Hagler Bailly Pakistan

DIGBY WELLS ENVIRONMENTAL

Appendix U: Cumulative Impact Assessment

Hagler Bailly Pakistan

Environmental and Social Feasibility Studies of Reko Diq Mining Project

Cumulative Impact Assessment

Final Report

HBP Ref.: D4CI5RKI

December 19, 2024

Reko Diq Mining Company

Quetta

Acronyms

BAP	Biodiversity Action Plan
BAU	Business as Usual
BEPA	Balochistan Environmental Protection Agency
CH	Critical Habitat
CIA	Cumulative Impact Assessment
CPEC	China-Pakistan Economic Corridor
CSR	Corporate Social Responsibility
DWE	Digby Wells Environmental
EM	Enhanced Management
EHS	Environmental, Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GHG	Greenhouse Gas
GIS	Geographic Information System
GRM	Grievance Redressal Mechanism
HBP	Hagler Bailly Pakistan
HFO	Heavy Fuel Oil
IFC	International Finance Corporation
LoM	Life of Mine
NHA	National Highway Authority
NTDC	National Transmission & Despatch Company
PMS	Power Market Survey
PS	Performance Standard
QESCO	Quetta Electric Supply Company
RDMC	Reko Diq Mining Company
SEP	Stakeholder Engagement Plan
UP&DD	Urban Planning and Development Department
USEPA	United States Environmental Protection Agency
VEC	Valued Environmental and Social Components

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Executive Summary

Barrick Gold Corporation (hereafter Barrick) through its subsidiary Reko Diq Mining Company (RDMC), in a Joint Venture partnership with the Government of Pakistan and the Government of Balochistan, is completing a feasibility study for the Reko Diq Mining Project (also referred to as the 'Project') in the western part of Balochistan Province of Pakistan. As part of the feasibility study, an Environmental and Social Impact Assessment (ESIA) has been conducted, including specialist studies. The ESIA will be part of the environmental permitting process and will provide a basis for the integration of environmental and social considerations into the Project design. RDMC appointed Digby Wells Environmental (hereafter Digby Wells) and Hagler Bailly Pakistan Pvt. Ltd (hereafter HBP) to carry out the proposed environmental and social studies and permitting process for the Project.

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. 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 towards the end of 2027 and Phase 2 operations in 2030.

This Cumulative Impact Assessment has been prepared to identify the cumulative impacts that may result from the development of the Project in conjunction with other projects in the region and to provide recommendations for joint management of cumulative impacts.

Spatial and Temporal Boundaries

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 mining developments may occur. These areas were selected on the spatial extent or location of the following aspects:

- Mineral resources in Chagai Magmatic Arc in which the Project is located
- Project’s groundwater impacts and groundwater resources the future mining projects can access
- Ecological resources that could be impacted by mining developments
- Transport routes connecting the mining projects to the country

- Urban centres that could be impacted by influx and induced development

The temporal boundary of the CIA was considered over a time horizon of 48 years, equivalent to the Life of Mine (LoM) of the Project and accounting for 5 years of construction and closure, which is the duration for which the Project's impacts are expected to occur[1].

Stakeholder Consultations

Stakeholder consultations specific to CIA related concerns, along with other consultations were used to inform the process of selecting priority Valued Environmental Components (VECs). While several stakeholder concerns were noted, most of these concerns can be readily addressed at the Project-level without a need for joint management under the CIA framework.

VEC Screening

An initial list of VECs was developed based on stakeholder concerns, secondary information and experience with similar mining Projects in Pakistan. A screening was carried out to identify Priority VECs based on the following criterion:

- Is the VEC impacted by the Project, in combination with other industrial developments and external stressors in the Study Area?
- Is the VEC an important issue for the stakeholders?
- Can the Potential Effects on the VEC be measured?
- Can the Potential Effects on the VECs be Considered within the Assessment of another VEC?

Based on the above criterion, the following VECs were selected as priority VECs:

- Safe and Uncongested Road Networks
- Sustainable Urban Centres
- Greenhouse Gas (GHG) Emissions
- Social Acceptance of Mining Projects
- Income from Mining Developments Dependent on Groundwater
- Biodiversity – Goitered Gazelle and Alcock's Toad-headed Agama that trigger Critical Habitat

CIA Scenarios

Based on the development patterns of the Study Area and number of additional mining projects expected the CIA scenarios below were developed.

[1] The duration of impact does not correspond to the duration of impacts on the receptor. Several impacts, such as groundwater impacts and unplanned expansion of urban centres are irreversible and will persist even after closure of the Reko Diq Project.

Exhibit 1: CIA Scenarios Selected for Assessment

CIA Scenario	Mining Developments		Management	
	Existing	*Forecasted*	*Baseline Management*	*Enhanced Management*
Baseline	✓		✓	
Business as Usual		✓	✓	
Enhanced Management		✓		✓

Baseline Conditions of Priority VECs

The baseline conditions for priority VECs were evaluated. A summary of these conditions is provided below:

- Safe and Uncongested Road Networks: Existing conditions of roads is poor along with inadequate provisions for health and safety. Several traffic accidents have occurred along the N-40 highway in the past.
- Greenhouse Gas (GHG) Emissions: The net GHG emissions in the baseline due to existing or planned mining developments is 1.75 million tons of CO2-eq emissions per annum.
- Social Acceptance of Mining Project: Social acceptance of mining developments is low, with persistent security related issues in the past.
- Sustainable Urban Centres: Town planning is minimal, and development patterns are sporadic in the baseline scenario. These patterns are most evident at Nok Kundi and Taftan, which will experience the most significant urban expansion due to the mining developments.
- Income from Mining Developments Dependent on Groundwater: If the Siah Diq and Reko Diq projects become fully operational, a total of ~119.4 GL/annum of water will be abstracted from the aquifers in the CIA Study Area in the baseline scenario.

Assessment of Impacts and Management

A significant degradation of all priority VECs is expected in the Business as Usual (BAU) scenario due to minimal management of cumulative impacts. This would result in significantly worsening the road safety conditions, adversely affecting the social acceptance of mining projects, affecting the income of mining projects due to unsustainable use of groundwater sources, high contribution to GHG emissions and unsustainable urban expansion.

Implementation of Enhanced Management (EM) measures aimed at joint management of cumulative impacts will ensure that the priority VECs are not adversely affected due to development of mining projects in the region. The EM measures for each priority VEC will be managed along the frameworks provided in this CIA. These frameworks include the following:

- Water Supply Strategy

- Determination of Groundwater Impact
- Monitoring

- Energy Supply Strategy
  - Assessment of Traffic Impacts in ESIAs and Traffic Management Plans
  - Alignment of CSR Activities
  - Monitoring and Reporting
- Urban Development and Transport Corridor Management
  - Quantification of GHG Emissions
  - Options for Renewable Energy
  - Transportation of Product by Railway
  - Monitoring and Reporting
- Stakeholder Engagement and Grievance Redressal
  - Stakeholder Engagement
  - Grievance Redressal
  - Monitoring and Reporting
- Biodiversity Action Plan

Institutional Arrangements

The CIA proposes the establishment of a common platform, such as the Advisory Forum for Mining Development for collaborative data collection, monitoring, and proactive stakeholder engagement.

The Balochistan Development Authority (Urban Planning and Development Department) could institute the Advisory Forum for Mining Development through a Memorandum of Understanding (MoU) executed with the key stakeholders including the mining companies. A senior official in the Balochistan government such as the Chief Secretary can head the forum to facilitate interdepartmental coordination and to ensure follow up on the decisions taken in the forum.

The forum will review the Annual Monitoring Reports submitted by the mining companies to evaluate effective implementation of the guidance provided by the management frameworks of this CIA, set targets, and discuss ongoing issues of potential significance.

1. Introduction

1.1 Background

Barrick Gold Corporation (hereafter Barrick) through its subsidiary Reko Diq Mining Company (RDMC), in a Joint Venture partnership with the Government of Pakistan and the Government of Balochistan, is completing a feasibility study for the Reko Diq Mining Project (also referred to as the 'Project') in the western part of Balochistan Province of Pakistan. As part of the feasibility study, an Environmental and Social Impact Assessment (ESIA) has been conducted, including specialist studies. The ESIA will be part of the environmental permitting process and will provide a basis for the integration of environmental and social considerations into the Project design. RDMC appointed Digby Wells Environmental (hereafter Digby Wells) and Hagler Bailly Pakistan Pvt. Ltd (hereafter HBP) to carry out the proposed environmental and social studies and permitting process for the Project.

This report is the Cumulative Impact Assessment (CIA). The purpose of this CIA was to identify the cumulative impacts of existing and planned developments on environmental and social receptors, referred to as Valued Environmental and Social Components (VECs).[2] 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.

1.2 Overview of the Project

[2] Good Practice Handbook—Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, IFC 2013

Exhibit 1.1 shows the location of the Project and the key infrastructure associated with the Project. **Exhibit 1.2** shows the layout of the Reko Diq Mine Site and associated infrastructure.

The proposed 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. The current Life-of-Mine 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 Concentrate will be railed to Port Qasim near Karachi 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.

Exhibit 1.1: Location of the Project and Key Infrastructure

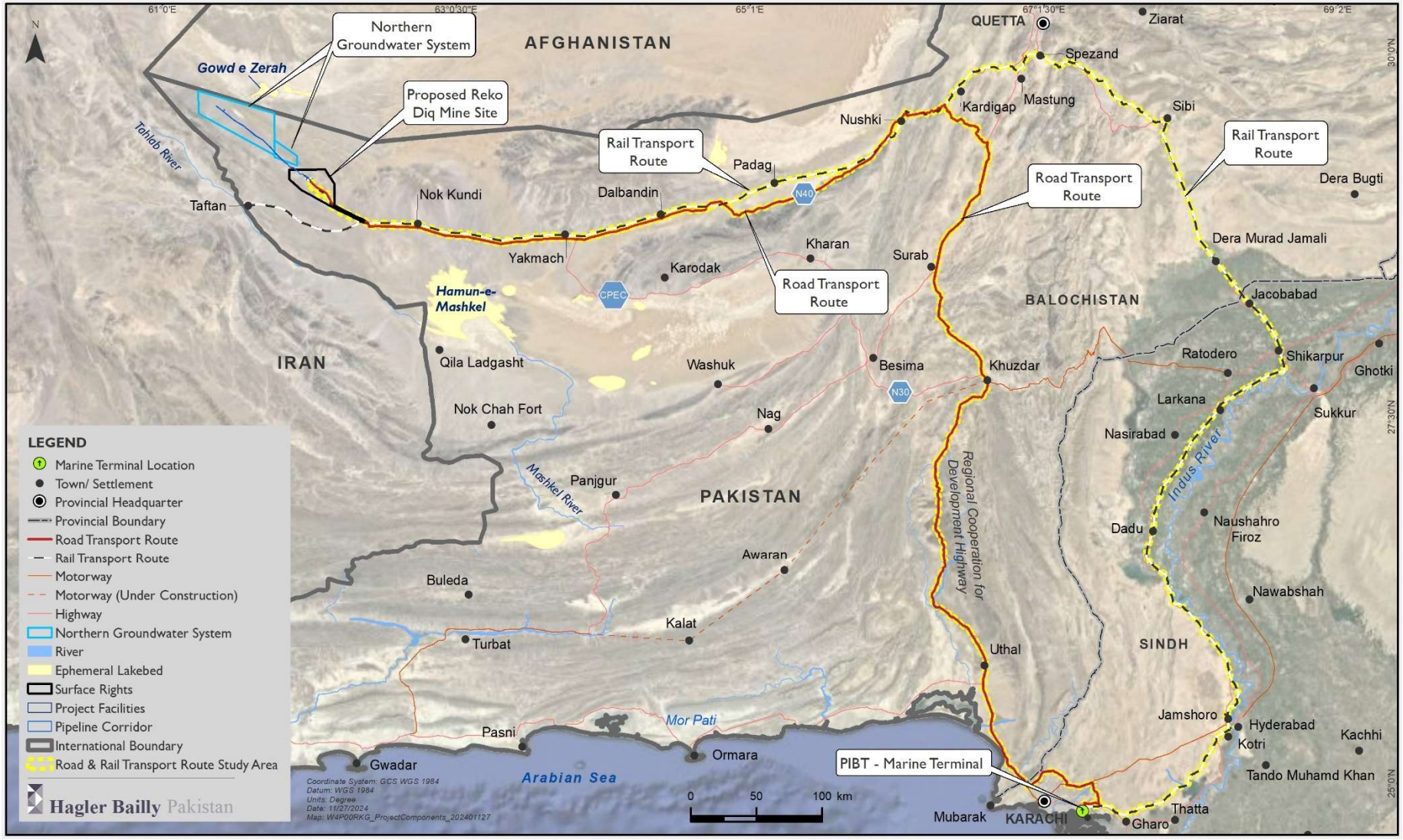
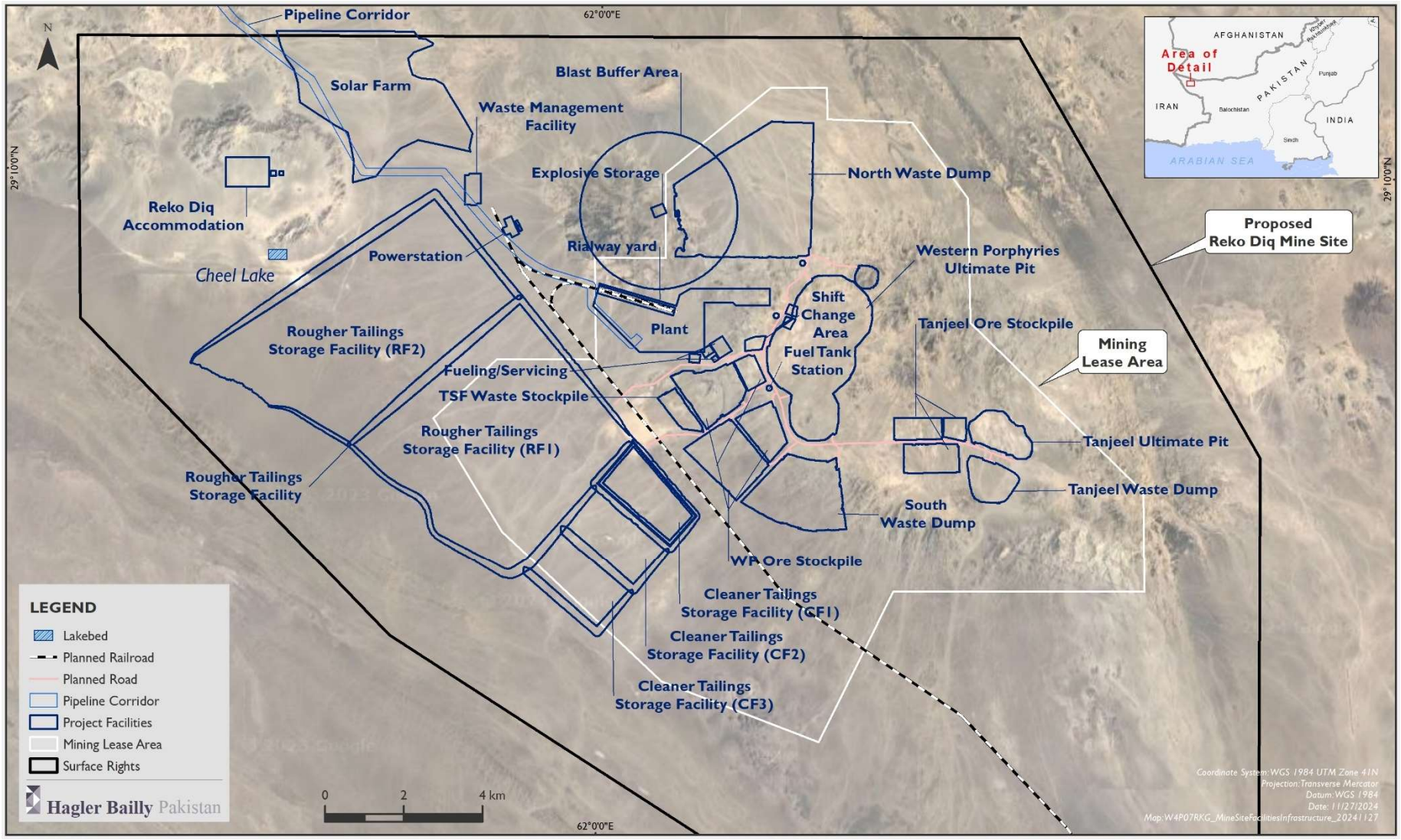


Exhibit 1.2: Layout of the Reko Diq Mine Site and Associated Infrastructure



1.3 Spatial Boundaries

This section provides the spatial and temporal boundaries for the CIA and the rationale behind selection of the boundaries.

The spatial areas within which the cumulative impacts of the Project on infrastructure and natural resources may occur in conjunction with other developments were first investigated. The CIA assumes that other mining developments that are planned in the area may share facilities including the Road Transport Route and Rail Transport Route with the Project. A discussion of the CIA study areas in the context of cumulative developments, environmental pathways and a preliminary identification of receptors is presented in this section. A consolidated CIA Study Area that accounts for combined impacts of existing and potential development on infrastructure and natural resources is presented at the end of this section.

1.3.1 Groundwater Resources

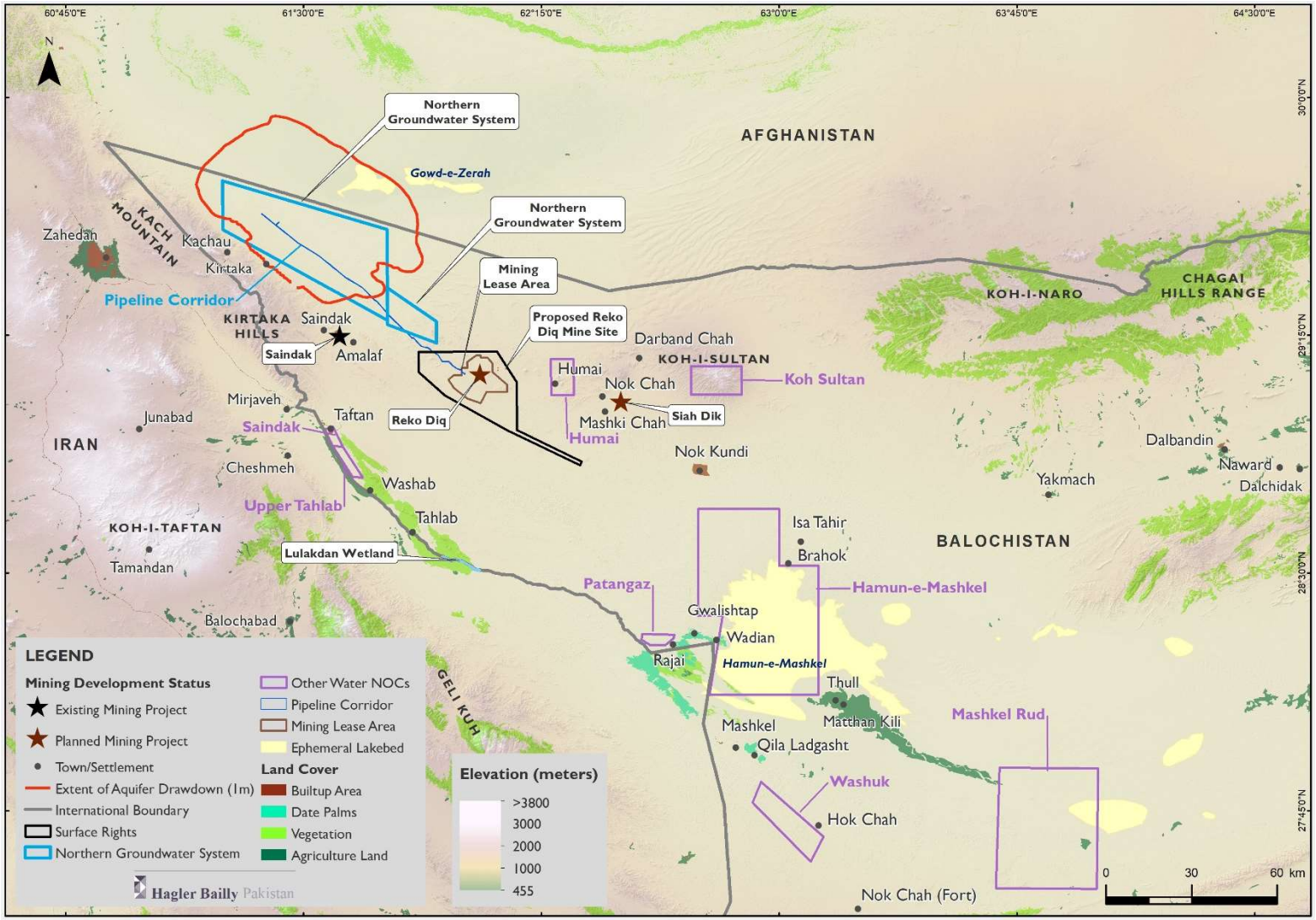
Groundwater impacts are a significant stakeholder concern, given the dependence of local communities on groundwater and the sparse rainfall and surface water resources in the region. **Exhibit 1.3** provides the extent of the aquifer drawdown to a depth of at least 1 metre (m)[3] due to extraction of water for the Project from the Northern Groundwater System over the lie of the Project. The spatial extent of the aquifer drawdowns resulting from the Project's groundwater use were determined using an uncertainty based numerical groundwater modelling approach. Normalized Difference Vegetation Index[4] (NDVI)-based mapping and Geographic Information System (GIS) imagery was used to identify receptors that fall within drawdown areas, including settlements, agriculture, date palm plantations and water bodies to inform the VEC screening.

