws and combat poaching. • Establish a robust monitoring and reporting system to track wildlife activity and incidents of exploitation or poaching. Encourage reporting of illegal activities through anonymous hotlines or reporting mechanisms. Particular focus should be given to the Asian Houbara, which is at high risk to poaching.

7. Stakeholder Engagement

Community and stakeholder engagement is a core aspect of Barrick and RDMCs operational philosophy and is an integral and ongoing part of the ESIA process to ensure sustainable development and integration of community and stakeholder interests into project planning and execution.

Engagement with communities and other stakeholders has been conducted by RDMC since the reconstitution of the Project in 2022. Regular consultation with stakeholders are prioritised to keep them informed about project developments and enable feedback. In addition to this, several ESIA specific engagement campaigns have been undertaken to ensure stakeholders are able to participate in the ESIA process.

This Chapter provides a description of the broader RDMC stakeholder engagement extended to Balochistan and Sindh provinces, and community development philosophies and frameworks and details the specific engagement campaigns undertaken as part of the ESIA.

7.1. Objectives of Stakeholder Engagement

The principal objective of the stakeholder engagement and information disclosure is to ensure the involvement of the Project stakeholders in the project planning, ESIA decision-making, and construction and operation phases of the Project. This was and continues to be achieved through:

- Identifying stakeholders that have an interest in the Project and may be affected by it;
- Informing the stakeholders on the proposed activities and its consequences;
- Gathering data and information from the local adjacent communities about their human and biophysical environment, as well as about the relations they have with their environment;
- Seeking input from the public on the planned activities to increase its positive outcomes and avoid or mitigate adverse impacts; and
- Ensuring continued engagement of the stakeholders throughout the life of the Project.

Stakeholder consultations start during the planning stage of the Project and continue throughout its lifecycle, including, construction, operation and closure phases. Stakeholders are continuously consulted and informed about any relevant project aspects which may affect them.

7.2. Regulatory Requirements and International Best Practice

7.2.1. Pakistan Requirements

Stakeholder engagement for this ESIA was undertaken in compliance with relevant national and provincial legislation and international guidelines and standards. Public consultation is mandated under the environmental laws of Balochistan and Sindh. The Pakistan EPA, Regulation 6 of the IEE-EIA Regulations 2000, provides the general requirements associated with consultations. In addition, the sectoral guidelines indicating specific assessment requirements are provided in the Guidelines for Public Consultation 1997 (the 'Guidelines'). These are summarised below.

- *Objectives of Public Involvement*: To inform stakeholders about the proposed Project and provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision-making, thereby creating a sense of ownership with the stakeholders.
- *Stakeholders:* People who may be directly or indirectly affected by a proposed project will be the focus of public involvement. Those directly affected may be project beneficiaries, those likely to be adversely affected, or other stakeholders. Identifying those indirectly affected is more complex and is a subjective judgment to some extent. For this reason, it is good practice to have a very wide definition of who should be involved and include any person or group who believes they have an interest in the Project. Sometimes, consulting with a representative from a particular interest group may be necessary. In such cases, the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of a proposed project but should also include those who can affect the outcome of a project.
- *Mechanism of Consultations*: Sufficient, relevant information should be provided in a form easily understood by non-experts (without being simplistic or insulting). Stakeholders should be given sufficient time to read, discuss, and consider the information and its implications, and present their views. Responses should be provided to issues and problems raised or comments made by stakeholders and the selection of venues and timings of events should encourage maximum attendance.
- *Timing and Frequency*: Planning for the public consultation program should begin at a very early stage; ideally, it should commence at the screening stage of the project scoping and continue throughout the ESIA process.
- *Consultation Tools*: Some specific consultation tools that can be used for conducting consultations include focus group meetings, needs assessment, semi-structured interviews; village meetings, and workshops.
- *Other Important Considerations*: The development of a public involvement program would typically involve consideration of the following issues: objectives of the proposal and the study; identification of stakeholders; identification of appropriate techniques to consult with the stakeholders; identification of approaches to ensure feedback to involved stakeholders; and mechanisms to ensure stakeholders' considerations are taken into account.

The national environmental laws require that only one round of consultations be conducted during the scoping phase of the Project.

7.2.2. International Standards

7.2.2.1. IFC Performance Standards

The IFC Performance Standards, along with the IFC sustainability and information access policies form the IFC Sustainability Framework. The Performance Standards outline the IFC client responsibilities for assessing and managing their environmental and social risks and applies to all projects which go through the IFC review process. The Performance Standards are also considered applicable to private finance organisations which adopt the Equator Principles risk management framework. Key principles of stakeholder engagement outlined in the Performance Standards include:

- Community engagement and timely disclosure of information should be an ongoing process across all project stages, particularly for local communities who may be affected by the project. The nature and frequency of community engagement will reflect the project risks to, and adverse impacts on, the affected communities;
- Community engagement will be free of external manipulation, interference, or coercion, and intimidation, and conducted on the basis of timely, relevant, understandable and accessible information;
- Consultation should be conducted in a manner that provides the affected communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the company to consider and respond to them;
- Community engagement should ensure the free, prior and informed consent of impacted communities and facilitate informed participation. Informed participation involves organised and iterative consultation to ensure that the decision-making processes of the company incorporate the views of affected parties, particularly in relation to proposed mitigation measures, the sharing of development benefits and opportunities, and implementation issues. The company will document the process, in particular the measures taken to avoid or minimise risks to and adverse impacts on the affected communities; and
- The company will respond to stakeholder concerns. Where ongoing risks to or adverse impacts on affected parties are likely, the company will establish a grievance mechanism to receive and facilitate resolution of concerns in relation to the project. The grievance mechanism should be scaled appropriately and should address concerns promptly, using an understandable and transparent process that is culturally appropriate and readily accessible to all segments of affected communities, and at no cost and without retribution. The mechanism should not impede access to judicial or administrative remedies. The company will inform the affected communities about the mechanism in the course of its community engagement process.

7.2.2.2. Equator Principles

The Equator Principles is a “risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects.” Financial

Institutions (referred to as Equator Principles Financial Institutions, or EPFIs) who adopt the Equator Principles commit to financing projects which meet the requirements of all 10 principles to ensure that projects are developed in a socially and environmentally responsible manner. The principles state that impacts to project affected communities and environments are avoided where possible, and where impacts are unavoidable, that they should be "minimised, mitigated and/or offset". The latest version of the principles (EP4 - 2020) lists out 10 principles which are described in the following sub-sections with comment as to how they apply to the project.

Principle 5 states:

"For all Category A and Category B Projects, the EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-making processes; and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation."

Principle 5 requires the project proponent to ensure that:

- The level of engagement is commensurate to the risks and potential impacts of the project;
- Appropriate information and documentation is readily available to affected parties and other relevant stakeholders;
- That engagement is conducted in a culturally appropriate manner and in the local language;
- The stakeholder engagement process is documented, including any agreed actions which result;
- Disclosure of environmental and social risks associated with the project, both prior to construction and on an ongoing basis; and
- Projects with adverse impacts on IPs demonstrate Free, Prior and Informed Consent (FPIC).

Principle 7 requires the implementation of an appropriately scaled grievance mechanism that:

- Seeks to resolve concerns in a timely manner;
- Is easily understandable, transparent and culturally appropriate;
- Is readily accessible at no cost;
- Ensures there is no retribution to the concerned party; and
- Is adequately socialised to affected communities and other relevant stakeholders.

7.3. ESIA Stakeholder Engagement Process

The ESIA stakeholder engagement process was designed and undertaken to ensure compliance with national and provincial regulatory requirements, and international best practice guidelines outlined in Section 7.2. Consultations were to be undertaken in good faith while remaining impartial, with consideration of the following good practice principles:

- *Cultural sensitivity*: This requires respect, understanding and appreciation for the customs, institutions, values and norms of the communities being consulted;
- *Interactive approach*: Stakeholder engagement should not be limited to the one- way dissemination of information by the Project proponent but should include stakeholder input into decision-making processes for the proposed Project;
- *Open, transparent and informative*: Project stakeholders should have access to relevant information, in a simple and understandable format;
- *Inclusive and equitable*: Ensure all stakeholder groups are represented, including less represented groups such as women, children, elderly, and vulnerable groups;
- *Appropriateness and flexibility*: Stakeholder engagement techniques (surveys, interviews, workshops, etc.) must be appropriate to the specific phase of the ESIA study (scoping consultations, feedback consultations) and the stakeholder groups identified; and
- *Capacity building*: Capacity should be built as part of the interaction with stakeholders, wherever appropriate and practicable.

All comments received during the ESIA consultation process have been considered during development of the ESIA.

7.3.1. Stakeholder Identification

Stakeholders include individuals and groups that can affect or take effect from a project's outcome. The identification of stakeholders is an ongoing and iterative process and additional stakeholders are continuously identified as the Project develops. Stakeholders include individuals and groups that can affect or be affected by a project.

7.3.1.1. Local Communities

A key focus for the Project is those communities which may be directly impacted (negatively and positively). Maintaining open and honest dialogue with communities proximal to the project is critical for success.

7.3.1.2. Vulnerable Groups

Consultation processes have been specifically with people representing potentially vulnerable or marginalised groups such as women, young people, landless people, the sick and disabled, internally displaced people, ethnic minorities and in-migrants. In-migrants may be defined broadly as people who originate from outside the Project area and who are motivated to move to the Project area by perceived economic opportunities or benefits associated with the development of the Project. Within this category, specific attention was paid only to those who may be considered vulnerable.

7.3.1.3. Government Institutions

There are a range of Government departments and other Government bodies at district, provincial and federal level who have been engaged through the pre-construction and ESIA phase of the project in relation to approvals processes as well as for general information purposes. Engagement with Government officials is carefully controlled and recorded as per Barrick policy.

7.3.1.4. Civil Society and Non-Governmental Organisations

This group includes all other people in society who may have an interest in the Project and its social and environmental aspects and NGOs representing their interests. It includes members of the wider general public in Pakistan and further afield, civil society organisations such as religious groups, cooperatives, professional associations, cultural groups and citizens associations and environmental and social groups. It also includes universities and other academic and research institutions undertaking work relevant to the Project (e.g. on mining, sustainability, social and environmental issues, local and regional development, etc.) who may have views on the Project or information that will be useful for the assessment of Project impacts.

7.3.1.5. Commerce and Industry

A range of different types of commercial organisations may be interested in the project including:

- Local entrepreneurs (both companies and individual farmers, traders, merchants etc) who may be adversely affected by social or environmental impacts, or who may gain benefit by providing goods and services to the project;
- Entrepreneurs and businesses from elsewhere in Pakistan who may gain benefits by providing goods and services to the Project; and
- Other mining companies working in the local area and elsewhere in Pakistan.

As the Project develops and new contractors and service providers are identified, it is likely that these businesses will become important stakeholders as they establish contractual relationships with the Project.

7.4. ESIA Specific Consultation

ESIA specific stakeholder consultations were conducted in 2022, 2023, and 2024. The consultation process, established during the preparation stage of the project, employed different types of consultation such as in-depth interviews with key informants, focus group discussions, seminars and meetings. The consultation program included the following:

- One-on-one interviews with key informants residing in the settlements located in the Socio-economic Study Area (Figure 7-1);
- Separate meetings with institutional stakeholders in Dalbandin, Quetta and other key centres;
- Consultations with communities located close to the Project footprint and along the railway;
- To respect local culture, consultations were conducted separately for men and women. Male consultants, accompanied by local male representatives, interviewed men in the villages, while female consultants, accompanied by local female representatives, interviewed women. All consultations were carried out in Urdu and Balochi, the local language, with English used in some of the meetings with institutional stakeholders;
- Separate consultations were held with each of the three CDCs – see Section 7.7 for more details on the Barrick Community Development Framework; and
- Special attention was given to identifying the needs of vulnerable groups (such as the poor, women, and elderly), to ensure that their views are considered in formulating the ESIA.

RDMC and HBP team representatives were present during the consultation meetings with the stakeholders. The contact details of the RDMC and HBP representatives were shared with the stakeholders to enable them to reach out at a later stage, if required, to share any concerns or ask any questions regarding the Project.

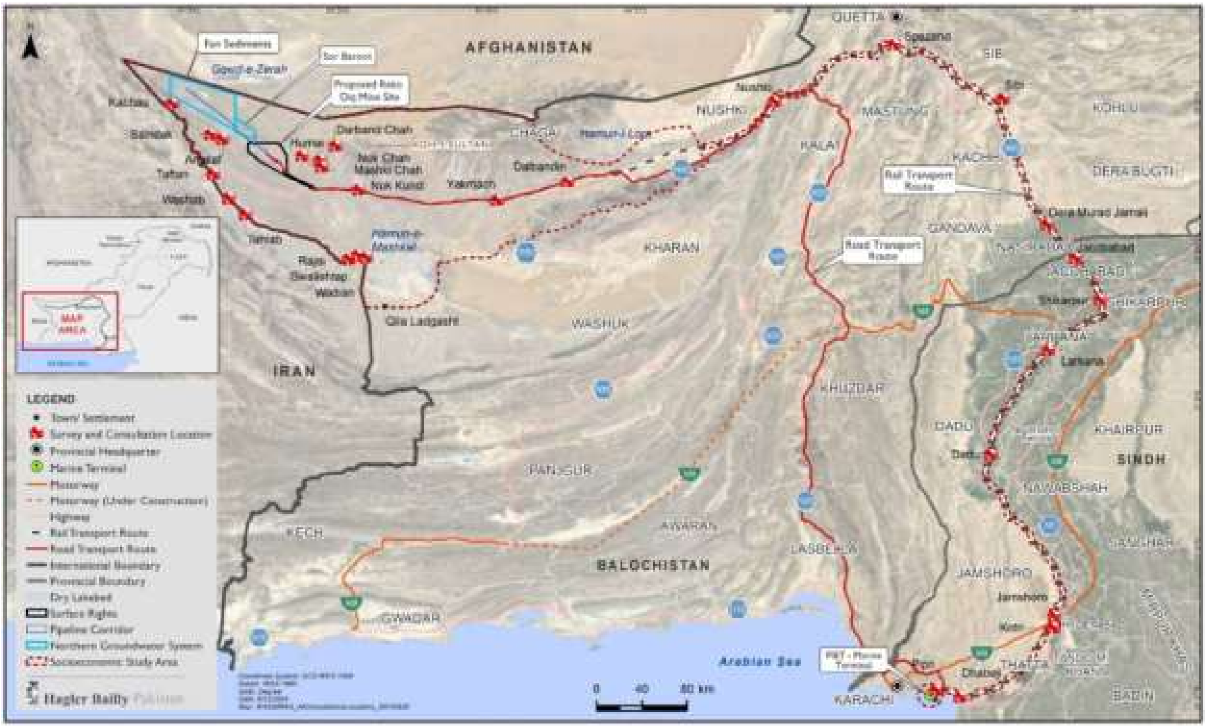


Figure 7-1: Socio-economic Study Area and Location of Consultations

7.5. ESIA Engagement Campaigns

Community consultations for the ESIA were conducted in four rounds.

- **Round 1 – ESIA Preparation:** The settlements near the Reko Diq Mine Site, associated infrastructure (i.e. water supply area), and other Water No-Objection Certificate (NOCs) were consulted between 13 September and 10 October 2022. This included settlements near the RDMS and associated infrastructure and also included Nok Kundi and Dalbandin, as the important administrative centres in the region. A total of 15 communities were consulted during this round. A Background Information Document (BID) was shared with the community and institutional stakeholders. The BID included information regarding the Project, the ESIA process and how they can participate and was prepared in English and the local Balochi language.

- **Round 2 – ESIA Preparation:** The settlements near the Rail Transport Route and Port Qasim were consulted in Round 2; from 10 October - 14 October 2023 as part of the consultations for the ESIA preparation and socio-economic data collection. In this round, a total of 15 communities were consulted where a Background Information Document in both English and Urdu was prepared and shared as per Round 1.

- **Round 3 – ESIA Feedback:** The settlements near the RDMS and associated infrastructure were consulted in Round 3, from 15 February - 20 February 2024, to provide information relating to the Project early works and provide opportunity for feedback. Nine communities were selected based on their proximity to the early works activities. Project information materials were prepared in English and Urdu and included information about the RDMC grievance process.

- **Round 4 – ESIA Roadshow and Feedback:** The settlements near the RDMS and associated infrastructure, along the Rail Transport Route and at Port Qasim were consulted between 21 June - 6 July 2024, as part of the ESIA Roadshow. During this round, details of the project and ESIA process together with preliminary impacts identified were provided. A total of 21 communities were engaged during this round and opportunities for feedback were provided. Engagement materials included a variety of information documents in both English and Urdu.

Table 7-1 provides details of the participants in the community consultations in 2022, 2023, and 2024.

Table 7-1: Community Consultations in 2022, 2023, and 2024

Community Consultations		Participants in the consultations (men and women)
Number	Name	
4	Balochistan – Humai, Nok Chah, Mashki Chah, Darband Chah	74

Community Consultations		Participants in the consultations (men and women)
Number	**Name**	
9	Balochistan – Kachau, Saindak, Amalaf, Taftan, Tahlab, Washab, Rajai, Wadian, Gwalishtap	192
2	Balochistan – Nok Kundi, Dalbandin	37
13	Balochistan – Nok Kundi, Yakmach, Dalbandin, Nushki, Spezand, Sibi, Dera Murad Jamali Sindh – Kotri, Jamshoro, Larkana, Jacobabad, Dadu, Shikarpur	98
2	Sindh – Pipri, Dhabe Ji	6
4	Humai, Nok Chah, Mashki Chah, Darband Chah	118
3	Kachau, Saindak, Amalaf	76
2	Nok Kundi, Dalbandin	56
4	Humai, Nok Chah, Mashki Chah, Darband Chah	100
6	Essa Tahir/Brahuk, Gwalishtap, Kachau, Amalaf, Saindak, Taftan	106
9	Balochistan - Nok Kundi, Yakmach, Dalbandin, Nuhski, Spezand, Dera Murad Jamali, Sindh - Jamshoro, Larkana, Dadu	128
2	Pipri, Dhabeji	16

7.5.1. Mine Area

Consultations were conducted with men and women in four settlements near the RDMS in Round 1, Round 3, and Round 4. Figure 7-1 shows the locations of the consultations in the settlements near the RDMS.

Table 7-2 shows the number of participants who participated in the consultations from each settlement in all the rounds.

Figure 7-2 shows the photographs of the consultations.

Table 7-2: Number of Participants and Consultation Dates – Reko Diq Mine Area

Location	Settlement	Number of Participants			Date Consulted
		Men	Women	Total	
Reko Diq Mine Site	Humai	12	11	23	13 September 2022
	Mashki Chah	7	11	18	14 September 2022
	Nok Chah	4	10	14	14 September 2022
	Darband Chah	10	9	19	15 September 2022
	Humai	26	34	60	15 February 2024
	Mashki Chah	4	9	13	16 February 2024
	Nok Chah	2	9	11	16 February 2024
	Darband Chah	12	22	34	16 February 2024
	Humai	12	14	26	23 June 2024
	Nok Chah	12	14	26	23 June 2024
	Mashki Chah	10	12	22	24 June 2024
	Darband Chah	13	13	26	24 June 2024

Consultation with men at Humai settlement – Round 1

Consultation with men at Nok Chah settlement – Round 1

Consultation with women at Darband Chah settlement - Round 1

Consultation with men at Darband Chah settlement – Round 1

Consultation with men at Humai settlement – Round 3

Consultation with men at Nok Chah settlement – Round 3

Consultation with men at Darband Chah settlement – Round 3

Consultation with men at Mashki Chah settlement – Round 3

Consultation with men at Humai settlement – Round 4

Consultation with women at Humai settlement – Round 4

Consultation with men at Nok Chah settlement – Round 4

Consultation with women at Nok Chah settlement – Round 4


Consultation with men at Mashki Chah settlement - Round 4


Consultation with women at Mashki Chah settlement – Round 4


Consultation with men at Darband Chah settlement – Round 4


Consultation with women at Darband Chah settlement – Round 4

Figure 7-2: Photographs of the Consultations – Reko Diq Mine Area

Table 7-3 provides the issues and concerns raised during the community consultations at the Mine Area and how they have been addressed in the ESIA report.

Table 7-3: Summary of Concerns/Issues Raised and Addressed – Mine Area

Community Concerns/Issues Raised	**ESIA Considerations**
Permanent employment opportunities for local community members.	The Project is anticipated to generate significant employment opportunities across all project Phases. RDMC is prioritising local employment and has established a number of training initiatives to improve the local skill base. See Impact 01 for more details.
Infrastructure (access to clean water and roads) development.	The Project has committed to a significant community development program. These initiatives will primarily focus on enhancing local infrastructure and services, with particular emphasis on health, education, water supply, food security and economic development. RDMC has been, and will continue to, work with communities and government to identify their needs and implement initiatives accordingly. Impact 03 on Social Development Initiatives addressed this aspect.

Potential health issues from dust and chemicals, based on past negative experiences with nearby projects.	RDMC has undertaken a comprehensive air quality dispersion assessment to assess the impacts on community which is available in Appendix Q. No impacts from the project are anticipated at nearby communities. Additionally, RDMC will conduct air quality monitoring at the nearest settlement, Humai.
Concerns were raised by women about the lack of skills development initiatives in the area.	The Project has implemented and will continue to implement training programs to enhance employment opportunities. These programs will focus on maximising the participation of local community members in the Project. Impact 04 on Skills Development addresses this aspect.
Lack of a nearby medical centre or hospital, making it difficult in case of emergencies.	RDMC, in partnership with the Indus Hospital and Health Network (IHHN), has embarked on delivering healthcare services across district Chagai to enhance access to healthcare services and improve the quality of life through timely provision of free healthcare services and preventive care education programs. Community health centres have been established Humai and Nok Kundi and a Mobile Health Unit has also been established to provide services to some of the smaller settlements.
Limited employment opportunities for skilled workers, with a request for job preferences to be given to the local community.	The Project is anticipated to generate significant employment opportunities across all project Phases. RDMC is prioritising local employment and has established a number of training initiatives to improve the local skill base. See Impact 01 for more details.

7.5.2. Northern Groundwater System and other Water NOCs

The consultations were conducted with men and women in nine settlements at the Northern Groundwater System and other water NOCs.

Figure 7-1 shows the locations of these settlements. Table 7-4 shows the number of participants who participated in the consultations from each settlement. Figure 7-3 shows photographs of the consultations.

Table 7-4: Number of Participants and Consultation Dates –Northern Groundwater System and other Water NOCs

Location	Settlement	Number of Participants			Date Consulted
		Men	Women	Total	
Northern Groundwater System, and other Water NOCs	Saindak	10	11	21	16 September 2022
	Amalaf	13	11	22	17 September 2022
	Kachau	10	10	20	18 September 2022
	Taftan	8	11	19	19 September 2022
	Washab	11	11	22	21 September 2022
	Tahlab	8	16	24	21 September 2022
	Wadian	7	16	23	29 September 2022
	Gwalishtap	7	14	21	30 September 2022
	Rajai	6	14	20	01 October 2022
	Amalaf	6	9	15	17 February 2024
	Saindak	10	7	17	17 February 2024
	Kachau	14	30	44	18 February 2024
	Essa Tahir/Brahuk	11		11	29 June 2024
	Gwalishtap	9	9	18	30 June 2024
	Kachau	14	10	24	25 June 2024
	Amalaf	12	7	19	28 June 2024
	Saindak	10	5	15	28 June 2024
	Taftan	9	10	19	26 June 2024


Consultation with men at Saindak settlement – Round 1


Consultation with men at Kachau settlement – Round 1


Consultation with men at Taftan settlement – Round 1


Consultation with men at Washab settlement – Round 1


Consultation with women at Kachau settlement – Round 1


Consultation with women at Taftan settlement – Round 1


Consultation with men at Amalaf settlement – Round 1


Consultation with men at Amalaf settlement – Round 3


Consultation with men at Saindak settlement – Round 3


Consultation with men at Kachau settlement Round 1


Consultation with men at Kachau settlement – Round 3


Consultation with men at Essa Tahir/Brahuk settlement – Round 4


Consultation with men at Gwalishtap settlement – Round 4


Consultation with men at Kachau settlement – Round 4


Consultation with men at Amalaf settlement – Round 4


Consultation with men at Saindak settlement – Round 4


Consultation with men at Taftan settlement – Round 4


Consultation with women at Kachau settlement – Round 4

Consultation with women at Taftan settlement – Round 4

Figure 7-3: Photographs of the Consultations –Northern Groundwater System and other Water NOCs

Table 7-5 provides the issues and concerns raised during the community consultations at the Northern Groundwater System and other Water NOCs and how they have been addressed in the ESIA report.

Table 7-5: Summary of Concerns/Issues Raised and Addressed – Northern Groundwater System and other Water NOCs

Community Concerns/Issues Raised	ESIA Considerations
Absence of teachers at schools.	RDMC are working with other stakeholders on education initiatives as part of the community development program.
Limited employment opportunities during the Project Early Works.	Local employment has been prioritised for all project phases.
Lack of a female doctor at the hospital in Amalaf, presents challenges for women during emergencies and pregnancy.	RDMC are working with stakeholders on health related initiatives as part of the community development program.
Health issues from poor quality water in Amalaf, with a request for an RO plant to provide clean drinking water.	RDMC are working with stakeholders on health and water provision related initiatives as part of the community development program.
Impacts to water sources due to the Project's planned water extraction.	The Project will not impact on any community water resource. A detailed hydrocensus has been undertaken to ensure community water sources are identified and understood.
Agricultural field damage caused by water flow during recent heavy rains. A request was made to the RDMC to install a check dam and protective	

walls. It was advised to bring this issue up at the CDC meeting for further consideration.	
Limited opportunities for women, and the exclusion of women from decision-making processes were highlighted.	The Project is currently developing a Gender Action Plan.
Increasing air pollution from the Saindak Project, which is leading to health issues among local community members. Additionally, the heavy reliance on the Saindak Project for employment, inadequate road infrastructure, a partially operational cellular network affecting communication.	Community concerns relating to general lack of infrastructure and services are noted. This has been included in considerations for influx management in particular.
The community in Saindak has faced negative experiences with previous mining projects, such as disruptions caused by electricity provision that affected their privacy, mobility, and access to local resources. As a result, they are sceptical about future projects like Reko Diq, raising concerns about inadequate consultation and the potential lack of benefits for community development.	

7.5.3. Rail Transport Route

Consultations were conducted in thirteen settlements along the Rail Transport Route. In some settlements, consultations with women were not conducted due to logistical restrictions. The settlements along the Rail Transport Route were consulted in three rounds. Nok Kundi and Dalbandin were consulted in 2022 as part of the Round 1 engagements, while Yakmach and Nushki were consulted in 2023. In October 2023, consultations were held in Kotri, Jamshoro, Dadu, Larkana, Shikarpur, Jacobabad, Dera Murad Jamali, Sibi, and Spezand. The ESIA Roadshow consultations were conducted in June-July 2024 in Nok Kundi, Yakmach, Dalbandin, Nushki, Spezand, Dera Murad Jamali, Larkana, Dadu, and Jamshoro.

Figure 7-1 shows the locations of the consultations in the settlements along the Rail Transport Route. Table 7-6 shows the number of participants who participated in the consultations from each settlement. Figure 7-4 shows photographs of the consultations.

Table 7-6: Number of Participants and Consultation Dates – Rail Transport Route

Location	Settlement	Number of Participants			Date Consulted
		Men	Women	Total	
Rail Transport Route	Kotri	3	-	3	10 October 2023
	Jamshoro	6	-	6	10 October 2023
	Dadu	11	-	11	11 October 2023
	Larkana	6	-	6	12 October 2023
	Shikarpur	5	-	5	12 October 2023
	Jacobabad	3	-	3	12 October 2023
	Dera Murad Jamali	8	-	8	13 October 2023
	Sibi	5	-	5	13 October 2023
	Spezand	10	-	10	14 October 2023
	Nok Kundi	9	12	21	24 September 2022
	Dalbandin	8	8	16	26 September 2022
	Yakmach	4	-	4	01 September 2023
	Nushki	6	-	6	01 September 2023
	Nok Kundi	18	11	29	19 February 2024
	Dalbandin	15	12	27	20 February 2024
	Nok Kundi	12	11	23	24 June 2024
	Yakmach	36	-	36	01 July 2024
	Dalbandin	20	-	20	02 July 2024
	Nushki	16	-	16	03 July 2024
	Spezand	5	-	5	03 July 2024
	Dera Murad Jamali	9	-	9	04 July 2024
	Larkana	5	-	5	05 July 2024
	Dadu	9	-	9	05 July 2024
	Jamshoro	5	-	5	06 July 2024


Consultation with men at Nok Kundi – Round 1


Consultation with men at Nok Kundi– Round 3


Consultation with men at Nok Kundi - Round 4


Consultation with women at Nok Kundi – Round 2


Consultation with women at Nok Kundi – Round 4


Consultation with men at Dalbandin – Round 1


Consultation with men at Dalbandin – Round 3


Consultation with men at Dalbandin – Round 4


Consultation with men at Yakmach Settlement – Round 2


Consultation with men at Yakmach Settlement – Round 4


Consultation with men at Nushki Settlement – Round 4


Consultation with men at Sibi Settlement – Round 2


Consultation with men at Spezand Settlement – Round 2


Consultation with men at Spezand Settlement – Round 4


Consultation with men at Dera Murad Jamali Settlement – Round 2


Consultation with men at Dera Murad Jamali Settlement – Round 4


Consultation with men at Jacobabad Settlement – Round 2


Consultation with men at Shikarpur Settlement Round 2


Consultation with men at Larkana Settlement – Round 2


Consultation with men at Larkana Settlement – Round 4


Consultation with men at Dadu Settlement – Round 2


Consultation with men at Dadu Settlement- Round 4


Consultation with men at Jamshoro Settlement – Round 2


Consultation with men at Jamshoro Settlement- Round 4


Consultation with men at Kotri Settlement- Round 2

Figure 7-4: Photographs of the Consultations – Rail Transport Route

Table 7-7 provides the issues and concerns raised during the community consultations along Rail Transport Route and how they have been addressed in the ESIA report.

