Hagler Bailly Pakistan

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Appendix I: Biodiversity - Fauna Assessment

Hagler Bailly Pakistan

Environmental and Social Impact Assessment for Reko Diq Mining Project

Biodiversity - Fauna

Final Report

HBP Ref.: D4US8RKG

January 24, 2025

Reko Diq Mining Company

Quetta, Pakistan

Executive Summary

The fauna baseline report for the Reko Diq Mining Project is developed to provide a comprehensive overview of the existing faunal conditions and assess the potential impacts of the project on local and regional fauna. The study also offers mitigation and monitoring measures to minimize these impacts. Baseline data was collected through field surveys and literature reviews across the Reko Diq Mine Site, Northern Groundwater System, Rail and Road Route Corridor and Port Qasim.

Study Areas and Sampling

- Ecological studies were conducted at the Reko Diq Mine Site and Associated Infrastructure, including the Northern Groundwater System, Access Route to Mine Site, and the Marine Terminal at Port Qasim. Studies were not conducted along the rail transport route and the road route to Port Qasim, as these areas have already been significantly modified, rendering Project impacts negligible at these locations. However, increased traffic from mining activities may lead to a higher likelihood of roadkill, which will be mitigated by measures provided in the report.
- The Ecological Study Area at Reko Diq Mine Site and Associated Infrastructure was categorized into various habitat types, including Mountains/ Hills, Clayey Plains, Dry Streambeds, Gravel Plains, and Sandy Plains. Buffers were defined to demarcate the study areas, including a 10 km buffer around the mine site and associated infrastructure and a 100 m buffer along the proposed railway track at Port Qasim.
- For additional data collection, the Study Area around the Reko Diq Mine Site and Northern Groundwater System was expanded to the Iran-Afghanistan borders, to record the species of conservation importance which may extend outside the 10 km buffer. This extended study area also include the Zangi Nawar Game Reserve and Corridor from Reko Diq Mine Site to Zangi Nawar Game Reserve, to record the connectivity and distribution of species and also, declaration potential offset for conservation.
- Baseline data were collected for terrestrial and marine ecological resources in different seasons. A total of 20 sampling locations were sampled at the Reko Diq Mine Site, and additional locations were sampled along the Northern Groundwater System, access routes, and at Port Qasim. Methods included line transects for large mammals and birds, reptiles, as well as some Sherman traps for small mammals, and gill nets for pelagic fish communities.

Key Findings

- **Birds**: A total of 14 bird species were observed at the Reko Diq Mine Site, 31 along the Northern Groundwater System, and 10 along the access route. At Port Qasim, 40 bird species were observed. Three bird species of conservation concern were noted: the Endangered Egyptian Vulture, Vulnerable Asian Houbara Bustard, and Near Threatened Curlew Sandpiper.

- **Mammals**: Four mammalian species were confirmed at the Reko Diq Mine Site, six along the Northern Groundwater System, and three along the access route, with seven species observed at Port Qasim. Conservation concern species observed include the Vulnerable Goitered Gazelle and the Nationally Critically Endangered Sand Cat.
- **Small Mammals**: Four small mammals species were confirmed at Reko Diq Mine Site, four along the Northern Groundwater System, one along the Access Route to Reko Diq Mine Site, two near Taftan Area, five along the Corridor, and 10 species in the Zangi Nawar Game Reserve. The restricted range Baluchistan Pygmy Jerboa was captured from the Zangi Nawar Game Reserve.
- **Herpetofauna**: 25 herpetofauna species were confirmed at the Reko Diq Mine Site, 21 along the Northern Groundwater System, 17 along the Access Route to Reko Diq Mine Site, 11 along Corridor from Reko Diq Mine Site to Zangi Nawar Game Reserve and 20 species at Zangi Nawar Game Reserve. At Port Qasim, four herpetofauna species were observed. The restricted range Alcock's Toad Headed Agama was observed at the Reko Diq Mine Site and Northern Groundwater System.
- **Invertebrates**: Five invertebrate species were recorded at the Reko Diq Mine Site, seven along the Northern Groundwater System, and four along the access route. No invertebrate species of conservation concern were noted.
- **Marine Fauna**: At Port Qasim, nine marine benthic invertebrate species, nine epi-pelagic fauna species, and eight pelagic fish species were confirmed, with only one species of conservation concern, the Vulnerable Toli Shad.

Key Recommendations

To minimize the impact of the Project on fauna in the Ecological Study Area, the mitigation measures and monitoring outlined in the Environmental Management Plan should be implemented. These measures will help ensure the conservation of local fauna and the overall sustainability of the Project.

Acronyms

%	Percentage
APHA	American Public Health Association
BEPA	Balochistan Environmental Protection Act
BEQS	Balochistan Environmental Quality Standards
BAP	Biodiversity Action Plan
C	Construction
CITES	Convention on International Trade in Endangered Species
CMP	Construction Management Plan
DC	During Construction
DO	During Operation
DRC	Decommissioning, Rehabilitation, and Closure
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPC	Engineering, Procurement, and Construction
ESIA	Environmental and Social Impact Assessment
GBIF	Global Biodiversity Information Facility
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
HBP	Hagler Bailly Pakistan
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
MBI	Marine Benthic Invertebrate
NA	Not Applicable
ND	Not Detected
O	Operation
PIBT	Pakistan International Bulk Terminal
PS	Performance Standard
RDMC	Reko Diq Mining Company

SEPA	Sindh Environmental Protection Act
TCC	Tethyan Copper Company Ltd
TM	Trade Mark
UAE	United Arab Emirates
WHO	World Health Organization

Units

g	gram
km	Kilometres
m	Metres
ppb	parts per billion

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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 environmental and social studies and permitting process for the Project.

This Specialist Report has been prepared to present information related to the fauna baseline for the project Area of Influence. The Specialist Report also describes potential Project-related impacts on fauna as well as mitigation measures and monitoring that will be carried out by the Project.

1.2 Objective and Scope

This Faunal Baseline has been prepared with the following objectives and scope:

- Carrying out desktop assessments based on the information obtained from published sources, including books and information from different databases such as the Integrated Biodiversity Assessment Tool (IBAT),[1] International Union for Conservation of Nature (IUCN),[2] Key Biodiversity Area (KBA),[3] Global Biodiversity Information Facility (GBIF),[4] Reptile Database,[5] Avibase,[6] Animal Diversity Web,[7] pervious ESIA studies,[8,9] within and around the Ecological Study Area

1 Integrated Biodiversity Assessment Tool, Available at: https://www.ibat–alliance.org/.

2 International Union for Conservation of Nature (IUCN) Red List of Threatened Species, Available at: https://www.iucnredlist.org/.

3 Key Biodiversity Area, Available at: https://www.keybiodiversityareas.org/.

4 Global Biodiversity Information Facility (GBIF), Available at: https://www.gbif.org/country/PK/summary

5 Reptile Database, Available at: http://www.reptile–database.org/.

6 Avibase, World's Bird Database, Available at: https://avibase.bsc-eoc.org/avibase.jsp?lang=EN.

7 Animal Diversity Web, Available at: https://animaldiversity.org/.

8 Hagler Bailly Pakistan, April 2010, Environmental Impact Assessment of Reko Diq Copper Mining Operations, Tethyan Copper Company Pty Limited (TCC).

9 Hagler Bailly Pakistan, November 2020, Environmental and Social Impact Assessment of Tanjeel Copper Project, National Resource Limited Pakistan.

- Delineation of the Ecological Study Areas and selection of sampling locations using information from previous studies[10,11] as well as ***Google Earth™*** Satellite Imagery
- Identification of species of conservation concern based on the IUCN Red List of Threatened Species
- Identification of microhabitats and sensitive ecosystems, if any
- Identification and mapping of Protected Areas in the vicinity of the Project
- Qualitative and quantitative assessment of terrestrial and marine fauna
- Verification of the information collected from the desktop-based assessment in the field surveys (Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024 surveys)
- Comparison of the ecological resources of the Ecological Study Areas observed in field surveys with the previous surveys conducted at the Reko Diq Mine Site and Associated Infrastructure area in 2010 and 2020[12, 13]
- Identification of the impacts due to Project activities and the possible mitigation measures for the identified impacts
- Preparation of the Environmental Management Plan (EMP) to develop the mechanisms for implementing the environmental mitigation measures
- Mechanism for monitoring and managing environmental changes during various stages of the Project life cycle with respect to baseline conditions.

[10] Hagler Bailly Pakistan, April 2010, Environmental Impact Assessment of Reko Diq Copper Mining Operations, Tethyan Copper Company Pty Limited (TCC).

[11] Hagler Bailly Pakistan, November 2020, Environmental and Social Impact Assessment of Tanjeel Copper Project, National Resource Limited Pakistan.

[12] Hagler Bailly Pakistan, April 2010, Environmental Impact Assessment of Reko Diq Copper Mining Operations, Tethyan Copper Company Pty Limited (TCC).

[13] Hagler Bailly Pakistan, November 2020, Environmental and Social Impact Assessment of Tanjeel Copper Project, National Resource Limited Pakistan.

2. Project Description

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 in 2028 and Phase 2 operations in 2030.

2.1 Reko Diq Mine Site and Associated Infrastructure

Exhibit 2.1 provides an overview of the Reko Diq Mine Site (RDMS) and the major proposed infrastructure.

The core infrastructure that will be established at the RDMS includes:

- Two main pits, Western Porphyry and Tanjeel (**Exhibit 2.1**). The mining method of these pits will be a 24-hour open-pit shovel and truck operation;
- Two designated Waste Rock Dumps (WRD) for the waste rock from the Western Porphyries pit. The Tajeel Pit will have a separate WRD in its proximity.
- Tailings storage facility (TSF).
- A processing plant.

2.1.1 Supporting Infrastructure

The proposed supporting infrastructure at the RDMS includes:

- Several sources for power supply will be utilised for the Project. The Project's estimated peak power requirements will be 183 megawatts (MW) in Phase 1 and 348 MW in Phase 2:
  - Diesel generators during the early works and construction phases until the establishment of the Heavy Fuel Oil (HFO) power station;
  - A Solar Photovoltaic (PV) system with an installed capacity of 183 MW in Phase 1 and 384 MW in Phase 2;
  - It is anticipated that the Project's energy requirements will be met through a grid connection from Year 15 (operational phase).

- Diesel, HFO and other sources of fuel will be railed to the site from Port Qasim and stored in bunded contained atmospheric tanks at the designated storage areas.
- Accommodation Facility to provide on-site accommodation for all employees and contractors;
- Security infrastructure;
- Waste management facilities:

2.1.2 Water Supply and Management

Water for the Construction Phase, Phase 1 and Phase 2 of the Project will be sourced from a sedimentary groundwater system located approximately 70 km to the northwest of the mining area referred to as the Northern Groundwater System (**Exhibit 2.1**). The system represents a small and isolated part of a much larger basin and there are no communities or community water sources located within the proposed borefield and its area of influence.

A 78 km long buried water supply pipeline with a diameter of 250 mm from the Northern Groundwater Borefield to the mine site to provide water for construction. A 900 mm buried, cement lined steel pipe will be constructed between the site and the Northern Groundwater Borefield for piping of operational water requirements.

An overhead transmission line will supply power (33 kV) to the Northern Borefield via a single circuit. Detailed design is yet to be finalized, but likely key characteristics of the transmission line include:

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

This groundwater system is considered capable of enabling development and sustaining operation of the Project, which is expected to add significantly to the socio-economic advancement within the region and country through employment, infrastructure, and services.

2.2 Transport and Marine Port

The Project will use the existing road and rail networks to transport materials during construction and operational phases and utilise the air transportation option for personnel. The main Project transport routes (Road Transport Route and Rail Transport Route) are shown in **Exhibit 2.2.**

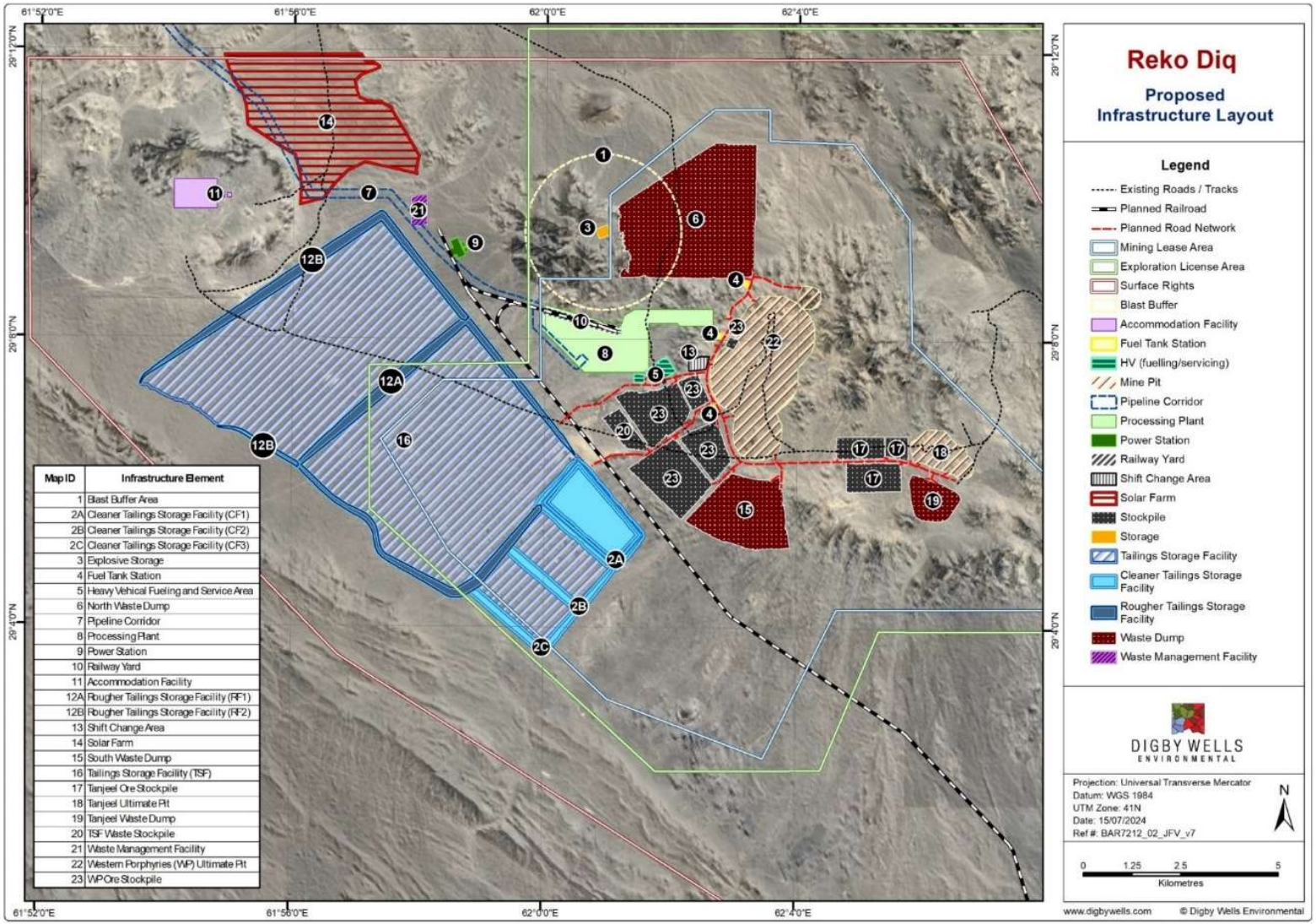
2.2.1 Transport of Concentrate to Port Qasim

The Concentrate will be transported from the RDMS processing plant to Port Qasim via an existing railway line, passing through the Balochistan and Sindh provinces. The existing rail route is approximately 1,350 km in length as outlined in **Exhibit 2.2**.

The Project will make use of the existing PIBT Terminal where all facilities are owned and operated by PIBT. An area will be leased to RDMC for the construction of a Concentrate storage shed.

An extract of the onshore and offshore layout is shown in **Exhibit 2.3**.

Exhibit 2.1: Proposed Reko Diq Mine Site Layout



Map ID	Infrastructure Element
1	Blast Buffer Area
2A	Cleaner Tailings Storage Facility (CF1)
2B	Cleaner Tailings Storage Facility (CF2)
2C	Cleaner Tailings Storage Facility (CF3)
3	Explosive Storage
4	Fuel Tank Station
5	Heavy Vehical Fueling and Service Area
6	North Waste Dump
7	Pipeline Corridor
8	Processing Plant
9	Power Station
10	Railway Yard
11	Accommodation Facility
12A	Rougher Tailings Storage Facility (RF1)
12B	Rougher Tailings Storage Facility (RF2)
13	Shift Change Area
14	Solar Farm
15	South Waste Dump
16	Tailings Storage Facility (TSF)
17	Tanjeel Ore Stockpile
18	Tanjeel Ultimate Pit
19	Tanjeel Waste Dump
20	TSF Waste Stockpile
21	Waste Management Facility
22	Western Porphyries (WP) Ultimate Pit
23	WP Ore Stockpile

Exhibit 2.2: Reko Diq Spatial Extent and Transport Routes (Rail Transport Route and Road Transport Route)

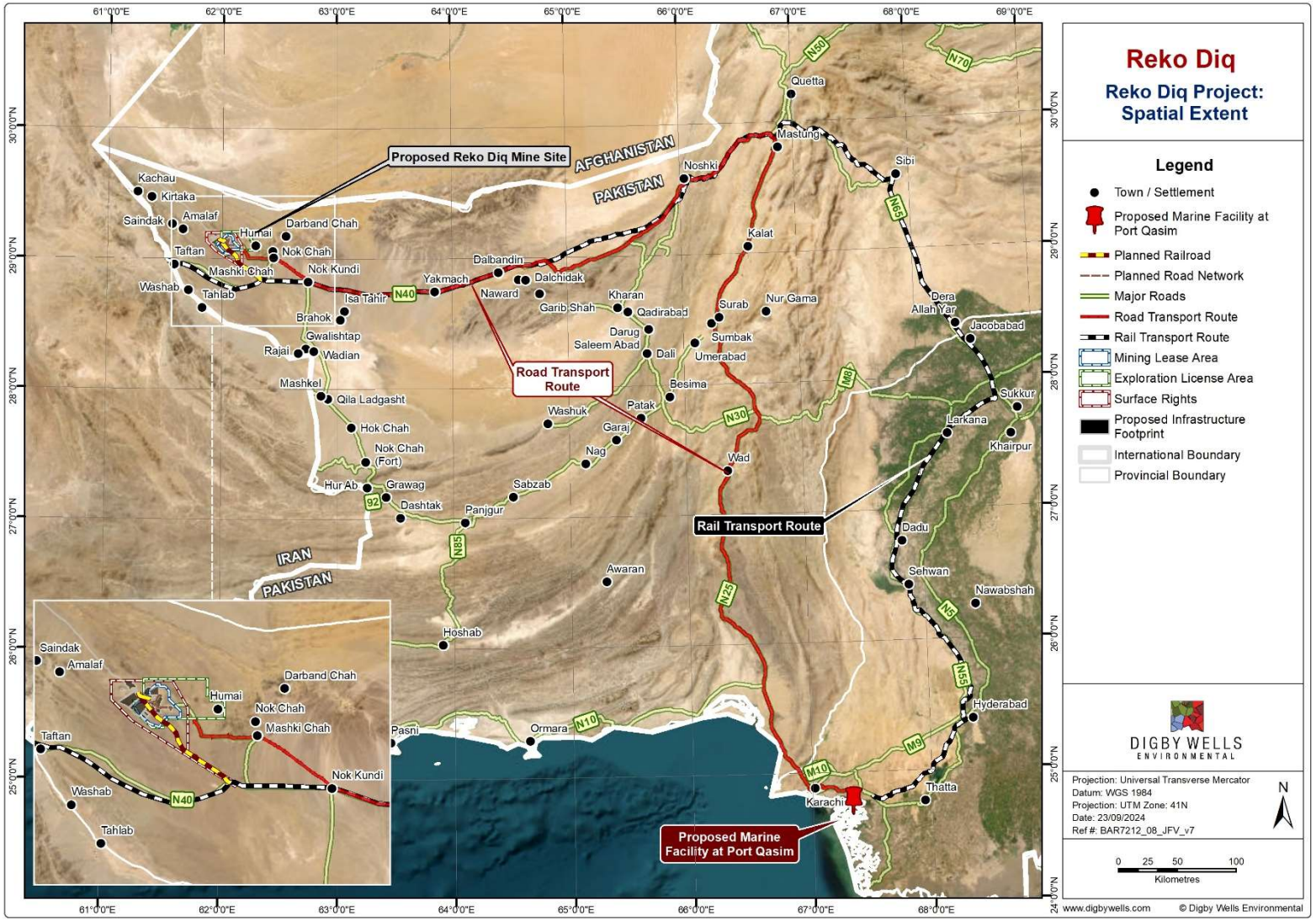


Exhibit 2.3: Proposed Rail Yard Layout at Port Qasim

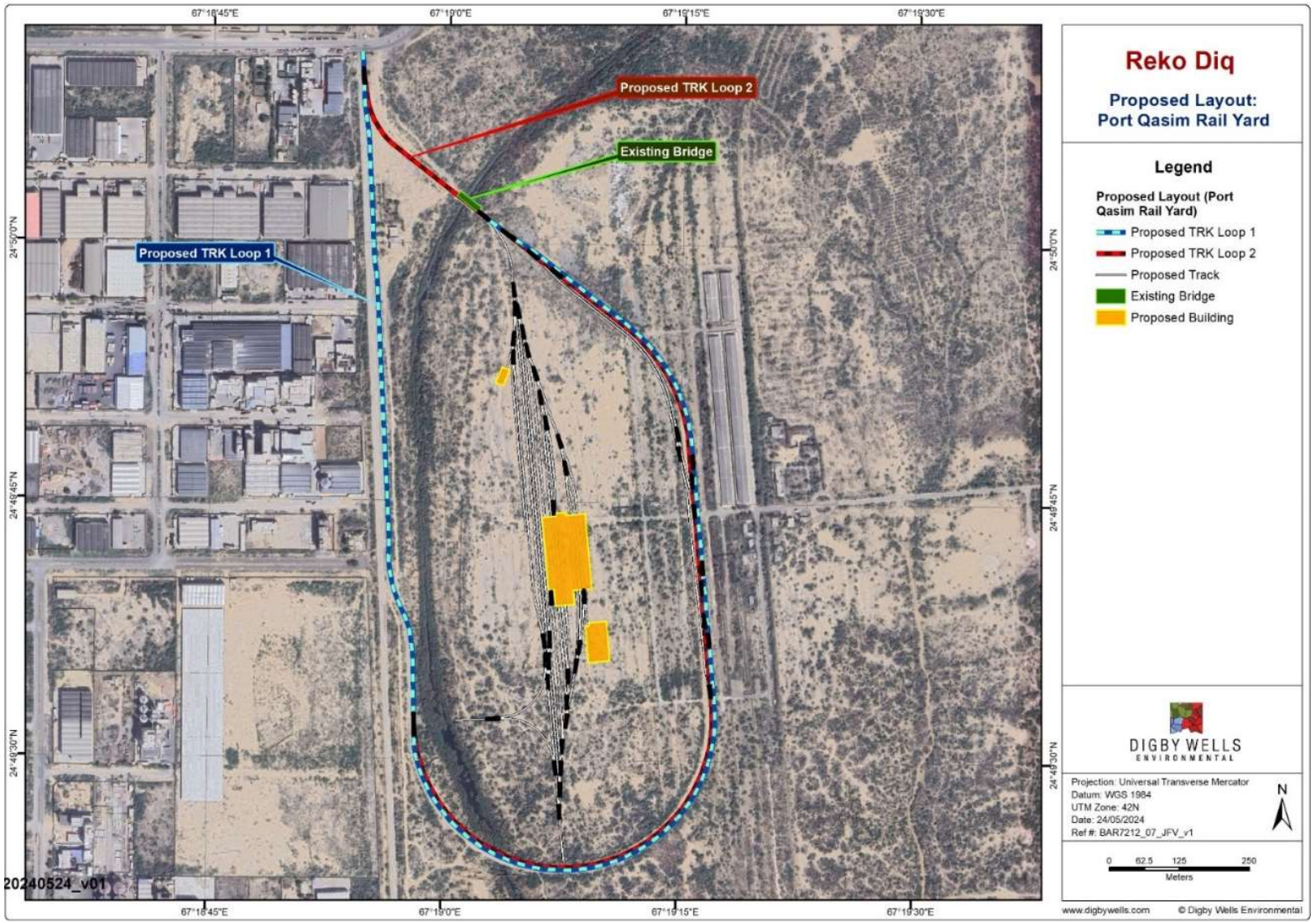
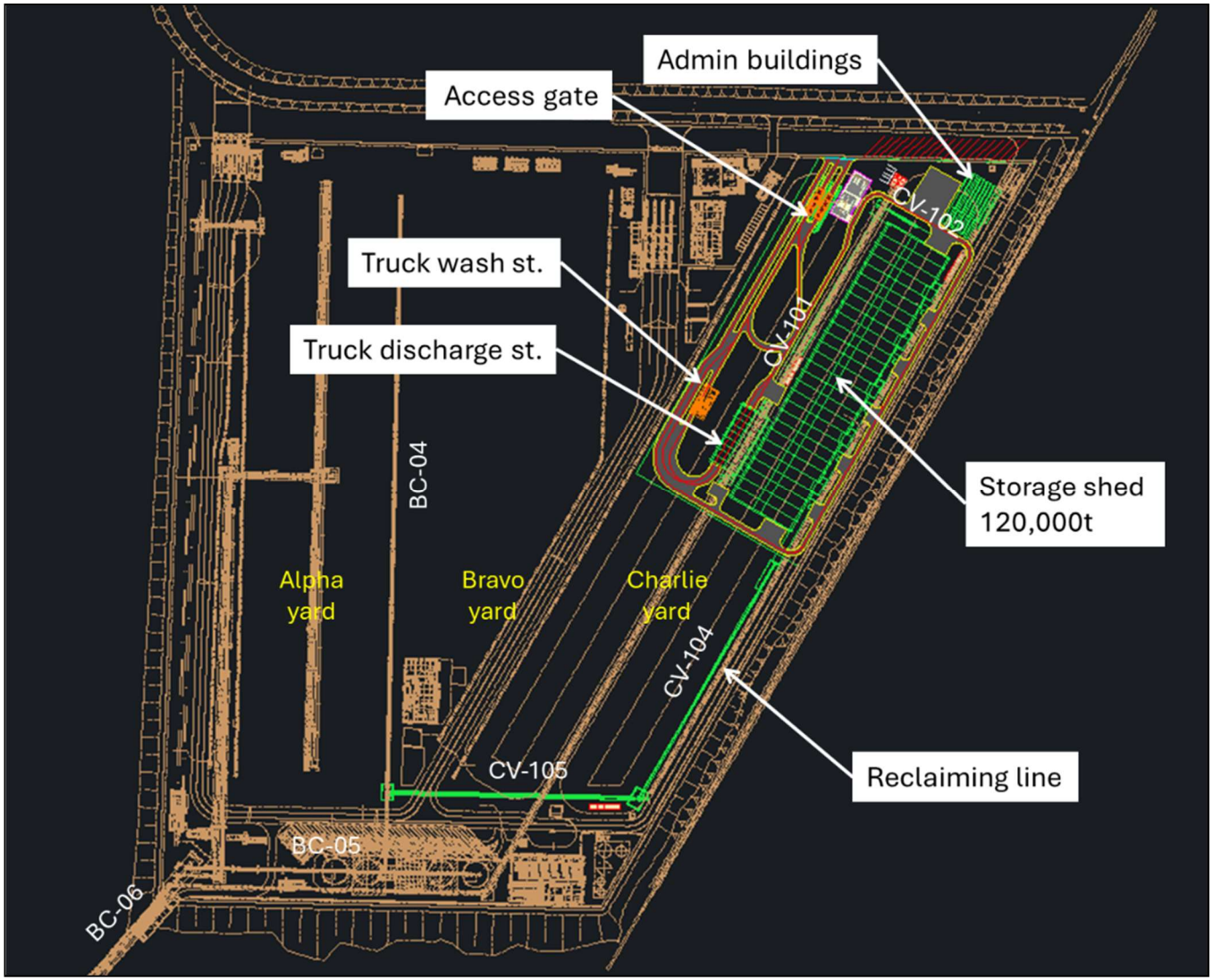


Exhibit 2.4: Layout of Concentrate Facilities at PIBT at Port Qasim



3. Legislative and Regulations Framework

Exhibit 3.1 provides the list of applicable legislations, guidelines, and standards that are applicable for the conservation and management of the impacts of the Project on fauna.

Exhibit 3.1: Applicable Legislations and International Guidelines

Legislation or Guideline	*Description and Relevance*
Provincial and National Legislations	
Balochistan Environmental Protection Act (BEPA), 2012	Balochistan Environmental Protection Act, 2012 deals with the protection of the environmental resources in the province of Balochistan. It also deals with the introduction of alien species, living modified organisms and the conservation of native fauna in the province.
Sindh Environmental Protection Act (SEPA), 2014	Sindh Environmental Protection Act, 2014 prohibits actions that can adversely affect the environment. These include adverse environmental impacts, including dumping waste or hazardous substances into coastal and inland water bodies. It also deals with environmental monitoring and environmental audit reviews.
Sindh Fisheries (Amendment) Act, 2011	Regulates fishing activities in Sindh province, aiming to sustainably manage fisheries resources and protect aquatic ecosystems. This act is applicable as the Project can potentially impact the marine ecology during the storage and transport of copper concentrate.
Sindh Wildlife Protection Ordinance, 1974	Allows the government to take measures for the protection of wildlife by declaring certain areas as national parks, wildlife sanctuaries, and game reserves and by declaring certain species as protected. This act is relevant for assessing and mitigating impacts of project construction and operation on sensitive wildlife habitats and protected areas and regulating activities such as hunting or capture of animals.
The Ports Act, 1908	Provides rules for the safety of shipping and conservation of ports. These rules restrict the disposal of ballast or any other discharges that may impact the aquatic environment or the shoreline, fire safety, carriage of artifacts etc. It is applicable during the operations phase of the Project to ensure that the vessels and ships engaged adhere to the rules defined in this Act. The Project will also have to ensure that the wastes are adequately disposed of and do not form the potential of fire at the ship or at the nearest port of Pakistan.
International Guidelines and Standards	
International Finance Corporation's (IFC) Environmental and Social Performance Standards on Sustainability	IFC PS6, Biodiversity Conservation, and Sustainable Natural Resource Management aims at protecting and conserving biodiversity. This PS addresses how clients can avoid or mitigate threats to biodiversity arising from their operations as well as incorporate sustainable management of renewable natural resources. It also includes the definition of critical habitat and natural habitat.

Legislation or Guideline	*Description and Relevance*
Biodiversity and the protection of plants and animals	Pakistan is a party to a number of conventions in relation to biodiversity, including the Convention on Biological Diversity, Bonn Convention on the Conservation of Migratory Species of Wild Animals, Convention on International Trade in Endangered Species of Wild Fauna, International Union for Nature Conservation. All these conventions focus on the conservation of biological resources and are thus applicable to the Project's activities.

4. Methodology

4.1 Ecological Resources and Survey Seasons

The data for the assessment of ecological resources was collected through field surveys to assess the baseline conditions within the Ecological Study Area. Data was collected for the terrestrial, marine, and coastal ecological fauna in different seasons for different Project components in the Balochistan and Sindh provinces.

Error! Reference source not found. shows the ecological attributes that were sampled in the Post-Monsoon 2022, Spring 2023, and Post-Monsoon 2023 surveys.

Exhibit 4.1: Ecological Resources Sampled in Post-Monsoon 2022, Spring 2023 and Post-Monsoon 2023 Surveys

Ecological Resource	*Post-Monsoon 2022 Survey (RDMS and Northern Groundwater System)*	*Spring 2023 Survey (RDMS and Northern Groundwater System)*	*Post-Monsoon 2023 Survey (Port Qasim)*	*Summer 2024 Survey RDMS, NGWS, Access Route to RDMS, Corridor and Zangi Nawar Game Reserve)*
Terrestrial Fauna				
Avifauna	√	√	√	-
Herpetofauna	√	√	√	√
Mammals	√	√	√	-
Small Mammals	√	√	–	√
Invertebrates	√	√	–	
Marine and Coastal Fauna				
Marine Benthic Invertebrate (MBIs)	–	–	√	-
Epi Pelagic Fauna	–	–	√	-
Pelagic Fish Communities	–	–	√	-

The field surveys were carried out in multiple seasons as follows:

- Post-Monsoon 2022 Survey: This survey was carried out between September 13, 2022, and October 13, 2022 at the RDMS and Northern Groundwater System Study Areas.[14] This survey covered terrestrial avifauna, herpetofauna, mammals, small mammals, and invertebrates.
- Spring 2023 Survey: This survey was carried out between April 28, 2023, and May 13, 2023 at the RDMS and Northern Groundwater System study areas.[15]

[14] The Post-Monsoon 2022 Survey was carried out at Reko Diq Mine Site, Northern Groundwater System and Access Route to Reko Diq Mine Site.

[15] The Spring 2023 Survey was carried out at Reko Diq Mine Site, Northern Groundwater System and Access Route to Reko Diq Mine Site.

This survey covered terrestrial fauna (terrestrial avifauna, herpetofauna, mammals, small mammals, and terrestrial invertebrates).

- Post-Monsoon 2023 Survey: This survey was carried out between October 12, 2023 to October 26, 2023 at Port Qasim.[16] This survey covered terrestrial fauna (terrestrial avifauna, herpetofauna, and mammals) and marine and coastal fauna (marine benthic invertebrates, epi pelagic fauna and pelagic fish communities).
- Summer 2024 Survey: This survey was carried out between July 22, 2024, to September 5, 2024 at Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, Taftan, Corridor and Zangi Nawar Game Reserve. This survey covered the additional biodiversity data collection for Herpetofauna and small mammals.

4.2 Terrestrial Fauna

4.2.1 Selection of Sampling Locations for Terrestrial Fauna

Sampling locations were selected in various habitat types within the Ecological Study Area to assess the ecological conditions unique to each habitat. Different species of animals are adapted to their surrounding habitats based on the vegetation community, edaphic (soil-related), and climatic conditions of the area. These adaptations ensure that the selected sampling locations provide a comprehensive understanding of the ecological diversity across the different habitats.

Reko Diq Mine Site and Associated Infrastructure

A total of 20 sampling locations (E13-E32) were selected at the Reko Diq Mine Site for terrestrial fauna survey in Post-Monsoon 2022 and Spring 2023 surveys. Among these sampling locations, seven were in the Gravel Plains, six in the Dry Streambeds, five in the Mountains/Hills, and one each in the Clayey Plains and Sandy Plains habitat types. (see Error! Reference source not found.). In addition, trapping for small mammals and invertebrates was conducted at four sampling locations in these surveys.

A total of 13 sampling locations (E1-E12 and MH1) were sampled along the Northern Groundwater System in Post-Monsoon 2022 and Spring 2023 surveys. Among these sampling locations, four each were in the Gravel Plains and Dry Streambeds, two in the Clayey Plains, and one each in the Mountains/Hills, Agricultural Areas/Date Palms, and Sandy Plains habitat types. A patch of Agricultural Areas/Date Palms (MH1), which was considered a microhabitat, was identified in the field and sampled (see Error! Reference source not found.).

A total of eight sampling locations (E41-E48) were sampled along the Access Route to Reko Diq Mine in Post-Monsoon 2022 Survey and Spring 2023 Survey. Among these sampling locations, four are in Dry Streambeds, three in the Gravel Plains, and one in the Mountains/Hills habitat types (see Error! Reference source not found.). The sampling at Reko Diq Mine Site and Associated Infrastructure was conducted between September 13,

[16] The Post-Monsoon 2023 Survey was carried out at Rail Transport Route Study Area and Marine Study Area at Port Qasim.

2022, to October 13, 2022 (referred hereafter as Post-Monsoon 2022 Survey), and April 28, 2023, to May 13, 2023 (referred hereafter as Spring 2023 Survey).

For additional biodiversity data collection in Summer 2024 Survey, a total of nine sampling locations for Sherman trapping and pitfall trapping of small mammals and herpetofauna species respectively, were selected at Reko Diq Mine Site, six along Northern Groundwater System, four along the Access Route to Reko Diq Mine Site, seven along the Corridor, and three sampling locations at Zangi Nawar Game Reserve. Furthermore, three sampling locations for trapping of small mammals only using Sherman traps were selected in the Taftan Area. (see Error! Reference source not found. and Error! Reference source not found.**).**

Port Qasim – Coastal Rail Transport Route Study Area

A total of three sampling locations were conducted at Port Qasim Coastal Rail Transport Route Study Area. One each sampling location was sampled in the Vegetation Cluster, Barren Land/Open Plot and Industrial Units habitat types (see Error! Reference source not found.). The sampling at Port Qasim was conducted between October 12, 2023, to October 26, 2023 (referred hereafter as Post-Monsoon 2023 Survey).

Exhibit 4.2: Sampling Locations at Reko Diq Mine Site, Post-Monsoon 2022 and Spring 2023 Surveys

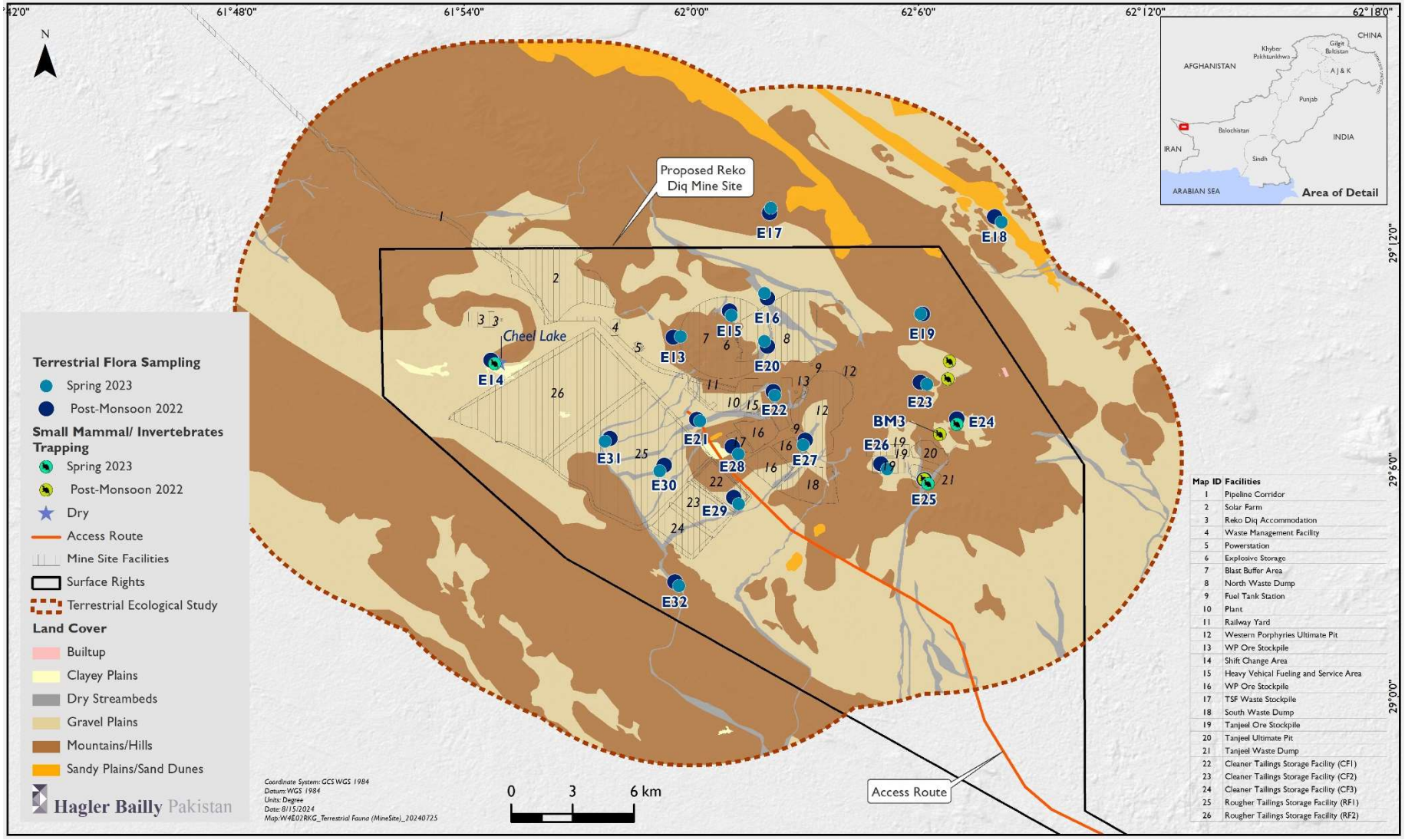


Exhibit 4.3: Sampling Locations along Northern Groundwater System, Post-Monsoon 2022 and Spring 2023 Surveys

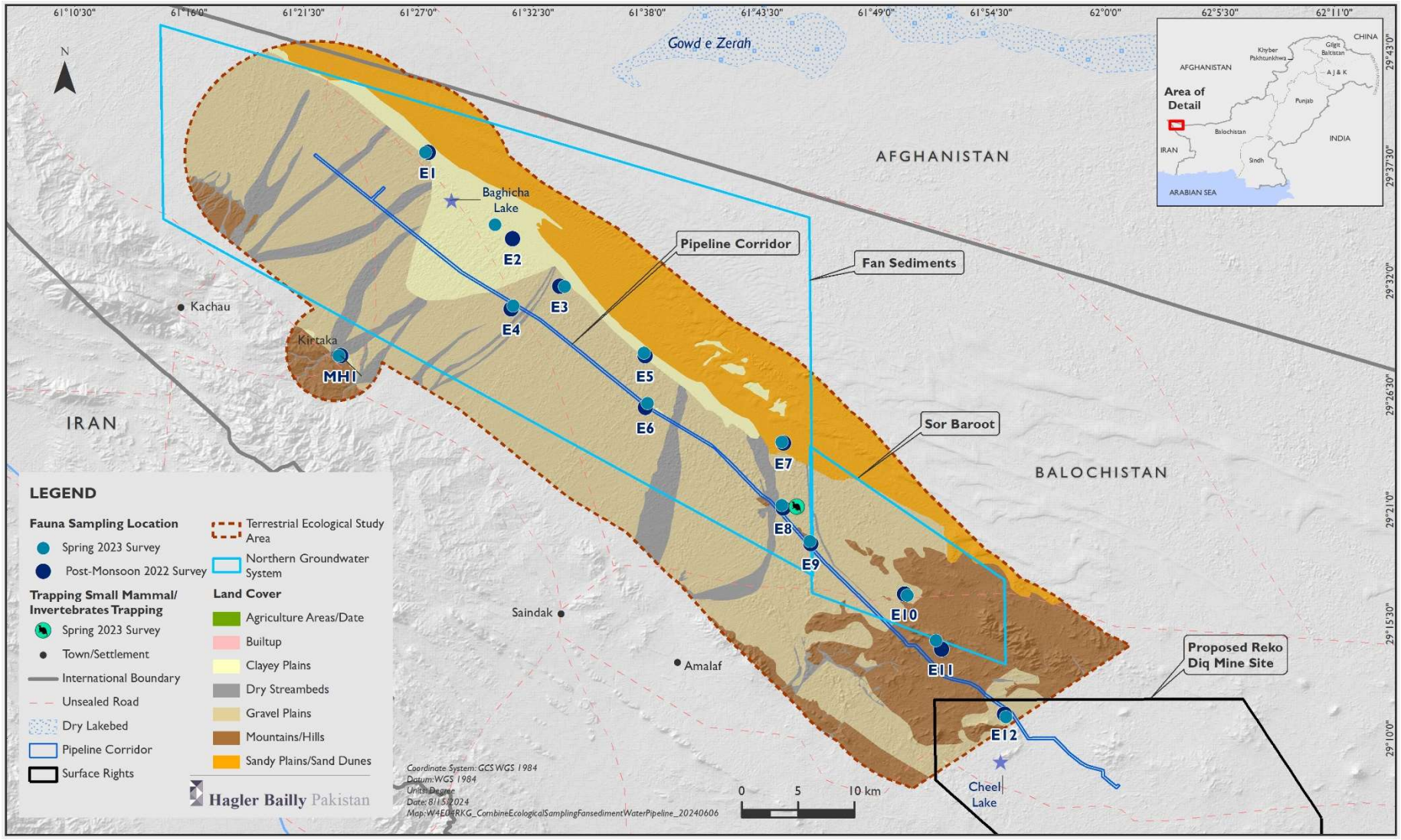


Exhibit 4.4: Sampling Locations along Access Route to Reko Diq Mine Site, Post-Monsoon 2022 and Spring 2023 Surveys

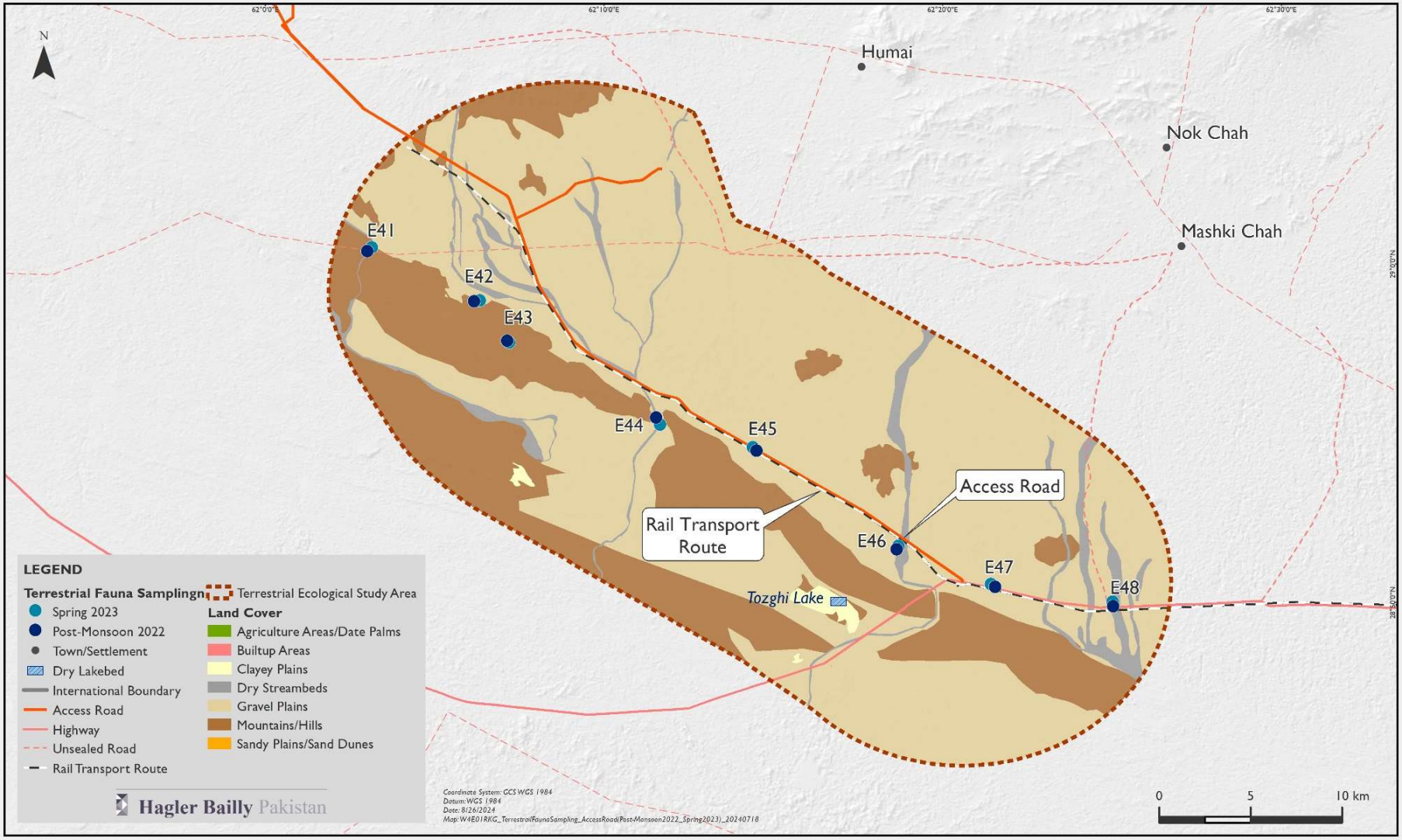


Exhibit 4.5: Sampling Locations for Pitfall Traps and Nocturnal Surveys for Herpetofauna Species, Summer 2024 Survey