While the receptors outside of the modelled aquifer drawdown extent will not be directly impacted by the Project to any significant extent, they remain under consideration from a monitoring perspective in the interest of developing a knowledge base for future projects and developments that may consider exploitation of the groundwater resource to be used by the Project. The Northern Groundwater System will be used exclusively by the Project as per lease for water extraction area granted by the government. Other projects that may be developed in future can explore and develop the aquifers indicated in **Exhibit 3.1** located South of the Reko Diq Mine Site around the Hamun-i-Mashkel depression.

[3] A threshold of 1 m drawdown was used to define the area within which the impacts of drawdown on the receptors could be of concern.

[4] NDVI is an index used for spatially quantifying the health and density of vegetation using remote sensing data.

Exhibit 1.3: Modelled Aquifer Drawdown by the Project of 1m or Greater



1.3.2 Transport Routes

Exhibit 1.1 provides a map of the corridors included in the CIA Study Area. The Project is currently considering two transport routes for movement of material and product:

- Road Transport Route: The road networks consist primarily of the N-40 highway and N-25 highway connected to Port Qasim. The Project is considering this route as an option for movement of construction machinery during the construction and the delivery of other equipment and consumables throughout the life of mine. An area of 500 m around this route was selected as a study area.
- Railway Transport Route: The Project will use the Rail Transport Route for movement of materials product between the Mine Site and Port Qasim. The Project will also transport fuel during the operations phase via rail. An area of 500 m around this route was selected as a study area.

An additional road by the name of the Yakmach-Kharan Road is presently under construction as part of the CPEC, but it is presently unknown when this road network will be completed and be suitable for use. The Project does not plan to use this road.

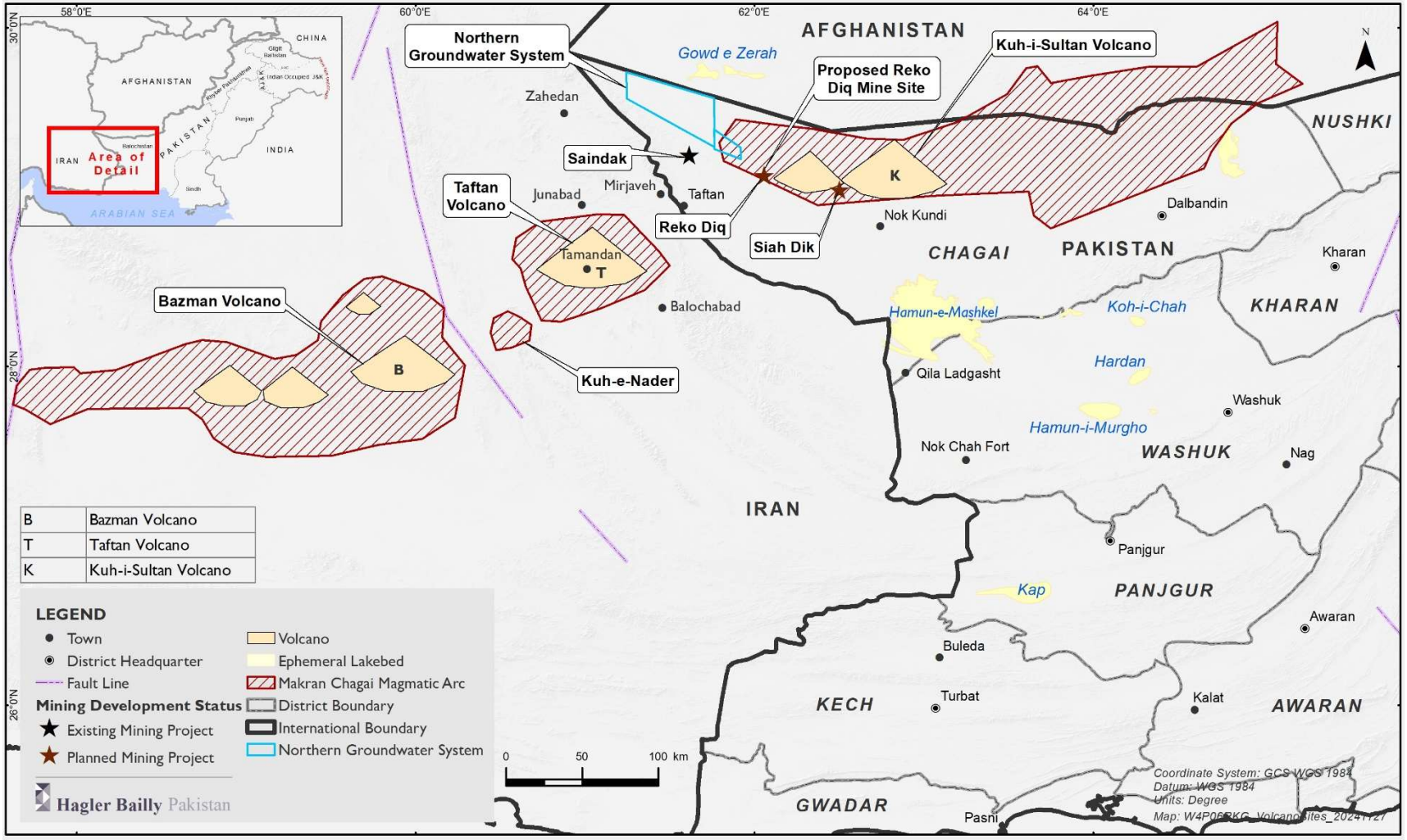
1.3.3 Mineral Resources

The CIA Study Area also encompasses the Chagai Magmatic Arc of the Ras Koh Range which spans the Chagai District, Balochistan and is considered one of the "*economically most important mountain belts of Pakistan*"[5] due to extensive deposits of copper with potential for gold, silver, and molybdenum. It is likely that additional mining developments in the future will occur within the geographical extent of this mineral resource.

The Saindak Copper Gold Project is the only Project currently exploiting the mineral resources from these deposits, with the Siah Diq Project expected to also become operational in the future. **Exhibit 1.4** provides a map of the Chagai Magmatic Arc, which indicates the geographic extent of the mineral resource. The resource area of concern for this CIA is the eastern most block in this magmatic arc in which the existing Saindak and the proposed Reko Diq and Siah Dik mining projects are located. Given the distance to other resource blocks in the Chagai Magmatic Arc, it is assumed that the development of mining projects in other blocks will not impact the Project and the resources and infrastructure used or impacted by it.

[5] Malkani, M. S., Malik, Z., Shaikh, S., & Arif, J. (2017). Mineral Resources of Balochistan Province, Pakistan.

Exhibit 1.4: Map of the Chagai Magmatic Arc



Source: Ghalamghash, J., Schmitt, A. K., Shiaian, K., Jamal, R., & Chung, S.-L. (2019). Magma origins and geodynamic implications for the Makran-Chagai arc from geochronology and geochemistry of Bazman volcano, southeastern Iran. Journal of Asian Earth Sciences, 171, 289-304. doi: https: //doi.org/10.1016/j.jseaes.2018.12.006

1.3.4 Urban Centres

Several urban centres are situated throughout the Balochistan Province. The cumulative development of mining projects will result in significant economic growth, particularly in urban centres. The towns of Nok Kundi, Taftan and Dalbandin (see **Exhibit 1.5**) are expected to experience the largest growth due to the mining developments as they are situated near transport corridors and potential future mining developments. Out of these urban centres, the CIA will focus primarily on the Nok Kundi and Taftan towns as they are likely to undergo significant expansion.

1.3.5 Ecological Resources

Ecological resources for the CIA include avifauna, mammals, herpetofauna and flora. The species present near the Project were determined in Appendix H - Biodiversity – Flora Assessment and Appendix I - Biodiversity - Fauna Assessment. The distribution of species that may trigger Critical Habitat (CH) under the IFC Performance Standard 6 is provided in Appendix J - Critical Habitat Assessment (CHA). The CHA was also used to inform the screening of priority VECs in **Section 4** of this report. An overview of the ecological resources at the Reko Diq Mine Site and the concentrate export terminal at Port Qasim is provided below. The ecological resources along the existing transport corridors that will be used by the Project are already heavily impacted by the existing traffic, and the marginal impact of the Project on these resources will not be of significance.

Avifauna

According to the literature review, 29 bird species are reported from the Reko Diq Mine Site, 37 along the Northern Groundwater System, and 17 along the Access Route to the Reko Diq Mine Site. IBAT reported 171 bird species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure.

A total of 153 bird species were reported from Port Qasim. Baseline surveys at the Reko Diq Mine Site confirmed the presence of 14 bird species from the Reko Diq Mine Site, 31 along the Northern Groundwater System, and 10 along the Access Route to the Reko Diq Mine Site. A total of 40 bird species were observed at Port Qasim in the baseline survey.

Three conservation concern bird species were observed in the baseline surveys. Two species, including the Egyptian Vulture (*Neophron percnopterus*), which is listed as Endangered, and the Asian Houbara Bustard (*Chlamydotis macqueenii*) listed as Vulnerable in the IUCN Red List of Threatened Species, were observed along the Northern Groundwater System. The third species, Curlew Sandpiper (*Calidris ferruginea*), listed as Near Threatened in the IUCN Red List of Threatened Species, was observed along Port Qasim.

Mammals

According to the literature review, 11 species of small mammals have been reported from the Reko Diq Mine Site and Access Route to the Reko Diq Mine Site, and four species of small mammals are reported along the Northern Groundwater System (see **Exhibit 1.1**). Baseline surveys at the Reko Diq Mine Site confirmed the presence of only one small

mammal species from the mine site and along the Northern Groundwater System. No species was captured along the Access Route to the Reko Diq Mine Site. Sampling was not conducted for small mammals at Port Qasim. All the small mammal species captured in the baseline survey are listed as Least Concern.

Baseline surveys at the Reko Diq Mine Site confirmed the presence of four mammalian species from the Reko Diq Mine Site, six along the Northern Groundwater System, and three along the Access Route to the Reko Diq Mine Site. A total of seven mammalian species were observed at Port Qasim in the baseline survey.

Only one conservation concern mammalian species, i.e., Goitered Gazelle (*Gazella subgutturosa*), listed as Vulnerable according to the IUCN Red List of Threatened Species, was observed along the Northern Groundwater System. Several conservation concern mammalian species, according to the Pakistan Mammal Red List, were observed in the baseline surveys. These include the Critically Endangered Goitered Gazelle (*Gazella subgutturosa*) and Sand Cat (*Felis margarita*), Vulnerable Cape Hare (*Lepus capensis*) and Ruppell's Fox (*Vulpes rueppellii*) and Near Threatened Red Fox (*Vulpes vulpes*).

The Goitered Gazelle (*Gazella subgutturosa*) triggers Critical Habitat as it is a Restricted Range as per IFC PS6 and is listed as Critically Endangered in Red List of Pakistan Mammals. **Exhibit 1.6** provides the Ecologically Appropriate Area of Analysis (EAAA) or the Extent of Occurrence (EOO) of this species as per IFC PS6 in which the Project is located and within which the impacts of the Project on this species may occur.

Herpetofauna

According to the literature review, 33, 28, and 26 herpetofauna species have been reported from the Reko Diq Mine Site, Northern Groundwater System, and Access Route to the Reko Diq Mine Site. The Integrated Biodiversity Assessment Tool (IBAT) reported 62 herpetofauna species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure. A total of 38 species of herpetofauna are expected in the vicinity of Port Qasim. Baseline surveys at the Reko Diq Mine Site confirmed the presence of 10 herpetofauna species from the Reko Diq Mine Site, 11 along the Northern Groundwater System, and five along the Access Route to the Reko Diq Mine Site. A total of four herpetofauna species were observed at Port Qasim in the baseline survey.

All herpetofauna species observed at the Reko Diq Mine Site and Associated Infrastructure and along Port Qasim in baseline surveys are listed as Least Concern or Data Deficient by the IUCN Red List of Threatened Species. One restricted-range species, i.e., Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*), was observed along the Northern Groundwater System in the baseline surveys. This species triggers Critical Habitat as per IFC PS6. **Exhibit 1.7** provides the EAAA in which the Project is located and within which the impacts of the Project on this species may occur.

Flora

According to the literature review, 58 plant species are reported from the Reko Diq Mine Site, Northern Groundwater System, and Access Route to the Reko Diq Mine Site. IBAT reported 78 plant species within a 50 km buffer of the Reko Diq Mine Site and associated infrastructure. More than 100 plant species are reported in the Port Qasim area.

Baseline surveys at the Reko Diq Mine Site confirmed the presence of 20 plant species from the Reko Diq Mine Site, 33 at the Northern Groundwater System, and 12 along the Access Route to the Reko Diq Mine Site. A total of 35 plant species were observed at Port Qasim in the baseline survey.

All the plant species observed at the Reko Diq Mine Site and along the Access Route to the Reko Diq Mine Site are listed as Least Concern, Data Deficient, or Not Evaluated in the IUCN Red List of Threatened Species. Only one conservation concern species i.e., Red-river Gum Eucalyptus camaldulensis, which is listed as Near Threatened according to the IUCN Red List of Threatened Species, was observed at the Northern Groundwater System. This is an introduced species in Pakistan; therefore, it does not raise conservation concerns within Pakistan.

Most of the terrestrial plant species observed in Port Qasim are listed as Least Concern or Not Evaluated and have a wide distribution range. National Red List is not available for flora in Pakistan; therefore, national status is not provided for the plant species. According to the literature review, three mangrove species are reported from Port Qasim. Baseline surveys at Port Qasim confirmed the presence of two out of three species. Both species are listed as Least Concern according to the IUCN Red List of Threatened Species.

1.3.6 Other Considerations

The following aspects were also considered for delineation of the Study Area:

- Greenhouse Gas Emissions (GHG): The contribution of GHG emissions to climate change will be a global impact and is not confined to a particular area. Thus, no study area was defined for GHG emissions, however the CIA quantifies the potential GHG emissions that may result from mining developments in the Balochistan region.
- Air and Noise Emissions: Noise and air quality emissions from the mining developments will be localized and will not contribute to a collective airshed degradation of the Study Area. Thus, no study area was defined for air and noise emissions.

1.3.7 Consolidated Spatial Boundary for the CIA

Exhibit 1.8 provides the consolidated spatial boundary for the CIA or the CIA Study Area considering the spatial boundaries of the impacts of the Project and other developments including the existing and proposed mining projects in the Project's area of influence. The proposed CIA Study Area is informed by the following special considerations:

- The CIA Study Area extends into Afghanistan only on account of the extension of 1m drawdown contour across the border from Pakistan.
- The Road Transport Route and Rail Transport Route are excluded from the CIA Study Area as the marginal impacts of the Project on the shared routes will not be of significance. The segment of Rail Transport Route from Spezand railway junction south of Quetta to just west of Nok Kundi where the route branches off towards the

Reko Diq Mine Site will be used exclusively by the Project, and mitigation of impacts including noise will be the subject of the Project ESIA and the ESMP.

- 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.
- The border of Pakistan with Afghanistan and Iran is fenced which will prevent the movement of the gazelle across the border. Developments across the border are there not likely to impact the population of the species in the EAAA in Pakistan.
- While the Extended Area of Occupancy (**Exhibit 1.7**) for the Alcock's Toad-headed Agama extends into Afghanistan, the EAAA for the species remains within Pakistan due to discontinuity of its habitat within Pakistan.
- 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.

1.4 Temporal Boundary

The temporal boundary of the CIA was considered to over a time horizon of 48 years, equivalent to the Life of Mine (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.[6]

[6] The duration of impact does not correspond to the duration of impacts on the receptor. Several impacts, such as groundwater impacts and unplanned expansion of urban centres are irreversible and will persist even after closure of the Reko Diq Project.

Exhibit 1.5: Major Urban Centres in the Vicinity of Reko Diq Mine Site Area

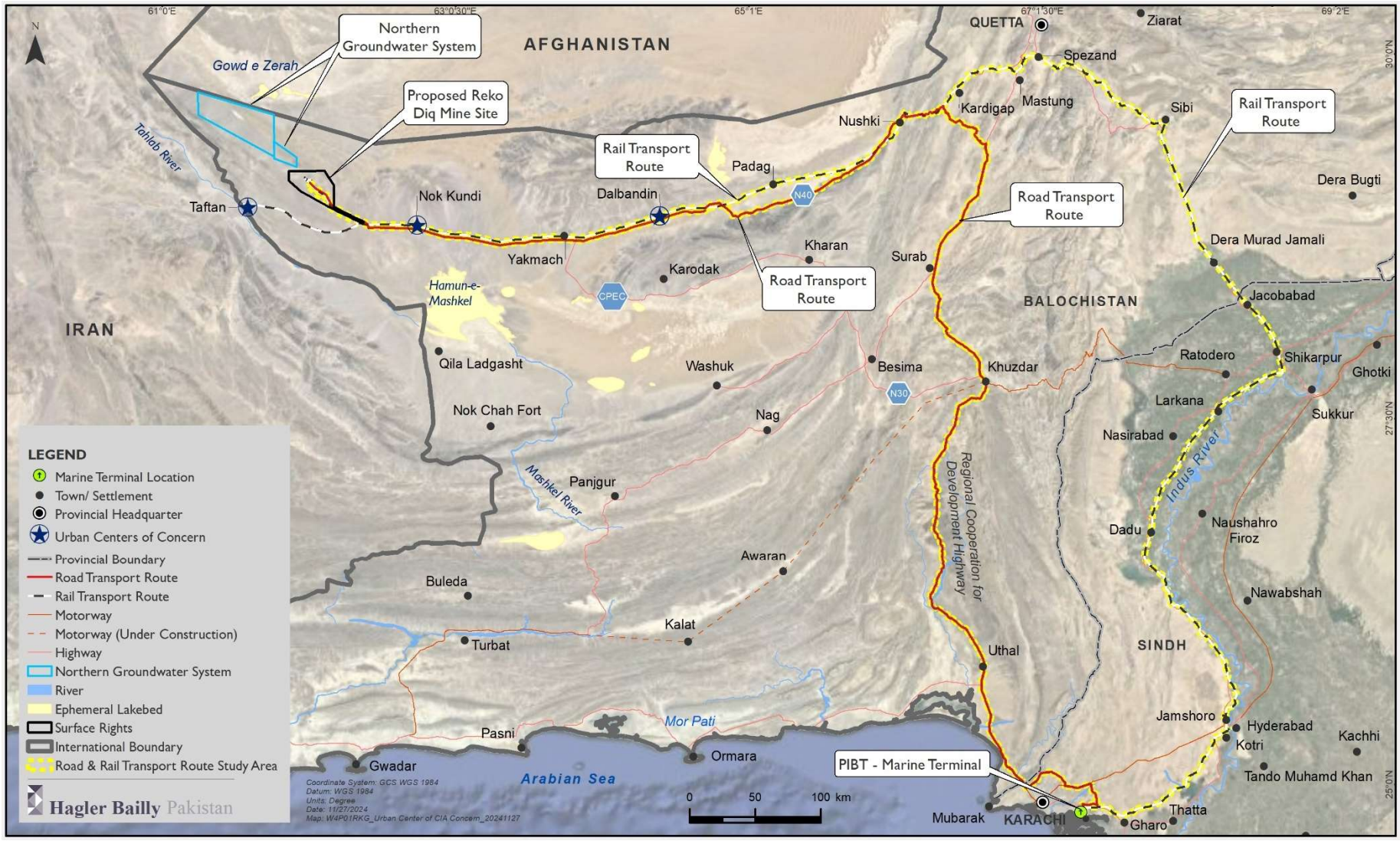


Exhibit 1.6: Ecologically Appropriate Area of Analysis for the Goitered Gazelle

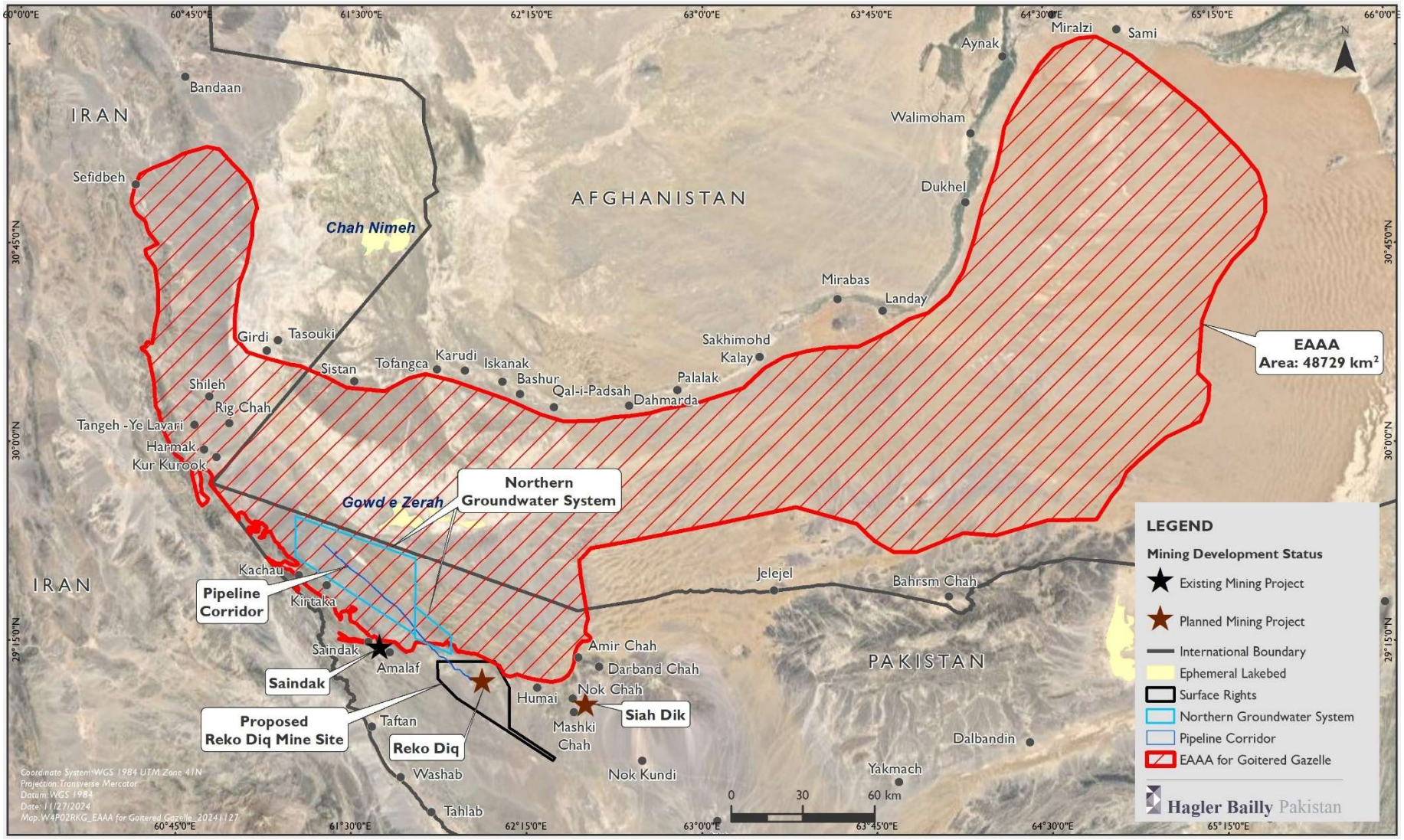


Exhibit 1.7: Ecologically Appropriate Area of Analysis for the Alcock's Toad-headed Agama