Table 7-7: Summary of Concerns/Issues Raised and Addressed – Rail Transport Route

Community Concerns/Issues Raised	ESIA Considerations

The number of available positions at the training centre and whether there would be a quota for nearby communities.	The Project will generate employment opportunities for the locals of Balochistan as well as residents of other provinces. Impact 01 on Employment Opportunities addresses this aspect.
Anticipated rise in traffic, potential health issues due to in-migration, increasing temperatures, and higher pollution levels resulting from project activities.	An Influx Management Plan is being developed.
Lack of clean drinking water and the absence of a waste management system.	RDMC are working with stakeholders on water provision and waste management related initiatives as part of the community development program.
Lack of a fully equipped hospital in Dalbandin, which forced patients to travel to Quetta for medical care.	RDMC are working with stakeholders on health related initiatives as part of the community development program.
The women in the community raised several concerns, including the proposed training centre being too far for them to access, a lack of jobs for male family members impacting family income, and the absence of nearby schools.	The Project will generate employment opportunities for the locals of Balochistan as well as residents of other provinces. Options for transport to and boarding at the training centre are being implemented, and a training centre specifically for training women in sewing has been established at Humai with a view to creating a women run business making uniforms and other goods for the Project. Impact 01 on Employment Opportunities addresses this aspect.
Community members suggested prioritising youth employment opportunities to address the issue of many local youths engaging in illegal and dangerous cross-border trade, which has resulted in significant loss of life.	Noted and RDMC will consider this suggestion to the extent feasible in its training programmes.
Safety concerns were raised due to the proximity of the existing railway tracks to settlements, suggesting the construction of fences along the tracks is essential to ensure	A rail safety risk assessment has been completed as part of this ESIA.

the safety of residents, especially children and livestock.	

7.5.4. Port Qasim

Consultations were conducted in two settlements at Port Qasim over two rounds. Consultations could not be conducted with women due to logistical restrictions.

Figure 7-1 shows the locations of consultations at Port Qasim. Table 7-8 shows the number of participants who participated in the consultations from each settlement. Figure 7-5 shows the photographs of the consultation.

Table 7-8: Number of Participants and Consultation Locations – Port Qasim

Location	Settlement	Number of Participants			Date Consulted
		Men	Women	Total	
Port Qasim	Pipri	3	-	3	10 October 2023
	Dhabeji	3	-	3	10 October 2023
	Pipri	6	-	6	06 July 2024
	Dhabeji	10	-	10	06 July 2024

Consultation with men at Dhabeji Settlement – Round 2

Consultation with men at Pipri Settlement – Round 2

Consultation with men at Dhabeji Settlement – Round 4

Consultation with men at Pipri Settlement – Round 4

Figure 7-5: Photographs of the Consultations – Port Qasim

Table 7-9 provides the issues and concerns raised during the community consultations along Rail Transport Route and how they have been addressed in the ESIA report.

Table 7-9: Summary of Concerns/Issues Raised and Addressed – Port Qasim

Community Concerns/Issues Raised	ESIA Considerations
The lack of proper healthcare facilities, necessitating residents to travel to Karachi for treatment.	The Project would create employment opportunities a small amount of local people.
The railway system and local transport were raised as a concern, with specific emphasis	

on the need for more railway stops and improvements in the train functionality.	
High unemployment levels.	
Inadequate infrastructure and rising pollution.	
Lack of clean drinking water.	

7.5.5. Institutional Consultation

Institutional stakeholders included relevant government departments/ agencies and NGOs that were consulted for the Project. A total of 28 institutional consultations were carried out across three rounds outlined below:

- **Round 1:** The initial consultations aimed at information disclosure were conducted between September and October 2022. Due to the unavailability of some government departments for consultations, the remainder were covered in Round 2. A total of nine institutional stakeholders were consulted during this round.
- **Round 2:** The remainder of the information disclosure related consultations were conducted in September 2023. A total of eight institutional stakeholders were consulted in this round of consultations.
- **Round 3:** Additional feedback consultations were undertaken between June and August 2024. Apart from follow up with institutional stakeholders consulted previously, the National Transmission & Despatch Company (NTDC) and Ministry of Railways were also consulted due to their significance in the CIA context. A total of 11 institutional stakeholders were consulted in this round.

Table 7-10 shows the list of institutional stakeholders consulted.

Table 7-10: List of Institutional Stakeholders

Stakeholder	Date Consulted	Round	Objective
Education Department, Dalbandin	26 September 2022	1	Information Disclosure
Health Department, Dalbandin	26 September 2022	1	Information Disclosure
Livestock & Dairy Development Department, Dalbandin	26 September 2022	1	Information Disclosure
District Administration, Dalbandin	27 September 2022	1	Information Disclosure
Agriculture Department, Dalbandin	27 September 2022	1	Information Disclosure
Forest and Wildlife Department, Quetta	05 October 2022	1	Information Disclosure

Stakeholder	Date Consulted	Round	Objective
Coastal Development and Fisheries Department, Quetta	05 October 2022	1	Information Disclosure
Balochistan Environmental Protection Agency (BEPA), Quetta	05 October 2022	1	Information Disclosure
Islamic Relief (NGO), Quetta	05 October 2022	1	Information Disclosure
District Vice Chairman Local Government and Rural Development Chagai	01 September 2023	2	Information Disclosure
Public Health Engineering (PHE) and Water and Sanitation Agency (WASA)	04 September 2023	2	Information Disclosure
National Highway Authority (NHA)	04 September 2023	2	Information Disclosure
Irrigation Department	04 September 2023	2	Information Disclosure
Home Department Quetta	04 September 2023	2	Information Disclosure
Forest and Wildlife Department, Quetta	04 September 2023	2	Information Disclosure
Balochistan Revenue Authority (BRA)	04 September 2023	2	Information Disclosure
Balochistan Rural Support Program (BRSP)	05 September 2023	2	Information Disclosure
Balochistan Environmental Protection Agency (BEPA)	24 June 2024	3	Feedback and follow-up
Balochistan Rural Support Program (BRSP)	25 June 2024	3	Feedback and follow-up
Islamic Relief	25 June 2024	3	Feedback and follow-up
Irrigation Department & Integrated Water Resource Management System (IWRMS), GoB	25 June 2024	3	Feedback and follow-up
Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS)	25 June 2024	3	Feedback and follow-up
Local Government & Rural Development Department (LG & RD)	26 June 2024	3	Feedback and follow-up
Mines & Mineral Development Department (MMDD)	26 June 2024	3	Feedback and follow-up
Forest and Wildlife Department, Quetta	26 June 2024	3	Feedback and follow-up
National Highway Authority (NHA)	30 July 2024	3	Feedback, follow-up and CIA related discussion
Ministry of Railways	30 July 2024	3	CIA related discussion
National Transmission & Despatch Company (NTDC)	02 August 2024	3	CIA related discussion

Figure 7-6 shows the photographs of the institutional stakeholder consultations.


Consultation with Deputy Director, Agriculture Department, Dalbandin


Consultation with Secretary, Coastal Development and Fisheries Department, Quetta


Consultation with Deputy Commissionaire, Dalbandin


Consultation with District Officer Education, Education Department, Dalbandin


Consultation with Deputy Director Environment (EPA), Quetta


Consultation with Secretary Forest and Wildlife Department, Quetta


Consultation with District Health Officer, Health Department, Dalbandin


Consultation with Deputy Director, Livestock and Dairy Development Department, Dalbandin


Consultation with Balochistan Revenue Authority (BRA) and Forest Department


Consultation with Balochistan Rural Support Program (BRSP)


Consultation with Public Health Engineering (PHE) and Water and Sanitation Agency (WASA)


Consultation with Home Department Quetta


Consultation with Irrigation Department


Consultation with LEVIES Department

Consultation with District Vice Chairman Local Government and Rural Development Chagai

Consultation with National Highway Authority (NHA)

Consultation with Area Program Manager, Islamic Relief (NGO) Quetta

Figure 7-6: Photographs of Consultations with Institutional Stakeholders

7.5.6. Summary of Institutional Stakeholder Consultations

The concerns shared by the institutional stakeholders are summarised below:

Biodiversity of Desert Ecosystems: The Balochistan Forest and Wildlife Department emphasized the project's role in the conservation of flora and fauna but did not identify any particular habitats or species of conservation concern.

Stakeholder Engagement and Negative Perceptions: The Local Government & Rural Development Department emphasized that continual and transparent stakeholder engagement will be required throughout the life of the project to manage stakeholder expectations and concerns.

GHG Emissions: An increase in GHG emissions and adverse climate change impacts in Balochistan were cited as concerns by the Home Department Quetta, the District Vice Chairman Local Government and Rural Development Chagai, and the NHA. The Ministry of Railways emphasized that the development of effective rail transport in the region can significantly assist Projects in offsetting their GHG emissions.

Air Emissions: The Balochistan Health Department highlighted that respiratory diseases in the region have increased in recent years, likely owing to industrial activity and increase in the number of vehicles.

Wastewater management: The Islamic Relief Organisation expressed several concerns regarding wastewater and provided suggestions for the reuse and recycling of wastewater.

Water Resource Use: Water resource-related concerns were cited as significant by the Irrigation Department, owing to the reliance of local communities on groundwater for meeting all water-related needs, including agriculture. The BEPA expressed similar concerns, particularly for any communities that may be located around the Northern Groundwater System.

Noise Pollution: Noise pollution associated with the operation of construction machinery were mentioned as concerns by the Home Department Quetta, similar to concerns expressed by the local communities. Noise from railway operations were not a concern of any stakeholder.

Traffic and Road Congestion: Traffic and road congestion were mentioned by the NHA as significant concerns, as existing roads have not been designed with extensive mining developments in mind. The Education Department stated that upgrading the roads is vital to supporting child education, as the local communities are poorly connected to larger settlements that have adequate educational facilities.

Security Management: The Levies Force of the Home Department clarified that the Project falls within an area classified as “medium risk” to “high risk” from a security management perspective. It is likely that additional mining projects increase the overall security risks in the region and may attract more insurgency.

Grievance Redressal: BEPA suggested that the Project should emphasize the development of a robust GRM that can adequately addresses community concerns and grievances in a timely and transparent manner.

Community Development Initiatives: The institutional stakeholders identified the following key areas for social development:

- Development of new, or improvement of existing, educational facilities such as schools and colleges;
- Development of new, or improvement of existing, health facilities such as hospitals and health centres;
- Provision of safe drinking water plants/wells;
- Provision of clean energy i.e. small-scale solar projects;
- Provision of technical and/or work-related courses/training;
- Provision of training for unskilled people;
- Scholarships for educated youth;
- Provision of a Technical Education and Vocational Training Authority (TEVTA) Centre for women;
- Conducting annual sports events for the local community residents; and

- Events to encourage and uplift local talent.

Consultations were also undertaken with the Ministry of Railways, NTDC and the NHA to solicit additional recommendations on CIA related concerns such as developing railways and connecting mining projects in Balochistan to the national grid. The information received is summarised in the Cumulative Impact Assessment.

7.6. Continual Engagement

RDMC established an on-site Community Relations team shortly after reconstitution of the Project to ensure early engagement. A formal SEP was developed which details the company approach to stakeholder engagement and the steps it intends to take during the development and operation of the Project, including a grievance mechanism. The SEP was developed, and is being implemented, in accordance with Barrick policy and, the IFC PSs and forms a component of the Reko Diq Environmental and Social Management System.

The key principles adopted by the Plan, and as outlined in the IFC Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, are to:

- Provide meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s);
- Provide information early in decision-making processes;
- Disseminate information in ways and locations that make it easy for stakeholders to access it;
- Respect local traditions, languages, timeframes, and decision-making processes;
- Establish two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed;
- Seek inclusiveness in representation of views, including women, vulnerable and/or minority groups;
- Adopt processes free of intimidation or coercion;
- Develop clear mechanisms for responding to people’s concerns, suggestions and grievances; and
- Incorporate feedback into program design, and report back to stakeholders.

The regular engagements have ensured that the communities’ concerns and suggestions are recorded and appropriately addressed.

7.6.1. Forms of Engagement

Forms of engagement with stakeholders vary depending on the stakeholder group. RDMC will continue with existing engagement techniques and will develop new ones as necessary, to ensure effective and culturally appropriate interaction with stakeholders. Participatory tools and methodologies such as community updates with Q&A sessions will continue to be utilised, as they are more likely to increase stakeholder involvement in the process and elicit alternative responses, especially if there is controversy or complexity, or a need to build a consensus around possible solutions.

Specific tools and tactics will be developed, where needed, to engage sub-groups within communities, including women, vulnerable groups and minority groups. Given the nature of engagement, the process will always be context specific. This means that techniques, methods, approaches and timetables will be tailored for the local situation and the various types of stakeholders being consulted. Engagement practices and processes will determine appropriate engagement methods and tools based on:

- Location and sensitivity of the project or activity – locally and internationally;
- Number and interest of stakeholders;
- Complexity of the issue to be discussed;
- Significance of potential impacts; and
- Expected or targeted outcomes of engagement.

It is expected that the type of engagement and targeted stakeholders will change throughout the Project lifecycle. However, in general, the more a particular stakeholder group is materially affected by a component of the Project, the more important it is for them to be properly informed and encouraged to participate in matters that directly affect them.

Four general formats for stakeholder engagement have been developed taking into account of the type of information and issue being discussed or communicated, as well the intended audience or target of the engagement. Variations of these will continue to form the basis of engagements, recognising that all will be open to change as needs and circumstances dictate and always respecting cultural sensitivities (i.e. holding separate engagements for men and women). These formats are:

- Bringing people together into productive dialogue through:
  - Communication events to deliver key messages or specific studies, reports or data;
  - Public meetings to deliver regular updates to the general public (e.g. regular meetings in affected villages).
- Sharing information through:
  - Newsletters, which are a useful tool for enabling regular feedback and updates for stakeholders;
  - Community notice boards to announce upcoming events and for general updates;
  - A website that provides information to stakeholders who have internet access.
- Direct meetings with representative individuals/groups and perception surveys such as:

    - Individual meetings for direct discussions with individuals or small groups, which enable sharing of specific information to a narrow audience;
    - Focus groups to collect data or gain feedback on specific actions or programs; or for weekly meetings with respected groups of community leaders. Focus group discussions are a useful way to engage women, minority and youth groups;
    - Periodic perception surveys to monitor the opinions or perspectives of different stakeholder groups; and
    - Topic-specific panels, working groups and committees to discuss often complex and scientific topics, e.g. biodiversity.
- The grievance redress process (see Section 7.6.4).

7.6.2. Consultation Schedule

A schedule for consultation with communities and institutions has been developed and maintained, and includes:

- Monthly CDC meetings (Par-e-Koh, Nok Kundi and Fan Sediments CDCs);
- Monthly project update sessions at nearby communities;
- Monthly engagement with local political organisations;
- Monthly engagement with local youth groups;
- Monthly engagement with key religious leaders;
- Monthly meeting with district administration;
- Monthly engagement with key Government agencies; and
- Bi-monthly (once every two months) meeting with key divisional level stakeholders.

7.6.3. Consultation Register

A consultation register is maintained, which records:

- Date of engagement;
- Nature/type of engagement method;
- Stakeholder(s) involved;
- Names of RDMC representatives involved; and
- Location of engagement.

7.6.4. Grievance Process

Due to the complex and personal nature of the project the Company are committed to ensuring an easy to use and well-structured grievance process for affected parties. The grievance process will be communicated through a number of forums and through general community engagement and discussions.

Table 7-11 lists the grievance process responsibilities. Figure 7-7 presents the grievance process flowchart.

Table 7-11: Responsibilities for Implementation of the Grievance Process

Position	Key Responsibilities
Community Relations Manager	Approval of the Grievance Process and ensuring adequate resources for implementation.
Project Director/Site Manager	Responsible for ensuring compliance with the Grievance Process.
Community Relations Lead / Grievance Officer	Management and administration of the grievance process.
All departments	Providing adequate and timely responses where grievances are referred.
Legal Officer/External Lawyer	Provide timely legal advice and assistance in all legal cases.

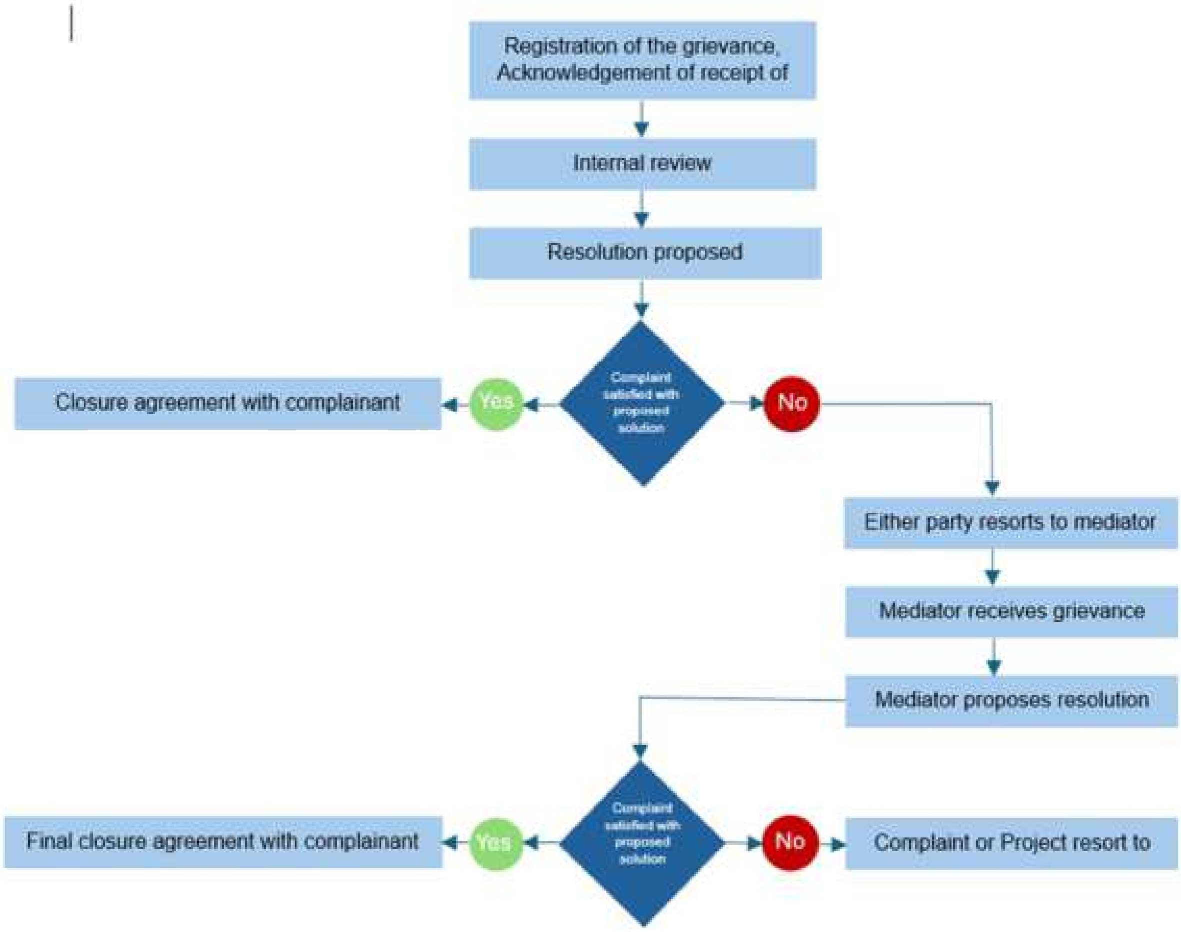


Figure 7-7: Grievance Mechanism Flowchart

7.6.4.1. Receiving Grievances

Community members will have two main avenues with which to express a grievance including:

- At an RDMC office (e.g. at Nok Kundi); and
- Through members of the Community Relations team (including with community based liaison officers) or through other senior staff members (i.e. through the site manager).

Grievances must be in writing. Should the person require assistance with recording the grievance in writing, the RDMC staff member will assist with this. On receipt, the grievance will be re-read and explained to the person to ensure agreement on the facts of the grievance.

7.6.4.2. Recording, Acknowledgement and Registration

All grievances will be recorded using a specified Complaint/Grievance Form and logged in the Grievance Register. A copy of the completed Form will be provided to the person raising the grievance at the time, or within 7-days of the grievance being raised. Both copies of the form will include a unique registration number.

7.6.4.3. Assessment

Grievances will be initially assessed by the Community Relations team using all available information to enable the grievance to be directed to the most appropriate staff member/department. It may be possible for the RDMC staff member to address the grievance immediately if it is in relation to simply providing or clarifying information. If the grievance is considered particularly urgent, it will be raised immediately to the Community Relations Manager or Site Manager as appropriate.

7.6.4.4. Management and Response

Depending on the nature of the grievance, the Community Relations team will assign the grievance to the appropriate staff member/department for action and resolution. The assigned staff member/department will review and investigate the grievance and provide a response (with a resolution and if necessary, a schedule of corrective actions) to the Community Relations Manager. The Community Relations Manager will ensure that a written and verbal response is be provided as soon as possible and not more than 30-days after receiving the grievance. If, however, more time is required for resolution, the Community Relations team will keep the person who raised the grievance informed.

In addition, complainants will be updated where possible during routine engagement activities (i.e. community visits).

If a grievance cannot be resolved by the relevant department or the Community Relations team the following will occur:

- The grievance will be escalated to the Site Manager or Project Director for consideration. If the grievance is associated with human rights, it will be escalated within 24 hours to the Sustainability Executive and Risk and Assurance Executive.
- If the grievance still cannot be resolved, mediation through an appropriate third party will be recommended (i.e. community leader(s)).
- As a last resort, grievances may be referred to an appropriate Court of Justice by either the complainant or RDMC.
- The complainant has the right of appeal to any recognised institution open to any citizen as stipulated by the laws of Pakistan if still not satisfied with the outcome and explanation of the third-party mediation.
- RDMC has the right to appeal to any recognised institution if not satisfied with a ruling given in any case or can act in accordance with the dispute resolution clause as stipulated in the investment agreement.
- In the event that a case is presented by the aggrieved person's legal counsel, or in case an unresolved complaint is forwarded to RDMC's Legal Advisor for further action, all correspondence with regard to the case is forwarded to the Legal Advisor for further action.

- Upon request of the Legal Advisor, the Grievance officer or someone with delegated authority will attend court anytime a legal issue is to be heard.
- In the event the investigation confirms the grievance is legitimate, the Grievance Officer ensures that the administrative process for redressing the grievance is immediately initiated.

7.6.4.5. Monitoring and Evaluation

The Community Relations team will monitor progress of each respective grievance and keep the person raising the grievance informed of its status. Updates will be given on a regular basis and information sharing will not exceed 30-days and will continue until the grievance is resolved. All grievances will be endeavoured to be closed out within 30 days; however, this must not come at the expense of following process and adequate investigation. The Community Relations Manager will monitor implementation of the response and corrective actions taken. Within a month of the response being provided to the person raising the grievance, a Community Relations team member will make a visit to verify that the situation has been resolved to the satisfaction of all involved. If required, monitoring will be made on a regular basis, which will be determined on a case-by-case basis.

7.7. Community Development Programme Framework

7.7.1. Barrick Global Strategy

Barrick's objective is to develop a solid, long-term relationship and development strategy with stakeholders based on trust, respect, transparency and partnership. Stakeholders include host communities, local, regional and national government, shareholders and other role players in our areas of operations, such as NGOs and Non-Profit Organisations (NPOs). This relationship – our "social license to operate" - is critical to Barrick's core business of permitting, building, operating and successfully closing mining operations.

The fundamental premise of obtaining our social license to operate is through the primacy of partnership, which is central to our community development initiatives.

7.7.2. The Primacy of Partnership

Barrick's primacy of partnership is based on the following partnership principles:

- Foster trust and genuine collaboration with stakeholders through constructive two-way engagement and dialogue.
- Working with government and other partners to mitigate the impacts of our operations and ensure the benefits associated with mining activities are equitably distributed.
- Ensure collaborative access to basic human rights across our areas of impact.
- Develop our youth with the objective that they become active and contributing members of the community, through education support.

- Focus on small and medium enterprise development to deliver real value to the mine and to local, regional and national economy.
- Invest in sustainable development of host communities and ensure their integration into main-stream business and social communities.
- Developing partnerships with host governments and communities to deliver long-term sustainable benefits, built on a model of shared responsibility and accountability to ensure these benefits endure beyond the life of the mine.
- Promote mining as a significant partner to local and national government and economy.
- Monitoring and giving account of our social performance to internal and external stakeholders.

Our guiding principles function to shape our ultimate approach with our stakeholders, and can be summarised into the below four main ideologies:

- *Engagement*: We will establish an ongoing dialogue with stakeholders in the communities where we operate, maintained in a spirit of transparency and good faith.
- *Evaluation*: We will conduct thorough and ongoing analysis of project impacts and opportunities, feedback from community engagement, results of socio-economic studies and other pertinent information to inform project design and define community development strategies.
- *Action*: We will proactively work to enhance the benefits of our operations and minimise impacts through community investment strategies designed to consolidate sustainable benefits within the communities where we operate.
- *Monitoring*: We will conduct regular, quantitative and qualitive measurements of the effectiveness of our corporate responsibility initiatives to inform further engagement, evaluation and action.

7.7.3. Community Development Pillars

Socio-economic development is focused on five sustainable development pillars or categories, as follows.

7.7.3.1. <u>Education</u>

- Development of childcare, education and supporting the growth of centres of excellence.
- Supporting host community schools in achieving their Strategic Plans (equipment, training, infrastructure, etc.).
- Provide support for local schools and universities, skilled trades programs and other training and educational initiatives as well as vocational training.
- Support may include:
    - Scholarships; and

    - Internships.
- Increase education levels and placement job rates.
- Invest in higher education for workforce development and relative research and development projects.
- Increase ratio of students with specific training: vocational, computer, economics, engineering etc.

7.7.3.2. Access to Healthcare

- Support host communities in achieving their Community Health Improvement Plans.
- Support local healthcare providers, research organisations and services to advance the affordability and accessibility of healthcare in the communities where we operate.
- Improve access to a variety of care: general practice, emergency, maternal, chronic, etc.
- Improve health awareness.
- Reduce incidence of alcoholism, addictive drug use and communicable diseases.
- Increase access to health awareness training/education.

7.7.3.3. Water and Environment

- Support and ensure access to potable water for all affected communities.
- Improve sanitation facilities and waste management to mitigate impacts to the environment and protect water resources.
- Work with government agencies and local non-profits on environmental activities including:
    - Invasive species management;
    - Species of conservation concern;
    - Fire risk management;
    - Management of ecosystem services.
- Support environmental causes such as biodiversity, water conservation and environmental research.
- Collaborate with leading environmental organisations to improve conservation outcomes in the area of influence.
- Reduce energy use and improve efficiency.
- Increase portion of renewable/alternative energy.
- Increase community participation rates in environmental improvement activities.

7.7.3.4. Food Security

- Support and develop initiatives to improve agricultural yield and food production.
- Provision of machinery, amelioration opportunities, education and training, funding and access to market.
- Determination of alternative livelihood opportunities.

7.7.3.5. Local Economic Development

- Support host communities in achieving their Economic Development Strategies.
- Alignment of programs with local, regional and national development goals and capacities.
- Leverage the economic value generated by our operations to support a broad spectrum of small local businesses in the communities where we operate. This includes suppliers as well as capacity building programs for local business ventures.
- Increase number of qualified local suppliers.
- Increase number and type of services and goods produced locally.
- Increase procurement of local goods and services by the operation.
- Improve highway safety and make traveling more efficient.
- Host community infrastructure.

7.7.4. Community Development Committees

CDCs are advisory groups whereby members are elected and provides a forum for two-way dialogue and to foster broad community support.

RDMC believes that nobody knows the needs of our host communities better than the communities themselves. RDMC understands the significance of setting up the CDCs to allocate the community development and investment budget to those initiatives most desired by the local community and improve living standards of local communities through access to quality education, health, clean drinking water and income generation opportunities.

RDMC, through the CDCs, has been and will remain involved in regular discussions with the local communities. By constituting and formalising CDCs in the area of operations, the RDMC team has initiated the institutionalisation of consensus-building among diverse stakeholders in local communities.

Although the CDCs are self-directed, they are guided by core development principles.

7.7.4.1. CDC Core Principles

While locally directed, the CDC model is underpinned by several core principles that apply across the company:

- CDC budgets are based on community priorities rather than, for example, the production levels of a mine.
- Allocations should fall within five broad sustainable development pillars/categories as outlined in Section 7.7.3.
- Projects should be sustainable. RDMC encourage all partners to put plans in place to become independent of any mine funding, and to deliver social, economic or environmental benefits for communities long after our mines have closed.
- Projects should benefit RDMC's business where appropriate. For example, improvements to local education provide improvements to the long-term employee base for the Project.
- To seek out partnership opportunities. Where possible, RDMC aim to pro-actively seek out potential partners from the public or private sector to be part of development projects. This can facilitate further investment, scale projects and multiply benefits.
- Where formal partnerships are formed, there must be clear roles, resources and agreements in place, and it must comply with Barrick's Code of Conduct and our Anti-Corruption Policy.