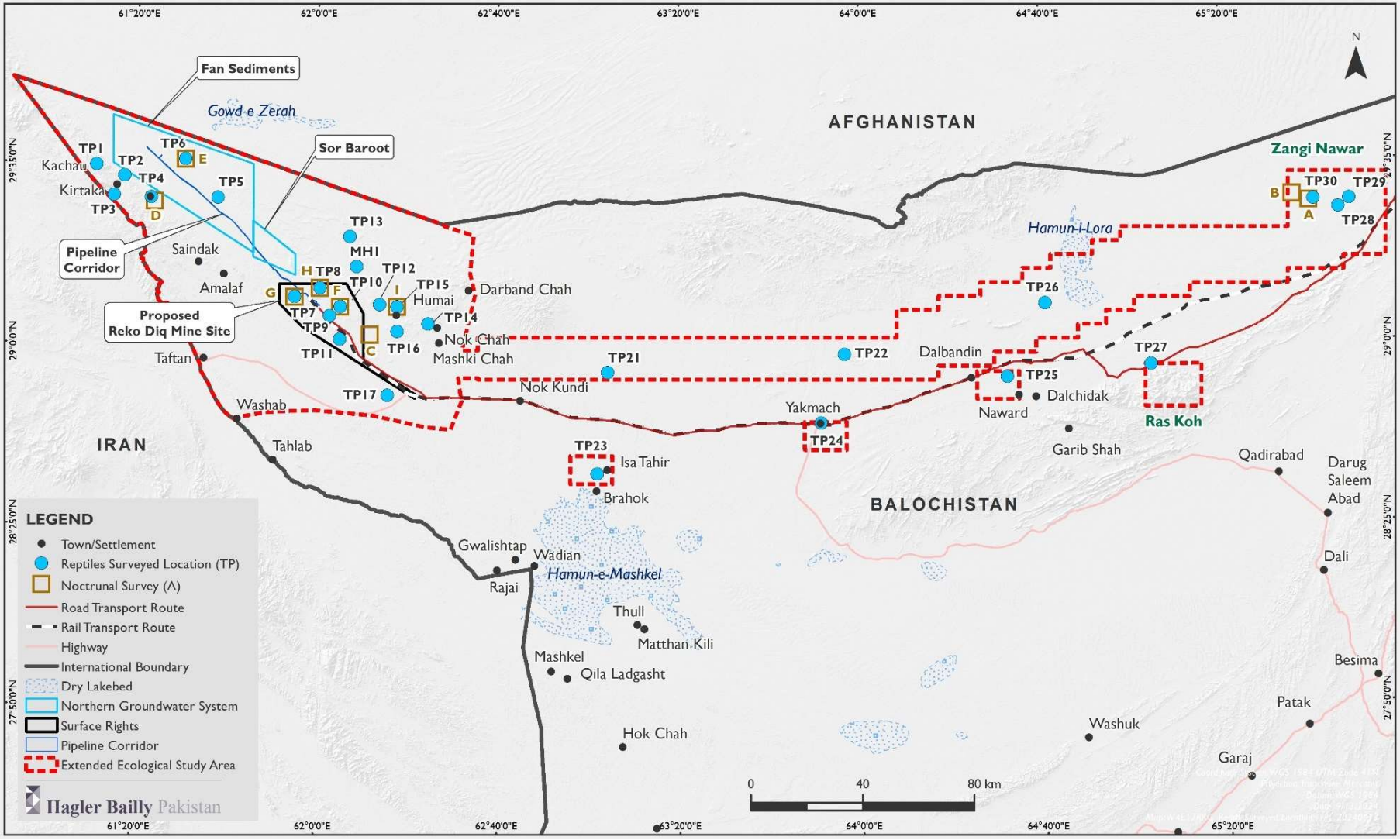


Exhibit 4.6: Sampling Locations for Sherman Traps and Nocturnal Surveys for Small Mammals Species, Summer 2024 Survey

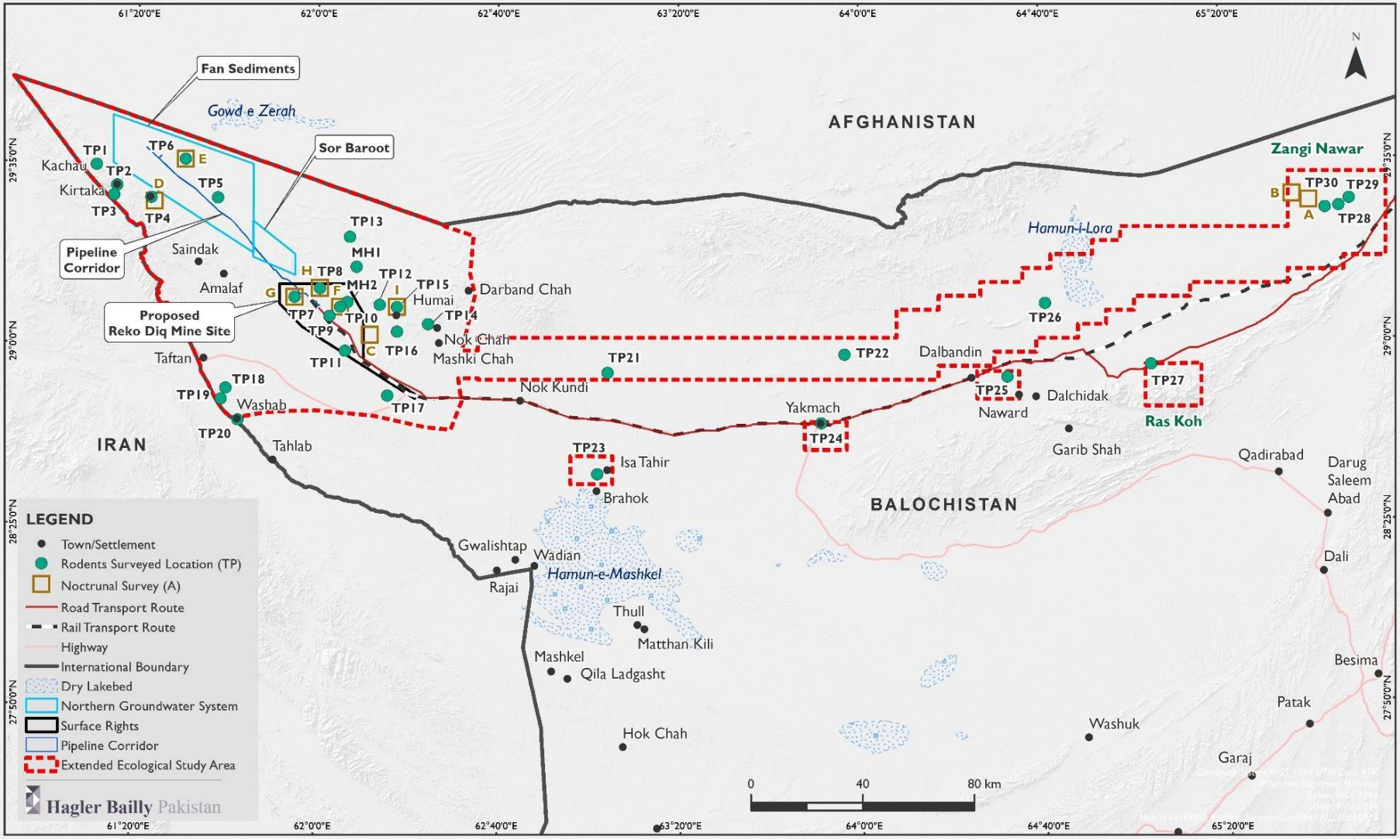


Exhibit 4.7: Sampling Locations at Post Qasim – Coastal Rail Transport Route Study Area, Post-Monsoon 2023 Survey

4.2.2 Methodology for Data Collection for Terrestrial Fauna

The terrestrial surveys conducted in the Post-Monsoon 2022 Survey, Spring 2023 Survey, and Post-Monsoon 2023 Survey involved the use of specific methodologies, details of which are provided below. The line transect method was employed for the sampling of avifauna, herpetofauna, mammals, and invertebrates, while Sherman traps were set at some sampling locations to capture small mammals. Pitfall traps were used at a number of sampling locations to capture and study invertebrate species.

The details of each of the sampling methods are provided below:

Avifauna

A line transect of 500 m long and 50 m wide was placed systematically at each sampling location in the Terrestrial Ecological Study Area to record all birds observed in the area. Transects were started as early as possible in the morning and in the late afternoon and covered all identified habitats. The start time, end time, and coordinates of the starting and end points were recorded. The bird species were identified using the most recent keys available in the literature. The diversity and abundance of birds were calculated at each sampling location. The IUCN Red List of Threatened Species and CITES status of the species of birds are provided while National Red List data is not available for the avifauna species in Pakistan.

Mammals

Line Transect Method

Line transect of 500 m by 20 m was placed at each sampling location to record sightings and signs of mammals. The GPS coordinates of the location and habitat type were documented. Animal signs such as scats, pugmarks, and tracks were searched and photographed. In addition, incidental sightings of all mammals were recorded; the number of individuals, location, and habitat type were recorded for each sighting. Anecdotal information regarding specific mammals was collected from the local people, and relevant literature was also consulted. The IUCN Red List of Threatened Species, CITES, and National Red List status of the mammal species are provided for the species observed in the survey as well as reported in the review of literature.

Live Trapping for Small Mammals

Sherman traps were used for small mammals. A mixture of different food grains mixed with fragrant seeds was used as bait. Wheat and rice were used as food grains, while peanuts, butter, coriander, and oats were used for fragrance. Freshly prepared bait was used on every trapping day. The traps were set at selected potential sites in the evening and checked the next day as early as possible. The species and number of specimens for each species trapped were noted. The trapped specimens were later released back to their habitat. Photographs of the trapped animals were taken.

In addition, nocturnal foot surveys were conducted for small mammals species. At each sampling location, a transect of about 2 km was selected and the observers walked along the transect using torches. The survey team walked along the transect, typically at a slow and steady pace, scanning the ground and surrounding vegetation for different species.

Herpetofauna

Line Transect Method

An effective way to survey reptiles is by active searching using the line transect method which is equally applicable to both nocturnal and diurnal species. A line transect of 500 m long and 20 m wide was placed systematically at each sampling location in the Terrestrial Ecological Study Area. The presence of signs such as an impression of body, tail or footprints, faecal pellets, tracks, dens, or egg-laying excavations were recorded.

In addition, nocturnal foot surveys were conducted for herpetofauna species. At each sampling location, a transect of about 2 km was selected and the observers walked along the transect using torches. The survey team walked along the transect, typically at a slow and steady pace, scanning the ground and surrounding vegetation for different species.

Pitfall Trapping for Herpetofauna

Sampling for the herpetofauna was conducted using the pitfall traps. Plastic buckets with a capacity of 25-30 litres were used as a pitfall trap for the herpetofauna species. The pitfall traps were set at roughly 5 m intervals along the transect. The traps were placed early in the evening, checked next morning and removed after 48 hours. The microhabitat variation and species mobility were taken into consideration while pitfall traps were deployed in the field. A total of eight pitfall traps along with the drift fences were set at each sampling location. The drift fence is an essential component in herpetofauna trapping which is used to guide or direct animals toward pitfall traps. The herpetofauna species observed in the field while setting or removing the pitfall traps were also recorded at each sampling location.

The specimens were identified with the help of the most recent keys available in literature. The samples were collected and preserved for identification purposes where the species were not identified in the field for any reason.

The species collected or observed in the survey were photographed with a digital camera, and necessary field data was recorded. The coordinates and elevations were recorded using GPS, and other features of interest, like habitat type and climate conditions, were also documented. The IUCN Red List of Threatened Species and CITES status of the species is provided, while National Red List data is not available for herpetofauna species in Pakistan.

Invertebrates

Invertebrates were collected using two types of sampling techniques: active sampling and passive sampling. Active sampling involves the direct collection of specimens by the collector (observer), i.e., transect line method, hand collecting, beat and sweep sampling. The passive sampling method was conducted without the collector (observer) present, which includes pitfall trapping.

Line Transect Method

Line transect of 100 m by 5 m was used to capture above and below-ground invertebrates. Random quadrats were taken out along the transect. The invertebrate samples were collected using digging techniques at each quadrat along the transect line.

Pitfall Traps

Pitfall traps were used for surface active invertebrates and deployed along one flank of the transect at about 5-10 m distance from the quadrat. The pitfall traps were set at roughly 5 m intervals along one flank of the transect. The traps were placed in the afternoon or early evening and emptied 12 hours later the following day. Abundance and richness were calculated for data collected using both sampling methods, and IUCN Red List status is provided for the species that were identified up to the species level. National Red List data is not available for invertebrate species in Pakistan.

4.2.3 Analysis of Data for Terrestrial Fauna

The species richness (number of species observed) and abundance (number of individuals of each species observed) at the specified sampling location for all the terrestrial fauna were calculated using data from the line transect, Sherman Traps, and pitfall traps.

Error! Reference source not found. provides photographs of field activities conducted during the sampling of terrestrial fauna.

Exhibit 4.8: Field Activities for Sampling of Terrestrial Fauna

a) Birds watching

b) *Identifying signs of mammals*

c) Setting of Sherman's traps for small mammals

d) Active searching of herpetofauna species

e) *Active searching of invertebrates*

f) *Pitfall Trapping for herpetofauna species*

4.3 Marine and Coastal Fauna

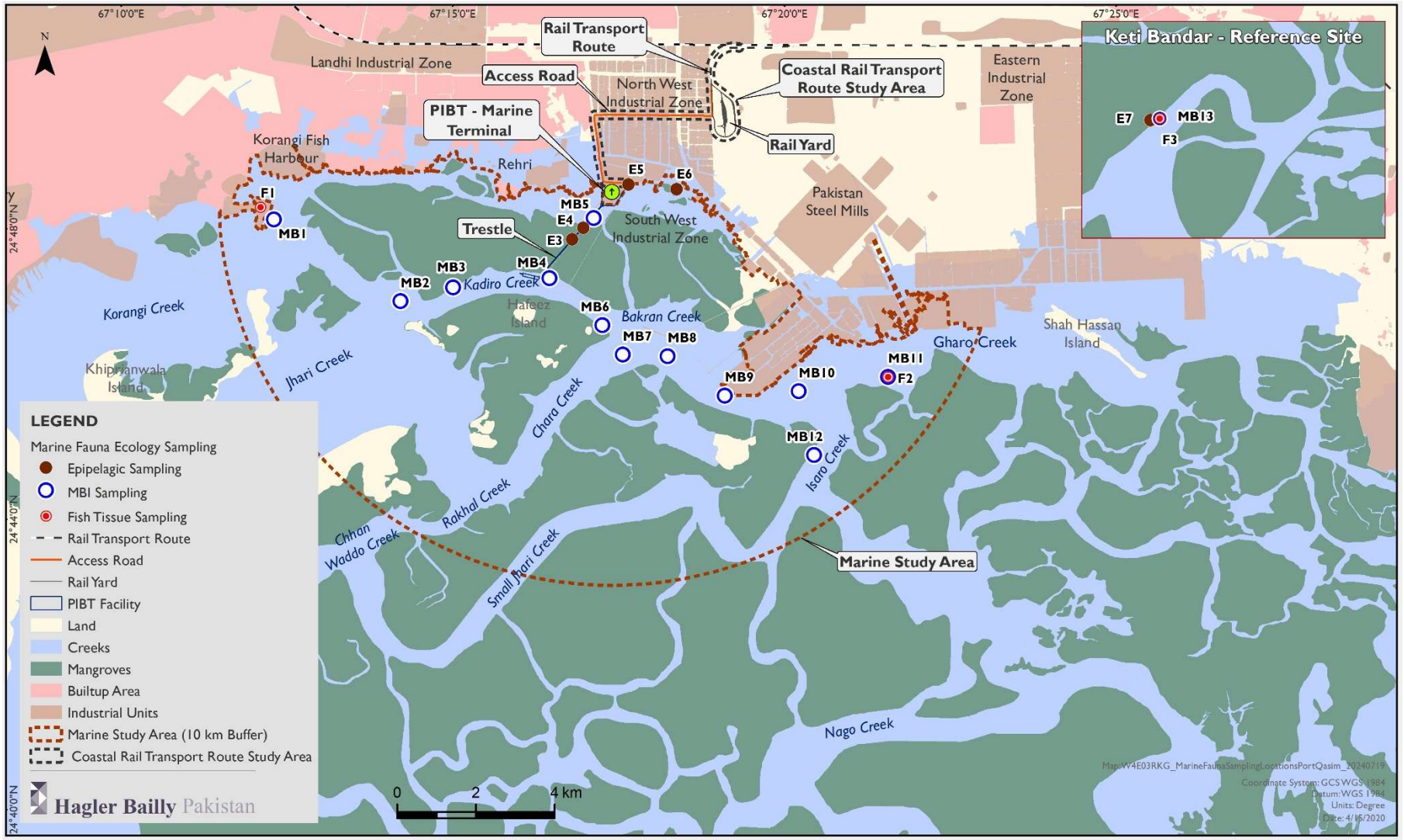
Sampling for marine and coastal fauna was conducted at the Port-Qasim Marine Terminal in the Post-Monsoon 2023 Survey only.

4.3.1 Selection of Sampling Locations for Marine and Coastal Fauna

Sampling for the marine and coastal fauna was conducted at different sampling locations in the Post-Monsoon 2023 Survey. A total of 13 sampling locations were sampled for marine benthic invertebrates (MBI), five for epi-pelagic fauna, and three for fish. One sampling location was designated as a reference point at Keti Bundar, where marine habitat is unaffected by any Project-related activities. This sampling location was strategically selected to compare the ecological conditions of marine resources in impacted areas versus those in protected, unaffected areas. Additionally, one sampling location was selected near Korangi Fish Harbor, which is the most disturbed area.

Error! Reference source not found. provides the map of marine and coastal fauna sampling locations at the Port Qasim Marine Terminal.

Exhibit 4.9: Marine and Coastal Fauna Sampling Locations along Port Qasim Marine Terminal



4.3.2 Methodology for Data Collection for Marine and Coastal Fauna

The terrestrial surveys conducted in the Post-Monsoon 2022 Survey, Spring 2023 Survey, and Post-Monsoon 2023 Survey involved the use of specific methodologies, details of which are provided below. The line transect method was employed for the sampling of avifauna, herpetofauna, mammals, and invertebrates.

The details of each of the sampling methods are provided below:

Marine Benthic Invertebrates (MBI)

MBI refers to macro/meiofauna in submerged marine sediments. For MBI sampling, a linear transect of 200 m by 20 m was taken at each sampling location, and sediment was collected from an area of 10 cm by 10 cm using a spatula. The MBI samples collected were outsourced to an accredited laboratory for further analysis. All species were identified, enumerated, and expressed as the number of species per square meter.

Epi-Pelagic Fauna

Epi-pelagic fauna refers to fauna observed on exposed coastal areas, such as crabs, gastropods, and bivalves. For the epi-pelagic fauna, a transect of 200 m by 20 m was taken, and the epifauna observed was noted and documented.

Pelagic Fish Communities

The sampling for the fish communities was conducted in the sea along the coastline using gill nets. Gill nets of two mesh sizes, 62 mm, and 87.5 mm, having lengths of about 100 m and depths of 8-10 m, were used at each site for 30 minutes each. The nets were not set up the way they were set up in the river. They were free from both sides while some weights and floaters were put to hold them in the sea. The purpose of this sampling was to verify the literature-based fish species and have an overview of fish abundance.

Fishermen catch at all the fish landing sites (jetties) was also observed for data collection. This includes fish landing sites at Korangi Fish Harbor and Keti Bandar. The fish captured by fishermen were identified and photographed, and auxiliary information from fishermen was also collected. In addition, a detailed review of the literature was conducted to establish the baseline conditions.

4.3.3 Analysis of Data for Marine and Coastal Fauna

Dedicated statistical software was used to compute the Biodiversity Index (Species diversity (Hmax), Species richness (H'), and Evenness (J"). Communities with many species that are evenly distributed are the most diverse, and communities with few species that are dominated by one species are the least diverse. The following equation was used.

Species diversity:

$$H' = -\sum_{i=1}^{s} pi\ ln\ pi.$$

Species evenness (J'):

$$J = H'/H\ max$$

Abundance and richness were calculated, and IUCN Red List of Threatened Species and CITES status (where available) are provided for the species identified up to the species level. National Red List data is not available for MBI, epi-pelagic fauna, and pelagic fish communities.

Error! Reference source not found. provides photographs of field activities conducted while sampling marine and coastal fauna.

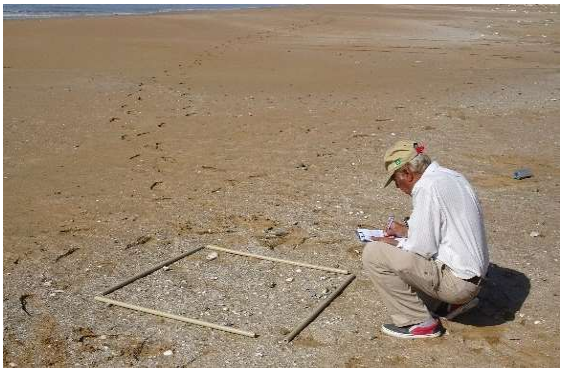
Exhibit 4.10: Field Activities for Marine and Coastal Fauna Sampling

a) Collection of substrate sediments

b) Hand-held grab deployed for the collection of sediments from deeper waters

c) Benthic samples and soft sediments retrieved by the grab

d) Plastic jars labelled and preserved in 10% formalin



e) Quadrat for epipelagic coastal fauna

f) Quadrat for crab holes

a) Setting of gill nets for fish sampling

5. Ecological Study Area and Habitats

The ecological studies were carried out for the following three areas:

- Reko Diq Mine Site and Associated Infrastructure, including the Northern Groundwater System and Access Route connecting the N-40 highway and existing rail route, are referred to as the Reko Diq Mine Site and Associated Infrastructure in this report. The Access Route will also accommodate the proposed railway line from the Mine Site to the existing railway line
- Rail Transport Route at Port Qasim connecting the Marine Terminal at Port Qasim to the main railway line of Pakistan Railways for export of copper concentrate
- Areas in the sea around the Marine Terminal at Port Qasim.

The ecological studies were not carried out for the Rail and Road Route Corridor consisting of existing railway lines that will be used for the transportation of the product from the Project to the port for export. The biodiversity along the main railway line has already been impacted over time, and the impacts of additional traffic due to the Project on ecology will, therefore, be negligible.

5.1 Ecoregions and Biomes

5.1.1 Reko Diq Mine Site and Associated Infrastructure

The Project infrastructure such as the proposed Reko Diq Mine Site, Northern Groundwater System and Access Route to Reko Diq Mine Site fall within a desert ecoregion which 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, with some irrigated cropland in areas with greater water availability. The area is characterized by a desert biome, revealing distinct features typical of an arid environment due to scant rainfall leading to limited vegetation. Drought conditions are prevalent as this region experiences low annual precipitation and high temperatures, fostering a landscape with limited vegetation adapted to survive in dry conditions. The terrain consists of sandy or gravelly surfaces, often with dunes or rocky landscapes, the soil is well-drained, and nutrient levels typically low. Temperature extremes are common, with hot daytime and cooler nights. Some reptiles and a few mammal species are specifically restricted to this ecoregion.

The Ecological Study Area in the Reko Diq Mine Site and Associated Infrastructure consists of different habitat types which include Gravel Plains, Clayey Plains, Mountains/Hills, Sandy Plains/Sand Dunes, Dry Streambeds, Built-up Areas and Agriculture Areas/Date Palms. Among these habitat types the major habitat type in the Reko Diq Mine Site and Associated Infrastructure is Gravel Plains (52.8%), followed by Mountains/Hills (27.1%) and Sandy Plains/Sand Dunes (10.0%) and the least habitat is Agriculture Areas/Date Palms (0.003%). All the habitat types are largely intact with a minimal disturbance due to anthropogenic activities and therefore, the habitat at the Reko

Diq Mine Site and Associated Infrastructure is categorized as Natural Habitat except for Agriculture Areas/Date Palms and Built-up Areas which are only fraction of the total habitat at the Reko Diq Mine Site.

The description of these habitat types are as follows:

- **Gravel Plains:** The Gravel Plains represent the largest and most prevalent habitat at the Reko Diq Mine Site and Associated Infrastructure. This habitat is characterized by a hard surface and small gravel particles, with very little to no vegetation in the centre of gravel plains which are mostly barren. The sparse vegetation is present at the interface of this habitat with other habitats providing favourable conditions for different species. These species largely consist of *Haloxylon persicum, Haloxylon salicornicum, Aeluropus lagopoides* and *Calligonum comosum*. The Gravel Plains offer limited refugia to herpetofauna, mammals, and avifauna. Only specialist species adapted to the harsh, xerophytic conditions are able to thrive in this habitat type. Some specialist reptiles which have the affinities to open habitats, such as Spotted Toad-headed Agama (*Phrynocephalus maculatus*), and Blanford's Fringe-fingered Lizard (*Acanthodactylus blanfordii*) can inhabit these habitats. Similarly, small bird species like larks and warblers can partially inhabit this habitat type. Although, this habitat type is largely intact, however, it experiences disturbance in the form of vehicle movements across the border and grazing of livestock on the scattered vegetation. The Gravel Plains is least to moderate sensitive habitat type and has a least potential to support an important concentration of different biodiversity groups.
- **Mountains/Hills:** This habitat type at the Reko Diq Mine Site and Associated Infrastructure is less represented and primarily consists of low, barren rocky outcrops with sparse vegetation. Dominant plant species include *Haloxylon salicornicum, Haloxylon persicum, Salsola stocksii, Cornulaca monacantha, Anabasis setifera, and Tribulus terrestris*. Despite the sparse vegetation, certain species have the affinities to this habitat type such as Large–scaled Rock Gecko (*Laudakia fusca*), which find suitable basking sites and crevices for shelter on the rocky slopes. These rocky slopes provide the sun exposure necessary for thermoregulation to this species. Similarly, bird species like the See-see Partridge (*Ammoperdix griseogularis*) thrive in rocky and sparsely vegetated areas, while the Little Owl (*Athene Noctua*) uses rocky ledges and burrows for nesting. The Eurasian Nightjar (*Caprimulgus europaeus*) roosts and forages in open rocky hills at night, and the Crag Martin (*Ptyonoprogne rupestris*) nests on vertical rock faces and cliffs. Also, the mammals, including the Cape Hare (*Lepus capensis*) and Red Fox (*Vulpes vulpes*), utilize this habitat, with the Cape Hare seeking shelter and the fox using the terrain for dens (resting place) and hunting. Overall, the Mountains/Hills habitat is moderately to highly sensitive, with a reasonable potential to support diverse ecological resources.
- **Sandy Plains/Sand Dunes:** This habitat type is characterized by various types of wind-blown sand formations, including shifting sand dunes, low tracts of permanent sand dunes, and high tracts of permanent sand dunes. The shifting sand dunes, with very little vegetation, are largely unsuitable for ecological resources

due to their active and unstable nature. In contrast, the low tracts of permanent sand dunes, particularly those with vegetation such as *Calligonum spp.* and *Salsola stocksii* and interface with other habitats like Gravel Plains or Clayey Plains which provide essential covers and suitable microhabitats. This type of habitat is most suitable and preferred habitat types of restricted-range Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*). The Indian Sand-swimmer (*Ophiomorus tridactylus*) thrives in loose, fine sand in low tracts of permanent dunes, which offer the ideal substrate for burrowing, while the Sand Racerunner (*Eremias scripta*) is adapted to the low tracts of permanent sand dunes, using the open sandy areas for foraging and sheltering in vegetation. This habitat type is largely intact, with minimal disturbance primarily limited to vehicular movement across the border. The shifting sand dunes and high tracts of permanent sand dunes are the least sensitive and offer the least potential for supporting biodiversity. However, the low tracts of sand dunes, particularly at the interface with other habitats and adequate vegetation, are highly sensitive and have significant potential to support biodiversity.

- **Dry Streambeds:** These are seasonal water channels that remain dry for most of the year but play a critical role during rainfall in desert and semi-desert areas by regulating water flow and retaining moisture for extended periods. This retained moisture creates favourable conditions for plant growth, making dry streambeds the most promising and sensitive habitat type for supporting various ecological resources. Dominant vegetation includes *Salsola stocksii, Haloxylon persicum, Haloxylon salicornicum, Calligonum comosum*, *and Panicum turgidum*, which provide essential refugia and shelter for reptiles, small mammals, and bird species. The Houbara Bustard is particularly attracted to this habitat during its wintering period. The Houbara Bustard prefers areas with sparse vegetation and open spaces for foraging and this habitat type provide seeds, insects, and small invertebrates, which are key components of the bustard's diet. Additionally, their open terrain allows for efficient predator detection and escape. Smaller birds like larks and warblers also utilize this habitat for nesting and breeding. Dry streambeds further support large mammals like Rüppell's fox, which prey on small mammals, reptiles, and birds found in this habitat type. With minimal anthropogenic disturbance, this habitat type is largely intact and has the high potential to support different biodiversity groups
- **Clayey Plains:** This habitat consists of flat or gently undulating terrains with fine-textured, clay-dominated soils, characteristic of arid and semi-arid regions. These soils retain water effectively but have poor drainage, often forming surface cracks during dry periods. This habitat is dominated by *Alhaji maurorum, Tribulus terrestris,* and *Citrullus colocynthis*, which are well adapted to the harsh conditions. This habitat is largely unsuitable for most herpetofauna, except from adaptable species such as the Spotted Toad-headed Agama (*Phrynocephalus maculatus*) which inhabit these plains due to their ability to thrive in open, sparsely vegetated environments. Additionally, Clayey Plains near Dry Streambeds serve as important wintering grounds for the Houbara Bustard, which prefers open areas for predator avoidance while foraging. The habitat remains largely intact but faces localized grazing pressure from livestock, particularly

camels, which impact vegetation like *Alhaji maurorum*. Overall, this habitat is classified as moderately to highly sensitive, with modest potential to support biodiversity, especially in less disturbed areas or where it interfaces with other habitat types

- **Agriculture Area/Date Palm**: This unique microhabitat, is characterized by larger Date Palm **(***Phoenix dactylifera***)** trees, along with vegetation such as *Tamarix aphylla, Peganum harmala, Alhagi maurorum, and Vachellia jacquemontii*, which provide essential resources and shelter for various species. This habitat type provides structure diversity due to mixed vegetation to wide array of bird species which includes Laughing Dove, White-eared Bulbul, Indian Golden Oriole, Crested Lark, Eurasian Crag Martin, Lesser White-throat, European Bee-eater, and Red-throated Flycatcher. Similarly, several herpetofauna species such as *Trapelus agilis* prefer mix habitats. This habitat type is largely intact with modest disturbances caused by anthropogenic activities from the law enforcement camps. This habitat type is highly sensitive and has high potential to support different biodiversity groups.

5.1.2 Port Qasim

The proposed Project infrastructure such as Rail Transport Route, Rail Yard, Road Transport Route, Access Road and Pakistan International Bulk Marine Terminal (PIBT) at Port Qasim falls within the broader context of the Indus Delta ecoregion which is situated in the Sindh Province especially the southeastern coastal areas. The Indus Delta ecoregion is characterized by a complex network of tidal channels, mudflats, and mangrove forests. It is influenced by the freshwater inputs from the Indus River, creating a unique and dynamic ecosystem. The fauna of the delta is specifically important in terms of hosting several native and migratory bird species. The delta and creeks also support the diverse marine species including fish, marine benthic invertebrates, epipelagic fauna, and a few marine mammalian species. This area is characterized by high temperatures and high humidity, supporting the subsequent fauna species in the coastal areas.

Port Qasim study area consists of the Barren Land/Open Plot, Industrial Units, Vegetation Cluster, Mangroves, Creeks, Road/Railway Lines, and Drainage. Among these habitat types, Vegetation Cluster is major habitat type consisting of 48.4% of Port Qasim study area followed by Industrial Unit (18.6%) and Barren Land/Open Plot (17.1%). All these habitats are largely modified due to anthropogenic activities and therefore the habitat of Port Qasim study area is categorized as Modified Habitat due to high level of anthropogenic activities and dominance of invasive species.

The description of these habitat types are as follows:

- **Barren Land/Open Plot:** This habitat type is predominantly characterized by sparse vegetation, primarily consisting of plant species such as *Calotropis procera* and *Prosopis juliflora*. The ecological productivity of this habitat is limited, supporting a modest assemblage of fauna, including passerine bird species such as the Common Chiffchaff (*Phylloscopus collybita*), Green Bee-eater (*Merops orientalis*), and Indian Robin (*Saxicoloides fulicatus*). Extensive anthropogenic modifications, including land clearance and the deposition of waste materials, have significantly altered the

habitat's structure and function. These disturbances have created favorable conditions for opportunistic and scavenging species, such as Wild Boar (*Sus scrofa*) and Golden Jackal (*Canis aureus*), which exploit the modified environment. This habitat is least sensitive and has modest potential to support ecological resources.

- **Vegetation Cluster:** This habitat type is defined by a heterogeneous mix of plant species, including native vegetation such as *Abutilon indicum*, *Aerva javanica*, *Calotropis procera*, *Capparis decidua*, *Saccharum munja*, *Salvadora oleoides*, and *Senna italica*, alongside the alien-invasive *Prosopis juliflora*, which dominates much of the area. The diverse vegetation supports various biodiversity groups by offering structural complexity, cover, and essential resources such as food and microhabitats. This habitat type provides a promising refuge for various mammalian species, including Cape Hare (*Lepus capensis*), Asiatic Jackal (*Canis aureus*), Five-striped Palm Squirrel (*Funambulus pennantii*), Indian Crested Porcupine (*Hystrix indica*), Indian Long-eared Hedgehog (*Hemiechinus collaris*), and Wild Boar (*Sus scrofa*). Additionally, it serves as an important nesting and feeding ground for birds like the Grey Francolin (*Francolinus pondicerianus*). The presence of *Prosopis juliflora* significantly alters the ecological dynamics, often outcompeting native plant species and modifying soil and hydrological properties.
- **Industrial Unit:** This habitat type is highly modified by anthropogenic activities and is mainly dominated by alien-invasive plant species such as *Phragmites karka*, *Prosopis juliflora*, and cultivated species like *Sesbania grandiflora*. These plants outcompete native species such as *Calotropis procera* and *Haloxylon salicornicum*, resulting in a loss of native vegetation and changes to the local ecosystem. The habitat supports opportunistic species, including the Golden Jackal (*Canis aureus*), which feeds on waste food from workers. Due to its proximity to the coastline, the area also provides foraging and nesting opportunities for various bird species that feed on stored grains and use built-up structures for shelter.

Exhibit 5.1 provides the percentage of habitat types, likely list of species including the conservation concern species within each habitat type, and sensitivity of each habitat type.

Exhibit 5.1: Habitat Types, Lits of Possible Species in Each Habitat Type, Conservation Concern Species and Sensitivity Level for Reko Diq Mine Site and Associated Infrastructure and Port Qasim

No.	Habitat Type	Percentage Out of Total Study Area	Possible Species to Inhabit				Expected Conservation Concern Species			Sensitivity
			Plant	Mammals	Birds	Herpetofauna	Mammals	Birds	Herpetofauna	
Reko Diq Mine Site and Associated Infrastructure										
1	Gravel Plains	52.8	*Haloxylon persicum* *Haloxylon salicornicum* *Aeluropus lagopoides* *Calligonum comosum*	-	Larks Warbler	*Phrynocephalus maculatus* *Acanthodactylus blanfordii*	*Vulpes rueppellii* *Lepus capensis* *Salpingotulus michaelis*	-	-	Least to moderate
2	Mountain/Hills	27.1	*Haloxylon salicornicum* *Haloxylon persicum* *Salsola stocksii* *Cornulaca monacantha* *Anabasis setifera* *Tribulus terrestris*	*Lepus capensis* *Vulpes vulpes*	*Ammoperdix griseogularis* *Athene Noctua* *Caprimulgus europaeus* *Ptyonoprogne rupestris*	*Laudakia fusca*	*Ovis vignei* *Capra aegagrus* *Vormela peregusna*	*Neophron percnopterus* *Aquila nipalensis* *Falco cherrug* *Clanga clanga* *Aquila heliaca*	*Varanus bengalensis*	Moderatly to highly
3	Sandy Plains/ Sand Dunes	10.0	*Calligonum spp* *Salsola stocksii*	-	-	*Phrynocephalus euptilopus* *Ophiomorus tridactylus* *Eremias scripta*	*Felis margarita* *Salpingotulus michaelis*	-	*Phrynocephalus euptilopus*	Highly senstive
4	Dry Streambeds	5.7	*Salsola stocksii* *Haloxylon persicum* *Haloxylon salicornicum* *Calligonum comosum* *Panicum turgidum*	*Vulpes rueppellii*	*Chlamydotis macqueenii* Larks Warblers	-	*Gazella subgutturosa*	*Vanellus gregarius* *Chlamydotis macqueenii*	-	Highly sensitive
5	Clayey Plains	4.3	*Alhaji maurorum* *Tribulus terrestris* *Citrullus colocynthis*	-	-	*Phrynocephalus maculatus*	-	*Chlamydotis macqueenii*	-	Moderatly to highly
6	Agricultural Area/ Date Palm	0.003	*Phoenix dactylifera* *Tamarix aphylla* *Peganum harmala* *Alhagi maurorum* *Vachellia jacquemontii*	-	*Spilopelia senegalensis* *Pycnonotus leucotis* *Oriolus kundoo* *Galerida cristata* *Ptyonoprogne rupestris* *Sylvia curruca* *Merops apiaster* *Ficedula parva*	*Trapelus agilis*	-	*Columba eversmanni* *Circus macrourus*	-	Highly sensitive
Port Qasim										
1	Barren Land/ Open Plot	17.1	*Calotropis procera* *Prosopis juliflora*	*Sus scrofa* *Canis aureus*	*Phylloscopus collybita* *Merops orientalis* *Saxicoloides fulicatus*	-	*Manis crassicaudata*	-	*Saara hardwickii*	Least sensitive
2	Vegetation Cluster	48.4	*Abutilon indicum* *Aerva javanica* *Calotropis procera* *Capparis decidua* *Saccharum munja* *Salvadora oleoides* *Senna italica* *Prosopis juliflora*	*Lepus capensis* *Canis aureus* *Funambulus pennantii* *Hystrix indica* *Hemiechinus collaris* *Sus scrofa*	*Francolinus pondicerianus*	*Acanthodactylus cantoris* *Ophisops jerdonii* *Calotes versicolor*	-	-	-	Least sensitive
3	Industrial Unit	18.6	*Phragmites karka* *Prosopis juliflora* *Sesbania grandiflora* *Calotropis procera* *Haloxylon salicornicum*	*Canis aureus*	*Columba livia* *Pycnonotus cafer*	*Psammophis schokari*	-	*Calidris ferruginea*	-	Least sensitive

5.2 Protected Areas

According to the IUCN, the protected area is defined as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."[17] For the purpose of management objectives, the IUCN has identified seven different protected areas categories those are described below.

- **Category Ia**: Strict nature reserve/wilderness protection area managed mainly for science or wilderness protection
- **Category Ib**: Wilderness Area: protected area managed mainly for wilderness protection
- **Category II**: National Park: protected area managed mainly for ecosystem protection and recreation
- **Category III**: Natural Monument: protected area managed mainly for conservation of specific natural features
- **Category IV**: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- **Category V**: Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation or recreation
- **Category VI**: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural resources.

According to the information collected from KBA[18] and IBAT,[19] the proposed Reko Diq Mine Site and Associated Infrastructure lies within the Saindak Community Game Reserve.[20]

The nearest protected areas along the Rail and Road Route Corridor include Kambran Wildlife SanctuaryIn addition, the Ras Koh Wildlife Sanctuary, Shashan Wildlife Sanctuary and Saindak Community Game Reserve.[21]

The nearest protected areas near Port Qasim Coastal Rail Transport Route and Marine Study Area include the Hub Dam and Mahro Kohri wildlife sanctuaries.

Exhibit 5.2 provides the list of protected areas and their distance from Mine Site, Rail and Road Route Corridor. **Exhibit 5.3** provides a map of the protected areas near Project infrastructure.

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17 Dudley, N., & Stolton, S. (2008). Defining protected areas: an international conference in Almeria, Spain. *IUCN, Gland*.

18 Key Biodiversity Areas. Available at https://www.keybiodiversityareas.org/sites/search Assessed on 20–Oct–22

19 Integrated Biodiversity Assessment Tool https://www.ibat–alliance.org/ Assessed on 20–Oct–22

20 The status and boundary of the Saindak Game Reserve is under investigation with the concern departments.

21 Ibid

Exhibit 5.2: Protected Areas and their Distance from Mine Site, Rail and Road Route Corridor

Protected areas	*Categories*	*Distance from the Facilities (km)*		
		Mine Site	*Rail Transport Route*	*Road Transport Route*
Dhoung Block	Wildlife Sanctuary	629	2.8	190
Hadero Lake	Wildlife Sanctuary and IBA	720	5.2	38
Haleji Lake	Wildlife Sanctuary and Ramsar Site	726	5.5	46
Kambran	Wildlife Sanctuary	269	8	0
Zangi Nawar	Game Reserve	352	14.0	15.1
Kinjhar (Kalri) Lake	Wildlife Sanctuary and IBA	730	5	66
Langh (Lungh) Lake	Wildlife Sanctuary	598	10.2	141
Maslakh	Wildlife Sanctuary	432	7	34.5
Shashan	Wildlife Sanctuary	460	140	0
Ras Koh	Wildlife Sanctuary	282	7	0
Chorani	Wildlife Sanctuary	462	140	4
Saindak	Game Reserve	-	-	-
Haleji	Important Bird Area (IBA)	726	5.5	46
Pugri Lake	Important Bird Area (IBA)	605	3.5	146.5
Drigh Lake	Wildlife Sanctuary and Ramsar Site	600	9.8	145

5.3 Ecological Study Area

Exhibit 5.4 shows a map of the Ecological Study Area.

The Ecological Study Area at Reko Diq Mine Site and Associated Infrastructure was demarcated by applying a buffer of 10 km around the Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, where disturbance to the wildlife, including reptiles and mammals due to the Project may extend. However, this buffer was expanded further in Summer 2024 to capture more species and observe habitats types in the region as documented in the IBAT and literature reviews. Additionally, there are certain species those have the distribution ranges and prefer the habitat which extend beyond the 10 km boundary around the Reko Diq Mine Site and its Associated Infrastructure(Northern Groundwater System and Access Route to the Mine Site). Therefore, the Study Area was expanded to the Iran-Afghanistan borders to encompass the Reko Diq Mine Site, the Northern Groundwater System, Access Route to the Mine Site and extending approximately 430 km northeast to the Zangi Nawar Game Reserve to observe the connectivity and distribution of species and habitats between the Reko Diq Mine Site and the Zangi Nawar Game Reserve. All of this area has now been included in the extended Study Area.

The extended Study Area was selected to encompass biodiversity hotspots, stretching from the Chah Nimeh Lake network in Iran near the Afghanistan border in the north to the Tahlab River along the Pakistan-Iran border in the south and include the area with a

linear corridor from Mine Site to Zangi Nawar towards northeast. These areas feature permanent water sources that act as refugia during droughts and serve as centers of dispersal, promoting species resilience in the arid environment. Sand dunes near the Afghanistan border were included for their role as habitats for specialized species such as the restricted-range Alcock's Toad-headed Agama and Baluchistan Pygmy Jerboa. Additionally, mountainous regions around settlements like Kirtika and Kachao, which provide vegetation, water bodies, and prime habitats for rodents and various mammals. Sampling was conducted in areas such as Kirthika, Kachao, Tang Kachao, andSarzai to observe reptile and mammal species and their populations in their potential habitats.

This extended Study Area also incorporated isolated water sources, including wells in Humai, Darbandchah, Nok Chah, and Mashki Chah, which are crucial for mammalian species, especially during drought conditions. The Taftan Area, supporting small mammal populations, and the corridor from the Reko Diq Mine Site to Zangi Nawar, including areas like Isa Tahir, Yakhmach, Dalbandin, and Ras Koh, were prioritized for studying species movement and habitat connectivity. The Zangi Nawar Game Reserve, a biodiversity hotspot, was included to assess faunal similarity between the Reko Diq Mine Site and Zangi Nawar.The Ecological Study Area along the Port Qaism Area was demarcated by applying a buffer of 100 m along the existing Rail Transport Route, Rail Yard, and Access Road extending from the main railway line to the PIBT at Port Qasim. The proposed Rail Yard will connect these two transport routes, serving multiple functions, including train operations, maintenance, project related transportation goods, and the management of railway infrastructure. The faunal ecology of the Port Qasim industrial area is already disturbed by extensive industrial activities.

A buffer of 10 km extending into the creeks and mangrove areas around the Marine Terminal at Port Qasim was defined to account for possible impacts of the Project on marine fauna.