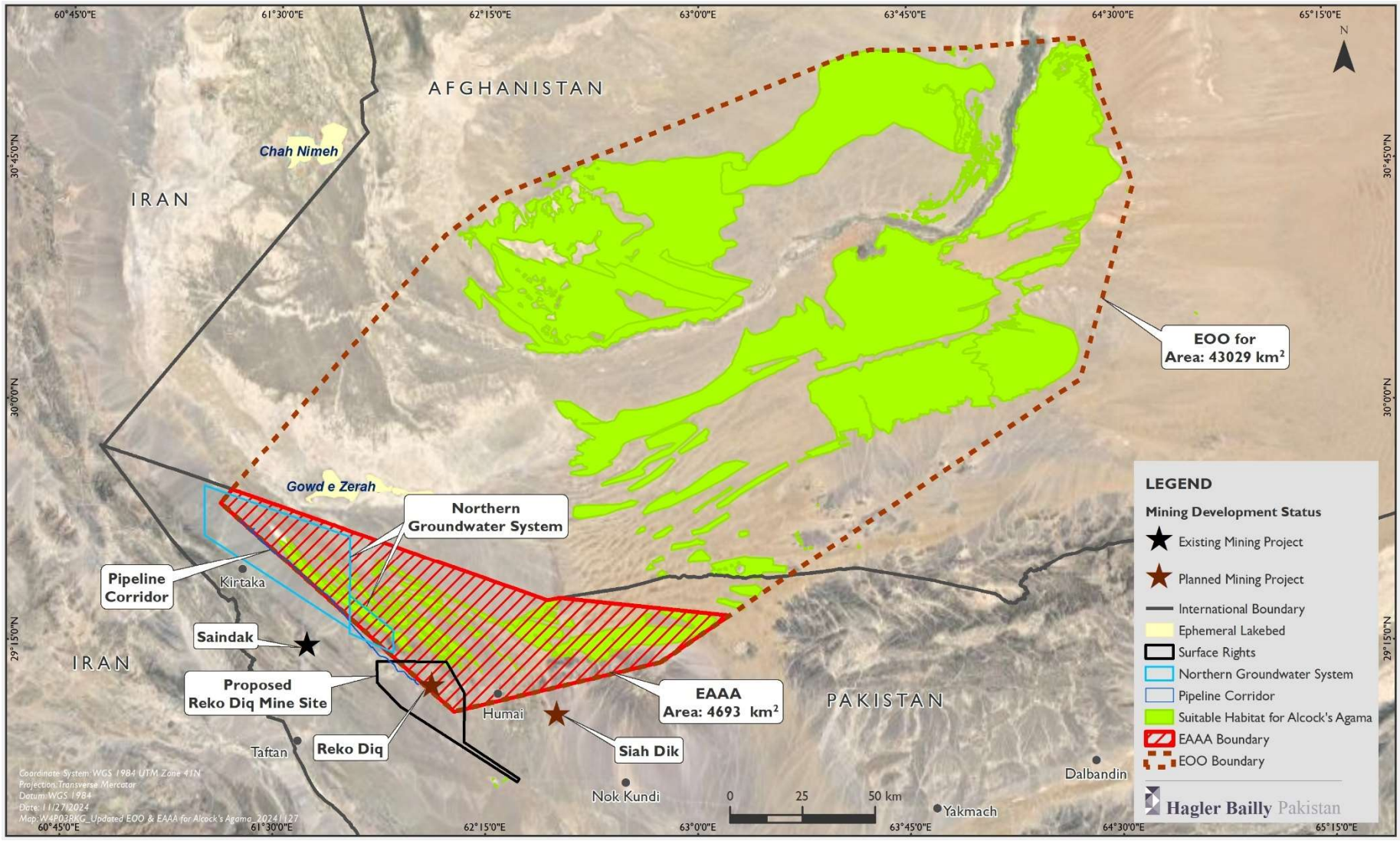
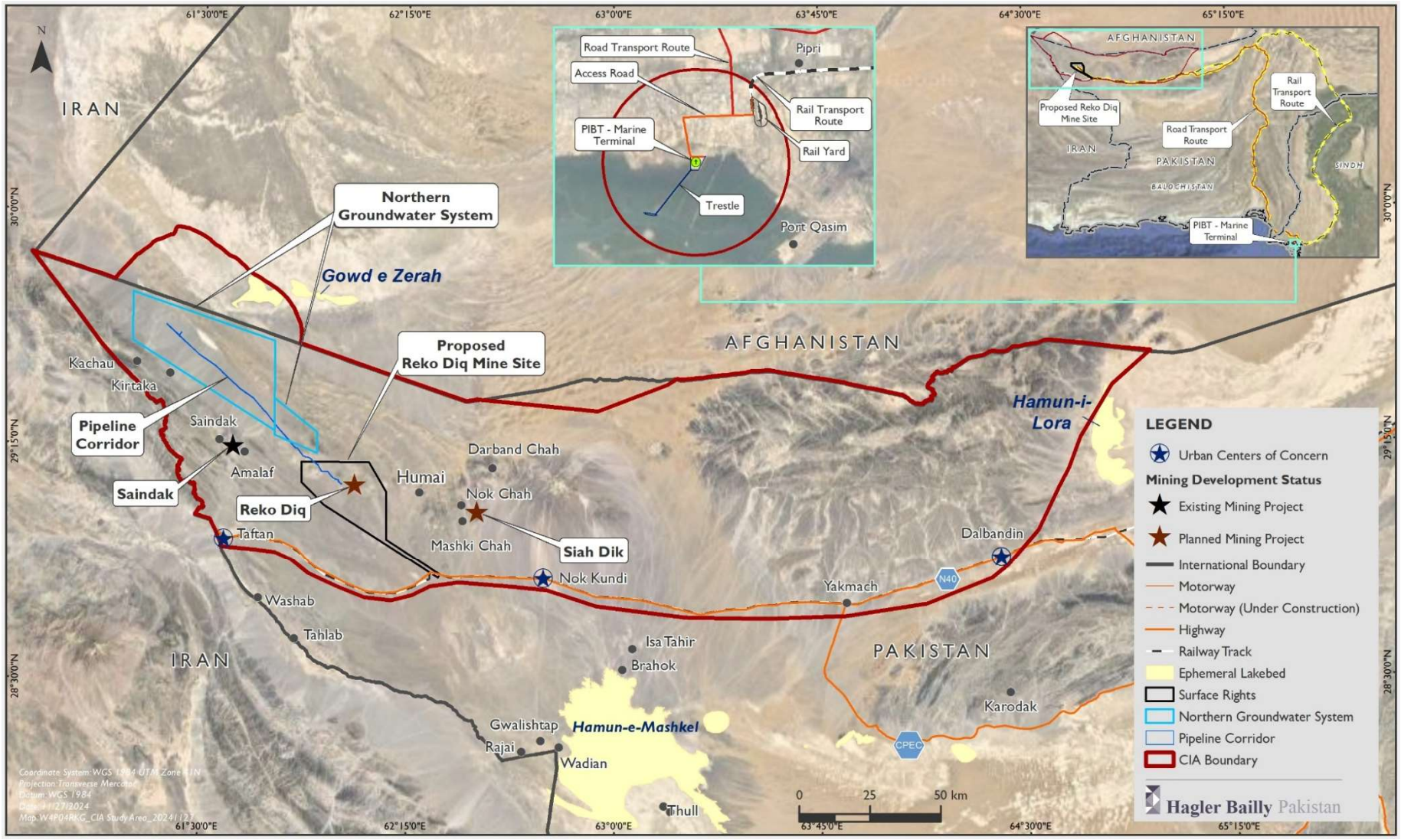


Exhibit 1.8: Consolidated Spatial Boundary for the CIA Study Area



2. Review of Regulations

This section is an overview of the applicable legal frameworks and international guidelines relevant to the CIA, based on the priority VECs identified and frameworks for the management of cumulative impacts. **Exhibit 2.1** provides a breakdown of the applicable regulations and guidelines,

Exhibit 2.1: Overview of Applicable Regulations and Guidelines

Regulation and Guideline	*Overview*	*Relevance to the CIA*
Relevant to the CIA		
Balochistan Groundwater Rights Administration Ordinance 1978	Regulates groundwater extraction, ensuring efficient and sustainable management of water resources.	Balochistan Groundwater Rights Administration Ordinance 1978 outlines the responsibilities of the Provincial Water Board in identifying groundwater aquifers and determining safe yields, which has implications for water users throughout the CIA Study Area.
Balochistan Development Authority Act 1974	Facilitates comprehensive development programs for economic upliftment, including land, water, and industrial development initiatives.	The Balochistan Development Authority has been identified as a significant institutional stakeholder for the formation of the Mining Developments Advisory Forum which will provide regulatory supervision to ensure that the management frameworks of this CIA are implemented.
Balochistan Buildings Control Ordinance 1979	Sets requirements for building approval, ensuring adherence to regulatory standards in construction projects.	The Balochistan Building Control Ordinance 1979 intersects with urban development concerns, particularly road networks and infrastructure, which are identified as Valued Environmental Components (VECs).
Balochistan Housing and Town Planning Authority Act 2020	Establishes an authority for regional development plans and town planning.	Balochistan Housing and Town Planning Authority Act 2020 establishes an authority for regional development plans and town planning. Under this act, the mining companies can align their Corporate Social Responsibility (CSR) activities with sustainable urban development initiatives which are further detailed in **Section 8**.
IFC Performance Standard 3	Provides guidelines for water conservation and resource efficiency.	The recommendations for energy and water efficiency under the Enhanced Management (EM) Scenario are derived from the recommendations of this Standard.
IFC Good Practice Handbook on CIA and Management: Guidance for the	Provides guidance for management of cumulative impacts.	The institutional framework for management of transboundary impacts was aligned with the guidance provided by this document.

Regulation and Guideline	*Overview*	*Relevance to the CIA*
Private Sector in Emerging Markets		
Canada EAO Guideline	Provides guidance for identification of Valued Environmental Components (VECs)	The VEC identification was carried out in accordance with the definitions and criterion provided by this document.

3. Stakeholder Consultations

The CIA has been developed based on stakeholder consultations conducted as part of the ESIA of the Reko Diq Mining Project. The advice and inputs provided by the stakeholders informed the screening of the Valued Environmental and Social Components in **Section 4**, and development of Frameworks for Management of Cumulative Impacts described in **Section 8**.

3.1 Consultation Methodology and Schedules

Consultations were conducted in accordance with the Stakeholder Engagement Plan developed by the Project which adheres to the IFC Principles on stakeholder engagement. [7] The details of consultation dates and the number of stakeholders consulted is provided below.

3.1.1 Community Consultations

The community consultations were carried out in four rounds.

- **Round 1:** The settlements near the Reko Diq Mine Site and along the Water Supply Pipeline from Northern Groundwater System (including Fan Sediments and Sor Baroot), and other Water NOCs were consulted in Round 1 from September 13, 2022, to October 10, 2022 as part of the consultations for the ESIA preparation.
- **Round 2:** The settlements near the Rail Transport Route and Port Qasim were consulted in Round 2 from October 10, 2023, to October 14, 2023 as part of the consultations for the ESIA preparation and included Nok Kundi and Dalbandin.
- **Round 3:** The settlements near the Reko Diq Mine Site, along the Water Supply Pipeline from Northern Groundwater System and other Water NOCs, and the Rail Transport Route were consulted in Round 3 from February 15 to February 20, 2024 as part of the ESIA follow-up consultations.
- **Round 4:** The settlements near the Reko Diq Mine Site, along the Water Supply Pipeline from Northern Groundwater System and other Water NOCs, along the Rail Transport Route and Port Qasim were consulted in Round 4 from June 21, 2024 to July 06, 2024 as part of the ESIA Roadshow.

Exhibit 3.1 details the participants in the community consultations in 2022 and 2023.

[7] IFC. (n.d.). Stakeholder Engagement: A good practice handbook for companies doing business in emerging markets. https: //www.ifc.org/en/insights-reports/2000/publications-handbook-stakeholderengagement--wci--1319577185063

Exhibit 3.1: Community Consultations in 2022 and 2023

Location	*Community Consultations*		*Participants in the consultations (men and women)*
	Number of Settlements	*Name*	
Settlements consulted in Round 1 – 2022 (ESIA Preparation)			
Reko Diq Mine Site	4	Balochistan – Humai, Nok Chah, Mashki Chah, Darband Chah	74
Water Supply Pipeline from Northern Groundwater System (including Fan Sediments and Sor Baroot), and other Water NOCs	9	Balochistan – Kachau, Saindak, Amalaf, Taftan, Tahlab, Washab, Rajai, Wadian, Gwalishtap	192
Settlements consulted in Round 2 – 2023 (ESIA Preparation)			
Rail Transport Route	13	Balochistan – Nok Kundi, Yakmach, Dalbandin Nushki, Spezand, Sibi, Dera Murad Jamali Sindh – Kotri, Jamshoro, Larkana, Jacobabad, Dadu, Shikarpur	98
Port Qasim	2	Sindh – Pipri, Dhabe Ji	6
Settlements consulted in Round 3 – 2024 (ESIA follow-up)			
Reko Diq Mine Site	4	Humai, Nok Chah, Mashki Chah, Darband Chah	118
Water Supply Pipeline from Northern Groundwater System, and other Water NOCs	3	Kachau, Saindak, Amalaf	76
Rail Transport Route	2	Nok Kundi, Dalbandin	56
Settlements consulted in Round 4 - 2024 (ESIA Roadshow)			
Reko Diq Mine Site	4	Humai, Nok Chah, Mashki Chah, Darband Chah	100
Water Supply Pipeline from Northern Groundwater System, and other Water NOCs	6	Essa Tahir/Brahuk, Gwalishtap, Kachau, Amalaf, Saindak, Taftan	106
Rail Transport Route	9	Balochistan - Nok Kundi, Yakmach, Dalbandin, Nuhski, Spezand, Dera Murad Jamali, Sindh - Jamshoro, Larkana, Dadu	128
Port Qasim	2	Pipri, Dhabeji	16
Total settlements	**58**	**Total number of participants**	**964**

3.1.2 Institutional Consultations

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 of 2022. Due to the unavailability of some government departments for consultations, the remainder were covered in Round 2. A total of 9 institutional stakeholders were consulted in this round of consultations.
- Round 2: The remainder of the information disclosure related consultations were conducted in September of 2023. A total of 8 institutional stakeholders were consulted in this round of consultations.
- Round 3: Additional feedback consultations were undertaken between June and August of 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.

Exhibit 3.2: Institutional Stakeholders Consulted

Stakeholder	*Date Consulted*	*Round*	*Objective*
Education Department, Dalbandin	September 26, 2022	1	Information Disclosure
Health Department, Dalbandin	September 26, 2022	1	Information Disclosure
Livestock & Dairy Development Department, Dalbandin	September 26, 2022	1	Information Disclosure
District Administration, Dalbandin	September 27, 2022	1	Information Disclosure
Agriculture Department, Dalbandin	September 27, 2022	1	Information Disclosure
Forest and Wildlife Department, Quetta	October 05, 2022	1	Information Disclosure
Coastal Development and Fisheries Department, Quetta	October 05, 2022	1	Information Disclosure
Balochistan Environmental Protection Agency (BEPA), Quetta	October 05, 2022	1	Information Disclosure
Islamic Relief (NGO), Quetta	October 05, 2022	1	Information Disclosure
District Vice Chairman Local Government and Rural Development Chagai	September 01, 2023	2	Information Disclosure
Public Health Engineering (PHE) and Water and Sanitation Agency (WASA)	September 04, 2023	2	Information Disclosure
National Highway Authority (NHA)	September 04, 2023	2	Information Disclosure
Irrigation Department	September 04, 2023	2	Information Disclosure
Home Department Quetta	September 04, 2023	2	Information Disclosure

Stakeholder	*Date Consulted*	*Round*	*Objective*
Forest and Wildlife Department, Quetta	September 04, 2023	2	Information Disclosure
Balochistan Revenue Authority (BRA)	September 04, 2023	2	Information Disclosure
Balochistan Rural Support Program (BRSP)	September 05, 2023	2	Information Disclosure
Balochistan Environmental Protection Agency (BEPA)	June 24, 2024	3	Feedback and follow-up
Balochistan Rural Support Program (BRSP)	June 25, 2024	3	Feedback and follow-up
Islamic Relief	June 25, 2024	3	Feedback and follow-up
Irrigation Department & Integrated Water Resource Management System (IWRMS), GoB	June 25, 2024	3	Feedback and follow-up
Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS)	June 25, 2024	3	Feedback and follow-up
Local Government & Rural Development Department (LG & RD)	June 26, 2024	3	Feedback and follow-up
Mines & Mineral Development Department (MMDD)	June 26, 2024	3	Feedback and follow-up
Forest and Wildlife Department, Quetta	June 26, 2024	3	Feedback and follow-up
National Highway Authority (NHA)	July 30, 2024	3	Feedback, follow-up and CIA related discussion
Ministry of Railways	July 30, 2024	3	CIA related discussion
National Transmission & Despatch Company (NTDC)	August 02, 2024	3	CIA related discussion

3.1.3 NGOs and Other Stakeholders

Consultations were also undertaken with academic groups and NGOs and security organizations. The Balochistan Rural Support Program (BSRP) is no longer active near the Project whereas the World-Wide Fund for Nature (WWF), Pakistan will be conducted as part of the Critical Habitat Assessment (CHA) and Biodiversity Action Plan (BAP) development.

Exhibit 3.3: NGOs and Other Stakeholders Consulted

Stakeholder	*Date Consulted*	*Round*	*Objective*
Islamic Relief, Quetta	October 05, 2022	1	Information Disclosure
Islamic Relief, Quetta	June 25, 2024	3	Feedback and follow-up
Balochistan Rural Support Program (BRSP)	June 24, 2024	3	Feedback

Stakeholder	*Date Consulted*	*Round*	*Objective*
Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS)	June 25, 2024	3	Feedback

3.2 Summary of Findings of Consultations

A summary of the consultation findings is presented in the **Stakeholder Engagement Report (R4SE6RKG)**.

3.2.1 Community Consultations

The local communities expressed the following concerns:

- The local communities emphasized the need for improved healthcare facilities to reduce the necessity of traveling to distant cities for treatment. They proposed establishing well-equipped local healthcare centres, focusing on maternity and general health services. Additional suggestions included setting up an ambulance system for road accident-related emergencies and maternity centres with trained midwives and medical professionals on standby.
- Concerns about the lack of proper infrastructure were raised, particularly regarding the water supply systems that have fell into disrepair. Many of the communities are reliant on groundwater for drinking, which is commonly reported to be brackish and unsuitable for drinking.
- The local communities advocated for more railway stops, improved train functionality, and the establishment of a secure local transport system to facilitate local transportation needs. It was reported that schools and hospitals are also situated at large distances, and the present conditions of roads makes it unsafe to travel on foot or on motorcycles.
- The communities requested more employment opportunities. Besides employment directly as labour at the Project, they suggested that vocational trainings to employ the local communities as doctors, teachers and other trained technical staff at the new facilities to be set up by the Project should also be a consideration.
- Some local community members expressed concern on degradation of the environment, such as noise and air pollution from trains. They expect that roadside dust and vehicular emissions during the construction phase will be the most significant source of air pollution.
- Transparent use of Corporate Social Responsibility (CSR) funds and community involvement in decision-making processes were emphasized, along with the establishment of a committee to oversee CSR initiatives and ensure they meet the evolving needs of the community.
- Illicit cross-border trade is a significant income source for many of the local community residents. The mining projects will result in an increased presence of security personnel in the region and will likely result in more stringent regulation of

the cross-border trade. The Project should consider providing the local communities with alternative means of income.