7.7.4.2. CDC Structure

CDC members are elected to the following assigned roles:

- *Chairperson*: the formal head of the committee, chairs the meetings, coordinates with all stakeholders, manage committee members, offices, reports and records.
- *Vice Chairperson*: in the absence of the Chairperson, the Vice Chairperson will act as Chairperson with mutual agreement of CDC members. The Vice Chairperson will also assist in reporting.
- *General Secretary*: convenes meetings on the advice of the Chairperson, record all meeting minutes and maintain all records and documents.
- *Finance Secretary*: maintain all financial records and present financial reports in the monthly meetings.
- *Coordination Secretary*: coordinates with CDC members and other stakeholders on the advice of Chairperson and also share community complaint/grievances with RMDC team (if any).
- *Members*: The CDC members actively participate in meetings and share their views, feedback and suggestions.

7.7.4.3. CDC Establishment

Three CDCs have been established to date.

7.7.4.3.1. Par-e-Koh CDC:

- Centred in Humai and representing the nearest settlements to the project (Humai, Nok Chah, Mashki Chah and Darband Chah).
- Consists of 15 members (11 Male and 4 Female):
  - RDMC Representative: 2 (1 Male and 1 Female);
  - Local Leader: 1 (Elected Councillor of the area);
  - Community Members: 10 (3 from each Humai and Darband Chah settlements, and 2 from each Nok Chah and Mashki Chah settlements); and
  - Group Representative: 2 (Government departments, NGOs, administration).

7.7.4.3.2. Nok Kundi CDC:

- Focus on urban centre i.e., Nok Kundi town.
- Consists of 17 members (13 Male and 4 Female):
  - RDMC Representative: 2 (1 Male and 1 Female);
  - Local Leader: 1 (Elected Union Council Chairman);
  - Members: Male (8) and Female (4) from tribes, political parties, NGOs, youths, Government employees, and Nok Kundi town; and
  - Group Representative: 2 (Government departments, NGOs, administration).

7.7.4.3.3. Fan Sediments CDC (Northern Groundwater System)

- Comprising the communities closest to the Fan Sediments (mainly Kachow and Kirtaka).
- Consists of 19 members (14 Male and 5 Female) as follows:
  - RDMC Representative: 2 (1 Male and 1 Female);
  - Community Members: 13 (9 Male and 4 Female) from the communities including, Kirtaka, Tang Kachow, Kachow, Sar Zay, Beeduk, Lashkaryab, Miskan, Peeran and Maki; and
  - Local Leaders and Group Representative: 1 CDC Chairman (male), 1 CDC General Secretary (male), and 2 CDC Finance Secretary (male).

As the project advances two additional CDCs will be established, one at District level and one at Division level.

7.7.4.4. CDC Monitoring and Evaluation

Projects and activities of the CDCs will be closely monitored at three levels.

1. *CDC Monitoring Committee*: the CDC Monitoring and Audit sub-committees will closely monitor all projects and interventions at all stages of project.
2. *Government Departments*: To ensure the quality of work at all stages of activities and projects of the CDC will be closely monitored by the relevant government departments (Health, Education, PHE etc.).
3. *RDMC*: From the inception to closure of the CDC projects the RDMC team will regularly monitor and ensure the quality of work and will also track the timeline, objectives, outcomes and impacts against the project scope.

7.8. Ongoing and Future Engagement

RDMC will continue to engage with local communities and institutions throughout the life of the project.

Ongoing community engagement activities specifically relevant to the ESIA include:

- Reporting on progress of the implementation of environmental and social management measures identified during the ESIA process and recoding of comments on the effectiveness of these measures;
- Updating communities about new project developments and addressing feedback; and
- Implementation of the grievance redress mechanism.

Table 7-12 provides an overview of the stakeholder engagement process for the future.

Table 7-12: Future Stakeholder Engagement

Stakeholder Group	Stakeholders	Engagement Method	Frequency
Government Institutions	• Balochistan Environmental Protection Agency, Quetta • Forest Department, Quetta • Wildlife Department, Quetta • Fisheries and Coastal Development Department, Quetta • District Administration, Dalbandin • Public Health Engineering (PHE) and Water and Sanitation Agency (WASA) • NHA • District Vice Chairman Local Government and Rural Development Chagai • Irrigation Department • Home Department Quetta	• Face-to-face meetings. • Periodic reports	Annually or more frequently, if required

Stakeholder Group	Stakeholders	Engagement Method	Frequency
	• Forest Department • Balochistan Revenue Authority (BRA) • The Mines and Minerals Department • Balochistan Development Authority • Provincial Water Board • District Water Committee (Dalbandin)		
Non-Government Organisations	• Islamic Relief • Muslim Hands • Balochistan Rural Support Program (BRSP)	• Face-to-face meetings. • Periodic reports	Annually or more frequently, if required
Local Communities within the Socio-economic Impact Area	• Directly or indirectly affected communities within the Socio-economic Impact Area	• Meetings with the communities • Home Visits • Group meetings • Sharing of documents in Urdu, Balochi and Sindhi	Ongoing

RDMC also plans to carry out future engagements as part of the ESIA review process. These engagements will cover the ESIA Disclosure Campaign following the ESIA Public Forum.

- **ESIA Disclosure Campaign (ESIA Roadshow 2):** The RDMC will conduct another round of engagements to disclose the Project ESIA information, including key environmental and social impacts and their mitigations. This campaign aims to raise awareness in the communities about the Project and its facilities, as well as the ESIA process. The RDMC Community Relations team will visit and conduct sessions with both men and women to keep them informed about the Project's activities and how the Project is considering their needs in development initiatives. These sessions will ensure that all community members understand the potential impacts of the Project and the measures being taken to mitigate them, fostering a sense of inclusion and transparency.
- **ESIA Public Forum:** This engagement will be part of the ESIA review process to meet the regulatory requirements of the EPA. The forum, organised by the EPA, will provide a platform for the general public and institutions such as government officials and

NGOs to share their feedback and views about the Project before a decision is taken regarding the ESIA. This public forum is crucial as it ensures that all stakeholders have an opportunity to voice their opinions and concerns, promoting a participatory approach to environmental governance. The feedback collected during this forum will be considered in the final decision-making process, ensuring that the Project aligns with both regulatory standards and community expectations.

8. Mine Closure and Rehabilitation Plan

This initial Mine Closure and Rehabilitation Plan (CP) has been compiled for the proposed Project as part of the ESIA process. The CP was informed by specialist studies and the results of environmental and social baselines and identified impacts.

This section provides a summary of the CP. The detailed CP Report is provided as Appendix W).

8.1. Methodology and Approach

The approach followed in developing this CP was as follows:

- Conduct a desktop review of the specialist studies conducted as part of the ESIA and the Barrick Mine Closure Standard;
- Define the closure battery limits, identify key closure domains, outline the closure objectives, identification of closure related risks and the development of the closure measures required for successful rehabilitation outcomes;
- Conduct specific discussions with the infrastructure design specialists (Reko Diq team) and TSF design engineers (Knight Piésold) to inform the initial CP;
- Compile a Closure Risk Assessment (CRA) based on the document review and discussions with subject matter specialists, apply appropriate risk rankings and initial closure measures aligned with specialist input;
- Propose preliminary end land uses based on available information;
- Propose initial site closure criteria based on the envisioned final land use;
- Develop a high-level post-closure monitoring plan to ensure successful rehabilitation implementation and align with the proposed closure criteria;
- Identify potential residual risks that may manifest on site after closure, which will need further investigation to quantify; and
- Identify potential gaps and a forward working plan to improve the resolution of the CP.

A high-level overview of the mine closure planning processes is presented in Figure 8-1.

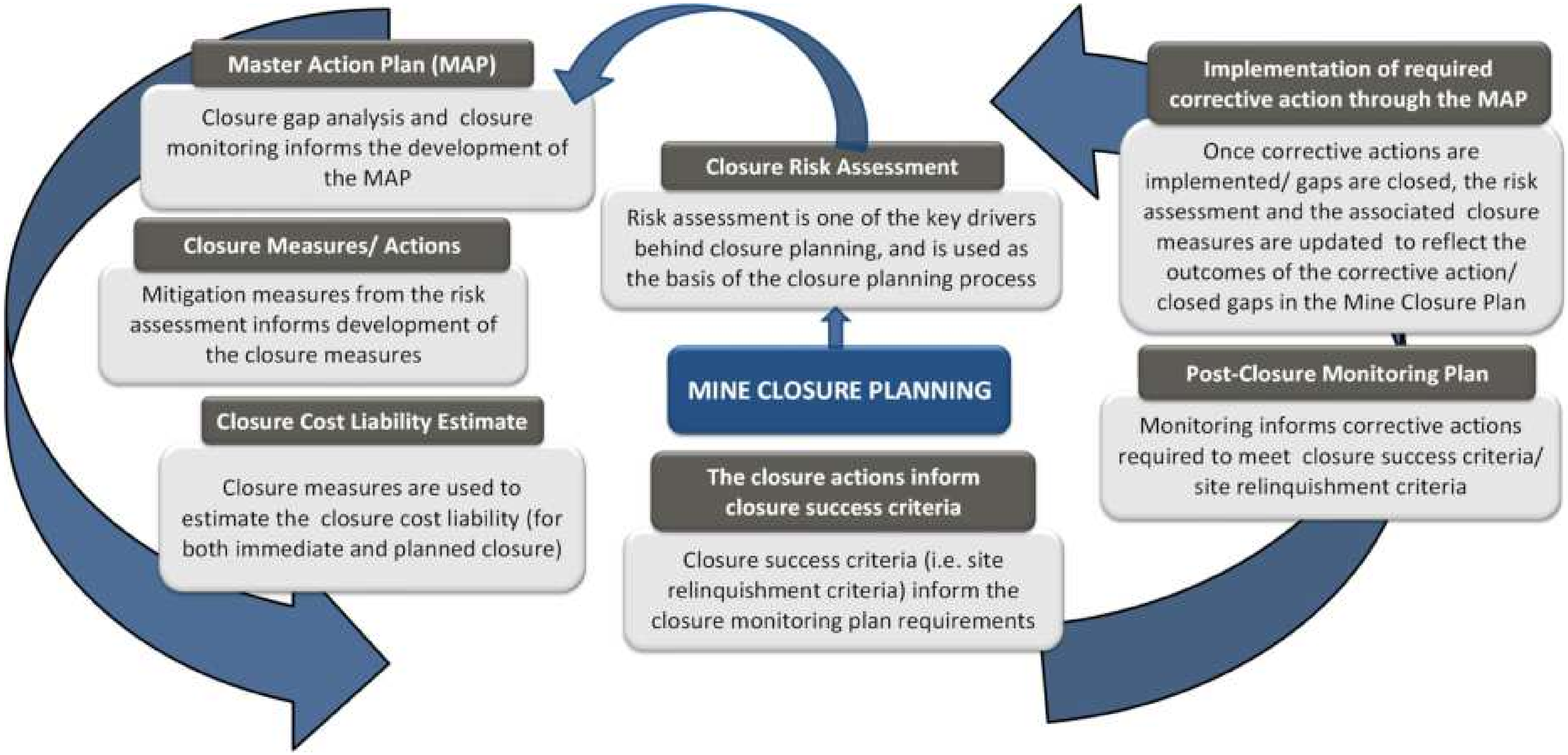


Figure 8-1: High-Level Mine Closure Planning Process

8.2. Relevant Legislation, Standards and Guidelines

There are several overarching GIIP standards which provide recommendations on how rehabilitation and closure should be undertaken to achieve best practice. For the CP, the following overarching guideline documents were considered:

- Tailings Management, Good Practice Guide, International Council on Mining and Metals, (ICMM, 2021);
- Global Industry Standard on Tailings Management, (ICMM, 2021); and
- Integrated Mine Closure, good practice guideline 2nd edition. International Council of Mining and Metals, 2019 (ICMM, 2019).

The Project aims to comply with the IFC PSs and the EPs as detailed below.

There are no specific Pakistan regulations with regards to mine closure.

8.2.1. IFC EHS Guidelines for Mining (2007)

The IFC EHS Guidelines for Mining (2007) outline several important objectives relating to mine closure and post-closure aspects, including:

- The incorporation of both physical rehabilitation and socio-economic considerations in the mine closure plan;
- The duration of post-closure monitoring should be defined on a risk basis taking site conditions into account. Monitoring is typically required for a period of five years or longer; and
- The financial feasibility of mine closure and post-closure activities, including post-closure care should be included in the business feasibility analysis during planning and design stages.

8.2.1.1. Global Industry Standard on Tailings Management

The GISTM prescribes various requirements relating to social, environmental, local economic, and technical considerations. In the preamble of the GISTM it is stated that the GISTM "*strives to achieve the ultimate goal of zero harm to people and the environment with zero tolerance for human fatality*".

Compliance with the GISTM is not mandatory, however, Barrick has committed to aligning with the provisions of the GISTM. The GISTM states that, "*Conformance with the Standard does not displace the requirements of any specific national, state or local governmental statutes, laws, regulations, ordinances, or other government directives. Operators are expected to conform with the Requirements of the Standard not in conflict with other provisions of law*".

The GISTM consists of various principles each relating to a specific aspect of tailings management. The following principles are the most relevant to the closure of the Reko Diq TSF, namely:

- Principle 1: "*Respect the rights of project-affected people and meaningfully engage them at all phases of the tailings facility lifecycle, including closure.*"
- Principle 2: "*Develop and maintain an interdisciplinary knowledge base to support safe tailings management throughout the tailing's facility lifecycle, including closure.*"
- Principle 3: "*Use all elements of the knowledge base – social, environmental, local economic and technical to inform decisions throughout the tailings facility lifecycle, including closure.*"
- Principle 4: "*Develop plans and design criteria for the tailing facility to minimise risk for all phases of its lifecycle, including closure and post-closure*."
- Principle 5: *"Develop a robust design that integrates the knowledge base and minimises the risk of failure to people and the environment for all phases of the trailing facility lifecycle, including closure and post-closure."*
- Principle 6: *"Plan, build and operate the tailing facility to manage risk at all phases of the tailing facility lifecycle, including closure and post-closure."*
- Principle 7: *"Design, implement and operate monitoring systems to manage risk at all phases of the facility lifecycle, including closure."*
- Principle 8: *"Establish policies, systems and accountabilities to support the safety and integrity of the tailings facility."*
- Principle 10: *"Establish and implement levels of review as part of a strong quality and risk management system for all phases of the tailing facility lifecycle, including closure."*
- Principle 15: "*Publicly disclose and provide access to information about the tailing facility to support public accountability*."

The requirements set out in the GISTM are reflected in the Barrick Mine Closure Standard.

8.2.2. Barrick Mine Closure Standard

The Barrick Mine Closure Standard is closely aligned with International Guidelines and industry good practice (i.e., International Council for Mining and Metals - Integrated Mine Closure: Good Practice Guideline (ICMM, 2019)). The approach is aimed at leaving a positive legacy post mining and indicates that "mine closure begins before mining starts, carries on throughout each mine's life and reflects our goal of sharing benefits and maximising value for local communities" (Barrick website).

The Barrick Mine Closure Standard (2020), requires the following:

- Application of a mitigation hierarchy to manage negative environmental impacts, to avoid these wherever possible and minimise those which cannot be avoided;
- Minimise the use of water and control impacts on water quality;
- Engage with stakeholders including local communities to support sustainable management of resources for the benefit of all local users; and

- Use energy as efficiently as possible.

8.2.3. Assumptions in Developing the Closure Plan

The CP was developed with the following assumptions and limitations:

- It is a conceptual CP addressing the planned mining and infrastructure of the Project, and is compiled as a desktop assessment;
- Rehabilitation of the finalised areas such as the TSF and WRD side slopes will take place throughout the operational phase;
- Upon cessation of mining, all infrastructure on site will be demolished unless these assets can be legally transferred to a third party and a contract is instituted detailing the conditions of transfer;
- Decommissioning and rehabilitation activities will follow directly after the cessation of mining;
- Information, mitigation measures and recommendations are based on the specialist studies completed as part of the Impact Assessment;
- The proposed monitoring includes the following aspects and is an adaptive strategy:
  - Rehabilitation monitoring and maintenance will take place annually for a minimum of three years post-closure;
  - Groundwater and surface water monitoring will continue for 3 years post-closure with a risk-based approach to updating monitoring and management plans thereafter; and
  - Air quality will also continue for 3 years post-closure with a risk-based approach to updating monitoring and management plans thereafter.
- There is yet to be any stakeholder engagement specifically related to closure. Incorporation of comments from stakeholders into the CP should be considered in subsequent annual updates as and when received; and

The CP will be updated as the body of knowledge progresses and will incorporate learnings from implemented measures and monitoring during the operational period.

8.3. Closure Vision

A clear closure vision provides a framework to guide the mine's rehabilitation, closure planning and implementation. The closure vision provides the envisioned status, and land use over the final rehabilitated landscape post-mining and can be refined in subsequent updates.

The RDMC closure vision for the proposed operations is "*to establish a safe, stable, and non-polluting, post-mining landscape that is sustainable over the long-term while achieving the desired end land use*".

8.3.1. Closure Objectives

The initial closure objectives, as informed by the Barrick Mine Closure Standard, have been adopted for the Project, and include the following:

- Ensure that all reclaimed properties support productive uses considering pre-mining conditions;
- Ensure safety and health of workers during closure activities;
- Ensure that local communities utilising the site after closure are not exposed to unacceptable risks;
- Properly manage all reagents and chemicals. Neutralise or control-and-treat all potentially harmful residual discharges from decommissioned facilities so that water and land resources are properly protected;
- Physically and chemically stabilise remaining structures to ensure proper drainage, minimise erosion and to limit the quantity of water requiring management;
- Reclaim mine properties to protect and enhance pre-existing plant and animal communities;
- Utilise closure strategies that relinquish properties in a self-sustaining condition with little or no need for ongoing care and maintenance;
- Understand and address community concerns regarding closure; and
- Comply with mine closure permitting and regulatory requirements and obtain documented confirmation of meeting all closure requirements.

The overall, long-term post-closure land use objective for the site is to return it to a self-sustaining condition suitable to support pre-mining land use activities, such as wildlife habitat.

8.3.2. Closure Risk Assessment

An initial closure related Risk Assessment (RA) was completed with the aim of informing the rehabilitation and closure measures required to meet the proposed closure objectives and promote sustainable mine closure (full risk assessment provided in Appendix W).

The RA is based on the supporting information and specialist studies. The identified risks should be revisited and updated annually to incorporate new information as closure planning progresses and the knowledge gaps identified are closed.

The objectives of the RA are as follows:

- Ensure timely risk reduction through appropriate interventions;
- Identify and quantify the potential latent or residual environmental risks related to post-closure;
- Detail the approach to managing the risks; and
- Outline monitoring, auditing, and reporting requirements.

Initial closure related risks were identified and ranked based on the review of the specialist studies compiled for this ESIA and information supplied by the mine.

The following approach was implemented in compiling this Risk Assessment:

- Review of available information and specialist studies;
- Identifying possible closure related risks;
- Ranking the pre-mitigation risks in terms of likelihood and consequence;
- Developing mitigation measures to reduce the likelihood of the risk occurring; and
- Reranking the risk for likelihood of occurrence, with the assumption that the mitigation measure is effectively applied.

Key identified risks and proposed actions are included below.

8.3.2.1. Highlighted Closure Related Risks

Mine employees and the local community (surrounding the mine and Nok Kundi): once mining operations cease there will be a limited team required for monitoring closed facilities and as such most employees will no longer be required and will need to seek employment elsewhere. This may lead to an increase in unemployment and poverty in the area. The mine will no longer support local suppliers and there will be reduced economic opportunities.

The following is proposed (along with monitoring) to enable employees and local businesses to find alternative employment and to explore opportunities for alternative industry/livelihoods:

- Develop and implement a Social Closure Plan 5 years prior to closure to proactively manage the transition from active mining to the planned end land use, specifically for local mine employees;
- Conduct regular consultations with Project stakeholders, including local communities and businesses to identify potential challenges and develop associated solutions;
- Continue implementing the development projects as per the Community Development Plan and track progress/success;
- Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training; and
- Maintain/ Implement a structured stakeholder engagement process and grievance mechanism, as well as direct communication channels to surrounding communities and ensure it aligns with the Social Closure Plan.

8.3.2.2. Potential Residual/Latent Risks

Cumulative impacts on groundwater in the region: The remote location of the Project in a unique arid environment means no key receptors were identified by the various specialist studies. Contributing factors include (but are not limited to):

- There is little potential for environmental impacts to groundwater as a result of the Project due to the extremely low infiltration rates predicted from hydrogeological modelling, the depth of groundwater across the site and the highly mineralised, saline nature of groundwater (SRK, HBP, 2010);
- Baseline groundwater at Tanjeel contains high trace metals and is acidic due to in-situ oxidation of sulphides by contacted groundwater;
- Very low rainfall and high evapotranspiration; and
- The region is sparsely populated, and the nearest settlements are Humai approximately 20 km away and Nok Kundi approximately 75 km away.

The numerical model developed by Digby Wells (2024), simulated groundwater recovery up to 1,000 years post closure. During the simulated period, a full recovery is not expected. Since no receptors are identified within the zone of influence, minor medium- and short-term impacts can be mitigated.

Impacts on Air Quality in the Region: The air dispersion modelling for the mine operations was carried out for the two scenarios, Ultimate Footprint and Year 2050 when the LoM will be completed by 50%. In terms of receptors, human receptors are generally located substantial distances from the RDMS. Therefore, the Humai settlement (located at ~30 km to the east of the western porphyries) and onsite accommodation facility (located at ~8.9 km to the west of the open-pit) have been considered as primary receptors. However, the modelling was also carried out for the operational areas such as Western Porphyries, Explosives Storage Buffer, Tanjeel Open-Pit, and North Waste Rock Dump. The details on air quality assessment and dispersion modelling are available in Appendix Q.

A brief discussion on the outputs of air dispersion modelling is provided below.

- _Humai Settlement_: The maximum Predicted Ambient Concentrations of gaseous pollutants (NO_2 and SO_2) and particulate matter (PM_{10} and $PM_{2.5}$) remained within the applicable limits prescribed in NEQS/BEQS for Ambient Air Quality and IFC General EHS Guidelines for both 24-hours and annual averaging periods.
- _Onsite Accommodation Facility_: The Predicted Ambient Concentrations of gaseous pollutants (NO_2 and SO_2) at this location remained within the applicable limits for both 24-hours and annual averaging periods in Scenario 1 (see Table 6-16). In terms of PM, the annual averaged Predicted Ambient Concentrations of PM_{10} and $PM_{2.5}$ are expected to remain within the applicable limits prescribed in NEQS for ambient air quality and IFC General EHS Guidelines at this receptor for Scenario 1 and Scenario 2 (see Table 6-16 and Table 6-17). For the Predicted Ambient Concentrations of the 24-hours averaging period, the PM_{10} and $PM_{2.5}$ concentrations exceeded the applicable limits in Scenario 1 and Scenario 2 (see Table 6-16 and Table 6-17). The following conclusions can be drawn for this location regarding the exceedances:

- Scenario 1: Both PM_{10} and $PM_{2.5}$ exceeded the applicable limits prescribed in NEQS and Interim Target-1 for a period of 6 days and 11 days per year in Scenario 1 – Ultimate Footprint, respectively (see Table 6-20).
- Scenario 2: In scenario 2, these exceedances are relatively lower and expected to occur for 4 days per year for PM_{10} and 6 days per year for $PM_{2.5}$ (see Table 6-21).

- *Operational Areas*: The Predicted Ambient Concentrations of gaseous pollutants and particulate matter in the operational areas of the Project remained within the applicable OHS limits for 8-hour averaging periods (see Table 6-18 and Table 6-19). The maximum Predicted Ambient Concentrations are expected to occur at the western porphyries, Tanjeel open pit, and north waste rock dump.

8.3.2.3. Risk Monitoring

Groundwater Quality:

Monitoring of groundwater and surface water should be undertaken frequently throughout the operational phase to improve the understanding of, and changes to, the groundwater system, including water levels and quality.

The following is proposed for the operational and closure phase for the Mining site:

- Continue groundwater monitoring quarterly during the operation and for 3 years post closure; and
- Continue water monitoring at surface water points when possible following high rainfall events (assuming bi-monthly) during operation and for 3 years post closure.

Groundwater and geochemical models should be updated regularly to replace or confirm initial assumptions with actual monitoring results and laboratory analyses of potential waste streams. The CP must be regularly updated as the site body of knowledge is improved over the LoM.

8.3.3. Mine Battery Limits for Closure

The CP for the Project is based on the LoM being executed as currently designed and planned (Table 8-1).

Table 8-1: Battery Limits for Closure

Map Ref	Domain	List of Aspects
22	Western Porphyries Ultimate Pit (WPUP)	The WPUP assuming the access barrier and associated storm water management measures constructed during the operations will be augmented to enclose the total pit perimeter.
	Existing/Planned Road Network	Demolish all linear infrastructure (existing roads, planned rail / road network and pipelines).

Map Ref	Domain	List of Aspects
6	North WRD	The remaining upper bench, access road and upper surface of the North WRD assuming the side slopes and other WRDs were constructed with coarse waste rock on the outer surfaces during the operations.
17, 20 & 23	Tanjeel Ore Stockpile, TSF Waste & WP Ore Stockpiles	Stockpile footprints only, assuming ore will be processed and the TSF waste stockpile used as cladding material.
8	Processing Plant	Demolish and remove all plant infrastructure, including foundations to 1 meter below ground level.
4, 5 &13	Ancillary Mine Buildings	Demolish and remove all ancillary mine buildings and facilities including a gatehouse, weighbridge, workshop, offices, heavy vehicle service area and warehouses.
2C & 12A	Cleaner TSF (CF3) & Rougher TSF (RF1)	Final rehabilitation of the upper surface of the remaining active cells of the TSF assuming the other cells are decommissioned during the operations as deposition progresses.
	Existing/Planned Road Network & Planned Railroad	Remaining haul roads associated with the WPUP and North Waste Dump (NWD) only.
At this stage, for planning purposes it is assumed that all infrastructure will be demolished and removed, however the following Infrastructure could remain or be relocated post-closure and utilised by others:		
11, 9, 14 & 21	Mine Accommodation, Solar farm, Power Station & Waste Management Facility	Solar farm, Power station, emergency generators, telecommunication infrastructure; and all related infrastructure providing basic services (wastewater treatment plant, water treatment plant, water supply pipeline etc.).
	Existing/Planned Road Network	Access roads to the site and railway lines.

8.3.4. Threats and Opportunities

The initial threats and opportunities associated with closure of the Project are provided in Table 8-2. The uncertainties are weighted towards the gaps identified (see Table 8-3) and should be revisited in subsequent updates to reflect additional monitoring data and analysis.

Table 8-2: Initial threats and Opportunities for Mine Closure

Threats	The absence of proactive management of the identified threats could lead to project underperformance or failure. Active management is required to place the project on the front foot in terms of closure planning:

	• Not having a coherent overarching site wide closure plan integrating the planned activities; • Inefficient communication and management of stakeholders and authorities' expectations regarding post closure land capabilities and land uses; • Failure to integrate closure design and concurrent rehabilitation into mine planning and execution; • Not continually improving the site body of knowledge and addressing gaps and uncertainties as they are identified; • Lack of regulatory consistency due to changes in legislation, political effort and regulator personnel with site-specific involvement and knowledge; • Ability to achieve end land use and land capability objectives; • Failing to engage in rigorous contract development and management to ensure efficient and accurate implementation by contractors onsite; • Failing to manage the post mining landform construction and materials balance throughout the LoM; and • Waste generation onsite, potential waste classifications and disposal that may be required at closure.

Opportunities	• On-going surface water and groundwater quality monitoring during the operational LoM to identify trends over time and to monitor changes in water quality to determine if the mine is impacting on water quality and/or quantity within the vicinity of the mine; • The water sampling results must inform the groundwater model, to more accurately predict post closure impacts based on actual data obtained during the operational phase; • Long timeline to develop the Social Closure Plan and identify opportunities i.e., skills training for staff; • Engagement with stakeholders and authorities throughout the project life cycle to ensure alignment on closure and rehabilitation methodologies and expected outcomes; • Develop and improve site specific rehabilitation methodologies to ensure known outcomes at closure; • Implement concurrent rehabilitation during the project lifespan to reduce the financial burden at closure; • WRDs and pit perimeter berms can be designed and constructed as permanent structures, requiring little to no additional measures at closure; • The implementation and maintenance of a comprehensive environmental monitoring programme. The results will provide solid baseline data to inform decision making; and • Availability of appropriate closure funds.

8.3.5. Closure Planning and Knowledge Gaps Identified

The following knowledge gaps, presented in Table 8-3, were identified during the compilation of this CP and need to be addressed during the operational period to inform further updates of this CP and to mitigate identified environmental risks related to closure.