Exhibit 5.3: Protected Areas near Project Infrastructure

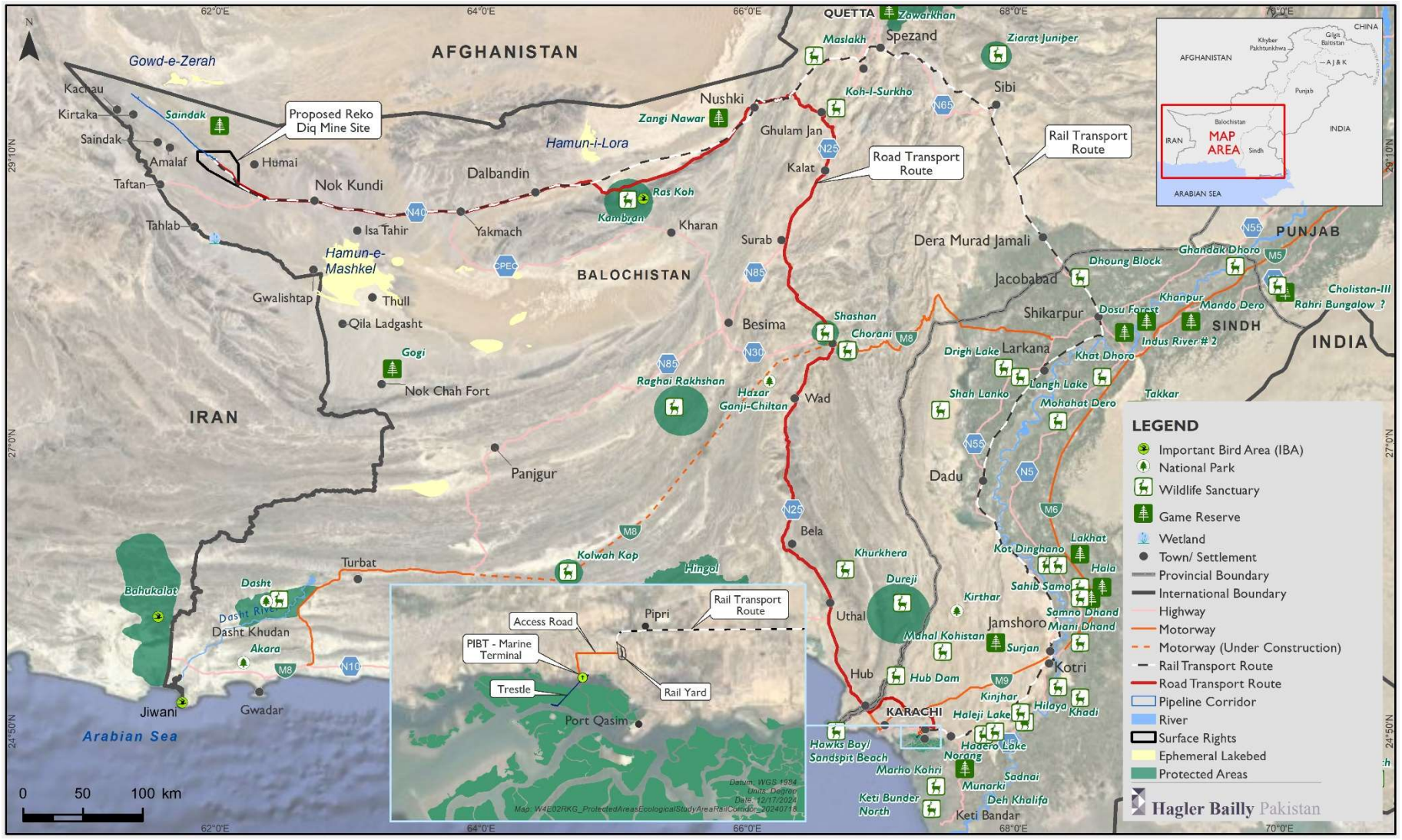
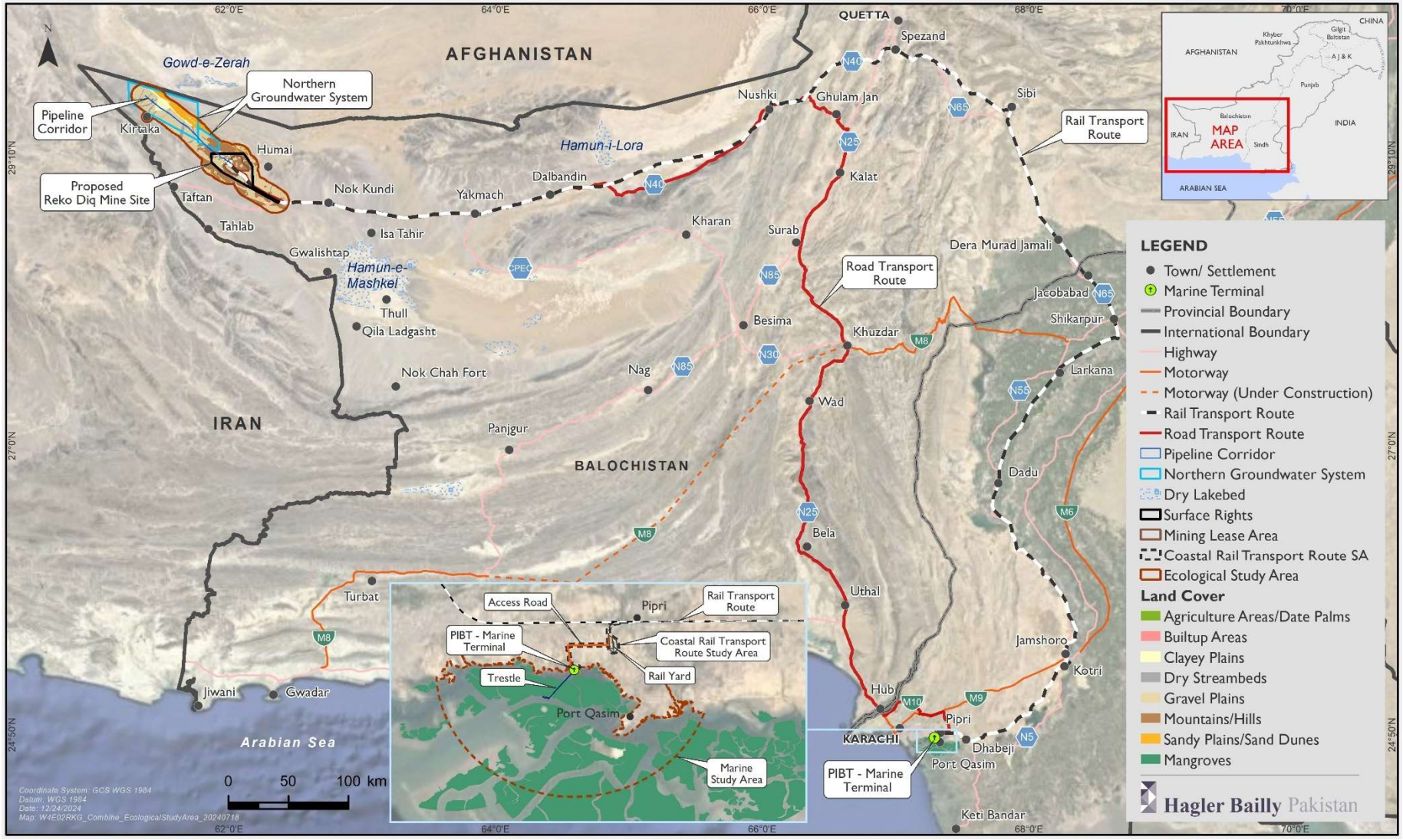


Exhibit 5.4: Ecological Study Area



5.4 Habitat Classification and Distribution in the Ecological Study Area

5.4.1 Reko Diq Mine Site and Associated Infrastructure

The Ecological Study Area was categorized into different habitat types based on Google Earth™ satellite imagery[22] which include the Mountains/Hills, Clayey Plains, Dry Streambeds, Gravel Plains, and Sandy Plains/Sand Dunes. **Exhibit 5.5** provides the Ecological Study Area on a map. **Exhibit 5.6** provide the map of the extended Study Area for herpetofauna and small mammals sampling in Summer 2024 Survey.

Exhibit 5.7 provides photographs of representative habitats whereas **Exhibit 5.8** provides habitat types along with the area and percentage of each habitat type. The Gravel Plains and Mountains/Hills habitat types dominate the landscape, with Dry Streambeds running through the Gravel Plains.

5.4.2 Rail and Road Route Corridor

The Rail and Road Route Corridor extends from RDMS to Port Qasim. This is an existing infrastructure that the Project will use. The biodiversity is already modified along these routes, however, the biodiversity is also adapted to these modified habitats. **Exhibit 5.9** provides the index map for desktop-based land use and land cover assessment along the Rail and Road Route Corridor within 1 km buffer on each side, whereas, segment wise landcover is provided in **Appendix A.**

Exhibit 5.10 provides some of the photographs of different habitat types along the Rail and Road Route Corridor retrieved from different online sources.

5.4.3 Port Qasim – Terrestrial and Marine Study Areas

Exhibit 5.11 provides the Terrestrial Study Area along the Coastal Rail Transport Route at Port Qasim. **Exhibit 5.12** includes photographs of the representative habitats in 1.5 km long Rail Transport Route and 6 km long Access Road. **Exhibit 5.13** lists habitat types along with the area and percentage of each habitat type in the Ecological Study Area. The habitats in the Study Area at Port Qasim are highly modified; the dominant habitat is Vegetation Clusters, which mostly consist of alien invasive mesquite plant species that may spread in the coastal area following the transportation of project material and reduce the regrowth of indigenous vegetation over time. The remaining land is occupied by industrial units, roads, and other infrastructure, with some land and demarcated industrial plots that are unutilized.

Exhibit 5.14 provides the Marine Ecological Study Area along Port Qasim. **Exhibit 5.15** includes photographs of the representative habitats in the creeks and mangroves extending about 10 km into the sea from the Marine Terminal at Port Qasim**.** **Exhibit 5.16** provides habitat types along with area and percentage of each habitat type in the Ecological Study Area. The creeks and excavated channels are used by the ships to access the berths at the port. The land is mostly covered by mangroves.

[22] Google Earth Pro. Free geospatial desktop application Available at: https://google–earth–pro.en.softonic.com/

Exhibit 5.5: Reko Diq Mine Site and Associated Infrastructure

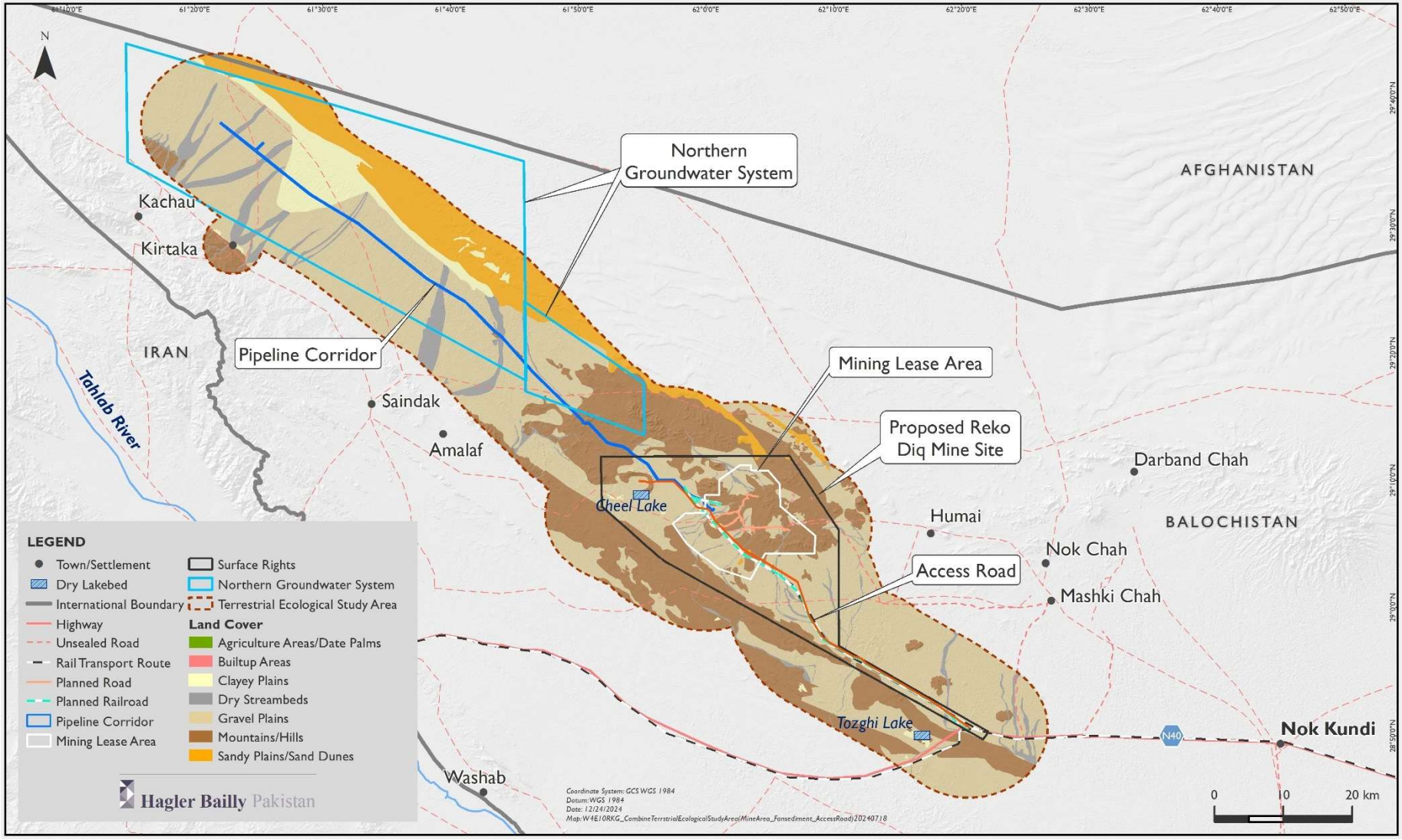


Exhibit 5.6: Extended Study Area, Summer 2024 Survey

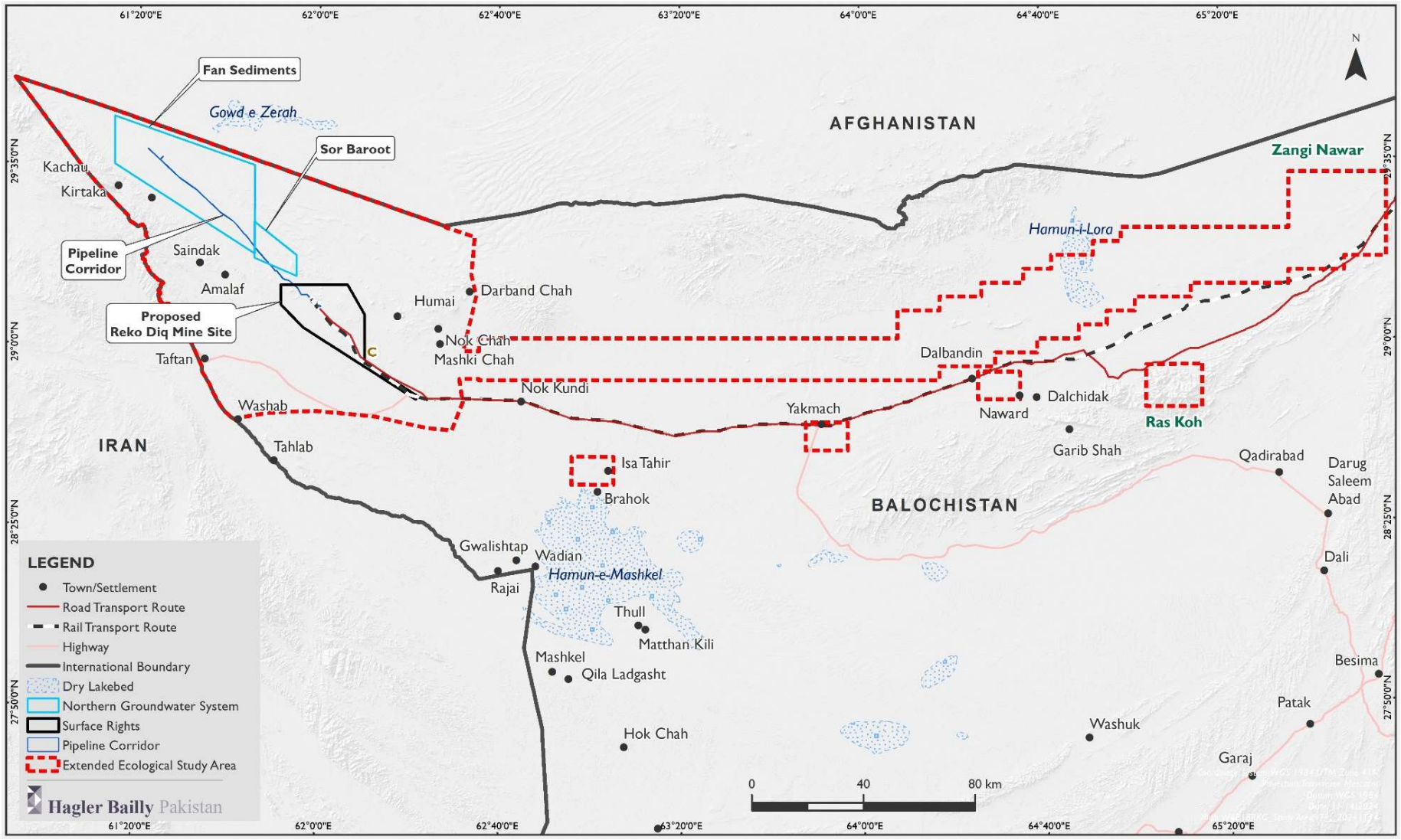


Exhibit 5.7: Photographs of Different Habitats along the Reko Diq Mine Site and Associated Infrastructure

a) Mountains/Hills

b) Sandy Plains/Sand Dunes

c) Dry Streambed

d) Clayey Plains

e) Gravel Plains

Exhibit 5.8: Distribution of Habitats in Reko Diq Mine Site and Associated Infrastructure

No.	*Habitat Type*	*Area (km^2)*	*Percentage (%)*
1.	Agriculture Areas/Date Palms	0.1	0.003
2.	Built-up Areas	0.4	0.01
3.	Clayey Plains	142.6	4.3
4.	Dry Streambeds	188.7	5.7
5.	Gravel Plains	1,759.4	52.9
6.	Mountains/Hills	903.7	27.1
7.	Sandy Plains/Sand Dunes	334.5	10.0
Total		**3,329.4**	**100.0**

Exhibit 5.9: Index Map along the Rail and Road Route Corridor

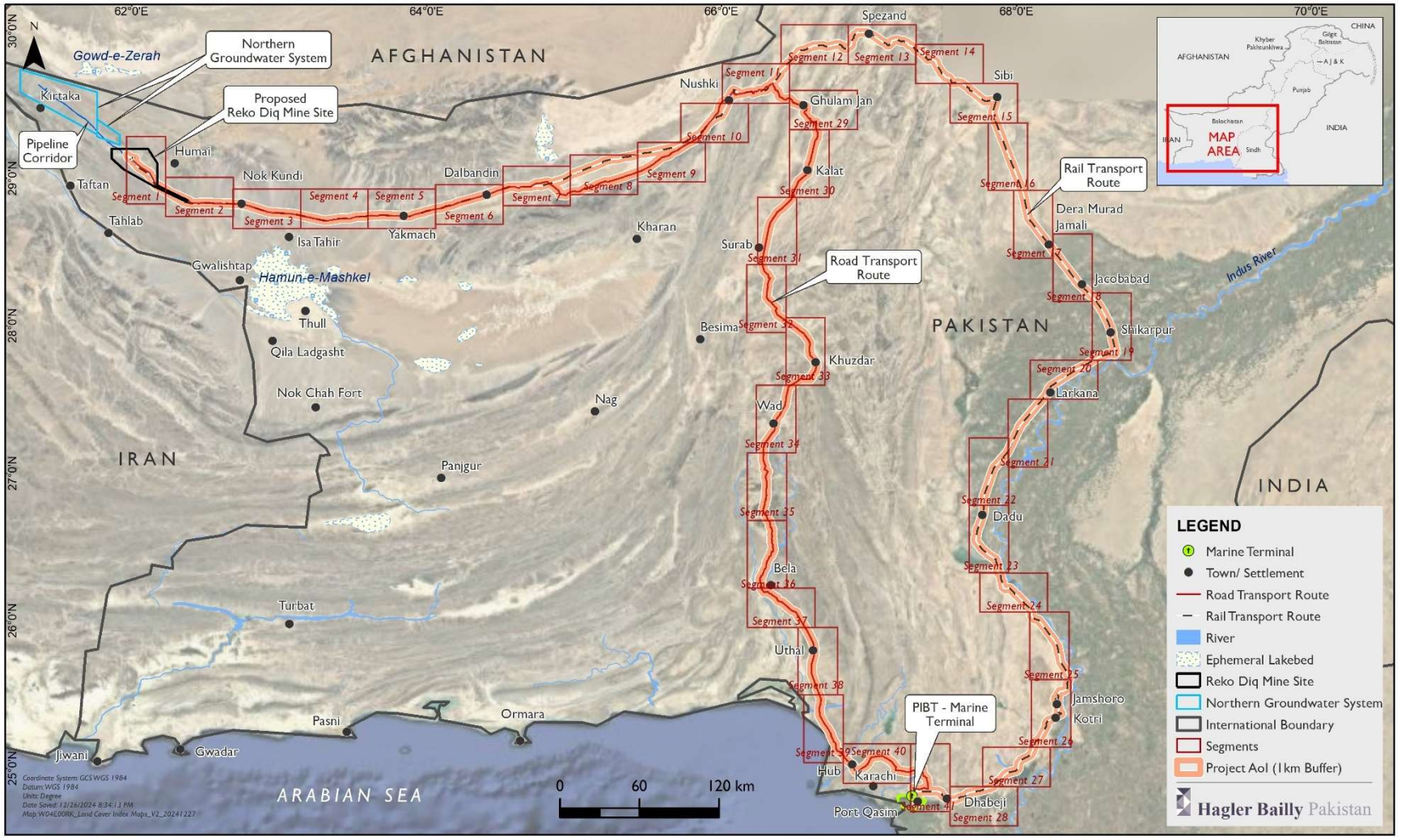


Exhibit 5.10: Habitat Types along the Rail and Road Route Corridor

a) Zangi Nawar Wetland[23]

b) Interface of Clayey Plains and Sand Dunes in Zangi Nawar Game Reserve[24]

c) Vegetation Patches in Charsar in foothills of Ras Koh[25]

d) Gravel Plains on the way to Ghat-e-Baroth near Dalbandin[26]

e) Habitat near Road Route in Kalat District[27] [28]

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[23] Source: Hagler Bailly Pakistan, Summer 2024 Survey

[24] Ibid

[25] Ibid

[26] Ibid

[27] Source: https://lh5.googleusercontent.com/p/AF1QipPw-da9rr3NXRW6_-Xrq9Ls5uThWf-j8RS_VZG_=h1440 Accessed on December 13, 2024.

[28] Source: https://lh5.googleusercontent.com/p/AF1QipNZUU7tk941kO_4TUt1KW0nnCzGZXRIRbI43EeO=h1440 Accessed on December 13, 2024.

f) Habitat near Road Route in Kalat District[29] [30]

g) Habitat types in Mastung District [31]

h) Habitat types near Road Route in Khuzdar District[32] [33]

[29] Source: https://lh5.googleusercontent.com/p/AF1QipNa9kDF42ttTHHvl9NsB8n9-8wduWsAriORQAwJ=h1440 Accessed on December 13, 2024

[30] Source: https://lh5.googleusercontent.com/p/AF1QipP8u5rJ0uGU4oOqYXRpUkEDmTnaxhixX75ndcHU=h1440 Accessed on December 13, 2024

[31] Source: https://lh5.googleusercontent.com/p/AF1QipNQNqD037_cR9ve81-lKQ-V-fDzjq45nXWolw90=h1440 Accessed on December 13, 2024.

[32] https://lh5.googleusercontent.com/p/AF1QipM3ufvJDCfIDqnAHhW-jfSNp3k2kN22FwLl9xkx=h1440 Accessed on December 13, 2024.

[33] Source: https://lh5.googleusercontent.com/p/AF1QipNqEKVjvJXdkQB50TEBatr_q8IpmRAZVlcldSX2=h1440 Accessed on December 13, 2024.

i) Habitat types near Road Route in Khuzdar District[34] [35]

j) Hub Dam Water Reservoir[36]

k) Habitat near Gopang Railway Station in Jamshoro District[37]

l) Rail Route passing near Indus River in Jamshoro[38]

m) Habitat near Railway Route in Kachhi District[39]

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[34] Source: https://lh5.googleusercontent.com/p/AF1QipM4uDlni0wnavEz64fBDLBDv5e11zBNg8NRLK31=h1440 Accessed on December 13, 2024.

[35] Source: https://lh5.googleusercontent.com/p/AF1QipMfk-y9rhq30LIPqSbYRyxs6UBFSBz7n_LzoFx8=h1440 Accessed on December 13, 2024.

[36] Source: https://lh5.googleusercontent.com/p/AF1QipM8dNgKe1X0h4HwPRJqvLyiAuj2yWwtCQVEXJ7m=h1440 Accessed on December 13, 2024.

[37] Source: https://lh5.googleusercontent.com/p/AF1QipPxY6rX6f81cNa3dMqFRB86vSAsXf7bSs_Kzn4G=h1440 Accessed on December 13, 2024.

[38] Source: https://lh5.googleusercontent.com/p/AF1QipNepIyx4KF-efPTtHbXoN0ZC8X8v_9kE2dsHbNS=h1440 Accessed on December 13, 2024.

[39] Source: https://lh5.googleusercontent.com/p/AF1QipPgIRbdAsnxBedGlg2l5A64Cgi2orf5q4-6qwq_=h1440 Accessed on December 25, 2024.

Exhibit 5.11: Port Qasim – Terrestrial Study Area

Note: The Study Area was initially defined when the project was still evaluating multiple options for port development. While this represents the final layout of the Study Area, further updates will be considered if necessary.

Exhibit 5.12: Photographs of Different Habitats at Port Qasim - Terrestrial Study Area

a) Vegetation Cluster at Port Qasim

b) Open Plot / Barren Area at Port Qasim

c) Industrial Units at Port Qasim

d) Barren Land near PIBT at Port Qasim

e) Railway Track at Port Qasim

Exhibit 5.13: Distribution of Habitats at the Port Qasim - Terrestrial Study Area

Habitat Types	*Area (km^2)*	*Percentages (%)*
Barren Land/ Open Plot	0.4	17.1
Drainage	0.04	1.9
Industrial Units /Commercial	0.4	18.6
Mangroves	0.1	3.9
Road/Railway Lines	0.2	10.1
Vegetation Cluster	1.1	48.4
Creeks	0.001	0.04
Total	**2.3**	**100.0**

Exhibit 5.14: Marine Ecological Study Area

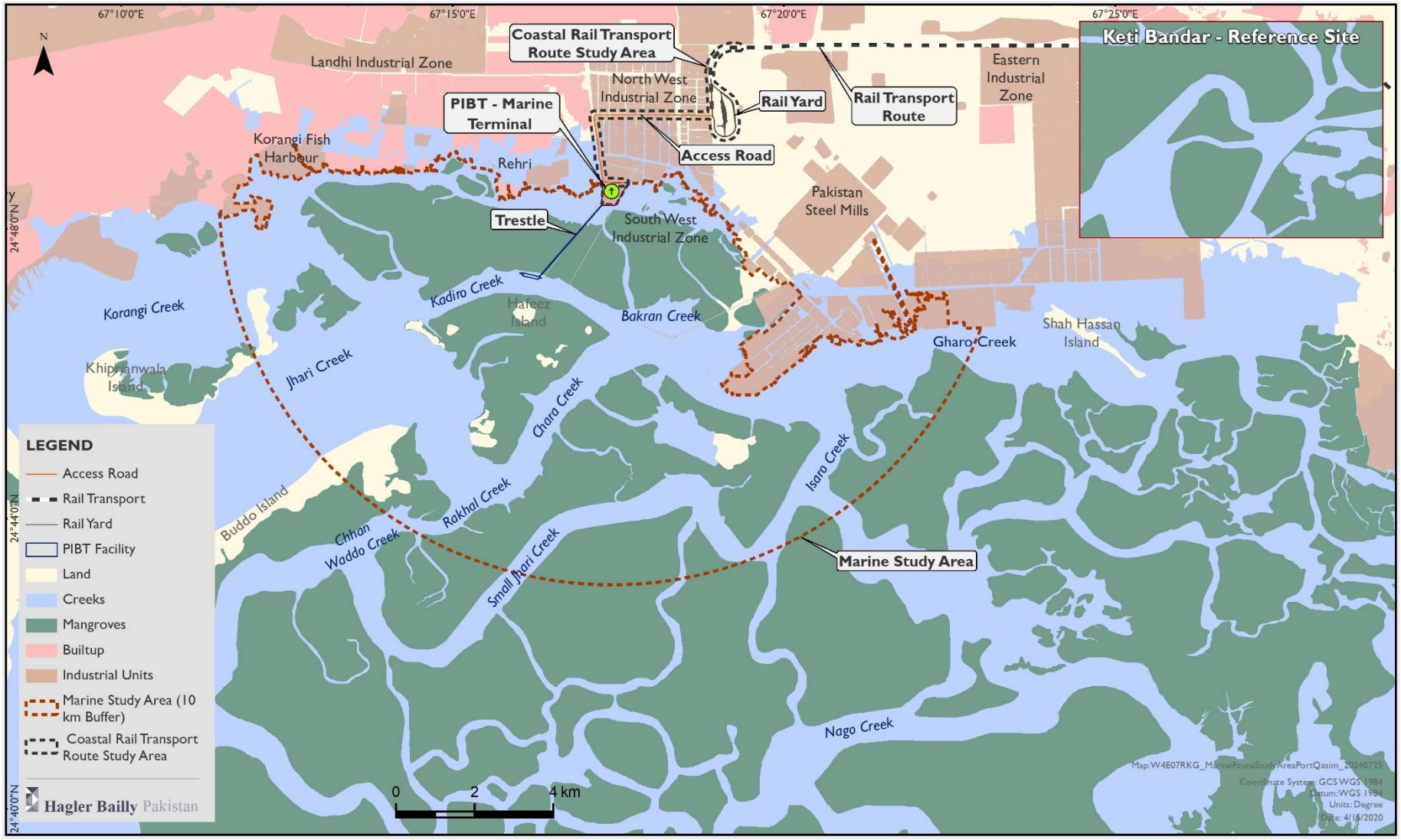

Exhibit 5.15: Marine Habitats at Port Qasim

a) Marine Habitat in Creeks at Port Qasim (High Tide)

b) Marine Habitat in Creeks at Port Qasim (Low Tide)

c) Marine Habitat at Keti Bandar

Exhibit 5.16: Distribution of Habitats in the Marine Ecological Study Area

Habitat Types	*Area (km^2)*	*Percentage (%)*
Creeks	72.0	52.7
Mangroves	64.7	47.3
Total	**136.7**	**100.0**

6. Baseline Description

The Faunal Baseline description provides an overview of the fauna of the Project infrastructure and their surroundings. This baseline description draws on a detailed desktop assessment which is based on the information obtained from published sources, including books and information from different databases such as the IBAT, IUCN, Reptile Database, Avibase, Animal Diversity Web, KBA, existing ESIA studies, within and around the Ecological Study Area. In addition, the finding of desktop assessment was confirmed through consultation with different stakeholders, IUCN Species Specialist Groups, NGOs and Research Institutions. Methodology and details of consultation is provided in **Appendix B** whereas, summary of species related consultation is given in the description of threatened species.

6.1 Literature Review for Terrestrial Fauna

As discussed above in the ***Section 4, Ecological Study Area and Habitats***, the assessment of the terrestrial fauna is carried out for the Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, Rail and Road Route Corridor and proposed Project infrastructure at Port Qasim.

Exhibit 6.7 provides the details of the conservation concern species of avifauna, herpetofauna, mammals, and small mammals along with the IUCN, National Status, preferred habitats, expected presence in Project AoI, feeding habits, homerange and elevation.

Appendix C provides the distribution maps of the key faunal species.

6.1.1 Terrestrial Fauna at Reko Diq Mine Site and Associated Infrastructure

Avifauna

A total of 43 species of avifauna are reported from the Reko Diq Mine Site, Northern Groundwater System, and along the Access Route to the Reko Diq Mine Site. The conservation concern bird species reported from the Reko Diq Mine Site and Associated Infrastructure are the Egyptian Vulture (*Neophron percnopterus*) and Asian Houbara Bustard (*Chlamydotis macqueenii*) which are listed as Endangered and Vulnerable, respectively, by the IUCN Red List of Threatened Species.[40] [41] [42]

The presence of these bird species indicates a range of microhabitats and resources that can support avian life within the Reko Diq Mine Site and Associated Infrastructure study area. The site predominantly supports some common as well as conservation concern bird

[40] Ghalib et al. (2019). Recent Observations on the Distribution and Status of Wildlife of Balochistan. Canadian Journal of Pure $ Applied Sciences, 13(2), 4813–4846Ibid

[41] LARS SVENSSON, ROBERT PRYS-JONES, PAMELA C. RASMUSSEN, URBAN OLSSON, The identification and distribution of the enigmatic Large-billed Reed Warbler Acrocephalus orinus, Ibis, 10.1111/j.1474-919X.2009.01004.x, 152, 2, (323-334), (2010).

[42] IUCN (1990). IUCN Directory of South Asian Protected Areas. IUCN, Gland, Switzerland and Cambridge, U.K. xxiv + 294

species. The baseline surveys confirmed the presence of the reported conservation concern species, Egyptian Vulture (*Neophron percnopterus*) and the Asian Houbara Bustard (*Chlamydotis macqueenii*) along the Northern Groundwater System.

As a migratory species, the Egyptian Vulture and Asian Houbara Bustard may use these sites as a migratory route and foraging, indicating that the area could serve as a movement route and a source of food for this species. The proposed activities along the Northern Groundwater System and Access Route to Reko Diq Mine Site are expected to temporarily impact the habitat and food resources of these bird species. A complete list of avifauna species reported from the Reko Diq Mine Site and Associated Infrastructure is provided in **Appendix D**.

The IBAT reported 171 bird species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure, including one Critically Endangered, three Endangered, four Vulnerable, and nine Near Threatened species.[43] **Exhibit 6.1** provides a list of conservation concern birds species reported by IBAT at Reko Diq Mine Site and Associated Infrastructure. While, a complete list of avifauna species reported within 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure according to IBAT is provided in **Appendix E**.

The description of the habitat and ecology of the conservation concern species reported as well as observed in the Reko Diq Mine Site and Associated Infrastructure is given below:

- Sociable Lapwing (*Vanellus gregarius*): The species is listed as Critically Endangered on the IUCN Red List of Threatened Species and is reported from Reko Diq Mine Site and Associated Infrastructure, but it was not observed in any of the baseline surveys. It forages in areas with high dung abundance, primarily feeding on insects like Orthoptera and Coleoptera, with occasional small vertebrates and plant matter. The species breeds semi-colonially in steppe and semi-arid habitats, nesting on saline patches or short vegetation near water sources. Nest survival is affected by predation from foxes and other animals, trampling by livestock, and varying environmental conditions near human settlements. The Project AoI overlaps with the passage migration range of this species, but it is very unlikely that the species breeds within the Project AoI
- Egyptian Vulture (*Neophron percnopterus*): This species is listed as Endangered in the IUCN Red List of Threatened Species and was observed in Post-Monsoon 2022 Survey in the Northern Groundwater System. It forages in open, arid regions, scavenging a variety of food types and is known for site fidelity, display flights, feeding congregations, and long-distance migrations, particularly by northern breeders. Breeding and nesting typically occur on cliffs, rocky outcrops, trees, buildings, or occasionally on the ground. *The consultation with World Wide Fund for Nature (WWF) in Pakistan confirmed that the species has no nesting*

[43] Integrated Biodiversity Assessment Tool, Report ID: 66148, Report Title: Mine Site and Northern Groundwater System, Downloaded on: June 24, 2024, Accessed through: https://www.ibat-alliance.org/sites/934160.

and only the carcass population[44] is observed in the area. This species is highly vulnerable to transmission line as this species make their nests at high poles and become a victim of electrocution. While the species' breeding range overlaps with the Project AoI, the topography and habitats in the Project AoI, it is unlikely to breed within the Project AoI and it visits the area occasionally for feeding

- Steppe Eagle (*Aquila nipalensis*): The species is listed as Endangered on the IUCN Red List of Threatened Species and is reported from the Reko Diq Mine Site and Associated Infrastructure. It inhabits steppe and semi-desert regions, breeding up to elevations of 2,300 m in mountainous areas. It primarily feeds on small mammals such as susliks and mole rats, as well as termites and Red-billed Quelea during winter. Nests are typically constructed on the ground but may also be found in bushes, trees, or on artificial structures. The species migrates to Southeast Africa and southern Asia, departing between August and November and returning between January and May, often concentrating at migration bottlenecks. The AoI of the Reko Diq Mine Site and Associated Infrastructure overlaps with the passage migration distribution and there are no records of breeding of this species in the area
- Saker Falcon (*Falco cherrug*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported from Reko Diq Mine Site and Associated Infrastructure. This species hunts close to the ground in open habitats such as desert edges, semi-deserts, steppes, agricultural land, and arid montane areas. It feeds on mid-sized rodents like ground squirrels. In some areas, especially near water or in urban environments, it switches to hunting birds, including domestic pigeons. It nests in copses, cliffs, or on the ground, often using old bird nests. Clutch size ranges from 3 to 5 eggs. The species can be sedentary, part-migratory, or fully migratory, depending on food availability. Migrant birds winter in East Africa, southern Europe, and Asia, leaving in September–October and returning between February and May. The Project AoI overlaps with the passage migrant distribution range of this species and it is very unlikely that the species will breed in the area and it may use this area for feeding or resting
- Yellow-eyed Pigeon (*Columba eversmanni*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from the Reko Diq Mine Site and Associated Infrastructure. It was not observed in the recent surveys. The species forages in open areas with scattered trees, agricultural crops, and fruiting trees. It breeds in cavities in trees, buildings, cliffs, and earth banks, primarily in steppe, semi-arid, and desert habitats, as well as near human settlements and in woodlands. Breeding occurs from April to August. The Project AoI overlaps with the non-breeding range of this species, making it very unlikely for the species to breed within the Project AoI
- Greater Spotted Eagle (*Clanga clang*a): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported in the literature. This species inhabits lowland forests near wetlands, nesting in tall trees depending on

[44] The population which feeds mostly on dead animals, predominantly camels. The Egyptian Vulture, being a scavenger, only visits the area occasionally, mostly when an animal dies.

local conditions. It feeds on small mammals, waterbirds, frogs, and snakes, hunting over swamps, wet meadows, and agricultural land, soaring up to 100 m high. A migratory species, it leaves its breeding grounds in October and November to winter in southern Europe, Asia, and northeast Africa, returning in February and March, often migrating in small groups. The Project AoI overlaps with the non-breeding distribution range of this species

- Imperial Eagle (*Aquila heliaca*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported in the literature, but it is not observed in the Post-Monsoon 2022 and Spring 2023 surveys. It forages in open woodlands, steppe, and semi-deserts, often nesting in large trees or on electricity pylons. It prefers lowland habitats but has been pushed to higher altitudes in parts of Europe. Breeding pairs are territorial, constructing large stick nests where females lay 1–3 eggs. The species is typically solitary or seen in pairs but may form small groups during migration or at food sources, with juveniles mingling with other large eagles in winter. The AoI of the Reko Diq Mine Site and Associated Infrastructure overlaps with the passage migration distribution
- Asian Houbara Bustard (*Chlamydotis macqueenii*): The species is listed as Vulnerable on the IUCN Red List and was observed during the Pre-Monsoon 2022 Survey in the Northern Groundwater System. It inhabits open, arid steppe and semi-desert environments, favouring xerophytic or halophytic vegetation and bush-steppe habitats rich in food sources like *Salsola* spp. and arthropods. It feeds on plants, invertebrates, and small vertebrates. During the breeding season, males perform elaborate courtship displays, while females lay 3–4 eggs in ground scrapes and rear the young alone. The species is a winter migrant in the Project AoI, and there are no recent breeding records for it within the area. *The consultation with WWF Pakistan indicated that the Chagai District host the wintering population of Houbara Bustard, however, there are very old literature record for its resident population in the Nag Valley, which is far away from the Project Site. The major threats to this species include noise, vibration and dust pollution from the vehicular movement , collision risk, reduction in food availability, hunting and trapping. Also, this species is vulnerable to the transmission lines.*

Exhibit 6.1: Conservation Concern Bird Species Reported by IBAT from Reko Diq Mine Site and Associated Infrastructure

Order	*Family*	*Scientific Name*	*Common Name*	*IUCN Status*	*Population Trend*	*Publication*	*Assessment Date*	*Movement Pattern*	*Restricted Range*
Charadriiformes	Charadriidae	*Vanellus gregarius*	Sociable Lapwing	CR	Decreasing	2019	8/7/2018	Full Migrant	No
Accipitriformes	Accipitridae	*Neophron percnopterus*	Egyptian Vulture	EN	Decreasing	2021	7/21/2021	Full Migrant	No
Accipitriformes	Accipitridae	*Aquila nipalensis*	Steppe Eagle	EN	Decreasing	2021	7/23/2021	Full Migrant	No
Falconiformes	Falconidae	*Falco cherrug*	Saker Falcon	EN	Decreasing	2021	7/5/2021	Full Migrant	No
Columbiformes	Columbidae	*Columba eversmanni*	Yellow-eyed Pigeon	VU	Decreasing	2022	5/31/2022	Full Migrant	No
Accipitriformes	Accipitridae	*Clanga clanga*	Greater Spotted Eagle	VU	Decreasing	2021	7/1/2021	Full Migrant	No
Accipitriformes	Accipitridae	*Aquila heliaca*	Eastern Imperial Eagle	VU	Decreasing	2019	10/1/2016	Full Migrant	No
Otidiformes	Otididae	*Chlamydotis macqueenii*	Asian Houbara Bustard	VU	Decreasing	2021	8/18/2021	Full Migrant	No
Anseriformes	Anatidae	*Marmaronetta angustirostris*	Marbled Teal	NT	Decreasing	2022	8/4/2022	Full Migrant	No
Anseriformes	Anatidae	*Aythya nyroca*	Ferruginous Duck	NT	Decreasing	2019	6/12/2019	Full Migrant	No
Otidiformes	Otididae	*Tetrax tetrax*	Little Bustard	NT	Decreasing	2018	8/7/2018	Full Migrant	No
Charadriiformes	Scolopacidae	*Limosa limosa*	Black-tailed Godwit	NT	Decreasing	2017	10/1/2016	Full Migrant	No
Charadriiformes	Scolopacidae	*Numenius arquata*	Eurasian Curlew	NT	Decreasing	2017	10/1/2017	Full Migrant	No
Charadriiformes	Haematopodidae	*Haematopus ostralegus*	Eurasian Oystercatcher	NT	Decreasing	2019	7/26/2019	Full Migrant	No
Accipitriformes	Accipitridae	*Aegypius monachus*	Cinereous Vulture	NT	Decreasing	2021	6/23/2020	Full Migrant	No
Accipitriformes	Accipitridae	*Circus macrourus*	Pallid Harrier	NT	Decreasing	2021	5/19/2021	Full Migrant	No
Pelecaniformes	Pelecanidae	*Pelecanus crispus*	Dalmatian Pelican	NT	Decreasing	2018	10/1/2017	Full Migrant	No

Note: Critically Endangered:(CR), Endangered: (EN), Vulnerable: (VU), Near Threatened: (NT)

Mammals

The Chagai District hosts a wide array of small, medium, and large mammalian species.[45] The Zawarkhan Wildlife Sanctuary and Kambran Wildlife Sanctuary and Game Reserves are designated as protected areas within Chagai District. These protected areas are located approximately 471 km and 241 km away from the Project area respectively. These protected areas safeguarding the habitats for Afghan Urial (*Ovis vignei*) and Goitered Gazelle (*Gazella subgutturosa)*.[46]

A total of ten mammal species are reported from the Reko Diq Mine Site, Northern Groundwater System, and along the Access Route to Reko Diq Mine Site[47]. The common species of mammals include the Asiatic Jackal (*Canis aureus*), and Ruppell's Fox (*Vulpes rueppellii*).

All the species reported from the Reko Diq Mine Site and Associated Infrastructure study areas are listed as Least Concern in the IUCN Red List of Threatened Species.

The conservation concern species reported from the Northern Groundwater System study area are the Afghan Urial (*Ovis vignei*), Goitered Gazelle (*Gazella subgutturosa),* Persian Ibex (*Capra aegurcus*)*,* which are listed as Vulnerable and Near Threatened, respectively, in the IUCN Red List of Threatened Species.

The Goitered Gazelle (*Gazella subgutturosa)* is listed as Critically Endangered and Afghan Urial (*Ovis vignei*), Ruppell's Fox (*Vulpes rueppellii*) and Cape Hare *(Lepus capensis)* species are listed as Vulnerable in National Red List of Pakistan. A complete list of mammal species reported from the Reko Diq Mine Site and Associated Infrastructure study area is provided in **Appendix D**.

The IBAT reported 17 mammalian species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure, including three Vulnerable and two Near Threatened species.[48] **Exhibit 6.2** provides a list of conservation concern mammals species reported by IBAT at Reko Diq Mine Site and Associated Infrastructure. While, a complete list of mammalian species reported within 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure according to IBAT is provided in **Appendix E**.

The desktop assessment features the arid conditions prevailing at the Reko Diq Mine Site and Associated Infrastructure study area, which predominantly support common mammal species adapted to desert environments. The faecal pellets of Goitered Gazelle were observed in the Northern Groundwater System study area during the Spring 2023 Survey, showing that this site provides food resources such as vegetation that attract the Goitered Gazelle. The arid landscape is suited to species like the Goitered Gazelle, which can survive on minimal water and forage. However, the presence of other conservation

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[45] Ghalib, S. A., Jabbar, A. B. D. U. L., Khan, A. R., & Zehra, A. (2007). Current status of the mammals of Balochistan. *Pakistan journal of Zoology*, *39*(2), 117.

[46] Chagai District Development Profile 2011, by Planning $ Development Department GoB with UNICEF

[47] Internation Unio for Conservation of Nature, Available at: International Union for Conservation of Nature, Available at: https://www.iucnredlist.org/species/54940655/195296049.

[48] Integrated Biodiversity Assessment Tool, Report ID: 66148, Report Title: Mine Site and Northern Groundwater System, Downloaded on: June 24, 2024, Accessed through: https://www.ibat-alliance.org/sites/934160.

concern species was not confirmed from the Project infrastructure during the Post-Monsoon 2022 and Spring 2023 surveys.

Exhibit 6.2: Conservation Concern Mammal Species Reported by IBAT from Reko Diq Mine Site and Associated Infrastructure Study Area

Order	*Family*	*Scientific Name*	*Common Name*	*IUCN Status*	*Population Trend*	*Publication*	*Assessment Date*	*Restricted Range*
Artiodactyla	Bovidae	*Gazella subgutturosa*	Goitered Gazelle	VU	Decreasing	2017	8/8/2016	No
Carnivora	Ursidae	*Ursus thibetanus*[49]	Asiatic Black Bear	VU	Decreasing	2020	3/17/2016	No
Carnivora	Mustelidae	*Vormela peregusna*	Marbled Polecat	VU	Decreasing	2016	3/3/2015	No
Artiodactyla	Bovidae	*Capra aegagrus*	Wild Goat	NT	Stable	2020	3/22/2020	No
Carnivora	Hyaenidae	*Hyaena hyaena*	Striped Hyaena	NT	Decreasing	2015	10/2/2014	No

Note: Vulnerable: (VU), Near Threatened: (NT)

The ecology and habitat of threatened species observed/reported in the Reko Diq Mine Site and Associated Infrastructure are given below:

- Afghan Urial (*Ovis vignei cycloceros*): This species is listed as Vulnerable on the IUCN Red List of Threatened Species as well as National Red List of Mammals. This species is observed as well as reported from the Northern Groundwater System. This species inhabits broken mountain terrain, plateaus, gentle slopes, and hills with gorges, typically at altitudes between 600 and 2,500 m, and below 1,200 m in southern Pakistan. They are found in open woodlands with shrub vegetation, as well as degraded habitats. Local populations follow predictable seasonal migrations, moving to lambing areas in late May and rutting areas in mid-November. Rutting behavior takes place from mid-December to mid-January. The AoI overlaps with the resident distribution of this species; however, this species is primarily found in the mountains along the Pak-Iran border, which are at significantly higher altitudes than the Project facilities. Therefore, no impact on this species is anticipated in the area
- Goitered Gazelle (*Gazella subgutturosa)*: The species is listed as Vulnerable on the IUCN Red List of Threatened Species and Critically Endangered on the National Red List of Mammals. It has been observed in the Northern Groundwater System and is also reported in the literature. The species primarily forages on grasses, shrubs, and occasionally fruits. It inhabits arid plains, deserts, and steppe regions with sparse vegetation and a mix of grassland and scrub, often near seasonal water sources. It exhibits nomadic behaviour, migrating in response to seasonal food and water availability, and typically forms small herds with

[49] It is Unlikely that this species is present in the area. This is the major issue with IBAT is that it collects information from nearby areas, and often using outdated reports that no longer represent the current fauna or flora of a particular location. The Black Bear has no current distribution range in the area; it has been declared extinct from the area by the IUCN, and the habitat conditions are not suitable for this species at all.

territorial males and grouped females. *Consultation with IUCN Antelope Specialist Group confirmed the presence of Goitered Gazzelle in the Chagai District, however, limited updated information about the population size of this species in the area is available and the fencing along the Iran and Afghanistan border could negatively impact the population of this species in Pakistan. Additional, fence lines along the Rail Corridor should be avoided as this could pose a barrier to Goitered Gazelle movement*

- Marbled Polecat (*Vormela peregusna*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and has been reported from the Iran-Pakistan border near the Northern Groundwater System. The species inhabits desert, semi-desert, and steppe habitats, as well as cultivated landscapes, and prefers sparsely vegetated, sandy areas. It primarily feeds on desert and steppe rodents, such as gerbils and ground squirrels, as well as birds. It is highly fossorial spending much of its time underground. The Project AoI overlaps with the resident distribution range of this species
- Sand Cat (*Felis margarita*): The species is Critically Endangered in the National Red List of Mammals. Signs of this species have been observed at the Reko Diq Mine Site and Northern Groundwater System, and it has been reported from the Zangi Nawar Game Reserve. It inhabits sandy deserts with sparse vegetation, including areas with *Haloxylon, Acacia*, and low bushes, but can also be found in rocky deserts and gravel plains. The species is highly adapted to extreme desert conditions, tolerating both high heat and freezing temperatures, and often uses burrows or dens for rest, especially during the day. It is primarily nocturnal and feeds on small rodents such as gerbils, jirds, and jerboas, as well as birds, reptiles, insects, and occasionally locusts. This species meets its water requirements from its prey and does not require drinking water, most often. The species has large home ranges, varying from 13 to 50 km², and can travel over 10 km in a single night. Given the habitat conditions in the Project AoI, it is very unlikely that the Project AoI supports an important concentration of this species.