3.2.2 Institutional Consultations

The concerns shared by the institutional stakeholders are summarized 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 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: Cited as concerns by the Home Department Quetta, the District Vice Chairman Local Government and Rural Development Chagai, and the National Highway Authority (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.
- : Water Resource Use: Cited as significant by the Irrigation Department, owing to the reliance of local communities on groundwater for meeting all water-related needs, including agriculture.
- 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 National Highway Authority 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" as "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.

- Community Development Initiatives: The institutional stakeholders identified the following initiatives for inclusion in the Community Development Plan (CDP)[8] of the Project:
    - 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 Technical Education and Vocational Training Authority (TEVTA) Centre for women.
    - Conducting annual sports events for the local community residents.
    - 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 following information was received:

- The NHA stated that presently, the existing highways do not account for future developments with respect to the mining sector in Balochistan. The additional road networks being developed under CPEC will be able to accommodate the increased traffic, but no such expansions and upgradations are planned along the N-40 highway. The projects may consider alternative road transport routes to Gwadar Port, but existing security related concerns make this option less viable.
- The Ministry of Railways emphasized that development of the railway network can significantly offset traffic and GHG emissions from the mining projects in addition to revitalizing the local economy. Upgradations to the ML-1 line are currently planned which will allow for significantly reduced delays for industrial developers wishing to use the railways for transport to Port Qasim. The Ministry informed that discussions are underway with RMDC for potential upgrades to the ML-3 line which runs from Taftan to Quetta and is expected to be financed by the RMDC. It is unlikely that additional users can be accommodated when accounting for the Project's demand, however feasibility studies are currently underway for this aspect.
- The NTDC highlighted connecting the national grid through a 220 kV transmission line to mining developments in Chagai and adjoining districts will not be

[8] Specialist Report for Socioeconomics (**R4SS6RKG**).

economically feasible and may cost up to 500 million USD in capital costs. It will likely be financially feasible for the mining projects to import electricity from Iran or to set up self-generation of power. A Power Market Survey (PMS) undertaken by QESCO that predicts a significant increase in the residential demand can justify relevant investments from the government for expansion of the transmission network.

3.2.3 NGOs and Other Stakeholders

The concerns shared by the stakeholders are summarized below:

- Wastewater management: The Islamic Relief Organization expressed several concerns regarding wastewater and provided suggestions for the reuse and recycling of wastewater. These includes reuse of wastewater for agriculture or for watering of plantations.
- Community Support: The Islamic Relief emphasized that they could assist the Project Company in implementation of support programs for the local communities. The areas where Islamic Relief can provide significant support is disaster relief, community development, skill development and livelihood support.
- Stakeholder Engagement: The Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS) emphasized the importance of a transparent stakeholder engagement process and the provided recommendations on areas where the Project company can strengthen information sharing.
- Endowment Funds: The Balochistan Rural Support Program (BRSP) recommended that endowment funds can be set up at the community level to promote grants from donor agencies.
- Cross Border Trade: BRSP recommended that cross border trade should be more stringently regulated and alternative employment opportunities provided to the local communities.
- Community Liaison: The BRSP and Islamic Relief highlighted the importance of community engagement and the role of Community Liaison Officers (CLOs) for grievance redressal, stakeholder engagement and information dissemination.

4. Identification and Prioritization of VECs

This section provides a summary of the selection process for the VECs considered in the CIA.

4.1 VEC Definitions

Valued Environmental and Social Components (VECs) are defined as fundamental elements of the physical, biological, or socio-economic environment (including the air, water, soil, terrain, vegetation, wildlife, fish, birds, and land use) that are likely to be the most sensitive receptors to the impacts of a proposed Project or the cumulative impacts of several projects. They may include:

- Physical features, habitats, wildlife population (e.g., biodiversity)
- Ecosystem services (e.g., fishing, timber, food, aesthetic values)
- Natural processes (e.g., water and nutrient cycles, microclimate)
- Social conditions (e.g., health, economics) and
- Cultural aspects (e.g., traditional spiritual ceremonies)[9]

While VECs may be directly or indirectly affected by a specific development, they often are also affected by the cumulative effects of several developments. VECs are the ultimate recipient of impact because they tend to be at the end of ecological pathways.

4.1 Initial Identification of VECs

The selection process of the VECs was informed by the following documents:

- Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets[10]
- Canada Environment Assessment Office (EAO) (2013) Guideline for the Selection of Valued Components and Assessment of Potential Effects[11]

The following steps were taken to identify and prioritize the VECs in the CIA Study Area:

- Literature review of journal articles, research papers and studies to better understand the physical, biological, and socio-economic environments of the region.
- Review of information and data gathered for the ESIA baseline prepared for the Reko Diq Mining Project.

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[9] International Finance Corporation, 2014, IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets

[10] Ibid

[11] Environmental Assessment Office, Canada, 2013, Guideline for the Selection of Valued Components and Assessment of Potential Effects

- Consultations conducted as part of the Project baseline surveys.

4.2 VEC Screening Process

The Canada EAO Guideline (2013)[12] provides a range of useful criteria to help determine the relevance of a VEC to a cumulative assessment (or CIA). These, outlined below, guided the screening and prioritization of a longer list of preliminary VECs.

4.2.1 Potential to be Impacted

A VEC must be potentially impacted by the Project in combination with other developments/ external stressors. This is to ensure that the impacts are cumulative, instead of being Project specific.

4.2.2 Focus on Key Issues

The importance of a VEC is determined based on cultural values or social and/or scientific concern appended to a VEC. For example, via views expressed by the public or government, legislative or regulatory requirements, government management priorities etc.; or general sensitivity or vulnerability to disturbance based on scientific evidence. Related to the latter, vulnerability was assessed based on the available information.

4.2.3 Measurability

Measurability is an important aspect to ensure that VECs which can be measured and monitored will be prioritized. VECs which cannot be monitored or measured will be difficult to manage. The parameters/indicators of measurability differ for environmental and social VECs.

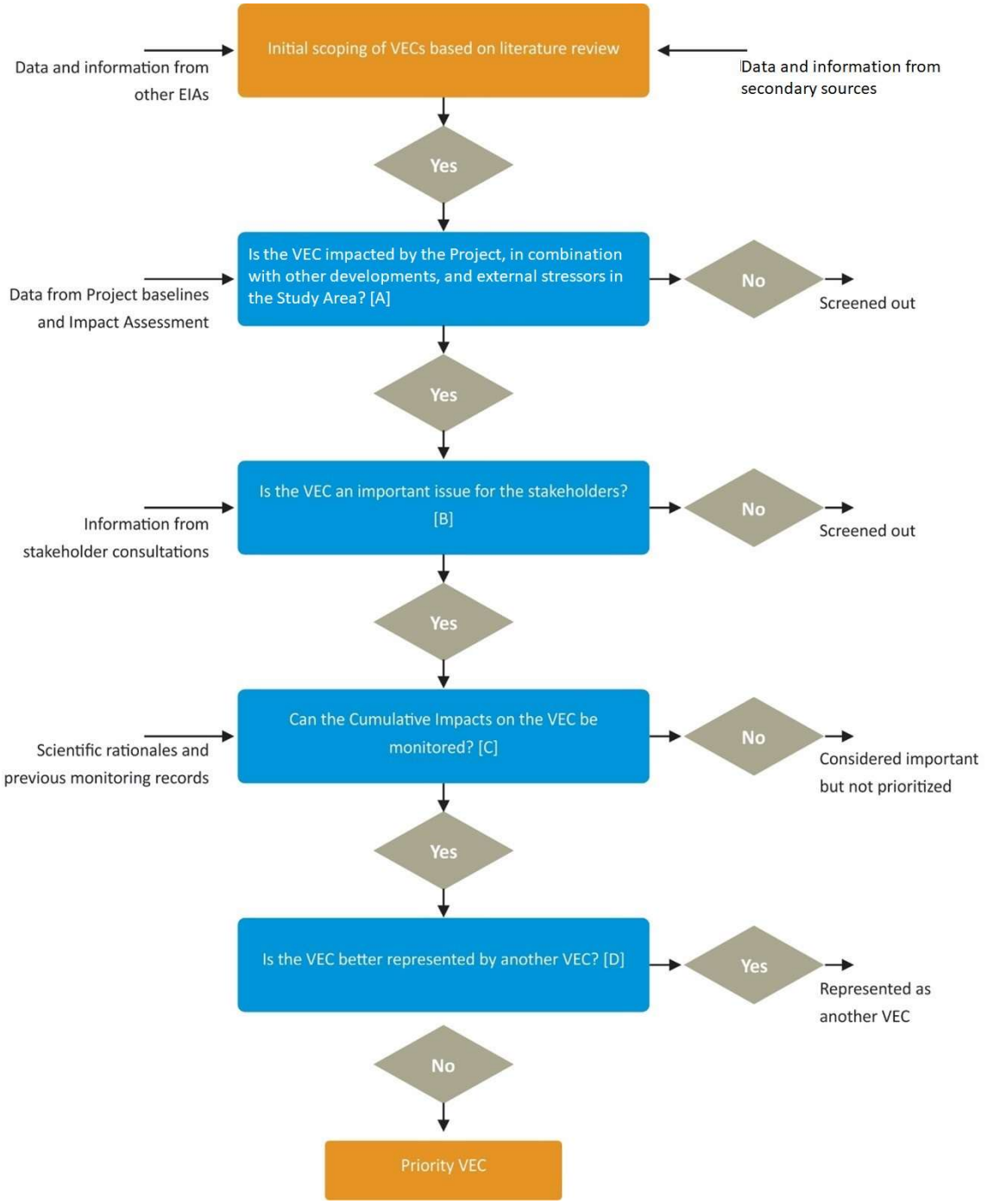
4.2.4 Efficiency

Some VECs may not directly be impacted, but rather impacted through a pathway of another VEC. To ensure that all the cumulative impacts on VECs, whether through a direct or an indirect pathway, are efficiently monitored and managed, some VECs are grouped into another VEC.

Exhibit 4.1 shows the value-based screening mechanism for the VECs.

[12] Guideline for the Selection of Valued Components and Assessment of Potential Effects, Canada, 2013.; Environmental Assessment Office (EAO),

Exhibit 4.1: VEC Screening Process



Note: The letters [A], [B], [C] and [D] correspond to the VEC screening stage, which is presented in **Exhibit 4.2**.

4.3 Prioritization of VECs

VECs were prioritized in accordance with the screening process provided in **Exhibit 4.1. Exhibit 4.2** details the rationale behind the screening in or out of priority VECs.

Exhibit 4.2: Rationale for Inclusion or Exclusion of a VEC based on the VEC Screening Criteria

No	VEC	Receptors of Concern	Reason for inclusion as initial VEC	VEC Screening					Included as a priority VEC?	Rationale for Inclusion/Exclusion as Priority VEC
				Is the VEC impacted by the Project, in combination with other industrial developments and external stressors in the Study Area? [A]		Is the VEC an important issue for the stakeholders? [B]	Can the Potential Effects on the VEC be measured? [C]	Can the Potential Effects on the VECs be Considered within the Assessment of another VEC? [D]		
				On a Project level (yes/no)	Cumulative level (yes/no)					
Biodiversity										
1.	Biodiversity of Hamun-i-Mashkel		Other mining developments will abstract groundwater to meet their construction and operational needs. This can have an adverse impact on vegetative cover and associated habitats if the flora is dependent on groundwater and there is a significant decrease in the groundwater levels.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	The Project will not withdraw water from the Hamun-i-Mashkel NOC. The aquifer drawdown resulting from the Project's groundwater use will not extend to this area.
2.	Biodiversity of Lulakdan Wetland		The Project and other mining developments will abstract groundwater to meet their construction and operational needs. This can have an adverse impact on vegetative cover and associated habitats if the flora is dependent on groundwater and there is a significant decrease in the groundwater levels.	No	Yes	Not considered for further screening	Not considered for further screening	Not considered for further screening	No (Monitoring under BMP)	The Project will not withdraw groundwater from the aquifer connected to this wetland. However, in the interest of monitoring biodiversity on a regional scale and impacts of other mining developments, the Project will consider monitoring the ecosystem health of this wetland under its Biodiversity Action Plan if feasible.
3.	Biodiversity of Gowd-e-Zerah		The Project and other mining developments will abstract groundwater to meet their construction and operational needs. This can have adverse effects on the Gowd-e-Zerah biodiversity depending on its recharge from the aquifer.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	The upstream flow to this water body has been extensively modified due to upstream damming in Afghanistan after the year 2000. As a result, the water body is ephemeral and accumulates water very occasionally, and unlikely to be significant from a biodiversity perspective.
4.	Biodiversity surrounding Reko Diq Mine site	Goitered Gazelle (*Gazella subgutturosa*)	The Project and other mining developments will use land and abstract groundwater to meet their construction and operational needs and will modify surrounding habitats. If the Project will impact a habitat which meets the IFC Performance Standard 6 (PS6) criterion for Critical Habitat (CH), a Biodiversity Action Plan (BAP) will be required which also considers joint management of cumulative impacts due to other projects within the CH. The detailed screening for CH is provided in the **Critical Habitat Assessment (CHA)**.	Yes	Yes	Yes	Yes	No	Yes	The distribution range of Goitered Gazelle *Gazella subgutturosa* (see **Section 1.3.5** and **Exhibit 1.6**) includes areas in and around the Northern Groundwater System. It is listed as Critically Endangered in the Pakistan Mammal red List triggering CH under IFC PC6 Criteria 1(c).
5.		Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*)		Yes	Yes	Yes	Yes	No	Yes	The CHA estimates that this is a Restricted Range species, and the preferred habitat this species consists of stable sand dunes with some vegetation which occurs in and around the Mine Site Area (see **Section 1.3.5** and **Exhibit 1.7**). Its EAAA is likely to hold ≥10% of the global population of this species on regular basis, thus meeting the IFC PS6 Criteria 2 for CH.
6.		Avifauna		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Eight bird species were recorded as long-distance migratory or congregatory species in the ecological baseline of the Project including Steppe Eagle (*Aquila nipalensis*), Egyptian Vulture (*Neophron percnopterus*), Saker Falcon (*Falco cherrug*), Asian Houbara Bustard (*Chlamydotis macqueenii*), Imperial Eagle (*Aquila helica*), Greater Spotted Eagle (*Clanga clanga*), Sociable Lapwing (*Vanellus gregarius*) and Yellow-eyed Pigeon (*Columba eversmanni*) (**Section 1.3.5**) The CHA determines that all these species are widespread globally and it is unlikely their EAAA supports the ≥ 0.5% of the global population of any of these species, therefore, there species do not trigger CHA under sub-criteria (a) of Criteria 1. The CHA also concludes that their EAAA does not hold the ≥ 1% of the global population of these species and therefore does not trigger CH for Criterion 3 (a). Criterion 3(b) is also not of consideration, as it requires the EAAA to support ≥10 percent of the global population of a species during periods of environmental stress.

No	VEC	Receptors of Concern	Reason for inclusion as initial VEC	VEC Screening					Included as a priority VEC?	Rationale for Inclusion/Exclusion as Priority VEC
				Is the VEC impacted by the Project, in combination with other industrial developments and external stressors in the Study Area? [A]		Is the VEC an important issue for the stakeholders? [B]	Can the Potential Effects on the VEC be measured? [C]	Can the Potential Effects on the VECs be Considered within the Assessment of another VEC? [D]		
				On a Project level (yes/no)	Cumulative level (yes/no)					
7.		Other Mammals		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Two other mammalian species, the Afghan Urial (*Ovis vignei cycloceros*), and Marbled Polecat (*Vormela peregusna*) are listed as Vulnerable in the IUCN Red List of Threatened Species but do not trigger CH for IFC PS6 Criterion 1(b). The Red List of Pakistan also categorizes the Sand Cat (*Felis margarita*) as Critically Endangered, however the EAAA supports only a small population of this species due to a lack of potential feeding and breeding grounds and thus does not trigger CH for Criterion 1(c). Additionally, one restricted-range mammalian species, the Pygmy Jerboa (*Salpingotulus michaelis*) was also evaluated under the CHA but did not trigger CH on account of its distribution beyond its EAAA.
8.		Other Herpetofauna		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No other herpetofauna were evaluated within the CHA as no other herpetofauna in the EAAA are an IUCN Red-listed Endangered (EN) or Critically Endangered (CR) species, nor nationally or regionally listed EN or CR species. Additionally, no other herpetofauna have been identified as restricted-range or migratory species.
9.		Flora		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	One floral species *Gagea quettica* was identified as endemic to the EAAA. However, in consideration of the absence of this species in the Project area and a Species Global Extent of Occurrence (EOO) likely greater than 50,000 km^2 which precludes its classification as a Restricted Range species under PS6, this species does not trigger Critical Habitat according to Criterion 2.
10.	Terrestrial Biodiversity near Port Qasim		Development of the Port and movement of traffic can adversely affect terrestrial ecology.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Much of the terrestrial habitat near Port Qasim is highly modified, and unlikely to be affected due to transportation activities as existing transportation routes will be used. Furthermore, no additional construction beyond the footprint existing Port Facilities of the will take place.
11.	Marine Biodiversity near Port Qasim		Leakages from and failure of the product storage areas can result in adverse impacts on the marine biodiversity.	Yes	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	The main impact will be due to potential contamination from mishandling of concentrate during shipment. Addressed in the ESIA as a Project-specific impact. The Impact will be minimum as an Emergency Response Plan (ERP) for recovery of the copper concentrate. There are no other copper product handling facilities at Port Qasim presently. While Port Qasim is home to species of conservation concern and a unique mangrove ecosystem; all the species are widely distributed in the Pakistan as well as across the other countries. Similarly, the mangrove habitat is listed as Vulnerable in the IUCN Red List of Ecosystem but the mangroves within Pakistan do not account for ≥5% of the global EN or CR mangroves, therefore, CH is not triggered.
Socioeconomic Receptors										
12.	Social Acceptance of Mining Projects	All Project stakeholders	The development of mining projects in Balochistan has been historically tied to discontent and allegations that the local populace does not reap the benefits brought forth by these projects.	Yes	Yes	Yes	Yes	No	Yes	General perception in Balochistan has to be managed to present the Project as important for development of the province.
13.	Safe and Uncongested Road Network	Local communities and businesses reliant on road network	Development of mining projects will result in an influx of traffic which will be concentrated on the N-40 highway.	Yes	Yes	Yes	Yes	No	Yes	Identified as a significant stakeholder concern in the consultations as part of the- ESIA in view of the expected increase in traffic levels and congestion if major mining developments take place in the area. The overall contribution to incremental noise will be minimal as the road network passes through Nok Kundi and Taftan, where existing levels of baseline noise are already high.

No	VEC	Receptors of Concern	Reason for inclusion as initial VEC	VEC Screening					Included as a priority VEC?	Rationale for Inclusion/Exclusion as Priority VEC
				Is the VEC impacted by the Project, in combination with other industrial developments and external stressors in the Study Area? [A]		Is the VEC an important issue for the stakeholders? [B]	Can the Potential Effects on the VEC be measured? [C]	Can the Potential Effects on the VECs be Considered within the Assessment of another VEC? [D]		
				On a Project level (yes/no)	Cumulative level (yes/no)					
14.	Uncongested Rail Network	Local communities and businesses reliant on the rail network	Development of mining projects will result in an influx of traffic which may use rail networks for transportation	Yes	No	Yes	No	Yes	No	Rail network congestion will be subject to further feasibility studies by the Project, which will assess the existing state of the railway network and whether expansion will be required to accommodate other users. The local communities presently do not use the railway network, and it is unlikely that other users will use the railway network after upgradations the Reko Diq Project may use most of the upgraded capacity of the network.
15.	Air Quality	Communities near mining developments	The mining developments can result in a degraded airshed depending on meteorological conditions, air pollution control technologies in place and their proximity from one another.	Yes	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Air quality impacts due to mine and road construction likely to be localized and can be readily addressed on an individual basis by other projects.
16.	Cultural Values	Communities near mining developments	The cumulative developments can result in an influx of workers and emigration to the area, resulting in threats to the cultural values of local communities.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No significant stakeholder concerns with respect to privacy and aesthetics were noted in the stakeholder consultations for the ESIA.
17.		Cultural Assets	The cumulative developments can result in adverse impacts on cultural heritage assets due to induced development in the CIA Study Area.	Yes	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	As the railway will be upgraded by the Project and will only be used by the Project with minimal use by other users, this is considered a Project-specific impact. Impacts on cultural heritage assets such as existing lithic procurement sites and railway stations have been evaluated in the Cultural Heritage Assessment Report, The Project will adopt responsibility for preservation, restoration and management of these assets under a Heritage Restoration Plan.
18.	GHG Emissions	All local communities and stakeholders	The mining developments can result in a significant contribution toward national and global GHG emissions depending on the number of developments and their scale.	Yes	Yes	Yes	Yes	No	Yes	Included as a priority VEC as contributions due to cumulative developments will be significant, mainly due to their dependency on fossil fuel burning.
19.	Sustainable Urban Centres	All Project stakeholders	Induced and unplanned development brought by the mining developments can adversely affect the sustainability of urban centres.	Yes	Yes	Yes	Yes	No	Yes	Included as priority VEC as cumulative development of mining projects is likely to result in unplanned development particularly in the major urban centres such as Dalbandin, Nok Kundi and Taftan. The impacts of such unplanned development on the safety, security and well-being of the populace within these urban centres can be significant if not adequately managed.
20.	Worker Health, Safety and Security	All Project workers	The influx of workers by multiple mining developments can result in the deterioration of worker living conditions and conflicts between the on-site workers.	Yes	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Worker accommodations will be owned and managed by individual projects. No accommodations have been shared between the mining projects in the past or are likely to be shared as detailed in the ESIAs of existing projects. The Project will develop a Human Resources (HR) framework which will include a Worker Accommodation Plan and a Labour Management Plan to safeguard worker health and accommodation.
21.	Clean and uncontaminated groundwater	Communities near Northern Groundwater System	Discharge of untreated wastewater can result in contamination of groundwater.	No	No	Yes	Not considered for further screening	Not considered for further screening	No	No communities presently reside in or near the Northern Groundwater System aquifer which can become contaminated due to wastewater emissions. Future settlements are at minimal risk as the Project will treat its wastewater and reuse it to the extent feasible. The remaining sludge will be treated at Sewage Treatment Plants (STPs) prior to disposal to ensure that it does not contaminate groundwater.
22.	Availability of Water for Settlements	Communities near Northern Groundwater System	The mining developments will abstract groundwater to meet their water requirements. The local communities are reliant primarily on the groundwater to meet their	No	No	Yes	Yes	No	No (Monitoring Only)	No communities exist the within the predicted aquifer drawdown as a result of the Project's water abstraction. Remote- sensing based monitoring will be undertaken on a precautionary basis and to confirm model predictions.