Table 8-3: Knowledge Gaps

Identified Knowledge Gaps	Schedule
Confirmation of assumptions relating to long term water management: • Update and refine the proposed geohydrological model for the operational and closure period, considering the outcomes of the geochemical study of the Project’s waste streams and the water balance; and • Use monitoring data and results to replace assumptions within the modelling.	Throughout the operational period.
Site wide rehabilitation planning and methodologies:	

Identified Knowledge Gaps	Schedule
• Compile a detailed site wide rehabilitation and end land use plan; • Develop and maintain LoM material balance of suitable cladding material for concurrent cladding and final closure activities; • Develop construction methodologies for the WRDs to encapsulate finer material coarser material to combat wind erosion; and • Develop and trial cladding methodologies for the TSF cells.	During operational period.
Social closure planning stakeholder engagement: • Engage with regulatory authorities to confirm the waste disposal strategy and environmental authorisations needed for waste disposal associated with demolition activities; and • Develop a detailed post-mining land use plan, based on the post-mining land capabilities currently planned, and ensure this plan is shared with the relevant stakeholders through effective stakeholder engagement. These engagements should ensure input and subsequent buy-in of local communities and any input supplied by stakeholders should be included in the land use plan where appropriate.	During the operational period.

8.4. Final Land Use Plan

The Final Land Use Plan is the end land use to which the mine would return the land disturbed by mining activities. The closure objectives set as part of the mine closure planning process aims to support achievement and effective implementation of a Final Land Use Plan. The final land use must be developed with the inputs of stakeholders, in particular Project affected communities. The plan for Reko Diq should be geared towards long-term safety and landform stability for remaining mining features and a land use aligned with the pre-mining and surrounding land capabilities.

No Final Land Use Plan has been developed for the Project yet. To ensure that areas are not rehabilitated in isolation, it is recommended that a cohesive site wide Final Land Use Plan as an integral component of future updates of the CP.

8.4.1. Current Land Use

8.4.1.1. Regional overview

Agriculture, although limited due to scarce water resources, plays a crucial role in supporting local communities, with date palms, wheat, and barley being the primary crops cultivated through traditional and often subsistence farming methods. The primary economy in Chagai, is cross border trade with some artisanal and larger scale mining. The sparse vegetation and extensive desert areas also reflects the district's arid climatic, impacting both agricultural potential and the livelihoods of its inhabitants.

The region is sparsely populated, and the nearest settlements are Humai approximately 20 km away and Nok Kundi approximately 75 km away.

8.4.1.2. Site specific overview

Pre-mining land use at the Project area is characterised by desert terrain and limited agricultural potential. Traditional water management systems, including the ancient karez systems, played a crucial role in sustaining agriculture and human settlements by channelling groundwater from the surrounding mountains. Human presence in the region was marked by small, scattered villages and historic trade routes, reflecting the area's significance as a crossroads for commerce and cultural exchange. Archaeological sites hinted at ancient human habitation and activities, underscoring the long-standing connection between people and the land in the Reko Diq area. There are no settlements or ground water users in the vicinity of the Project site.

It is important that all mining and rehabilitation actions are geared towards achieving the end land use incrementally over time. The following Land Use Categories have been defined within the ecological study area and is detailed in Section 5.9 (Biodiversity):

- Large sections of the area consist of gravel plains, which are composed of alluvial sand and gravel.
- Mountains/ hills and sand dunes are extensive across the Project site; and
- Most probable end land use for the Project area is wildlife habitat, with potential for limited grazing and /or a mix of small scale agricultural and subsistence activities.

8.4.2. Post-Mining Land Use

A high-level land use evaluation was undertaken for the Project, assessing the potential land use options for the site. The land use options were evaluated based on the following criteria and are reflected in Table 8-4.

- *Likely end land uses:* Primary or anchoring end land uses, which are likely to be functionally self-sufficient over the long-term;
- *Possible end land uses:* Secondary or supporting land uses, which are reliant on likely uses or other external factors to be sustainable; and
- *Unlikely end land uses:* Undesirable end land uses, or land uses that are unlikely to be sustainable or that would be contextually inappropriate.

Table 8-4: High Level Evaluation of Post-Mining Land Use Options

Likely	Possible	Unlikely
• Wildlife habitat (desert).	• Small scale agricultural processing with retention of suitable mining infrastructure and services (water, solar power, workshops/warehousing etc.); • Ecological conservation • Limited grazing and /or a mix of small scale agricultural and subsistence activities; and • Renewable energy generation given connection to the Pakistan grid is planned;	• Large-scale commercial or urban development; • Medium to large scale Agricultural processing; • Intensive agriculture (dependent on post mining land capability); and • Irrigated cultivated land (dependent on post mining land capability and water quality/availability)

8.5. Closure and Rehabilitation Actions

The closure measures supporting the proposed closure scenario are presented in Table 8-5. The closure measures are developed in support of achieving the preliminary end land use and mitigating post-closure risks outlined in the Closure Risk Assessment.

The closure measures and associated costs should be refined overtime as part of the regular CP updates as more detailed supporting information becomes available.

Table 8-5: Closure and Rehabilitation Actions

Component	Rehabilitation measures
Mining Aspects – Open Pits, Waste Rock Dumps, Ore Stockpiles, TSF waste Stockpile and Laydown areas	<u>Open Pits still active at closure (Western Porphyries Ultimate Pit):</u> • Construct final portion of the perimeter berm to close off access with waste rock within a hauling distance of 2 km; • Construct the storm water management measures on the outer toe line of the berm to align runoff with the site wide drainage framework; and • Pits to be left open. <u>Waste Rock Dumps remaining at closure (North WRD):</u> • Implement erosion control measures such as ripping or other method; and • Reinforce dump crest as required based on operational learnings. <u>Stockpiles and laydown areas:</u> • Grade drainage lines across the cleared footprint to reroute surface water runoff aligned with the site wide drainage framework.
Tailings Storage Facilities	<u>Cleaner TSF cells:</u> • Load, haul and place a final cladding layer of <u>gravel/waste rock across the cleaner cells, reprofiled towards the closure spillway;</u> • Grade the downstream batters to 3H:1V and cover with gravel; and • Construct the rock lined closure spillway to allow for surface water discharge down the final embankment slope. <u>Rougher TSF cells:</u>

Component	Rehabilitation measures
	• Construct the contour causeways (500 m spacing) and swales across the final tailings surface; • Grade the downstream batters to 3H:1V and cover with gravel; and • Construct the rock lined discharge channel cut into natural ground to discharge surface runoff to the south.
Process Plant, conveyors and associated workshops	Infrastructure demolition and clean-up: • Demolish and remove all concrete structures to a maximum of 1 m below ground level; • Dismantle and remove temporary/prefabricated structures; • Dismantle streel structures and store in designated salvage yard prior to removal/sale; • Decontaminate the Plant; • Dispose inert building rubble in the WPUP within a 2 km hauling distance; and • Remove all contractor containers from site prior to closure. General rehabilitation measures: • Grade drainage lines across the cleared footprint to reroute surface water runoff aligned with the site wide drainage framework.
Ancillary infrastructure – Mine infrastructure, on-site supporting infrastructure, Accommodation Facility, Solar Farm, Explosives storage, Power Plant and Waste Management Facility	Infrastructure demolition and clean-up: • Demolish and remove all concrete structures to a maximum of 1 m below ground level; • Demolish all temporary/prefabricated buildings; • Dismantle streel structures and store in designated salvage yard prior to removal/selling off; • Dismantle solar panels and store in designated salvage yard prior to removal/selling off; • Dispose of inert building rubble in the WPUP within a 2 km hauling distance; and • Remove all contractor containers from site prior to closure. General rehabilitation measures: • Level and shape dam walls and basins to be free draining, aligning the surface water runoff with the site wide drainage framework;

Component	Rehabilitation measures
	• Grade drainage lines across the cleared footprint to reroute surface water runoff aligned with the site wide drainage framework (assumed 10% of the disturbed footprint).
Linear Infrastructure	Haul roads and gravel roads: • Grade drainage lines across the cleared footprint to reroute surface water runoff aligned with the site wide drainage framework. Fencing, pipelines and powerlines: • Remove all wire fencing; • Demolish and remove all surface pipelines; and • Remove all powerlines not required by a subsequent user.
Monitoring and Maintenance	• Implement monitoring and maintenance across rehabilitated areas for three years post-closure; • Conduct inspections of key permanent features like the TSF complex, WRDs and pit perimeter berms as part of the rehabilitation monitoring; • Continue the air quality monitoring programme for three years post closure; • Groundwater qualities and in borehole elevations will be monitored and reported quarterly for three years post-closure; and • Water chemistry will be monitored at existing surface water sampling sites quarterly for three years post-closure.

8.5.1. Preliminary Mine Closure Planning Activities

Key planning activities RDMC will conduct during the decommissioning and post-closure phases have been identified and are detailed in Table 8-6.

It is expected that the decommissioning phase will last five years after which the pre-site relinquishment period, which includes monitoring and maintenance, will continue for an estimated period of three years. Monitoring and maintenance will need to continue until the site relinquishment criteria are met. Any potential water treatment requirements could affect the pre-site relinquishment phase (if any).

Table 8-6: Preliminary Mine Closure Planning Activities

Planning Phase and Operational Period	Decommissioning and Closure Period	Pre-site Closure Management Period
Update the initial CP and Closure RA periodically.	Decontaminate the plant area, demolish surface infrastructure, and ensure that access to the mining areas is prevented.	Undertake rehabilitation monitoring as per the post-closure monitoring programme to confirm success of rehabilitation measures, by assessing whether site closure objectives are being achieved.
Reduce the threats and uncertainties identified in the plan by addressing the highlighted knowledge gaps, undertaking additional studies as required, and designing for closure.	Rehabilitate the disturbed footprints once infrastructure is removed.	Undertake closure management activities (corrective action) where applicable. This will be informed by the rehabilitation monitoring.
Engage with the relevant stakeholders regarding the final land use plan, closure criteria, and completion schedule.	Complete all outstanding rehabilitation on site, in line with the mine's closure objectives and final land use plan.	Continue surface water, groundwater and air quality monitoring until site relinquishment criteria are achieved.
Identify potential infrastructure for third-party transfer / selling and ensure the required agreements / contracts are in place.	Transfer identified and usable infrastructure as per agreements / contracts and demolish all remaining infrastructure.	Ensure contractual matters and training (if required) are finalised.
Implement monitoring over areas that have been progressively rehabilitated and ensure a feedback mechanism to refine approaches and improve outcomes.	Continue rehabilitation monitoring and maintenance (if not completed operationally).	Continue monitoring for the manifestation of residual risks and continue mitigation of long-term closure risks.

8.5.2. Progressive and Post-Closure Monitoring

Initial monitoring requirements relating the to the rehabilitation measures for the post-closure phase at specific areas on the mine are provided in Table 8-7.

Monitoring provides data to confirm whether the rehabilitation techniques implemented have been successful (i.e., whether site closure criteria are being met). Monitoring should further provide an early indication of challenges that may arise so that corrective action can be taken in a timely manner. The construction and operational monitoring programmes should continue into closure.

The duration of post-closure monitoring will be determined based on environmental performance and should continue until it can be demonstrated that the rehabilitation work has achieved the closure criteria.

Post-closure monitoring programmes are typically informed by the receptors. It is recommended that an adaptive approach is applied. The proposed monitoring programme outlined in Table 8-7 should be regularly reviewed against operational conditions, monitoring results and updated modelling for the site (air quality/dispersion and groundwater in particular).

Table 8-7: Progressive and Post-Closure Monitoring

Component / Aspect	Monitoring		Performance / Success criteria	Corrective Action
	Methodology	Frequency / Duration		
Soil Management				
Erosion	• Conduct a visual assessment post-closure to determine areas of potential erosion; • Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site; and • Undertake regular digital surveys of rehabilitated areas to confirm that final topography is aligned with landform designs.	• Bi-annually during for at least 3 years after rehabilitation or as deemed necessary.	• No evidence of significant erosion; and • Rock cladding of graded drainage lines intact and stable.	• Regrade areas and maintain cladding as required.
General site status	• Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat	• Continually following implementation of rehabilitation measures.	• Waste / rubble free sites.	• As required: • Clear remnant rubble and dispose of at a designated facility.

Component / Aspect	Monitoring		Performance / Success criteria	Corrective Action
	Methodology	Frequency / Duration		
	and tidy, and that no health or safety risks exist on site.			
Post-mining end land use	• Assess activities completed, as well as legal and related documentation completed and signed-off for identified infrastructure; and • Ensure rehabilitation measures are aligned to the end land use plan.	• Continually, throughout the operational phase.	• Area has been rehabilitated to an aesthetic quality; • Transfer identified infrastructure to end land users has taken place once the area has been proven to be safe for use; • Stable landforms with suitable protection against wind erosion and increased runoff during storm events.	• Refer to the end land use approach and refine measures to be implemented in achieving the desired final land use.
Topography	• Conduct a visual assessment to determine areas of potential erosion; and • Undertake regular digital surveys of rehabilitated areas to confirm that final topography is aligned with landform designs.	• During rehabilitation phase.	• No evidence of significant erosion; and • The final profile achieved must be acceptable in terms of surface water drainage requirements and the end land use objectives.	As required: • Regrade areas and maintain cladding as required, and ensure alignment with the site wide surface post-closure SWMP; and • Refer to the end land use approach and

Component / Aspect	Monitoring		Performance / Success criteria	Corrective Action
	Methodology	Frequency / Duration		
				refine measures to be implemented in achieving the desired final land use.
Invasive alien species	• Visually inspect areas where invasive species have been previously eradicated and areas prone to invasive species (e.g., eroded/ degraded areas, along drainage lines, etc.); and • Undertake surveys on relevant sites where bush encroachment has previously been identified to determine the status quo of invasive vegetation.	• Yearly for at least 3 years after rehabilitation or as deemed necessary.	• Limit and/or prevent declared invader species; • Minimise extended threats to ecosystems, habitats or other species; and • Increase the potential for natural systems to deliver goods and services.	• Remove invasive species aligned with operational protocols; • Revisit mitigation measures; and • Continue control and management.
Surface Water and Groundwater Management				
Surface water flow	• Visually assess the functionality of the surface water drainage systems feeding surface water runoff from rehabilitated areas for blockages, erosion etc.;	• Monthly throughout the operational phase and quarterly for 3 years after post-closure; and • After major rains during major storm events.	• No evidence of significant erosion and scouring; • Free-draining landforms aligned with the site wide surface drainage framework; and	• As required: • Regrade areas and maintain cladding as required; • In-fill erosion gullies; and

Component / Aspect	Monitoring		Performance / Success criteria	Corrective Action
	Methodology	Frequency / Duration		
	• Determine whether the rehabilitated mine site is free draining, and that unnecessary impoundment of surface water run-off is prevented; • Conduct a site inspection after the onset of the rainy period, after all closure related measures have been implemented; • Inspect all notable drainage lines on the rehabilitated mine site and establish whether these lines are free draining and have a limited potential for scouring; and • Inspect the catchments of the respective drainage lines for possible unnecessary impoundment of surface water run-off.		• Re-instated pre-mining surface water flow patterns maximising the clean surface water runoff into natural drainage lines.	• Re-instate surface drainage, as necessary.
Surface water quality	• Monitor specific parameters in surface water, continue the operational monitoring	• Monthly throughout the operational phase and quarterly	• To be determined during the operational period and	• As required: • Refer to end land use approach and refine

Component / Aspect	Monitoring		Performance / Success criteria	Corrective Action
	Methodology	Frequency / Duration		
	programme into the closure phase.	for at least a 3 year period post-closure.	agreed to with the relevant authorities	measures to be implemented in achieving the desired final land use.
Groundwater quality	• Monitor specific parameters in groundwater and continue the operational monitoring programme into the closure phase.	• Quarterly monitoring during the operational phase and quarterly for at least a 3-year period after post-closure.	• To be determined during the operational period and agreed to with the relevant authorities	• As required.
Groundwater quantity	• Sample and monitor groundwater levels in the vicinity of the mine; and • Monitor for adequate rebound of the aquifer.	• Quarterly during the operational phase and quarterly for at least 3 years period post-closure.	• Confirmation of modelling predictions.	• As required.
Dust Management				
Dust	• Continuous PM_{10} and $PM_{2.5}$ monitoring by a designated air quality officer at sensitive receptor locations.	• Quarterly for at least a 3-year period after rehabilitation or as deemed necessary.	• To be determined during the operational period and agreed to with the relevant authorities; and • Acceptable threshold levels based on comparisons with the baseline data and	• As required: • Undertake an investigation as to the source of the dust; and • Devise measures to reduce dust to acceptable levels.

Component / Aspect	Monitoring		Performance / Success criteria	Corrective Action
	Methodology	Frequency / Duration		
			appropriate guideline values.	
General				
Audit Reports	• Auditing against the conditions outlined within the approved ESIA / ESMP Performance Assessment or CP at time of mine closure; and • To determine compliance to ESMP or MRCP conditions; and	• Conducted annually and must be audited by the ECO or an independent auditor.	• Annual performance assessment.	• As required: • Environmental Officer / Independent Third Party and updated annually.
General site status	• Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat and tidy, and that no health or safety risks exist on site.	• Once-off following implementation of rehabilitation measures.	• Waste / rubble free sites.	• As required.

8.5.3. Preliminary Site Closure Criteria

Site closure criteria need to be set, measured, and met for all parties to understand what needs to be completed.

This provides all parties involved in the process a target that needs to be achieved and sets the standards that closure, and rehabilitation are measured against. Table 8-8 provides the preliminary site closure criteria outlined for the mine. These criteria will need to be revised and updated as the site body of knowledge is improved during the operations (through ongoing monitoring and further specialist investigations).

Table 8-8: Site Closure Criteria

Environmental Aspect	Closure criteria	Monitoring Requirement	Reporting Requirement
Groundwater	Groundwater qualities after mine closure need to comply with the qualities agreed to with the relevant authorities. Geohydrological, geochemical and water balance modelling must be confirmed against predictions.	Quarterly groundwater monitoring for 3 years after mine closure; and Updated modelling to confirm actuals against predicted closure scenarios.	Groundwater Monitoring Reports. Specialist Modelling Reports.
Surface water	Surface water qualities after mine closure need to comply with the qualities agreed to with the relevant authorities.	Quarterly surface water monitoring for 3 years after mine closure.	Surface Water Monitoring Reports.
Social	Engagement with stakeholders and employees regarding closure related aspect and formulation of a retrenchment and downscaling policy. Demonstrating training initiatives and skills development assisting in employees being up skilled, which would help individuals to seek alternative employment at the time of closure.	Engagement, training, and skills development policies during operational phase.	Records of correspondence, training matrices and records of training.
Air quality	Dust, PM_{10} and $PM_{2.5}$ must comply with the minimum standards and limits agreed to with the relevant authorities.	Monthly air quality monitoring during the decommissioning and rehabilitation phase.	Air Quality Monitoring Reports.

Environmental Aspect	Closure criteria	Monitoring Requirement	Reporting Requirement
Soil, land capability and land use	Post land use mining assessment to determine status of rehabilitated areas with respect to areas rehabilitated to an agreed upon land use; and Comparisons of the as-built landforms against the FLFD elevations.	Land capability assessments; Daily soil erosion monitoring during the rehabilitation phase; and Setting out elevations during rehabilitation phase and monthly survey reports on landform construction to design elevations.	Land Capability Reports, Survey Reports and Erosion Monitoring Reports.
Safety	Ensure dangerous mining areas, such as open pit areas, have been appropriately bunded / protected and suitable signage erected.	Visual inspections and sign off report by a registered engineer.	Signed off report by a registered engineer.

9. Environmental and Social Management and Monitoring Plan

This Chapter presents the ESMMP for the Project to ensure that identified mitigation and optimisation measures are effectively implemented and that any unforeseen or unidentified impacts of the Project are detected and addressed. The overarching objectives of the ESMMP are as follows:

- Consolidate the management measures identified during the ESIA Process;
- Ensure effective implementation of the management measures, to minimise negative impacts and enhance positive impacts;
- Outline the roles and responsibilities for implementation of the identified management measures;
- Ensure appropriate monitoring of the effectiveness of the management measures to implement corrective measures, if necessary; and
- Establish, prepare and maintain records of Project environmental and social performance (i.e., monitoring, audits and non-compliance tracking).

9.1. Approach to the ESMMP

The ESMMP has been compiled with consideration of the following principles:

- **The precautionary principle** holds that wherever there is doubt about the impacts an activity may have on the environment, precautionary measures should be taken, even if cause-and-effect relationships have not been established scientifically. Mitigation measures have been prescribed based on the scientific quantification of the identified potential impacts, as well as unplanned and low-risk events.
- **The mitigation hierarchy** is listed as the primary objective in IFC PS1 which stipulates “To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.” (Figure 9-1). The mitigation measures included in the ESMMP aim to prevent the occurrence of identified potential impacts. Where impacts cannot be prevented, mitigation measures are prescribed with the intention of minimise/ reducing the significance of these impacts (Table 9-1).
- **The polluter pays principle** requires that the proponent be committed to preventing pollution and will make resources available to ensure that all reasonable measures are in place. The proponent must also accept accountability and financial liability for any pollution that may occur.

Figure 9-1: The Mitigation Hierarchy as defined by the IFC

Table 9-1: The Different Levels of the Mitigation Hierarchy Defined

Avoidance (or Prevention)	If impacts on the natural environment can be avoided, this is the best possible way of reducing impacts. Avoidance involves considering other options in the project location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services and people. This is the best option but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts, development should not take place. In such cases, it is unlikely to be possible or appropriate to rely on the latter steps in the mitigation.
Minimization	If impacts cannot be avoided, it is important that these are minimised. Minimisation refers to optimising project location, siting, scale, layout, technology and phasing to reduce the footprint of the development on biodiversity, associated ecosystem services and people as far as possible.
Restoration (or Rehabilitation)	If residual impacts remain, restoration or rehabilitation may be employed to increase the biodiversity value and/ or return impacted areas to near natural state (or an agreed post-development land use after development activities). Rehabilitation may, however, fall short of replicating the diversity and complexity of natural systems.
Offset (or Compensation)	If residual impacts remain after all efforts to avoid, minimise and restore have been taken into consideration, offsets may be needed. These include the setting aside of areas as corridors and conservation areas, either within the development area or in other areas for conservation. Offsets are difficult to determine and manage, and a separate study is often needed to identify the best options and those which compensate identical (or as close as possible) biodiversity to that which was impacted by the development.

9.2. Environmental and Social Management System

RDMC are developing an Environmental and Social Management System (ESMS) in line with the requirements and structure of ISO 14001 to implement the ESMMP. The ESMS has been developed in such a way to enable it to evolve during the various project stages and to ensure a process of continuous improvement. Monitoring and management plans are and will continue to be developed to ensure compliance with the IFC Performance Standards and the relevant IFC EHS Guidelines. The Management Plans that have been developed as part of the ESIA are included in Appendix Y of this report.

A high-level draft structure of the ESMS is provided in Figure 9-2.

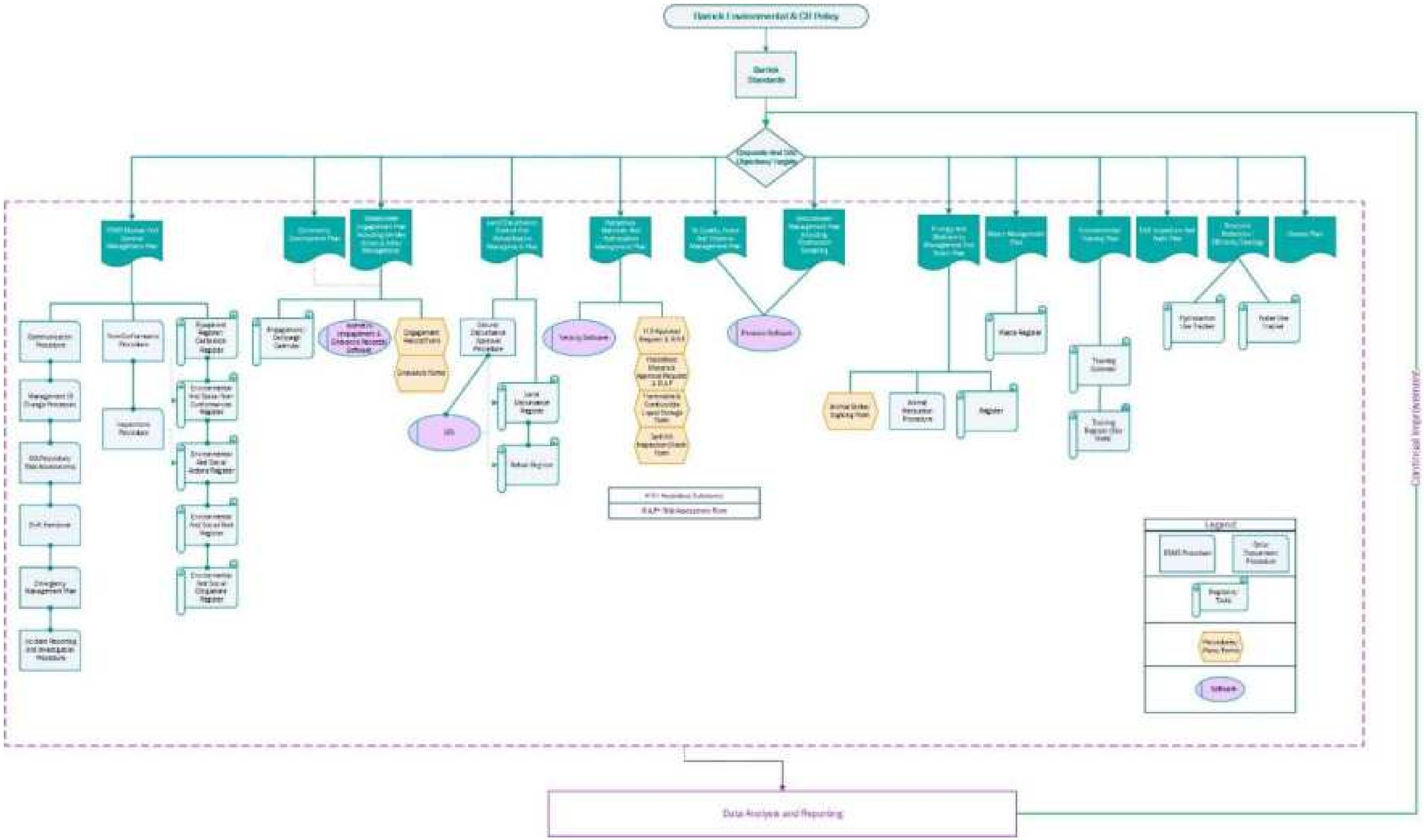


Figure 9-2: Draft Structure of the ESMS

The objectives of the ESMS have been developed to ensure compliance and consistency with RDMC values:

- To ensure that the project is delivered sustainably, that is to ensure that the project is implemented in such a way that environmental and social impacts are minimised;
- To ensure compliance with the requirements of Pakistan legislation and regulations, licences and permits;
- To ensure that environmental and social risks are understood, and mitigation actions are put in place to reduce the likelihood and/or severity of impacts from the Project;
- To have a robust mechanism for continuous improvement of the management of environmental and social management aspects of the project;
- To minimise waste and the use of power and water;
- To ensure a structured approach to training and information sharing with regard to the environmental and social aspects of the project;
- To ensure that all aspects of the project, including design, development and operations are implemented in line with the company's environmental and social objectives;
- To ensure the appropriate allocation of resources and responsibilities to environmental and social management, and to ensure accountability;
- To recognise and respect the culture, values, traditions and lifestyle of the communities in which we operate;
- To ensure transparency of the company's environmental and social performance; and
- To assist in presenting the Company as a responsible environmental manager and good corporate citizen.

Specific environmental and social performance targets will be developed on an annual basis.

9.2.1. Training, Awareness and Competence

An ESMS training plan will be developed to define the skills and competencies required to deliver the ESMS and determine any training needs. This may require the development and delivery of a range of training courses and material, and inductions, including (but not limited to):

- Site environmental and social management inductions. These inductions will provide an overview of the ESMS and the environmental and social responsibilities of all people on site;
- Site based training courses and on the job training will be provided to relevant staff (i.e. environmental staff, team leaders/supervisors etc.);
- Posters and notices will be placed around site; and

- Incident reports will be prepared and disseminated to supervisors for discussion with their teams.

A register of all training and inductions etc. will be maintained.

9.2.2. Communication

9.2.2.1. Internal

Environmental and Social related information will be provided internally through a number of channels, including:

- Through internal training programs: records to be maintained in the site training register;
- Staff, contractor and site visitor inductions: records to be maintained in the site induction register;
- Posters and information sheets displayed on bulletin boards and in prominent locations throughout site;
- Email blasts for dissemination of important information (i.e. incidents, important updates etc.); and
- Staff meetings.

Internal staff will be encouraged to discuss environmental and social issues with their line managers or the environmental management team.

Staff will be trained and encouraged, and tools provided, to identify, record and report environmental and social related issues (i.e. spills, unauthorised clearing, negative or positive interactions with communities etc.). Easy to use forms and registers are referred to in specific management plans and procedures.

9.2.2.2. External

External communications can include:

- Statutory reporting (i.e. as required by the Environment Permit);
- Information available on the Barrick/RDMC website;
- Press or market information releases;
- Annual reports;
- Community and other stakeholder engagement, including (but not limited to):
  - Open forums and information days;
  - Community consultation;
  - Direct discussions with individuals (i.e. regulators, community members etc.);
  - Discussions with NGOs and other interested parties;

- Grievance mechanisms and processes;
- Presentations; and
- Information provided to investors and other interested parties.

There has been extensive stakeholder engagement throughout this and the previous project study periods. A formal SEP has been developed to guide future engagement and to ensure communications are appropriately documented. The SEP includes mechanisms and outlines the responsibilities for receiving and addressing any grievances which the community may have. The Plan aim to continue to have an open and honest dialogue with the communities likely to be affected by the project (both positively and adversely), as well as the regulators and other stakeholders.