Small Mammals

A total of 11 species of small mammals are reported from the Reko Diq Mine Site, Northern Groundwater System and Access Route to Reko Diq Mine Site. These reported species include Great Gerbil (*Rhombomys opimus)*, Indian Hairy Footed Gerbil (*Gerbillus gleadowi)*, Balochistan Pygmy Jerboa (*Salpingotus michaelis),* and Cheesman's Gerbil (*Gerblus cheesmani)*.[50]

A total of four bats species are also reported from the Reko Diq Mine Site and Access Route to the Reko Diq Mine Site study areas including Greater Horseshoe Bat *(Rhinolophus ferrumequinum),* Kuhl's Pipistrelle *(Pipistrellus kuhlii),* Notch-eared Bat *(Myotis emarginatus)* and Persian Serotine *(Eptesicus nasutus)*.[51]

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[50] Rafique, M., Nawaz, M. A., & Asif, M. (2010). Mammalian fauna of the Chagai desert and adjoining areas. *Proceedings of the Pakistan Academy of Sciences (Pakistan)*, *47*(1).

[51] Ghalib, S. A., Jabbar, A. B. D. U. L., Khan, A. R., & Zehra, A. (2007). Current status of the mammals of Balochistan. Pakistan journal of Zoology, 39(2), 117.

A total of two bats species are reported from the Northern Groundwater System study area which includes Notch-eared Bat (*Myotis emarginatus)* and Persian Serotine (*Eptesicus nasutus)*.[52] The presence of bat species was not confirmed in the in the Post-Monsoon 2022 and Spring 2023 surveys as a designated surveys for bat species was not conducted; additional specific surveys are currently underway.

All species reported from the Reko Diq Mine Site and Associated Infrastructure study area are listed as Least Concern as per the IUCN Red List of Threatened Species. The Sand Cat (*Felis margarita*) is listed as Critically Endangered, Small Mouse-Tailed Bat (*Rhinopoma muscatellum*) and Egyptian Fruit Bat (*Rousettus aegyptiacus*) listed as Near Threatened and Vulnerable, respectively in National Red List of Pakistan. A complete list of small mammals species reported from the study area is provided in **Appendix D**.

The desktop assessment highlights the ecological value of the area, emphasizing the presence of diverse small mammal and bat populations. These species are integral to the desert ecosystem, indicating a healthy and functioning environment. However, only one species of small mammal, the Great Gerbil (*Rhombomys opimus*), was captured in the Post-Monsoon 2022 and Spring 2023 surveys.

The IBAT reported 28 small mammals species from the Reko Diq Mine Site and Associated Infrastructure. All the species observed are Least Concern in the IUCN Red List of Threatened Species. A complete list of small mammals species reported within 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure according to IBAT is provided in **Appendix E**.

The ecology and habitat of threatened species in the Reko Diq Mine Site and Associated Infrastructure are given below:

- Pygmy Jerboa (*Salpingotulus michaelis)*: The species is the world's smallest rodent and is endemic to Pakistan. It has been captured and reported from the Zangi Nawar Game Reserve. This species inhabits arid sandy and gravelly plains with sparse shrubs such as *Haloxylon* and *Calligonum*. It is nocturnal and fossorial, sheltering in simple burrows during the day to avoid extreme temperatures and emerging at night to forage. The species primarily feeds on seeds and desert vegetation, occasionally supplementing its diet with insects. The distribution of this species is far from the Project AoI.

Herpetofauna

A total of 35 herpetofauna species are reported from the Reko Diq Mine Site, Northern Groundwater System, and Access Route to the Reko Diq Mine Site. These species include amphibians, i.e., Zugmayer's Green Toad (*Bufotes zugmayeri*) and Skittering Frog (*Euphlyctis cyanophlyctis*), gecko species, agama species, skinks, and snakes' species. The dominant species include the Blacktail Toad-head Agama *(Phrynocephalus maculatus*), Striped Toad Agama (*Phrynocephalus ornatus*), and Brilliant Ground Agama (*Trapelus agilis*).

[52] Ghalib, S. A., Jabbar, A. B. D. U. L., Khan, A. R., & Zehra, A. (2007). Current status of the mammals of Balochistan. Pakistan journal of Zoology, 39(2), 117.

The habitat at the Reko Diq Mine Site and Associated Infrastructure study area supports a variety of herpetofauna species, which thrive due to their unique physiological, behavioural, and ecological strategies.

All the species reported from the Reko Diq Mine Site and Associated Infrastructure are either Not Evaluated or Least Concern according to the IUCN Red List of Threatened Species. However, Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*) observed at the Northern Groundwater System is a restricted range species. A complete list of herpetofauna species reported from the Reko Diq Mine Site and Associated Infrastructure study area is provided in **Appendix D**.

The IBAT reported 62 herpetofauna species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure, including three Near Threatened species.[53] **Exhibit 6.2** provides a list of conservation concern herpetofauna species reported by IBAT While, a complete list of herpetofauna species reported within 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure according to IBAT is provided in **Appendix E**.

Exhibit 6.3: Conservation Concern Herpetofauna Species Reported by IBAT from Reko Diq Mine Site and Associated Infrastructure

Class	*Order*	*Family*	*Scientific Name*	*Common Name*	*IUCN Status*	*Population Trend*	*Restricted/ Endemic*	*Publication*	*Assessment Date*	*Restricted Range*
Reptilia	Squamata	Varanidae	*Varanus bengalensis*	Bengal Monitor Lizard	NT	Decreasing	No	2021	6/8/2018	No
	Squamata	Elapidae	*Naja oxiana*	Central Asian Cobra	NT	Decreasing	No	2021	4/5/2016	No
	Squamata	Boidae	*Eryx johnii*	Red Sand Boa	NT	Decreasing	No	2021	9/5/2019	No
	Squamata	Agamidae	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	LC	Unknown	Yes	2017	4/4/2016	Yes

Note: Least Concern: (LC), Near Threatened: (NT)

The ecology and habitat of threatened species in the Reko Diq Mine Site and Associated Infrastructure given below:

- Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*): This is a restricted range herpetofauna species. It 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 its primary food sources.

[53] Integrated Biodiversity Assessment Tool, Report ID: 66148, Report Title: Mine Site and Northern Groundwater System, downloaded on: June 24, 2024, Accessed through: https://www.ibat-alliance.org/sites/934160

Invertebrates

A variety of invertebrates are present across Pakistan due to the seasonal variation of the country and the availability of different habitat types. The research on invertebrates is limited. More than 5,000 species of invertebrates are reported from Pakistan, including insects (1,000 species of true bugs, 400 species of butterflies and moths, 110 species of flies, and 49 species of termites). The total number of butterfly species probably exceeds 400, with high rates of endemism in the Satyrids, Lycaenids, and Pierids families.[54] No study has been conducted previously on invertebrates in the Chagai District, and the current study will serve as a baseline.

The IBAT reported 62 invertebrate species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure.[55] All of the species reported are listed as Least Concern or Data Deficient according to the IUCN Red List of Threatened Species. A complete list of invertebrate species reported within 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure according to IBAT is provided in **Appendix E**.

6.1.2 Terrestrial Fauna along the Rail and Road Route Corridor

The rail route traverses through two provinces of Pakistan; Balochistan, including the section from the Reko Diq Mine Site (RDMS) to Nok Kundi and then to Jacobabad in the Sindh province, comprising the remaining rail route from Jacobabad to Port Qasim. The road transport route in Balochistan includes RDMS to Nok Kundi and then to Hub, while in Sindh, it extends from Hub to Port Qasim.

The Rail and Road Route Corridor passes through several districts, including Chagai, Nushki, Mastung, Kalat, Khuzdar, Lasbella, Quetta, Sibi, Kachhi, Nasirabad, Jacobabad, Larkana, Dadu, Jamshoro, Thatta, and Karachi.

An extensive desktop-based assessment was conducted for the Rail and Road Route Corridor for ecological resources, which include avifauna, mammals, and herpetofauna. Additionally, an IBAT assessment was carried out along the Rail and Road Route Corridor with a 50 km buffer around the facility is conducted to establish the baseline conditions.

The desktop assessment based on a review of comprehensive literature and IBAT provided below.

Avifauna

The review of published papers, books and articles reported a total of 509 bird species along the Rail and Road Route Corridor. Common bird species reported along the Rail and Road Route Corridor include Greater Short-toed Lark (*Calandrella brachydactyla*), Common Quail (*Coturnix coturnix*), Rain Quail (*Coturnix coromandelica*), Macqueen's

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[54] Malkani, M. S. (2019). Recently Discovered Basilosaurid, Baluchithere Rhinoceros, Horses, Sea Cow, Proboscidean, Eucrocodile, Pterosaurs, Plesiosaur, Fishes, Invertebrates and Wood Fossils, Tracks and Trackways of Dinosaurs from Pakistan; Comparison of Recognized Four Titanosaur Taxa of Indo–Pakistan with Madagascar. *Open Journal of Geology*, *9*(12), 919–955.

[55] Integrated Biodiversity Assessment Tool, Report ID: 66148, Report Title: Mine Site and Northern Groundwater System, Downloaded on: June 24, 2024, Accessed through: https://www.ibat-alliance.org/sites/934160

Bustard (*Chlamydotis macqueenii*), Desert Wheatear (*Oenanthe deserti*), Common Chiffchaff (*Phylloscopus collybita*) and House Crow (*Corvus splendens)*. [56] The Rail and Road Route Corridor encompasses several notable protected areas, such as Hazarganji Chiltan National Park, Hingol National Park, and the Kirthar Protected Areas Complex. These protected areas provide important habitats for a diverse range of resident and migratory bird species, significantly contributing to the region's biodiversity.[57] [58] [59]

Several conservation concern bird species are reported from the Rail and Road Route Corridor. These species include White-rumped Vulture (*Gyps bengalensis*), Indian Vulture (*Gyps indicus*), Red-headed Vulture (*Sarcogyps calvus*), Lesser Florican (*Sypheotides indicus*) and Sociable Lapwing (*Vanellus gregarius*), which are listed as Critically Endangered, Steppe Eagle (*Aquila nipalensis*), Great Knot (*Caldris tenuirostris*), Saker Falcon (*Falco cherrug*), Pallas's Fish-eagle (*Haliaeetus leucoryphus*), Egyptian Vulture (*Neophron percnopterus*), White-headed Duck (*Oxyura leucocephala*), Indian Skimmer (*Rynchops albicollis*), Black-bellied Tern (*Sterna acuticauda*) are listed as Endangered, while, Eastern Imperial Eagle (*Aquila heliacal*), Tawny Eagle (*Aquila rapax*), Common Pochard (*Aythya ferina*), Broad-billed Sandpiper (*Calidris falcinellus*), Curlew Sandpiper (*Calidris ferruginea*), Asian Houbara (*Chlamydotis macqueenii*), Jerdon's Babbler (*Chrysomma altirostre*), Greater Spotted Eagle (*Clanga clanga*), Yellow-eyed Pigeon (*Columba eversmanni*), Sooty Falcon (*Falco concolor*), Black-capped Kingfisher (*Halcyon pileate*), Grey Plover (*Pluvialis squatarola*), Horned Grebe (*Podiceps auritus*), White-browed Bushchat (*Saxicola macrorhynchus*) and River Tern (*Sterna aurantia*) are listed as Vulnerable in the IUCN Red List of Threatened Species. Majority of these species are classified as full migrant by the IUCN.

The IBAT reported 422 bird species within a 50 km buffer along the Rail and Road Route Corridor, including five Critically Endangered, eight Endangered, 13 Vulnerable, and 24 Near Threatened species.[60].

Exhibit 6.1 provides the list of conservation concern bird species reported by IBAT along the Rail and Road Route Corridor.

Appendix D provides a literature and survey-based list of bird species.

Appendix E provides a complete list of bird species reported in IBAT.

The description of the habitat and ecology of the conservation concern species reported along the Rail and Road Route Corridor is given below:

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[56] eBird Baluchistan, Available at https://ebird.org/region/PK-BA/bird-list

[57] Ghalib, S. A., Jabbar, A., Wind, J., Zehra, A., & Abbas, D. (2008). Avifauna of hingol national park, Balochistan. *Pakistan Journal of Zoology*, *40*(5).

[58] Khan, M. Z., Zehra, A., Ghalib, S. A., Siddiqui, S., & Hussain, B. (2010). Vertebrate biodiversity and key mammalian species status of Hingol National Park. *Canadian Journal of Pure and Applied Sciences*, 1151.

[59] Khan, M. Z., & Siddiqui, S. (2009). Studies on bioecology and fauna of Hazarganji Chiltan National Park and development of ecotourism in protected areas. *Canadian Journal of Pure and Applied Sciences*, *5*(1), 1371-1384.

[60] Integrated Biodiversity Assessment Tool, Report ID: 66148, Report Title: Mine Site and Northern Groundwater System, Downloaded on: June 24, 2024, Accessed through: https://www.ibat-alliance.org/sites/934160.

- Tawny Eagle (*Aquila rapax*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from along the Rail and Road Route Corridor. It thrives in dry, open habitats such as woodlands, wooded savannahs, and areas near settlements, up to 3,000 m elevation. It has an opportunistic and broad diet, consuming mammals, birds, reptiles, insects, carrion, and occasionally fish and amphibians, and is known to pirate prey from other raptors. Generally sedentary, it may exhibit nomadic behavior and seasonal movements in some areas. Breeding occurs on large stick nests, often built on tall trees or pylons, with timing varying by region. This adaptability allows it to explore diverse habitats effectively. The Project AoI overlaps with resident range of this species; however, the Project will use the existing infrastructure and very minimal impacts are anticipated on this species
- Common Pochard (*Aythya ferina*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It is primarily found in wetlands, including swamps, marshes, lakes, reservoirs, and slow-flowing rivers with abundant vegetation. It is also reported from brackish and saline water bodies, such as coastal lagoons and estuaries during migration or wintering. Key habitats include the Indus River basin, associated wetlands, and coastal areas, which provide suitable feeding and breeding grounds for this species. Its diet in Pakistan mirrors its global pattern, comprising aquatic vegetation, seeds, invertebrates, and small aquatic animals. Pakistan serves as an important wintering ground for migratory populations, especially in Sindh and southern Punjab. The Project AoI overlaps with the non-breeding distribution range of this species and it is unlikely that the species breeds in the Project AoI
- Broad-billed Sandpiper (*Limicola falcinellus*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It forages in muddy shores, lagoons, saltpans, and intertidal mudflats, feeding on worms, mollusks, crustaceans, insects, and seeds. The species breeds in wet peatlands, bogs, and tundra, constructing nests as cup structures on wet sedge or moss cushions to stay above water. It is a full migrant, traveling singly or in small groups, with a series of stopover sites during its migration to wintering grounds in Africa, Pakistan, and India. The Project AoI overlaps with the passage distribution of this species
- Curlew Sandpiper (*Calidris ferruginea*): This species in listed as Vulnerable in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. This species inhabits tundra with marshes and pools during breeding and wetlands like lagoons, estuaries, and lakes in winter. It is highly migratory, traveling long distances along established flyways. Its diet includes insects and molluscs, crustaceans, and worms in winter. Breeding occurs in the Arctic, with nests near water. In Pakistan, it is a migrant and winter visitor, relying on wetlands like the Indus Delta. The Project AoI overlaps with the passage range for this species
- Great Knot (*Calidris tenuirostris*): The species is listed as Endangered on the IUCN Red List of Threatened Species and is reported along the Rail and Road

Route Corridor near to Port Qasim. It feeds on berries and seeds during the breeding season, insects for chicks, and bivalves and crustaceans in winter. The species breeds in subarctic tundra with lichen, moss, and sparse vegetation on plateaus or slopes at elevations of 300–1,600 m. In winter, it inhabits sheltered coastal areas, including mudflats, sandy beaches, estuaries, and mangroves, often roosting in shallow water or on salt flats. As a long-distance migrant, it breeds in late May to June and migrates between July and April. The Project AoI overlaps with the non-breeding distribution range of this species and it is very unlikely that the species will breed in the area

- Jerdon's Babbler (*Chrysomma altirostre*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. The species primarily forages in tall grasslands and reedbeds (2–4 m high) within river floodplains, often seasonally inundated or near rivers and pools, with dominant vegetation including *Imperata, Saccharum, Phragmites, and Typha*. It breeds and nests in dense, contiguous, undisturbed stands of tall grass, avoiding drier, semi-open habitats with shorter grass and scattered bushes. The project's Area of Interest (AoI) along the Rail and Road Route Corridor overlaps with the resident population range of this species, however, the Project is anticipated to have a minimal impact on this species as the Project will use the existing infrastructure
- White-rumped Vulture (*Gyps bengalensis*): The species is listed as Critically Endangered on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It primarily feeds on carrion, often gathering in large flocks at feeding sites and using communal roosts. It inhabits plains and occasionally hilly regions, utilizing light woodlands, villages, cities, and open areas. The species is social, breeding in colonies typically in tall trees near human settlements. Movement patterns are not well understood, but individuals can forage over vast distances. According to the IUCN Red List, the White-rumped Vulture is rarely present in the Project AoI and may potentially be extinct in this region
- Indian Vulture (*Gyps indicus*): This species is listed as Critically Endangered in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. This species inhabits cities, towns, villages near cultivated areas, and in open and wooded landscapes. The foraging grounds for this species primarily include carcass dumps and slaughterhouses, where it feeds almost entirely on carrion, often associating with White-rumped Vultures (*Gyps bengalensis*). Breeding and nesting predominantly occur in colonies on cliffs and ruins, although, in areas lacking cliffs, nesting in trees has also been reported. This species is rarely found in the Project AoI and is limited to the Sindh side of the Rail and Road Route
- Black-capped Kingfisher (*Halcyon pileata*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from the Rail and Road Corridor. This species inhabits inland and coastal habitats. The inland habitats include rice fields, open cultivated lands, bamboo forests, forest clearings, gardens, streams in willow jungles, and Nipa palm groves, where it feeds on

insects, frogs, and reptiles. In coastal habitats, it is found in mangroves, wooded seashores, lagoons, estuaries, and tidal creeks, where it primarily feeds on fish and crabs. Breeding occurs in its temperate and tropical range, typically near rivers, streams, or coastal mangroves. The species nests in tunnels excavated in riverbanks, earthen cliffs, or similar substrates, with breeding aligned to the local wet season. The Project AoI along the Rail and Road Route Corridor overlaps with its non-breeding distribution range, as it migrates to other areas for reproduction

- Pallas's Fish Eagle (*Haliaeetus leucoryphus*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. It is closely associated with wetlands, particularly large lakes and rivers, across elevations up to 5,000 m. It forages in these aquatic habitats, feeding on a variety of prey. Breeding occurs from late summer to winter, with nests typically built in trees near water. Satellite tracking has revealed extensive seasonal migrations exceeding 4,000 km, including flights over mountain ranges at altitudes above 6,000 m. It is rarely found in the Project AoI
- White-headed Duck (*Oxyura leucocephala*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. It primarily forages in larger, deeper alkaline or saline waters, which are typically low in emergent vegetation but still support algae and pondweeds. It feeds mainly on aquatic invertebrates, such as midge larvae, amphipods, and polychaetes, particularly at its coastal wintering sites. Seeds and vegetative parts of aquatic plants like Potamogeton and Ruppia are also part of its diet. During the breeding season, which occurs from April to July, the species prefers freshwater or brackish lakes with dense emergent vegetation, such as *Phragmites* or *Typha*. Nests are typically built over water in emergent vegetation, often as platforms of leaves and stems, or by using old nests of other waterfowl and nesting boxes. The Project AoI overlaps with the species' passage migration route, but breeding in the area is highly unlikely
- Grey Plover (*Pluvialis squatarola*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. During migration and wintering, the species forages on intertidal mudflats and saltmarshes, feeding on marine worms, mollusks, and insects. It breeds in the high Arctic, favoring dry, stony tundra and coastal areas. In Pakistan, the species is found in wetlands and coastal habitats during migration and wintering. The Project AoI along the Rail and Road Route Corridor overlaps with the passage distribution range of this species; however, it is very unlikely that the species breeds in the Project AoI
- Indian Skimmer (*Rynchops albicollis*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. It forages in estuaries, coasts, and mudflats during the non-breeding season, and requires extensive shallows for successful foraging. Breeding occurs colonially on large, exposed sandbars and islands, with nesting success currently very low due to high rates of egg and chick mortality. The

species migrates over long distances, with some individuals traveling over 1,000 km to find suitable feeding areas. The project Area of Interest (AoI) along the Rail and Road Route Corridor overlaps with the species' passage migration and non-breeding range, serving primarily as a feeding and resting area

- Red-headed Vulture (*Sarcogyps calvus*): This species is listed as Critically Endangered in the IUCN Red List of Threatened Species and is reported from Rail and Road Route Corridor. It inhabits open country, well-wooded hills, and dry deciduous forests with rivers, typically below 2,500 m. Nesting has been recorded in tall trees. Due to its territorial behavior, it occurs at lower densities than *Gyps* vultures. The movement of this species is poorly understood. Vultures provide critical ecosystem services, such as aiding in the disposal of animal and human remains. This species is rarely found in the Project AoI along the Rail and Road Route Corridor
- White-browed Bushchat (*Saxicola macrorhynchus*): This species is listed as Vulnerable on the IUCN Red List and is reported along the Rail and Road Route. It primarily forages in dry, sandy semi-deserts and desert plains with low herbs and scattered shrubs. It can also be found in arid subtropical thorn-scrub, irrigated areas, and tall grasslands, although these are considered suboptimal habitats. The species is thought to breed in the deserts of central and western Rajasthan, likely moving there with the onset of the monsoon rains in June. This species is rarely found in the Project AoI along the Rail and Road Route Corridor
- Black-bellied Tern (*Sterna acuticauda*): The species is listed as Endangered on the IUCN Red List of Threatened Species and is reported along the Rail and Road Corridor near Port Qasim. It inhabits large rivers, marshes, and small pools in the lowland areas up to 730 m and feeds on fish, aquatic invertebrates, and small prey. The species nests on sandspits and islands, relying on stable water levels for breeding. In Pakistan, it thrives along the Indus River and its tributaries. The Project AoI along the Rail and Road Corridor overlaps with the resident distribution range of this species; however, it is very unlikely that the species will breed in this area
- River Tern (*Sterna aurantia*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It inhabits river, freshwater lakes, and estuaries and feeds on fish, crustaceans, insects, and frogs. Breeding occurs on sandy or rocky islands along riverbanks, reservoirs, and wetlands. The spanning season of this species starts in February to May and occasionally extending to November. In Pakistan, the species thrives in river systems and wetlands for feeding and nesting. The Project AoI overlaps with its resident distribution range; however, the Project is not anticipated to disturb the population of this species
- Lesser Florican (*Sypheotides indicus*): This species is listed as Critically Endangered in the IUCN Red List of Threatened Species and is reported from the Rail and Road Transport Route. It is locally migratory, with movements influenced by rainfall, and males exhibit high site fidelity. It is observed in rain-fed grasslands, scrublands, and lightly wooded areas. Foraging occurs in

productive grasslands dominated by *Sehima nervosum* and *Chrysopogon fulvus*, as well as in various crops such as soybean, sesame, and sugarcane. Breeding takes place during the southwest monsoon (May-September), primarily in grasslands larger than two hectares on black cotton soil, where males perform aerial displays. Nesting has also been reported in cultivated fields and rain-fed habitats within the species' range. In Project AoI, it may be rarely found and the Project is anticipated to have very minimal impact as the Project will used the existing infrastructure

- Sociable Lapwing (*Vanellus gregarius*): The species is listed as Critically Endangered on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. The Project AoI along the Rail and Road Route Corridor overlaps with the passage migration range of this species
- Egyptian Vulture (*Neophron percnopterus*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. The Project AoI along the Rail and Road Route Corridor overlaps with the breeding and resident distribution range of this species, however, the Project is not anticipated to disturb the population of this species
- Greater Spotted Eagle (*Clanga clang*a): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. The Project AoI along the Rail and Road Route Corridor overlaps with the non-breeding and passage migration range of this species
- Yellow-eyed Pigeon (*Columba eversmanni*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. The Project AoI along the Rail and Road Corridor Route overlaps with the non-breeding range of this species, making it very unlikely for the species to breed within the Project AoI
- Saker Falcon (*Falco cherrug*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported in the literature along the Rail and Road Route Corridor. The Project AoI along the Rail and Road Route Corridor overlaps with the non-breeding and passage migration range of this species
- Asian Houbara Bustard (*Chlamydotis macqueenii*): The species is listed as Vulnerable on the IUCN Red List and is reported along the Rail and Road Route Corridor. This species' non-breeding distribution range lies along the Rail and Road Route Corridor and the Project is not anticipated to disturb the population of this species
- Imperial Eagle (*Aquila heliaca*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. This species has non-breeding distribution range along the Rail and Road Route Corridor and the Project is not anticipated to have any significant impact on this species
- Steppe Eagle (*Aquila nipalensis*): The species is listed as Endangered on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. This species has a non-breeding distribution along the Rail and

Road Route Corridor, and the Project is not expected to have any significant impact on it.

The habitat and ecology of Sociable Lapwing (*Vanellus gregarius*), Steppe Eagle (*Aquila nipalensis*), Imperial Eagle (*Aquila heliaca*), Asian Houbara Bustard (*Chlamydotis macqueenii*), Saker Falcon (*Falco cherrug*), Yellow-eyed Pigeon (*Columba eversmanni*), Greater Spotted Eagle (*Clanga clang*a), and Egyptian Vulture (*Neophron percnopterus*) is discussed in the *Section 6.1.1 Terrestrial Fauna at Reko Diq Mine Site and Associated Infrastructure.*

Exhibit 6.4: Conservation Concern Bird Species Reported by IBAT along the Rail and Road Route Corridor

No	*Scientific Name*	*Common Name*	*IUCN Category*	*Population Trend*	*Year Assessed*	*Movement Pattern*
1.	*Aegypius monachus*	Cinereous Vulture	NT	Decreasing	2021	Full Migrant
2.	*Aquila heliaca*	Eastern Imperial Eagle	VU	Decreasing	2019	Full Migrant
3.	*Aquila nipalensis*	Steppe Eagle	EN	Decreasing	2021	Full Migrant
4.	*Aquila rapax*	Tawny Eagle	VU	Decreasing	2021	Nomadic
5.	*Ardenna carneipes*	Flesh-footed Shearwater	NT	Decreasing	2019	Full Migrant
6.	*Arenaria interpres*	Ruddy Turnstone	NT	Decreasing	2024	Full Migrant
7.	*Aythya ferina*	Common Pochard	VU	Decreasing	2021	Full Migrant
8.	*Aythya nyroca*	Ferruginous Duck	NT	Decreasing	2019	Full Migrant
9.	*Bulweria fallax*	Jouanin's Petrel	NT	Unknown	2018	Full Migrant
10.	*Calidris alpina*	Dunlin	NT	Decreasing	2024	Full Migrant
11.	*Calidris canutus*	Red Knot	NT	Decreasing	2024	Full Migrant
12.	*Calidris falcinellus*	Broad-billed Sandpiper	VU	Decreasing	2024	Full Migrant
13.	*Calidris ferruginea*	Curlew Sandpiper	VU	Decreasing	2024	Full Migrant
14.	*Calidris tenuirostris*	Great Knot	EN	Decreasing	2019	Full Migrant
15.	*Chlamydotis macqueenii*	Asian Houbara	VU	Decreasing	2021	Full Migrant
16.	*Chrysomma altirostre*	Jerdon's Babbler	VU	Decreasing	2021	Not a Migrant
17.	*Circus macrourus*	Pallid Harrier	NT	Decreasing	2021	Full Migrant
18.	*Clanga clanga*	Greater Spotted Eagle	VU	Decreasing	2021	Full Migrant
19.	*Columba eversmanni*	Yellow-eyed Pigeon	VU	Decreasing	2022	Full Migrant
20.	*Ephippiorhynchus asiaticus*	Black-necked Stork	NT	Decreasing	2016	Not a Migrant
21.	*Esacus recurvirostris*	Great Thick-knee	NT	Decreasing	2017	Not a Migrant
22.	*Falco cherrug*	Saker Falcon	EN	Decreasing	2021	Full Migrant
23.	*Falco chicquera*	Red-headed Falcon	NT	Decreasing	2016	Not a Migrant

No	Scientific Name	Common Name	IUCN Category	Population Trend	Year Assessed	Movement Pattern
24.	*Falco jugger*	Laggar Falcon	NT	Decreasing	2020	Not a Migrant
25.	*Gypaetus barbatus*	Bearded Vulture	NT	Decreasing	2021	Not a Migrant
26.	*Gyps bengalensis*	White-rumped Vulture	CR	Decreasing	2021	Nomadic
27.	*Gyps indicus*	Indian Vulture	CR	Decreasing	2021	Not a Migrant
28.	*Haematopus ostralegus*	Eurasian Oystercatcher	NT	Decreasing	2019	Full Migrant
29.	*Halcyon pileata*	Black-capped Kingfisher	VU	Decreasing	2022	Full Migrant
30.	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	EN	Decreasing	2021	Full Migrant
31.	*Laticilla burnesii*	Rufous-vented Grass-babbler	NT	Decreasing	2017	Not a Migrant
32.	*Leptoptilos dubius*	Greater Adjutant	NT	Increasing	2023	Not a Migrant
33.	*Limosa lapponica*	Bar-tailed Godwit	NT	Decreasing	2017	Full Migrant
34.	*Limosa limosa*	Black-tailed Godwit	NT	Decreasing	2017	Full Migrant
35.	*Marmaronetta angustirostris*	Marbled Duck	NT	Decreasing	2022	Full Migrant
36.	*Neophron percnopterus*	Egyptian Vulture	EN	Decreasing	2021	Full Migrant
37.	*Numenius arquata*	Eurasian Curlew	NT	Decreasing	2017	Full Migrant
38.	*Oxyura leucocephala*	White-headed Duck	EN	Decreasing	2017	Full Migrant
39.	*Palaeornis eupatria*	Alexandrine Parakeet	NT	Decreasing	2017	Nomadic
40.	*Pelecanus crispus*	Dalmatian Pelican	NT	Decreasing	2018	Full Migrant
41.	*Pluvialis squatarola*	Grey Plover	VU	Decreasing	2024	Full Migrant
42.	*Rynchops albicollis*	Indian Skimmer	EN	Decreasing	2020	Full Migrant
43.	*Sarcogyps calvus*	Red-headed Vulture	CR	Decreasing	2021	Not a Migrant
44.	*Saxicola macrorhynchus*	White-browed Bushchat	VU	Decreasing	2017	Not a Migrant
45.	*Sterna acuticauda*	Black-bellied Tern	EN	Decreasing	2022	Not a Migrant
46.	*Sterna aurantia*	River Tern	VU	Decreasing	2020	Not a Migrant
47.	*Sypheotides indicus*	Lesser Florican	CR	Decreasing	2021	Full Migrant

No	*Scientific Name*	*Common Name*	*IUCN Category*	*Population Trend*	*Year Assessed*	*Movement Pattern*
48.	*Tetrax tetrax*	Little Bustard	NT	Decreasing	2018	Full Migrant
49.	*Vanellus gregarius*	Sociable Lapwing	CR	Decreasing	2019	Full Migrant
50.	*Vanellus vanellus*	Northern Lapwing	NT	Decreasing	2017	Full Migrant

CR; Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened

Mammals

A total of 39 species of mammals are reported along the Rail and Road Route Corridor. The variation in climatic conditions, topographic features, and vegetation types across these regions contributes to significant biodiversity. The common species of mammals include, Gray Wolf (*Canis lupus*), Hill Fox (*Vulpes vulpes griffithii*), Asiatic Jackal (*Canis aureus*), Striped Hyena (*Hyaena hyaena*), Sindh Ibex (*Capra aegagrus*), Afghan Urial (*Ovis vignei cycloceros*), Chinkara (*Gazella bennettii*), Bush Rat (*Golunda ellioti*), Red Fox (*Vulpes vulpes*), Jungle Cat (*Felis chaus*), Indian Hare (*Lepus nigricollis*), Five-striped Palm Squirrel (*Funambulus pennanti*), Fishing Cat (*Prionailurus viverrinus*), Wild Boar (*Sus scrofa*), Hog Deer (*Hyelaphus porcinus*), Indus Dolphin (*Platanista gangetica minor*), Smooth-coated Otter (*Lutrogale perspicillata*), and Honey Badger (*Mellivora capensis*).[61] [62] [63] [64] [65] [66] [67] [68] [69]

The conservation concern mammal species reported along the Rail and Road Route Corridor include Hog Deer (*Axis porcinus*), Indian Pangolin (*Manis crassicaudata*), and Indus Dolphin (*Platanista gangetica minor*) which are listed Endangered, Smooth-coated Otter (*Lutrogale perspicillata*), Balochistan Urial (*Ovis vignei blanfordi*), Afghan Urial (*Ovis vignei cycloceros*), Common Leopard (*Panthera pardus*), Fishing Cat (*Prionailurus viverrinus*), Balochistan Black Bear (*Ursus thibetanus gedrosianus*), and Marbled Polecat (*Vormela peregusna*) are listed as Vulnerable and Sindh Ibex or Wild Goat (*Capra aegagrus blythi*), Chiltan Markhor (*Capra falconeri chialtanensis*), Straight-horned Markhor (*Capra falconeri jerdoni*), and Striped Hyena (*Hyaena hyaena*) are listed as Near Threatened in the IUCN Red List of Threatened Species.[70]

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61 Rafique, M., Nawaz, M. A., & Asif, M. (2010). Mammalian fauna of the Chagai desert and adjoining areas. *Proceedings of the Pakistan Academy of Sciences (Pakistan)*, *47*(1).

62 Ullah, N., Basheer, I., Zhang, M., Rehan, M., UR REHMAN, F., & Khan, M. T. (2024). FLUCTUATIONS IN CHINKARA GAZELLE POPULATION AND GENDER RATIOS: A FOUR-YEAR STUDY IN KHUZDAR AND LASBELA, BALOCHISTAN. *Applied Ecology & Environmental Research*, *22*(1).

63 Begum, A. B. E. D. A., Khan, M. Z., Khan, A. R., Zehra, A. F. S. H. E. E. N., Hussain, B. A. B. A. R., Siddiqui, S. A. I. M. A., & Tabbassum, F. O. Z. I. A. (2013). Current status of mammals and reptiles at Hub Dam area, Sindh/Balochistan, Pakistan. *Current World Environment*, *8*(3), 407-414.

64 Virk, A. T. (1991). Management plan for wild ungulates in Balochistan Pakistan.

65 Ullah, U., Umar, H. M., Iqbal, M. A., & Yasmin, G. (2021). Study of ecology, distribution and status of biodiversity of Bin Qasim Industrial Zone Malir, Karachi, Pakistan. *Canadian Journal of Pure and Applied Sciences*, 15(1), 5179–5192

66 Ghalib, S. A., Kanwal, R., Zehra, A., Siddiqui, S., Hussain, B., Yasmeen, G., ... & Begum, A. (2018). Review of the distribution, status and conservation of wildlife of Sindh. *Canadian Journal of Pure and Applied Sciences*, *12*(2), 4519-4533.

67 Khan, M. Z., Ghalib, S. A., Khan, A. R., Zehra, A., Yasmeen, R., Hussain, B., ... & Hashmi, M. U. A. (2013). Current habitat, distribution and status of the mammals of Khirthar protected area complex, Sindh. *Canadian Journal of Pure and Applied Science*, *7*(2), 2347-2356.

68 Ghalib, S. A., Khan, M. Z., Ahmed, S. M., Begum, A., Hussain, B., & Ahmed, W. (2014). STUDY OF THE WILDLIFE OF JHIMPIR WIND CORRIDOR, DISTRICT THATTA, SINDH AND DEVELOPMENT OF BIRD MONITORING STRATEGY IN THE AREA. *African Journal of Science and Research*, *3*(6), 01-09.

69 Shakil, M. Report on baseline study of large mammalian fauna of Riverine Forests of Sukkur Sindh, Pakistan.

70 IUCN Red List Categories and Criteria https://www.iucnredlist.org/resources/categories-and-criteria Assessed on 01–December–2024

The IBAT reported 60 species of mammals within a 50 km buffer along the Rail and Road Route Corridor, including six Endangered, eight Vulnerable and eight Near Threatened.[71]

Exhibit 6.5 provides the list of conservation concern species of mammals reported by IBAT along the Rail and Road Route Corridor.

Appendix D provides a complete list of mammals reported in literature, while **Appendix E** provides a complete list of mammals reported in IBAT.

The description of the habitat and ecology of the conservation concern species reported along the Rail and Road Route Corridor is given below:

- Indian Pangolin (*Manis crassicaudata*): This species is listed as Endangered on the IUCN Red List of Threatened Species and Vulnerable on the National Red List of Mammals. It is reported along the Rail and Road Route Corridor. It is a nocturnal, burrow-dwelling species found in tropical forests, grasslands, arid areas, and degraded habitats, often near villages. It adapts well to modified environments if ant and termite prey remain abundant and hunting pressure is low. In Pakistan's Potohar Plateau, its diet mainly consists of black ants (*Camponotus confucii* and *C. compressus*) and some termites. Equipped with strong claws, a prehensile tail, and a long tongue, it efficiently excavates nests and climbs trees. This species is solitary except during mating. The females give birth to one young after a six-month gestation. Mothers protect and nurse their young, carrying them on their tail while foraging. Sexual maturity is reached at three years. *The consultation with IUCN Pangolin Specialist Group, confirmed the presence of the Indian Pangolin along the Rail and Road Route Corridor in Lasbella, Sibi and Jacobabad regions, however, no records of this species is present in RDMS. The working group have been asked to identify potential impacts along the Rail and Road Route Corridor due to increased traffic, however, working group has not provided any additional inputs*
- Persian Leopard (*Panthera pardus ssp. Tulliana*): This species is listed as Endangered on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It inhabits a variety of habitats but mainly inhabits mountain ranges covered with forests, woodlands and scrublands with an essential presence of rocky outcrops and precipitous slopes. It avoids deserts and plains but may survive also in lowlands and cold desert ecosystems. Persian Leopards are solitary and active mostly at night and in crepuscular time but also during the day over the cold season. Persian leopards are seasonal breeders, with mating peaking between January and March, though breeding outside these months also occurs. After a 90–106 days gestation, females give birth to 1–4 cubs, which are weaned within 70–100 days. This species has become extinct across most of its distribution range and now persists in small, fragmented populations in the province of Balochistan in southern Pakistan. However, as the Project will utilize existing facilities, no additional impact on the species is expected

[71] IBAT Proximity Report. Generated under licence 39257-75857 from the Integrated Biodiversity Assessment Tool on 28 November 2024 (GMT). www.ibat-alliance.org

- Hog Deer (*Axis porcinus*): This species is listed as Endangered in the IUCN Red List of Threatened Species and Vulnerable in the National Red List of Mammals. It is reported along the Rail and Road Route Corridor and inhabits wet or moist grasslands, particularly floodplains and areas near medium- to large-sized rivers. It prefers for open habitats like alluvial floodplains, coastal grasslands, and lightly wooded regions, and avoid dense forests. It forages primarily in grasslands dominated by species like *Imperata spp.* and *Saccharum spp.* As a grazer, it feeds on young grasses, herbs, flowers, fruits, and browse, showing a strong preference for grazing over browsing. During the breeding season, which occurs between September and October in India and Nepal, Hog Deer gives birth to one or two fawns, typically in areas with abundant food. The gestation period lasts 220–230 days, with fawns weaning at six months and reaching sexual maturity at 8–12 months. The Rail and Road Route Corridor passes through the distribution range of this species. However, since the Project will utilize existing facilities, no additional impact on the species is anticipated
- Common Leopard (*Panthera pardus*): This species is listed as Vulnerable on the IUCN Red List of Threatened Species and Critically Endangered on the National Red List of Mammals. It is reported along the Rail and Road Route Corridor. It inhabits across diverse landscapes, including arid mountains, scrublands, and forested areas, preying on medium-sized wild ungulates such as urial (*Ovis vignei*) and wild boar (*Sus scrofa*). It also hunts smaller mammals, birds, and, in proximity to human settlements, domestic livestock like goats, sheep, and dogs. Their opportunistic diet reflects their adaptability, with prey availability and competition shaping their foraging behaviour. Ecologically, leopards are solitary and territorial, with home range sizes varying based on prey density and habitat structure; they cover larger areas in regions with sparse prey. Breeding occurs year-round, with females selecting secluded dens in rocky terrain or dense vegetation to give birth and rear their cubs. Cubs are nurtured by their mothers until they can hunt independently. This species has become extinct across most of its distribution range and now persists in small, fragmented populations in the province of Balochistan in southern Pakistan. However, as the Project will utilize existing facilities, no additional impact on the species is expected
- Fishing Cat (*Prionailurus viverrinus*): This species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. It inhabits wetlands like marshlands, swamps, and areas with tall vegetation near water bodies, occasionally found in hilly regions. It is nocturnal, relying on dense grasslands for shelter and hunting, with home ranges overlapping human-modified landscapes. This species is a generalist predator, feeding on rodents, birds, and fish, and plays an important role in controlling rodent populations. The presence of this species is uncertain in most of the area and mostly restricted to small area far away from Rail and Road Route Corridor. Additionally, since the Project will utilize existing facilities, no further impact on the species is anticipated
- Balochistan Black Bear (*Ursus thibetanus gedrosianus*): This species is listed as Vulnerable on the IUCN Red List of Threatened Species and Critically

Endangered on the National Red List of Mammals. It is reported along the Rail and Road Route Corridor. It inhabits rugged arid mountains with sparse shrub vegetation. This species is omnivorous, as it eats fruits, insects, and small reptiles. Largely nocturnal, sleeping in trees and caves during the day. Sexual maturity of females is thought to occur at three to four years. Believed to mate in October and cubs are born in winter, probably most often in February. Females are sexually mature at three to four years of age. Litters are usually of one, two or three and the cubs stay with their mothers for two to three years. This species has become extinct across most of its distribution range and now persists in small, fragmented populations in the province of Balochistan in southern Pakistan. However, as the Project will utilize existing facilities, no additional impact on the species is expected

- Balochistan Urial (*Ovis vignei blanfordi*): This species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It inhabits moderately to very arid habitats at an altitude of 2750-4000 m. It prefers hills, undulating terrain and gentle slopes, but also use cliffs. It also occurs in grasslands and open woodlands. It may also forage at crop fields and use cavities in slopes or cliffs for shelter or rest under shrubs. This species is gregarious, sexually dimorphic, and non-territorial. The rutting starts in late November and female's give birth to one or less often two lambs. Females typically give first birth after two years, males are sexually mature at three years, but are fully mature at eight years. The Rail and Road Route Corridor passes through the minimal distribution range of this species. Additionally, as the Project will utilize existing facilities, no further impact on the species is anticipated
- Goitered Gazelle (*Gazella subgutturosa)*: The species is listed as Vulnerable on the IUCN Red List of Threatened Species and Critically Endangered on the National Red List of Mammals. This species is least studied in Pakistan and its presence along the Rail and Road Route Corridor is not confirm however, this species is reported by IBAT along the Rail and Road Route Corridor
- Marbled Polecat (*Vormela peregusna*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. The Rail and Road Route Corridor overlaps with the small patch of resident distribution range of this species. However, the Project will not disturb the population of this species.

The habitat and ecology of Marbled Polecat (*Vormela peregusna*) and Goitered Gazelle (*Gazella subgutturosa)* is discussed in the *Section 6.1.1 Terrestrial Fauna at Reko Diq Mine Site and Associated Infrastructure.*

Small Mammals

Based on desktop assessment, a total of 34 species of small mammals are reported along the Rail and Road Route Corridor. Common species include Grey Spiny Mouse (*Acomys cineraceus*), Small Five Toad Jerboa (*Allactaga elater*), Hotson's Five-toed Jerboa (*Allactaga hotsoni*), Mouse like Hamster (*Calomyscus bailwardi*), Migratory Hamster (*Cricetulus migratorius*), Balochistan Short Tailed Shrew (*Crocidura gmelina*), Indian Bush Rat (*Golunda ellioti*), Afghan Hedgehog (*Hemiechinus auritus megalotis*), Indian

Long-eared Hedgehog (*Hemiechinus collaris*), and Libian Jird (*Meriones libycus*).[72] [73] [74] [75]

All the small mammals reported along the Rail and Road Route Corridor are classified as Least Concern or Data Deficient in the IUCN Red List of Threatened Species. However, some of these species are threatened in the National Red List of Mammals which include *Dryomys nitedula* and *Gerbillus cheesmani* as Vulnerable**,** while *Acomys cahirinus*, *Ellobius fuscocapillus*, *Gerbillus gleadowi*, *Gerbillus nanus*, *Meriones crassus*, and *Rhombomys opimus* as Near Threatened.[76]

The IBAT reported 38 species of small mammals within a 50 km buffer along the Rail and Road Route Corridor. All the species reported by the IBAT are either Least Concern or Data Deficient in the IUCN Red List of Threatened Species. None of the conservation concern species is report.[77] However, one restricted-range species *Salpingotulus michaelis* is reported along the Rail and Road Route Corridor. **Appendix D** provides a complete list of small mammal species reported in literature, while **Appendix E** provides a complete list of small mammal species reported by IBAT.

[72] Rafique, M., Nawaz, M. A., & Asif, M. (2010). Mammalian fauna of the Chagai desert and adjoining areas. *Proceedings of the Pakistan Academy of Sciences (Pakistan)*, *47*(1).

[73] Begum, A. B. E. D. A., Khan, M. Z., Khan, A. R., Zehra, A. F. S. H. E. E. N., Hussain, B. A. B. A. R., Siddiqui, S. A. I. M. A., & Tabbassum, F. O. Z. I. A. (2013). Current status of mammals and reptiles at Hub Dam area, Sindh/Balochistan, Pakistan. *Current World Environment*, *8*(3), 407-414

[74] Ullah, U., Umar, H. M., Iqbal, M. A., & Yasmin, G. (2021). Study of ecology, distribution and status of biodiversity of Bin Qasim Industrial Zone Malir, Karachi, Pakistan. *Canadian Journal of Pure and Applied Sciences*, 15(1), 5179–5192

[75] Khan, M. Z., Ghalib, S. A., Khan, A. R., Zehra, A., Yasmeen, R., Hussain, B., ... & Hashmi, M. U. A. (2013). Current habitat, distribution and status of the mammals of Khirthar protected area complex, Sindh. *Canadian Journal of Pure and Applied Science*, *7*(2), 2347-2356

[76] Sheikh, K. M., & Molur, S. (2004). Status and red list of Pakistan's mammals. *Based on the conservation assessment and management plan. IUCN Pakistan*, 312.