No	VEC	Receptors of Concern	Reason for inclusion as initial VEC	VEC Screening					Included as a priority VEC?	Rationale for Inclusion/Exclusion as Priority VEC
				Is the VEC impacted by the Project, in combination with other industrial developments and external stressors in the Study Area? [A]		Is the VEC an important issue for the stakeholders? [B]	Can the Potential Effects on the VEC be measured? [C]	Can the Potential Effects on the VECs be Considered within the Assessment of another VEC? [D]		
				On a Project level (yes/no)	Cumulative level (yes/no)					
23.		Communities near Lulakdan wetland	own needs and can be adversely affected due to a decrease in the groundwater levels.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	The Project will not abstract water from within this aquifer.
24.		Communities near Patangaz		No	No	Yes	Yes	No	No (Monitor Only)	The Project will not withdraw water from this NOC area. However, monitoring of groundwater levels will be undertaken at these locations to support future exploratory work for groundwater abstraction if it is required.
25.		Communities near Hamun-i-Mashkel		No	No	Yes	Yes	No	No (Monitor Only)	
26.		Communities near Hok Chah		No	No	Yes	Yes	No	No	Abstraction for Project from South Hamun presently not planned, and unlikely for future Projects
27.		Future settlements near Gowd-e-Zerah		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No communities present and unlikely to exist in the future.
28.	Date Palm Produce	Date palms near Patangaz	Depletion of the groundwater aquifer due to exploitation by the Project and other mining projects can adversely affect the growth rate and output of date palms.	No	Yes	No	Yes	No	No	No Project water abstraction is expected at this VEC.
29.		Date palms near Fan Sediments		Not considered for further screening	Not considered for further screening	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No existing date palms within the groundwater depletion area as predicted by the model.
30.	Aesthetic and Cultural Value of Date Palms	Date palms near Patangaz	Depletion of the groundwater aquifer due to exploitation by the Project and other mining projects can adversely affect the growth rate and thus aesthetic and cultural value of date palms.	Not considered for further screening	Not considered for further screening	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No existing date palms within the groundwater depletion area as predicted by the model.
31.		Date palms near Fan Sediments		Not considered for further screening	Not considered for further screening	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No existing date palms within the groundwater depletion area as predicted by the model.
32.	Recreational Value of Wetlands	Visitors to Hamun-i-Mashkel	Adverse impacts on biodiversity can result in reduced recreational value of wetlands.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Minimal existing recreational value due to ephemeral nature of the lake.
33.		Visitors to Lulakdan Wetland		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Does not fall within Project's groundwater depletion area. Limited recreational value.
34.		Visitors to Gowd-e-Zerah		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	Does not fall within Project's groundwater depletion area. The wetland is mostly dry due to water utilization in its upstream catchment. Unlikely for tourism to meaningfully develop in this area in the future.
35.	Irrigated Agriculture Using Water from Shallow/Deep Aquifers	Future users near Fan Sediments	Groundwater abstraction from deep aquifers by cumulative developments can affect groundwater availability for agriculture and increase pumping costs.	No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	It is unlikely that agriculture will be developed within the Fan Sediments based on existing development patterns observed in the area.
36.		Users near Tahlab		No	Yes	Not considered for further screening	Not considered for further screening	Not considered for further screening	No (Monitoring Only)	There is a potential for future abstraction by Iran to develop agriculture. Remote-sensing based monitoring will be undertaken to monitor agriculture cover until relevant mechanisms for management of transboundary impacts are established in consultation with the Iranian government. This will be undertaken to support data gathering for groundwater resources in Balochistan – The aquifer drawdown resulting from the Project's water use predicted via modelling does not extend to these locations.
37.		Users near Patangaz		No	Yes	Not considered for further screening	Not considered for further screening	Not considered for further screening	No (Monitoring Only)	
38.		Users near Hamun-i-Mashkel		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No (Monitoring Only)	The Project will not withdraw water from this NOC area. However, monitoring of groundwater levels will be undertaken at these locations to support future exploratory work for groundwater abstraction if it is required. .
39.		Users near Hok Chah		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	The area is currently neither planned for groundwater exploitation by the Project nor by other mining developers.

No	VEC	Receptors of Concern	Reason for inclusion as initial VEC	VEC Screening					Included as a priority VEC?	Rationale for Inclusion/Exclusion as Priority VEC
				Is the VEC impacted by the Project, in combination with other industrial developments and external stressors in the Study Area? [A]		Is the VEC an important issue for the stakeholders? [B]	Can the Potential Effects on the VEC be measured? [C]	Can the Potential Effects on the VECs be Considered within the Assessment of another VEC? [D]		
				On a Project level (yes/no)	Cumulative level (yes/no)					
40.		Future users near Gowd-e-Zerah		No	No	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	No agriculture users dependent on the water body identified and highly unlikely to exist in the future.
41.		Users near Taftan		No	Yes	Not considered for further screening	Not considered for further screening	Not considered for further screening	No	The Project will not be abstracting water from this aquifer.
42.	Income from Mining Industries Dependent on Groundwater		The exploitation of groundwater by the Project and other mining developments takes up 'development space', and it limits the financial viability of future industries that would require groundwater.	Yes	Yes	Yes	Yes	No	Yes	The other mining developments will have to use groundwater resource in the Hamun-e-Mashkel Basin Possibly compromising the ability of future projects in the area to access the groundwater and affecting their financial feasibility, reducing the potential income for the Balochistan province from other industry that may use this resource.

Key:

Priority VEC Selection	*Colour*
Yes	
No	
Monitoring Only	

5. CIA Scenarios

This section provides the scenarios developed for the CIA, the rationale behind their development and any assumptions made. A combination of these scenarios has been selected to develop the final CIA scenarios.

5.1 Development Scenarios

The CIA primarily focuses on mining developments as the main driver of economic growth and stimulus in the wider area. The CIA considered other aspects of economic development initially but concluded that other developments are likely to have a minor contribution.

The existing mining developments include all mining projects that have progressed beyond the feasibility stage and will thus likely be constructed. **Exhibit 5.1** provides an overview of the developments expected, with emphasis on mining developments, with mining capacity in Million Tons per Annum (MTPA).

Exhibit 5.1: Overview of Development Scenarios

	Existing Developments	*Forecasted*
Mining Developments	• Reko Diq (including Tanjeel): ~90 MTPA • Saindak Copper-Gold Project including expansion: ~4.25 MTPA • Siah Diq: ~20 MTPA Total: ~114 MTPA	4 additional Projects of similar size as Siah Diq or an addition of ~80 MTPA. Total: ~194 MTPA or 170% of baseline.
Other Developments	• Unlikely for significant other developments to be spurred due to mining projects. • Population Growth Rate: 6.4%[13] • Nominal GDP Growth Rate (Compounded Annual- 5Y): 7.5%[14]	

5.2 Management Scenarios

In addition to the extent of development and associated resource utilization that will result in impact on VECs, environmental management by the projects and other stakeholders including the governments and the communities will determine the extent to which the VECs will be impacted. **Exhibit 5.2** provides a matrix of baseline management versus enhanced management below.

[13] 2x historical population growth rate

[14] 3x historical GDP growth rate, per capita growth rate of 50% increase over historical projection.

Exhibit 5.2: Options for Management of VECs Under Management Scenarios

VEC	*Baseline Management*	*Enhanced Management*
Safe and Uncongested Road Networks	• Road maintenance is sporadic. • Speed limits are not enforced. • Incremental traffic is not considered. • No mechanisms for traffic related grievances. • Joint management is not considered.	• Roads are regularly maintained. • Speed limits are enforced, with emphasis on speed limits near settlements. • Road network is proactively expanded to account for future developments. • Grievance redressal mechanisms in which the mining companies includes provisions for traffic related grievances. • The mining companies train their staff in safe driving and road safety. • Additional safety measures such as barriers and speed breakers are enforced. • The government liaisons with the mining companies to establish collective mechanisms for management of the road networks.
Sustainable Urban Centres	Present-day management practices to continue	The government will undertake additional development measures in support from the mining companies including: • Establishing dedicated zones for vehicle repairs, maintenance, and service. • Relocating businesses and encroachments near transportation corridors. • Development of additional facilities such as hospitals and schools under CSR initiatives to reduce the burden on existing infrastructure. • Establishing liaison between security agencies and the mining companies to ensure that cross border smuggling is reduced.
GHG Emissions	Existing trend of Heavy Fuel Oil (HFO) for energy generation continues and use of the road networks for transport of product continues.	Renewable energy resources have been developed, sufficient to offset at least 30% of the energy requirement of the mining developments.[15]
Social Acceptance of Mining Projects	Existing practice of each project individually managing their stakeholder engagement continues.	• A forum which includes the government, mining companies, local community representatives and other stakeholders is

[15] Based on HBP's experience with mining projects and other industrial projects within Pakistan.

VEC	*Baseline Management*	*Enhanced Management*
		established to express stakeholder concerns and manage expectations. • The grievance mechanisms of mining companies have provisions for the aggrieved to receive support and intervention from the local government if the project is unable to resolve grievances.
Income from Mining Developments dependent on Groundwater	Water-use technologies and methods currently practiced in the baseline persist in this scenario.	High efficiency water use technologies are mainstreamed throughout the CIA Study Area. A breakdown of the reduction in water demand is provided in **Exhibit 5.3**. These measures will reduce dependency of the mining companies on the groundwater and provide additional 'development space' to the mining companies before they resort to more costly alternatives for water supply.
Biodiversity	No biodiversity management beyond mitigation measures in the ESIA Report.	Implementation of a standalone **Biodiversity Action Plan**.

Water use by the mining developments, settlements and agriculture will also be reduced via high efficiency technology measures introduced under the enhanced management scenario. **Exhibit 5.3** provides the projected water demand under the baseline management versus under enhanced management.

Exhibit 5.3: Water Demand under Baseline compared to under Enhanced Management

Sector	*Demand under Baseline Management*	*Demand under Enhanced Management*
Mining	Includes all mining projects that have progressed beyond the feasibility stage and will thus likely be constructed. The following Projects will be included: • Reko Diq (including Tanjeel): 48 (GL[16]/annum) • Saindak Copper-Gold Project including expansion: 9.6 GL/annum[17] • Siah Diq: ~61.8 GL/annum	• Reko Diq (including Tanjeel): 24 GL/annum • Saindak Copper-Gold Project including expansion: 4.8 GL/annum[18] • Siah Diq: ~30.9 GL/annum Total: 59.7 GL/annum or 50% of baseline Total (If only Reko Diq implements high efficiency): 95.4 GL/annum or ~80% of baseline

16 GL: Gigalitres or MCM (Million Cubic Meters)

17 Assuming 600 gallons per ton of ore processed, Source: https: //www.patagoniaalliance.org/wp-content/uploads/2014/08/Water-Consumption-at-Copper-Mines-in-Arizona.pdf

18 Assuming 600 gallons per ton of ore processed, Source: https: //www.patagoniaalliance.org/wp-content/uploads/2014/08/Water-Consumption-at-Copper-Mines-in-Arizona.pdf

Sector	*Demand under Baseline Management*	*Demand under Enhanced Management*
	Total: ~119.4 GL/annum	
Settlements	100 L/c/d	66.5 L/c/d[19]
Agriculture	Wheat: 3,625 m^3/ha[20] Maize: 3,979 m^3/ha[21] Date Palm: [22] 8,342 m^3/ha [1 ha = 100 trees]	Wheat, based on 44 %[23] reduced water use: ~2,000 m^3/ha Maize, based on 50%[24] reduced water use: ~1,990 m^3/ha Date Palm based on 40%[25] reduced water use: 8,342 m^3/ha [1 ha = 100 trees]

5.3 Scenarios Selected for CIA

Three scenarios have been defined to evaluate cumulative impacts of potential future mining developments in the CIA Study Area. **Exhibit 5.4** provides an overview of the scenarios, which are based on a combination of development and management scenarios. These scenarios illustrate the best and the worst outcomes for impacts of the development of mining industry on environment. Under the Business as Usual (BAU) Scenario, management practices will remain at the baseline or present-day level which will result in a higher level of impacts on the VECs. The Enhanced Management (EM) Scenario presents a best possible outcome for the environment, where the projects and stakeholders will adopt best practices to mitigate and minimize the impact on the environment. Both the BAU and EM scenarios assume a forecasted level of developments defined in **Section 5.1**, wherein pressures on VECs will continue to increase as the mining industry develops in the region.

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19 Study performed in Jamshoro, Pakistan which achieved water savings of 33.5% using various water saving methods. Source:
Talpur, B. D., Ullah, A., & Ahmed, S. (2020). Water consumption pattern and conservation measures in academic building: a case study of Jamshoro Pakistan. SN Applied Sciences, 2(11), 1781. doi: 10.1007/s42452-020-03588-z

20 Usman, M., Kazmi, I., Khaliq, T., Ahmad, A., Saleem, M., & Shabbir, A. (2012). Variability in water use, crop water productivity and profitability of rice and wheat in Rechna Doab, Punjab, Pakistan. Journal of Animal and Plant Sciences, 22(4), 998-1003.

21 https: //www.jains.com/Company/news/blog/HOWMUCHWATERDOESMYCROPNEEDPart7.htm#: ~: text=For%20a%20growth115%20days%20period,drip%20%E2%80%93fertigation%20assisted%20precision%20farming.

22 Al-Omran, A., Eid, S., & Alshammari, F. (2019). Crop water requirements of date palm based on actual applied water and Penman–Monteith calculations in Saudi Arabia. Applied Water Science, 9(4), 69. doi: 10.1007/s13201-019-0936-6

23 Zhang X, Zhang J, Xue J, Wang G. Improving Wheat Yield and Water-Use Efficiency by Optimizing Irrigations in Northern China. Sustainability. 2023; 15(13): 10503. https: //doi.org/10.3390/su151310503

24 Fonteyne, S., Flores García, Á., & Verhulst, N. (2021). Reduced water use in barley and maize production through conservation agriculture and drip irrigation. Frontiers in sustainable food systems, 5, 734681.

25 Al Wahaibi, H. S. (2018). Date Palm Production and Water Productivity Under Subsurface Drip Irrigation System.

Exhibit 5.4: CIA Scenarios Selected for Assessment

CIA Scenario	Mining Developments		Management	
	Existing	*Forecasted*	*Baseline Management*	*Enhanced Management*
Baseline	✓		✓	
Business as Usual		✓	✓	
Enhanced Management		✓		✓

6. Baseline Conditions of Priority VECs

This Section identifies the baseline conditions of priority VECs based on primary information and secondary information sources including GIS based techniques and literature.

6.1 Safe and Uncongested Road Networks

The road network in the CIA Study Area consists of small, unsealed roads connected to the N-40 highway. The N-40 highway is a 610 km long two-lane highway that connects Quetta to Taftan. All major settlements in the CIA Study Area such as Nok Kundi, Dalbandin, Mashkel and Taftan are connected via this highway. The N-40 highway will be the main access route for all traffic of the existing and future mining developments in the CIA Study Area that opt for road transportation.

Additionally, a new road is under construction under the China-Pakistan Economic Corridor (CPEC) Project called the Yakmach-Kharan Road. The road will connect the Yakmach settlement located near the N40-highway to the Kharan District. In consideration of the location of the existing and future mining developments, the construction of the Yakmach-Kharan Road will not reduce the incremental traffic over the N-40 highway.

The safety conditions of the existing road network are poor. Over the past few years, particularly after an influx of traffic over the major roads, several road accidents have occurred typically involving construction related traffic.[26,27] The road accidents, in addition to the loss of human life, can also a reputational concern for the projects and stakeholders involved[28]. The deterioration of the roads has contributed to increased traffic incidents.

Pictorial information collected during fieldwork of the ESIA reveals that most roads are unsealed, and speed limits are poorly enforced on the N-40 highway. In the case of any road accident, the injured are typically required to be transported more than tens of kilometres or more to a suitable health facility such as the hospital in Dalbandin.[29] **Exhibit 6.1** shows conditions of the road network in the CIA Study Area.

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[26] The News. (2016). Nok Kundi: 7 dead, 8 injured as trailer truck collides with bus. Retrieved from https://www.thenews.com.pk/latest/172535-Nok-Kundi-7-dead-8-injured-as-trailer-truck-collides-with-bus

[27] Balochistan Point. (2015). Noshki: 3 People Dead in Traffic Accident. Retrieved from http://thebalochistanpoint.com/noshki-3-people-dead-in-traffic-accident/

[28] Dawn News. (2023). Portuguese tourist killed in Dalbandin road accident. Retrieved from https://www.dawn.com/news/1768270/portuguese-tourist-killed-in-dalbandin-road-accident

[29] Dawn News. (2017). At least 11 dead, 37 injured in Chaghi road accident. Retrieved from https://www.dawn.com/news/1365966/at-least-11-dead-37-injured-in-chaghi-road-accident

Exhibit 6.1: Photographs of the Road Network

Un-sealed road near Mashki Chah settlement

Blacktop N-40 road near Nok Kundi Town

Blacktop road near Lulakdan settlement Water source

Un-sealed road near Project site

Un-sealed road near Kachow settlement
(West of the Reko Diq Mine Site)

Un-sealed road near Saindak settlement (West of the Reko Diq Mine Site)

6.2 Greenhouse Gas (GHG) Emissions

Greenhouse gas emissions from the CIA Study Area under baseline conditions will rise primarily from the three mining developments. The main source of the emissions will be the power generation facilities of the mining developments, with a minor contribution in

the form of indirect emissions from transportation activities. The GHG estimations from the three projects based on their total mining capacity is provided below.

- Siah Diq: ~252,000 tons CO_2-eq per annum[30,31].
- Saindak Copper Gold Mine: ~50,000 tons CO_2-eq per annum[32].
- Reko Diq: ~ 1,450,000 tons CO_2-eq per annum.

The net GHG emissions in the baseline due to existing or planned mining developments is 1.75 million tons of CO2-eq emissions per annum.

6.3 Social Acceptance of Mining Projects

Mining projects in Balochistan face significant reputational risks due to a perception that the mining projects intend to extract the mineral resources of the province without benefiting the local population. The Balochistan government has also protested against what it perceives as the province and its communities receiving an unfair share from the ongoing exploitation its energy and mineral resources[33].

Recent incidents involving armed attacks and insurgent activities have highlighted the precarious security situation affecting mining operations in the region.[34,35] These security challenges not only threaten the physical infrastructure and staff of mining companies but also increase the perceived risk for future investments in the province.

Additionally, health and safety issues in the mining industry in Balochistan are common, with a significant number of miners killed in accidents over recent years[36]. These health and safety issues not only affect miners' well-being but also pose significant reputational risks to mining companies, as they highlight the need for improved working conditions, better safety protocols, and more robust health and safety training for miners[37]. The mining developments discussed in this CIA will likely be open-pit mining, which significantly reduce the risk of worker injuries and casualties.

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30 Based on a Copper (Cu) metal output of ~97,000 tons/annum and a GHG intensity of 2.6t CO_2-eq/ton of Cu produced.

31 GHG intensity of 2.6 CO_2-eq/ton of Cu from Australian Government: Australian Renewable Energy Agency (ARENA), 2017. SunSHIFT: Renewable Energy in the Australian Mining Sector.

32 Linearly extrapolated from Siah Diq emissions based on 4.25 MTPA of ore mined.

33 The Express Tribune. (2015). Balochistan protests against extension in mining lease. Retrieved from https: //tribune.com.pk/story/979563/sui-gas-field-balochistan-protests-against-extension-in-mining-lease

34 Nikkei Asia. (2022). Pakistan insurgents behind China attacks threaten Barrick Gold mine. Retrieved from https: //asia.nikkei.com/Politics/International-relations/Pakistan-insurgents-behind-China-attacks-threaten-Barrick-Gold-mine

35 Asia Times. (2022). China to soldier on in Pakistan despite attacks. Retrieved from https: //asiatimes.com/2022/02/china-to-soldier-on-in-pakistan-despite-attacks/

36 Peoples Dispatch. (2023). In just three months, 30 coal miners died in Pakistan. Retrieved from https: //peoplesdispatch.org/2023/03/23/in-just-three-months-30-coal-miners-died-in-pakistan/

37 Dawn News. (2018). What is behind the deaths of coal miners in Balochistan? Retrieved from https: //www.dawn.com/news/1434931

The consultations carried out as part of the ESIA reveal that expectations for CSR activities from mining developments is high. The local communities expect illicit cross border trade to be increasingly regulated in the future, and thus expect that sufficient employment opportunities should arise from these developments to offset the loss. The consultations did not identify individual stakeholders who are opposed to the mining projects in the province, provided that the distribution of benefits of the projects is equitable and that adequate provisions are in place for the security of these projects.