9.2.3. Operational Control

Operational procedures for project aspects which may have significant environmental or social implications have or will be developed as appropriate, such aspects may include (but not limited to):

- Fuel and chemical transport and storage;
- Management of wastes;
- Management of spills;
- Noise;
- Dust and other emissions;
- Groundwater abstraction; and
- Land clearing.

Any developed management plan or procedure will be made easily accessible to relevant staff and contractors and reviewed on a regular basis. The responsibility for the maintenance and distribution of operational control procedures will be with the Environment Manager and relevant site managers. Any operational procedure should consider and reference appropriate standards and comply with relevant laws or regulations.

A review of activities will be undertaken during each review of the ESMS to determine which activities may require an operational procedure. An operational procedure can be developed at any time however if deemed necessary.

9.2.4. Non-conformance and Corrective and Preventative Action

The purpose of a non-conformance procedure is to:

1. Document the non-conformance;
2. Notify relevant personnel/stakeholder and mitigate against any adverse impacts;
3. Investigate the cause;
4. Prevent reoccurrence;

5. Modify existing procedure (preventative); and
6. Communicate the changed procedure.

A non-conformance can be identified through either the internal reporting, review or auditing systems of the ESMS, or from external sources such as service providers, contractors, suppliers or stakeholders. A non-conformance register will be developed and maintained.

An investigation as to the reason for the non-conformance will be taken at the earliest available time by either the Environment Manager or their delegate. Any discussions or interviews with stakeholders will be documented and a final report prepared (report structure will be dependent on nature, seriousness or complexity of non-conformance).

Any outcomes or recommendations of the investigation will be undertaken (i.e. update of procedure or management plan for example) and communicated to relevant stakeholders.

9.2.5. ESMS Audit

Prior to each audit an Audit Plan will be developed. This will outline the tasks to be completed during the audit, timeline for completion and roles and responsibilities. Tasks may include review of ESMS documents against the overall environmental and social performance of the project, and interviews with key staff involved in implementation of the ESMS.

Key aspects to be covered by the audit include:

- Are the environmental and social aspects monitored when applicable?
- Are any required environmental and social operational controls in place and maintained?
- Are nonconformities, corrective actions, and preventive actions against the process being addressed?

As part of the audit process, a detailed audit report will be prepared and saved within the ESMS document management system and distributed to Senior Management. Any corrective actions will be communicated to the relevant department/staff members. Corrective actions will include a specified time frame and will be followed up by the auditor as appropriate.

9.2.6. Management Review

An ESMS Management Review workshop will be held on an annual basis following the ESMS Audit. The workshop will include members of the senior management team and will cover:

- Environment and social performance against agreed objectives and targets;
- Any non-conformances and actions taken;
- Any stakeholder issues raised during the period and actions taken;
- Any relevant changes to laws or regulations;
- Discussion of any changes to the project which will impact on the ESMS;
- Suitability of the environmental and social policy, and the objectives of the ESMS;

- Continual improvement process; and
- Changes to the ESMS over the period, suitability of the ESMS moving for project status at that time.

9.3. Biodiversity Risk Management Framework

In line with Lender safeguard policy requirements, the Project will develop a Biodiversity Action Plan that describes a pathway to No Net Loss and/or Net Gain for any Natural Habitat or Critical Habitat-qualifying biodiversity on which the Project is predicted to have significant residual impacts after implementation of actions in the BMP (Section 9.3.1). The scale of the No Net Loss/Net Gain approach will be commensurate to impacts, which are only identified at a high-level in the current Draft ESIA. The scale of those impacts will be refined by further study, and is ultimately expected to be smaller than precautionarily considered in this Draft.

Owing to limited habitat loss/degradation to date in the Project region, few opportunities exist for achieving No Net Loss/Net Gain through restoration of habitats and as such, efforts will focus upon ensuring elevated protection of habitats against future impacts. It will be important that such efforts are focused on areas without underlying mineral resources, which would likely reduce political support for protection. One potential area under consideration for conservation efforts is the alluvial areas adjacent to the borefield area within the Project AoI, for which geology suggests a low likelihood of underlying valuable mineral resources. The broad area of this borefield is notably larger than the potential net loss of ~14,000 ha , and it is currently considered likely that most Project-impacted species (including PBVs and Critical Habitat-trigger species) utilise habitats within this area. Consequently, the protection of this area would be sufficient to compensate for residual impacts outlined in Section 6.2.2.4.1.

The Project will further investigate the distribution of key impacted species and habitats, review legal and other options for elevated protection of habitats in Pakistan[47], assess a broad set of potential areas (including, but not limited to, the borefield[48]), which could receive elevated protection, and consult relevant government and local community stakeholders on feasibility of - and support for - such actions. Subsequently, a refined Residual Impact Assessment and pathway to No Net Loss/Net Gain will be further developed in a future Biodiversity Action Plan.

A Biodiversity Management/Action Plan will be developed, based on this framework, with the objectives of:

- Providing precautionary management measures where data gaps remain;
- Demonstrate the application of the mitigation hierarchy, supplement the baseline knowledge and feedback from expert consultation/s, and map out actions and target to address the risks/opportunities identified through the Critical Habitat Assessment.

[47] It is understood that other protection-type offsets have successfully been implemented within Pakistan, particularly in association with hydropower projects, so further investigation into the success and support of these projects is warranted as part of the next phase of the feasibility studies.

[48] Considering the presence selected PBVs and CH-triggers (incl. Goitered Gazelle) near Kirtaka Hills and Baghicha Area to the west of the Project, the suggestion is to undertake further assessment and enhancements within this area, as it is in close proximity to the Mine Site and will be easier to manage as a potential offset area, if required and pending further investigation. "

- Ensure alignment with the Barrick Biodiversity Policy and Biodiversity Standard.

The headline metrics and/or indicators are defined by the ESIA, particularly in relation to the classification of natural and critical habitat. The IFC PS requires a no-net-loss commitment and net-gain commitment in relation to the overall residual impact upon these identified species, habitats, and/or ecosystem services. In addition, there are commitments in the Barrick Biodiversity Policy that inform the approach to managing impacts upon Key Biodiversity Features (KBFs), where a no-net-loss is envisioned, and Measurable Conservation Actions (MCAs) are considered throughout the Life of the Project.

This framework comprises the following biodiversity management actions:

- Site Mitigation Actions (refer to Section 9.3.1 for BMP actions/objectives)
  - Measures associated with the construction activities to avoid adverse impacts upon terrestrial habitat, particularly natural and critical habitat. (e.g. declaring no-go zones, continuing to implement the Ground Disturbance Approval Procedure, identify key habitats (niches) supporting PBVs/CH trigger for avoidance, etc.)
  - Minimisation measures associated with adverse impact upon terrestrial habitats, particularly natural and critical habitat (e.g. minimise construction footprint where possible, demarcate construction areas to avoid disturbance, etc.).
  - Minimisation measures for nuisance disturbances (such as light, dust, and noise), particularly where receptors are PBVs and/or CH-triggers (e.g. dust management and speed limits, etc.).
  - Minimisation measures for collision with powerlines, particularly for the large raptors and ground-dwelling foraging birds (i.e. the Houbara Bustard) that don’t fly very high (e.g. installation of bird flappers, improve visibility of the powerline, ensure design has minimal impact on installation and habitat loss, etc.).
  - Minimisation measure for AIPs to ensure control and eradication of non-native species, especially within a water-scarce area (e.g. develop AIP removal guidance document, monitoring program, etc.).
  - Minimisation of fragmentation within the operational area to facilitate movement of wildlife through the operational area and to maintain connectivity with other populations refuges (e.g. consider movement corridors within the project design, facilitate crossing points to avoid roadkill, etc.).
  - Restoration measures throughout the operational phase to ensure that residual impact is as low as possible to ensure proactive roll-over mining activities, where is if feasible to do so.

- **Improvement of Understanding of Species of Concern**
    - Supplement baseline knowledge through the verification of the presence of Sand Cat through targeted surveys in the Project vicinity, establishing ongoing camera trapping and local knowledge surveys.
    - Supplement population estimate data for the Goitered Gazelle, particularly in terms of coverage in Project area and surrounds, and in relation to known broader distribution in the region.
    - Undertake further surveys in the Project area initially to better understand ecological behaviour and investigate the distribution range of the Toad-headed Agama, so as to better inform the mitigation measures and protection of these populations.
    - Undertake targeted surveys in the Project area at during the appropriate season in search of the Dead Sea Sparrow to determine its presence or not and the significance of the population within the region in order to adaptively amend management approach toward this critical habitat trigger.
    - Undertake residual impact assessment calculation for each of the CH-triggers/ PBVs (or KBFs) and their habitat proxies using the BRIA tool to inform potential offset liabilities.
- **Supporting Conservation Actions:**
    - Supplement taxonomic issues relating to the potentially new species of reptile which have been sampled as part of the baseline survey (e.g. genetic analysis, further morphological comparisons, additional sampling of more specimens during April 2025, etc.).
    - Partner with local NGOs in to develop awareness programs to reduce impacts from hunting and falconry within the region.
    - Educational awareness for RDMC and contractor employees and the surrounding communities to improve understanding of the value of natural resources and the mitigate against potential unsustainable hunting practices.

The roles and responsibilities, and timeframes associated with these proposed actions will be developed, and adaptive management will be considered throughout the project, as informed by an ongoing Biodiversity Monitoring and Evaluation Programme (BMEP).

9.3.1. Biodiversity Management Plan

The following management objectives are presented to consolidate the application and the approach to the mitigation hierarchy and some supporting conservation values to better understand the identified risks for each of the relevant Project Phases (Table 9-2, Table 9-3, Table 9-4).

Table 9-2: Construction Biodiversity Management Actions

Management Objective	Mitigation Type	Methodology/Approach	Applicable Impact
Project footprint will be minimised, and work lay-down areas.	Avoidance/ Minimisation	• Disturbance areas will be limited to the proposed footprint only, and any sensitive niche habitats supporting CH-trigger and/or PBVs will be delineated, demarcated, and access will be restricted (i.e. no -go zones), • A suitably-qualified environmental team will be stationed on-site to monitor construction to ensure that it adheres to the mitigation guidance and the support the conservation objectives of the BMP/BAP, especially within core habitats fo CH-triggers and PBVs (i.e. largely applicable to raptors and birds of prey). • Implement Ground Disturbance Protocol prior to breaking new ground during the Construction Phase.	12
Reduce and avoid unnecessary fencing to allow movement of species, where possible.	Avoidance	• Fenced areas are primarily dictated by a) security requirements and b) community health and safety requirements. Fencing will be constructed around the boundary of the surface rights lease, with an internal fence also constructed around the accommodation facility. • To reduce impacts on corridors the water supply pipeline and power lines to the Northern borefield should not be fenced. However, each individual water supply bore and pump stations should be fenced for security reasons. • Where possible, the design of the fence will aim to accommodate the movement of selected wildlife groups within identified movement corridors, where possible. • Where possible, assess the potential movement restrictions for large mammals (particularly Goitered Gazelle) associated with the fence lines along the Iranian-Pakistan border, either through physical transect surveys or engagement with local official posted along the border. This is suspected as a pre-existing movement restriction to the sub-population with the Pakistan and provides valuable context for assessing the conservation objectives for the species in Pakistan.	12, 14
Implement 'wildlife-friendly fencing' where possible which includes sections with adjustable heights or openings, allowing movement of smaller fauna such as herpetofauna and small mammals while restricting human access.	Minimisation	• Fencing installed has apertures of 2" to allows small mammals and reptiles to pass through such as the various critical habitat reptilian species. • Fencelines will be patrolled regularly by security as such these security teams should be provided training and will immediately contact a representative of the Environment Team should a trapped animal be identified. Species trapped should be recorded and kept in a register to identify problem areas/species so monitoring can be adapted. • If there are continual trappings it is advised to create some larger holes at ground level for animals to pass through. These will be small enough that it would prevent access by humans for security and community health and safety	12
Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat.	Minimisation	• Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and ensure this is incorporated into the wider Traffic Management Plan. • Conduct training to ensure people are aware of the impacts of driving off designated roads/tracks	13, 14
Decrease direct mortalities/injuries from powerline collision or electrocution	Minimisation	• Ensure that the installation of avian deterrents is included in the detailed design. This would include bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks.	15, 22

		• Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. • Regularly inspect the powerline to check for bird fatalities and collisions.	
Implement a 'find and relocate' procedure prior to clearing areas	Avoidance/ Minimisation	• Capture and relocate incidentally-sighted individuals within the construction footprint. This would involve ethical capture and immediate release to suitable habitat. If applicable, consider small tags to monitor the species movement and distribution. • A suitably-qualified environmental monitoring team will be stationed on-site to monitor construction to ensure that it adheres to the mitigation guidance and the support the conservation objectives of the BMP/BAP, especially within core habitats for CH-triggers and PBVs (i.e. largely applicable to raptors and birds of prey).	16, **17**

Introduction and spread of AIPs	Avoidance/ Minimisation	• Develop and implement an AIP Management Plan within this BMP, which provides guidance on identifying the alien species within the study area and recommendation on removal and control of these species, as well as monitoring objectives that are envisaged to ensure that re-treatment is also addressed, if necessary.
		• Develop and maintain robust early detection and monitoring programs to promptly identify signs of AIPs within or near the mining Project area.
		• Implement the training matrix which will include AIP training that has been developed for the education and awareness programme for staff. Training is to be provided through:
		  ◦ Site inductions;
		  ◦ Toolbox meetings;
		  ◦ Pre-start meetings;
		  ◦ Site posters and
		  ◦ Where necessary, dedicated training sessions.
		• Sightings of AIPs within the Project Area should be reported to the Environmental Team and appropriately controlled.
			18

Increased noise, dust and light pollution from construction, operation and decommissioning of RDMS	Minimisation	• Use vibration reduction technologies and regularly monitor vibration levels to ensure they are kept within thresholds that minimise disturbance to wildlife. • Install shielded lighting to minimise light spills and disruption to nocturnal wildlife.	19

Wildlife mortality/injuries from vehicle collisions and other infrastructure at the RDMS	Avoidance/ Minimisation	• Amend and implement the Ground Disturbance Approval Process to incorporate the following:
		  ◦ Install physical barriers, such as fencing, around open excavations and hazardous areas to prevent wildlife entry.
		• All vehicles must adhere to a speed limits to avoid unnecessary collisions with susceptible species, particularly the Sand Cat, Goitered Gazelle, Toad-headed Agama, and any other species that may cross the road.
		  ◦ A traffic management plan has been developed and implemented.
		  ◦ Training will be conducted to ensure people are aware of the impacts of driving off designated roads/tracks.
		• Work with local wildlife conservation organizations to develop and implement measures to protect wildlife and reduce entrapment risks.
			13, 14, 16, 17, 21, 22

		• Incorporate wildlife-friendly design features, such as escape ramps in excavations, to facilitate the safe exit of trapped animals. Consider reptile-friendly culverts under roads or other barriers. These should be wide enough to allow light and airflow, encouraging their use. • Continue to implement the Ground Disturbance Approval Process. • Train staff to recognise and address wildlife entrapment issues and raise awareness about the importance of wildlife protection.	

Given the uncertainty around the target species (specifically CH-triggers), further research and surveys to improve the level of understanding and develop long term management actions is necessary	Baseline Verification / Supporting Conservation Action	Targeted supplementary survey efforts will be prioritised for CH-trigger and identified PBVs, including additional recce-transects, camera trapping, eDNA sampling or genetic sampling[49], supporting Local Knowledge Surveys, where possible. This will allow for confirmation of the species' presence/absence, and assist with understanding population estimates and/or movements. Thereafter, the mitigation measures will be amended to protect any identified niche habitats and/or known movement corridor/s. If there is a need to further investigate the species' ecological preferences, distribution, uniqueness, and threat status, additional investigation will be considered as more information becomes available for each of the identified species of concern.
		Camera traps will need to be secured and hidden to provide useful long-term value (~6-12 months), and locations need to change over time with a focus on the suspected movement patterns of the Sand Cat and the Goitered Gazelle. Camera traps should be designed to capture each of the specific target-species:
		• Sand Cat (Confirmed Critical Habitat trigger)
		  • Placed at a height suitable for the species (typically 30-40 cm above the ground).
		  • Adapted for nighttime sensitivity and equipped with infrared or motion-sensor technology for nighttime activity, as Sand Cats are crepuscular (or largely nocturnal).
		  • In some cases, placing a scent or food attractant near the camera trap can increase the chances of capturing the animal's presence, though this should be done cautiously to avoid habituating the species.
		• Goitered Gazelle (Confirmed Critical Habitat trigger)
		  • Watering holes as the gazelles are likely to be present near natural or artificial water sources.
		  • Migration paths
		  • Fencelines or boundaries
		• Alcock's Toad Headed Agama (Confirmed Critical Habitat trigger)
		  • Supplementary survey effort, using regular pitfall trap arrays and targeted sampling within niche microhabitats (e.g. rocky ridges), to assess the distribution and population estimates within the study area and the AoI would be important to understand and adaptively manage mitigation actions.
		  • Tag-and-recapture programme should be considered to assess the population estimates. If other species are collected as part of the process, they will be recorded within the registry and further genetic analysis may be required for any cryptic species.
		• Dead Sea Sparrow (Confirmed Critical Habitat trigger)
		• Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks.
			13, 14, 15, 16

[49] Genetic sampling may be useful in terms of the faeces previously observed, which can be used to further investigate the population dynamics and/or the prey being targeted. There may be challenges differentiating between *Felis* species within the study area, but guidance will be sought out from the Sand Cat Specialist team, who are understood to be updating the IUCN Red List Assessment over the next two years.

Conserve and protect the undescribed reptilian species	Avoidance / Minimisation / Supporting Conservation Action	Given the uncertainty around the target species, including *Cyrtopodion* sp. (3 specimens of Bent-toes Geckos), *Eremias* sp. (2 specimens of Steppe Runners), and *Eremias* cf. *scripta* (9 specimens of Sand Racerunners), the likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions, such as: • Considering the location of selected specimens, avoidance measures will be considered as part of the initial construction activities until further evidence supports a reduction in risk. • In addition, targeted ecological survey walk-downs will be undertaken by suitably-trained environmental staff in these potential 'hotspots' to confirm the presence/absence of any of these potentially undescribed species. Should individual specimens be located, they will be trapped for relocation in a nearby area. • Suitably qualified taxonomist/s and collaborators are being sought out to further investigate the morphological differences and undertake genetic analysis of collected blood and tissue samples. • Should additional samples be required, additional efforts will be undertaken during the forthcoming April 2024 survey and considered to further increase the sample size and statistical analysis. • Develop a Monitoring Plan and incorporate into the BAP/BMP.	17

Develop a monitoring Plan and incorporate into the BAP/BMP.	Adaptive Management	• Monitoring efforts will form part of a wider faunal monitoring plan to be updated every 2 years, which will be supplemented by the data collected from the site team through camera traps, incident reports, and incidental observations.
		• Experts for the following species[50] should be sought to advise on and refine approach.
		  ◦ Sand Cat.
		  ◦ Goitered Gazelle
		  ◦ Toad-headed Agama
		  ◦ Dead Sea Sparrow
		• The agama is a CH-trigger and undescribed reptilian species are confirmed to be present within the study area. Prior to construction a permanent ecological ECO is recommended to support the walk-down of these areas prior to construction and to assist with quarterly surveys.
			13, 14, 16, 17

[50] In selected instances, the monitoring efforts and design cannot be adequately considered in terms of ecological preferences and niche habitats, as more investigation is required within the study area. It is envisaged that a biennial monitoring programme (once every two years) will be developed as part of the Biodiversity Monitoring and Evaluation Programme, and each of the relevant monitoring frequencies, focus points, and objectives will need to be refined based on feedback from further investigations into each of the CH-trigger and PBVs.

Table 9-3: Operational Biodiversity Management Actions

Management Objective	Mitigation Type	Methodology/Approach	Applicable Impact
Develop protocols for the removal of animals trapped in fencing.	Minimisation / Adaptive Management	Train staff on the protocol and methodologies to remove trapped animals and raise awareness about the importance of wildlife protection. This can be included in the training matrix. Protocols for removal of trapped species would include: • Inform Environmental Team immediately • Identify the species • Determine appropriate removal methodology based on species. • Humane removal • Release animal in a safe and appropriate habitat for the species • Document and capture in an incident register • Monitor the register to identify trends regarding repeated incidents e.g same species/areas and adaptively manage. Conduct regular monitoring of open excavations and infrastructure to identify and rescue trapped wildlife.	12, 21

Supplement baseline survey data to further analyse and monitor wildlife movement near infrastructure (e.g. identify critical hotspots).	Minimisation	• Once construction has taken place, an ecologist will provide advice on where camera traps should be placed. By choosing strategic locations and ensuring that the camera traps are set at appropriate heights and angles, valuable data on species movement through the mine site can be gathered. Examples include:
		  ◦ Fencing gaps and entry points
		  ◦ Rocky outcrops
		  ◦ Water sources (dams etc)
		  ◦ Wildlife crossings (bridges, corridors etc)
		• Camera trap placement will be dynamic and based on areas that have been identified as problem areas. All reports of animals on cameras should be reported to a representative from the Environmental Team.
		• The future BMP will be informed by the supplementary survey (to be undertaken in April 2025), which is aimed at supplementing the existing baseline conditions and covering selected faunal groups that need further investigation:
		  ◦ Bats survey through nocturnal foot surveys and thermal imaging cameras, acoustic sampling using the SongMeter SM4BAtT FS, as well as mist nets.
		  ◦ Large mammal surveys through incidental observations of signs and habitat conditions, signs (e.g. scats, pugmarks, and hair), as well as nocturnal foot surveys and thermal imaging cameras, as well as camera trapping arrays.
		  ◦ Bird surveys through point/vantage count methods, as well as SongMeter (SM4) which records bird calls for further analysis using Kaleidoscope.
		  ◦ Reptile surveys using pitfall traps arrays (including drift array fences), as well as nocturnal foot surveys.
		  ◦ Vegetation surveys focusing on possible micro-habitats and area within 500 m of selected sampling locations.
			12

Decrease adverse impacts associated with nuisances, such as light, noise and dust.	Minimisation	• In the detailed design phase, ensure inclusion of directional and shielded lighting to minimise light spill into surrounding areas, particularly nocturnal habitats. • Implement motion-activated lighting to reduce unnecessary illumination and disturbance of nocturnal species	12
Develop and implement an Education and Awareness Programme for staff, contractors and	Minimisation	• Implement the training matrix that has been developed for the education and awareness programme for staff, contractors and communities on the species and the importance of it for conservation. Training is to be provided through:	13, 14, 16, 17, 20, 21

communities on the species and the importance for conservation.		◦ Site inductions; ◦ Toolbox meetings; ◦ Pre-start meetings; ◦ Site posters and ◦ Where necessary, dedicated training sessions. • Sightings should be reported to the Environmental Team.	
Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results.	Minimisation / Adaptive Management	• Ensure that the environmental inspection programmes incudes regular inspection and maintenance of powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. • All collision incidents should be reported to a representative from the Environmental Team and captured on a register. • Monitor the register to identify trends regarding repeated incidents e.g. same species/areas and adaptively manage • Monitoring efforts will form part of a wider faunal monitoring plan to be updated every 2 years, which will be supplemented by the data collected from the site team through camera traps, incident reports, and incidental observations.	15, 22
Control invasive or unnatural predator species (e.g., stray dogs or feral cats) that may exploit **CH reptile species** populations near operational areas.	Minimisation	• Considering the presence of stray dogs and other feral pets within the study area, programmes should be considered as part of the operational management plans to control these populations numbers, as their presence within the area may have direct and indirect impacts upon CH-triggers and /or PBVs (e.g. competition, predations, habitat degradation, etc.).	16, **17**
Minimise disposal of waste into the environment to manage contamination risks	Minimisation	• Refer to the Waste Management Plan.	18
Regularly monitor vibration levels.	Minimisation	• Vibration should be monitored throughout the life of the Project and most impacts should be minimised in the detailed design phase.	19
Monitor the established wildlife crossings or corridors to allow safe passage for animals and reduce the risk of collisions	Minimisation/ Adaptive Management	• Monitor through fixed camera traps to determine usage of these crossings.	21

Table 9-4: Closure and Rehabilitation Biodiversity Management Actions

Management Objective	Mitigation Type	Methodology/Approach	Applicable Impact
Rehabilitation of disturbed areas, where relevant and possible, with native species	Rehabilitation	• Design reclamation, and restoration efforts to reduce the likelihood of introducing non-native species that could outcompete native flora and fauna	12, 13, 14, 16, 18
Rehabilitation and enhancement of movement corridors and/or to facilitate connectivity	Minimisation/ Rehabilitation	• Ensure rehabilitation is undertaken in such a way to reduce fragmentation • Remove fencing as soon as it becomes redundant during closure and rehabilitation to facilitate reintroduction of species into these areas. • Continue to monitor remaining fencing and the removal of animals trapped in fencing until such a time that it requires removal.	12, 13, 14
Remove unnecessary infrastructure (incl. powerlines)	**Avoidance/** Rehabilitation	• Remove Powerlines as soon as they become redundant.	15, 22
Rehabilitate areas to ensure continuity of the range restricted and undescribed reptile species	Rehabilitation/ Supporting Conservation Action	• Restore soil quality and loosen compacted areas to facilitate burrowing and natural behaviours of the reptiles. • Spread fine, loose sand across rehabilitated areas for *Eremias sp.* and *Eremias cf scripta*, as the genus depends on sandy substrates for movement and burrowing. • If feasible, reintroduce individuals from these species into restored habitats. Conduct this gradually and in synchrony with the rehabilitation timeline. Establish soft release areas with adequate cover and food sources to support the survival of reintroduced individuals.	**16** ,17

9.3.2. Biodiversity Action Plan

In line with Lender safeguard policy requirements, the Project will develop a Biodiversity Action Plan that describes a pathway to No Net Loss and/or Net Gain for any Natural Habitat or Critical Habitat-qualifying biodiversity on which the Project is predicted to have significant residual impacts after implementation of actions in the BMP (Section 9.3.1). The scale of the No Net Loss/Net Gain approach will be commensurate to impacts, which are only identified at a high-level in the current Draft ESIA. The scale of those impacts will be refined by further study, and is ultimately expected to be smaller than precautionarily considered in this Draft.

Defining a specific path to No Net Loss/Net Gain at this stage is complicated by the recent discovery in the Project area of three potentially-undescribed reptile species. If these do represent undescribed species, it is quite possible that significant parts of their range exist in nearby Iran or (particularly, given habitat/biogeographic patterns) Afghanistan. Given the challenges of undertaking surveys in neighbouring countries, any undescribed species in the Project area would likely have to precautionarily be treated as restricted-range for the foreseeable future. Work is planned to verify the taxonomic status of these species (currently estimated to produce results by the end of May 2025), and to assess their distribution inside and outside of the Project area within Balochistan (surveys planned to start in late March 2025). Until such a point as information is available to prove otherwise, these three species will be treated as restricted-range and potentially threatened.

9.3.2.1. Offset Potential

Taxonomic studies and surveys are needed to clarify, firstly, whether the Project is likely to have significant residual impacts on undescribed species (in which case offset measures would be necessary), or not. Should the species prove to be variants of more widespread, common species, impacts on these may not be at a level for which Lender safeguards require offsets. Regardless, the ADB SPS would require measures to compensate for impacts on Natural Habitat.

Should significant residual impacts be predicted on undescribed – potentially restricted-range – species, offsets will be needed to compensate for such impacts. Given limited current known threats to the species themselves, and predicted Project habitat impacts, any offset would need to focus on site-based restoration and/or protection – likely in an area quite close to the Project. Nonetheless, any such offset would also include actions to prevent collection and trade of any newly-described reptiles, as this has proven to be a high threat in other areas. It is understood that site-based conservation offsets are already being successfully implemented within Pakistan, particularly in association with hydropower projects.

9.3.2.2. Existing Threats to Biodiversity

There has been limited habitat loss/degradation to date in north-west Balochistan, with impacts to date largely owing to mining, off-road driving, collection of woody plants for fuel, littering of plastic, and a level of overgrazing in some areas. In the habitats used by the three reptile species, plastic littering and collection of woody plants for fuel are likely limited impacts.

The most widespread impact is currently off-road driving. Dry environments are particularly susceptible to damage from this impact, because their soils are often lower in organic matter, less well held together by plant roots, and often covered in thin algal/bacterial 'biocrusts' (Pócs, 2009) or (Havrilla and Barger, 2018) – all of these factors increase both the potential for damage and erosion, and the time needed for recovery after damage (Davaasuren, 2017). This physical damage is readily apparent in north-west Balochistan, where soil compacted by off-road driving is clearly visible on satellite imagery across >6,000 ha (~0.5%) of north-west Balochistan (based on 5 m-buffering of main tracks).

Off-road driving also causes direct mortality and displacement of reptiles, destruction of their burrows, and has been demonstrated to have significant impacts on native vegetation and to encourage spread of non-native species (Assaeed *et al.*, 2019) . Although each individually small, these issues can result in severe impacts in sensitive desert environments, particularly when operating cumulatively, and can lead to cascading changes in faunal communities. Initial analysis suggests that this could have had measurable impacts on reptiles in >64,000 ha (~4%) of the area (based on 50 m-buffering of main tracks, to account for dispersed impacts on reptiles and their habitats from off-road driving). In the near past, off-road driving in north-west Balochistan has decreased, as border fencing has reduced transit of vehicles to/from Afghanistan. However, development (particularly from mining projects) in the region is likely to increase incomes, and thus vehicle ownership and levels of off-road driving.