[77] IBAT Proximity Report. Generated under licence 39257-75857 from the Integrated Biodiversity Assessment Tool on 28 November 2024 (GMT). www.ibat-alliance.org

Exhibit 6.5: Conservation Concern Mammals Species Reported by IBAT along the Rail and Road Route Corridor

No	Scientific Name	Common Name	IUCN Category	Population Trend	Year Assessed	Movement Pattern
1	*Balaenoptera musculus*	Blue Whale	EN	Increasing	2018	-
2	*Manis crassicaudata*	Indian Pangolin	EN	Decreasing	2019	Not a Migrant
3	*Panthera pardus ssp. tulliana*	Persian Leopard	EN	Decreasing	2024	Altitudinal Migrant
4	*Platanista minor*	Indus River Dolphin	EN	Increasing	2022	Unknown
5	*Axis porcinus*	Hog Deer	EN	Decreasing	2015	-
6	*Sousa plumbea*	Indian Ocean Humpback Dolphin	EN	Decreasing	2023	-
7	*Gazella subgutturosa*	Goitered Gazelle	VU	Decreasing	2017	Unknown
8	*Panthera pardus*	Leopard	VU	Decreasing	2024	-
9	*Prionailurus viverrinus*	Fishing Cat	VU	Decreasing	2016	Not a Migrant
10	*Ursus thibetanus*	Asiatic Black Bear	VU	Decreasing	2020	-
11	*Vormela peregusna*	Marbled Polecat	VU	Decreasing	2016	Not a Migrant
12	*Physeter macrocephalus*	Sperm Whale	VU	Unknown	2019	-
13	*Neophocaena phocaenoides*	Indo-Pacific Finless Porpoise	VU	Decreasing	2017	Not a Migrant
14	*Ovis vignei*	Urial	VU	Decreasing	2020	Full Migrant
15	*Capra aegagrus*	Wild Goat	NT	Stable	2020	Altitudinal Migrant
16	*Capra falconeri*	Markhor	NT	Increasing	2015	Altitudinal Migrant
17	*Hyaena hyaena*	Striped Hyaena	NT	Decreasing	2015	Not a Migrant
18	*Pseudorca crassidens*	False Killer Whale	NT	Unknown	2018	-
19	*Pteropus medius*	Indian Flying Fox	NT	Decreasing	2024	Full Migrant
20	*Rousettus leschenaultii*	Leschenault's Rousette	NT	Decreasing	2021	-
21	*Tursiops aduncus*	Indo-Pacific Bottlenose Dolphin	NT	Unknown	2019	-
22	*Miniopterus pallidus*	Pale Bent-wing Bat	NT	Decreasing	2021	-

CR; Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened

Herpetofauna

Based on the review of literature, a total of 90 species of herpetofauna are reported along the Rail and Road Route Corridor. Common herpetofauna species include Common Krait (*Bungarus caeruleus*), Caucasian Rock Agama (*Laudakia caucasia*), Persian Spider Gecko (*Crytopodian kachhense*), Long- tailed Desert Lacerta (*Mesalina watsonana*), Snake Eyed Lacerta (*Ophisops jerdoni*), Eastern Dwarf Skink (*Ablepharus pannonicus*), Dark-headed Dwarf Racer (*Pseudocyclophis persicus*), Dhaman (*Ptyas mucosus*), Bark Gecko (*Hemidactylus flavivirdis*), Common Tree Lizard (*Calotes versicolor*), Common Krait (*Bungarus caeruleus*) Saw Scaled Viper (*Echis carinatus*).and Cliff Racer (*Platyceps rhodorachis*).[78] [79] [80] [81] [82] [83]

Several herpetofauna species of conservation concern are reported along the Rail and Road Route Corridor. These species include, Crowned River Turtle (*Hardella thurjii*) which is listed as Endangered, Marsh Crocodile (*Crocodylus palustris*), Indian Spiny-tailed Lizard (Saara hardwickiii), Afghan Tortoise (*Testudo horsfieldii*) which are listed as Vulnerable, Rough-tailed Sand Boa (*Eryx conicus*), Red Sand Boa (*Eryx johnii*), Caspian Cobra (*Naja oxiana*), and Indian Monitor Lizard (*Varanus bengalensis*) are listed as Near Threatened in the IUCN Red List of Threatened Species.

The IBAT reported 144 herpetofauna species within a 50 km buffer along the Rail and Road Route Corridor, including one Critically Endangered, six Endangered, seven Vulnerable and six Near Threatened species.[84]

Exhibit 6.3 provides the list of conservation concern species of herpetofauna reported by IBAT along the Rail and Road Route Corridor.

Appendix D provides a complete list of herpetofauna species reported in literature while **Appendix E** provides a complete list of herpetofauna species reported by IBAT.

The description of the habitat and ecology of the conservation concern species reported along the Rail and Road Route Corridor is given below:

- Spotted Pond Turtle *Geoclemys hamiltonii*: This species is listed as Endangered on the IUCN Red List of Threatened Species and is reported from the Rail and

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[78] Baig, K. J., Awan, M. R., & Ashraf, N. A. E. E. M. (2006). Ecological studies and zoogeographic affinities of the amphibians and reptiles found in Chagai desert, Balochistan, Pakistan. Pakistan Journal of Zoology, 38(2), 145.

[79] Alia, M., Habibullahb, M. A., & Nawaz, M. (2012). HERPETOFAUNA IN THE PROVINCE OF BALOCHISTAN, PAKISTAN. *Science International*, *24*(1).

[80] Essote, S. A., Iqbal, A., Taj, M. K., Kakar, A., Taj, I., Kakar, S. U. D., & Ali, I. (2022). Occurrence and distribution of snake species in Balochistan Province, Pakistan.

[81] Khan, M. Z., & Siddiqui, S. (2009). Studies on bioecology and fauna of Hazarganji Chiltan National Park and development of ecotourism in protected areas. *Canadian Journal of Pure and Applied Sciences*, *5*(1), 1371-1384.

[82] Khan, M. Z., Zehra, A., Ghalib, S. A., Siddiqui, S., & Hussain, B. (2010). Vertebrate biodiversity and key mammalian species status of Hingol National Park. *Canadian Journal of Pure and Applied Sciences*, 1151.

[83] Pourmousa, S., & Paraftabi, S. S. (2013). Efficiency of Chemical Treatments on Reduction of COD and Turbidity of Deinked Pulp Waste Water. *Current World Environment*, *8*(3), 403.

[84] Integrated Biodiversity Assessment Tool, Report ID: 66148, Report Title: Mine Site and Northern Groundwater System, Downloaded on: June 24, 2024, Accessed through: https://www.ibat-alliance.org/sites/934160.

Road Route. This species is found in Bangladesh, India, Nepal, and Pakistan. It prefers shallow, densely vegetated standing waterbodies but can also be found in rivers, ponds, and reservoirs, often basking in reed beds. The species primarily feeds on snails, dragonfly larvae, insects, freshwater crustaceans, and various plant and animal matter. Females have two distinct nesting seasons, with the second clutch typically smaller than the first, producing 12-36 eggs. The species has a minimal distribution within the area traversed by the Rail and Road Route Corridor. However, as the Project will use existing facilities, and given its aquatic nature and limited reliance on terrestrial habitats, it is anticipated that the Project will have no significant impact on this species

- Crowned River Turtle (*Hardella thurjii*): This species is listed as Endangered on the IUCN Red List of Threatened Species and has been reported from the Rail and Road Route Corridor. It primarily inhabits pools, ponds, canals, oxbow lakes, and occasionally rivers and estuarine environments. The species is largely herbivorous but also consumes prawns and fish. Females nest on sandbanks and are larger than males. Females lay 8–19 eggs per clutch and up to 100 eggs per year. The Rail and Road Route Corridor passes through the distribution range of this species. However, given its aquatic nature and the fact that the Project will utilize existing facilities, no additional impact on the species is expected
- Yellow Monitor (*Varanus flavescens*)*:* This species is listed as Endangered on the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. This species is found in a number of humid habitats, including riverbanks, canals and rice fields, but predominantly in marshland. It is absent from dry grassland or hot steppe, areas in which it has erroneously been assumed to occur. It is mainly terrestrial, but is largely aquatic between June and October in the monsoon season. Its diet is known to include amphibian, reptile and bird eggs, insects and rodents. They also are specialized for feeding on crabs. Females lay a single clutch of 4–30 eggs (average 16) in burrows between July and October. A minimal portion of the species' distribution range falls within the area traversed by the Rail and Road Route Corridor. However, since the Project will utilize existing facilities, no additional impact on the species is expected
- Indian Softshell Turtle (*Nilssonia gangetica*)*:* This species is listed as Endangered on the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. *Nilssonia gangetica* primarily inhabits rivers and large canals with turbid water, muddy bottoms, and some current, occasionally using lakes, oxbows, ponds, and temporary waterbodies. It basks on riverine sandbanks and feeds on a diverse diet, including animal prey, carrion, and aquatic plants. Females lay 8–35 eggs per clutch and produce multiple clutches annually. The species has a minimal distribution within the area traversed by the Rail and Road Route Corridor. However, as the Project will use existing facilities, and given its aquatic nature and limited reliance on terrestrial habitats, it is anticipated that the Project will have no significant impact on this species
- Indian Peacock Softshell Turtle (*Nilssonia hurum*)*:* This species is listed as Endangered on the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. *Nilssonia hurum* inhabits rivers, lakes and ponds.

It feeds omnivorously; reported diet items include snails and other molluscs, prawns, fish, and mosquito larvae; items fed in temple ponds include rice and sweetmeats. The species has a minimal distribution within the area traversed by the Rail and Road Route Corridor. However, as the Project will use existing facilities, and given its aquatic nature and limited reliance on terrestrial habitats, it is anticipated that the Project will have no significant impact on this species

- Mugger (*Crocodylus palustris*): This species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from Rail and Road Route Corridor. This species inhabits freshwater habitats such as rivers, lakes, reservoirs, ponds, and occasionally coastal lagoons. It is an opportunistic predator, feeding on fish, amphibians, reptiles, birds, and small mammals. This species often nests near or inside burrows and lays 25–30 eggs during the dry season, with incubation lasting 55–75 days. These burrows also serve as crucial refuges against extreme temperatures, aiding survival in harsh conditions. The Rail and Road Route Corridor passes through the distribution range of this species. However, given its aquatic nature and the fact that the Project will utilize existing facilities, no additional impact on the species is expected
- Indian Roofed Turtle (*Pangshura tecta*)*:* This species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from the Rail and Road Route. Indian roofed turtles inhabit the Ganges, Brahmaputra, Indus, and Mahanadi River drainages across Pakistan, India, and Bangladesh. They primarily reside in standing and slow-flowing waters but are also found in flowing streams. These turtles bask on riverbanks, snags, and vegetation. While primarily herbivorous, feeding on aquatic plants like water hyacinths and weeds, they are also opportunistic omnivores, consuming crabs, snails, and carrion. The species has a minimal distribution within the area traversed by the Rail and Road Route Corridor. However, as the Project will use existing facilities, and given its aquatic nature and limited reliance on terrestrial habitats, it is anticipated that the Project will have no significant impact on this species
- Indian Spiny-tailed Lizard (*Saara hardwickii*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported along the Rail and Road Route Corridor. It inhabits hard-soiled areas, preferring slightly elevated positions with sparse xerophytic grass and bushes, and avoiding stony or sandy substrates. It thrives in semi-desert environments, often found in sandy patches and agricultural fields. This species is diurnally active, and ground-dwelling. This lizard feeds primarily on grasses, flowers, fruits, and occasionally insects. Its breeding season occurs from June to September, during which the female lays 8–15 eggs near her burrow. The Project AoI overlaps with the resident distribution range of this species. However, as the Project will use existing facilities, it is anticipated that the Project will have no significant impact on this species
- Indian Flapshell Turtle (*Lissemys punctata*)*:* This species is listed as Vulnerable on the IUCN Red List and has been reported from the Rail and Road Route Corridor. It thrives in diverse aquatic habitats, including rivers, lakes, ponds, marshes, rice fields, and urban canals. Adapted to survive prolonged dry conditions, it prefers shallow waters over main river channels. The species basks

on riverbanks, pond edges, and floating vegetation, with most activity occurring in winter. An opportunistic omnivore, it feeds on animal prey, carrion, and plant matter. The species has a minimal distribution within the area traversed by the Rail and Road Route Corridor. However, as the Project will use existing facilities, and given its aquatic nature and limited reliance on terrestrial habitats, it is anticipated that the Project will have no significant impact on this species

- Painted Keelback (*Xenochrophis cerasogaster*)*:* This species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from the Rail and Road Route Corridor. This aquatic species of snake inhabits freshwater marshland with abundant emergent vegetation. It is a diurnal species that feeds on fishes and frogs. A minimal portion of the species' distribution range falls within the area traversed by the Rail and Road Route. However, since the Project will utilize existing facilities, no additional impact on the species is expected.

Several other threatened species, including the Hawksbill Turtle (*Eretmochelys imbricata*), Green Turtle (*Chelonia mydas*), Olive Ridley Sea Turtle (*Lepidochelys olivacea*), and Loggerhead Turtle (*Caretta caretta*), are reported along the Rail and Road Route Corridor by IBAT. However, these species are strictly restricted to marine ecosystem, therefore, description of these species is provided in *Section 6.1.3 Terrestrial Fauna at Port Qasim.*

Exhibit 6.6: Conservation Concern Herpetofauna Species Reported by IBAT along the Rail and Road Route Corridor

No	*Scientific Name*	*Common Name*	*IUCN Category*	*Population Trend*	*Year Assessed*	*Movement Pattern*
1	*Eretmochelys imbricata*	Hawksbill Turtle	CR	Decreasing	2008	Full Migrant
2	*Chelonia mydas*	Green Turtle	EN	Decreasing	2023	Full Migrant
3	*Geoclemys hamiltonii*	Spotted Pond Turtle	EN	Decreasing	2019	-
4	*Hardella thurjii*	Crowned River Turtle	EN	Decreasing	2021	-
5	*Varanus flavescens*	Yellow Monitor	EN	Decreasing	2021	-
6	*Nilssonia gangetica*	Indian Softshell Turtle	EN	Decreasing	2021	-
7	*Nilssonia hurum*	Indian Peacock Softshell Turtle	EN	Decreasing	2021	-
8	*Caretta caretta*	Loggerhead Turtle	VU	Decreasing	2017	Full Migrant
9	*Crocodylus palustris*	Mugger	VU	Stable	2013	-
10	*Lepidochelys olivacea*	Olive Ridley Turtle	VU	Decreasing	2008	Full Migrant
11	*Pangshura tecta*	Indian Roofed Turtle	VU	Decreasing	2021	-
12	*Saara hardwickii*	Indian Spiny-tailed Lizard	VU	Decreasing	2022	-
13	*Lissemys punctata*	Indian Flapshell Turtle	VU	Decreasing	2021	-
14	*Xenochrophis cerasogaster*	Painted Keelback	VU	Decreasing	2022	-
15	*Pangshura smithii*	Brown Roofed Turtle	NT	Decreasing	2021	-
16	*Varanus bengalensis*	Bengal Monitor Lizard	NT	Decreasing	2021	-
17	*Naja oxiana*	Central Asian Cobra	NT	Decreasing	2021	-
18	*Eryx johnii*	Red Sand Boa	NT	Decreasing	2021	-
19	*Bufotes zugmayeri*	Baloch Green Toad	NT	Decreasing	2023	Not a Migrant
20	*Python molurus*	Indian Rock Python	NT	Decreasing	2021	-

CR; Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened

6.1.3 Terrestrial Fauna at Port Qasim

Avifauna

Based on the desktop assessment, a total of 153 bird species are reported from the Port Qasim area. Common bird species reported include Little Cormorant (*Phalacrocorax niger),* Grey Heron (*Ardea cinerea)*, Indian Pond Heron (*Ardeola grayii),* Great Egret (*Casmerodius albus)*, Little Egret (*Egretta garzetta),* Common Myna (*Acridotheres tristis),* Indian Robin (*Saxicoloides fulicatus)*, House Sparrow (*Passer domesticus)* and House Crow (*Corvus splendens).*[85]

Another study reported 49 species of birds from Gharo Creek, among them five species of shorebird, i.e., Black-winged Stilt (*Himantopus himantopus)*, Little Ringed Plover (*Charadrius dubius)*, Common Sandpiper (*Actitis hypoleucos)*, Common Snipe (*Gallinago gallinago)* and Temminck's Stint (*Calidris temminckii)*.[86] [87] [88] [89]

A few bird species of conservation importance are reported from the area. These include the Egyptian Vulture (*Neophron percnopterus)* and Black Bellied Tern (*Sterna acuticauda*), which are listed as Endangered; River Tern (*Sterna aurantia*) which is listed as Vulnerable and Dalmatian Pelican (*Pelecans crispus*) and Long-tailed Grass Warbler (*Prinia burnesii)* which are listed as Near Threatened in the IUCN Red List of Threatened Species. A complete list of bird species reported from Port Qasim is provided in **Appendix D**.

Port Qasim supports both native and migratory bird species due to the availability of coastal habitat. The conservation concern species reported in the area are migratory, spending the winter and summer seasons depending on their migratory patterns. Port Qasim is an important area for these bird species, providing suitable habitats and food resources along the coastal region.

The description of habitat and ecology of the threatened species reported in the literature in the Port Qasim study area is given below:

- Steppe Eagle (*Aquila nipalensis*): The species is listed as Endangered on the IUCN Red List of Threatened Species and is reported in the literature at Port Qasim. The AoI of the Port Qasim study area lies within the breeding range of

[85] Hagler Bailly Pakistan (HBP), March 2014, Environmental Impact Assessment of PQEPC's 2×660 MW Coal Power Plant, Bin Qasim, Karachi, Port Qasim Electric Power Company, Karachi.

[86] Ward, R. M. (1999). The shorebirds of Gharo Creek and the Indus Delta, Pakistan. BULLETIN-WADER STUDY GROUP, 90, 31-34.

[87] Khan, M. Z., Ullah, U., Roohi Kanwal, A. Z., & Zubair, S. (2018). Distribution and Status of The Vertebrate Biodiversity of Korangi and Phitti Creeks, Karachi Coast, Sindh, Pakistan. International Journal of Biology and Biotechnology, 15(4), 751-764.

[88] Khan, M. Z., Ullah, U., Roohi Kanwal, A. Z., & Zubair, S. (2018). Distribution and Status of The Vertebrate Biodiversity of Korangi and Phitti Creeks, Karachi Coast, Sindh, Pakistan. International Journal of Biology and Biotechnology, 15(4), 751-764.

[89] Ali, A., Altaf, M., Khan, M. S. H., Khan, A. M., Ashraf, S., & Chattha, S. A. (2017). Avifauna diversity along the coastline of Banbhore (Gharo creek), district Thatta, Sindh, Pakistan. *Journal of Wildlife and Ecology*, *1*(1), 8-16.

this species. However, given the habitat conditions in the Project AoI at Port Qasim, it is highly unlikely that the species breeds there

- Tawny Eagle (*Aquila rapax*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from Port Qasim study area. The Project AoI overlaps with resident range of this species, however, due to extreme modification and habitat condition, it is very unlikely that the species breed within the Project AoI
- This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. The Project AoI overlaps with the non-breeding distribution range of this species and it is unlikely that the species breeds in the Project AoI
- Curlew Sandpiper (*Calidris ferruginea*): This species in listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. In Pakistan, it is a migrant and winter visitor, relying on wetlands like the Indus Delta. The Project AoI overlaps with the passage range for this species
- Broad-billed Sandpiper (*Limicola falcinellus*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from Port Qasim. The Project AoI overlaps with the passage distribution of this species
- Great Knot (*Calidris tenuirostris*): The species is listed as Endangered on the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. The Project AoI overlaps with the non-breeding distribution range of this species and it is very unlikely that the species will breed in the area
- This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from the Port Qasim. The Project AoI overlaps with the non-breeding distribution range of this species
- White-rumped Vulture (*Gyps bengalensis*): The species is listed as Critically Endangered on the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. According to the IUCN Red List, the White-rumped Vulture is rarely present in the Project AoI and may potentially be extinct in this region
- Egyptian Vulture (*Neophron percnopterus*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported from Port Qasim study area. The Project AoI in the Port Qasim overlaps with the resident distribution range of this species however, it is very unlikely that the species will breed in the area
- Grey Plover (*Pluvialis squatarola*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from Port Qasim. The Project AoI overlaps with the passage distribution range of this species; however, it is very unlikely that the species breeds in the Project AoI and may use this area for foraging and resting

- Broad-billed Sandpiper (*Limicola falcinellus*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from Port Qasim. The Project AoI overlaps with the passage distribution of this species
- River Tern (*Sterna aurantia*): The species is listed as Vulnerable on the IUCN Red List of Threatened Species and is reported from the Port Qasim. The Project AoI overlaps with its resident distribution range; however, the habitat types within the Project AoI do not align with the species' breeding habitats, making it very unlikely for the species to breed in the Project AoI.

The detailed description of habitat and ecology of all these species is given in **Section 6.1.1** and **Section 6.1.2** of this report.

Mammals

Based on the desktop assessment, a total of 34[90] mammalian species are reported from Port Qasim and Karachi District. The most common species of mammals reported from Karachi include Indian Pangolin (*Manis crassicaudata)*, Long-eared Desert Hedgehog (*Hemiechinus collaris)*, Brown Rat (*Rattus norvegicus*) and Small Indian Civet (*Viverricula indica)*.[91] The Egyptian Fruit Bat (*Rousettus aegyptiacus)* and Brown Rat (*Rattus norvegicus*) were reported from Port Qasim.[92]

Most of the species reported from the Port Qasim are Least Concern except for the Indian Pangolin (*Manis crassicaudata),* which is listed as Endangered; Fishing Cat (*Prionailurus viverrinus)* which is listed as Vulnerable; and Egyptian Fruit Bat (*Rousettus aegyptiacus)* and Fulvous Fruit Bat (*Rousettus leschenaultii*) which are listed as Near Threatened in the IUCN Red List of Threatened Species. A complete list of mammal species reported from Port Qasim is provided in **Appendix D**.

The desktop assessment underscores the ecological importance of the mammalian species in Port Qasim and Karachi District. While most species are listed as Least Concern, the presence of endangered, vulnerable, and near-threatened species highlights the need for targeted conservation actions; however, these conservation concern species were not observed during the Post-Monsoon 2023 Survey.

The description of ecology and habitat of the threatened species reported in the literature is given below:

- Indian Pangolin (*Manis crassicaudata*): This species is listed as Endangered on the IUCN Red List of Threatened Species and Vulnerable on the National Red List of Mammals. It is reported in the Port Qasim study area. The Project AoI overlaps with the resident distribution range of this species; however, the Project will use the existing infrastructure and it is very unlikely that the Project will disturb the population of this species
- Fishing Cat (*Prionailurus viverrinus):* This species is listed as Vulnerable in the IUCN Red List of Threatened Species and Vulnerable on the National Red List of

[90] Molur, S. (2003). Status and Red List of Pakistan's Mammals.

[91] ibid

[92] ibid

Mammals. It is reported in the Port Qasim study area. The distribution of this species is uncertain in the Project AoI.

The detail description of these species is provided in the *Section 6.1.2 Terrestrial Fauna along the Rail and Road Route Corridor.*

Herpetofauna

Based on the desktop assessment, a total of 38 species of herpetofauna are expected to occur in the vicinity of Port Qasim. Expected reptile species include Oriental Garden Lizard (*Calotes versicolor)*, Persian House Gecko (*Hemidactylus persicus*,) Blunt-tailed Spider Gecko (*Agamura persica)*, Sindh Gecko (*Crossobamon orientalis)*, Bengal Monitor Lizard (*Varanus bengalensis)*, Desert Monitor Lizard (*Varanus griseus)*, Red Sand-Boa (*Eryx conicus)*, Saw-scaled Viper (*Echis carinatus)*, Common Krait (*Bungarus caeruleus)*, Brilliant Agama (*Trapelus agilis isolepis)*, Glossy-bellied Racer (*Coluber ventromaculatus)*, Indian Cobra (*Naja naja)*, Indian Fringe-fingered Lizard (*Acanthodactylus cantoris)*, Pakistan Ribbon Snake (*Psammophis leithii)*, Spiny Tailed Lizard (*Uromastyx hardwickii*) and Yellow bellied House Gecko (*Hemidactylus flaviviridis).*[93] [94]

Two species of amphibians have previously been reported from the vicinity of Port Qasim, namely Indus Toad *(Bufo stomaticus)* and Skittering Frog *(Euphlyctis cyanophlyctis)*.[95] A survey conducted by HBP in Port Qasim in 2021 reported only one species, i.e., Sindh Gecko (*Crossobamon orientalis).*[96]

In addition, a study conducted in Karachi coastal area, including Korangi Creek and Phitti Creek reported a total of 19 herpetofauna species belonging to one order and nine families, which includes ten lizards, one marine snake, and eight terrestrial snakes, including two venomous snakes, and six non-venomous snakes. A total of three amphibian species were also reported from both Korangi Creek and Phitti Creek, which included the Indus Toad *Bufo stomaticus*, Skittering Frog (*Euphlyctis cyanophlyctis),* and the Bull Frog (*Hoplobatrachus tigerinus)*.[97]

One species, the Indian Spiny–tailed Lizard (*Saara hardwicki*), is listed as Vulnerable while three species, i.e., Sand Boa (*Eryx conicus)*, Common Sand Boa (*Eryx johnii*) and Indian Monitor Lizard (*Varanus bengalensis)* are listed as Near Threatened in the IUCN

[93] Preparatory survey report on the project for construction and rehabilitation of national highway n-5 in Karachi city in the Islamic Republic of Pakistan (2017). Japan International Cooperation Agency.

[94] Ubaid U, Umar, M, Iqbal, A, Yasmeen, G, Kanwal, R, Lateef, A, Ghalib, S, Zaheer, M and Mirza, B. (2021). Study of ecology, distribution, and status of biodiversity of Bin Qasim industrial zone Malir, Karachi, Pakistan. Canadian Journal of Pure and Applied Sciences, 5 (1), pp. 5179-5192.

[95] Preparatory survey report on the project for construction and rehabilitation of national highway n-5 in Karachi city in the Islamic Republic of Pakistan (2017). Japan International Cooperation Agency.

[96] Hagler Bailly Pakistan (HBP), June 2021, Environmental Impact Assessment of Onshore LNG Terminal Project Bin Qasim, Karachi, Port Qasim Elengy Terminal Pakistan Limited.

[97] Khan, M. Z., Ullah, U., Roohi Kanwal, A. Z., & Zubair, S. (2018). Distribution and Status of The Vertebrate Biodiversity of Korangi and Phitti Creeks, Karachi Coast, Sindh, Pakistan. International Journal of Biology and Biotechnology, 15(4), 751-764.

Red List of Threatened Species.[98] A complete list of herpetofauna species reported from Port Qasim is provided in **Appendix D**.

Port Qasim, located in Karachi's coastal region, supports a wide variety of herpetofauna species. The conservation concern herpetofauna species reported from Port Qasim were not observed during the Post-Monsoon 2023 Survey.

The description of the habitat and ecology of the conservation concern species reported in Port Qasim is given below:

- Hawksbill Turtle *Eretmochelys imbricata:* This species is listed as Critically Endangered on the IUCN Red List of Threatened Species and is reported from Port Qasim study area. However, this species is not observed in the baseline survey. It has a circumglobally distribution, primarily throughout tropical and, to a lesser extent, subtropical waters of the Atlantic, Indian, and Pacific Oceans. The species nests on sandy beaches, both insular and mainland, across tropical and subtropical regions. Hawksbill Turtles are highly migratory, utilizing a diverse range of widely separated localities and habitats throughout their lifetimes. They are omnivorous, feeding on both plants and animals, with sea sponges being their preferred food in many areas. Given their extensive range and aquatic nature, it is unlikely that the Project facilities and related activities will have a significant impact on this species
- Green Turtle (*Chelonia mydas*): This species is listed as Endangered in the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. This species is highly migratory and move between oceanic and coastal areas throughout their lives. As juveniles, they float in ocean currents, then move to coastal feeding areas rich in seagrass and algae when they mature. Their diet mainly includes seagrass, algae, and marine invertebrates. Once mature, they migrate long distances to nest on sandy beaches which are perfect habitat for their nesting. The Project AoI, lacks this habitat feature and therefore, it is unlikely for this species to breed in the area
- Hawksbill Turtle *Eretmochelys imbricata:* This species is listed as Critically Endangered on the IUCN Red List of Threatened Species and has been reported in the Port Qasim study area. It has a circumglobal distribution, primarily throughout tropical and, to a lesser extent, subtropical waters of the Atlantic, Indian, and Pacific Oceans. The species nests on sandy beaches, both insular and mainland, across tropical and subtropical regions. Hawksbill Turtles are highly migratory, utilizing a diverse range of widely separated localities and habitats throughout their lifetimes. They are omnivorous, feeding on both plants and animals, with sea sponges being their preferred food in many areas. Given their extensive range and aquatic nature, it is unlikely that the Project facilities and related activities will have a significant impact on this species
- Olive Ridley Sea Turtle (*Lepidochelys olivacea):* This species is listed as Vulnerable on the IUCN Red List and has been reported in the Port Qasim study

[98] The IUCN Red List of Threatened Species. Version 2019-1. <www.iucnredlist.org>. Downloaded on 10 October 2023.

area. This species has a broad distribution across tropical and subtropical regions of the Pacific, Indian, and Southern Atlantic Oceans. It primarily inhabits shallow coastal waters within 15 km of shore, where it feeds and basks, but is also observed in open ocean environments. A predominantly carnivorous species, the Olive Ridley Turtle feeds on invertebrates and protochordates, including jellyfish, snails, shrimp, and crabs. Given their extensive range and aquatic nature, it is unlikely that the Project facilities and related activities will have a significant impact on this species

- Indian Spiny-tailed Lizard (*Saara hardwickii*): This species is listed as Vulnerable in the IUCN Red List of Threatened Species and is reported from the Port Qasim study area. The Project AoI overlaps with the resident distribution range of this species, the habitat conditions in the Project AoI suggest that it is very unlikely for this species to breed in the area. The detailed description of ecology and habitat is given in the *Section 6.1.2 Terrestrial Fauna along the Rail and Road Corridor.*

Exhibit 6.7: Potential Conservation Concern Avifauna, Herpetofauna, Mammals and Small Mammals

No.	Scientific Name	Common Name	Conservation Status				IBAT	Literature	Survey Based	Presence in the AoI	Resident/Migratory	Distribution in AoI	Home Range (km^2)	Preferred Habitat	Activity Pattern	Food Preference	Breeding Season	Elevation (m)	Distribution Maps
			Global	Year Assessed	National	Restricted Range													
1	*Aquila heliaca*	Eastern Imperial Eagle	VU	2019	N/A	-	Yes	Yes	-	Likely	Full Migrant	The Project AoI at Reko Diq Mine Site overlaps with the passage migration and non-breeding distribution along the Rail and Road Route Corridor	15	Open grasslands, steppes, forest edges	Diurnal	Carnivores	March and April	up to 1600	**Appendix C, Exhibit C.16**
2	*Aquila nipalensis*	Steppe Eagle	EN	2021	N/A	-	Yes	Yes	-	Likely	Full Migrant	The Project AoI at Reko Diq Mine Site overlaps with the passage migration and non-breeding distribution along the Rail and Road Route Corridor	50	Ggrasslands, wetlands, open woodlands	Diurnal	Carnivores	April to late August	up to 3000	**Appendix C, Exhibit C.17**
3	*Aquila rapax*	Tawny Eagle	VU	2021	N/A	-	Yes	Yes	-	Likely	Nomadic	The Project AoI along the Rail and Road Route Corridor and Port Qasim overlaps with the resident distribution range	109	Semi-deserts, steppes, savanna plains	Diurnal	Carnivores	Between April and July	up to 3000	**Appendix C, Exhibit C.1**
4	*Aythya ferina*	Common Pochard	VU	2021	N/A	-	Yes	Yes	-	Possible	Full Migrant	The Project AoI along the Rail and Road Route Corridor overlaps with the non-breeding distribution range	-	Freshwater lakes, wetlands	Crepuscular	Omnivores	April to May	up to 2690	**Appendix C, Exhibit C.22**
5	*Calidris falcinellus*	Broad-billed Sandpiper	VU	2024	N/A	-	Yes	Yes	-	Unlikely	Full Migrant	The Project AoI along the Rail and Road Corridor overlaps with the passage migration distribution range	-	Mudflats, coastal wetlands, shallow tidal lagoons	Diurnal and Crepuscular	Granivorous and Carnivores	June and July	up to 2000	**Appendix C, Exhibit C.2**
6	*Calidris ferruginea*	Curlew Sandpiper	VU	2024	N/A	-	Yes	Yes	Yes	Possible	Full Migrant	The Project AoI along the Rail and Road Corridor and Port Qasim overlaps with the passage migration distribution range	-	Mudflats, tidal flats, estuaries	Diurnal and Crepuscular	Granivorous and Carnivores	June to late August	up to 2000	**Appendix C, Exhibit C.26**
7	*Chlamydotis macqueenii*	Asian Houbara	VU	2021	N/A	-	Yes	Yes	Yes	Yes	Full Migrant	The Project AoI at the Reko Diq Mine Site and Associated Infrastructure holds wintering population and Rail and Road Route Corridor overlaps with the non-breeding distribution range	274	Dry streambeds, clayey plains	Diurnal	Omnivores	August to October	-	**Appendix C, Exhibit C.18**
8	*Clanga clanga*	Greater Spotted Eagle	VU	2021	N/A	-	Yes	Yes	-	Possible	Full Migrant	The Project AoI at the Reko Diq Mine Site and Associate Infrastructure and along the Rail and Road Route Corridor overlaps with the non-breeding and passage migration distribution range, respectively	321	Wetlands, riverine forests	Diurnal	Carnivores	February and March	up to 1400	**Appendix C, Exhibit C.51**
9	*Columba eversmanni*	Yellow-eyed Pigeon	VU	2022	N/A	-	Yes	Yes	-	Possible	Full Migrant	The Project AoI along the Reko Diq Mine Site and Associate Infrastructure and along the Rail and Road Route Corridor overlaps with the non-breeding distribution range	259	Mountains/hills, steppe	Diurnal	Granivorous and Frugivorous	April to August	up to 2000	**Appendix C, Exhibit C.29**
10	*Falco cherrug*	Saker Falcon	EN	2021	N/A	-	Yes	Yes	-	Possible	Full Migrant	The Project AoI along the Reko Diq Mine Site and Associate Infrastructure and along the Rail and Road Route Corridor overlaps with the non-breeding and passage migration distribution range, respectively	169	Mountains/hills, steppe, semi-deserts	Diurnal	Carnivores	March and April	up to 4700	**Appendix C, Exhibit C.15**
11	*Gyps bengalensis*	White-rumped Vulture	CR	2021	N/A	-	Yes	Yes	-	Unlikely	Nomadic	This species may be possibly extinct from the Project AoI along the Rail and Road Route Corridor	18	Mountains/hills, scrublands, savannas	Diurnal	Scavengers	October to March	up to 1500	**Appendix C, Exhibit C.4**
12	*Halcyon pileata*	Black-capped Kingfisher	VU	2022	N/A	-	Yes	Yes	-	Likely	Full Migrant	The Project AoI along the Rail and Road Route Corridor and Port Qasim overlaps with the non-breeding distribution range	-	Riverbanks, scrublands	Diurnal	Carnivores	April to May	up to 1525	**Appendix C, Exhibit C.6**
13	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	EN	2021	N/A	-	Yes	Yes	-	Unlikely	Full Migrant	According to the IUCN, this species may be potentially extinct within the Project (AoI) along the Rail and Road Route Corridor.	90.8	Lakes, rivers, wetlands, coastal areas	Diurnal	Carnivores	September to February	up to 5000	**Appendix C, Exhibit C.36**
14	*Neophron percnopterus*	Egyptian Vulture	EN	2021	N/A	-	Yes	Yes	Yes	Yes	Full Migrant	The Project AoI overlaps with breeding and resident distribution range	-	Mountains/hills, dry-arid regions, scrublands	Diurnal	Scavengers	March to May	up to 4500	**Appendix C, Exhibit C.14**
15	*Pluvialis squatarola*	Grey Plover	VU	2024	N/A	-	Yes	Yes	-	Possible	Full Migrant	The Project AoI along the Rail and Road Route Corridor overlaps with the passage migration distribution range	-	Estuaries, tidal flats	Diurnal	Insectivores	May to August	-	**Appendix C, Exhibit C.8**

No.	Scientific Name	Common Name	Conservation Status				IBAT	Literature	Survey Based	Presence in the AoI	Resident/Migratory	Distribution in AoI	Home Range (km^2)	Preferred Habitat	Activity Pattern	Food Preference	Breeding Season	Elevation (m)	Distribution Maps
			Global	Year Assessed	National	Restricted Range													
16	*Sarcogyps calvus*	Red-headed Vulture	CR	2021	N/A	-	Yes	Yes	-	Unlikely	Not a Migrant	This species may be possibly extinct from the Project AoI along the Rail and Road Route Corridor	-	Dry savannas, forested areas near settlements, scrublands	Diurnal	Scavengers	February and March	up to 2500	**Appendix C, Exhibit C.9**
17	*Sterna acuticauda*	Black-bellied Tern	EN	2022	N/A	-	Yes	Yes	-	Possible	Not a Migrant	The Project AoI along the Rail and Road Route Corridor overlaps with the resident distribution range	-	Shallow estuaries, riverbanks, mudflats	Diurnal	Carnivores	February to May	up to 700	**Appendix C, Exhibit C.11**
18	*Sterna aurantia*	River Tern	VU	2020	N/A	-	Yes	Yes	-	Possible	Not a Migrant	The Project AoI along the Rail and Road Route Corridor and Port Qasim overlaps with the resident distribution range	-	Freshwater lakes, river, reservoirs	Diurnal	Carnivores	February to May	up to 600	**Appendix C, Exhibit C.12**
19	*Vanellus gregarius*	Sociable Lapwing	CR	2019	N/A	-	Yes	Yes	-	Likely	Full Migrant	The Project AoI along the Reko Diq Mine Site, Rail and Road Route Corridor overlaps with the passage migration distribution range	-	Agricultural fields, grasslands and dried steppe	Diurnal	Insectivores	Mid-April to July	up to 300	**Appendix C, Exhibit C.19**
20	*Acinonyx jubatus*	Asiatic Cheetah	VU	2021	Regionally Extinct			Yes		Unlikely	Regionally Extinct[99] [100]	-	-	-	–	–	–		**Appendix C Exhibit C.81**
21	*Canis lupus*	Grey Wolf	LC	2018	Endangered		Yes	Yes		Likely	Extant	This species is distributed in the Sulaiman Mountains, Chaghi Hills, Makran Coastal Range and the district of Kharan in Balochistan. In Sindh province, it is found in the Kirthar Range and Thar Desert. Project AoI overlaps with the resident population range of this species.	259 - 1676	Mountain/hills, gravel plains, and deserts and semi-arid regions	Primarily crepuscular	Carnivore: (eats terrestrial vertebrates)	Between January and April	Up to 3,000	**Appendix C Exhibit C.82**
22	*Capra aegagrus blythi*	Sindh Ibex	NT	2020	Near Threatened		Yes	Yes	Yes	Possible	Extant (resident)	This species is distributed in the Kachau Mountain ranges along the Pakistan-Iran border, the Sulaiman Mountains, Koh-i-Siah Range, Koh-i-Maran, and the districts of Kharan, Makran and Hingol National Park in Balochistan. In Sindh province, it is found in the Kirthar Range. Its distribution overlaps with the Project AoI along the Rail and Road Route Corridor.		Mountain/hills	Diurnal	Herbivore: primarily grasses and browse	November to January	Up to 3,250	**Appendix C Exhibit C.83**
23	*Felis margarita*	Sand Cat or Dune Cat	LC	2014	Critically Endangered		Yes	Yes	Yes	Likely	Extant (resident)	This species is distributed in the northeastern part of Balochistan, extending from Noshki towards the Pakistan-Iran border. Its distribution range overlaps with Project AoI.	16	Sandy plains/sand dunes	Summer: Nocturnal Winter: Crepuscular	Carnivore: (eats terrestrial vertebrates, insects)			**Appendix C Exhibit C.78**
24	*Gazella subgutturosa*	Goitred Gazelle	VU	2016	Critically Endangered		Yes	Yes	Yes	Yes	Extant (resident)	This species is distributed in the Kirtaka area near the Northern Groundwater System and along the Pakistan-Iran border.	10-15[101]	Dry streambeds	Diurnal and sometimes nocturnal[102]	Herbivore: primarily grasses	November to January	up to 2,700	**Appendix C Exhibit C.79**
25	*Hyaena hyaena*	Striped Hyena	NT	2014	Critically Endangered		Yes	Yes		Likely	Resident	This species is distributed in Kirthar National Park, the Makran Coastal Range, the Chagai Hills, and the Sulaiman Mountains. Its distribution overlaps with the Project AoI.		Open scrublands, semi-arid plains, deserts, and rocky or rugged mountainous regions	Nocturnal	Predominantly a scavenger; its diet consisting mainly of carrion and human refuse	Breeding is nonseasonal	up to 3,300	**Appendix C Exhibit C.85**
26	*Ovis vignei cycloceros*	Afghan Urial	VU	2020	Vulnerable		Yes	Yes	Yes	Likely	Resident	It is distributed in the Kachau Mountain ranges along the Pakistan-Iran border, Sulaiman Mountains, Koh-i-Siah Range, Koh-i-Maran, and Torghar Hills. It is also likely to be present in the Khuzdar and Kharan districts and Project AoI.		Mountain/hills	Diurnal	Herbivore: primarily grasses and shrubs	November to December	600-2500	**Appendix C Exhibit C.73**
27	*Ursus thibetanus gedrosianus*	Balochistan Black Bear	VU	2016	Critically Endangered		Yes	Yes		Unlikely	It has become extinct in most of the area, except for a few regions	It has been recorded as being distributed in the Sulaiman Mountains, Khuzdar District, and Kharan District. Its distribution overlaps with the Project AoI along the Rail and Road Route	20 to 60	Mountain/hills	Nocturnal	Omnivorous: eats fruits, insects, and reptiles	October	up to 4,300	**Appendix C Exhibit C.77**

[99] Husain T. 2001. Survey for the Asiatic cheetah, Acinonyx jubatus, in Balochistan province, Pakistan Barbara Delano Foundation; 39 p.

[100] Durant, S.M., Groom, R., Ipavec, A., Mitchell, N. & Khalatbari, L. 2024. Acinonyx jubatus (amended version of 2023 assessment). The IUCN Red List of Threatened Species 2024: e.T219A259025524. https://dx.doi.org/10.2305/IUCN.UK.2024-1.RLTS.T219A259025524.en. Accessed on 26 December 2024.

101 Average home range size of Goitered Gazelles has not been documented. However, they often travel 10 to 15 km throughout the day, moving between night pastures, watering holes, and resting areas

[102] Goitered gazelles feed during early morning and afternoon in the summer and can become nocturnal in areas where they are heavily hunted. During winter, they graze nearly continuously, resting briefly at midday

No.	Scientific Name	Common Name	Conservation Status				IBAT	Literature	Survey Based	Presence in the AoI	Resident/Migratory	Distribution in AoI	Home Range (km^2)	Preferred Habitat	Activity Pattern	Food Preference	Breeding Season	Elevation (m)	Distribution Maps
			Global	Year Assessed	National	Restricted Range													
											in Khuzdar and Kharan.	corridor, however, it is very unlikely for this species to be present in the Project AoI.							
28	*Vormela peregusna*	Marbled Pole Cat	VU	2015	Least Concern		Yes	Yes		Likely	Resident	The Marbled Polecat is distributed across arid and semi-arid regions of Balochistan, with confirmed presence in Chagai District, Kharan Desert, and parts of the Makran Coastal Range. The sitribution of this species overlaps with the Northern Groundwater System in the extended Study Area.	0.5 to 0.6	Arid and semi-arid regions	Crepuscular	Carnivore: (eats terrestrial vertebrates)	March to June	up to 3,000	**Appendix C Exhibit C.84**
29	*Salpingotulus michaelis*	Baluchistan Pygmy Jerboa	DD	2016		Restricted Range	Yes		Yes	Unlikely	Resident	This species has been recorded from Noshki, Pakistan and may occur in Afghanistan and its distribution range does not overlaps with Project AoI.		Sand plain/sand dunes and gravel plains	Nocturnal	Omnivores[103]		1,000 to 1,600	**Appendix C Exhibit C.80**
30	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	LC	2016	N/A	Restricted Range	Yes	Yes	Yes	Yes		This species is distributed in limited areas of Pakistan and Afghanistan. In Pakistan, it is distributed along in Chagai District along the Northern Ground Water System which is a Project facility.		Sandy plains/sand dunes	Diurnal	Insectivores	March to August		**Appendix C Exhibit C.69**
31	*Saara hardwickii*	Indian Spiny-tailed Lizard	VU	2019	N/A		Yes	Yes		Likely		Spiny-tailed Lizard is distributed all over the Indus Valley extending up to Las Bela, south Baluchistan and its distribution range overlaps with Rail and Road Route Corridor.		Arid and semi-arid regions	Diurnal	Carnivorous	March to June		**Appendix C Exhibit C.66**
32	*Crocodylus palustris*	Mugger	VU	2009	N/A		Yes	Yes		Possible		It is native to freshwater habitats from southern Iran to the Indian subcontinent, where it inhabits marshes, lakes, rivers and artificial ponds and its resident distribution overlaps with Rail and Road Route Corridor and Port Qasim.		Rivers, lakes, reservoirs, ponds, coastal lagoons		Carnivorous			**Appendix C Exhibit C.58**
33	*Bufotes zugmayeri*	Baloch Green Toad	Near Threatened	2020	N/A		Yes	Yes	Yes	Yes		This species is distributed along the Pak-Iran border, Quetta Valley, Zhob District, Kalat District, and Khuzdar District of Balochistan and also observed from the Northern Groundwater System in the extended Study Area.		Temporary or permanent water sources	Nocturnal	Insectivores	March to June		**Appendix C Exhibit C.70**

[103] It feed on wind-blown seeds, succulent leaves of desert-adapted vegetation, and various dead animals such as other rodents and lizards

6.2 Literature Review for Marine and Coastal Fauna at Port Qasim

6.2.1 Marine Benthic Invertebrates (MBI)

To date, a total of 109 species of marine worms, over 800 species of mollusks (700 marine mollusks, 100 land snails), and 355 species of nematodes have been reported in Pakistan.[104] Communities belonging to the order Brachyuran, Grapsoid, Xanthoid Crab species, Gastropods and Bivalves, Mollusca, Annelida, Arthropods, and Echinodermata have been reported from the Project area.[105]

The study conducted in various sites in Sindh, including Sandspit, Port Qasim, and Clifton, reported the presence of 26 species of MBI. These species include (*Marphysa sp.), (Cerithidea cingulatus),(Natica lamarckii), (Natica didyma), (Nodilittorina l. leucosticte), (Nodilittorina picta), (Telescopium telescopium), (Ceratoxancus sp.),* Freshwater (snail sp.)*, (Thais carinifera), (Laternula sp.),* Empty shells of (oyster spat)*, (Placuna placenta), (Haloa japonica), (Melampus nuxcastanea), (Onchidella sp.), (Sphaeroma terebrans), (Microdeutopus sp.), (Illyoplax paulidicola), (Illyoplax sp.), (Macrophthalmus depressus), (Paguristes perspicax),* Insect cocoons, Insect larvae, Nudibranch egg strings, and (*Haloa japonica*) egg masses.[106]

Studies conducted on MBI since 1984 reported a total of 21 species along Port Qasim.[107] Dominant communities include Fiddler Crab (*Uca sp.)*, Pinnotherid Crabs, Mud Skippers (*Boleophthalmus sp.)* and (*Telescopium telescopium)* as well as annelid (polychaete) worms, bivalve mollusks such as (*Cerithidea cingulatus), (Natica lamarkii), (N. didyma), (Nodilittorina leucosticta), (N. picta)* and freshwater snail sp., and (*Cerithium sp)*.[108] [109] [110] [111]

Seven MBI groups were identified during the June 2021 Survey conducted by Hagler Bailly Pakistan (HBP). These included Foraminifera, Gastropod Shell, Polychaeta, Crustacean's appendages, Bivalve Shell, Egg Mass, Ostracods, Cladocera, and broken

[104] Pakistan Fourth National Report by Ministry of Environment (2009).

[105] Akhter, N Sustainable Fisheries the Pakistan National Conservation Strategy, Government of Pakistan Environment and Urban Affairs Division in collaboration with IUCN – The World Conservation Union, 1995

[106] Barkati, S. O. H. A. I. L., & Rahman, S. O. L. A. H. A. (2005). Species composition and faunal diversity at three sites of Sindh mangroves. *Pakistan Journal of Zoology*, *37*(4), 17.

[107] Barkati, S. O. H. A. I. L., & Rahman, S. O. L. A. H. A. (2005). Species composition and faunal diversity at three sites of Sindh mangroves. *Pakistan Journal of Zoology*, *37*(4), 17.

[108] Hagler Bailly Pakistan (HBP), March 2014, Environmental Impact Assessment of PQEPC's 2×660 MW Coal Power Plant, Bin Qasim, Karachi, Port Qasim Electric Power Company, Karachi.

[109] Hagler Bailly Pakistan (HBP), February 2014, Environmental Impact Assessment of Coal Power Plant (CPP) Project, Fauji Fertilizer Bin Qasim Complex, Fauji Fertilizer Bin Qasim Limited (FFBL)

[110] Hagler Bailly Pakistan (HBP), September 2013, Environmental Impact Assessment of Bin Qasim Coal Conversion Project, K Energy (PVT) Limited, Karachi.