6.4 Sustainable Urban Centres

Typically, cumulative developments of the scale of mining projects result in an influx of businesses and labour to the urban centres of a region. This is especially true in regions such as Balochistan where employment opportunities and services are limited.

The cumulative development of mining projects will result in the enhancement of services and more businesses in urban centres. While this will improve the local economy, it can have unintended effects such as unplanned urban developments. Presently, major urban centres in the CIA Study Area include Nok Kundi, Dalbandin and Taftan. Although development is expected to occur in some of the smaller communities, these urban centres are expected to experience the largest surge in growth.

Secondary information on the urban centres in the CIA Study Area is limited. Based on GIS imagery of Nok Kundi, much of the development appears to be unplanned as evidenced by the proximity of businesses and vehicles parked near the highway. This is typical of urban developments in the region as much of the economy is informal and unregulated. The development in this town is expected to be high as all traffic from the mining projects will travel through the N-40 highway which runs through the town. This town will likely serve as a key service area for heavy machinery and trucks. Additionally, Nok Kundi houses a railway station and is thus a gateway for both rail and road traffic into the region.

The proliferation of narcotics in part due to illicit border trade has in certain instances impacted the security situation in these settlements[38]. The relationship between security agencies and the local communities has historically remained tense, and the influx of additional business and economic activity will likely increase these security conflicts if not managed properly. **Exhibit 6.2** provides Google Earth ™ imagery on trends in some of these developments.

[38] Radio Pakistan. (2019). FC Balochistan recovers huge quality of narcotics in Mashkail. Retrieved from https: //www.radio.gov.pk/31-05-2019/fc-balochistan-recovers-huge-quality-of-narcotics-in-mashkail

Exhibit 6.2: Comparison of GIS Imagery

Pakistan - Afghanistan border (2013 imagery) – unpaved tracks from illicit trade across the border can be observed

Pakistan - Afghanistan border (2023 imagery) – the number of unpaved tracks has increased considerably

6.5 Income from Mining Developments Dependent on Groundwater

The only operational project in the CIA Study Area is the Saindak Copper Gold Project which commenced operation in 1995. In 2022, the project produced 16,426 tonnes of blister copper at a profit of 74.71 million USD. In total, the CIA Study Area is estimated to have upwards of ~6.5 billion tons of copper ore with grading between 0.4 to 0.5%. **Exhibit 6.3** provides a map that broadly identifies locations of the mineral resources of Balochistan.

The Siah Diq and Reko Diq projects are currently planned for construction and are expected to be fully operational by 2030. The projects have carried out exploratory drilling and are not expected to be financially constrained due to unavailability of groundwater supply. The Saindak Copper Gold Project currently abstracts water from the Lulakdan Wetland NOC area which will also be shared by the Siah Diq Project, whereas the Reko Diq Project will abstract from the Fan Sediment NOC.

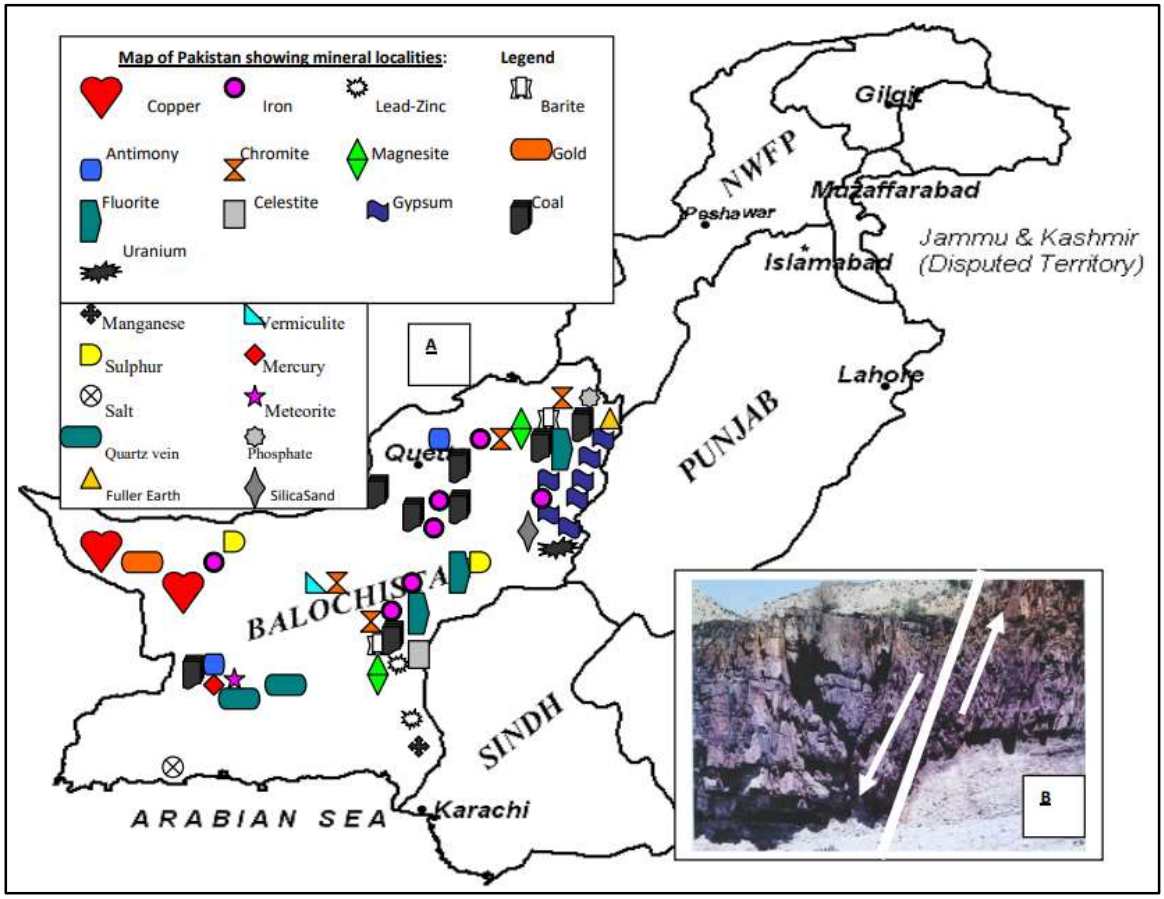
If the Siah Diq and Reko Diq projects become fully operational, a total of ~119.4 GL/annum of water will be abstracted from the aquifers in the CIA Study Area (Error! Reference source not found.). However, it is likely that additional mining projects will come into operation as the mineral resource potential of the CIA Study area is high. A breakdown of the deposits of the Chagai Magmatic Arc within the Chagai district is provided below:

- Dasht Kain Copper Deposit: Situated 35 km North-West of Chagai Village, it is a porphyry type copper prospect. Three bore holes have been drilled in western stock. The average copper values in quartz sericite zone vary from 0.1% to 0.17% from 0.25% to 0.54 % in the potassium silicate zone.
- Talaruk Copper Deposit: Situated 64 km Noth-West of Saindak in Chagai District, it is an extensive Kuroko type deposit. Six exploratory bore holes have been drilled in these deposits and its copper content has been about 0.65%.
- Saindak Copper Deposit: Located 9.4 km South-East of Fort Saindak in Chagai district. The ore is hydrothermally altered, and the mineralized zone is known as

Saindak alteration zone. The north ore body is developed along vein zones though oxide mineralization. Nineteen bore holes were drilled in this body and 19 Mt of ore averaging 0.498% copper have been proven. The south ore body lies 2 km south of the North ore body and is developed within a few meters of the surface. 27 holes have been drilled and reserves of 27 Mt of ore averaging 0.64% copper have been proven. The total reserves at Saindak comprise 412 Mt of ore containing an average of 0.38% copper and gold at 0.3228g per ton of ore.

Exhibit 6.3 provides a map of the mineral resources of Balochistan, showing that the copper and gold deposits of the Balochistan province fall entirely within CIA Study Area.

Exhibit 6.3: Mineral Resources of Balochistan



6.6 Biodiversity

The Reko Diq Mine Site and Associated Infrastructure fall within a desert ecoregion that contains the dry Sistan Basin of southern Afghanistan and portions of eastern Iran and southwest Pakistan. The region is dominated by dry sandy desert conditions. The proposed Marine Terminal at Port Qasim fall within the broader context of the Indus Delta ecoregion, which is characterized by a complex Associated Infrastructure network of tidal channels, mudflats, and mangrove forests. The Specialist Reports on

Biodiversity[39,40] detail the baseline ecological conditions prior to the Project construction. A summary of these findings is provided below.

6.6.1 Goitered Gazelle

The Red List of Pakistan categorizes the Goitered Gazelle (*Gazella subgutturosa*) as Critically Endangered which is a mammalian species reported from the Reko Diq Mine Site Area.

The distribution range of Goitered Gazelle (*Gazella subgutturosa*) as reported by IUCN as well observed in the Summer 2024 Survey and consultation with local hunters and Sardars; is restricted to only the western part of the Chagai District i.e., predominantly the Northern Groundwater System and Reko Diq Mine Site. Error! Reference source not found. provides the EAAA for this species.

6.6.2 Alcock's Toad-headed Agama

The Alcock's Toad-headed Agama (*Phrynocephalus euptilopus)* has been reported near Darband Cha in Balochistan, along the Afghan border, and from southwest Afghanistan while it was also captured from the Northern Groundwater System area in the 2022, and 2024 surveys carried out by HBP's team for the Reko Diq Mining Project. The species occurs rarely and there is very little data for this species, much of which is outdated, with only 11 specimens[41] observed so far. Error! Reference source not found. provides the EOO and EAAA developed for the species.
As per the local expert[42] and discussion with international expert[43] this species prefers to inhabit low sand dune tracts with relatively good vegetation cover, ideally at the interface with clayey or gravel plains, and up to an elevation of 950 m. The home range for this species is around 100 m^2 as estimated by experts. This species exhibits a distinct habitat preferring sandy habitat with some vegetation. Loose sand is crucial for its survival, as it relies on burrowing into the sand for camouflage and protection when sensing a threat. Additionally, vegetation plays a vital role by supporting the insects and other organisms that constitute their primary food sources.

The species distribution map was refined based on expert input and field observations, focusing on the species' habitat preferences. The map identifies an EOO of 40,150 km², characterized by tracts of sand dunes with scattered vegetation and low sand dunes.

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39 R4US5RKG - Biodiversity - Fauna

40 R4FS5RKG - Biodiversity - Flora

41 Seven from Darband Cha, one from Darwesian and three collected by HBP from three different sites while specimen (s) shown on the IUCN map at the border between Afghanistan and Pakistan, but there is no available record for the specimen (s).

42 Dr Rafaqat Masroor-Herpetologist, Pakistan Museum of Natural History.

43 Expert from California Academy of Sciences.

7. Assessment of Impacts

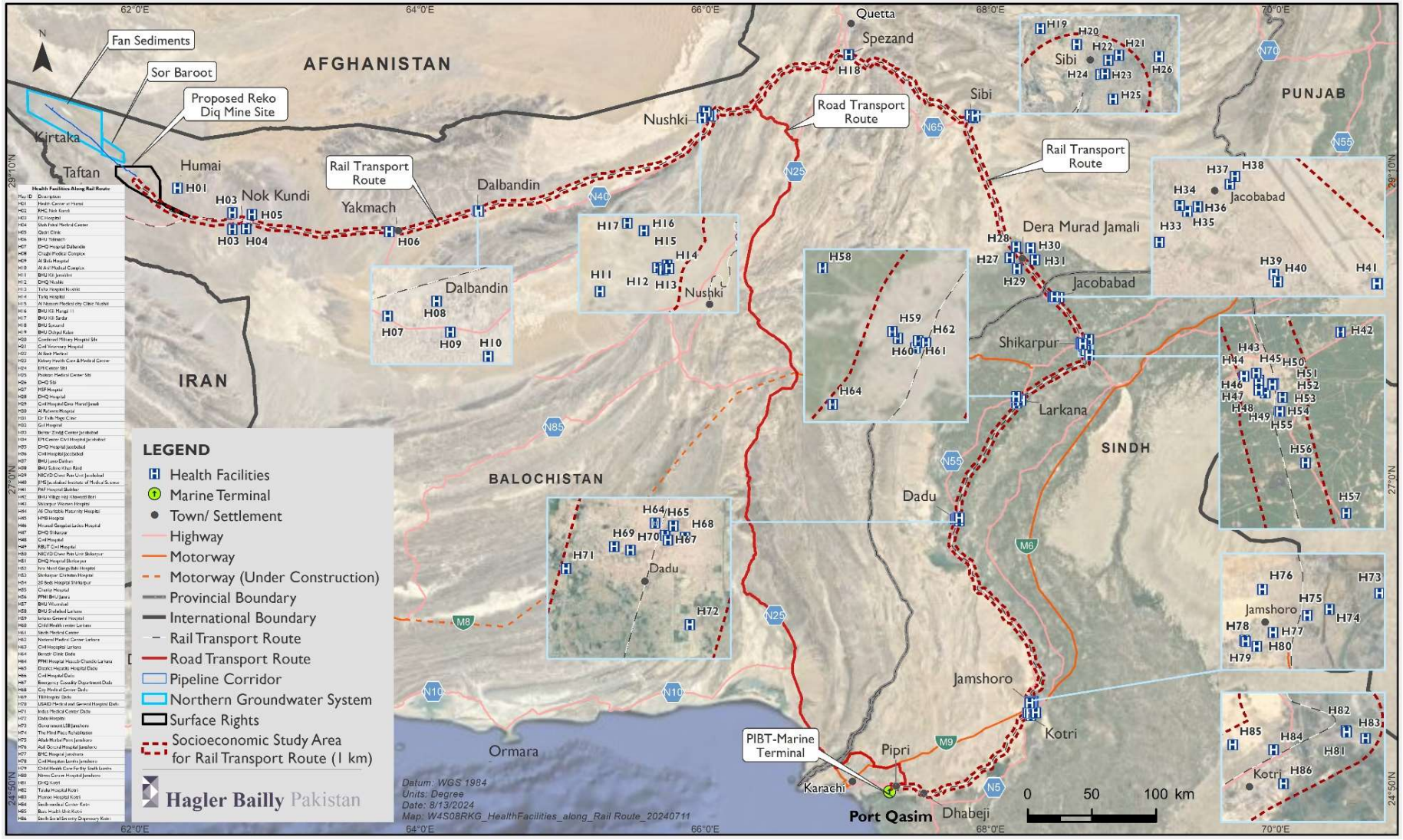
This section provides an assessment of impacts on VECs expected under the CIA Scenarios. An overview of the baseline conditions is also provided. **Section 6** provides a description of the baseline conditions of the VECs.

7.1 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 the construction phase, and possibly in the operations phase, 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.

A review of secondary sources indicates that road accidents have occurred on several occasions in the past, owing to congestion on the road, degraded road conditions and unsafe driving. Often, healthcare facilities are situated at large distances from points of accidents, resulting in the injured persons being unable to receive timely medical assistance. **Exhibit 7.1** 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.

Exhibit 7.1: Health Facilities along Road Transport Route and Rail Transport Route



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 reported several times in news articles over the past few years.

7.1.1 Business as Usual Scenario

The condition of the road network is expected to deteriorate significantly in the BAU scenario. The forecasted developments include four additional mining developments in addition to the Reko Diq 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 concentrate to the ports, and import of fuel and other materials will significantly degrade the roads, resulting in increased congestion and reduced road safety. Along the N-25 highway, one of the roads that will be partially used for the Projects for all construction-related traffic, roughly 800 traffic accidents took place in 2019[44]. 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[45].

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[46]. There are presently no plans for upgrading the N-40 highway to a four or six-lane carriage, roads constructed 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 and controlled access for traffic or streetlights. **Exhibit 7.2** 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.

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44 Dawn News. (2020). Balochistan: accidents. Retrieved from https: //www.dawn.com/news/1585865

45 Radio Free Europe (RFE) and Radio Liberty (RL). (2021). 'Killer Highways': Why Balochistan's Roads Are More Lethal Than Terrorists. Retrieved from https: //www.rferl.org/a/balochistan-traffic-accidents-/31296038.html

46 ibid.

Exhibit 7.2: Map of the Planned CPEC Western Alignment Route

Source: Ministry of Planning Development & Special Initiatives. (n.d.). Highways Network Of CPEC. Retrieved from https: //cpec.gov.pk/map-single/1

Based on estimates derived from the Project's ESIA, an incremental traffic equivalent to 4,900 truck trips per annum equivalent to 13 additional Passenger Car Units (PCU) day at the N-40 Highway near Nok Kundi. The contribution from the Project is equivalent to a 0.6% increase over the baseline traffic levels.

The Business as Usual Scenario assumes a total of 194 MPTA of copper mining, or 215% of the Reko Diq 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.

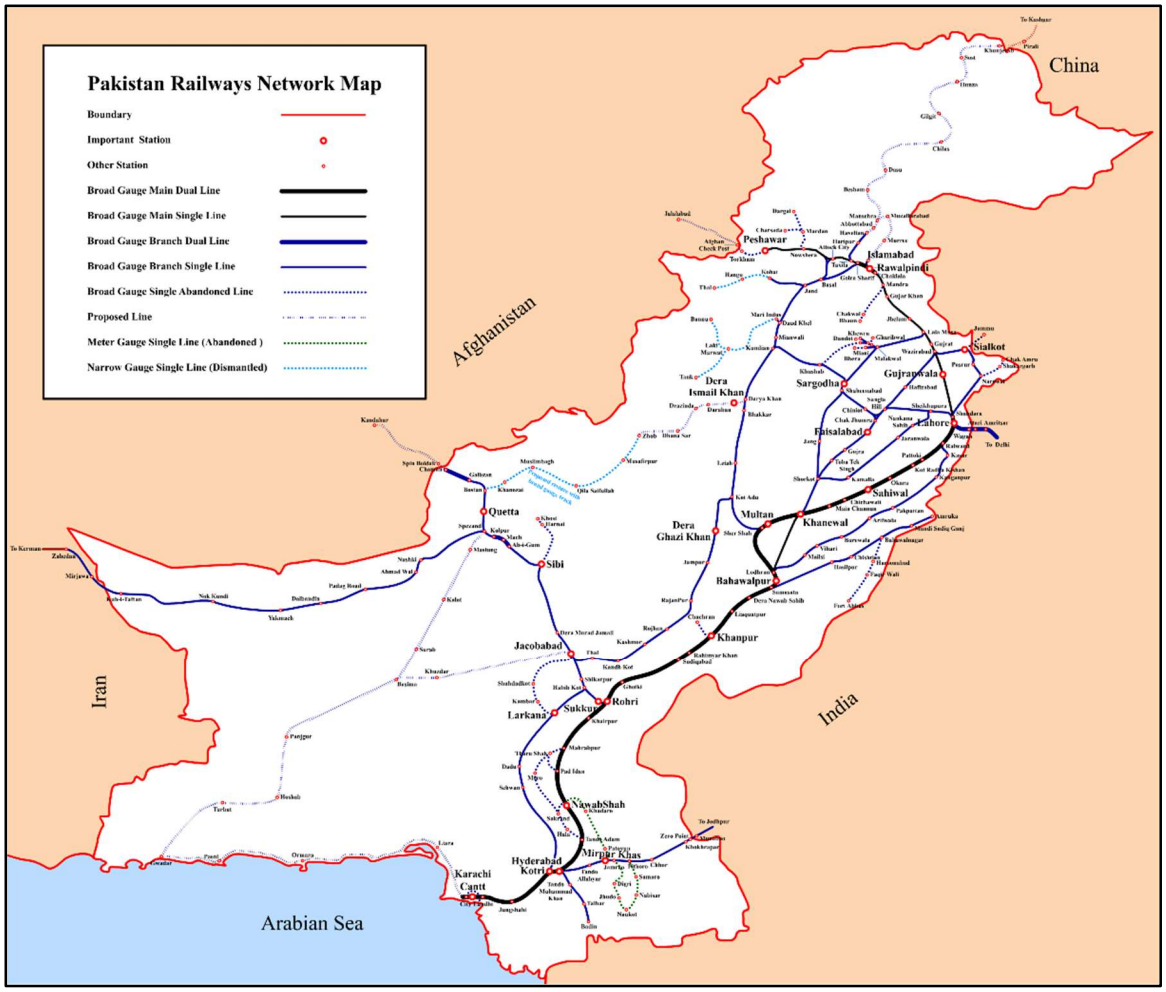
7.1.2 Enhanced Management (EM) Scenario

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 minimized.

In the 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. **Exhibit 7.3** provides a map of the planned railway route to Gwadar.
- 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.

Exhibit 7.3: Planned Railway Route to Gwadar



Source: WFP. Logistics Cluster. (2022). Pakistan Railway Assessment. Retrieved from https: //dlca.logcluster.org/24-pakistan-railway-assessment

If 50% of the additional forecasted mining capacity, corresponding to 40 MPTA, 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 minimized.

7.2 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.