Off-road driving and grazing are often closely interlinked (Al-Dousari *et al.*, 2019). Limited data currently exists on the sustainability of current grazing in north-west Balochistan, but the Project will aim to collect such data based on exclusion plots. However, as in most low income, dry environments, it is likely that areas near settlements and – particularly – water sources are currently overgrazed at some level. In such unpredictable environments, livestock act as an insurance, and culture often encourages large numbers of low-quality livestock (GOB and ICUN Pakistan, 2000). While overgrazing is likely currently limited to areas near natural water sources, development (particularly from mining projects) in the region is likely to increase incomes. In similar environments in southern Mongolia, this has in turn rapidly led to extensive overgrazing, owing to the ability to transport water in large plastic cubes to any grazing area. Nonetheless, the human population in north-west Balochistan is currently low, so it is unclear whether significant overgrazing pressure is likely to develop here.

In summary, while existing habitat impacts in north-west Balochistan are limited, the development trajectory of the region is of rapidly increasing incomes, and commensurately increasing habitat impacts from off-road driving, and potentially overgrazing or other impacts linked to rising incomes. Such impacts can be effectively managed through site-based conservation, or other types of exclosures. Examples can be found in (Berry et al., 2014) and Brooks, 1999).

9.3.2.3. Potential Offset Locations

In order to confirm suitable locations for an offset, if requirted, the Project is planning further surveys for reptiles in spring 2025. Prior to the results of those surveys – and taxonomic studies which verify whether any species truly are undescribed – it is premature to select specific areas for any offset. However, should an offset ultimately be required, it will be important that such efforts are focused on areas without underlying mineral resources, which would likely reduce political support for protection. One potential area may be the alluvial areas adjacent to the borefield area within the Project AoI, for which geology suggests a low likelihood of underlying valuable mineral resources. Another potential area may be near the Kirtaka Hills to the west of the Project, from where many PBVs and CH-triggers (including Goitered Gazelle) are also known. The broad area of the borefield is about ten times the size of the potential net loss of ~14,000 ha, and it is currently considered likely that most Project-impacted species (including PBVs and Critical Habitat-trigger species) utilise habitats within this area. Consequently, the protection of that area may be sufficient to compensate for residual impacts outlined in Section 6.2.2.4.1.

9.3.2.4. Key offset criteria

In line with international best practice, should an offset be necessary for this Project, it will:

a) be a last resort, after full implementation of the mitigation hierarchy to avoid, minimise and restore impacts;
b) be based upon sound science and international good practice;
c) be ecologically equivalent (‘like-for-like’), i.e. contain very similar species (and at least those of most conservation concern), habitats and ecosystem functions to those impacted by the Project, and be sufficiently large and/or connected to other habitat to ensure their long-term survival by providing ecologically-appropriate conditions for breeding and foraging;
d) be additional, i.e. deliver conservation benefits above and beyond those that would have occurred without the offset intervention (based on an assessment of threats under a business-as-usual scenario). Protection of areas that were already secured, unlikely to be threatened, or would have been conserved regardless of the project would not count as additional;
e) be sufficiently large to realistically generate measurable gains equal or greater than residual Project impacts, in order to achieve No Net Loss/Net Gain. Such gains will be quantifiable, based on measures of population, habitat extent and quality, etc.;
f) openly and transparently involve all appropriate stakeholders in government, civil society, and local communities, and ensure equitable benefits to them (any offset should not create significant new negative social or economic impacts);
g) be able to demonstrate long-term outcomes, through a robust long-term biodiversity monitoring plan to track offset success and ecological recovery; and
h) ensure long-term outcomes (‘permanence’), at least as long as Project impacts, through legal protection and sufficient secured long-term funding for implementation, monitoring and governance (a governance framework is essential to ensure ongoing protection, enforcement, and compliance).

Should this Project require an offset, its feasibility will be judged against these criteria. The feasibility of the offset will in turn indicate the likelihood that the Project can achieve No Net Loss/Net Gain.

9.3.2.5. Next steps

To address knowledge gaps, particularly in relation to key offset criteria, the Project is planning – among other things – to:

i. fund taxonomic studies, including inspection of museum specimens and DNA analysis, to clarify the status of the three potentially-undescribed reptiles (addressing offset criterion b; estimated results by end of May 2025);
ii. conduct further surveys in the Project impact area, and across north-west Balochistan, to better understand the distribution and status of the three potentially-undescribed reptiles, relative impacts from the Project, and potential offset sites – should they be necessary (addressing offset criteria b and c; surveys planned to start in late March 2025);
iii. consult experts to understand size and/or connectivity needs to ensure any offset is of a sufficient size for long-term survival of key species, by providing ecologically-appropriate conditions for breeding and foraging (addressing offset criterion c);
iv. conduct further surveys to refine understanding of the quality/condition of impacted habitat in both impact and potential offset areas (e.g., including impacts from off-road driving; addressing offset criteria b, d and e);
v. establish exclosures to assess passive restoration success/timelines (addressing offset criteria b and e);
vi. assess legal and other mechanisms for enhanced habitat protection in Pakistan (addressing offset criteria f and h)
vii. review success and challenges of existing site-based offsets in Pakistan to date (addressing offset criteria f and h);
viii. assess a broad set of potential offset areas which could receive elevated protection, and consult relevant government and local community stakeholders on feasibility of - and support for - such offset actions in such locations (addressing offset criteria e, f, and h);
ix. conduct a detailed, long-term cost estimate of any offset measures, including – as appropriate – habitat restoration, legal protection, enforcement, monitoring, adaptive management, and contingency for unforeseen costs, to ensure financial feasibility (criterion h);
x. integrate full costs of any offsets (ix) into the Project's budgets and financial analysis, to ensure that adequate funding is affordable and allocated over the offset’s lifespan (criterion h);
xi. develop a formal governance framework for any offset, specifying roles and responsibilities for all stakeholders in offset implementation, monitoring and oversight, ensuring transparency and compliance with lender safeguard policies (criteria f and h); and
xii. include a refined Residual Impact Assessment (addressing offset criterion e) and pathway to No Net Loss/Net Gain in the final disclosed ESIA, which will be further developed in a future Biodiversity Action Plan.

9.4. Environmental and Social Mitigation Measures

Mitigation and management actions for each identified environmental and social impact are presented in Table 9-5. The Environmental and Social Monitoring Plan is presented in Table 9-6.

Table 9-5: Environmental and Social Management Plan

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
Socio-economic	Impact 01: Direct, indirect, and induced employment resulting in increased prosperity and wellbeing (Positive Impact).	• Ensure preferential recruitment of local candidates, with consideration of vulnerable individuals, provided they have the required skills and qualifications. • Develop and implement local employment and procurement strategies including establishing specialist HR teams and career and job guidance services in Nok Kundi and other communities. • Clearly define and publicise recruitment policies. • Include promotion of local, female and youth employment within employment policy. • Monitor subcontractors in terms of local employment numbers and include specific local employment targets in contracts where appropriate. • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training. • Implement a structured stakeholder engagement process and grievance mechanism, as well as direct communication channels to surrounding communities. • Monitor and enforce local employment targets for contractors. • Coordinate recruitment efforts with contractors. • Determine and apply what is 'fair and transparent' in recruitment, including the distribution of jobs between different community groups, in consultation with local communities and their leaders. • Continued use and improvement of the current registry for jobseekers to document relevant qualifications/experience. • Continue to implement local training and skills development programs. • Continue to implement and expand specific training and business and employment opportunities for women in site and non-site roles. • Continue program of sharing stories of existing female employees to attract female applicants. • Continue program of site tours for local women and their families to understand site living and working arrangements.	Local employment and procurement strategies	Continually, during construction and operations	RDMC and its contractors

	Impact 02: Disputes over the distribution (real and perceived) of Project employment and other benefits within and between the local community near the Project facilities.	• Implement a Stakeholder Engagement Plan including:
		  ◦ Maintaining regular and effective communication with local communities and other stakeholders;
		  ◦ Maintaining a grievance procedure and encourage and facilitate stakeholders to use the mechanism to express concerns (with consideration of current cultural norms for women to raise concerns);
		  ◦ Providing sufficient resources to the community relations officers to enable them to monitor perceptions to ensure issues can be addressed in a timely manner; and
			Stakeholder Engagement Plan and grievance process
			Community Development Programme
				Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility

		• Implement comprehensive socio-economic monitoring.
		• Ensure women and vulnerable groups are engaged and that community development initiatives consider these groups.
		• Continue to implement local training and skills development programs. Encourage contractors to recruit locally through the Reko Diq training centre(s).
		• Provide local employees with confirmation of employment documents for work undertaken and certificates of completion of training.
		• Continue to monitor community perceptions and concerns through regular engagement, feedback and other monitoring activities.
		Complete a needs assessment for the surrounding communities. A two phase assessment has already commenced in partnership with Islamic Relief Pakistan (IRP). The, first phase is primarily focusing on identifying strategic-level gaps and challenges with the involvement of stakeholders. Initially, IRP will facilitate stakeholder dialogues at the district and provincial levels, engaging relevant departments and stakeholders. These discussions will revolve around identifying key strategic gaps in areas such as water supply, electricity/power supply, road and transport infrastructure, social services (including health and education), land allocation and management, town administration and management, sanitation, and disaster risk management. During the first phase key informant interviews will also be conducted with designated stakeholders. After receiving departmental endorsements on the identified gaps, IRP will organize an interim review session with stakeholders and RDMC to present the findings related to strategic-level gaps and challenges. The second phase will be designed to collect the information at the community level data through Focus Group Discussions and In-depth Interviews to draw out the exact picture of the needs existing at the community level and the status of the service delivery with respect to the identified needs.
		• Continue to advance the CDC program to ensure that communities are empowered and encouraged to directly address social infrastructure and services challenges.
		• Adoption of social, economic, environmental, and cultural considerations into the community development programme.
		• Formalise the preferential hiring policy.
		• Continue to implement a Local Employment Policy including:
		  ◦ Provisions for preferential employment for vulnerable groups and nearby communities.
		  ◦ Guidelines for a clear, fair, and accessible recruitment process.
		  ◦ Mechanisms for regular updates on job opportunities, application timelines, and progress to manage expectations and maintain trust.			

	Impact 03: Social development projects resulting in improved infrastructure, health and education	• Formulate, implement and maintain a Community Development Programme including: ◦ Conducting a needs assessment of the local communities across Chagai area (see details in Impact 2).	Community Development Programme.	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
	outcomes and general economic uplift (Positive Impact).	- Provisions for continual engagement with the local community stakeholders to involve them in the planning and decision-making processes of the social development projects to ensure project outcomes are reflective of community needs. - Tailoring development projects to the needs of the communities in the respective Project facilities. - A system to monitor and evaluate the progress and effectiveness of social development projects. • Prioritise sustainable infrastructure development that aligns with the long-term needs of the community. • Ensure consideration of women and vulnerable groups for planned social development projects. • Establish partnerships with educational institutions and local NGOs to enhance the quality of education and promote skills development. • Involve local community members in the planning and decision-making processes of social development projects to ensure project outcomes are reflective of community needs. • Implement a monitoring and evaluation system to track the progress and effectiveness of social development projects. • The Project will ensure that the upgraded or newly constructed healthcare and educational infrastructure account for the increased flood-related risks. • The Project will consider CSR-related funding toward the drainage and flood management infrastructure of local communities. • The Project will commit 1% of CAPEX into community development and initiatives, as per the Mineral Agreement.			
	Impact 04: Increase in the stock of skilled human capital due to the transfer of knowledge and skills from the Project resulting in enhanced productivity of local labour (Positive Impact).	The Project will: • Assist local communities, especially vulnerable groups having practical skills but lacking qualifications to further increase training and employment opportunities. • Support initiatives promoting a culture of learning in local communities. • Continue to implement local training and skills development programs. Encourage contractors to recruit locally through the Reko Diq training centre(s). • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion of training. • Continue to implement and expand specific training and business and employment opportunities for women in site and non-site roles .	Periodic review of socio-economic conditions	Continually, during construction and operations	RDMC and its contractors
	Impact 05: Increase in population due to the in-migration of job seekers (in-migrants) leading to pressure on	• Develop an in-migration management plan: - Complete needs assessment as details in Impact 2 to understand current deficiencies in infrastructure and Government services.	In-migration Management Plan Grievance process	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
	existing social infrastructure and services in communities.	• Engage Government planners and services managers at local, district and provincial level to understand current plans and ensure consideration of population growth risks. • Provide support Government at local, district and provincial level as appropriate in their development and implementation of Infrastructure Development Plans. • Continue to implement point of hire policies (i.e. transport to site is currently provided from point of hire only). • Ensure ID checks are completed for prospective employees to ensure they are designated as local (the Mineral Agreement defines local as a native or resident of Balochistan). • Maintain policy of staff residing on site rather than in local communities. • Continue to implement the GRM with consideration of existing cultural norms for women raising concerns. • Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand the extent of population growth and any problems that it may cause. • Ensure the community development programmes consider the monitored changes in the social landscape. • Carry out awareness campaigns in the surrounding communities in relation to in-migration related risks and impacts. • Continue to implement a Local Employment Policy. • Include provisions for Cultural Sensitivity training and training related to community health and safety in training plans.	Community Development Plan		
	Impact 06: Increase in social ills such as crime, illicit substance distribution and use etc. due to population influx and increased Project induced traffic through communities.	• Develop an in-migration management plan: • Complete needs assessment as details in Impact 2 to understand current deficiencies in infrastructure and Government services. • Engage Government planners and services managers at local, district and provincial level to understand current plans and ensure consideration of population growth risks. • Provide support Government at local, district and provincial level as appropriate in their development and implementation of Infrastructure Development Plans. • Continue to implement point of hire policies (i.e. transport to site is currently provided from point of hire only). • Ensure ID checks are completed for prospective employees to ensure they are designated as local (the Mineral Agreement defines local as a native or resident of Balochistan).	Stakeholder Engagement Plan	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Maintain policy of staff residing on site rather than in local communities. • The Project will provide recreational facilities, fitness programmes, and mental health resources to support the physical and emotional health of Project personnel, including sub-contractors. • Conduct community awareness sessions as part of the SEP to educate community members about the dangers of drugs and other harmful substances, encouraging them to refrain from their use. • Continue to advance the RDMC community development program and ensure that influx management is given due consideration during the CDC decision making process. • Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand the extent of population growth and any problems that it may cause.			
	Impact 07: Real or perceived increase in prices of basic commodities and the cost of living due to the economic activities generated by the Project.	• Engage with business owners and local government groups with respect to cost-of-living concerns. • Conduct regular community consultations to inform the local community about the factors contributing to inflation, to clarify the Project's role in the local economy, and to address any misconceptions or attributions of price increases to the Project. • Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand changes in conditions.	Stakeholder Engagement Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase.	• Develop a training plan to assist in the transitioning of employees from construction to operations phases of the Project. • Develop and implement a retrenchment plan well in advance of the completion of construction and ensure employees are kept informed. • Develop and implement local employment and procurement strategies. • Develop local employment and retention targets for Contractors. • Clearly define and publicise recruitment policies. • Include promotion of local, female and youth employment within employment policy. • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training to assist in seeking alternative employment once construction is complete. • Implement a structured stakeholder engagement process and GRM, as well as direct communication channels to surrounding communities.	Local employment and procurement strategies	Continually, during construction	RDMC and its contractors
	Impact 37: Discontent over the absence of passenger trains available to communities while the Project's transportation trains operate.	• Engage with local communities to understand their transportation needs, concerns, and priorities. • Engage with relevant government institutions such as the Ministry of Railways to share potential concerns of the communities.	Stakeholder Engagement Plan	Continually, during operations	RDMC

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
	Impact 38: Loss of income upon conclusion of the operations phase of the Project	• Implement comprehensive training initiatives aimed at equipping the local community with the skills needed for transitioning from the operations phase. • Develop a retrenchment plan well in advance of mine closure. • Conduct regular stakeholder consultations between Project stakeholders, including local communities and businesses to identify potential challenges and develop solutions. • Invest in infrastructure Projects that enhance the area's connectivity, such as road improvements or access to utilities, to facilitate economic development independently of the Project's activities. • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training, in order to seek alternative employment. • Offer continued employment opportunities during decommissioning to members of the local communities. • Implement a structured stakeholder engagement process and GRM, as well as direct communication channels to surrounding communities.	Stakeholder Engagement Plan	Continually, during decommissioning	RDMC

Soils and Sediments	Impact 08: Disturbance of soil due to construction operation of the mine.	• Limit the movement of heavy machinery to designated pathways to prevent widespread soil compaction.
		• Use diversion channels or berms to redirect clean water away from disturbed soils and reduce erosion risk.
		• Plan construction activities to minimise the area of soil disturbance.
		• The Project has implemented a Ground Disturbance Procedure which includes:
		  ◦ A ground disturbance approval process to ensure environmental or social aspects are identified and addressed before the disturbance occurs (i.e. community engagement, pre-disturbance surveys for flora, fauna or heritage sites, runoff management etc.);
		  ◦ Identification of post disturbance actions such as rehabilitation measures if necessary.
		  ◦ Pre and post disturbance registration of the disturbance type and area.
		  ◦ Closeout inspections and signoff.
			Ground Disturbance Control Plan	Continually, during construction and operations	RDMC and its contractors

	Impact 31: Disturbance of soil due to construction of water supply pipeline from Northern Groundwater System Area to Mine Site.	• Plan construction activities to minimise the area of soil disturbance.
		• The Project will develop a Ground Disturbance Procedure which includes:
		  ◦ A ground disturbance approval process to ensure environmental or social aspects are identified and addressed before the disturbance occurs (i.e. community engagement, pre-disturbance surveys for flora, fauna or heritage sites, runoff management etc.);
		  ◦ Identification of post disturbance actions such as rehabilitation measures if necessary.
			Ground Disturbance Control Plan	Continually, during construction	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Pre and post disturbance registration of the disturbance type and area. • Closeout inspections and signoff.			
	Impact 09: Improper Management of Chance Finds.	The Project will maintain a Chance Find Procedure.	Chance Find Procedure	Continually, during construction and operations	RDMC and its contractors
Cultural Heritage	Impact 10: Impacts on Archaeological Sites.	The Project will ensure proper clearance of archaeological sites in consultation with the Balochistan Directorate of Archaeology & Museums.	Approval from Balochistan Directorate of Archaeology & Museums	Continually, during construction and operations	RDMC and its contractors
	Impact 11: Impacts on Intangible Cultural Heritage (Adverse effects: (loss of oral traditions and languages etc and disruption of traditional practices) on practices lined to intangible cultural heritage.)	• The Project will ensure that there are no restrictions on religious expression and observance. • The site will remain dry, and inspections on entry will be completed to ensure people are not bringing alcohol to site. • Develop influx management plan.	Influx Management Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 27: Increased movement of sediment to drainage lines resulting from erosion of disturbed soils during construction and operation of mine.	• Minimise the disturbance of soils to the footprint when construction and demolition of infrastructure will be taking place. • Movement of machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance and subsequent erosion. • Maintain sediment and erosion control measures to minimise entry of sediment into nearby drainage lines. • Landscape re-profiling to be undertaken to rehabilitate disturbed sites and to allow free drainage that promotes the desired post mining land use after decommissioning. • Detailed site drainage plans to be developed during detailed design phases.	Rehabilitation Plan	Continually, during construction and operations	RDMC and its contractors
Surface Water	Impact 32: Alteration of flow path patterns and channel geometry leading to increased erosion.	• Minimise the footprint of disturbance, as far as practicable. Demarcate the proposed areas for land clearance and earthworks to minimise the unnecessary expansion of the footprint of disturbance. • Provide suitable sanitary facilities and remove waste to an appropriate waste facility. • Clearing of vegetation and excavations must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones. • Disturbed areas remaining after construction activities should be rehabilitated in a timely manner as much as practically possible. • Due to the dry nature of the Project area monitoring of Total Suspended Solids (TSS), TDS and turbidity in surface water resources in close proximity to the project site may not be practically possible. However, when conditions permit such monitoring is recommended upstream and downstream of construction areas to facilitate the prompt implementation of remedial actions, if necessary. • Detailed site drainage plans will be developed during the detailed design phase.	Rehabilitation Plan	During constructions	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
Traffic	Impact 26: Increase in traffic volumes due to Project-related transportation resulting in increased congestion, road wear and increased community safety risks.	The Project will implement a Traffic Management Plan which will include provisions for the following: • Provisions for the use of alternative routes. • Timing for HTV movement accounting for rush hour timings (where practicable). • Speed limits. • Training programmes for safe driving practices including vehicle maintenance, drug and alcohol use and managing security risks. • Checklists for vehicle inspection. • Traffic management at the intersection of the N40 intersection (i.e. stop signs, ensuring adequate visibility). The Project has will continue to implement the following: • Verification and competency and licence checks for all RDMC and contractor drivers. • Regular vehicle maintenance and third-party inspections. • Verification of licences of truck drivers who deliver to site.	Traffic Management Plan	Continually, during construction and operations	RDMC and its contractors
Biodiversity (Flora and Fauna)	Impact 12: Terrestrial habitat loss due to land clearing and disturbance and resultant impacts on abundance and diversity of terrestrial flora and fauna.	<u>Construction:</u> • A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. • Disturbance to, or movement of, soil and vegetation will be minimised. • Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible. • Implement measures such as fencing and signage to prevent unauthorised access and disturbance to wildlife. • Implement a ‘find and relocate’ procedure prior to clearing areas. <u>Operation:</u> • Utilise designated routes for the movement of vehicles and machinery. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading. • Solid and liquid wastes will only be disposed of at designated sites, and a WMP will be developed and implemented. • Implement adaptive management strategies based on findings from the management programs. • Education and awareness of staff, contractors and communities. <u>Closure and Rehabilitation</u>	Biodiversity Management/Action Plan	During constructions	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		Rehabilitation of disturbed areas, where relevant and possible, with native species.			
	Impact 13: Fragmentation and loss of movement corridors at RDMS.	<u>Construction:</u> • Reduce fencing where possible to allow movement of species. • Ensure fencing that is required for restricting human access only, has large enough wire openings to allow movement of small animals. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. <u>Operation:</u> • Develop protocols for the removal of animals trapped in fencing. • Consider 'wildlife-friendly fencing' which includes sections with adjustable heights or openings, allowing movement of smaller fauna such as herpetofauna and small mammals while restricting human access. • Use camera traps and remote sensors to monitor wildlife movement near infrastructure. Analyse this data to identify critical hotspots and adaptively manage operations. • Use directional and shielded lighting to minimise light spill into surrounding areas, particularly nocturnal habitats. Implement motion-activated lighting to reduce unnecessary illumination. <u>Closure and Rehabilitation</u> • Develop protocols for the removal of animals trapped in fencing. • Ensure rehabilitation is undertaken in such a way to reduce fragmentations. • Rehabilitation of disturbed areas, where relevant and possible, with native species.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 14: Impacts to Critical Habitat of the Sand Cat.	<u>Construction:</u> • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Implement genetic sampling to confirm the presence of this species within the AoI and the surrounding EAAA, • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Develop a monitoring Plan and incorporate into the BAP/BMP <u>Operation:</u> • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Develop and implement an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		Closure and Rehabilitation: • Remove fencing as soon as it becomes unnecessary, and the area is deemed safe. • Rehabilitation of disturbed areas, where relevant and possible, with native species.			
	Impact 15: Impacts to Critical Habitat of the Goitered Gazelle.	Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Develop a monitoring plan and incorporate into the BAP/BMP. • Avoid unnecessary fencing. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Operation: • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Closure and Rehabilitation: • Remove fencing as soon as it becomes unnecessary, and the area is deemed safe. • Rehabilitation of disturbed areas, where relevant and possible, with native species.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 16: Impacts to Critical Habitat of the Dead Sea Sparrow.	Construction: • Install avian deterrents such as bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks. Operation: • Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. Closure and Rehabilitation: • Remove Powerlines as soon as they become redundant	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 17: Impacts to Critical Habitat of the Alcocks Toad Headed Agama.	Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Develop a Monitoring Plan and incorporate into the BAP/BMP. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Implement a 'find and relocate' procedure prior to clearing areas. Operation:	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Consider reptile-friendly culverts under roads or other barriers. These should be wide enough to allow light and airflow, encouraging their use. • Control invasive or unnatural predator species (e.g., stray dogs or feral cats) that may exploit Agama populations near operational areas. • Restrict vehicle movement to pre-designated pathways to avoid disturbing or fragmenting Agama habitats. • Implement speed limits. Closure and Rehabilitation: • Rehabilitation of disturbed areas, where relevant and possible.			
	Impact 18: Impacts to habitat of the potentially undescribed reptilian species, *Eremias sp., Eremias cf scripta* and *Cyrtopodion sp*.	Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Implement a ‘find and relocate’ procedure prior to clearing areas. • Develop a Monitoring Plan and incorporate into the BAP/BMP. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. Operation: • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Closure and Rehabilitation: • Restore soil quality and loosen compacted areas to facilitate burrowing and natural behaviours of the reptiles. • Place carefully arranged rock piles or artificial crevices to mimic natural shelters for *Cyrtopodion sp.*, which are known to utilise rocky habitats. • Spread fine, loose sand across rehabilitated areas for *Eremias sp.* and *Eremias cf scripta*, as the genus depends on sandy substrates for movement and burrowing. • If feasible, reintroduce individuals from these species into restored habitats. Conduct this gradually and in synchrony with the rehabilitation timeline. Establish soft release areas with adequate cover and food sources to support the survival of reintroduced individuals.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Control populations of invasive or unnatural predators (e.g., feral cats, rats) that may exploit reptile populations in the rehabilitated area.			
	Impact 19: Introduction and spread of AIPs to the RDMS and Port Qasim due to Project-related transportation and vehicular movement.	Construction: • Develop and implement AIP management. • Develop and maintain robust early detection and monitoring programs to promptly identify signs of AIPs within or near the mining Project area. Operation: • Establish strict guidelines for the disposal of waste materials and wastewater, ensuring they are managed in a manner that prevents the introduction and spread of AIPs. • Provide comprehensive education and training to Project personnel, emphasising the risks associated with AIPs introduction and instructing them on how to recognise and report potential invasive species. Closure and Rehabilitation: • Use native species for landscaping, reclamation, and restoration efforts to reduce the likelihood of introducing non-native species that could outcompete native flora and fauna.	AIP Management Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 20: Increased noise, dust, and light generated from construction, operation and decommissioning of RDMS.	Construction: • Use vibration reduction technologies and regularly monitor vibration levels to ensure they are kept within thresholds that minimize disturbance to wildlife. • Install shielded lighting to minimize light spills and disruption to nocturnal wildlife. Operation: • Regularly monitor vibration levels.	Noise Management Plan Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 21: Increased wildlife mortality/injuries from vehicle and train collisions along the Transport Route.	• All vehicles must adhere to speed limits to avoid unnecessary collisions with susceptible species.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 22: Wildlife mortality/injuries from vehicle collisions and other infrastructure at RDMS.	Construction: • Install physical barriers such as fencing around open excavations and hazardous areas to prevent wildlife entry. • All vehicles must adhere to speed limits to avoid unnecessary collisions with susceptible species. • Incorporate wildlife-friendly design features, such as escape ramps in excavations, to facilitate the safe exit of trapped animals. • Train staff to recognise and address wildlife entrapment issues, and raise awareness about the importance of wildlife protection. Operation: • Conduct regular monitoring of open excavations and infrastructure to identify and rescue trapped wildlife.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Monitor the established wildlife crossings or corridors to allow safe passage for animals and reduce the risk of collisions. • All vehicles must adhere to a low-speed limit to avoid unnecessary collisions with susceptible species. • Work with local wildlife conservation organizations to develop and implement measures to protect wildlife and reduce entrapment risks. • Develop protocols for the removal of animals trapped in fencing/excavations.			
	Impact 23: Direct mortality/injuries from powerline collisions or electrocutions.	Construction: • Install avian deterrents such as bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks. Operation: • Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. Closure and Rehabilitation: • Remove Powerlines as soon as they become redundant.	Biodiversity Management/Action Plan	Continually, during construction and operations	RDMC and its contractors
	Impact 33: Terrestrial habitat loss due to temporary infrastructure.	Construction: • A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. • Disturbance to, or movement of, soil and vegetation will be minimised. • Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible. • Implement measures such as fencing and signage to prevent unauthorised access and disturbance to wildlife. • Implement a 'find and relocate' procedure prior to clearing areas. • Use directional and shielded lighting if works are implemented at night to minimise light spill into surrounding areas. Implement motion-activated lighting to reduce unnecessary illumination. • Encourage drivers and local communities to report wildlife sightings or collisions, enabling timely management responses. Operation: • Utilise designated routes for the movement of vehicles and machinery.	Biodiversity Management/Action Plan Waste Management Plan	During constructions	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading. • Solid and liquid wastes will only be disposed of at designated sites, and a WMP will be developed and implemented. • Implement adaptive management strategies based on findings from the management programs. • Education and awareness of staff, contractors and communities. <u>Closure and Rehabilitation</u> • Rehabilitation of disturbed areas as soon as possible, with native species.			
	Impact 34: Impacts to flora and fauna during the upgrade of the Transport Route.	<u>Construction:</u> • A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. • Disturbance to, or movement of, soil and vegetation will be minimised. • Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible. • Implement measures such as fencing and/or signage to prevent unauthorised access and disturbance to wildlife. • Implement a 'find and relocate' procedure prior to clearing areas. • Use directional and shielded lighting if works are implemented at night to minimise light spill into surrounding areas. Implement motion-activated lighting to reduce unnecessary illumination. • Incorporate speed bumps and signage to enforce speed limits in high-wildlife areas. Install wildlife crossing alerts to prevent roadkill incidents. • Encourage drivers and local communities to report wildlife sightings or collisions, enabling timely management responses. <u>Closure and Rehabilitation</u> • Rehabilitation of disturbed areas, where relevant and possible, with native species.	Biodiversity Management/Action Plan	During constructions	RDMC and its contractors
Noise	Impact 24: Nuisance at receptors due to noise generated from construction, operations and decommissioning of mine.	• The Project will develop and implement a Noise Management Plan. • Monitor and maintain noise producing units to manufacturing specifications, to reduce noise levels to the lowest possible extent. • Consider installing visual alarms instead of or in addition to audible alarms to the extent possible. • Installation of noise abatement devices around noise producing equipment such as mufflers and silencers will reduce noise at the source wherever feasible.	Noise levels above allowed limit Noise Management Plan	During construction, operations, and decommissioning	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Prioritise use of new equipment and vehicles over older equipment to ensure that the noise levels do not exceed the prescribed limits at reference distances. • Periodically monitor instantaneous and 24-hours continuous noise levels at the Mine Site boundary and at receptors to ensure compliance with applicable standards. • Worker accommodation rooms are to be constructed using insulated wall panels to reduce noise.			
	Impact 26: Increase in vehicular movement on local roads can cause elevated noise levels.	• Regularly maintenance of vehicles according to the manufacturer specifications. • Implement policies to prohibit use of horn (except in emergency situations) in areas where human dwellings or receptors are close to the Road Transport Route. • Minimise vehicular movement during peak congestion hours to reduce contribution in elevated noise levels. • Comply with speed limits at all times.	Vehicle maintenance schedules	During constructions and operations	RDMC and its contractors
	Impact 35: Nuisance to local communities due to impulse noise generated from blasting activities.	• The Project will develop and implement a Noise Management Plan. • Blasting times will be posted in advance. • Blasting will not be carried out during night-time hours (10:00 pm to 06:00 am).	Noise Management Plan	During operations	RDMC
	Impact 36: Nuisance to local communities due to elevated noise levels from railway movement.	• Conduct continuous 24-hours noise monitoring periodically over a weekday and weekend at nearest receptors where the Predicted Ambient Noise levels with Project railway shows an increase of more than 3 dBA over the baselines. This will assist the Project to assess incremental noise levels as well as their perception by the receptors. • In case of any impacts due to increase in noise levels from Project's railway traffic, collaborate with Pakistan Railway for implementation of mitigation and control measures. • Periodic engagement with communities along the rail route to monitor cumulative impacts.	Noise monitoring results	During operations	RDMC
Visual	Impact 29: Impact on visual amenity due to mining activities and Project facilities.	• The Project will investigate options for rehabilitation to match the landscape to the extent possible. • The Project will investigate any perceptual concerns as part of its ongoing stakeholder consultation process. • The Project will investigate options for limiting lighting impacts to within the mine site that conform to operational illumination requirements.	Rehabilitation Plan	During construction, operations, and decommissioning	RDMC and its contractors
Air Quality	Impact 28: Increase in the concentration of PM due to mine development including the construction, mining and decommissioning activities.	• Installation of dust control measures to reduce dust emissions from the mining equipment including hoppers, conveyors and other equipment. • Progressive closure of the cleaner cells of the TSF to prevent dust generation and release of other pollutants from the impoundment. • Installation of windrows along haul and other roads, and at other traffic locations such as laydown yards to minimise wind erosion.	Implementation of PPEs and speed limits and dust monitoring at Humai and onsite accommodation facility	During construction, operations, and decommissioning	RDMC and its contractors

Aspect	Impact	Mitigation Measures	Recommended Action Plans/ Performance Indicator	Time Period for Implementation	Responsibility
		• Setting of speed limits along all site roads. • Regular maintenance of vehicles as per manufacturers specifications to ensure that the exhaust emissions do not exceed the prescribed limits. • Use of respiratory masks and other appropriate PPE – and ensure PPE is readily available. • Continual monitoring of air quality at the camp. • Install and regularly clean/maintain filtration on air-conditioning units at accommodation and other buildings. • Maintain window and door seals in accommodation rooms. • Investigate options for reduction in haulage speed to reduce haul road emissions. • Gravel the top surface of haul roads for reduction in emissions during haulage. • Consider installation of wind breaks in the northwest of TSF for further reduction in particulate emissions.			