[111] Barkati, S. O. H. A. I. L., & Rahman, S. O. L. A. H. A. (2005). Species composition and faunal diversity at three sites of Sindh mangroves. *Pakistan Journal of Zoology*, *37*(4), 17.

shells.[112] Brachyuran Crabs form a major component of the crabs present in the mangroves in Sindh's coastal areas.[113]

The mangroves support species that fall into the families Grapsidae, Ocypodiadae, Xanthidae, and Portunidae. Swimming Crabs, (*Scylla senata)* (family Portunidae), can be seen darting for safety under the root cover of mangroves or the holes of the trunks of mangroves.[114]

All MBI species reported from the vicinity of Port Qasim are listed as either Data Deficient, Not Evaluated, or Least Concern by the IUCN Red List of Threatened Species. A complete list of MBI reported along Port Qasim is provided in **Appendix D**.

The diversity of marine benthic invertebrates at Port Qasim is a result of the region's complex habitats, nutrient-rich environment, stable conditions, and intricate biotic interactions. These factors, combined with human influences, create a dynamic ecosystem that supports a wide range of benthic invertebrate species.

6.2.2 Epipelagic Fauna

Epipelagic fauna refers to fauna observed on the exposed coastal area at low tide, such as crabs, gastropods, bivalves, mudskippers, etc. Many epipelagic faunas[115] are found in the sediment of coastal areas. These include Annelida, Mollusca, Ostracods, Crabs, False Crabs, Hydrozoan, Sea Anemone, Amphipods, Nematoda, Platyhelminthes, Copepods, Tanaidacean, Shrimps, Mysids, Isopods, Carides, insect larvae, fish eggs, and fish larvae. Epipelagic fauna is closely associated with the substratum and energy flow in the ecosystem.[116] Moreover, there are also 15 species of shrimps, 12 species of cephalopods, and five species of lobster reported from Pakistan.

The epipelagic zone is home to all sorts of iconic animals, along with pelagic fauna such as whales, dolphins, billfishes, tunas, jellyfish, sharks, and many other groups. The epipelagic[117] community is dominated by polychaete, arthropods (shrimps, lobsters, and crabs), annelids, mollusks, nematodes, copepods, ostracods, platyhelminths, crustaceans, and echinoderms.[118,119]

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[112] Hagler Bailly Pakistan (HBP), June 2021, Environmental Impact Assessment of Onshore LNG Terminal Project Bin Qasim, Karachi, Port Qasim Elengy Terminal Pakistan Limited.

[113] IUCN "Mangroves of Pakistan: status and management" IUCN, 2005

[114] Ibid

[115] Epifauna refers to benthic animals that live on the surface of a substrate, such as rocks, pilings, marine vegetation, or the sea or lake floor itself. Epifauna may attach themselves to such surfaces or range freely over them, as by crawling or swimming.

[116] Barkati, S. O. H. A. I. L., & Rahman, S. O. L. A. H. A. (2005). Species composition and faunal diversity at three sites of Sindh mangroves. *Pakistan Journal of Zoology*, *37*(4), 17.

[117] Marine benthic invertebrates and epifauna are benthic animals that live on the surface of a substrate, such as rocks, pilings, marine vegetation, or the sea or lake floor itself. These communities may attach themselves to such surfaces or range freely over them, as by crawling or swimming.

[118] Sousa, W. P., & Dangremond, E. M. (2011). Trophic interactions in coastal and estuarine mangrove forest ecosystems. *Treatise Estuar Coast Sci*, *6*, 43-93.

[119] Sousa, W. P., & Dangremond, E. M. (2011). Trophic interactions in coastal and estuarine mangrove forest ecosystems. *Treatise Estuar Coast Sci*, *6*, 43-93.

The study conducted near Port Qasim reported 21 species of Epi-Pelagic Fauna.[120] Dominant communities include the Fiddler Crab (*Uca sp.)*, Pinnotherid Crabs, Mud Skippers (*Boleophthalmus sp.),* and (*Telescopium telescopium*) assemblages as well as annelid (Polychaete) worms, bivalve mollusks such as (*Cerithidea cingulatus), (Natica lamarkii), (N. didyma), (Nodilittorina leucosticta), (N. picta)* and freshwater snail species and (*Cerithium sp.).*[121] [122] [123] [124]

The epipelagic fauna at the species level reported along Port Qasim fall under Data Deficient, Not Evaluated, or Least Concern in the IUCN Red List of Threatened Species. A complete list of epipelagic fauna reported from Port Qasim is provided in **Appendix D**.

The high diversity of epipelagic fauna at Port Qasim is due to its location near the Indus River delta, which brings nutrient-rich waters into the Arabian Sea. These nutrients support the growth of phytoplankton, forming the base of the marine food web for epipelagic fauna. The region encompasses a variety of habitats, including mangroves, mudflats, and estuarine areas. Each habitat supports different communities of epipelagic fauna. Mangrove forests and other coastal habitats provide shelter and breeding grounds for these species, contributing to higher biodiversity.

6.2.3 Pelagic Fish Communities

The Karachi coastal area features diverse ecosystems with a wide variety of pelagic fish species. However, the mobility of these species, as they migrate over long distances in response to changing environmental conditions, makes it challenging to accurately inventory their diversity. Despite these difficulties, some limited ichthyological studies have been conducted along the Karachi Coast. A study conducted in coastal areas of Keti Bandar reported a total of 48 species,[125] and another study reported 40 finfish collected from Fish Harbor Trawl station of Manora Channel, Northern Arabian Sea, and Karachi Coast.[126] In addition, a study conducted in the Karachi coastal area, including Ghizri Creek, Korangi Creek, Chashma Goth, Rehri Creek, Russian Beach, Phitti Creek, Chann

[120] Barkati, S. O. H. A. I. L., & Rahman, S. O. L. A. H. A. (2005). Species composition and faunal diversity at three sites of Sindh mangroves. *Pakistan Journal of Zoology*, *37*(4), 17.

[121] Hagler Bailly Pakistan (HBP), March 2014, Environmental Impact Assessment of PQEPC's 2×660 MW Coal Power Plant, Bin Qasim, Karachi, Port Qasim Electric Power Company, Karachi.

[122] Hagler Bailly Pakistan (HBP), February 2014, Environmental Impact Assessment of Coal Power Plant (CPP) Project, Fauji Fertilizer Bin Qasim Complex, Fauji Fertilizer Bin Qasim Limited (FFBL)

[123] Hagler Bailly Pakistan (HBP), September 2013, Environmental Impact Assessment of Bin Qasim Coal Conversion Project, K Energy (PVT) Limited, Karachi.

[124] Barkati, S. O. H. A. I. L., & Rahman, S. O. L. A. H. A. (2005). Species composition and faunal diversity at three sites of Sindh mangroves. *Pakistan Journal of Zoology*, *37*(4), 17.

[125] Ul-Hassan, H., Mahboob, S., Masood, Z., Riaz, M. N., Rizwan, S., Al-Misned, F., ... & Waqar, M. (2021). Biodiversity of commercially important finfish species caught by mid-water and bottom trawls from two different coasts of Arabian Sea: Threats and conservation strategies. *Brazilian Journal of Biology*, *83*, e249211.

[126] Ajazuddin, S. R., & Rao, S. PELAGIC FAUNAL ASSEMBLAGE AT FISH HARBOUR, KARACHI, NORTHERN ARABIAN SEA.

Waddo Creek, Bundal Island, Buddo Island, and Kadiro Creek, reported a total of 20 fish species.[127]

Some of the reported species from these areas include Two-bar Seabream (*Acanthopagrus bifasciatus),* Picnic Seabream *(Acanthopagrus berda),* Bridled Seabream *(Acanthopagrus catenula),* Spotted Yellowfin Seabream *(Acanthopagrus sheim),* Sobaity Seabream *(Sparidentex hasta),* Indian Seabream (*Crenidens indicus),* Cape White Seabream *(Diplodus capensis),* Talang Queenfish *(Scomberoides commersonnianus),* Malabar Trevally *(Carangoides malabaricus),* Malabar Blood Snapper *(Lutjanus malabaricus),* Blubberlip Snapper *(Lutjanus rivulatus),* Orange-spotted Grouper *(Epinephelus coioides),* Spinycheek Grouper *(Epinephelus diacanthus),* Indian Mackerel *(Rastrelliger kanagurta)* and Shortfin Mako (*Isurus oxyrinchus)*.[128] [129] [130]

Most of the pelagic fish species reported from the coastal area near Port Qasim are listed as Data Deficient, Not Evaluated, or Least Concern. Two fish species, namely the Shortfin Mako (*Isurus oxyrinchus)* and Sliver Pomfret (*Pampus argenteus*), are listed as Endangered and Vulnerable, respectively, in the IUCN Red List of Threatened Species. A complete list of pelagic fish reported from the Port Qasim Coastal Study Area is provided in **Appendix D**.

Located on the Arabian Sea, Port Qasim benefits from nutrient-rich waters due to upwelling currents and the Indus River's outflows. This nutrient influx supports a rich marine environment, essential for the growth of various marine species. The area's coastal features, including mangroves, estuaries, and tidal flats, provide essential breeding and feeding grounds for pelagic species. The warm water temperatures and varied depths further support a thriving plankton community, which forms the base of the marine food web. These combined factors make Port Qasim an ideal location for a diverse array of pelagic fish communities.

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[127] Khan, M. Z., Ullah, U., Roohi Kanwal, A. Z., & Zubair, S. (2018). Distribution and Status of The Vertebrate Biodiversity of Korangi and Phitti Creeks, Karachi Coast, Sindh, Pakistan. *International Journal of Biology and Biotechnology*, *15*(4), 751-764.

[128] Ul-Hassan, H., Mahboob, S., Masood, Z., Riaz, M. N., Rizwan, S., Al-Misned, F., & Waqar, M. (2021). Biodiversity of commercially important finfish species caught by mid-water and bottom trawls from two different coasts of Arabian Sea: Threats and conservation strategies. *Brazilian Journal of Biology*, *83*, e249211.

[129] Ajazuddin, S. R., & Rao, S. PELAGIC FAUNAL ASSEMBLAGE AT FISH HARBOUR, KARACHI, NORTHERN ARABIAN SEA.

[130] Khan, M. Z., Ullah, U., Roohi Kanwal, A. Z., & Zubair, S. (2018). Distribution and Status of The Vertebrate Biodiversity of Korangi and Phitti Creeks, Karachi Coast, Sindh, Pakistan. *International Journal of Biology and Biotechnology*, *15*(4), 751-764.

7. Findings of the Study

The findings of the Post-Monsoon 2022 Survey, Spring 2023 Survey, Summer 2024 Survey are discussed in this section. The surveys at the Reko Diq Mine Site, along the Northern Groundwater System and Access Route to the Reko Diq Mine Site were conducted in Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys. While the survey along the coastal area along Port Qasim for both terrestrial and marine and coastal fauna was conducted only in the Post-Monsoon 2023 Survey.

Field data for the fauna is provided in **Appendix F**.

7.1 Terrestrial Fauna

7.1.1 Avifauna

A total of 59 bird species were observed during the Post-Monsoon 2022, Spring 2023, and Post-Monsoon 2023 surveys conducted at the Reko Diq Mine Site and Associated Infrastructure, as well as the Port Qasim study area. Of these, 31 species were observed during the Post-Monsoon 2022 Survey, 21 species in Spring 2023 Survey, and 22 species in Post-Monsoon 2023 Survey.

Among the bird species observed in the baseline surveys, three conservation concern species were observed which include one Endangered species, the Egyptian Vulture, and two Vulnerable species, the Curlew Sandpiper and the Asian Houbara Bustard.

Exhibit 7.1 provides a list of avifauna species observed in Post-Monsoon 2022, Spring 2023 and Post-Monsoon 2023 surveys.

Exhibit 7.1: Avifauna Species Observed in Baseline Surveys

No	*Scientific Name*	*Common Name*	*IUCN*	*Year of Assessment*	*Survey Based Species*		
					Post-Monsoon 2022 Survey	*Spring 2023 Survey*	*Post-Monsoon 2023 Survey*
1	*Acrocephalus melanopogon*	Moustached Warbler	Least Concern	2018	–	✓	–
2	*Acrocephalus stentoreus*	Clamorous Reed-warbler	Least Concern	2022	–	✓	–
3	*Alaemon alaudipes*	Greater Hoopoe-lark	Least Concern	2024	✓	✓	–
4	*Amandava amandava*	Red Avadavat	Least Concern	2024	–	–	✓
5	*Ammomanes cinctura*	Bar-tailed Lark	Least Concern	2024	✓	✓	–
6	*Ammomanes deserti*	Desert Lark	Least Concern	2018	✓	✓	–
7	*Ammoperdix griseogularis*	See-see Partridge	Least Concern	2016	✓	–	–
8	*Anthus trivialis*	Tree Pipit	Least Concern	2018	✓		
9	*Ardea intermedia*	Intermediate Egret	Least Concern	2020			✓
10	*Ardeola grayii*	Indian Pond-heron	Least Concern	2024			✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey Based Species		
					Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey
11	*Athene noctua*	Little Owl	Least Concern	2019	✓		
12	*Buteo buteo*	Eurasian Buzzard	Least Concern	2021	✓		
13	*Calandrella brachydactyla*	Greater Short-toed Lark	Least Concern	2018	✓	✓	
14	*Calidris ferruginea*	Curlew-Sandpiper	Vulnerable	2024	–	–	✓
15	*Calidris minuta*	Little Stint	Least Concern	2019	–	–	✓
16	*Caprimulgus europaeus*	European Nightjar	Least Concern	2016	✓		
17	*Cercotrichas galactotes*	Rufous-tailed Scrub Robin	Least Concern	2019	✓	✓	–
18	*Chlamydotis macqueenii*	Asian Houbara Bustard	Vulnerable	2021	✓	–	–
19	*Cinnyris asiaticus*	Purple Sunbird	Least Concern	2024	–	–	✓
20	*Columba livia*	Blue Rock Pigeon	Least Concern	2019	–	–	✓
21	*Copsychus fulicatus*	Indian Robin	Least Concern	2018	–	–	✓
22	*Coracias garrulus*	Eurasian Roller	Least Concern	2019	✓	✓	–
23	*Corvus corax*	Common Raven	Least Concern	2017	–	✓	–
24	*Corvus ruficollis*	Brown-necked Raven	Least Concern	2024	✓	✓	
25	*Corvus splendens*	House Crow	Least Concern	2018	–	–	✓
26	*Curruca curruca*	Lesser Whitethroat	Least Concern	2024	✓	–	–
27	*Curruca mystacea*	Menetries`s Warbler	Least Concern	2016	✓	–	–
28	*Curruca nana*	Asian Desert Warbler	Least Concern	2017	✓	✓	–
29	*Dicrurus macrocercus*	Black Drongo	Least Concern	2024	–	–	✓
30	*Egretta garzetta*	Little Egret	Least Concern	2016	–	–	✓
31	*Ficedula parva*	Red-breasted Flycatcher	Least Concern	2018	✓	–	–
32	*Francolinus francolinus*	Black Partridge	Least Concern	2018	–	–	✓
33	*Galerida cristata*	Crested Lark	Least Concern	2024	✓	–	–
34	*Himantopus himantopus*	Black-winged stilt	Least Concern	2019	–	–	✓
35	*Hirundo rustica*	Barn Swallow	Least Concern	2019	–	✓	–
36	*Iduna caligata*	Booted Warbler	Least Concern	2020	✓	✓	–
37	*Merops orientalis*	Asian Green Bee-eater	Least Concern	2024	–	–	✓
38	*Milvus migrans*	Black Kite	Least Concern	2021	–	–	✓
39	*Monticola saxatilis*	Rufous-tailed Rock Thrush	Least Concern	2024	–	✓	–
40	*Motacilla alba*	White or Pied Wagtail	Least Concern	2019	✓	–	–
41	*Muscicapa striata*	Spotted Flycatcher	Least Concern	2019	✓	–	–
42	*Neophron percnopterus*	Egyptian Vulture	Endangered	2021	✓	–	–
43	*Oenanthe monacha*	Hooded Chat or Wheatear	Least Concern	2019	–	✓	–

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey Based Species		
					Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey
44	*Oriolus kundoo*	Indian Golden Oriole	Least Concern	2020	✓	✓	–
45	*Ortygornis pondicerianus*	Grey Francolin	Least Concern	2018	–	–	✓
46	*Pastor roseus*	Rosy Starling	Least Concern	2016	✓	✓	–
47	*Phylloscopus collybita*	Common Chiffchaff	Least Concern	2024	–	–	✓
48	*Phylloscopus neglectus*	Plain Leaf-warbler	Least Concern	2019	–	–	✓
49	*Porzana porzana*	Spotted Crake	Least Concern	2016	✓	–	–
50	*Ptyonoprogne rupestris*	Eurasian Cag Martin	Least Concern	2024	✓		
51	*Pycnonotus cafer*	Red-vented Bulbul	Least Concern	2018	–	✓	✓
52	*Pycnonotus leucotis*	White-eared Bulbul	Least Concern	2018	✓	✓	✓
53	*Saxicola caprata*	Pied Bushchat	Least Concern	2024	✓	–	–
54	*Saxicola torquatus*	Siberian Stonechat	Least Concern	2020	✓	–	–
55	*Spilopelia senegalensis*	Laughing Dove	Least Concern	2018	✓	–	–
56	*Streptopelia decaocto*	Eurasian Collared-dove	Least Concern	2019	✓	✓	–
57	*Vanellus indicus*	Red Wattled Lapwing	Least Concern	2016	–	–	✓
58	*Vanellus malabaricus*	Yellow-wattled Lapwing	Least Concern	2016	–	–	✓
59	*Progne chalybea*	Grey-breasted Martin	Least Concern	2020	–	✓	–
Total					**31**	**21**	**22**

Reko Diq Mine Site

A total of 17 bird species were observed within the surveyed area during both the Post-Monsoon 2022 and Spring 2023 Surveys. Of these, 12 species were observed in the Post-Monsoon 2022 Survey and 10 species in the Spring 2023 Survey.

Exhibit 7.2 provides a list of bird species observed in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.3 provides some photographs of bird species observed in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.2: Bird Species Observed in Post-Monsoon 2022 Survey and Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Feeding Habit*	*Major Food Items*	*Occurrence in Area*	*Global Population Trend* [131]	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
1	*Acrocephalus melanopogon*	Mustached Warbler	LC	-	Insectivore	Insects, larvae	Wintering	Stable	-	✓
2	*Alaemon alaudipes*	Hoopoe Lark	LC	-	Omnivore	Insects, seeds	Wintering	Decreasing	✓	✓
3	*Ammomanes cinctura*	Bar-tailed Lark	LC	-	Granivore/Insectivore	Seeds, insects	Year-round Resident	Decreasing	✓	✓
4	*Ammomanes deserti*	Desert Lark	LC	-	Granivore/Insectivore	Seeds, insects	Year-round Resident	Increasing	-	✓
5	*Ammoperdix griseogularis*	See-see Partridge	LC	-	Granivore	Seeds, small invertebrates	Year-round Resident	Stable	✓	-
6	*Anthus trivialis*	Tree Pipit	LC	-	Insectivore	Insects, small invertebrates	Passage migrant and irregular year round visitor	Decreasing	✓	-
7	*Athene noctua*	Little Owl	LC	-	Carnivore	Small mammals, insects	Year-round Resident	Stable	✓	-
8	*Calandrella brachydactyla*	Greater Short-Toed Lark	LC	-	Granivore	Seeds, grains	Wintering	Unknown	✓	✓
9	*Cercotrichas galactotes*	Rufous-tailed Scrub Robin	LC	-	Insectivore	Insects, small fruits	Summer Breeder	Stable	-	✓
10	*Corvus corax*	Common Raven	LC	-	Omnivore	Carrion, small animals, fruits	Year-round Resident	Increasing	-	✓
11	*Corvus ruficollis*	Brown-necked Raven	LC	-	Omnivore	Insects, seeds, small animals	Year-round Resident	Increasing	✓	✓
12	*Curruca curruca*	Lesser Whitethroat	LC	III	Insectivore	Insects, small fruits	Summer Breeder	Stable	✓	-

[131] International Union for Conservation of Nature (IUCN), https://www.iucnredlist.org, Accessed on August 26, 2024.

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Feeding Habit*	*Major Food Items*	*Occurrence in Area*	*Global Population Trend* [131]	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
13	*Curruca mystacea*	Menetries`s Warbler	LC	-	Insectivore	Insects, small fruits	Summer Breeder	Stable	✓	-
14	*Curruca nana*	Asian Desert Warbler	LC	-	Insectivore	Insects, small fruits	Wintering	Stable	-	✓
15	*Iduna caligata*	Booted Warbler	LC	-	Insectivore	Insects, larvae	Summer Breeder and Wintering	Increasing	✓	✓
16	*Ptyonoprogne rupestris*	Crag Martin	LC	-	Insectivore	Flying insects	Summer Breeder	Stable	✓	-
17	*Saxicola torquatus*	Siberian Stonechat	LC	-	Insectivore	Insects, small invertebrates	Not Available	Unknown	✓	-
Total									**12**	**10**

Note: Least Concern: (LC), Not Evaluated: (NE)

Exhibit 7.3: Bird Species Observed at Reko Diq Mine Site in Post-Monsoon 2022 Survey and Spring 2023 Survey

a) Hoopoe Lark *(Alaemon alaudipes)*

b) Brown-necked Raven *(Corvus ruficollis)*

c) Little Owl (*Athene noctua)*

d) Menetries`s Warbler *(Curruca mystacea)*

Post-Monsoon 2022 Survey

A total of 62 bird specimens belonging to 12 species were observed from the Reko Diq Mine Site study area from 20 sampling locations in the Post-Monsoon 2022 Survey. The most abundant bird species was the Brown-necked Raven (*Corvus ruficollis*), with a total of 40 specimens observed, followed by the See-see Partridge (*Ammoperdix griseogularis*) (four specimens) and Bar-tailed Lark (*Ammomanes cinctura)*, Hoopoe Lark (*Alaemon alaudipes)*, Lesser Whitethroat (*Sylvia curruca*) (three specimens each). Species like Booted Warbler (*Iduna caligate)*, Menetries's Warbler *(Curruca mystacea)*, Little Owl (*Athene noctua)*, Siberian Stonechat *(Saxicola maura)*, and Tree Pipit (*Anthus trivialis*) were rare species with only one specimen of each species observed.

The highest diversity of birds was observed in the Dry Streambeds (1.3) habitat, followed by Mountains/Hills (1.0) and Gravel Plains (0.4), while the highest density of birds was observed in Gravel Plains (3.6) habitat, followed by Dry Streambeds (3.3) and Mountains/Hills (2.6). The availability of food and shelter in Dry Streambeds was the main reason for higher diversity in this habitat. No bird species was observed in the Sandy Plains/Sand Dunes habitat during the Post-Monsoon 2022 Survey.

Exhibit 7.4 provides the abundance of bird species by habitat type observed at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey.

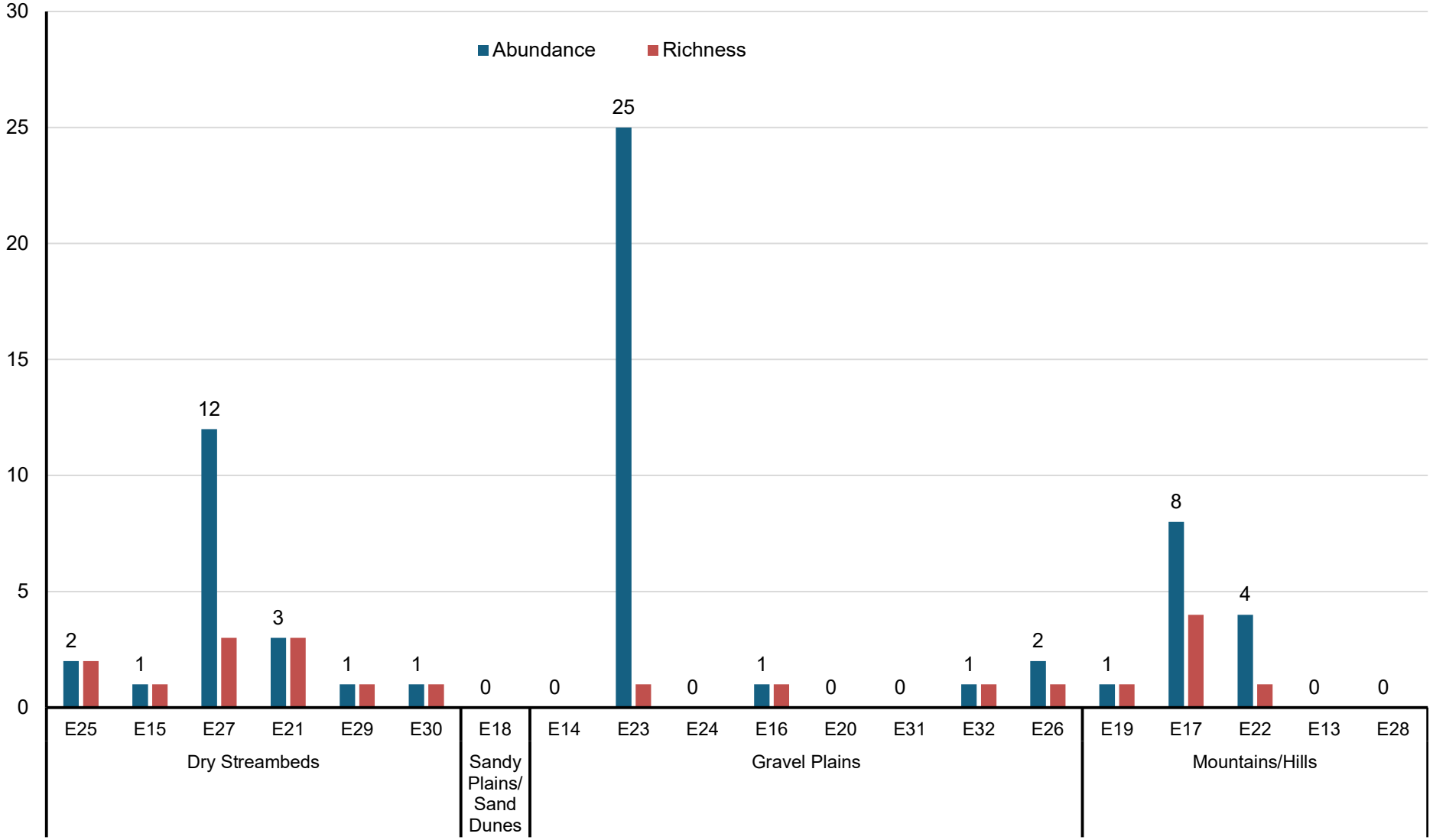
Exhibit 7.5 provides the graph of bird abundance and richness observed at each sampling location at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.4: Birds Species Observed at Reko Mine Site Study Area in Post-Monsoon 2022 Survey

No.	*Scientific Names*	*Common Names*	*Habitat*				
			Dry Streambeds	*Sandy Plains/ Sand Dunes*	*Gravel Plains*	*Mountains/Hills*	*Total*
1	*Ammomanes cinctura*	Bar-tailed Lark	2	0	1	0	**3**
2	*Alaemon alaudipes*	Hoopoe Lark	2	0	0	1	**3**
3	*Ammoperdix griseogularis*	See-see Partridge	0	0	0	4	**4**
4	*Anthus trivialis*	Tree Pipit	1	0	0	0	**1**
5	*Athene noctua*	Little Owl	0	0	0	1	**1**
6	*Calandrella brachydactyla*	Greater Short-Toed Lark	2	0	0	0	**2**
7	*Corvus ruficollis*	Brown-necked Raven	8	0	27	5	**40**
8	*Curruca mystacea*	Menetries's warbler	1	0	0	0	**1**
9	*Iduna caligate*	Booted Warbler	1	0	0	0	**1**
10	*Ptyonoprogne rupestris*	Crag Martin	0	0	0	2	**2**
11	*Saxicola maura*	Siberian Stonechat	0	0	1	0	**1**
12	*Sylvia curruca*	Lesser Whitethroat	3	0	0	0	**3**
Total Abundance			**20**	**-**	**29**	**13**	**62**
Total Richness			**8**	**-**	**3**	**5**	**12**

Exhibit 7.5: Bird's Abundance and Richness Observed at the Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey



Spring 2023 Survey

A total of 25 bird specimens belonging to 10 species were observed at the Reko Diq Mine Site study area from 20 sampling locations in the Spring 2023 Survey. The most abundant bird species was the Brown-necked Raven (*Corvus ruficollis*) with a total of 11 specimens, followed by the Common Raven (*Corvus corax*) with a total of three specimens, and Asian Desert Warbler (*Sylvia nana*), Mustached Warbler (*Acrocephalus melanopogon*) and Rufous-tailed Scrub Robin (*Cercotrchas galactotes*) with two specimens each. Only single specimens of Bar-tailed Lark (*Ammomanes cinctura*), Booted Warbler (*Iduna caligate*), Desert Lark (*Ammomanes deserti*), and Greater Short-toed Lark (*Calandrella brachydactyla*) were observed.

The highest average diversity of birds was observed in Clayey Plains (2.0), followed by Mountains/Hills (1.2), Sandy Plains/Sand Dunes (1.0), and Dry Streambeds (0.3). Similarly, the highest average density (density per sampling location for each survey) was observed in Mountains/Hills (3.4), followed by Clayey Plains (3.0), Sandy Plains/Sand Dunes (3.0), and Dry Streambeds (0.3). No specimen of any species was observed in Gravel Plains at the Reko Diq Mine Site. This can be attributed to the absence of suitable habitats for food and refugia for birds in the Gravel Plains.

Exhibit 7.6 provides the list of the bird species observed in different habitats at the Reko Diq Mine Site in the Spring 2023 Survey.

Exhibit 7.7 provides the graph of bird abundance and richness observed at each sampling location at the Reko Diq Mine Site in the Spring 2023 Survey.

The comparison of Spring 2023 Survey and Previous Spring Survey is provided in **Appendix H**.

Exhibit 7.6: Birds Species Observed in Different Habitats at the Reko Diq Mine Site Study Area in Spring 2023 Survey

No.	*Scientific Names*	*Common Names*	*Habitat*					
			Clayey Plains	*Gravel Plains*	*Mountain/Hills*	*Dry Streambeds*	*Sandy Plains*	*Total*
1	*Acrocephalus melanopogon*	Mustached Warbler	-	-	2	-	-	**2**
2	*Alaemon alaudipes*	Hoopoe Lark	-	-	-	1	-	**1**
3	*Ammomanes cinctura*	Bar-tailed Lark	-	-	-	1	-	**1**
4	*Ammomanes deserti*	Desert Lark	-	-	1	-	-	**1**
5	*Calandrella brachydactyla*	Greater Short-toed Lark	-	-	1	-	-	**1**
6	*Cercotrchas galactotes*	Rufous-tailed Scrub Robin	2	-	-	-	-	**2**

No.	Scientific Names	Common Names	Habitat					Total
			Clayey Plains	Gravel Plains	Mountain/Hills	Dry Streambeds	Sandy Plains	
7	*Corvus corax*	Common Raven	-	-	-	-	3	**3**
8	*Corvus ruficollis*	Brown-necked Raven	-	-	11	-	-	**11**
9	*Iduna caligate*	Booted Warbler	-	-	1	-	-	**1**
10	*Sylvia nana*	Asian Desert Warbler	1	-	1	-	-	**2**
Total Abundance			**3**	**-**	**17**	2	3	**25**
Total Richness			**2**	**0**	**6**	2	1	**10**

Northern Groundwater System

A total of 30 bird species were observed within the surveyed area in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey. Of these, 23 species were observed in the Post-Monsoon 2022 Survey and 17 in the Spring 2023 Survey. Common bird species observed in the Northern Groundwater System study area include Desert Lark (*Ammomanes deserti),* Greater Hoopoe Lark (*Alaemon alaudipes)*, Eurasian Roller (*Coracias garrulous)*, and Barn Swallow (*Hirundo rustica)*.

Exhibit 7.8 provides the list of bird species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.10 provides the photographs of bird species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.7: Bird's Abundance and Richness Observed at the Reko Diq Mine Site Study Area in Spring 2023 Survey

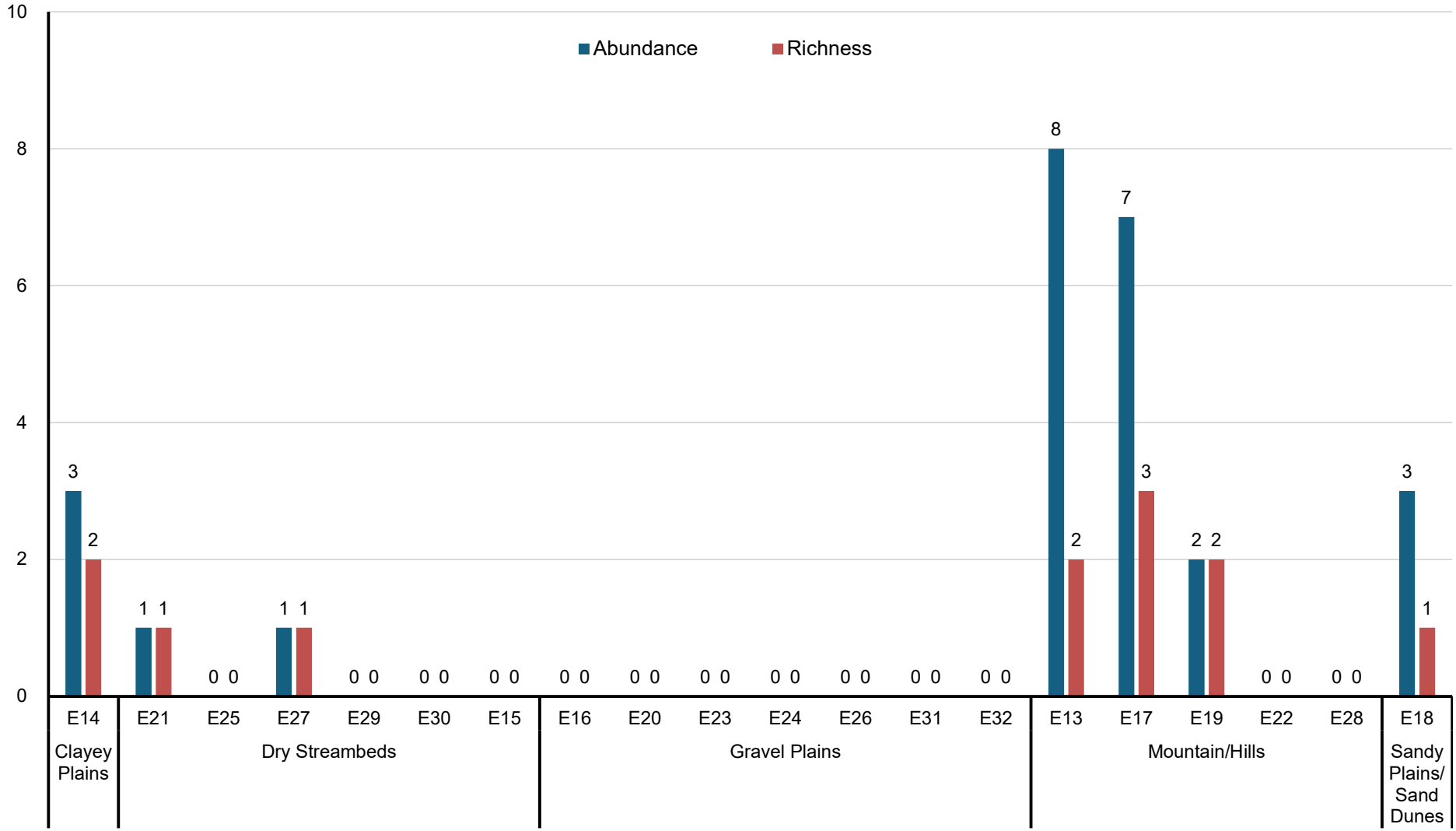


Exhibit 7.8: Bird Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Feeding Habit*	*Major Food Items*	*Occurrence in Area*	*Global Population Trend* [132]	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
1	*Acrocephalus melanopogon*	Mustached Warbler	LC	-	Insectivore	Insects, larvae	Wintering	Stable	-	✓
2	*Acrocephalus stentoreus*	Clamorous Reed-Warbler	LC	-	Insectivore	Insects, small invertebrates	Wintering	Stable	-	✓
3	*Alaemon alaudipes*	Hoopoe Lark	LC	-	Omnivore	Insects, seeds	Year-round Resident	Decreasing	✓	✓
4	*Ammomanes cinctura*	Bar-tailed Lark	LC	-	Granivore/ Insectivore	Seeds, insects	Year-round Resident	Decreasing	✓	
5	*Ammomanes deserti*	Desert Lark	LC	-	Granivore/ Insectivore	Seeds, insects	Year-round Resident	Increasing	✓	✓
6	*Buteo buteo*	Common Buzzard	LC	II	Carnivore	Small mammals, birds	Wintering	Increasing	✓	-
7	*Calandrella brachydactyla*	Greater Short-Toed Lark	LC	-	Granivore	Seeds, grains	Wintering	Unknown	✓	✓
8	*Caprimulgus europaeus*	Eurasian Nightjar	LC	-	Insectivore	Nocturnal flying insects	Summer Breeder	Decreasing	✓	-
9	*Chlamydotis macqueenii*	Asian Houbara Bustard	VU	I	Omnivore	Insects, small vertebrates	Passage migrant/ Irregular year round resident and also visit for wintering	Decreasing	✓	-
10	*Coracias garrulus*	Eurasian Roller	LC	-	Insectivore	Large insects, small vertebrates	Passage migrant/ Irregular year round resident	Decreasing	✓	✓
11	*Corvus ruficollis*	Brown-necked Raven	LC	-	Omnivore	Insects, seeds, small animals	Year-round Resident	Increasing	✓	✓
12	*Curruca curruca*	Lesser Whitethroat	LC	-	Insectivore	Insects, small fruits	Summer Breeder	Stable	✓	-
13	*Curruca nana*	Asian Desert Warbler	LC	-	Insectivore	Insects, small fruits	Wintering	Stable	✓	✓
14	*Ficedula parva*	Red-throated Flycatcher	LC	-	Insectivore	Insects, small invertebrates	Passage migrant and Irregular year round visitor	Increasing	✓	-

[132] International Union for Conservation of Nature (IUCN), https://www.iucnredlist.org, Accessed on August 26, 2024.

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Feeding Habit*	*Major Food Items*	*Occurrence in Area*	*Global Population Trend* [132]	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
15	*Galerida cristata*	Crested Lark	LC	III	Granivore/ Insectivore	Seeds, insects	Year-round Resident	Decreasing	✓	-
16	*Hirundo rustica*	Barn Swallow	LC	-	Insectivore	Flying insects	Summer Breeder	Decreasing	-	✓
17	*Monticola saxatilis*	Rufous-tailed Rock Thrush	LC	-	Insectivore	Insects, small invertebrates	Wintering	Decreasing	-	✓
18	*Motacilla alba*	White Wagtail	LC	-	Insectivore	Insects, aquatic invertebrates	Wintering	Stable	✓	-
19	*Muscicapa striata*	Spotted Flycatcher	LC	-	Insectivore	Flying insects	Passage migrant and Irregular year round visitor	Decreasing	✓	-
20	*Neophron percnopterus*	Egyptian Vulture	EN	II	Scavenger/Carnivore	Carrion, small animals	Year-round Resident and Summer Breeder	Decreasing	✓	-
21	*Oenanthe monacha*	Hooded Wheatear	LC	-	Insectivore	Insects, small invertebrates	Year-round Resident	Stable	-	✓
22	*Oriolus kundoo*	Indian Golden Oriole	LC	-	Insectivore	Insects, small fruits	Not Available	Unknown	✓	✓
23	*Pastor roseus*	Rosy Starling	LC	-	Omnivore	Insects, fruits	Passage migrant/ Irregular year round Visitor	Unknown	✓	✓
24	*Progne chalybea*	Grey-breasted Martin	LC	-	Insectivore	Flying insects	Not Available	Stable	-	✓
25	*Ptyonoprogne rupestris*	Crag Martin	LC	-	Insectivore	Flying insects	Summer Breeder	Stable	✓	
26	*Pycnonotus cafer*	Red-vented Bulbul	LC	-	Omnivore	Fruits, seeds, insects	Year-round resident	Increasing	-	✓
27	*Pycnonotus leucotis*	White-eared Bulbul	LC	-	Omnivore	Fruits, seeds, insects	Year-round Resident	Decreasing	✓	✓
28	*Saxicola caprata*	Pied Bushchat	LC	-	Insectivore	Insects, small invertebrates	Passage Migrant	Stable	✓	-
29	*Spilopelia senegalensis*	Laughing Dove	LC	-	Granivore	Seeds, grains	Summer Breeder	Stable	✓	-
30	*Streptopelia decaocto*	Eurasian Collared Dove	LC	-	Granivore	Seeds, grains	Passage Migrant	Increasing	✓	✓
Total									**23**	**17**

Note: Least Concern: (LC), Endangered: (EN), Vulnerable: (VU).

Exhibit 7.9: Bird's Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey and Spring 2023 Survey

a) Spotted Flycatcher (*Muscicapa striata)*

b) Eurasian Collard Dove (*Streptopelia decaocto)*

c) Crested Lark (*Galerida cristata)*

d) Gulp of Barn Swallows (*Hirundo rustica)*

Post-Monsoon 2022 Survey

A total of 69 bird specimens belonging to 23 species were observed the Northern Groundwater System study area from 13 sampling locations in the Post-Monsoon 2022 Survey. The most abundant bird species was the Indian Golden Oriole (*Oriolus kundoo*), with a total of 11 specimens, followed by the European Bee-eater (*Spilopelia senegalensis*) (10 specimens) and White-eared Bulbul (*Pycnonotus leucotis*) (eight specimens). Asian Desert Warbler (*Curruca nana*), Asian Houbara Bustard (*Chlamydotis macqueenii*), Bar-tailed Lark (*Ammomanes cinctura*), Common Buzzard (*Buteo buteo vulpinus*), Eurasian Nightjar (*Caprimuleus europaeus*), Eurasian Roller (*Coracias garrulus*), Hoopoe Lark (*Alaemon alaudipes*), Pied Bush Chat (*Saxicola caprata*), Red-throated Flycatcher (*Ficedula parva*), and Rosy Starling (*Pastor roseus*) were rare species with one specimen each of these species observed. The highest abundance and richness of birds were observed in the Agricultural Areas/Date Palms habitat closer to the Kirtaka Hills, with a total of 40 specimens belonging to 10 species.

The highest diversity of birds was observed in Agricultural Areas/Date Palms (10.0) habitat, followed by Sandy Plains/Sand Dunes (2.5), Mountains/Hills (2.0), Gravel Plains (1.7), Dry Streambeds (1.3), and Clayey Plains (1.0). Similarly, the highest density of birds was also observed in Agricultural Areas/Date Palms habitat (42.0) followed by

Sandy Plains/Sand Dunes (4.0), Mountains/Hills (3.0), Gravel Plains (2.5), Dry Streambeds (1.3), and Clayey Plains (1.0) habitat in the Post-Monsoon 2022 Survey.

Exhibit 7.10 provides the abundance of bird species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey.

Exhibit 7.11 provides the graph of birds' abundance and richness by sampling location and habitat types the Northern Groundwater System study area in the Post-Monsoon 2022 Survey.

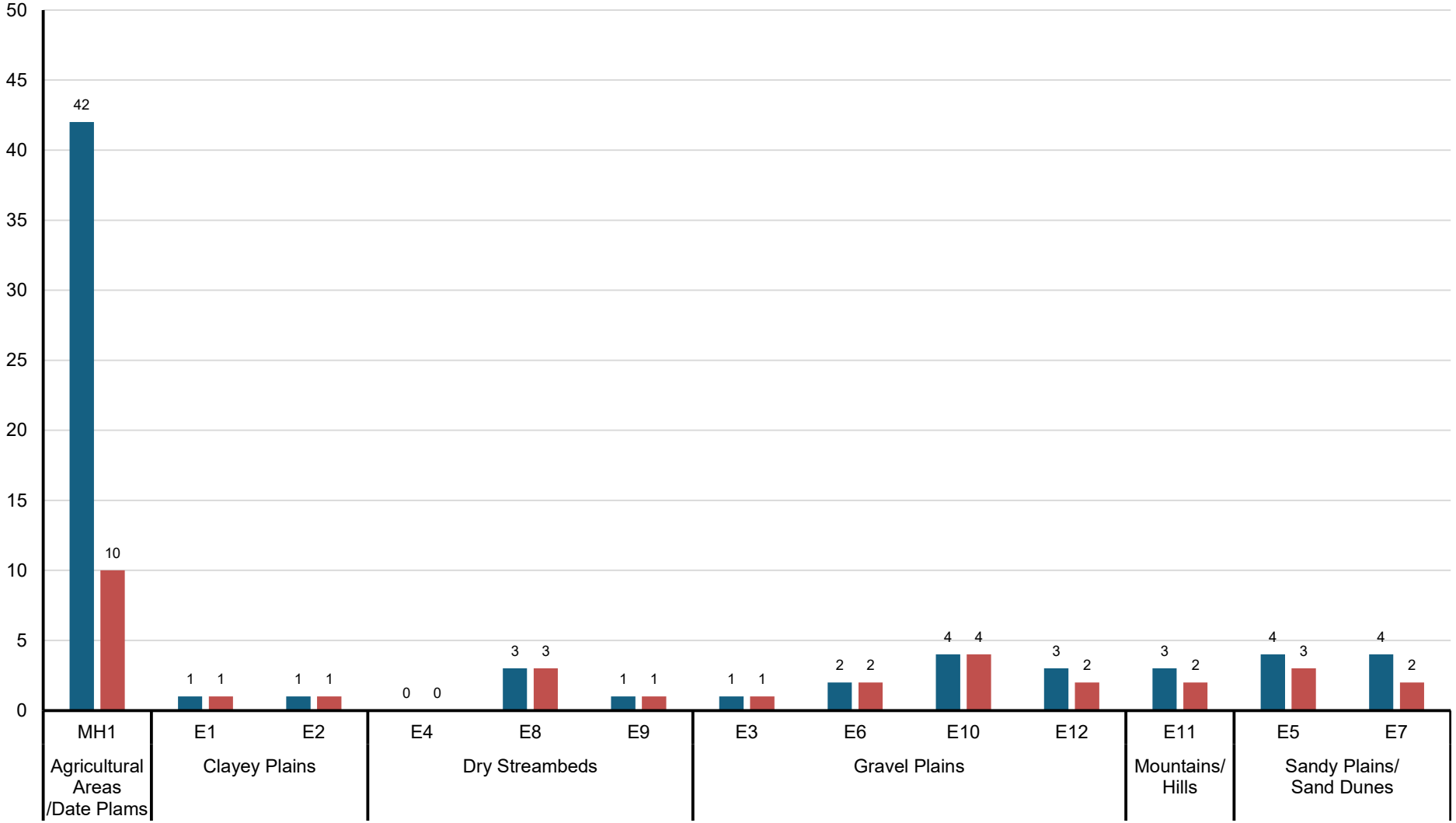
The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.10: Birds Species Observed in Different Habitats in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey

No.	*Common Names*	*Common Names*	*Habitat*						
			Dry Streambeds	*Sandy Plains/ Sand Dunes*	*Gravel Plains*	*Mountains/Hills*	*Clayey Plains*	*Agricultural Areas/Date Palms*	*Total*
1.	*Alaemon alaudipes*	Hoopoe Lark	0	1	0	0	0	0	**1**
2.	*Ammomanes cinctura*	Bar-tailed Lark	0	0	0	0	1	0	**1**
3.	*Ammomanes deserti*	Desert Lark	0	0	0	2	0	0	**2**
4.	*Buteo buteo*	Common Buzzard	0	0	1	0	0	0	**1**
5.	*Calandrella brachydactyla*	Greater Short-Toed Lark	1	2	1	0	0	0	**4**
6.	*Caprimulgus europaeus*	Eurasian Nightjar	0	0	0	1	0	0	**1**
7.	*Chlamydotis macqueenii*	Asian Houbara	0	0	0	0	1	0	**1**
8.	*Coracias garrulus*	Eurasian Roller	0	1	0	0	0	0	**1**
9.	*Corvus ruficollis*	Brown-necked Raven	0	0	2	0	0	0	**2**
10.	*Curruca nana*	Asian Desert Warbler	1	0	0	0	0	0	**1**
11.	*Ficedula parva*	Red-throated Flycatcher	0	0	0	0	0	1	**1**
12.	*Galerida cristata*	Crested Lark	1	0	2	0	0	1	**4**
13.	*Motacilla alba*	White Wagtail	0	0	1	0	0	1	**2**
14.	*Muscicapa striata*	Spotted Flycatcher	1	2	0	0	0	0	**3**
15.	*Neophron percnopterus*	Egyptian Vulture	0	0	2	0	0	0	**2**
16.	*Oriolus kundoo*	Indian Golden Oriole	0	0	0	0	0	11	**11**
17.	*Pastor roseus*	Rosy Starling	0	0	0	0	0	1	**1**
18.	*Ptyonoprogne rupestris*	Crag Martin	0	0	0	0	0	6	**6**
19.	*Pycnonotus leucotis*	White-eared Bulbul	0	0	0	0	0	8	**8**
20.	*Saxicola caprata*	Pied Bushchat	0	0	1	0	0	0	**1**

No.	*Common Names*	*Common Names*	*Habitat*						
			Dry Streambeds	*Sandy Plains/ Sand Dunes*	*Gravel Plains*	*Mountains/Hills*	*Clayey Plains*	*Agricultural Areas/Date Palms*	*Total*
21.	*Spilopelia senegalensis*	European Bee-eater	0	0	0	0	0	10	**10**
22.	*Streptopelia decaocto*	Laughing Dove	0	0	0	0	0	2	**2**
23.	*Sylvia curruca*	Lesser Whitethroat	0	2	0	0	0	1	**3**
Total Abundance			**4**	**8**	**10**	**3**	**2**	**42**	**69**
Total Richness			**4**	**5**	**7**	**2**	**2**	**10**	**23**

Exhibit 7.11: Bird's Abundance and Richness Observed in in Different Habitats in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey



Spring 2023 Survey

A total of 50 birds belonging to 17 species were observed in the Northern Groundwater System study area from 13 sampling locations in the Spring 2023 Survey. The most abundant bird species was the Hoopoe Lark (*Alaemon alaudipes*) with a total of 11 specimens, followed by Desert Lark (*Ammomanes deserti*) and Brown-necked Raven (*Corvus ruficollis*) (five specimens each), four specimens each for Eurasian Collared Dove (*Streptopelia decaocto*), European Roller (*Coracias garrulus*), and Red Vented Bulbul (*Pycnonotus cafer*), three specimens each for Asian Desert Warbler (*Sylvia nana*) Barn Swallow (*Hirundo rustica*) and White-eared Bulbul (*Pycnonotus leucotis*) observed.