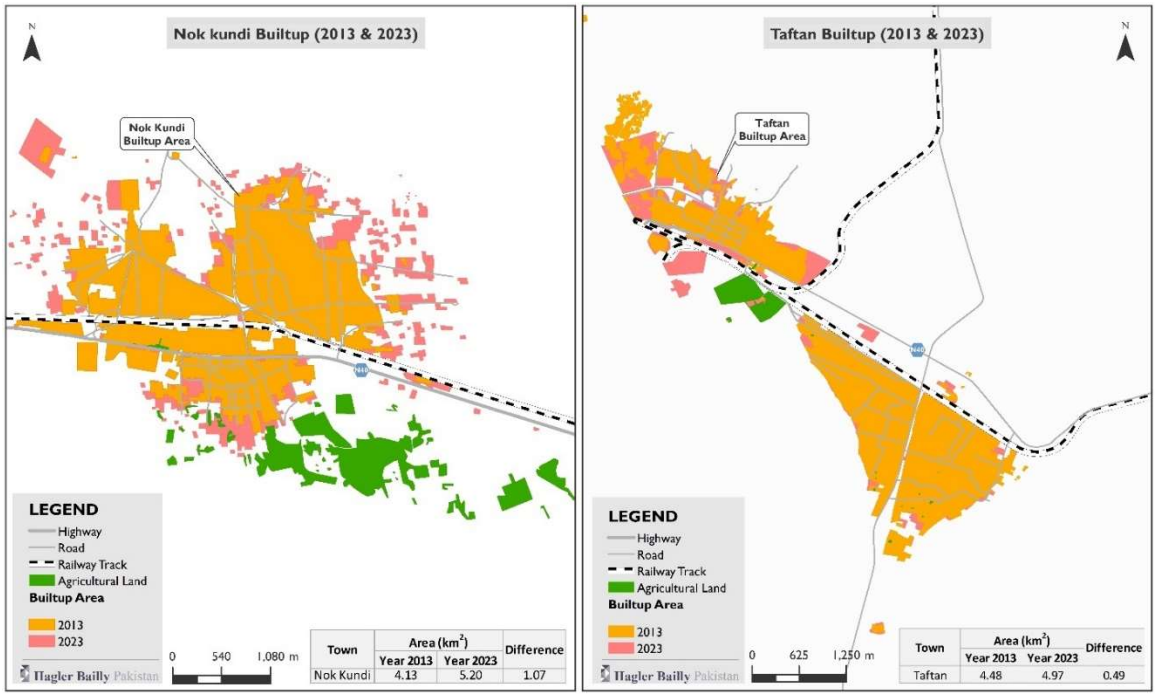
The baseline conditions derived from GIS imagery, secondary sources and consultations carried out as part of the early works ESIA suggest that developments in the CIA Study Area are largely unplanned. This is evidenced by the GIS imagery that shows increased urbanization near the road network and expansion of retail areas.

7.2.1 Business as Usual Scenario

The unplanned development will result in reduced road safety, encroachment around transportation routes and deteriorating security violations. Based on the population growth rate in the BAU Scenario, the population in the Nok Kundi is expected to increase to ~40,000 residents[47] 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. **Exhibit 7.4** provides an overview of the land-use in and near the towns of Nok Kundi and Taftan between 2013 and 2023.

Exhibit 7.4: 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 prioritized in the BAU scenario.

[47] 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.

Exhibit 7.5 provides imagery of Taftan and Nok Kundi which illustrates this phenomenon.

Exhibit 7.5: Images identifying Public Spaces in Taftan and Nok Kundi Settlement

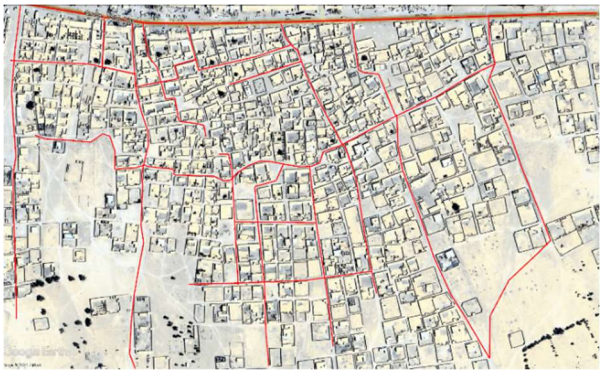
Nok Kundi Settlement – No parks or recreational spaces are observed. Some undeveloped space has been allocated for a local school (outlined in red) is situated near a busy road.

Taftan Settlement – A complete absence of parks and public spaces can be observed with the exception of one cricket ground (outlined in red).

- **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. **Exhibit 7.6** 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.

Exhibit 7.6: Comparison of Arterial Roads in Nok Kundi

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.

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. **Exhibit 7.7** provides imagery of the Nok Kundi outskirts, showing the emergence of scattered settlements likely to continue in the BAU Scenario.

Exhibit 7.7: Comparison of GIS Imagery

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.

7.2.2 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 minimized, 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.

7.3 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 is a GHG intensive process and can significantly contribute to climate change.

The existing and planned mining projects rely on Heavy Fuel Oil (HFO) for energy production. While the Reko Diq Project intends to develop a solar field to offset its HFO use[48], 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.

7.3.1 Business as Usual Scenario

In the absence of a connection with the national power grid that can provide backup power, it will be significantly less financially attractive for the other mining projects to install solar PV and wind-based generation capacity to meet a large portion of their power requirements 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 million tons 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.

7.3.2 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 million tons per annum 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.[49,50]

7.4 Social Acceptance of Mining Projects

The mining projects can face reactions from the local communities and other stakeholders if their activities are perceived to contribute to infringement on the rights of the local

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[48] The Reko Diq Project intends to develop a 200 MW solar field at the time of writing. This is expected to fulfil between 20 to 25% of the Project's energy requirements.

[49] 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.

[50] Difference in Road and Rail emissions scenario for Reko Diq interpolated for 80 MPTA of additional mining expansions in BAU Scenario.

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 provided by mining projects. 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.

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.[51]

7.4.1 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 Community Development Committees (CDC) comprised of members from various local stakeholders, including tribal elders and district representatives. 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 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. Exhibit 7.8 presents examples of CSR initiatives completed by the Reko Diq Project.
- 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[52].
- 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

[51] The Express Tribune. (2015). Balochistan protests against extension in mining lease. Retrieved from https: //tribune.com.pk/story/979563/sui-gas-field-balochistan-protests-against-extension-in-mining-lease

[52] Retrieved from https: //saindak.com.pk/csr/ on March 14th, 2024

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.

Exhibit 7.8: CSR Initiatives completed by the Reko Diq Project

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)

7.4.2 Enhanced Management Scenario

The complex socioeconomic and broader regional issues impacting the mining industry fall beyond the scope of Reko Diq's existing CDC. Several issues, such as labour rights

violations,[53] safety hazards,[54] and challenges related to worker registration and training,[55] 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 Reko Diq for the CDC, 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.

7.5 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 Hamu-e-Mashkel Basin (**Exhibit 1.3**) and may extract water from Gowd e Zareh 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 water supply pipelines from the sea and desalination of sea water to meet their demand for water.

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 the aquifers in Tahlab, Fan Sediments, and Patangaz/South Hamun (**Exhibit 1.3**) will be sufficient to meet demand for water by the projects.

7.5.1 Business as Usual Scenario

The forecasted mining developments in this scenario will likely put significant pressure on the supply from the Tahlab and Patangaz areas, as exploratory work undertaken by the Project suggests that the supply from the Fan Sediments groundwater system will meet the needs of the Project for its entire life. This will prompt other mining projects to carry

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53 Retrieved from https: //thefridaytimes.com/14-Jan-2023/mining-sector-s-potential-not-fully-exploited-in-balochistan

54 Retrieved from https: //www.theguardian.com/global-development/2020/feb/19/coal-workers-are-orphans-the-children-and-slaves-mining-pakistans-coal

55 Retrieved from https: //www.brecorder.com/news/40265519

out exploratory work on the Hamun-e-Mashkel NOC or Nok Chah NOC areas, and to the north, east and west of the Hamun-e-Mashkel where NOCs for exploration of groundwater have not been issued yet.

7.5.2 Enhanced Management Scenario

Adoption of technologies that achieve high efficiency of water use will result in a net reduction of 30-50% 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.

7.6 Biodiversity

The development of additional mining projects in the CIA Study Area can adversely affect biodiversity by permanently modifying habitats and fragmenting ecosystems. Additionally, the movement of heavy vehicles and machinery for mining operations can result in death of various fauna species.

The presence of the Goitered Gazelle (*Gazella subgutturosa*) and Alcock's Toad-headed Agama (*Phrynocephalus euptilopus)* triggers Critical Habitat (CH) under IFC Performance Standard 6. The proposed Reko Diq Mine Site, in the Northern Groundwater System and pipeline route and Access Route to Reko Diq Mine Site are located in a habitat with scattered vegetation patches, attributed to natural desert conditions and classified as Natural Habitat under IFC PS6. There are low level disturbances in terms of routes for cross-border trade, camps for security agencies and project-related camps. Moreover, according to the United Nations Environmental Programme: World Conservation Monitoring Centre’s (UNEP-WCMC) screening layers, most of the Study Area is Likely Natural habitat (75.4%) followed by Potential Natural (10.6%), Potential Modified (12.4%) and Likely Modified (1.5%). Considering these, the terrestrial habitat within the Reko Diq Mine Site and Associated Facilities are largely classified as Natural Habitat.

7.6.1 Business as Usual Scenario

In the Business as Usual Scenario, long-term impacts are expected to occur to the biodiversity due to development of additional mining projects. Additional mining Projects can result in cumulative impacts to biodiversity, as the Project’s own mitigation measures may be unable to offset impacts that can occur from future mining developments.

While it is expected that Project’s Environmental and Social Management Plan (ESMP) can offset some of these impacts, joint management of cumulative impacts will be required to control introduction of AIS into the EAAA, fragmentation of habitat and disruption of ecosystem functions due to land clearing and exploration work.

7.6.2 Enhanced Management Scenario

Enhanced Management (EM) will involve the implementation of a Biodiversity Action Plan which will ensure that cumulative impacts of mining developments within the Mine Site EAAA can be appropriately mitigated, and that long term monitoring of the ecosystem health and species that trigger CH is effectively undertaken.

8. Frameworks for Management of Cumulative Impacts

This section provides management frameworks for cumulative impacts, identifies roles and responsibilities, and identifies monitoring requirements envisioned under the Enhanced Management Scenario.

8.1 Water Supply Strategy

Management of the groundwater resources in Balochistan is governed under the Balochistan Groundwater Rights Administration Ordinance, 1978 (No. IX of 1978). The ordinance under Clause 3, sub-clause 6 stipulates that the Provincial Water Board will:

> e) Identify aquifers (*sic*) of ground water and declare such aquifers as considered necessary as Designated Ground Water Basins.
>
> k) It shall also determine the safe yield in respect of each basin beyond which the District Water Committee will not be authorized to issue further permits.

At present, the government has notified the groundwater resources of the province but has not undertaken a determination of the "safe yield" of the groundwater resources. The responsibility for the determination of the "safe yield" and whether water abstraction results in a significant aquifer drawdown at receptors, has thus been relegated to the mining companies.

A Water Supply Strategy needs to be prepared to manage the groundwater resources for the mining projects that may be developed in Chagai Magmatic Arc. The mining companies can align their approach with the existing work undertaken by RMDC for the determination of the impacts of water abstraction and monitoring. In addition, this framework will also outline technology options that the mining projects can consider for a reduction in their water use and alternative options available.

8.1.1 Determination of Groundwater Impact

A quantitative analysis based on groundwater modelling should be used to inform the project's impact on the aquifer resources. The project must initially determine:

- The aquifer from which it intends to extract groundwater.
- The total water requirements expected for the project.
- The life of the project over which it intends to extract groundwater.

To support an assessment such that it fulfils good practices as identified in the IFC Good Practice Handbook for Cumulative Impact Assessment and Management, a receptor-based approach is required such that appropriate transboundary impacts are also captured. The following must be identified:

- Identification of the receptors dependent on groundwater
- Receptors based on stakeholder consultations

- Other receptors that can be of reputational concern

Once determined, a variety of groundwater models can be used to support a quantitative assessment. The assessment should be able to determine the aquifer drawdown expected at the receptor locations with a reasonable accuracy in the order of 1.0 m of greater. The temporal domain of the model should extend throughout the LoM and can be extended further if it is expected that the groundwater drawdown will be induced after the project has discontinued abstraction.

8.1.2 Monitoring

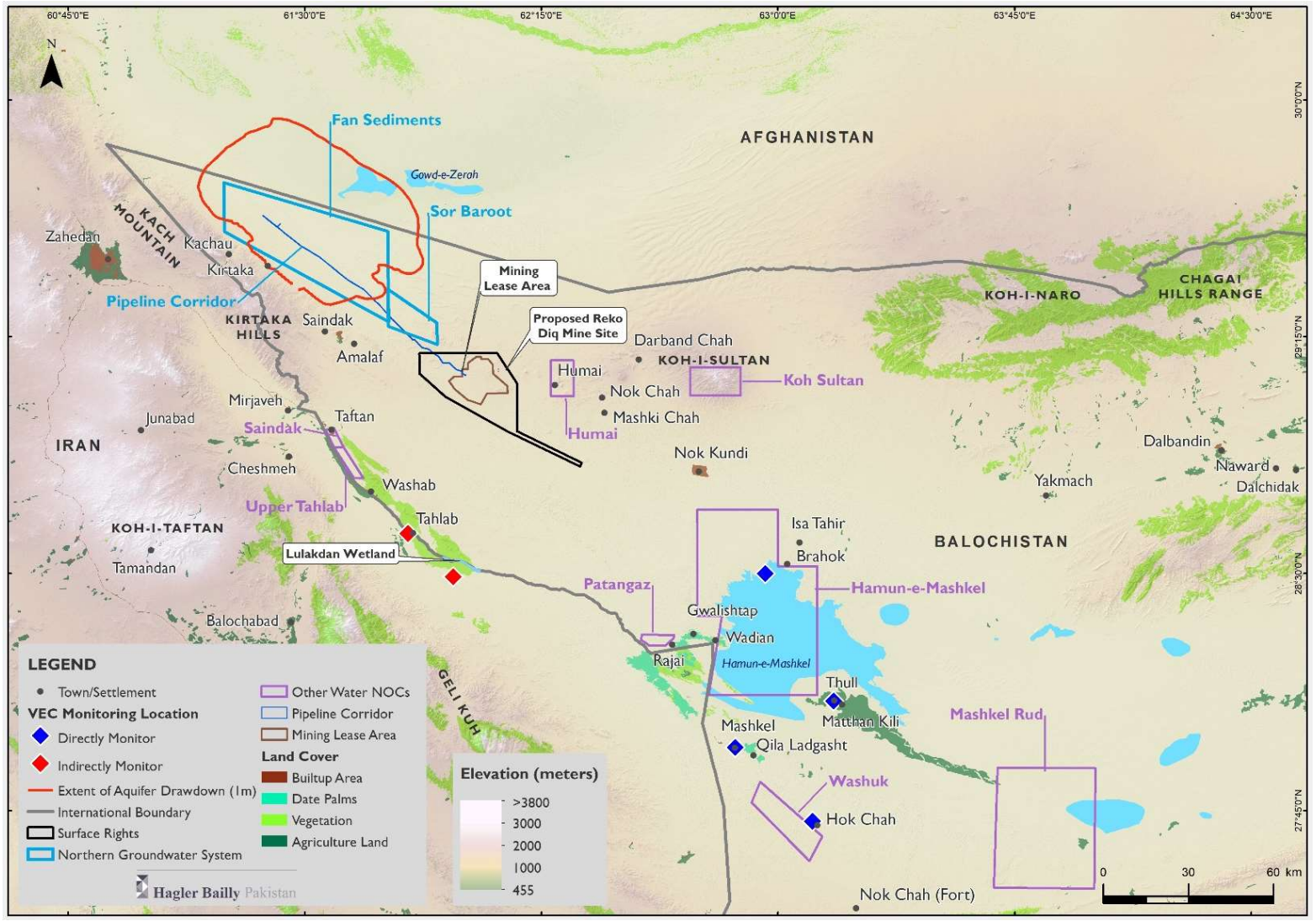
All projects must monitor the groundwater levels at the nearest receptors, in addition to other receptors of concern as determined through field surveys, stakeholder consultations and remote sensing.

RMDC, in addition to monitoring of groundwater levels within its model domains at which a drawdown of at least 1 m is expected, has also identified potential receptors within the CIA Study Area for consideration for other mining projects. **Exhibit 8.1** provides the list of receptors, which is not intended to be exhaustive and can be supplemented based on the individual project's aquifer drawdown and **Exhibit 8.2** shows the locations on a map.

Exhibit 8.1: Suggested Monitoring Locations

No.	*VEC*	*General Description of Receptors*	*Name of Location*	*Location ID*	*Lat*	*Long*	*Rationale for Selection*
Monitoring in CIA Context Based on Borehole Data							
1	Availability of Water for Settlements (Drinking/Irrigation)	Communities near Hamun-i-Mashkel	Thul	CD_001	28.096993°	63.176454°	Impact of abstraction by future mining projects on groundwater resource east of the Hamun-i-Mashkel.
2			Brahok village north of Hamun-i-Mashkel	CD_002	28.500000°	62.960000°	Impact of abstraction by future mining projects on groundwater resource north of the Hamun-i-Mashkel.
3			Mashkel	CD_003	27.949444°	62.865151°	Impact of abstraction by future mining projects in Hamun-i-Mashkel and Mashkel Rud on groundwater resource south of the Hamun-i-Mashkel.
4		Communities near Hok Chah	Hok Chah	CD_004	27.715526°	63.109670°	Impact of abstraction by future mining projects in Washuk NOC on groundwater resource.
Monitoring in CIA Context Based on Remote Sensing and Secondary Sources							
5	Availability of Water for Settlements (Drinking/Irrigation)	Communities in Iran near Lulakdan	Lulakdan	CS_001	28.489982°	61.970741°	Impact of abstraction due to developments on Iranian side of border.
6			Tahlab	CS_002	28.626836°	61.827637°	Impact of abstraction due to developments on Iranian side of border.

Exhibit 8.2: Map of Suggested Monitoring Locations



8.2 Urban Development and Transport Corridor Management

Sustainable urban centres and safe and uncongested road networks have been identified as VECs in this CIA in **Section 3**. The baseline identifies those conditions of road networks and urban centres have already undergone degradation due to development in the past and are expected to degrade in the BAU Scenario due to the mining projects forecasted.

Urban development and management of local roads in Balochistan is the mandate of the local government, with regulatory supervision from the Urban Planning & Development Department, Government of Balochistan. The development and maintenance of the highway networks is managed at the Federal Level by the National Highway Authority (NHA) under the Ministry of Communications (MoCom). **Section 2** provides an overview of the applicable laws under which urban development is managed by the government in the CIA Study Area.

The mining companies under the scope of this Urban Development and Transport Corridor Framework can mitigate their cumulative impacts on the VECs by proactively identifying their traffic related impacts and developing traffic management plans and aligning their CSR initiatives toward sustainable urban development which is further detailed below.

8.2.1 Assessment of Traffic Impacts in ESIAs and Traffic Management Plans

There are currently no nationally published guidelines for traffic-related information that mining companies must include in their ESIAs. Mainstreaming this practice at the ESIA stage will allow for regulatory bodies to make informed decisions on planned expansions to the road networks. Mining companies can include the following information in their ESIAs:

- Transport routes that will be used by the project
- Baseline traffic information along transport routes
- Incremental traffic along transport routes for construction and operations[56]

The ESIA should commit to the development of a Traffic Management Plan which at minimum should address the following aspects:

- Vehicle maintenance
- Maximum loading capacity for vehicles
- Enforcement of speed limits
- Training for project staff on safe driving
- Provisions in the Grievance Redressal Mechanism (GRM) for traffic related grievances
- Visual inspection of road conditions and continual stakeholder consultation

[56] Expressed either as annualized PCU (Passenger Car Units), truck trips or any other comparable value

8.2.2 Alignment of CSR Activities

The mining companies in consultation with the local government will align their CSR activities to the extent possible in supporting sustainable urban development. Some examples of what these activities can include are provided below:

- Development of public recreational spaces
- Public transport schemes
- Enhanced maintenance and upgradation of arterial roads
- Upgrading of the safety of the highway network
- Development of Heavy Transport Vehicles (HTV) service areas away from towns

Under Section 18 of The Balochistan Housing and Town Planning Authority Act, 2020, a Housing and town Planning (Revolving) Fund has been formed. The mining companies in consultation with the UP&DD will consider contributions to this Fund to support regional development plans and capacity building.

8.2.3 Monitoring and Reporting

The mining projects will monitor the following aspects in accordance with this framework as indicative measures of their performance:

- Funding for CSR initiatives, with breakdown of activities (in PKR)
- Number of consultations with UP&DD, with minutes of meetings
- Pictorial evidence of road conditions[57] at:
    - N-40 highway as it passes through Nok Kundi and Taftan
    - N-40 highway near project entrance
    - N-85 highway at select locations

The information will be compiled in a monitoring report and submitted annually for the review and deliberations of the Mining Development Advisory Forum.

8.3 Energy Supply Strategy

A significant reduction in GHG emissions can be achieved if the mining projects opt for and implement measures aimed at a reduction in their net energy use. A reduction in energy use and use of rail network are considered priority actions under this strategy; other GHG emission reduction measures such as forestation will not be feasible in highly arid environment of the region.