Table 9-6: Environmental and Social Monitoring Plan

Aspect	Monitoring Element	Type of Monitoring	Monitoring Frequency
Socio-economic	Community Engagement	• Regular engagement will all stakeholders as per the Stakeholder Engagement Plan. • Periodic re-evaluation of identified stakeholders. • Periodic sentiment surveys.	• Engagement is continual. • Annual review of stakeholder list. • Quarterly sentiment surveys.
	Child and Forced Labour	• Internal and external audits of RDMC and contractors.	• Monthly contractor audits. • Bi-annual Human Rights Audits.
	Development Activities and Equitable Hiring	• Maintain employment data including proportion of local hire, proportion of female hire. • Maintain training data. • Periodic sentiment surveys.	• Ongoing data tracking. • Quarterly sentiment surveys.
	Worker Accommodation	• Audit of worker accommodation against the requirements of the IFC/EBRD Workers' Accommodation: Processes and Standards.	• Annually.
	Pressure on Local Infrastructure	• Track community development expenditure. • Monitor development of projects and usage of facilities. • Periodic sentiment surveys. • Periodic socio-economic data collection.	• Ongoing data tracking. • Quarterly sentiment surveys. • Bi-annual socio-economic data collection.
Culture and Heritage	Chance Find Procedures	• Site inspections.	• Prior to construction clearance.
		• Visual surveys and reconnaissance of known archaeological sites.	• Annually.

Aspect	Monitoring Element	Type of Monitoring	Monitoring Frequency
Biodiversity – Flora and Fauna	Wastewater	• Monitoring of wastewater quality at WWTP and inspections to ensure it is being disposed properly.	• Quality Quarterly. • Inspections Weekly.
	Terrestrial Flora and fauna	• Visual inspection of construction sites and accommodation facility to ensure that no unnecessary area is disturbed.	• As per Ground Disturbance Approval Process.
	AIS	• Inspection of the Project site for the presence of AIS and their level of spread.	• Ongoing.
	Solid Waste Disposal	• Visual inspection of waste disposal areas and channels.	• Weekly.
	Accidental Spills	• Visual inspection of chemical use storage areas and for any oil, lubricant, and chemical spills and leakages during construction activities. • Analysis of soil samples from chemical and fuel usage and storage areas.	• Weekly inspections. • Annual soil analysis.
	Terrestrial Fauna	• Inspections of excavations to ensure trapped fauna are relocated.	• Daily while excavations are open.
	Marine Ecology	• Visual inspections around port facility.	• Monthly once operations commence.
Traffic	Community Safety Issues	• Regular engagement will all stakeholders as per the Stakeholder Engagement Plan. • Tracking of grievances. • Periodic sentiment surveys.	• Engagement and tracking of grievances is continual. • Quarterly sentiment surveys.
	Vehicle Inspection	• Vehicle pre-start checks.	• Daily.

Aspect	Monitoring Element	Type of Monitoring	Monitoring Frequency
	Driver Inspections and Audits	• Ensure that that all drivers have valid driving licenses for the vehicles they are driving. •	• Ongoing.
Soils	Soil Erosion	• Visual inspections of construction sites for signs of excessive erosion or wind deposition.	• Ongoing.
	Rehabilitation	• Visual inspections to ensure that site restoration is carried out as per the requirements of designated rehabilitation plans.	• Quarterly.
Air Quality	Fugitive Dust Emissions	• PM_{10} and $PM_{2.5}$ continuous 24-hours monitoring at Humai settlement and the RDMS.	• Monthly at Humai. • Continuous at site.
	Gaseous Emissions	• Monitoring of criteria gaseous pollutants at the RDMS.	• Continuous.
	Exhaust Emissions	• Spot testing of the exhaust emissions of power generators, and vehicles.	• Quarterly.
Geochemistry	Pit Wall and Waste Rock	• Geochemical characterisation of pit wall materials for each pit (laboratory static).	• As required.
	Pit Water	• Parameters should include but not limited to pH, EC, TDS and major anions and cations and metals.	• Initially monthly monitoring once water it intersected, which could become less frequent over time depending on results.
	Runoff and seepage	• Inspection of the WRDs.	• During and following rainfall events.
	Toe Seepage from the WRD/TSF	• pH, EC, TDS and major anions and cations and metals.	• Quarterly once seepage is identified.

Aspect	Monitoring Element	Type of Monitoring	Monitoring Frequency
Noise	Noise levels during blasting	• Short-term noise monitoring to capture impulse noise during blasting.	• During blasting events.
	Elevated daytime and night-time noise levels	• Continuous 24-hours monitoring at the onsite accommodation camp and Humai settlement.	• Monthly.
	Elevated noise levels in operational areas	• Continuous 8-hour monitoring in operational areas including mineral processing plant, open-pit, and HFO power plant.	• Monthly.
	Noise levels during train pass-by	• Noise monitoring during train pass-by at 30 m distance from the centre of the railway track. This monitoring will be conducted in sections where sensitive receptors are located close to the railway track along the Rail Transport Route.	• Quarterly, at receptors situated within 100 m of the Rail Transport Route during pass-by events.
	Elevated daytime and night-time noise levels	• Continuous 24-hours monitoring at the nearest receptor from the railway track along the Rail Transport Route.	• Half yearly, can only be done on days where train pass-by occurs.
	Vehicles Noise	• Instantaneous noise monitoring of vehicles.	• Quarterly.
Groundwater	Rainfall and evaporation rates	• Site inspections, measurement through equipment and laboratory analysis of the parameters. • Water quality parameters should include but not limited to pH, EC, TDS and major anions and cations and metals.	• Ongoing daily data capture.
	Groundwater Levels		• Dependent on location. Mine and active borefield operations at least monthly. Regional quarterly to annually.
	Groundwater Quality		• Field parameters (pH, EC, temperature) at mine and active borefield operations

Aspect	Monitoring Element	Type of Monitoring	Monitoring Frequency
			at least monthly, regional quarterly to annually. • Full chemical analysis monthly to annually dependent on location and operationality.
Surface Water	Quality	• Water quality parameters should include but not limited to pH, EC, TDS and major anions and cations, metals and hydrocarbons.	• Opportunistic sampling where possible following significant rainfall events.

10. Conclusion

The Project is a Copper-Gold mining operation with an onsite processing plant to produce a high-quality copper-gold concentrate (the Concentrate) that will be exported for final processing into various products. It is located in an isolated and remote dessert environment in western Pakistan, with no doorstep communities, no land uses and limited vegetation and biodiversity. The current Life-of-Mine (LoM) is 38 years in terms of defined resources (resources that have been identified already) with significant exploration upside.

The construction phase is anticipated to take approximately 40 months, including pre-stripping. The mine will be a truck-and-shovel open pit mining operation with processing facilities that include crushing, grinding, and flotation. The final Concentrate will be railed to Port Qasim for final export by ship.

The mine will be developed in two phases, Phase 1 is expected to have a capacity of 45 Mt per annum (Mtpa) and Phase 2 is expected to have a combined processing capacity of 90 Mtpa. Phase 1 operations are anticipated to commence in 2028 and Phase 2 operations in 2030.

The Project will comprise the following:

- Two main pits, Western Porphyry and Tanjeel. The mining method of these pits will be a 24-hour open-pit shovel and truck operation;
- Two designated Waste Rock Dumps (WRD) for the waste rock from the Western Porphyries pit. The Tajeel Pit will have a separate WRD in its proximity.
- Tailings storage facility (TSF).
- A processing plant.
- Project power supply including:
  - Phase 1: Combination of HFO and solar power generation;
  - Phase 2: It is anticipated that the Project's energy requirements will be met through a grid connection from Year 15.
- Diesel, HFO and other sources of fuel will be railed to the site from Port Qasim and stored in bunded contained atmospheric tanks at the designated storage areas.
- Accommodation Facility to provide on-site accommodation for all employees and contractors;
- Security infrastructure;
- Waste management facilities.

Water for the Project will be sourced from a sedimentary and saline groundwater system located approximately 70 km to the northwest of the mining area referred to as the Northern Groundwater System. The system represents a small and isolated part of a much larger basin and there are no communities or community water sources located within the proposed borefield and its area of influence. There is no biodiversity that is reliant on this water source.

The Project will use the existing road and rail networks to transport materials during construction and operational phases and utilise the air transportation option for personnel.

The Project will make use of the existing PIBT Terminal at Port Qasim near Karachi where all facilities are owned and operated by PIBT and RDMC will sub-lease an area for the construction of a Concentrate storage shed and truck unloading facilities.

This study was completed to assess the environmental and socioeconomic impacts associated with the Reko Diq Project over the Life of Mine, with adherence to the legislative and policy framework of Pakistan and International Best Practice, including:

- Provincial level regulations set by the Balochistan and Sindh-EPAs and compliance with the Pakistan Environmental Protection Act 1997 and its regulations (applicable to the Balochistan province at the writing of the ESIA because the rules set out by Balochistan-EPA were in draft form);
- IFC Performance Standards (PSs) on Environmental and Social Management;
- World Bank Group Environmental, Health and Safety Guidelines;
- The Equator Principles;
- ADB Safeguard Policy Statement;
- The Global Industry Standard on Tailings Management (GISTM); and
- Barrick sustainability policies.

A number of specialist studies have been completed to ensure all environmental and social aspects have been addressed, including:

- Soils and Sediments;
- Noise;
- Traffic;
- Air quality;
- Ecology;
- Socio-economic;
- Stakeholder Engagement;
- Archaeology and Cultural Heritage;
- Cumulative Impact Assessment;
- Hydrogeology including predictive numerical groundwater modelling (water supply area and mine area);
- Hydrology;
- Remote Sensing;
- Geochemistry;
- Human Rights Risk Assessment; and
- Climate Change Risk Assessment.

The Study has identified a number of environmental and social impacts (negative and positive) and risks and has developed appropriate monitoring programs and mitigation actions which will be implemented, should Environmental Approval be granted, and the Project progresses as planned.

Key environmental and social aspects identified, and proposed mitigation strategies are presented in Table 10-1.

Community consultations for the ESIA were conducted in four rounds.

- **Round 1 – ESIA Preparation:** The settlements near the Reko Diq Mine Site, associated infrastructure (i.e. water supply area), and other Water No-Objection Certificate (NOCs) were consulted between 13 September and 10 October 2022. This included settlements near the RDMS and associated infrastructure and also included Nok Kundi and Dalbandin, as the important administrative centres in the region. A total of 15 communities were consulted during this round. A Background Information Document (BID) was shared with the community and institutional stakeholders. The BID included information regarding the Project, the ESIA process and how they can participate and was prepared in English and the local Balochi language.

- **Round 2 – ESIA Preparation:** The settlements near the Rail Transport Route and Port Qasim were consulted in Round 2; from 10 October -14 October 2023 as part of the consultations for the ESIA preparation and socio-economic data collection. In this round, a total of 15 communities were consulted where a Background Information Document in both English and Urdu was prepared and shared as per Round 1.

- **Round 3 – ESIA Feedback:** The settlements near the RDMS and associated infrastructure were consulted in Round 3, from 15 February - 20 February 2024, to provide information relating to the Project early works and provide opportunity for feedback. Nine communities were selected based on their proximity to the early works activities. Project information materials were prepared in English and Urdu and included information about the RDMC grievance process.

- **Round 4 – ESIA Roadshow and Feedback:** The settlements near the RDMS and associated infrastructure, along the Rail Transport Route and at Port Qasim were consulted between 21 June - 6 July 2024, as part of the ESIA Roadshow. During this round, details of the project and ESIA process together with preliminary impacts identified were provided. A total of 21 communities were engaged during this round and opportunities for feedback were provided. Engagement materials included a variety of information documents in both English and Urdu.

Groundwater abstraction for Project water supply is considered to be a key environmental and social aspect, however due to the lack of receptors it is not classified as an environmental or social impact. Regardless, a comprehensive monitoring program will be implemented including tracking of changes in water levels and quality, and periodic updates to the predictive numerical groundwater model. Additionally, alternative sources including other groundwater options or desalination of seawater will continue to be investigated.

Table 10-1: Summary of Impacts due to Project and Proposed Management Actions

Impacts Identified	Project Phase	Pre-Mitigation Significance	Management Actions (Mitigation/Enhancement Measures)	Post-Mitigation Significance
Impact 01: Direct, indirect, and induced employment at the local level for men and women resulting in increased prosperity and wellbeing (Positive Impact).	Life of Project	Moderate (positive) +60	• Ensure preferential recruitment of local candidates, with consideration of vulnerable individuals, provided they have the required skills and qualifications. • Develop and implement local employment and procurement strategies including establishing specialist HR teams and career and job guidance services in Nok Kundi and other communities. • Clearly define and publicise recruitment policies. • Include promotion of local, female and youth employment within employment policy. • Monitor subcontractors in terms of local employment numbers and include specific local employment targets in contracts where appropriate. • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training. • Implement a structured stakeholder engagement process and grievance mechanism, as well as	Moderate (positive) +65

			direct communication channels to surrounding communities. • Monitor and enforce local employment targets for contractors. • Coordinate recruitment efforts with contractors. • Determine and apply what is 'fair and transparent' in recruitment, including the distribution of jobs between different community groups, in consultation with local communities and their leaders. • Continued use and improvement of the current registry for jobseekers to document relevant qualifications/experience. • Continue to implement local training and skills development programs. • Continue to implement and expand specific training and business and employment opportunities for women in site and non-site roles. • Continue program of sharing stories of existing female employees to attract female applicants. • Continue program of site tours for local women and their families to understand site living and working arrangements.	

Impact 02: Disputes over the distribution (real and perceived) of Project employment and other benefits within and between the local community near the Project facilities.	Life of Project	Moderate (negative) -44	• Implement a Stakeholder Engagement Plan including:
			  ◦ Maintaining regular and effective communication with local communities and other stakeholders;
			  ◦ Maintaining a grievance procedure and encourage and facilitate stakeholders to use the mechanism to express concerns (with consideration of current cultural norms for women to raise concerns);
			  ◦ Providing sufficient resources to the community relations officers to enable them to monitor perceptions to ensure issues can be addressed in a timely manner; and
			  ◦ Implement comprehensive socio-economic monitoring.
			• Ensure women and vulnerable groups are engaged and that community development initiatives consider these groups.
			• Continue to implement local training and skills development programs.
			• Encourage contractors to recruit locally through the Reko Diq training centre(s).
				Negligible (negative) -18

			• Provide local employees with confirmation of employment documents for work undertaken and certificates of completion of training. • Continue to monitor community perceptions and concerns through regular engagement, feedback and other monitoring activities. • Complete a needs assessment for the surrounding communities. A two phase assessment has already commenced in partnership with Islamic Relief Pakistan (IRP). The, first phase is primarily focusing on identifying strategic-level gaps and challenges with the involvement of stakeholders. Initially, IRP will facilitate stakeholder dialogues at the district and provincial levels, engaging relevant departments and stakeholders. These discussions will revolve around identifying key strategic gaps in areas such as water supply, electricity/power supply, road and transport infrastructure, social services (including health and education), land allocation and management, town administration and management, sanitation, and disaster risk management. During the first phase key informant interviews will also be conducted with designated stakeholders. After receiving	

			departmental endorsements on the identified gaps, IRP will organize an interim review session with stakeholders and RDMC to present the findings related to strategic-level gaps and challenges. The second phase will be designed to collect the information at the community level data through Focus Group Discussions and In-depth Interviews to draw out the exact picture of the needs existing at the community level and the status of the service delivery with respect to the identified needs.
			• Continue to advance the CDC program to ensure that communities are empowered and encouraged to directly address social infrastructure and services challenges.
			• Adoption of social, economic, environmental, and cultural considerations into the community development programme.
			• Formalise the preferential hiring policy.
			• Continue to implement a Local Employment Policy including:
			  • Provisions for preferential employment for vulnerable groups and nearby communities.
			  • Guidelines for a clear, fair, and accessible recruitment process.	

			• Mechanisms for regular updates on job opportunities, application timelines, and progress to manage expectations and maintain trust.	

Impact 03: Social development projects resulting in improved infrastructure, health and education outcomes and general economic upliftment. (Positive Impact).	Life of Project	Minor
		(positive) +36
			• Formulate, implement and maintain a Community Development Programme including:
			  • Conducting a needs assessment of the local communities across Chagai area (see details in Impact 02).
			  • Provisions for continual engagement with the local community stakeholders to involve them in the planning and decision-making processes of the social development projects to ensure project outcomes are reflective of community needs.
			  • Tailoring development projects to the needs of the communities in the respective Project facilities.
			  • A system to monitor and evaluate the progress and effectiveness of social development projects.
			• Prioritise sustainable infrastructure development that aligns with the long-term needs of the community.
				Major
				(positive) +60

			• Ensure consideration of women and vulnerable groups for planned social development projects. • Establish partnerships with educational institutions and local NGOs to enhance the quality of education and promote skills development. • Involve local community members in the planning and decision-making processes of social development projects to ensure project outcomes are reflective of community needs. • Implement a monitoring and evaluation system to track the progress and effectiveness of social development projects. • The Project will ensure that the upgraded or newly constructed healthcare and educational infrastructure account for the increased flood-related risks. • The Project will consider CSR-related funding toward the drainage and flood management infrastructure of local communities. • The Project will commit 1% of CAPEX into community development and initiatives, as per the Mineral Agreement.	
Impact 04: Increase in the stock of skilled human	Life of Project	Major	• The Project will:	Major

capital due to the transfer of knowledge and skills from the Project resulting in enhanced productivity of local labour (positive impact).		(positive) +60	• Assist local communities, especially vulnerable groups having practical skills but lacking qualifications to further increase training and employment opportunities. • Support initiatives promoting a culture of learning in local communities. • Continue to implement local training and skills development programs. Encourage contractors to recruit locally through the Reko Diq training centre(s). • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion of training. • Continue to implement and expand specific training and business and employment opportunities for women in site and non-site roles..	(positive) +70

Impact 05: Increase in population due to the in-migration of people seeking employment and other economic opportunities leading to	Life of Project	Minor
		(negative) -36
			• Develop an in-migration management plan:
			  • Complete needs assessment as detailed in Impact 02 to understand current deficiencies in infrastructure and Government services.
			  • Engage Government planners and services managers at local, district and provincial level
				Negligible
				(negative) -16

pressure on social infrastructure and services in communities.			to understand current plans and ensure consideration of population growth risks. • Provide support Government at local, district and provincial level as appropriate in their development and implementation of Infrastructure Development Plans. • Continue to implement point of hire policies (i.e. transport to site is currently provided from point of hire only). • Ensure ID checks are completed for prospective employees to ensure they are designated as local (the Mineral Agreement defines local as a native or resident of Balochistan). • Maintain policy of staff residing on site rather than in local communities. • • Continue to implement the GRM with consideration of existing cultural norms for women raising concerns. • Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand the extent of population growth and any problems that it may cause.	

			• Ensure the community development programmes consider the monitored changes in the social landscape. • Carry out awareness campaigns in the surrounding communities in relation to in-migration related risks and impacts. • Continue to implement a Local Employment Policy. • Include provisions for Cultural Sensitivity training and training related to community health and safety in training plans.	

Impact 06: Increase in social ills such as crime, illicit substance distribution and use etc. due to population influx and increased Project induced traffic through communities.	Life of Project	Minor
		(negative) - 30
			• Develop an in-migration management plan:
			  • Complete needs assessment as detailed in Impact 02 to understand current deficiencies in infrastructure and Government services.
			  • Engage Government planners and services managers at local, district and provincial level to understand current plans and ensure consideration of population growth risks.
			  • Provide support Government at local, district and provincial level as appropriate in their development and implementation of Infrastructure Development Plans.
				Negligible
				(negative) -18

			- Continue to implement point of hire policies (i.e. transport to site is currently provided from point of hire only). - Ensure ID checks are completed for prospective employees to ensure they are designated as local (the Mineral Agreement defines local as a native or resident of Balochistan). - Maintain policy of staff residing on site rather than in local communities. - The Project will provide recreational facilities, fitness programmes, and mental health resources to support the physical and emotional health of Project personnel, including sub-contractors. - Conduct community awareness sessions as part of the SEP to educate community members about the dangers of drugs and other harmful substances, encouraging them to refrain from their use. - Continue to advance the RDMC community development program and ensure that influx management is given due consideration during the CDC decision making process. - Conduct regular socio-economic surveys and review census data for communities in the vicinity	

			of the Project throughout the life of the Project to understand the extent of population growth and any problems that it may cause.	
Impact 07: Real or perceived increase in prices of basic commodities and the cost of living due to the economic activities generated by the Project.	Life of Project	Minor (negative) - 30	• Engage with business owners and local government groups with respect to cost-of-living concerns. • Conduct regular community consultations to inform the local community about the factors contributing to inflation, to clarify the Project's role in the local economy, and to address any misconceptions or attributions of price increases to the Project. • Conduct regular socio-economic surveys and review census data for communities in the vicinity of the Project throughout the life of the Project to understand changes in conditions.	Minor (negative) -20
Impact 08: Disturbance of soil due to construction and operation of the mine.	Life of Project	Moderate (negative) - 40	• Limit the movement of heavy machinery to designated pathways to prevent widespread soil compaction. • Use diversion channels or berms to redirect clean water away from disturbed soils and reduce erosion risk. • Plan construction activities to minimise the area of soil disturbance.	Minor (negative) -35

			• The Project has implemented a Ground Disturbance Procedure which includes:
			  • A ground disturbance approval process to ensure environmental or social aspects are identified and addressed before the disturbance occurs (i.e. community engagement, pre-disturbance surveys for flora, fauna or heritage sites, runoff management etc.).
			  • Identification of post disturbance actions such as rehabilitation measures if necessary.
			  • Pre and post disturbance registration of the disturbance type and area.
			  • Closeout inspections and signoff.
			  •	

Impact 09: Improper Management of Chance Finds.	Life of Project	Negligible (negative) - 16	• The Project will maintain a Chance Find Procedure.	Negligible (negative) -7
Impact 10: Impacts on Archaeological Sites.	Life of Project	Negligible (negative) - 14	• The Project will ensure proper clearance of archaeological sites in consultation with the Balochistan Directorate of Archaeology & Museums.	Negligible (negative) -7

Impact 11: Impacts on Intangible Cultural Heritage (Adverse effects (loss of oral traditions and languages etc and disruption of traditional practices) on practices lined to intangible cultural heritage).	Life of Project	Minor (negative) - 30	• The Project will ensure that there are no restrictions on religious expression and observance. • The site will remain dry, and inspections on entry will be completed to ensure people are not bringing alcohol to site. • Develop influx management plan.	Negligible (negative) -9
Impact 12: Terrestrial habitat loss due to land clearing and disturbance and resultant impacts on abundance and diversity of terrestrial flora and fauna.	Construction Phase	Major (negative) -60	<u>Construction:</u> • A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. • Disturbance to, or movement of, soil and vegetation will be minimised. • Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible.	Moderate (negative) -55

			• Implement measures such as fencing and signage to prevent unauthorised access and disturbance to wildlife. • Implement a 'find and relocate' procedure prior to clearing areas. Operation: • Utilise designated routes for the movement of vehicles and machinery. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading. • Solid and liquid wastes will only be disposed of at designated sites, and a WMP will be developed and implemented. • Implement adaptive management strategies based on findings from the management programs. • Education and awareness of staff, contractors and communities. Closure and Rehabilitation • Rehabilitation of disturbed areas, where relevant and possible, with native species.	
Impact 13: Fragmentation and loss of movement corridors at RDMS.	Life of Project	Moderate (negative) -40	Construction: • Reduce fencing where possible to allow movement of species.	Minor (negative) -27

			• Ensure fencing that is required for restricting human access only, has large enough wire openings to allow movement of small animals. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. Operation: • Develop protocols for the removal of animals trapped in fencing. • Implement 'wildlife-friendly fencing' where possible which includes sections with adjustable heights or openings, allowing movement of smaller fauna such as herpetofauna and small mammals while restricting human access. • Use camera traps and remote sensors to monitor wildlife movement near infrastructure. Analyse this data to identify critical hotspots and adaptively manage operations. • Use directional and shielded lighting to minimise light spill into surrounding areas, particularly nocturnal habitats. Implement motion-activated lighting to reduce unnecessary illumination.	