The Clamorous Reed Warbler (*Acrocephalus stentoreus)*, Greater Short-toed Lark (*Calandrella brachydactyla)*, Hooded Wheatear (*Oenanthe monacha)*, Indian Golden Oriole (*Oriolus kundoo*), Mustached Warbler (*Acrocephalus melanopogon*), Rosy Starling (*Pastor roseus*), and Rufous-tailed Rock Thrush (*Monticola saxatilis*) were the rare species, with only one specimen each of these species observed. The highest abundance and richness of birds was observed in Agricultural Areas/Date Palms in te Kirtaka Hills area, with 23 specimens belonging to nine species.

In the Spring 2023 Survey, the highest average diversity (diversity per sampling location for each survey) of birds was observed in Agricultural Areas/Date Palms (9.0), followed by Mountains/Hills (5.0), Sandy Plains/Sand Dunes (2.0), Clayey Plains (1.0), Gravel Plains (0.7) and Dry Streambeds (0.5). Similarly, the highest average density (density per sampling location for each survey) of the bird species was observed in Agricultural Areas/Date Palms (23.0), Mountains/Hills (7.0), Clayey Plains (3.0), Sandy Plains/Sand Dunes (2.0), Gravel Plains (1.7), and Dry Streambeds (1.2).

Exhibit 7.12 provides the abundance of bird species observed in the Northern Groundwater System study area in the Spring 2023 Survey.

Exhibit 7.13 provides the graph of birds' abundance and richness by sampling location and habitat types in the Northern Groundwater System study area in the Spring 2023 Survey.

Access Route to Reko Diq Mine Site

A total of 10 bird species were observed within the surveyed area along the Access Route to Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey. Of these, eight species were observed in the Post-Monsoon 2022 Survey and four in the Spring 2023 Survey. Common bird species observed along the Access Route to the Reko Diq Mine Site include Greater Short-Toed Lark (*Calandrella brachydactyla*), Eurasian Roller (*Coracias garrulous)*, and Barn Swallow (*Hirundo rustica)*.

Exhibit 7.14 provides the list of bird species observed along the Access Route to Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.
Exhibit 7.15 provides the photographs of bird species observed along the Access Route to Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.12: Birds Species Observed in Different Habitats in the Northern Groundwater System study area in Spring 2023 Survey

No.	Scientific Names	Common Names	Habitat						Total
			Agricultural Areas/ Date Palms	Dry Streambeds	Mountains/Hills	Sandy Plains/Sand Dunes	Clayey Plains	Gravel Plains	
1	*Acrocephalus melanopogon*	Moustached Warbler	1	-	-	-	-	-	**1**
2	*Acrocephalus stentoreus*	Clamorous Reed Warbler	-	-	-	-	1	-	**1**
3	*Alaemon alaudipes*	Hoopoe Lark	5	-	-	1	5	-	**11**
4	*Ammomanes deserti*	Desert Lark	-	4	1	-	-	-	**5**
5	*Calandrella brachydactyla*	Greater Short-toed Lark	-	-	-	-	-	1	**1**
6	*Coracias garrulus*	European Roller	-	-	-	-	-	4	**4**
7	*Corvus ruficollis*	Brown-necked Raven	-	1	2	-	-	2	**5**
8	*Hirundo rustica*	Barn Swallow	3	-	-	-	-	-	**3**
9	*Monticola saxatilis*	Rufous-tailed Rock Thrush	-	-	1	-	-	-	**1**
10	*Oenanthe monacha*	Hooded Wheatear	-	-	1	-	-	-	**1**
11	*Oriolus kundoo*	Indian Golden Oriole	1	-	-	-	-	-	**1**
12	*Pastor roseus*	Rosy Starling	1	-	-	-	-	-	**1**
13	*Riparia chinensis*	Asian Plain Martin	-	-	-	1	-	-	**1**
14	*Pycnonotus cafer*	Red Vented Bulbul	4	-	-	-	-	-	**4**
15	*Pycnonotus leucotis*	White-eared Bulbul	3	-	-	-	-	-	**3**
16	*Streptopelia decaocto*	Eurasian Collared Dove	4	-	-	-	-	-	**4**
17	*Sylvia nana*	Asian Desert Warbler	1	-	2	-	-	-	**3**
Total Abundance			**23**	**5**	**7**	**2**	**6**	**7**	**50**
Total Richness			**9**	**2**	**5**	**2**	**2**	**3**	**17**

Exhibit 7.13: Bird Abundance and Richness Observed in Different Habitats in the Northern Groundwater System study area in Spring 2023 Survey

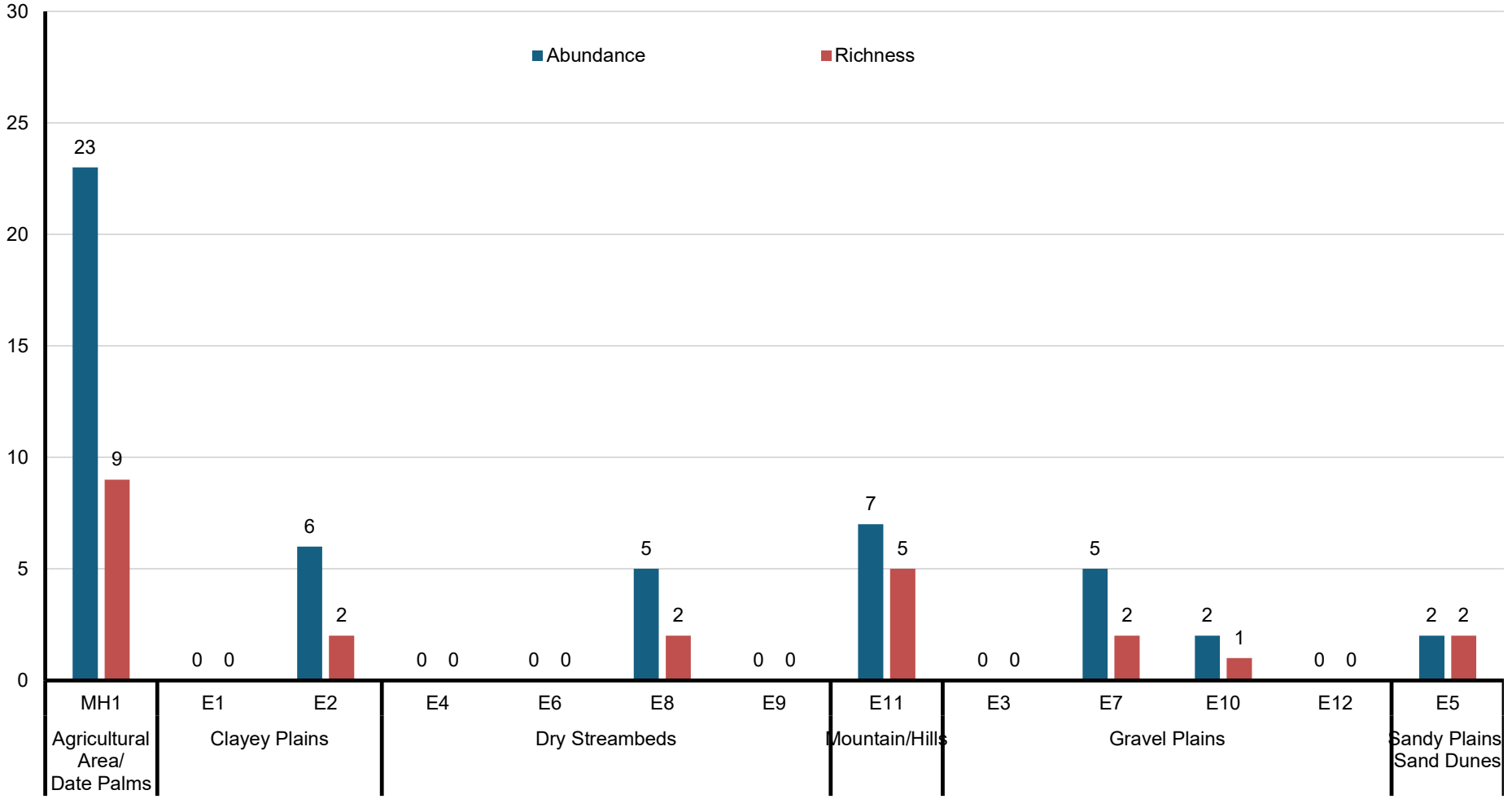


Exhibit 7.14: Birds' Species Observed in in Different Habitats along Access Route to Reko Diq Mine Site Study area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Feeding Habit*	*Major Food Items*	*Occurrence in Area*	*Global Population Trend*[133]	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
1	*Ammomanes cinctura*	Bar-tailed Lark	LC	-	Granivore/Insectivore	Seeds, insects	Year-round Resident	Decreasing	✓	-
2	*Alaemon alaudipes*	Hoopoe Lark	LC	-	Omnivore	Insects, seeds	Year-round Resident	Decreasing	✓	-
3	*Calandrella brachydactyla*	Greater Short-Toed Lark	LC	-	Granivore	Seeds, grains	Wintering	Unknown	✓	✓
4	*Caprimulgus europaeus*	Eurasian Nightjar	LC	-	Insectivore	Nocturnal flying insects	Summer Breeder	Decreasing	✓	-
5	*Cercotrichas galactotes*	Rufous-tailed Scrub Robin	LC	-	Insectivore	Insects, small fruits	Summer Breeder	Stable	✓	✓
6	*Corvus ruficollis*	Brown-necked Raven	LC	-	Omnivore	Insects, seeds, small animals	Year-round Resident	Increasing	✓	-
7	*Galerida cristata*	Crested Lark	LC	III	Granivore/Insectivore	Seeds, insects	Year-round Resident	Decreasing	✓	-
8	*Hirundo rustica*	Barn Swallow	LC	-	Insectivore	Flying insects	Summer Breeder	Decreasing	-	✓
9	*Oriolus kundoo*	Indian Golden Oriole	LC	-	Insectivore	Insects, small fruits	Not Available	Unknown	-	✓
10	*Porzana porzana*	Spotted Crake	LC	-	Insectivore/ Herbivore	Insects, aquatic plants	Passage migrant and Irregular year round Visitor	Stable	✓	-
Total									**8**	**4**

[133] International Union for Conservation of Nature (IUCN), https://www.iucnredlist.org, Accessed on August 26, 2024.

Exhibit 7.15: Bird's Species Observed in Different Habitats along Access Route to Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey and Spring 2023 Survey

a) Hoopoe Lark (*Alaemon alaudipes)*

b) Crested Lark (*Galerida cristata)*

Post-Monsoon 2022 Survey

A total of 34 bird specimens belonging to eight species were observed along the Access Route to the Reko Diq Mine Site study area from eight sampling locations. The most abundant bird species that was observed was the Greater Short-toed Lark (*Calandrella brachydactyla*), with a total of 26 specimens, followed by the Brown-necked Raven (*Corvus ruficollis*) (two specimens). The rest of the species were rare, with one specimen each observed during the Post-Monsoon 2022 Survey. The highest abundance of birds was observed in Mountain/Hills, with a total of 25 specimens belonging to one species, while the highest bird richness was observed in Gravel Plains, with a total of four species.

The highest diversity of birds was observed in Mountains/Hills (2.0), followed by Dry Streambeds and Gravel Plains (0.1 in each habitat), while the highest density of birds was observed in Mountains/Hills (25.0), followed by Gravel Plains (1.5) and Dry Streambeds (1.0) habitats.

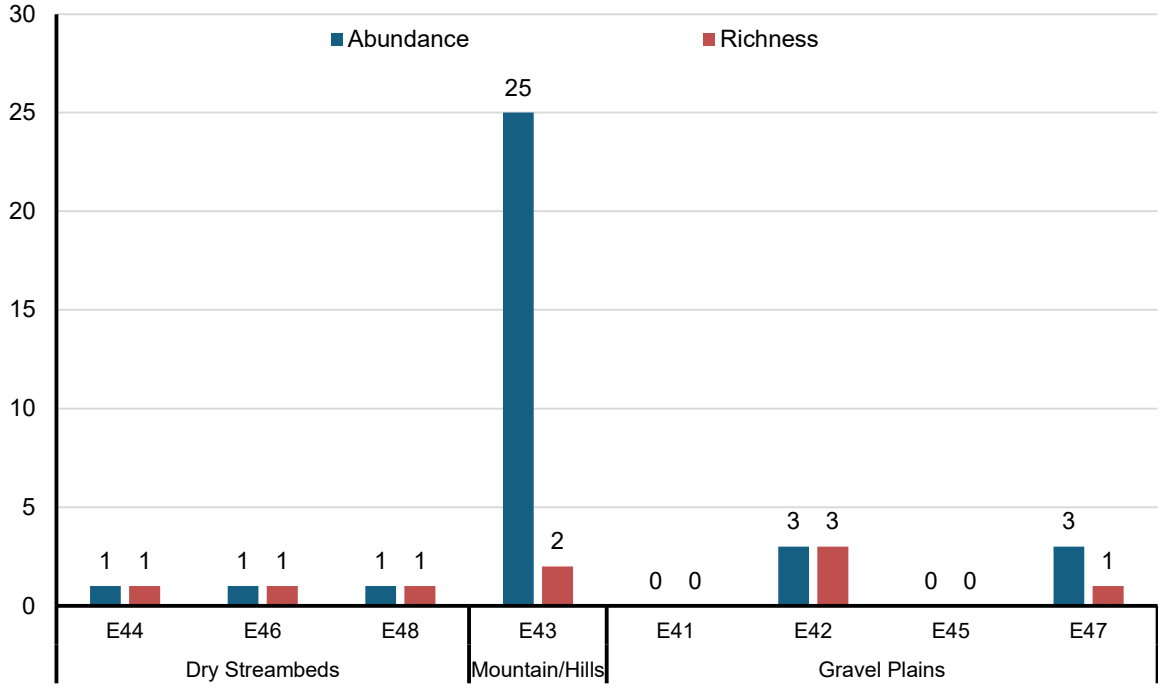
Exhibit 7.16 provides the abundance of bird species observed while **Exhibit 7.17** provides a graph for bird abundance and richness observed by sampling locations along the Access Route to the Reko Diq Mine Site study area.

The comparison of the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.16: Birds Species Observed in Different Habitats along Access Route to Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey

No.	*Scientific Names*	*Common Names*	*Habitat*			
			Mountain/Hills	*Dry Streambeds*	*Gravel Plains*	*Total*
1.	*Ammomanes cinctura*	Bar-tailed Lark	0	0	1	**1**
2.	*Corvus ruficollis*	Brown-necked Raven	2	0	0	**2**
3.	*Galerida cristata*	Crested Lark	0	1	0	**1**
4.	*Caprimulgus europaeus*	Eurasian Nightjar	0	1	0	**1**
5.	*Calandrella brachydactyla*	Greater Short-Toed Lark	23	0	3	**26**
6.	*Alaemon alaudipes*	Hoopoe Lark	0	1	0	**1**
7.	*Cercotrichas galactotes*	Rufous-tailed Scrub Robin	0	0	1	**1**
8.	*Porzana porzana*	Spotted Crake	0	0	1	**1**
Total Abundance			**25**	**3**	**6**	**34**
Total Richness			**2**	**3**	**4**	**8**

Exhibit 7.17: Bird Abundance and Richness Observed in Different Habitats along Access Route to Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey



Spring 2023 Survey

A total of four birds belonging to four species were observed along the Access Route to the Reko Diq Mine Site study area from eight sampling locations. The bird species observed during the Spring 2023 Survey include the Barn Sallow (*Hirundo rustica*), Greater Short-toed Lark (*Calandrella brachydactyla*), Indian Golden Oriole (*Oriolus kundoo*), and Rufous-tailed Scrub Robin (*Cercotrchas galactotes*).

During the Spring 2023 Survey, the highest average diversity (diversity per sampling location for each survey) and density were observed in Dry Streambeds (1.0), while no bird species was observed from Gravel Plains and Mountains/Hills during the Spring 2023 Survey.

Exhibit 7.18 provides the abundance of bird species observed along the Access Route to the Reko Diq Mine Site study area during the Spring 2023 Survey.

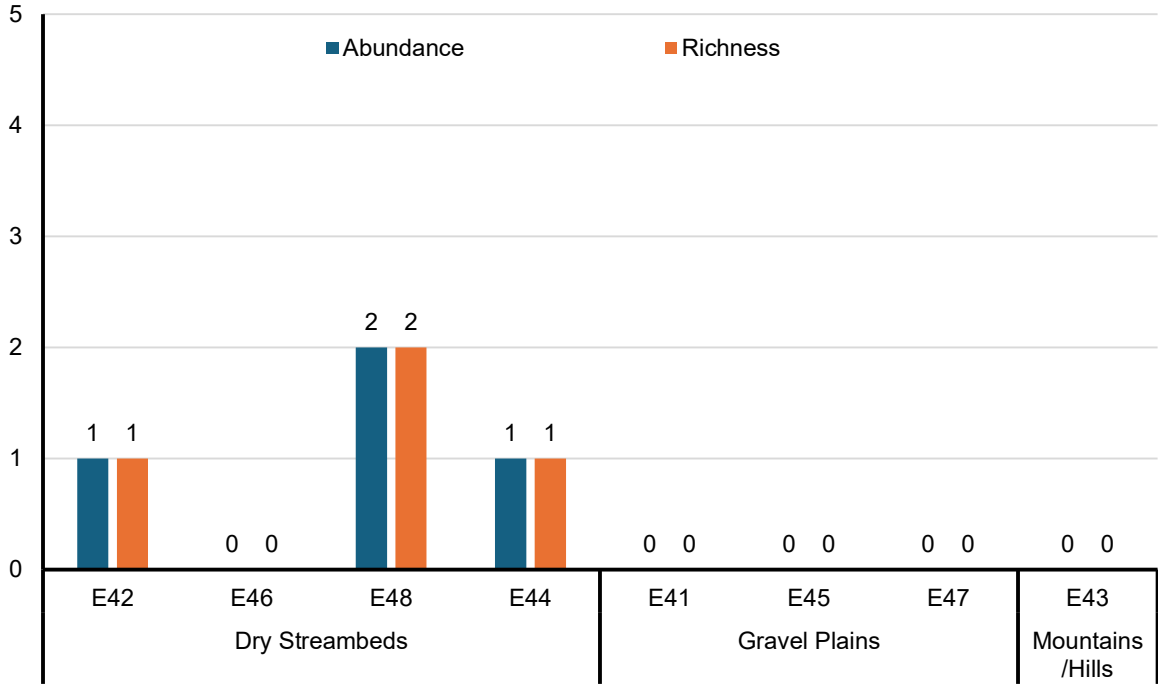
Exhibit 7.19 provides the graph of bird abundance and species richness observed by sampling location along Access Route to the Reko Diq Mine Site study area.

No sampling was conducted at the Access Route to Reko Diq Mine Site study area in the Previous Spring Survey, therefore, no comparison is provided.

Exhibit 7.18: Bird Species Observed in Different Habitats along Access Route to the Reko Diq Mine Site Study Area, Spring 2023 Survey

No.	*Scientific Names*	*Common Names*	*Habitat*			
			Dry Streambeds	*Mountain/Hills*	*Gravel Plains*	*Total*
1.	*Calandrella brachydactyla*	Greater Short-toed Lark	1	-	-	**1**
2.	*Cercotrchas galactotes*	Rufous-tailed Scrub Robin	1	-	-	**1**
3.	*Hirundo rustica*	Barn Swallow	1	-	-	**1**
4.	*Oriolus kundoo*	Indian Golden Oriole	1	-	-	**1**
Total Abundance			**4**	**-**	**-**	**4**
Total Richness			**4**	**-**	**-**	**4**

Exhibit 7.19: Bird Abundance and Richness Observed along Access Route to the Reko Diq Mine Site Study Area, Spring 2023 Survey



Port Qasim – Coastal Rail Transport Route Study Area

Post-Monsoon 2023 Survey

A total of 207 bird specimens belonging to 22 species were observed within the surveyed area from three sampling locations (T1, T2, and T3). The most abundant bird species observed was the Black-winged Stilt (*Himantopus himantopus*) with a total of 55 specimens, followed by Little Sint (*Calidris minuta*) (22 specimens), Red-wattled Lapwing (*Vanellus indicus)* (21 specimens) and Rock Pigeon (*Clumbia livia*) (19 speciemens). The least abundant bird species were Black Francolin (*Francolinus francolinus*), Grey Francolin (*Francolinus pondicerianus*) and Red Avadavat (*Amandava amandava)* with only one specimen each.

The highest average diversity (diversity per sampling location for each survey) of birds was observed in the Industrial Units (13.0), followed by Barren Land and Vegetation Cluster (9.0) in each habitat types. Similarly, the highest average density (density per sampling location for each survey) of birds was observed in the Industrial Units (143.0), followed by Barren Land (43.0) and Vegetation Cluster (21.0). The Industrial Units showed better diversity compared to other habitats as this area is located near the creeks, which provides abundant food sources like fish and invertebrates and shelter for bird species. In addition, creeks also serve as important migration routes and breeding grounds, further boosting bird populations.

During the Post-Monsoon 2023 Survey, seven unique bird species were observed in the Industrial Units, four each species were observed in Vegetation Cluster and Barren Land, that were not observed in any other habitat types.

Exhibit 7.20 provides the list of bird species observed in the Port Qasim study area in the Post-Monsoon 2023 Survey with IUCN Red List of Threatened Species status, CITES status, regional status, migratory status, food items, and occurrence in the area.

Exhibit 7.21 provides photographs of some bird species observed in the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.22 provides a list of bird species observed in different habitats in the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.23 provides the graph of bird abundance and richness by sampling locations observed in the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.20: Bird Species Observed in the Port Qasim Study Area in Post-Monsoon 2023 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Feeding Habit*	*Major Food Items*	*Occurrence in Area*	*Global Population Trend* [134]
1.	*Dicrurus macrocercus*	Black Drongo	Least Concern	-	Insectivorous	They feed mainly on insects such as grasshoppers, cicadas, termites, wasps, bees, ants, moths, beetles, and dragonflies	Year-round resident	Stable
2.	*Francolinus francolinus*	Black Francolin	Least Concern	-	Insectivorous	Aquatic insects, mollusks, crustaceans etc.	Resident	Stable
3.	*Milvus migrans*	Black Kite	Least Concern	II	Carnivorous	Feeds mainly on rodents, particularly the introduced House Mouse, Mus musculus, often following mouse plagues in agricultural areas.	Year-round resident	Stable
4.	*Himantopus himantopus*	Black-winged Stilt	Least Concern	-	Carnivorous	Mollusks, miniscule crustaceans, algae, flies, and aquatic insects	Year-round resident	-
5.	*Phylloscopus collybita*	Common Chiffchaff	Least Concern	-	Insectivorous	Insects and invertebrates	Summer breeders and winter visitor	-
6.	*Calidris ferruginea*	Curlew Sandpiper	Near Threatened	-	Omnivorous	Insects, crustaceans, mollusks, worms	-	Decreasing
7.	*Merops orientalis*	Green Bee-eater	Least Concern	-	Insectivorous	Large insects, small reptiles, rodents, and frogs	Summer breeders	Decreasing
8.	*Francolinus pondicerianus*	Grey Francolin	Least Concern	-	Insectivorous	Insects	Year-round resident and Summer Breeder	Stable
9.	*Corvus splendens*	House Crow	Least Concern	-	Insectivorous	Insects	Year-round resident	Increasing
10.	*Ardeola grayii*	Indian Pond Heron	Least Concern	-		-	-	Unknown
11.	*Saxicoloides fulicatus*	Indian Robin	Least Concern	-	Insectivorous/ Carnivorous	Insects and Reptiles	Year-round resident	Increasing
12.	*Ardea intermedia*	Intermediate Egret	Least Concern	-	Carnivorous	Aquatic animals, principally fish, and frogs	Year-round resident	-

[134] International Union for Conservation of Nature (IUCN), https://www.iucnredlist.org, Accessed on August 26, 2024.

No.	Scientific Name	Common Name	IUCN Status	CITES Status	Feeding Habit	Major Food Items	Occurrence in Area	Global Population Trend [134]
13.	*Egretta garzetta*	Little Egret	Least Concern	-	Insectivorous	Mainly insects, notably crickets, beetles (including weevils, scarabs, ladybirds), locustids, ants, firebugs, caterpillars, dragonflies	Year-round resident	Stable
14.	*Calidris minuta*	Little Stint	Least Concern	-	Insectivorous	Mainly invertebrates	Passage Migrant	-
15.	*Phylloscopus neglectus*	Plain Warbler	Least Concern	-	Insectivorous	feeds almost exclusively on insects, spiders, and other small arthropods	-	Stable
16.	*Cinnyris asiaticus*	Purple Sunbird	Least Concern	-	Nectarivore	mainly on nectar, although they will also take insects, especially when feeding young	Year-round resident	Stable
17.	*Amandava amandava*	Red Avadavat	Least Concern	-	Granivorous/ Insectivorous	Small grass seeds; occasionally insects, including termites (Isoptera).	-	Stable
18.	*Pycnonotus cafer*	Red Vented Bulbul	Least Concern	-	Carnivorous	Freshwater mollusks, spiders, snakes, annelid worms, beetles, larvae, grasshopper.	Year-round resident	Unknown
19.	*Vanellus indicus*	Red-wattled Lapwing	Least Concern	-	Granivorous/ Insectivorous	Seeds and Insects	Year-round resident	Stable
20.	*Columba livia*	Rock Pigeon	Least Concern	-	Granivorous	Mostly seeds	Year-round resident	-
21.	*Pycnonotus leucotis*	White Cheeked Bulbul	Least Concern	-	Fructivorous	Berries, seeds, buds, fruits	Resident	Decreasing
22.	*Vanellus malabaricus*	Yellow-wattled Lapwing	Least Concern	-	Insectivorous	Beetles, termites, and other invertebrates	Summer breeder	-

Exhibit 7.21: Photographs of Bird Species Observed in the Port Qasim Study Area in Post-Monsoon 2023 Survey

a) Green Bee-eater *(Merops orientalis)*

b) Red-wattled Lapwing *(Vanellus indicus)*

c) Little Egret *(Egretta garzetta)* and Indian Pond Heron *(Ardeola grayii)*

d) Rock Pigeon *(Columba livia)*

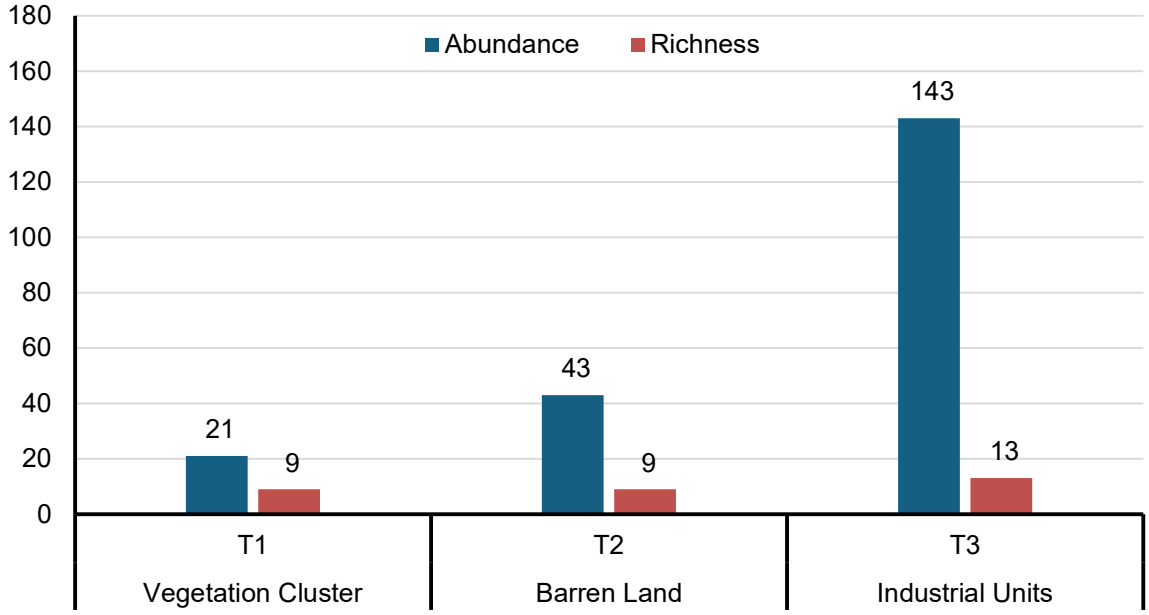
e) Black Kite *(Milvus migrans)*

f) Common Myna *(Acridotheres tristis)*

Exhibit 7.22: Birds Species by Habitat Types Observed in the Port Qasim Study Area in Post-Monsoon 2023 Survey

No.	Scientific Names	Common Names	Habitat			Total
			Barren Land	Vegetation Cluster	Industrial Units	
1	*Dicrurus macrocercus*	Black Drango	2	-	-	**2**
2	*Francolinus francolinus*	Black Francolin	-	-	1	**1**
3	*Milvus migrans*	Black Kite	1	2	1	**4**
4	*Himantopus himantopus*	Black-winged Stilt	-	-	55	**55**
5	*Phylloscopus collybita*	Common Chiffchaff	2	-	-	**2**
6	*Calidris ferruginea*	Curlew Sandpiper	-	-	6	**6**
7	*Merops orientalis*	Green Bee-eater	5	2	-	**7**
8	*Francolinus pondicerianus*	Grey Francolin	-	1	-	**1**
9	*Corvus splendens*	House Crow	-	3	3	**6**
10	*Ardeola grayii*	Indian Pond Heron	-	-	10	**10**
11	*Saxicoloides fulicatus*	Indian Robin	4	-	-	**4**
12	*Ardea intermedia*	Intermediate Egret	-	-	15	**15**
13	*Egretta garzetta*	Little Egret	-	-	12	**12**
14	*Calidris minuta*	Little Stint	-	-	22	**22**
15	*Phylloscopus neglectus*	Plain Warbler	-	3	-	**3**
16	*Cinnyris asiaticus*	Purple Sunbird	-	2	-	**2**
17	*Amandava amandava*	Red Avadavat	-	1	-	**1**
18	*Pycnonotus cafer*	Red Vented Bulbul	-	2	1	**3**
19	*Vanellus indicus*	Red-wattled Lapwing	18	-	3	**21**
20	*Columba livia*	Rock Pigeon	7	-	12	**19**
21	*Pycnonotus leucotis*	White Cheeked Bulbul	2	5	2	**9**
22	*Vanellus malabaricus*	Yellow-wattled Lapwing	2	-	-	**2**
Total			**43**	**21**	**143**	**207**

Exhibit 7.23: Bird's Abundance and Richness Observed in the Port Qasim Study Area in Post- Monsoon 2023 Survey



Conservation Concern Species of Birds

A total of three conservation concern bird species were observed in the baseline surveys (Post-Monsoon 2022, Spring 2023, and Post-Monsoon 2023).

Conservation Concern Species at Reko Diq Mine Site and Associated Infrastructure Study Area

Two species conservation 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 in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey. No conservation concern species, based on the IUCN Red List of Threatened Species, was observed at the Reko Diq Mine Site and along the Access Route to the Reko Diq Mine Site in these surveys. The National Red List data is not available for the avifauna species in Pakistan.

In addition to this, the Lesser Whitethroat *(Sylvia curruca),* observed at the Reko Diq Mine Site, is listed in Appendix III of CITES. The Common Buzzard *(Buteo buteo vulpinus)*, Asian Houbara Bustard *(Chlamydotis macqueenii)*, Crested Lark (*Galerida cristata*), and Egyptian Vulture *(Neophron percnopterus)* observed along Northern Groundwater System are listed in Appendix II, I, III, and II of CITES, respectively.

The IBAT report included 17 conservation concern species from the Reko Diq Mine Site and Associated Infrastructure study area, including one Critically Endangered, three Endangered, four Vulnerable, and nine Near Threatened species (see **Exhibit 6.1**). Sociable Lapwing (*Vanellus gregarious),* listed as Critically Endangered, is a migratory bird that prefers habitats with water bodies, usually lakes. Since surface water only occurs rarely and for short periods following heavy rainfall events, there is very little

probability of this species' occurrence in the area. Two species of conservation concern, the Egyptian Vulture and Asian Houbara Bustard were observed during baseline surveys in the Northern Groundwater System study area. No others were not observed and are considered unlikely to be present in the area. Additionally, species that prefer aquatic habitats, like the Dalmatian Pelican, Eurasian Curlew, and Eurasian Oystercatcher, are typically found in Pakistan's coastal regions away from the Project site. Similarly, raptor species reported by IBAT are also unlikely to be present due to the same reasons mentioned above.

Conservation Concern Species at Port Qasim

The Curlew Sandpiper (*Calidris ferruginea*), listed as Near Threatened in the IUCN Red List of Threatened Species, was observed along Port Qasim in the Post-Monsoon 2023 Survey. The Black Kite (*Milvus migrans*) was observed along Port Qasim is listed in Appendix II of CITES, respectively.

Similarly, two Endangered species, i.e., Great Knot (*Calidris tenuirostris*) and Black Bellied Tern (*Sterna acuticauda*), two Vulnerable species, i.e., Pochard (*Aythya ferina*) and River Tern (*Sterna aurantia*) and six Near Threatened Species are reported from Port Qasim.

The conservation concern Great Knot, Black Bellied Tern and River Tern could occasionally be seen in estuarine areas near Indus River mouth, but have preference for freshwater habitat, therefore, the likelihood of the Great Knot, Black Bellied Tern, Common Pochard, and River Tern being present at Port Qasim is low due to significant industrial activities, habitat modification, and pollution. While these species might occasionally visit during migration, particularly near the Indus River delta, the degraded and disturbed environment at the Port Qasim makes it unlikely for them to thrive or consistently be present.

Several conservation concern species reported in the literature review for the Reko Diq Mine Site and Associated Infrastructure study area as well as from Port Qasim, were not observed in the baseline surveys. These include one Endangered species, i.e., Steppe Eagle (*Aquila nepalensis*) and two Vulnerable species, i.e., Greater Spotted Eagle (*Aquila clanga*) and Imperial Eagle (*Aquila heliaca*). These are raptor species that feed on small mammals, reptiles, insects, and other bird species. Given the habitat conditions with stunted vegetation growth due to prolonged dry and drought seasons, prey species populations are low in the area. Therefore, it is very unlikely that these raptor species can exist in the area.

7.1.2 Mammals

A total of 12 species of mammals were observed (signs/sightings) in the Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024 surveys. Out of these, four species were recorded in Post-Monsoon 2022 Survey, five in Spring 2023 Survey, five in Post-Monsoon 2023 Survey and eight in Summer 2024 Survey from the Reko Diq Mine Site and Associated Infrastructure and Port Qasim study area.

Several conservation concern species were observed in the baseline surveys. These species include Goitered Gazelle Vulenrable in the IUCN Red List of Threatened Species and Critically Endangered in the National Red List of Mammals, Afghan Urial listed as

Vulnerable in IUCN Red List as well as in National Red List, and Sindh Ibex which is listed as Near Threatened in IUCN Red List as well as in National Red List. In addition, some nationally threatened species were observed which include Sand Cat which is listed as Critically Endangered in the National Red List of Mammals, Cape Hare, and Sand Fox are listed as Vulnerable in the National Red List of Mammals.

Exhibit 7.24 provides the list of mammal species observed in the Post-Monsoon 2022 , Spring 2023, Post-Monsoon 2023 and Summer 2024 surveys.

Exhibit 7.24: Mammal Species Observed (Signs/Sightings) in the Baseline Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*Year of Assessment*	*National Status*	*Survey Based Species*			
						Post-Monsoon 2022 Survey	*Spring 2023 Survey*	*Post-Monsoon 2023 Survey*	*Summer 2024 Survey*
1	*Canis aureus*	Asiatic Jackal	Least Concern	2018	Near Threatened	–	–	✓	✓
2	*Capra aegagrus blythi*	Sindh Ibex	Near Threatened	2020	Near Threatened	–	–	–	✓
3	*Felis margarita*	Sand Cat or Dune Cat	Least Concern	2014	Critically Endangered	✓	✓	–	–
4	*Funambulus pennantii*	Five–striped Palm Squirrel	Least Concern	2016	Least Concern	–	–	✓	–
5	*Gazella subgutturosa*	Goitred Gazelle	Vulnerable	2016	Critically Endangered	–	✓	–	✓
6	*Hystrix indica*	Indian Crested Porcupine	Least Concern	2016	Near Threatened	–	–	✓	✓
7	*Lepus capensis*	Cape Hare	Least Concern	2018	Vulnerable	✓	✓	✓	✓
8	*Ovis vignei cycloceros*	Afghan Urial	Vulnerable	2020	Vulnerable	–	–	–	✓
9	*Sus scrofa*	Wild Boar	Least Concern	2018	Least Concern	–	–	✓	–
10	*Vulpes rueppellii*	Sand Fox	Least Concern	2015	Vulnerable	✓	✓	–	✓
11	*Vulpes vulpes*	Red Fox	Least Concern	2016	Near Threatened	✓	✓	–	✓
12	*Vulpes vulpes montana*	Hill Fox	Least Concern	2016	Data Deficient	–	–	–	–
Total						**4**	**5**	**5**	**8**

Reko Diq Mine Site

A total of four mammalian species were observed within the surveyed area in the Post-Monsoon 2022 and Spring 2023 surveys. Of these, four species were observed in the Post-Monsoon 2022 Survey and three species during the Spring 2023 Survey.

Exhibit 7.25 provides the list of species observed at the Reko Diq Mine Site study area in Post-Monsoon 2022 Survey and Spring 2023 Survey. **Exhibit 7.26** provides some of the photographs of signs of mammalian species in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.25: Mammals Species Observed at the Reko Diq Mine Site Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*National Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
1	*Felis margarita*	Sand Cat	Least Concern	II	Critically Endangered	✓	✓
2	*Lepus capensis*	Cape Hare	Least Concern	-	Vulnerable	✓	✓
3	*Vulpes rueppellii*	Ruppell's Fox	Least Concern	-	Vulnerable	✓	-
4	*Vulpes vulpes*	Red Fox	Least Concern	III	Near Threatened	✓	✓
Total						**4**	**3**

Exhibit 7.26: Signs of Mammalian Species Observed at Reko Diq Mine Site, Post-Monsoon 2022 Survey and Spring 2023 Survey

a. Faecal Pellets of Cape Hare *Lepus capensis*

b. Pugmarks of Red Fox *Vulpes vulpes*

c. Scats of Sand Cat *Felis margarita*

Post-Monsoon 2022 Survey

In the Post-Monsoon 2022 Survey, a total of four mammalian species or signs of species were observed from 20 sampling locations. The species observed were the Cape Hare (*Lepus capensis*), Red Fox (*Vulpes vulpes*), Ruppell's Fox (*Vulpes rueppellii*), and Sand Cat (*Felis margarita*). The highest number of signs and sightings were observed in Gravel Plains (five signs), followed by Dry Streambeds (four signs/sightings) and Mountains/Hills (three signs). However, no sightings or signs were observed in Sandy Plains/Sand Dunes. The highest average diversity (diversity per sampling location for each survey) was observed in Mountains/Hills (0.6), followed by Gravel Plains (0.3) and Dry Streambeds (0.2), while the highest average density (density per sampling location for each survey) was observed in Dry Streambeds (0.7) followed by Gravel Plains (0.6) and Mountains/Hills (0.6). Dry Streambeds and Mountains/Hills are considered preferred habitats for mammals as they provide food and refuge due to the presence of vegetation and rocks in these habitats.

Exhibit 7.27 provides signs and sightings of mammal species by habitat type observed at the Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey.

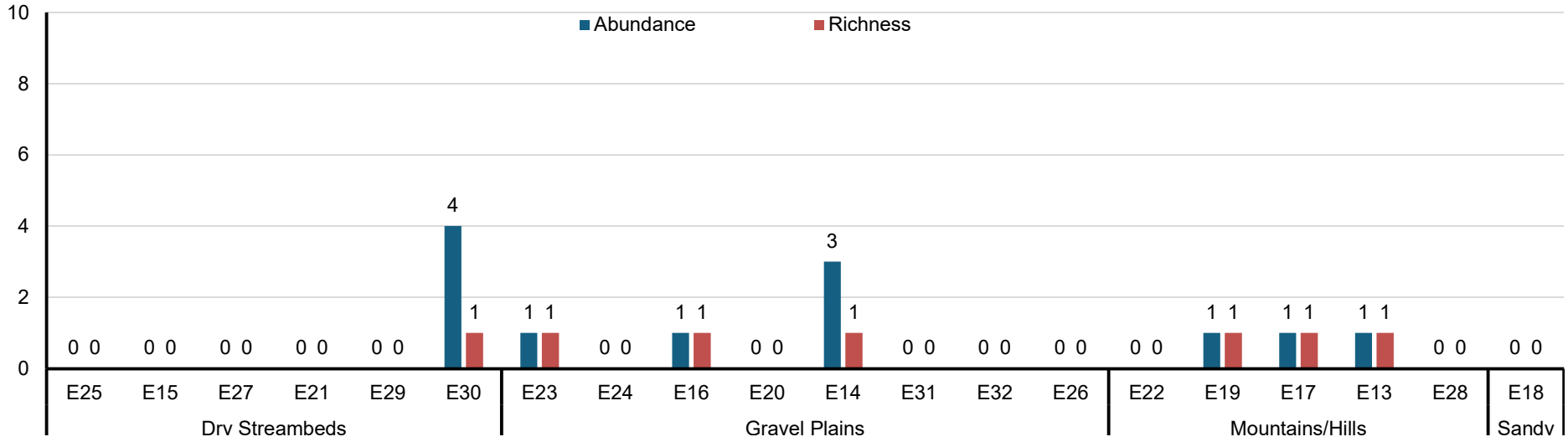
Exhibit 7.28 provides the graph of mammals' abundance and richness by sampling location observed at the Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.27: Mammal Signs and Sightings at Reko Diq Mine Site Study Area by Habitat Type Observed in Post-Monsoon 2022 Survey

No.	*Scientific Name*	*Common Name*	*Habitat*								*Total*
			Dry Streambeds		*Gravel Plains*		*Mountains/Hills*		*Sandy Plains/Sand Dunes*		
			Sightings	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*	
1	*Felis margarita*	Sand Cat	0	0	0	0	0	1	0	0	**1**
2	*Lepus capensis*	Cape Hare	0	0	0	0	0	1	0	0	**1**
3	*Vulpes rueppellii*	Ruppell's Fox	1	3	0	1	0	0	0	0	**5**
4	*Vulpes vulpes*	Red Fox	0	0	0	4	0	1	0	0	**5**
Total			**1**	**3**	**0**	**5**	**0**	**3**	**0**	**0**	**12**

Exhibit 7.28: Abundance and Richness of Mammals by Sampling Location Observed at the Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey



Spring 2023 Survey

No mammals were observed at the Reko Diq Mine Site study area during the Spring 2023 Survey, however, signs of the following three mammalian species were observed: Cape Hare (*Lepus capensis)*, Red Fox (*Vulpes vulpes)*, and Sand Cat (*Felis margarita)*. The highest number of signs were observed in the Mountains/Hills (five signs at Sampling Location E19 and three signs at Sampling Location E13). The highest average diversity (diversity per sampling location for each survey) was observed in Clayey Plains (1.0), followed by Mountains/Hills (0.6), Dry Streambeds (0.3), and Gravel Plains (0.1), while the highest average density (density per sampling location for each survey) was observed in Mountains/Hills (1.8), followed by Clayey Plains (1.0), Dry Streambeds (0.3) and Gravel Plains (0.1).

In the Spring 2023 Survey, two habitats, Clayey Plains and Mountains/Hills, appeared to be preferred habitats for mammals; this is because these habitats offer moderate food and potential shelter for mammals. The mountains protect from predators, extreme temperatures, and harsh desert conditions due to the availability of rocks and scattered vegetation, allowing mammals to find suitable sites for breeding, resting, and raising their young.

Exhibit 7.29 provides signs and sightings of mammal species by habitat type observed at the Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey.

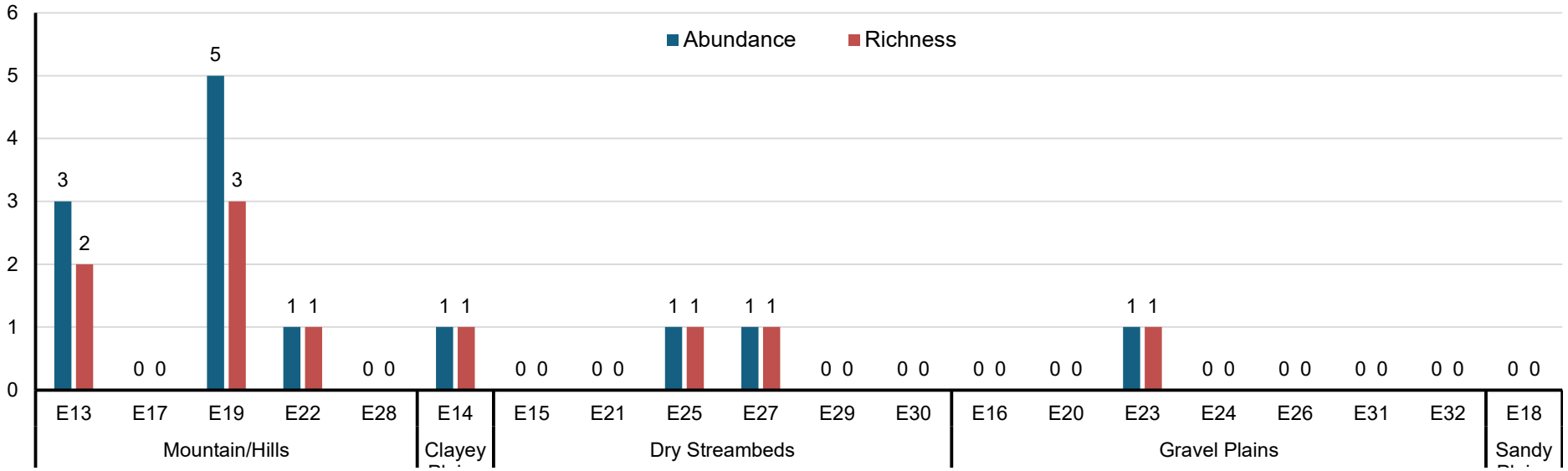
Exhibit 7.30 provides the graph of mammals' abundance and richness by sampling locations at the Reko Diq Mine Site study area in the Spring 2023 Survey.