8.3.1 Quantification of GHG Emissions

A starting point for mining companies to reduce their GHG emissions is to first quantify them. There are presently no nationally published guidelines or regulatory requirements that require developers to quantify the GHG emissions for their projects. The IFC

[57] All locations must be georeferenced to allow for comparison

Performance Standard 3 requires all projects with annual GHG emissions exceeding 25,000 tons of CO_2-eq to quantify their GHG emissions, within the context of this CIA will be applicable to all future mining developments in the CIA Study. The mining projects will quantify their energy related emissions in the ESIA. The following information will be required:

- Fuel and energy requirements for the project (tons/annum, MWh/annum, respectively)
- Source of energy and type of fuel required[58]
- Emission factors[59]

8.3.2 Options for Renewable Energy

Renewable energy has a significantly lower GHG footprint than the use of fossil fuels for self-generation of energy for supply of power to the mining projects. The two most feasible renewable energy options are discussed below:

- **Solar Energy:** The Balochistan province has significant solar energy development potential, with Direct Normal Irradiance (DNI) values exceeding 1,800 kWh/m^2 in the CIA Study Area. The province has a high potential for development of solar energy, making PV Solar Technology cost-competitive compared to purchase of electricity from the grid.[60]
- **Wind Energy:** The province also has significant development potential for wind energy, due to high wind speeds and relatively unobstructed topography. Areas near and to the West of Nok Kundi have a high potential for the development of wind energy.[61]

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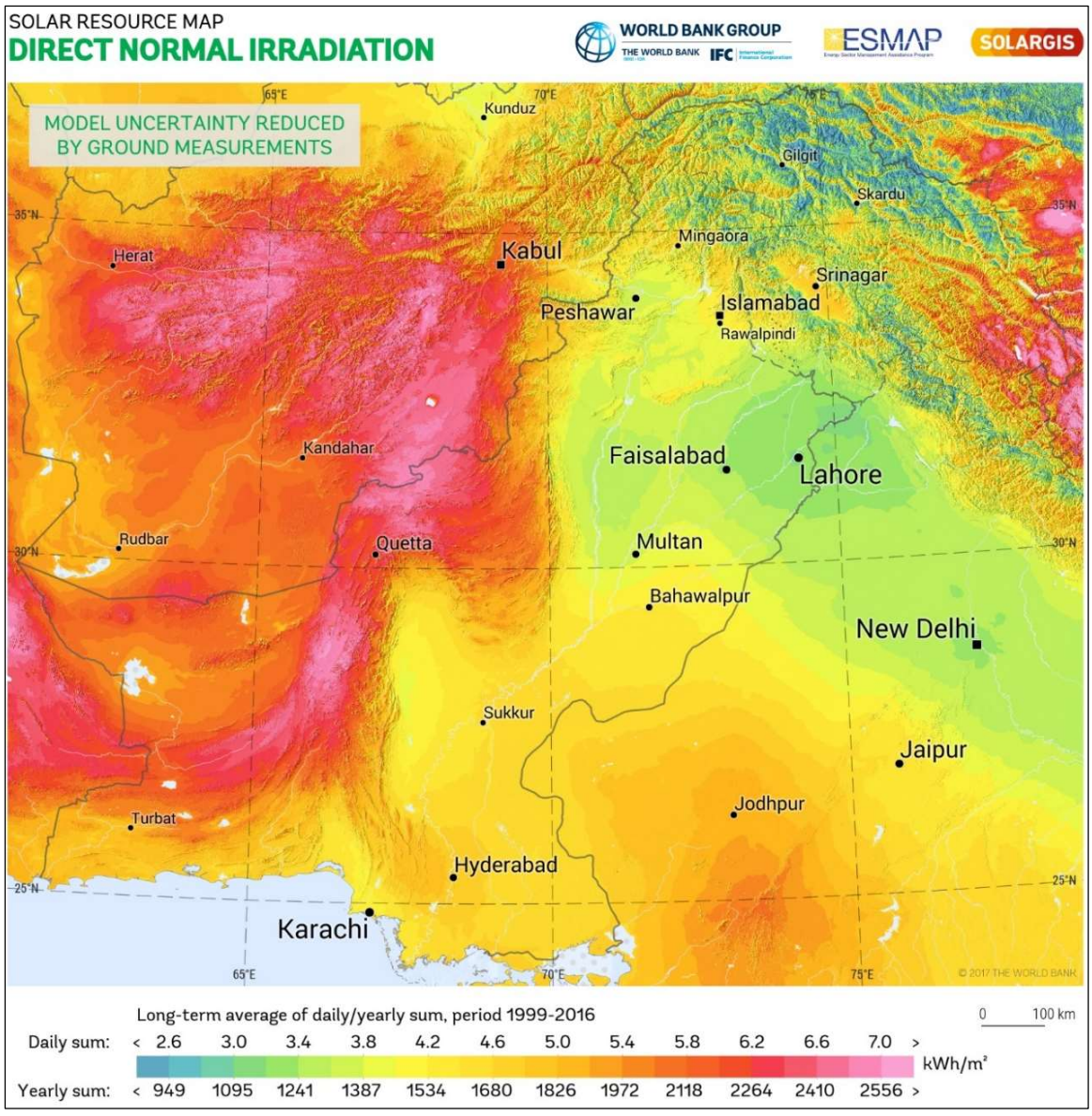
58 Mining companies will be most likely to opt for self-generation of electricity using fossil fuels i.e., Heavy Fuel Oil (HFO).

59 Emission factors for fuel can be obtained from several secondary sources such as the IPCC Emissions Factor Database, whereas emission factors for grid electricity based on the energy-mix of Pakistan can be obtained from the Asian Development Bank's "Guidelines for Estimating Greenhouse Gas Emissions of ADB Projects"

60 Shah, S. A. A., Valasai, G. D., Memon, A. A., Laghari, A. N., Jalbani, N. B., & Strait, J. L. (2018). Techno-Economic Analysis of Solar PV Electricity Supply to Rural Areas of Balochistan, Pakistan. Energies, 11(7), 1777.

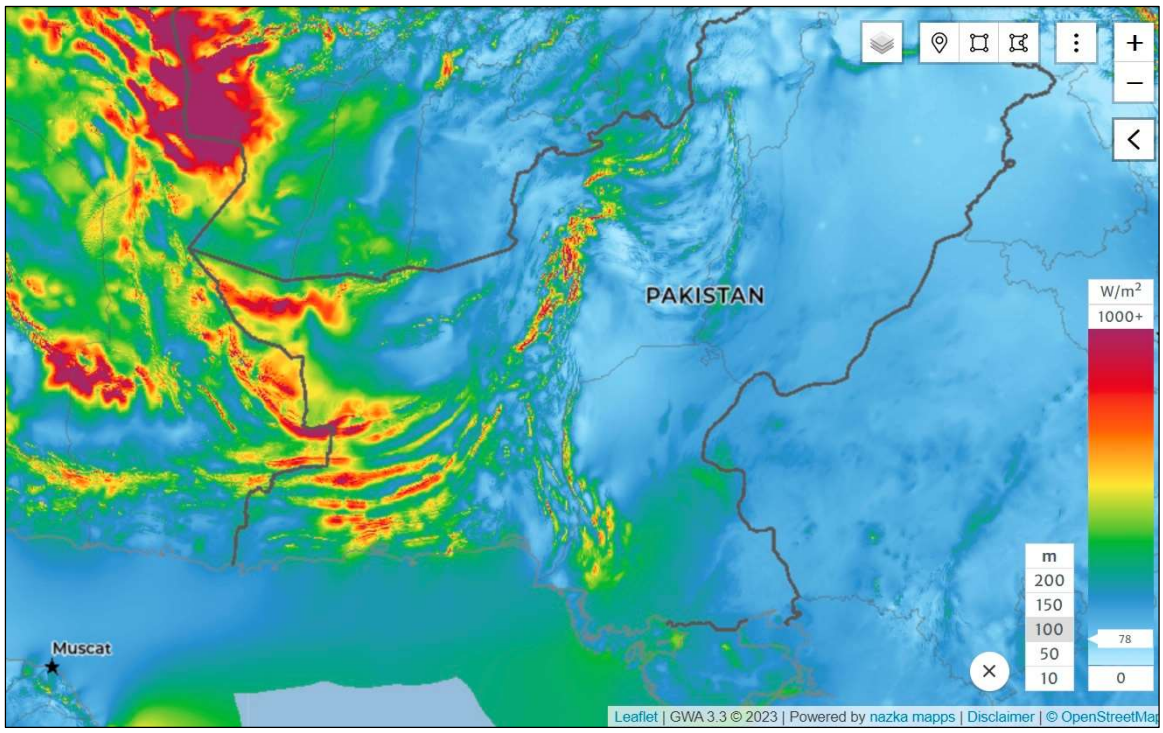
61 Nasir, S. M., Raza, S. M., & Abidi, S. B. H. (1991). Wind energy in Balochistan (Pakistan). Renewable Energy, 1(3), 523-526. doi: https: //doi.org/10.1016/0960-1481(91)90066-X

Exhibit 8.3: Map of Direct Normal Irradiation



Source: Solargis and World Bank Group

Exhibit 8.4: Map of Wind Energy Potential



Source: Davis, N. N., Badger, J., Hahmann, A. N., Hansen, B. O., Mortensen, N. G., Kelly, M., Lizcano, G. (2023). The Global Wind Atlas: A high-resolution dataset of climatologies and associated web-based application. Bulletin of the American Meteorological Society, 104(8), E1507-E1525.

The economics of installation of renewable energy capacity by the projects will improve considerably if the projects can be connected to the national power transmission system which can provide backup power when renewable capacity is not available and can absorb excess power when the supply of renewable energy exceeds the demand from the projects. The national grid also has a substantial renewable component and connection of the Project and Nok Kundi to the national grid provides greater opportunity for renewables development in Chagai by third parties. The projects can coordinate with the NTDC and Ministry of Energy (Power Division) for planning of extension of the national power grid to Nok Kundi and can also consider investing in the extension of the grid in return for compensatory tariffs for sale of power to and purchase of power from the grid. Extension of the national grid to the area will also provide economic and reliable power to the local communities and towns which will improve the wellbeing of the local population and support economic development in the region.

8.3.3 Transportation of Product by Railway

The mining companies should give serious consideration to transportation of products to ports for export by railway, which can significantly reduce their transport related emissions. The mining companies can seek advisory support from the Ministry of Railways through the Mining Development Advisory Forum for upgrading of the rail track particularly the Gwadar-Spezand segment. A collective approach by the mining

industry to investment in the upgrade of the railway infrastructure for transportation of products under a public private partnership framework could also be considered to improve utilization of the railway network and to arrange financing for the upgrade.

8.3.4 Monitoring and Reporting

The mining companies will be required to report the following indicators:

- GHG emissions (tons of CO_2-eq/annum)
- Product transport mechanisms, volume of product (m^3/annum, t/annum)
- Renewable energy capacity installed (MWh/annum)
- Investment toward renewable energy or other GHG emission reduction initiatives (PKR)

The information will be compiled in a monitoring report and submitted annually for the review and deliberations of the Mining Development Advisory Forum.

8.4 Stakeholder Engagement and Grievance Redressal

Stakeholder engagement and grievance redressal is presently handled individually by the mining projects. There is currently no existing forum for management or monitoring of wider perspectives on the mining projects in the CIA Study Area. Thus, negative stakeholder perception regarding one project can invariably be a reputational risk for the mining companies.

Mainstreaming the mining project's stakeholder engagement and grievance redressal practices in alignment with this framework will enhance the wider social acceptance of the mining projects. The relevant provisions are provided below.

8.4.1 Stakeholder Engagement

The stakeholder engagement of the mining projects should be transparent and considerate of the social perspectives in the broader CIA Study Area. The mining projects should include the following aspects within their Stakeholder Engagement Plans (SEPs):

- **Perspective surveys**: The perspective surveys should include perspectives on both the mining project carrying out the survey and perspective of mining projects in the CIA Study Area. The perspective survey should utilize a scoring system to easily quantify the data and simplify it for reporting purposes.
- **Needs analysis**: A needs analysis should be included in the SEP, wherein development areas identified by the local communities and stakeholders should be identified and recorded.

All consultations should be recorded with minutes of the consultation, pictorial evidence, and names of the attendees.

8.4.2 Grievance Redressal

The grievance redressal of the mining companies should be transparent and should also include mechanisms for grievances to be forwarded to the Mining Development Advisory

Forum for grievances that lie beyond the project's scope but are a reputational risk for the mining projects throughout the CIA Study Area.

The Reko Diq Project has developed its own tiered Grievance Redressal Mechanism (GRM) which includes Local Government as part of conflict resolution and sets out clear timelines for conflict resolution transparently. All grievances under this GRM are to be logged and closure status included as part of the Project's annual reporting. The other mining developments can develop a similar GRM to fulfil their grievance redressal requirements in-line with this CIA framework.

8.4.3 Monitoring and Reporting

The project companies should report the following indicators:

- Number of consultations, along with minutes (per annum)
- Aggregate scores of social perspectives, divided between categories
- Grievances forwarded to the Mining Development Advisory Forum (% of total)

The information will be compiled in a monitoring report and submitted annually for the review and deliberations of the Mining Development Advisory Forum.

8.5 Biodiversity Action Plan

A standalone Biodiversity Action Plan has been developed for the Project to ensure appropriate management of the Critical Habitat through joint management and the appropriate institutional mechanisms. Given the sensitivity of the ecology in the CIA Study Area, other projects can develop their BAPs following the example provided by the Project.

9. Proposed Institutional Arrangements

Exhibit 9.1 outlines the suggested roles and responsibilities of the local and provincial government, mining companies and other stakeholders which includes civil society organizations and Non-Governmental Organizations (NGOs) for the management of cumulative impacts. **Exhibit 9.2** provides a VEC-specific framework for the roles and responsibilities of government institutions, mining companies and other stakeholders.

Establishment of a common platform, such as the Advisory Forum for Mining Development for collaborative data collection, monitoring, and proactive stakeholder engagement will allow:

- A direct line of communication between stakeholders: government agencies, project developers, finance institutions, international organizations, and affected communities.
- An early identification of key issues that are specific to a specific project or VEC in a collaborative manner and coordinated solutions.
- Identification of feasible mitigation measures for the identified issues which can be carried out by the mining projects, in partnership or stand-alone.
- Opportunities for the exchange of information for better mitigation of adverse impacts and enhancement of positive impacts at a regional or provincial level.
- Organization and management of environmental and social data and information from different projects, such as studies, records, and monitoring reports, so that they can be shared, distributed, and readily consulted by all the stakeholders of the forum.

The Balochistan Development Authority (Urban Planning and Development Department) could institute the Advisory Forum for Mining Development through a Memorandum of Understanding (MoU) executed with the key stakeholders including the mining companies. A senior official in the Balochistan government such as the Chief Secretary can head the forum to facilitate interdepartmental coordination and to ensure follow up on the decisions taken in the forum. In addition to the mining companies, the forum can include representation from:

- The Mines and Minerals Department, which can also act as Secretariat for the forum.
- Local Government and Rural Development Department
- Balochistan Environmental Protection Agency
- Balochistan Development Authority
- Provincial Water Board
- District Water Committee (Dalbandin)
- Quetta Electric Supply Company (QESCO)
- Forest and Wildlife Department, Quetta

The following can participate in the forum by invitation on needs basis.

- National Highway Authority (Ministry of Planning)
- National Transmission & Dispatch Company
- Ministry of Energy (Power Division)
- Ministry of Railways
- Port Authorities

The Mining Development Advisory Forum can convene bi-annually and can be headquartered in Quetta. The forum can review the Annual Monitoring Reports submitted by the mining companies to evaluate effective implementation of the guidance provided by the management frameworks of this CIA, set targets, and discuss ongoing issues of potential significance.

The Mining Development Advisory Forum can also be convened for review of the feasibility studies prepared by the Ministry of Energy for extension of the grid connection to the Nok Kundi and upgradation of the rail network linking the Project area to the terminals for export of products from the mining projects.

Exhibit 9.1: Roles and Responsibilities of Government Institutions, Mining Companies and Other Stakeholders

Aspect to be Managed	*Government Institutions*	*Mining Companies*	*Other Stakeholders*
General Aspects			
Environmental Impact Assessments	• BEPA to ensure that ESIAs of the mining projects are aligned with the frameworks for environmental management included in this CIA. • BEPA to include relevant commitments in Environmental Approval (EA) of the mining projects aligned with the CIA frameworks.	Align the ESIA with the management frameworks of this CIA and include the monitoring indictors identified in the CIA frameworks in the ESMP.	Raise appropriate concerns during public hearing.
Cumulative Impact Assessments	• BEPA to direct mining companies to also include a CIA as part of their ESIA. • BEPA to publish this CIA and provide advisory support to mining companies on relevant aspects to be included for alignment with the CIA frameworks.	Develop a CIA for the project, and ensure that the CIA accounts for the institutional mechanisms, guidelines and frameworks present in this CIA.	Review the CIA provide feedback on whether sufficiently inclusive stakeholder consultation has been undertaken.
Establishment of Mining Development Advisory Forum	• The Balochistan Development Authority to manage the relevant institutional arrangements for the formation of the Mining Development Advisory Forum. • All government institutes to participate in the decision-making process to ensure regulatory oversight. • Relevant government organizations to coordinate preparation of feasibility studies related to expansion of road networks, power transmission network, railways and other regional development initiatives that can benefit the mining sector.	Ensure that relevant personnel and resources have been assigned to ensure representation and meaningful participation in the forum.	Ensure that relevant community focal persons, representatives, and civil society groups of significance participate in the forum.
Monitoring and Reporting	BEPA to review monitoring reports compiled by the projects under the CIA management framework	Ensure that relevant resources are allocated for monitoring under the CIA management framework, and appropriate information is captured in the monitoring reports.	Review the reports and discuss them in the Advisory Forum meetings.

Aspect to be Managed	*Government Institutions*	*Mining Companies*	*Other Stakeholders*
Corporate Social Responsibility (CSR)	Mining Development Advisory Forum to direct Projects to coordinate their CSR activities in line with annual targets and to review whether requirements of the mining lease agreements have been met.	Allocate relevant resources for carrying out the CSR activities and appropriately report the value created.	Participate in initiatives and provide timely feedback to developers.

Exhibit 9.2: VEC Specific Framework for Roles and Responsibilities

Aspect to be Managed	VEC Addressed	Government Institutions	Mining Companies	Other Stakeholders
VEC Specific Frameworks				
Water Supply Strategy	Income from mining developments dependent on groundwater	♦ Provincial Water Board and District Water Committees (DWC) to review the Water Supply Strategy prepared by individual projects and issue permits for groundwater extraction accordingly. ♦ Provincial Water Board to direct mining developments to install monitoring wells and provide annual monitoring reports for changes in groundwater levels near abstraction points and near local community water sources.	Develop a Water Supply Strategy for inclusion in the ESIA in-line with the requirements of the management framework and fulfil all reporting requirements.	Participate in consultations and review the water supply strategies presented in the ESIAs.
Transport Corridor and Urban Development	Sustainable Urban Centres & Safe and Uncongested Road Networks	♦ Urban Planning and Development Department (UP&DD) and Local Government and Rural Development Department to review the project's CSR programs and highlight urban development initiatives the projects can support. ♦ National Highway Authority (NHA) to review monitoring reports[62] and Traffic Management Plans submitted by the projects and plan expansions or upgrades to the national highways and evaluate whether the CPEC route designs account for traffic forecasts from additional mining projects. ♦ NHA to liaison with mining developers to investigate options for upgradation of the roads through financing from the developers.	Align considerations for management of Transport Corridor and Urban Development in the ESIA with the management framework in **Section 8.2**	Participate in consultations and review considerations for management of transport corridor and urban development in the ESIAs.

[62] Monitoring reports by the mining projects to include monitoring indicators on traffic congestion, road safety and road transportation related grievances.

Aspect to be Managed	VEC Addressed	Government Institutions	Mining Companies	Other Stakeholders
Energy Supply Strategy	Reduced GHG Emissions	♦ NTDC and Ministry of Energy (Power Division) to coordinate with the mining companies on initiatives such as expansion of the national power grid to Nok Kundi. ♦ QESCO to carry out a Power Market Survey (PMS) to develop forecasts for demand within the Chagai district. ♦ Ministry of Energy to carry out feasibility studies for extension of national grid to the Project and to other mining developments in Balochistan. ♦ NTDC to develop power evacuation and transmission plans based on feasibility study findings.	Align considerations for energy supply in the ESIA with the management framework in **Section 8.3**	Participate in consultations and review the energy supply strategies presented in the ESIAs.
Stakeholder Engagement and Grievance Redressal	Social Acceptance of Mining Projects	The Mining Development Advisory Forum to review: ♦ The stakeholder consultations undertaken, and areas identified where the mining companies can assist the local government. ♦ The perspectives survey data and decide on a course of action such as public information campaigns. ♦ Grievances and identify mining related activities that need more stringent regulatory oversight and improved management.	Align considerations for stakeholder engagement and grievance redressal in the ESIA with the management framework in **Section 8.4**	Participate in the stakeholder engagement process and provide feedback on whether the grievance redressal is effective and fair.
Biodiversity Management	Biodiversity	♦ Forest and Wildlife Department to support in establishment of protection zones, patrolling and watch-and-ward operations in consultation with local NGOs and stakeholders. ♦ Local government to support initiatives for awareness and liaison with academia, NGOs and other stakeholders to support public participation.	Align considerations with the requirements of the Biodiversity Action Plan (BAP).	Participate in public initiatives and support operations of the Forest and Wildlife Department, as well as providing technical and scientific support for follow-up surveys and monitoring.