			Closure and Rehabilitation • Develop protocols for the removal of animals trapped in fencing. • Ensure rehabilitation is undertaken in such a way to reduce fragmentations • Rehabilitation of disturbed areas, where relevant and possible, with native species.	
Impact 14: Impacts to Critical Habitat of the Sand Cat.	Life of Project	Moderate (negative) -55	<u>Construction:</u> • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Implement genetic sampling to confirm the presence of this species within the AoI and the surrounding EAAA, • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Develop a monitoring Plan and incorporate into the BAP/BMP. <u>Operation:</u> • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. • Develop and implement an Education and Awareness Programme for staff, contractors and	Minor (negative) -30

			communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. Closure and Rehabilitation: • Remove fencing as soon as it becomes unnecessary, and the area is deemed safe. • Rehabilitation of disturbed areas, where relevant and possible, with native species.	
Impact 15: Impacts to Critical Habitat of the Goitered Gazelle.	Life of Project	Major (negative) -65	Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Develop a monitoring Plan and incorporate into the BAP/BMP. • Avoid unnecessary fencing. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Operation: • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team.	Minor (negative) -36

			• Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Closure and Rehabilitation: • Remove fencing as soon as it becomes unnecessary, and the area is deemed safe. • Rehabilitation of disturbed areas, where relevant and possible, with native species.	
Impact 16: Impacts to Critical Habitat of the Dead Sea Sparrow.	Life of Project	Minor (negative) -22	Construction: • Install avian deterrents such as bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks. Operation: • Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. Closure and Rehabilitation: Remove Powerlines as soon as they become redundant.	Negligible (negative) -10
Impact 17: Impacts to habitat critical to the Alcocks Toad Headed Agama.	Life of Project	Minor (negative) -30	Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Develop a Monitoring Plan and incorporate into the BAP/BMP.	Negligible (negative) -18

			- Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. - Implement a 'find and relocate' procedure prior to clearing areas. <u>Operation:</u> - Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. - Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. - Consider reptile-friendly culverts under roads or other barriers. These should be wide enough to allow light and airflow, encouraging their use. - Control invasive or unnatural predator species (e.g., stray dogs or feral cats) that may exploit Agama populations near operational areas. - Restrict vehicle movement to pre-designated pathways to avoid disturbing or fragmenting Agama habitats. - Implement speed limits. <u>Closure and Rehabilitation:</u> Rehabilitation of disturbed areas, where relevant and possible.	

Impact 18: Impacts to habitat of the undescribed reptilian species, *Eremias sp., Eremias cf scripta* and *Cyrtopodion sp.*	Life of Project	Moderate (negative) -56	Construction: • Given the uncertainty around the target species, likely first steps will be to commit to further research and surveys to improve the level of understanding and develop long term management actions. • Implement a 'find and relocate' procedure prior to clearing areas. • Develop a Monitoring Plan and incorporate into the BAP/BMP. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat. Operation: • Develop an Education and Awareness Programme for staff, contractors and communities on the species and the importance of it for conservation. Sightings should be reported to the Environmental Team. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading to minimise disruption to habitat and potential for collisions. Closure and Rehabilitation: • Restore soil quality and loosen compacted areas to facilitate burrowing and natural behaviours of the reptiles.	Minor (negative) -27

			• Place carefully arranged rock piles or artificial crevices to mimic natural shelters for *Cyrtopodion sp.*, which are known to utilise rocky habitats. • Spread fine, loose sand across rehabilitated areas for *Eremias sp.* and *Eremias cf scripta*, as the genus depends on sandy substrates for movement and burrowing. • If feasible, reintroduce individuals from these species into restored habitats. Conduct this gradually and in synchrony with the rehabilitation timeline. Establish soft release areas with adequate cover and food sources to support the survival of reintroduced individuals. • Control populations of invasive or unnatural predators (e.g., feral cats, rats) that may exploit reptile populations in the rehabilitated area.	
Impact 19: Introduction and spread of AIPs to the RDMS and Port Qasim due to Project-related transportation and vehicular movement.	Life of Project	Moderate (negative) -52	Construction: • Develop and implement AIP management. • Develop and maintain robust early detection and monitoring programs to promptly identify signs of AIPs within or near the mining Project area. Operation: • Establish strict guidelines for the disposal of waste materials and wastewater, ensuring they are managed in a manner that prevents the introduction and spread of AIPs.	Negligible (negative) -16

			• Provide comprehensive education and training to Project personnel, emphasising the risks associated with AIPs introduction and instructing them on how to recognise and report potential invasive species. Closure and Rehabilitation: • Use native species for landscaping, reclamation, and restoration efforts to reduce the likelihood of introducing non-native species that could outcompete native flora and fauna.	
Impact 20: Increased noise, dust and light pollution generated from construction, operation and decommissioning of RDMS.	Life of Project	Moderate (negative) -40	Construction: • Use vibration reduction technologies and regularly monitor vibration levels to ensure they are kept within thresholds that minimize disturbance to wildlife. • Install shielded lighting to minimize light spills and disruption to nocturnal wildlife. Operation: • Regularly monitor vibration levels.	Minor (negative) -27
Impact 21: Increased wildlife mortality from vehicle and train collisions along the Transport Route.	Life of Project	Minor (negative) -22	• All vehicles must adhere to a speed limit to avoid unnecessary collisions with susceptible species.	Negligible (negative) -10
Impact 22: Wildlife mortality/injuries from vehicle collisions and	Life of Project	Minor (negative) -24	Construction:	Negligible (negative) -14

other infrastructure at the RDMS.			• Install physical barriers such as fencing around open excavations and hazardous areas to prevent wildlife entry. • All vehicles must adhere to a speed limits to avoid unnecessary collisions with susceptible species. • Incorporate wildlife-friendly design features, such as escape ramps in excavations, to facilitate the safe exit of trapped animals. • Train staff to recognise and address wildlife entrapment issues, and raise awareness about the importance of wildlife protection. <u>Operation:</u> • Conduct regular monitoring of open excavations and infrastructure to identify and rescue trapped wildlife. • Monitor the established wildlife crossings or corridors to allow safe passage for animals and reduce the risk of collisions. • All vehicles must adhere to a speed limits to avoid unnecessary collisions with susceptible species. • Work with local wildlife conservation organizations to develop and implement measures to protect wildlife and reduce entrapment risks. • Develop protocols for the removal of animals trapped in fencing/excavations.	
Impact 23: Direct mortality/injuries from	Life of Project	Moderate (negative) -48	<u>Construction:</u>	Negligible (negative) -11

powerline collisions or electrocutions.			• Install avian deterrents such as bird flight diverters or markers on power lines and similar structures to make them more visible to birds. • Incorporate bird-friendly design modifications, such as using wider spacing or grounding structures, to reduce collision risks. Operation: • Regularly inspect and maintain powerlines to ensure deterrent measures are effective and adjust as necessary based on monitoring results. Closure and Rehabilitation: • Remove Powerlines as soon as they become redundant.	
Impact 24: Nuisance at receptors due to noise generated from construction, operations and decommissioning of mine.	Life of Project	Minor (negative) -36	• The Project will develop and implement a Noise Management Plan. • Monitor and maintain noise producing units to manufacturing specifications, to reduce noise levels to the lowest possible extent. • Consider installing visual alarms instead of or in addition to audible alarms to the extent possible. • Installation of noise abatement devices around noise producing equipment such as mufflers and silencers will reduce noise at the source wherever feasible.	Minor (negative) -27

			• Prioritise use of new equipment and vehicles over older equipment to ensure that the noise levels do not exceed the prescribed limits at reference distances. • Periodically monitor instantaneous and 24-hours continuous noise levels at the Mine Site boundary and at receptors to ensure compliance with applicable standards. • Worker accommodation rooms are to be constructed using insulated wall panels to reduce noise.	
Impact 25: Increase in vehicular movement on local roads can cause elevated noise levels.	Life of Project	Negligible (negative) - 24	• Regularly maintenance of vehicles according to the manufacturer specifications. • Implement policies to prohibit use of horn (except in emergency situations) in areas where human dwellings or receptors are close to the Road Transport Route. • Minimise vehicular movement during peak congestion hours where possible to reduce contribution in elevated noise levels. • Comply with speed limits at all times.	Negligible (negative) -21

Impact 26: Increase in traffic volumes due to Project-related transportation resulting in increased congestion, road wear and increased community safety risks.	Life of Project	Moderate (negative) - 45	• The Project will implement a Traffic Management Plan which will include provisions for the following:
			  ◦ Provisions for the use of alternative routes.
			  ◦ Timing for HTV movement accounting for rush hour timings (where practicable).
			  ◦ Speed limits.
			  ◦ Training programmes for safe driving practices including vehicle maintenance, drug and alcohol use and managing security risks.
			  ◦ Checklists for vehicle inspection.
			  ◦ Traffic management at the intersection of the N40 intersection (i.e. stop signs, ensuring adequate visibility).
			• The Project has and will continue to implement the following:
			  ◦ Verification and competency and licence checks for all RDMC and contractor drivers.
			  ◦ Regular vehicle maintenance and third-party inspections.
				Moderate (negative) -40

			• Verification of licences of truck drivers who deliver to site.	
Impact 27: Increased movement of sediment to drainage lines resulting from erosion of disturbed soils during construction and operation of mine.	Life of Project	Moderate (negative) - 40	• Minimise the disturbance of soils to the footprint when construction and demolition of infrastructure will be taking place; • Movement of machinery and vehicles should be restricted to designated access roads to minimise the extent of soil disturbance and subsequent erosion; • Maintain sediment and erosion control measures to minimise entry of sediment into nearby drainage lines; and • Landscape re-profiling to be undertaken to rehabilitate disturbed sites and to allow free drainage that promotes the desired post mining land use after decommissioning. • Detailed site drainage plans to be developed during detailed design phases.	Minor (negative) -21
Impact 28: Increase in the concentration of PM at the accommodation facility due to mine development including the	Life of Project	Major (negative) - 60	• Installation of dust control measures to reduce dust emissions from mining equipment including hoppers, conveyors etc.,	Moderate (negative) -40

construction, mining and decommissioning activities.			• Progressive closure of the cleaner cells of the TSF to prevent dust generation and release of other pollutants from the impoundment.
			• Installation of windrows along haul and other roads, and at other traffic locations such as laydown yards to minimise wind erosion..
			• Regular maintenance of vehicles as per manufacturers specifications to ensure that the exhaust emissions do not exceed the prescribed limits.
			• Use of respiratory masks and appropriate PPE and ensure PPE is readily available.
			• Continual monitoring of air quality at the camp.
			  ◦ Install and regularly clean/maintain filtration on air-conditioning units at accommodation and other buildings.
			  ◦ Maintain window and door seals in accommodation rooms.
			  ◦ Investigate options for reduction in haulage speed to reduce haul road emissions.
			  ◦ Gravel the top surface of haul roads for reduction in emissions during haulage.	

			• Consider installation of wind breaks in the northwest of TSF for further reduction in particulate emissions.	
Impact 29: Impact on visual amenity due to mining activities and Project facilities.	Life of Project	Moderate (negative) - 40	• The Project will investigate options for rehabilitation of the landscape to the extent possible. • The Project will investigate any perceptual concerns as part of its ongoing stakeholder consultation process. • The Project will investigate options for limiting lighting impacts to within the mine site that conform to operational illumination requirements.	Minor (negative) -35
Impact 30: Loss of livelihood due to retrenchment upon the conclusion of the construction phase.	Construction Phase	Minor (negative) - 28	• Develop a training plan to assist in the transitioning of employees from construction to operations phases of the Project. • Develop and implement a retrenchment plan well in advance of the completion of construction and ensure employees are kept informed. • Develop and implement local employment and procurement strategies. • Develop local employment and retention targets for Contractors. • Clearly define and publicise recruitment policies.	Negligible (negative) -14

			• Include promotion of local, female and youth employment within employment policy • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training to assist in seeking alternative employment once construction is complete. • Implement a structured stakeholder engagement process and grievance mechanism, as well as direct communication channels to surrounding communities.	

Impact 31: Disturbance of soil due to construction and excavation of the water supply pipeline from Northern Groundwater System Area to Mine Site.	Construction Phase	Negligible (negative) - 15	• Plan construction activities to minimise the area of soil disturbance.
			• The Project has implemented a Ground Disturbance Procedure which includes:
			  • A ground disturbance approval process to ensure environmental or social aspects are identified and addressed before the disturbance occurs (i.e. community engagement, pre-disturbance surveys for flora, fauna or heritage sites, runoff management etc.);
			  • Identification of post disturbance actions such as rehabilitation measures if necessary.
				Negligible (negative) -5

			• Pre and post disturbance registration of the disturbance type and area. • Closeout inspections and signoff. •	
Impact 32: Alteration of flow path patterns and channel geometry leading to increased erosion.	Construction Phase	Minor (negative) - 21	• Minimise the footprint of disturbance, as far as practicable. Demarcate the proposed areas for land clearance and earthworks to minimise the unnecessary expansion of the footprint of disturbance. • Provide suitable sanitary facilities and remove waste to an appropriate waste facility. • Clearing of vegetation and excavations must be limited to the development footprint, and the use of any existing access roads must be prioritised to minimise creation of new ones. • Disturbed areas remaining after construction activities should be rehabilitated in a timely manner as much as practically possible. • Due to the dry nature of the Project area monitoring of total suspended solids (TSS), TDS and turbidity in surface water resources in close proximity to the project site may not be practically possible. However, when conditions permit such monitoring is recommended upstream and downstream of construction areas to facilitate the	Negligible (negative) -8

			prompt implementation of remedial actions, if necessary. • Detailed site drainage plans will be developed during the detailed design phase.	
Impact 33: Terrestrial habitat loss due to temporary infrastructure.	Construction Phase	Moderate (negative) -45	Construction: • A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. • Disturbance to, or movement of, soil and vegetation will be minimised. • Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible. • Implement measures such as fencing and signage to prevent unauthorised access and disturbance to wildlife. • Implement a 'find and relocate' procedure prior to clearing areas. • Use directional and shielded lighting if works are implemented at night to minimise light spill into	Moderate (negative) -40

			surrounding areas. Implement motion-activated lighting to reduce unnecessary illumination. • Encourage drivers and local communities to report wildlife sightings or collisions, enabling timely management responses. Operation: • Utilise designated routes for the movement of vehicles and machinery. • Impose designated speed limits and restrict vehicle movement to designated routes to avoid off-roading. • Solid and liquid wastes will only be disposed of at designated sites, and a WMP will be developed and implemented. • Implement adaptive management strategies based on findings from the management programs. • Education and awareness of staff, contractors and communities. Closure and Rehabilitation • Rehabilitation of disturbed areas as soon as possible, with native species.	
Impact 34: Impacts to flora and fauna during the upgrade of the Transport Route.	Construction Phase	Negligible (negative) -18	Construction: • A Biodiversity Management/Action Plan (BMP) is to be prepared and implemented in accordance with the Barrick Biodiversity Standard which will	Negligible (negative) -10

			support the conservation of biodiversity in the area. The ESMMP prepared for the Project will also support the conservation of the biodiversity in the area. • Project footprint will be minimised, and work sites and other areas will be delineated and restricted. • Disturbance to, or movement of, soil and vegetation will be minimised. • Soil damage and erosion will be minimised, and natural vegetation will be retained as far as possible. • Implement measures such as fencing and/or signage to prevent unauthorised access and disturbance to wildlife. • Implement a ‘find and relocate’ procedure prior to clearing areas. • Use directional and shielded lighting if works are implemented at night to minimise light spill into surrounding areas. Implement motion-activated lighting to reduce unnecessary illumination. • Incorporate speed bumps and signage to enforce speed limits in high-wildlife areas. Install wildlife crossing alerts to prevent roadkill incidents. • Encourage drivers and local communities to report wildlife sightings or collisions, enabling timely management responses. Closure and Rehabilitation	

			• Rehabilitation of disturbed areas, where relevant and possible, with native species.	
Impact 35: Nuisance to local communities due to impulse noise generated from blasting activities.	Operation Phase	Minor (negative) -21	• The Project will develop and implement a Noise Management Plan. • Blasting times will be posted in advance. • Blasting will not be carried out during night-time hours (10:00 PM to 06:00 AM).	Negligible (negative) -7
Impact 36: Nuisance to local communities due to elevated noise levels from railway movement.	Operation Phase	Minor (negative) -36	• Conduct continuous 24-hours noise monitoring for over a weekday and weekend at nearest receptors where the Predicted Ambient Noise levels with Project railway shows an increase of more than 3 dBA over the baselines. This will assist the Project to assess incremental noise levels as well as their perception by the receptors. • In case of any impacts due to increase in noise levels from Project's railway traffic collaborate with Pakistan Railway for implementation of mitigation and control measures. • Periodic engagement with communities along the rail route to monitor cumulative impacts.	Minor (negative) -36
Impact 37: Discontent over the absence of passenger trains available	Operation Phase	Negligible	• Engage with local communities to understand their transportation needs, concerns, and priorities.	Negligible (negative) -9

to communities while the Project's transportation trains operate.		(negative) - 18	• Engage with relevant government institutions such as the Ministry of Railways to share potential concerns of the communities.	
Impact 39: Loss of income upon conclusion of the operations phase of the Project.	Decommissioning Phase	Minor (negative) - 30	• Implement comprehensive training initiatives aimed at equipping the local community with the skills needed for transitioning from the operations phase. • Develop a retrenchment plan well in advance of mine closure. • Conduct regular stakeholder consultations between Project stakeholders, including local communities and businesses to identify potential challenges and develop solutions. • Invest in infrastructure Projects that enhance the area's connectivity, such as road improvements or access to utilities, to facilitate economic development independently of the Project's activities. • Provide local employees with confirmation of employment documents for work undertaken and certificates of completion for in-house training, in order to seek alternative employment. • Offer continued employment opportunities during decommissioning to members of the local communities.	Negligible (negative) -7

			• Implement a structured stakeholder engagement process and grievance mechanism, as well as direct communication channels to surrounding communities.	

11. References

Al-Dousari, A.M., Alsaleh, A., Ahmed, M. *et al.* (2019). *Off-Road Vehicle Tracks and Grazing Points in Relation to Soil Compaction and Land Degradation*. *Earth Systems and Environment* Vol. 3, pp 471–482.

Ali, Hamid, Gul Hasan, and Abdul Razzak Sabir (2023). *Language Contact and its Impact on the Phonological Evolution of Balochi*. Balochistan Journal of Linguistics 11 (2023): 22-22.

Anees, M. S. (2020). *How Balochistan Is Failing Its Girls*. Accessed at: https://thediplomat.com/2020/10/how-balochistan-is-failing-its-girls/ (Accessed on 26 June 2024)

Berry, K., Lyren, L., Yee, J. and Bailey, Y. (2014). *Protection Benefits Desert Tortoise (Gopherus agassizii) Abundance: The Influence of Three Management Strategies on a Threatened Species*. Herpetological Monographs, Vol. 28(1), pp 66-92.

Bhutta, B. (2015). *Balochistan protests against extension in mining lease*. Accessed at: https://tribune.com.pk/story/979563/sui-gas-field-balochistan-protests-against-extension-in-mining-lease (accessed on 26 July 2024).

Bosworth, C. E., & Stronach, D. (1988). *Baluchistan*. Encyclopædia Iranica. Accessed at: https://www.iranicaonline.org/articles/baluchistan-iii (accessed on 27 July 2024)

Britannica (2024). *The Balochistan plateau*. Accessed at: https://www.britannica.com/place/Pakistan/The-Balochistan-plateau (Accessed on 12 December 2024).

Brooks, M. (1999). *Effects of Protective Fencing on Birds, Lizards, and Black-Tailed Hares in the Western Mojave Desert*. Environmental Management Vol. 23, pp 387-400.

Browne, D. (2023). *Geothermal Resource Evaluation, Koh-I-Sultan Prospect*, *Balochistan, Pakistan for Barrick Gold (Report no. 106777-ER-00000-18170*). Geothermal Consulting Services, Australia.

Burke, F., Huda, S., Hamza, S., Azam, M. (2005). *Disparities in agricultural productivity in Balochistan - A GIS perspective*. Pakistan Geographical Review

Chrysochoou, M., Theologou, E., Bompoti, N., Dermatas, D., & Panagiotakis, I. (2016). *Occurrence, Origin and Transformation Processes of Geogenic Chromium in Soils and Sediments.* Current Pollution Reports, 2(4), 224-235. doi:10.1007/s40726-016-0044-2

Construction Civil Engineering (2024). *Comparing Open-Cut Mining and Underground Mining: Exploring the Differences*. Accessed at: https://www.constructioncivilengineering.com/open-cut-mining-and-underground-mining.html (Accessed on 27 June 2024).

Davaasuren, D. (2019). *Vehicle Off-Road Erosion Assessment in Southern Mongolia*. Accessed at: https://www.grocentre.is/static/gro/publication/456/document/davaasuren2017.pdf (Accessed on 25 February 2025).

Ernst & Young. (2024). *South Africa announces sustainability and energy tax measures as part of 2024 Budget Review*. Retrieved from https://taxnews.ey.com/news/2024-0496-south-africa-announces-sustainability-and-energy-tax-measures-as-part-of-2024-budget-review.

ExchangeRates.org. (2024). *South African Rand (ZAR) To US Dollar (USD) Exchange Rate History for 2024*. Retrieved from ExchangeRates.org: https://www.exchange-rates.org/exchange-rate-history/zar-usd-2024.

EMC (2011). *ESIA: Proposed Coal Clinker and Cement Import/Export Terminal at Port Qasim, Karachi*, Environmental management Consultants, Pakistan.

Environment Canada (2013). *Guidelines for the Assessment of Alternatives for Mine Waste Disposal.* Environment Canada, Gatineau, Quebec.

Erik Eberhardt (2024). *The Copper Supply Gap: Mining Bigger*. Heavy Metal, pp. 171-180. doi 10.11647/obp.0373.24

Finance Department (2017). *White Paper on Budget 2018-19*. Accessed at: https://www.finance.gob.pk/wp-content/uploads/2021/01/White-Paper-on-Budget-2018-19.pdf (accessed on 29 July 2029).

Global Tailings Review (2020). *Global Industry Standard on Tailings Management*. global-industry-standard_EN.pdf (globaltailingsreview.org).

Government of Balochistan (2018). *PAK: Balochistan Water Resources Development Sector Project - Project No. 48098-002*. Accessed at: https://www.adb.org/sites/default/files/linked-documents/48098-002-eiaab.pdf (Accessed on 12 December 2023).

Government of Balochistan (GOB) and ICUN Pakistan (2000). *Balochistan Conservation Strategy*. IUCN Pakistan and GoB, Karachi, Pakistan. pp 354.

Hagler Bailly Pakistan (HBP) (2020). *Environmental and Social Impact Assessment for the Tanjeel Copper Project*, National Resources Limited Pakistan, Unpublished Report.

Havlin, J. L., Beaton, J. D., Tisdale, S. L., & Nelson, W. L. (2013). *Soil Fertility and Fertilizers: An Introduction to Nutrient Management*. Pearson.

Havrilla, C and Barger, N. (2018). *Biocrusts and their disturbance mediate the recruitment of native and exotic grasses from a hot desert ecosystem*, Ecosphere, Vol. 9, Issue 7.

International Union for Conservation of Nature and Natural Resources (IUCN) (2024). *Red List of Mangrove Ecosystem*, https://iucn.org/resources/conservation-tool/iucn-red-list-ecosystems/red-list-mangrove-ecosystems, Accessed on December 18, 2024.

Khan, U. M., Ijaz, R. H., & Saadat, S. (2021). *Extending Constitutional Rights to Pakistan's Tribal Areas*. United States Institute of Peace.

Knight Piésold (2024a). *Reko Diq – TSF Concept Closure Plan*. Knight Piésold Consulting Pty Limited, Australia.

Kanwal, G. (2018). *Pakistan's Gwadar Port: A New Naval Base in China's String of Pearls in the Indo-Pacific*. Accessed at: https://www.csis.org/analysis/pakistans-gwadar-port-new-naval-base-chinas-string-pearls-indo-pacific (Accessed on 07 May 2024)

Knight Piésold (2024b). Tailings Management Multiple Account Analysis for the Reko Diq Mining Project, Reko Diq Mining Company, Pakistan. Knight Piésold Consulting Pty Limited, Kuo, C.S. (2011). *The Mineral Industry of Pakistan*: United States Geological Survey (USGS), U.S.A.

LibreTexts (2023). *Hydrometallurgy*. Accessed at: https://chem.libretexts.org/Courses/University_of_Missouri/MU%3A__1330H_%28Keller%29/23%3A_Metals_and_Metallurgy/23.3%3A_Hydrometallurgy (Accessed on 25 July 2024).

LNC Lavalin (2010). *Feasibility Study for Tenthyan Copper Company and the Reko Diq Project*. Report No. TCCA033189. LNC Lavalin, Canada.

Massachusetts Institute of Technology (2024). *The Future of Strategic Natural Resources*. Accessed at: https://web.mit.edu/12.000/www/m2016/finalwebsite/problems/mining.html (Accessed 27 June 2024).

Micromine (2017). The *Mining Life: Open Pit vs. Underground.* Available at: https://www.micromine.com/mining-life-open-pit-vs-underground/ (Accessed on 27 June 2024).

National Research Council (2002). *Evolutionary and Revolutionary Technologies for Mining*. Washington, DC: The National Academies Press. https://doi.org/10.17226/10318.

UNEP-WCMC (2020). *Registan-North Pakistan Sandy Desert*. Available from https://www.oneearth.org/ecoregions/registan-north-pakistan-sandy-desert/ (accessed December 8, 2024)

UNEP-WCMC (2020). *Registan-North Pakistan Sandy Desert*. Available from https://www.oneearth.org/ecoregions/registan-north-pakistan-sandy-desert/ (accessed December 8, 2024)

Ostby, K. (2023). Gender Equality in Pakistan: Climatic & Politico-Economic Stressors. United Nations Development Programme (UNDP).

PorterGeo (2024). *Reko Diq, Baluchistan, Pakistan*. Accessed at: https://portergeo.com.au/database/mineinfo.asp?mineid=mn1333#:~:text=The%20Humai%20Formation%2C%20which%20is,(Maastrichtian)%20biohermal%20Humai%20Limestone. (Accessed on 7 May 2024).

Pócs, T (2009). *Cyanobacterial crust types, as strategies for survival in extreme habitats*, Acta Botanica Hungaria Vol. 51, Issue 1-2, pp 147-178.

PRDW (2024). *Port Feasibility Study for the Reko Diq Mining Project*, *Reko Diq Mining Company, Pakistan*. PRDW Consulting Port and Coastal Engineers, Australia.

Qadir, J. (2023). *Concerns over unemployment in Balochistan*. Accessed at: https://www.nation.com.pk/18-Jul-2023/concerns-over-unemployment-in-balochistan (accessed on 28 July 2024)

Razique, A and Tosdal, R. (2010). *Reko Diq Porphyry Cu-Au Deposits, Balochistan-Pakistan*. Society of Economic Geologists Annual Conference held in Keystone, USA, 26-29 August 2010.

SRK Consulting (SRK) and Hagler Bailly Pakistan (HBP), (2010). *Environmental and Social Impact Assessment for the Reko Diq Project*, Tethyan Copper Company Pakistan (Private) Ltd., Islamabad, Pakistan.

SMEC International Pty Ltd (2010). *Water Resource Assessment, Reko Diq Project, Pakistan*. SMEC International Pty Ltd, Australia.

Szmigiel, Alicja, Derek B. Apel, Krzysztof Skrzypkowski, Lukasz Wojtecki, and Yuanyuan Pu. (2024). *Advancements in Machine Learning for Optimal Performance in Flotation Processes: A Review.* Minerals 14, no. 4: 331. https://doi.org/10.3390/min14040331.

Trading Economics (2024). Pakistan. Accessed at: https://tradingeconomics.com/search.aspx?q=pakistan (accessed on 18 July 2024)

USGS (2024). *Earthquake Hazards Program: 11km NNE of Harnai, Pakistan*. Accessed at: https://earthquake.usgs.gov/earthquakes/eventpage/us6000fsg9/executive (Accessed on 12 December 2023.

Usman, A. (2017). *A comparison of Hindu and Muslim Caste system in sub-continent*. South Asian studies, 32(01), 91-98.

Veriforce (2024). *The Mining Safety: 7 Hazards to Identify and How to Avoid Them*. Available at: https://veriforce.com/blog/mining-safety-7-hazards-to-identify-and-how-to-avoid-them (Accessed on 27 June 2024).

Zaid, A., & Arias, E. J. (2002). *Date Palm Cultivation.* FAO Plant Production and Protection Paper 156.

This ESIA has been undertaken by a team of independent specialists, that are experts in their respective fields and have been peer reviewed for each deliverable. This ESIA is submitted to the BEPA and SEPA for consideration of approval and will be made publicly available on the RDMC website.

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Appendix A: Applicable Standards and Guidelines

Appendix B: Socio-economic Assessment

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Appendix C: Indigenous Peoples Assessment

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Appendix D: Noise Assessment

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Appendix E: Traffic Study

Hagler Bailly Pakistan

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Appendix F: Cultural Heritage Assessment

Hagler Bailly Pakistan

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Appendix G: Chance Find Procedure

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Appendix H: Biodiversity – Flora Study

Appendix I: Biodiversity - Fauna Assessment

Hagler Bailly Pakistan

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Appendix J: Critical Habitat Assessment

Hagler Bailly Pakistan

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Appendix K: Surface Water Assessment

Hagler Bailly Pakistan

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Appendix L: Hydrocensus Report

Hagler Bailly Pakistan

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Appendix M: Hydrogeology Factual & Interpretive Report (Water Supply)

Hagler Bailly Pakistan

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Appendix N: Groundwater Conceptualisation and Modelling Reports (Water Supply)

Hagler Bailly Pakistan

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Appendix O: Groundwater Modelling Report (Water Supply)

Hagler Bailly Pakistan

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Appendix P: Mine Site Hydrogeological Assessment

Hagler Bailly Pakistan

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Appendix Q: Air Quality Assessment

Hagler Bailly Pakistan

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Appendix R: Soils & Sediments Assessment

Hagler Bailly Pakistan

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Appendix S: Geochemistry Report

Appendix T: Climate Change Risk Assessment

Hagler Bailly Pakistan

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Appendix U: Cumulative Impact Assessment

Hagler Bailly Pakistan

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Appendix V: Stakeholder Engagement

Hagler Bailly Pakistan

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Appendix W: Closure Plan

Hagler Bailly Pakistan

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Appendix X: Remote Sensing Report

Hagler Bailly Pakistan

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Appendix Y: Management Plans

Hagler Bailly Pakistan

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