The comparison of Spring 2023 Survey and Previous Spring Survey is provided in **Appendix H**.

Exhibit 7.29: Mammal Signs and Sightings at Reko Diq Mine Site Study Area by Habitat Type Observed in Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Habitat*									
			Clayey Plains		*Dry Streambeds*		*Gravel Plains*		*Mountain/Hills*		*Sandy Plains*	
			Sightings	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*
1	*Lepus capensis*	Cape Hare	-	-	-	1	-	-	-	6	-	-
2	*Vulpes vulpes*	Red Fox	-	-	-	1	-	1	-	2	-	-
3	*Felis margarita*	Sand Cat	-	1	-	-	-	-	-	1	-	-
Total			-	1	-	2	-	1	-	9	-	-

Exhibit 7.30: Abundance and Richness of Mammals by Sampling Location Observed at the Reko Diq Mine Site Study Area in Spring 2023 Survey



Summer 2024 Survey (Observations and Anecdotal Information)

A total of two species of large mammals were observed from Reko Diq Mine Site in Summer 2024 Survey. These species include Red Fox (*Vulpes vulpes*) and Ruppell's Fox (*Vulpes rueppellii*).

- The Red Fox (*Vulpes vulpes*) was observed at two locations: one north of the Tanjeel Ore Stockpile and the other in the agricultural areas near Humai (TP15).
- Ruppell's Fox (*Vulpes rueppellii*) was observed from the surroundings of the Airport.
- Both of these species were observed in nocturnal surveys as these species are strictly nocturnal.

Northern Groundwater System

A total of six mammalian species were observed within the surveyed area in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey. Of these, three species were observed in the Post-Monsoon 2022 Survey, and six species were observed in the Spring 2023 Survey. The mammal species observed in the Northern Groundwater System study area include Red Fox (*Vulpes vulpes),* Ruppell's Fox (*Vulpes rueppellii)*, Cape Hare (*Lepus capensis)*, and Sand Cat (*Felis margarita).*

Exhibit 7.31 provides a list of mammalian species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.32 provides photographs of signs of mammalian species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.31: Mammals Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*National Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
1	*Felis margarita*	Sand Cat	Least Concern	II	Critically Endangered	-	✓
2	*Gazella subgutturosa*	Goitered Gazelle	Vulnerable	III	Critically Endangered	-	✓
3	*Hemiechinus auritus*	Long Eared Hedgehog	Least Concern	-	Least Concern	-	✓
4	*Lepus capensis*	Cape Hare	Least Concern	-	Vulnerable	✓	✓
5	*Vulpes rueppellii*	Ruppell's Fox	Least Concern	-	Vulnerable	✓	✓
6	*Vulpes vulpes*	Red Fox	Least Concern	II	Near Threatened	✓	✓
Total						**3**	**6**

Exhibit 7.32: Signs of Mammalian Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey and Spring 2023 Survey

a) Scats of Sand Cat (Felis margarita)

b) Scats of Red Fox (Vulpes vulpes)

c) Pellets of Goitered Gazelle (Gazella subgutturosa)

d) Pellets of Cape Hare (Lepus capensis)

Post-Monsoon 2022 Survey

In the Post-Monsoon 2022 Survey, signs of three mammalian species were observed along the Northern Groundwater System. Signs were observed for species including the Cape Hare (*Lepus capensis*), Red Fox (*Vulpes vulpes*), and Ruppell's Fox (*Vulpes rueppellii*). Signs of mammalian species were only observed in Gravel Plains, Dry Streambeds, and Sandy Plains.

The highest diversity of mammals was observed in Gravel Plains (0.5) and Sandy Plains/Sand Dunes (0.5), followed by Dry Streambeds (0.3), while the highest density was observed in Sandy Plains/Sand Dunes (1.0) followed by Dry Streambeds (0.7) and Gravel Plains (0.5). However, no signs or sightings of mammalian species were observed in the Mountains/Hills, Agricultural Areas/Date Palms, and Clayey Plains habitat. This can be attributed to dry conditions, absence of food and shelter, disturbance due to livestock grazing, and the presence of security forces camps mainly in the Clayey Plains and Agricultural Areas/Date Palms habitats.

Exhibit 7.33 provides a list of mammal species by habitat type observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey.

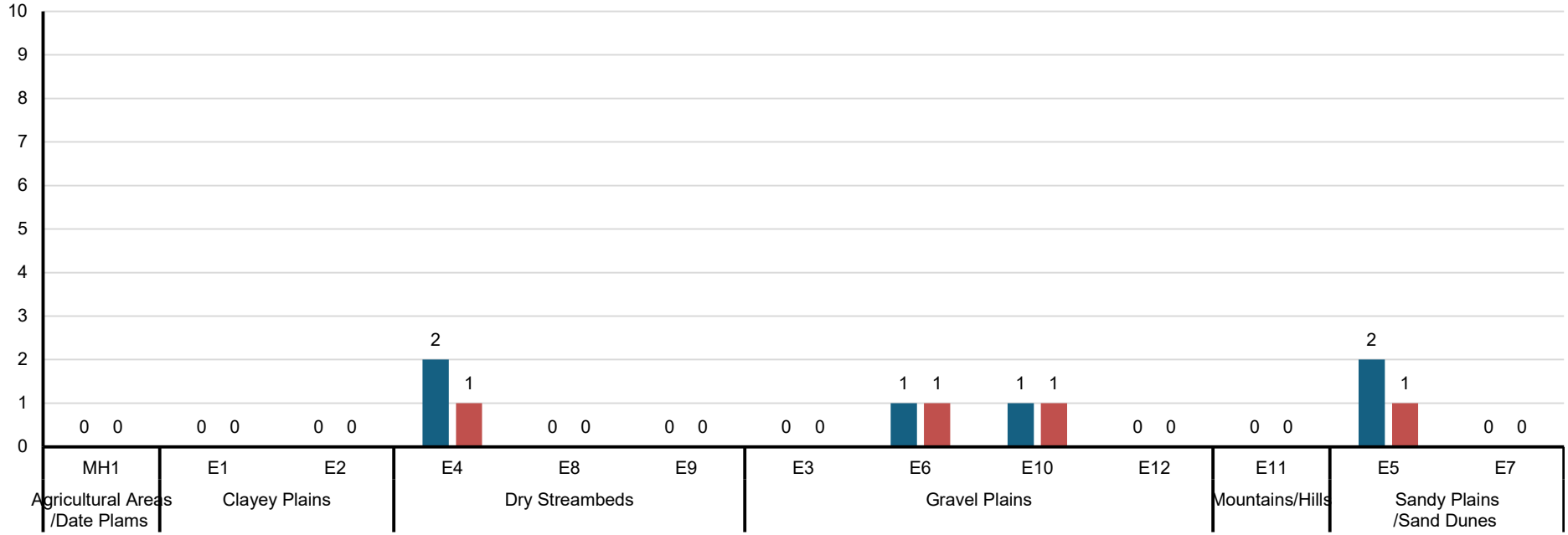
Exhibit 7.34 provides the graph of mammal abundance and richness by sampling locations observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.33: Mammals Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey

No	Common Name	Scientific Name	Habitat										Total
			Clayey Plains		Dry Streambeds		Gravel Plains		Mountains/Hills		Sandy Plains/Sand Dunes		
			Sightings	Signs	Sightings	Signs	Sightings	Signs	Sightings	Signs	Sightings	Signs	
1	Lepus capensis	Cape Hare	-	-	-	-	-	1	-	-	-	-	**1**
2	*Vulpes rueppellii*	Ruppell's Fox	-	-	-	2	-	-	-	-	-	-	**2**
3	*Vulpus vulpus*	Red Fox	-	-	-	-	-	1	-	-	-	2	**3**
Total			**-**	**-**	**-**	**2**	**-**	**1**	**-**	**-**	**-**	**2**	**5**

Exhibit 7.34: Mammals' Abundance and Richness by Sampling Location Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey



Spring 2023 Survey

In the Spring 2023 Survey, signs of six mammalian species were observed in the Northern Groundwater System study area. The species observed include the Cape Hare (*Lepus capensis)*, Red Fox (*Vulpes vulpes)*, Goitered Gazelle (*Gazella subgutturosa)*, Long-eared Hedgehog (*Hemiechinus auritus)*, Sand Cat (*Felis margarita),* and Ruppell's Fox (*Vulpes rueppellii)*. Signs of mammalian species were observed in all habitat types except the Clayey Plains habitat. This can be attributed to dry conditions, the absence of food and shelter, and higher grazing pressure in Clayey Plains.

The highest diversity of mammals was observed in Mountains/Hills (3.0), followed by Agricultural Areas/Date Palms (2.0), Sandy Plains/Sand Dunes (1.0), Dry Streambeds (0.8), and Gravel Plains (0.3). Similarly, the highest density was also observed in Mountains/Hills (4.0), followed by Agricultural Areas/Date Palms (2.0), Dry Streambeds (1.3), Sandy Plains/Sand Dunes (1.0), and Gravel Plains (0.8). The higher diversity and density in the Mountains/Hills can be attributed to the presence of vegetation due to the onset of spring, which attracts the mammalian species for feeding.

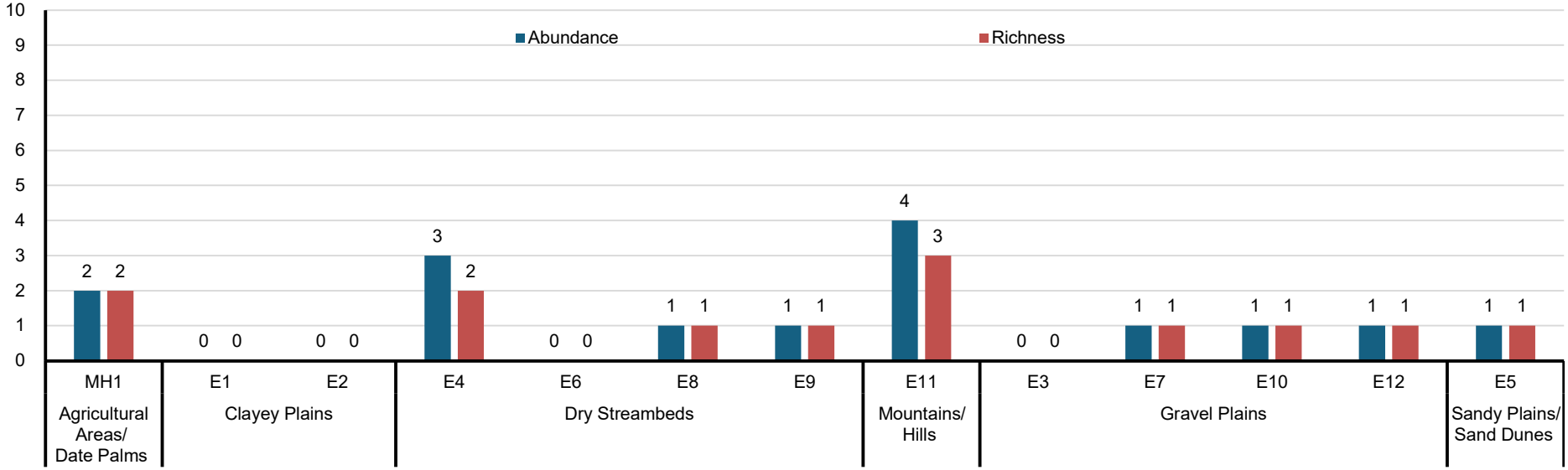
Exhibit 7.35 provides lists of mammal species by habitat type observed in the Northern Groundwater System study area in the Spring 2023 Survey.

Exhibit 7.36 provides the graph of mammal abundance and richness by sampling locations observed along the Northern Groundwater System study area in the Spring 2023 Survey.

Exhibit 7.35: Mammals Species Observed along Northern Groundwater System Study Area in Spring 2023 Survey

No.	Scientific Name	Common Name	Habitat												Total
			Clayey Plains		Dry Streambeds		Gravel Plains		Mountains/ Hills		Sandy Plains/Sand Dunes		Agricultural Areas/Date Palms		
			Sightings	Signs	Sightings	Signs	Sightings	Signs	Sightings	Signs	Sightings	Signs	Sightings	Signs	
1	*Lepus capensis*	Cape Hare	-	-	-	-	-	-	-	2	-	-	-	-	**2**
2	*Gazella subgutturosa*	Goitered Gazelle	-	-	-	2	-	-	-	-	-	-	-	-	**2**
3	*Hemiechinus auritus*	Long Eared Hedgehog	-	-	-	-	-	-	-	-	-	-	-	1	**1**
4	*Vulpes vulpes*	Red Fox	-	-	-	-	-	3	-	-	-	1	-	1	**5**
5	*Vulpes rueppellii*	Ruppel Fox	-	-	-	1	-	-	-	1	-	-	-	-	**2**
6	*Felis margarita*	Sand Cat	-	-	-	2	-	-	-	1	-	-	-	-	**3**
Total			**-**	**-**	**-**	**5**	**-**	**3**	**-**	**4**	**-**	**1**	**-**	**2**	**15**

Exhibit 7.36: Mammals' Abundance and Richness by Sampling Location Observed along Northern Groundwater System Study Area, Spring 2023 Survey



Summer 2024 Survey (Observations and Anecdotal Information)

A total of six species of large mammals were observed as well as reported by the locals from Northern Groundwater System. These species include Indian Crested Porcupine (*Hystrix indica*), Wild Goat (*Capra aegagrus*), Goitered Gazelle (*Gazella subgutturosa*), Asiatic Jackal (*Canis aureus*), Afghan Urial (*Ovis vignei cycloceros*), and Cape Hare (*Lepus capensis*).

- Quills of Indian Crested Porcupine (*Hystrix indica*) were observed from the Kachao and Tang Kachao settlements. Also, the locals reported the presence of this species.
- A dead specimen of Wild Goat (*Capra aegagrus*) was observed in the nullah near Kachao settlement. Also, a hybrid of Wild Goat and domestic goat was observed in Sarzai Settlement, where locals also reported the presence of this species in the mountainous range near the settlement.
- Goitered Gazelle (*Gazella subgutturosa*) was observed near Kirthika settlement and its presence is reported by locals in Sarzai settlement.
- A dead specimen of Asiatic Jackal (*Canis aureus*) was observed in a nullah at Tang Kachao settlement. Also, the locals reported the presence of this species in the area.
- Afghan Urial (*Ovis vignei cycloceros*), was observed near Tang Kachao settlement.
- Pallets of Cape Hare (*Lepus capensis*) was observed near Kachao settlement as well as the locals also reported the presence and hunting of this species in the area.
- Hunting of these ungulates species and Cape Hare was reported by locals.

Access Route to Reko Diq Mine Site

A total of three mammalian species were observed within the surveyed area along the Access Route to Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Spring 2023 Survey. Of these, two species were observed in the Post-Monsoon 2022 Survey, and three species were observed in the Spring 2023 Survey. Mammalian species observed include Red Fox (*Vulpes vulpes),* Cape Hare (*Lepus capensis)*, and Sand Cat (*Felis margarita).*

Exhibit 7.37 provides a list of mammalian species observed along the Access Route to Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.38 provides photographs of signs of mammalian species observed along the Access Route to Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.37: Mammals Species Observed along the Access Route to Reko Diq Mine Site Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*National Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*
1	*Felis margarita*	Sand Cat	Least Concern	II	Critically Endangered	-	✓
2	*Lepus capensis*	Cape Hare	Least Concern	-	Vulnerable	✓	✓
3	*Vulpes vulpes*	Red Fox	Least Concern	II	Near Threatened	✓	✓
Total						**2**	**3**

Exhibit 7.38: Signs of Mammalian Species Observed along the Access Route to Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey and Spring 2023 Survey

Pugmark and Scat of Canidae Family

Post-Monsoon 2022 Survey

During the Post-Monsoon 2022 Survey, signs of two mammalian species were observed from eight sampling locations located along the Access Route to the Reko Diq Mine Site study area. The species observed were the Cape Hare and Red Fox. Sampling was conducted in Gravel Plains, Dry Streambeds, and Mountain/Hills. Signs of mammalian species were only observed in Gravel Plains and Mountain/Hills.

The highest diversity of mammals was observed in Mountains/Hills (1.0), followed by Gravel Plains (0.3). Similarly, the highest density was also observed in Mountain/Hills (2.0), followed by Gravel Plains (0.3). However, no signs or sightings of mammalian species were observed in the Dry Streambed habitat. This can be attributed to dry conditions, absence of food and shelter, and disturbance due to frequent vehicle movement.

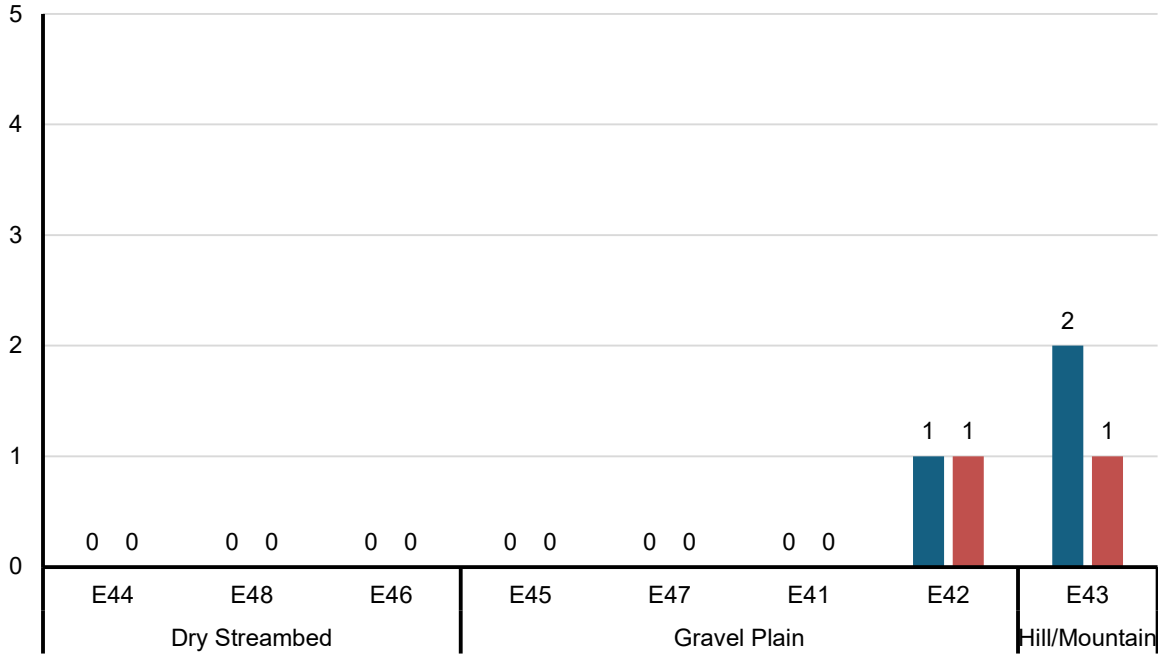
Exhibit 7.39 provides lists of mammal species by habitat type observed along the Access Route to the Reko Diq Mine Site study area during the Post-Monsoon 2022 Survey. **Exhibit 7.40** provides the graph of mammal abundance and richness by sampling locations.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.39: Mammal Species Observed along Access Route to the Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey

No.	Scientific Name	Common Name	Gravel Plain		Hill/Mountain		Dry Streambed		Total
			Sightings	Signs	Sightings	Signs	Sightings	Signs	
1.	*Lepus capensis*	Cape Hare	-	-	-	2	-	-	**2**
2.	*Vulpes vulpes*	Red Fox	-	1	-	-	-	-	**1**
Total			**-**	**1**	**-**	**2**	**-**	**-**	**3**

Exhibit 7.40: Mammal Abundance and Richness by Sampling Location Observed along Access Route to the Reko Diq Mine Site study area, Post-Monsoon 2022 Survey



Spring 2023 Survey

In the Spring 2023 Survey, signs of three mammalian species were observed from eight sampling locations located along the Access Route to the Reko Diq Mine Site study area. The species that were observed during the Spring 2023 Survey include the Cape Hare (*Lepus capensis)*, Red Fox (*Vulpes vulpes)*, and Sand Cat (*Felis margarita)*. Sampling was conducted in Gravel Plains, Dry Streambeds, and Mountain/Hills. Signs of mammalian species were observed in all habitat types except the Gravel Plains habitat. This can be attributed to dry conditions and the absence of food and shelter.

The highest diversity of mammals was observed in Mountain/Hills (1.0) followed by Dry Streambeds (0.6). Similarly, the highest density was also observed in Mountain/Hills (1.0), followed by Dry Streambeds (0.8).

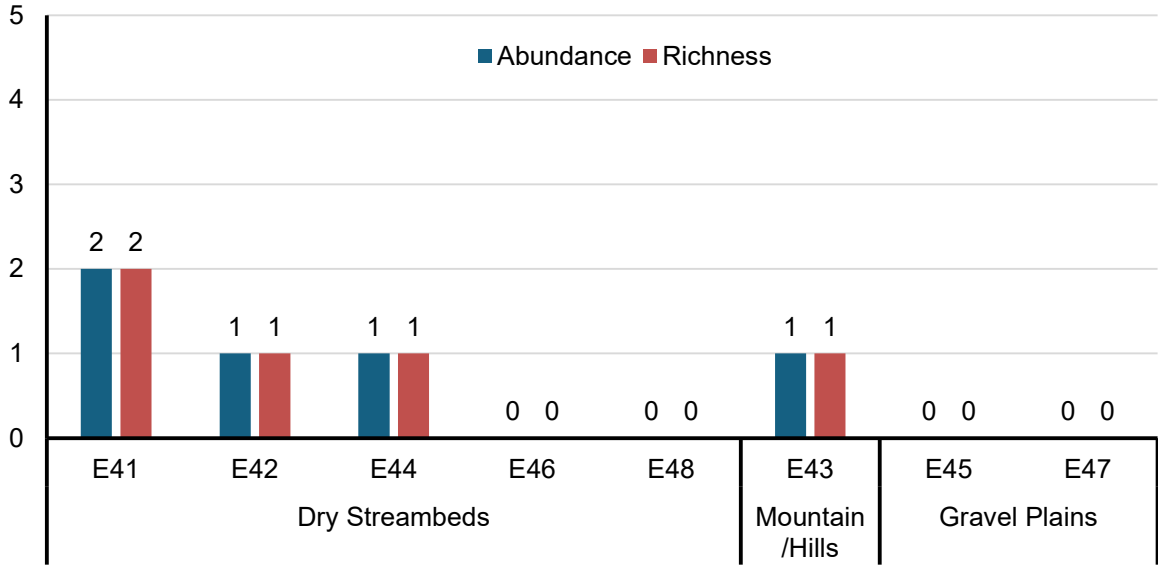
Exhibit 7.41 provides lists of mammals species by habitat type observed along the Access Route to the Reko Diq Mine Site study area.

Exhibit 7.42 provides the graph of mammals' abundance and richness by sampling locations observed along the Access Route to the Reko Diq Mine Site study area.

Exhibit 7.41: Mammals Species Observed along Access Route to the Reko Diq Mine Site Study Area, Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Habitat*						*Total*
			Dry Streambeds		*Gravel Plains*		*Mountain/Hills*		
			Sightings	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*	
1.	*Lepus capensis*	Cape Hare	-	1	-	-	-	1	**2**
2.	*Vulpes vulpes*	Red Fox	-	2	-	-	-	-	**2**
3.	*Felis margarita*	Sand Cat	-	1	-	-	-	-	**1**
Total			**-**	**4**	**-**	**-**	**-**	**1**	**5**

Exhibit 7.42: Mammal Abundance and Richness by Sampling Location Observed along Access Route to the Reko Diq Mine Site Study Area, Spring 2023 Survey



Zangi Nawar Game Reserve

Summer 2024 Survey (Observations and Anecdotal Information)

A total of six species of large mammals were observed/reported by the local wildlife experts. These species include Blanford's Fox (*Vulpes cana*), and Ruppell's Fox (*Vulpes rueppellii*), Cape Hare (*Lepus capensis*), Sand Cat (*Felis margarita*), Red Fox (*Vulpes vulpes*) and Indian Crested Porcupine (*Hystrix indica*).

- Quills of Indian Crested Porcupine (*Hystrix indica*) were observed from the Zangi Nawar Game Reserve area.
- Presence of Blanford's Fox (*Vulpes cana*), and Ruppell's Fox (*Vulpes rueppellii*), Cape Hare (*Lepus capensis*), Sand Cat (*Felis margarita*), and Red Fox (*Vulpes vulpes*) is reported by the local wildlife experts.

Port Qasim – Coastal Rail Transport Route Study Area

Post-Monsoon 2023 Survey

In the Post-Monsoon 2023 Survey, a total of six mammal species were observed within the surveyed area from three sampling locations (T1, T2 and T3) at Port Qasim. Signs of species including the Asiatic Jackal (*Canis aureus*), Cape Hare (*Lepus capensis*), Indian Crested Porcupine (*Hystrix indica*), Wild Boar (*Sus scrofa*), and Long-eared Desert Hedgehog (*Hemiechinus collaris*) were observed, while the Five-striped Palm Squirrel (*Funambulus pennantii*) was sighted in Vegetation Cluster habitat.

The highest number of signs were observed in Vegetation Cluster (12 signs and sightings), followed by Barren Land (two signs), and Industrial Units (one sign). The highest average diversity and density of mammalian species was observed in the Vegetation Cluster (6.0), followed by Barren Land (2.0) and Industrial Units (1.0). The diversity and density of mammal species observed in three habitats were same. The vegetation in these habitats provides essential food and refugia.

Exhibit 7.43 provides lists of mammal species along with their IUCN Red List of Threatened Species, CITES, and national status observed at Port Qasim Study Area in the Post-Monsoon 2023 Survey.

Exhibit 7.44 provides photographs of mammal signs and sightings observed at Port Qasim Study Area in the Post-Monsoon 2023 Survey.

Exhibit 7.45 provides signs and sightings of mammal species by habitat type observed at Port Qasim Study Area in the Post-Monsoon 2023 Survey.

Exhibit 7.46 provides the graph of mammal abundance and richness observed at Port Qasim Study Area in the Post-Monsoon 2023 Survey.

Exhibit 7.43: Mammal Species Observed at Port Qasim – Coastal Rail Transport Route Study Area in Post-Monsoon 2023 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*National Status*
1	*Canis aureus*	Asiatic Jackal	Least Concern	III	Near Threatened
2	*Funambulus pennantii*	Five-striped Palm Squirrel	Least Concern	-	Least Concern
3	*Hemiechinus collaris*	Long-eared Desert Hedgehog	Least Concern	-	Least Concern
4	*Hystrix indica*	Indian Crested Porcupine	Least Concern	-	Near Threatened
5	*Lepus capensis*	Cape Hare	Least Concern	-	Vulnerable
6	*Sus scrofa*	Wild Boar	Least Concern	-	Least Concern

Exhibit 7.44: Mammals Signs and Sightings Observed at Port Qasim – Coastal Rail Transport Route Study Area in Post-Monsoon 2023 Survey

a) Five-striped Palm Squirrel (*Funambulus pennantii*) sighted at Sampling Location T1

b) Scats of Asiatic Jackal (*Canis aureus)* observed at Sampling Location T2

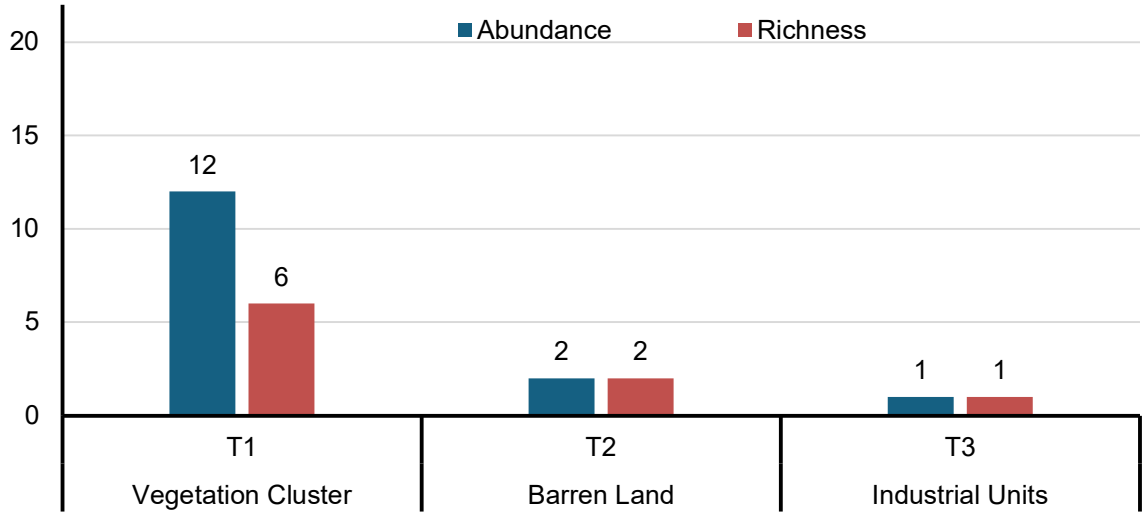
c) Small mammal dens observed at Sampling Location T1

d) Digging of Wild Boar (*Sus scrofa)* observed at Sampling Location T1

Exhibit 7.45: Mammals Signs and Sightings by Habitat Type Observed at Port Qasim Study Area in Post-Monsoon 2023 Survey

No.	*Scientific Name*	*Common Names*	*Habitat*					
			Vegetation Cluster		*Barren Land*		*Industrial Units*	
			Sightings	*Signs*	*Sightings*	*Signs*	*Sightings*	*Signs*
1	*Canis aureus*	Asiatic Jackal	-	2	-	1	-	1
2	*Lepus capensis*	Cape Hare	-	1	-	-	-	-
3	*Funambulus pennantii*	Five-striped Palm Squirrel	2	-	-	-	-	-
4	*Hystrix indica*	Indian Crested Porcupine	-	1	-	-	-	-
5	*Hemiechinus collaris*	Long-eared Desert Hedgehog	-	3	-	1	-	-
6	*Sus scrofa*	Wild Boar	-	3	-	1	-	-
Total			**2**	**10**	**-**	**2**	**-**	**1**

Exhibit 7.46: Abundance and Richness of Mammals Species Observed at Port Qasim Study Area in Post-Monsoon 2023 Survey



Conservation Concern Species of Mammals

Conservation Concern Species at Reko Diq Mine Site and Associated Infrastructure Study Area

The conservation concern species observed at Reko Diq Mine Site and Associated Infrastructure Study Area includes the Goitered Gazelle (*Gazella subgutturosa*) which is listed as Vulnerable in the IUCN Red List of Threatened Species. The signs of this species were observed at one sampling location in the the Northern Groundwater System study area in the Spring 2023 Survey.

The other species those were observed and are listed as conservation concern in the Pakistan Mammal Red List includes the Critically Endangered Sand Cat (*Felis margarita*), Vulnerable Cape Hare (*Lepus capensis*) and Ruppell's Fox (*Vulpes rueppellii*) and Near Threatened Red Fox (*Vulpes vulpes*) from Reko Diq Mine Site and Associated Infrastructure in Post-Monsoon 2022 and Spring 2023 surveys. The Sand Cat *(Felis margarita)*, Goitered Gazelle (*Gazella subgutturosa*), and Red Fox *(Vulpes vulpes)* observed from the Reko Diq Mine Site and Associated Infrastructure are listed in Appendix II, III, and III of CITES, respectively.

In addition, several conservation concern species reported in the literature review from the Reko Diq Mine Site and Associated Infrastructure and Port Qasim but were not observed in the baseline surveys. These include Vulnerable species, i.e., Afghan Urial (*Ovis vignei*), and Marbled Polecat (*Vormela peregusna*).

Afghan Urial (*Ovis vignei*) has a certain distribution in the Kirtaka mountains areas where hunting of this species was reported by locals. However, habitat modifications, prolonged dry and drought conditions, fencing along borders, and hunting have greatly reduced the distribution range of this species. This species is unlikely to occur in habitats found at the Reko Diq Mine Site and Associated Infrastructure.

Asiatic Cheetah (*Acinonyx jubatus*) was reported from Western Balochistan a couple of decades ago; however, currently, it survives only in Iran in areas adjoining Balochistan. This species was not even recorded from the Kirtaka mountains area in surveys conducted in the past, which is supposed to be the potential habitat for Asiatic Cheetah. The decline in the prey species and other habitat-related modifications, as discussed above, have greatly contributed to the local extirpation of this species.

The Asiatic Black Bear requires dense forests and mountainous areas, which are not present at this site According to IUCN, this species has extinct from the area.

The likelihood of the Vulnerable Marbled Polecat (*Vormela peregusna*) being present at the Reko Diq Mine Site is low due to unsuitable habitat conditions, the species' preference for more vegetated areas, and its distribution being on the fringes of the site. Despite being reported in regional literature, it was not observed during recent surveys, further suggesting its absence or rarity in the area.

One Near Threatened species, the Chiltan Markhor (*Capra falconeri chiltanensis*) is unlikely to be present at the Reko Diq Mine Site due to its preference for steep, rugged mountainous terrain with specific vegetation, such as juniper, wild olive, wild almond, and thorny bushes. This habitat is found in places like Hazarganji Chiltan National Park in Balochistan, where the species thrives on shrubs, herbs, and grasses, particularly *Pistacia khinjuk* (Shinay). The distance from its known range and the lack of suitable habitat conditions at Reko Diq further reduce the likelihood of its presence there.[135]

Similarly, both the Near Threatened Wild Goat (*Capra aegagrus*) and Striped Hyaena (*Hyaena hyaena*) have uncertain distributions in the area, and their presence is unlikely due to the lack of suitable habitat. These species generally prefer environments with more complex terrain and vegetation that are not characteristic of the Reko Diq area. However, the mountains in the Kirtaka and Kachao have the potential to host this species as the hunting of the Wild Goat is reported by local.

Three Vulnerable and two Near Threatened species are reported by IBAT for the Reko Diq Mine Site and Associated Infrastructure (see **Exhibit 6.2**). The Vulnerable species include the Asiatic Black Bear (*Ursus thibetanus*), Goitered Gazelle (*Gazella subgutturosa*) and Marbled Polecat (*Vormela peregusna*) while Wild Goat (*Capra aegagrus*) and Striped Hyaena (*Hyaena hyaena*) are listed as Near Threatened.

Conservation Concern Species at Port Qasim

The mammalian species which are observed at Port Qasim are the Cape Hare *(Lepus capensis),* Asiatic Jackal *(Canis aureus),* Indian Grey Mongoose *(Herpestes edwardsii)* and Indian Crested Porcupine *(Hystrix indica*). These species are listed as Least Concern in IUCN Red List of Threatened Species while, in Pakistan Mammals Red List Cape Hare is listed as Vulnerable, Asiatic Jackal and Indian Crested Porcupine are listed as Near Threatened. Of these, the Asiatic Jackal and Indian Grey Mongoose observed from the Port Qasim are both listed in Appendix III of CITES.

[135] Ahmad, S., Rehman, E. U., Ali, H., Din, N., Haider, J., Din, J. U., & Nawaz, M. A. (2022). Density pattern of flare-horned markhor (Capra falconeri) in northern Pakistan. Sustainability, 14(15), 9567.

According to IUCN Red List of Threatened Species, the Vulnerable Fishing Cat (*Prionailurus viverrinus*) and Near Threatened Fulvous Fruit Bat (*Rousettus leschenaultii*) species reported in the literature review from the Port Qasim but were not observed in the baseline surveys.

The Fishing Cat typically inhabits wetlands, mangroves, and areas near rivers or marshes. It relies heavily on water bodies for hunting and shelter. The industrial nature of Port Qasim has led to a loss of natural habitats, making it unlikely for the Fishing Cat to find the environment it needs for survival. While, the Fulvous Fruit Bat prefers roosting in caves, old buildings, and dense forests. It requires fruiting trees for feeding. The heavily modified landscape at Port Qasim, with reduced natural vegetation and fewer fruiting trees, is not conducive to supporting a population of Fulvous Fruit Bats.

7.1.3 Small Mammals

A total of nine species of small mammals were observed/captured in the baseline surveys. Out of these, one species was captured in Post-Monsoon 2022 Survey, two species in Spring 2023 Survey, one is Post-Monsoon 2023 Survey and eight in Summer 2024 Survey.

All the species observed/captured are least concern in the IUCN Red List of Threatened Species, however, Cheesman Gerbil is listed as Vulnerable in the National Red List of Mammals.

Exhibit 7.47 provide the list of small mammal species observed/captured in the Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024 surveys.

Exhibit 7.47: Small Mammal Species Observed/Captured in Baseline Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*Year Last Assessed*	*National Status*	*Survey Based Species*			
						Post-Monsoon 2022 Survey	*Spring 2023 Survey*	*Post-Monsoon 2023 Survey*	*Summer 2024 Survey*
1	*Gerbillus cheesmani*	Cheesman Gerbil	Least Concern	2016	Vulnerable	–	–	–	✓
2	*Gerbillus gleadowi*	Indian Hairy Footed Gerbil	Least Concern	2016	Near Threatened	–	–	–	✓
3	*Gerbillus nanus*	Dwarf Gerbil	Least Concern	2016	Near Threatened	–	–	–	✓
4	*Hemiechinus auritus*	Long Eared Hedgehog	Least Concern	2016	Least Concern	–	✓	–	✓
5	*Hemiechinus collaris*	Long-eared Desert Hedgehog	Least Concern	2016	Least Concern	–	–	✓	–
6	*Meriones crassus*	Sundevall's Jird	Least Concern	2016	Near Threatened	–	–	–	✓
7	*Meriones persicus*	Persian Jird	Least Concern	2016	Least Concern	–	–	–	✓
8	*Mus booduga*	Little Indian Field Mouse	Least Concern	2016	Least Concern	–	–	–	✓
9	*Rhombomys opimus*	Great Gerbil	Least Concern	2016	Near Threatened	✓	✓	–	✓
Total						**1**	**2**	**1**	**8**

Reko Diq Mine Site

A total of four species of small mammals were captured from the Reko Diq Mine Site in Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys. Out of these, only one species of small mammals, i.e., Great Gerbil (*Rhombomys opimus),* was captured within the surveyed area at the Reko Diq Mine Site study area in the Post-Monsoon 2022 and Spring 2023 surveys, whereas, four species were captured in Summer 2024 Survey.

Comparison for the small mammals is only given for the Post-Monsoon 2022 Survey with Previous Post-Monsoon Surveys. Sampling for small mammals was not conducted in Previous Spring Surveys; therefore, a comparison between Spring 2023 Survey and the Previous Spring Survey is not given.

Exhibit 7.48 provides a list of small mammals species captured at Reko Diq Mine Site in Post-Monsoon 2022, Spring 2023, and Summer 2024 surveys.

Exhibit 7.49 provides photographs of species captured at the Reko Diq Mine Site study area in Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys.

Exhibit 7.48: Small Mammals captured at Reko Diq Mine Site in Post-Monsoon 2022, Spring 2023 and Summer 2024 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*	*Summer 2024 Survey*
1	*Gerbillus nanus*	Dwarf Gerbil	Least Concern	Near Threatened			✓
2	*Hemiechinus auritus*	Long-eared Hedgehog	Least Concern	Least Concern			✓
3	*Rhombomys opimus*	Great Gerbil	Least Concern	Near Threatened	✓	✓	✓
4	*Meriones crassus*	Sundevall's Jird	Least Concern	Near Threatened			✓
Total					**1**	**1**	**4**

Exhibit 7.49: Small Mammals Species Captured at Reko Diq Mine Site in Post-Monsoon 2022 Survey, Spring 2023 Survey and Summer 2024 Survey

a) Baluchistan Pygmy Jerboa (*Salpingotulus Michaelis*)

b) Small Five-Toed Jerboa (*Allactaga elater*)

c) Little Indian Field Mouse (*Mus booduga*)

d) House Mouse (*Mus musculas*)

e) Great Gerbil (*Rhombomys opimus*)

Post-Monsoon 2022 Survey

In the Post-Monsoon 2022 Survey, trapping was conducted at a total of four sampling locations at the Reko Diq Mine Site. A total of seven specimens of Great Gerbil (*Rhombomys opimus)* were captured from the Reko Diq Mine Site study area which includes five specimens from Sampling Location BM3 and two specimens from Sampling Location BM4.

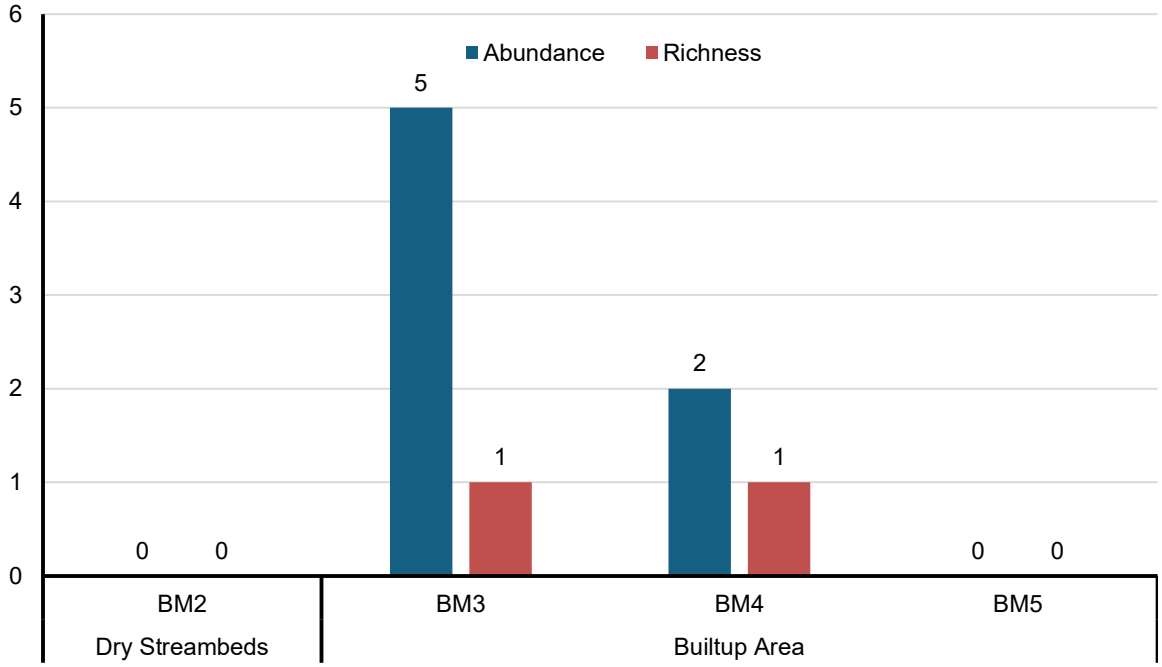
In the Post-Monsoon 2022 Survey, small mammals were only captured from the Built-up Area (near to human habitation). The small mammals are typically herbivores, but can alter their nature of food and habitat if usual food sources are not available. Therefore, their abundance was high near the Built-up Area where they feed on different waste food that was disposed of by humans near that area.

As a secondary consumer, small mammals have a significant role in ecological niches and are a primary food source for a broad range of predators. Therefore, it is possible that the occurrence of large mammals in the area that feed on these species influenced the population of these species. Additionally, the dry conditions in the area contribute to insufficient food availability for small mammals, potentially leading to lower diversity in the region.

Exhibit 7.50 provides the abundance and richness of small mammals captured at the Reko Diq Mine Site Study Area in the Post-Monsoon 2022 Survey.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.50: Abundance and Richness of Small Mammals at Reko Diq Mine Site in Post-Monsoon 2022 Survey



Spring 2023 Survey

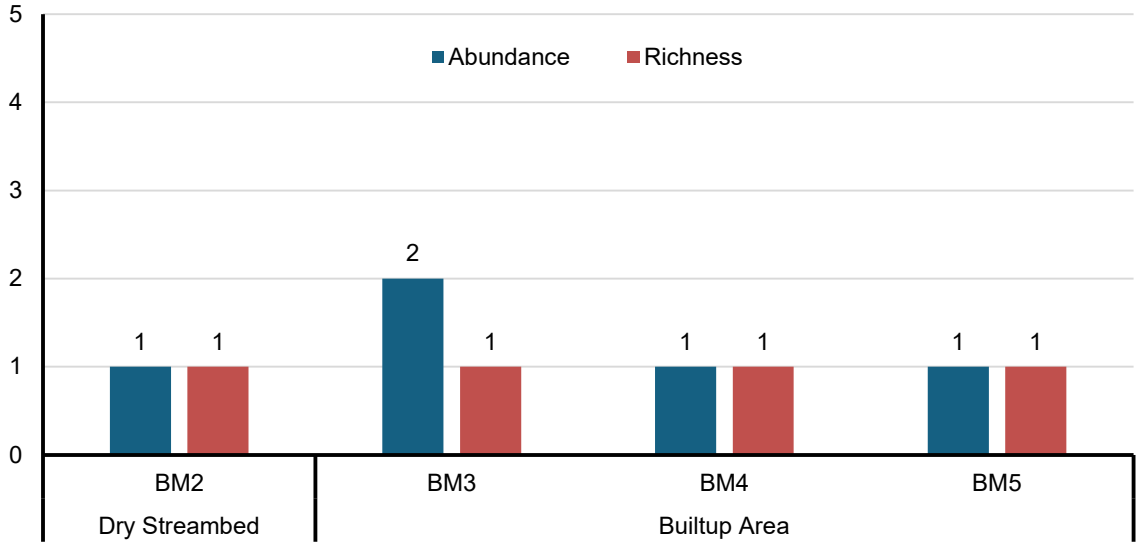
During the Spring 2023 Survey, Sherman traps were set at four sampling locations at the Reko Diq Mine Site study area. A total of five specimens of Great Gerbil (*Rhombomys opimus)* were captured which included two specimens from Sampling Location BM3 and one specimen each from sampling locations BM2, BM4 and BM5.

In Spring 2023 Survey, four specimens of small mammals were captured from Built-up Area habitat and one specimen was captured from Dry Streambed habitat. Dry Streambed provides a conducive habitat to the small mammalian species as they are primarily herbivores, however, due to lack of plant sources, they can change their diet habit.

Exhibit 7.51 provides the abundance and richness of small mammals captured at the Reko Diq Mine Site in the Spring 2023 Survey.

The comparison of Spring 2023 Survey and Previous Spring Survey is provided in **Appendix H**.

Exhibit 7.51: Abundance and Richness of Small Mammals at the Reko Diq Mine Site in Spring 2023 Survey



Summer 2024 Survey

A total of four species of small mammals were captured/observed at the Reko Diq Mine Site in the Summer 2024 Surveys through Sherman traps and nocturnal surveys. Of these, three species were captured using the Sherman trapping, while three species were observed during the nocturnal surveys.

Exhibit 7.52 provides the list of small species captured/observed at Reko Diq Mine Site through Sherman trapping and nocturnal surveys in Summer 2024 Survey.

Exhibit 7.52: Small Mammals Species Captured/Observed at Reko Diq Mine Site, Summer 2024 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*	*Reko Diq Mine Site*	
					Sherman Trapping	*Nocturnal Survey*
1	*Gerbillus nanus*	Dwarf Gerbil	Least Concern	Near Threatened	-	✓
2	*Hemiechinus auritus*	Long-eared Hedgehog	Least Concern	Least Concern	✓	-
3	*Rhombomys opimus*	Great Gerbil	Least Concern	Near Threatened	✓	✓
4	*Meriones crassus*	Sundevall's Jird	Least Concern	Near Threatened	✓	✓
Total					**3**	**3**

Sherman Trapping

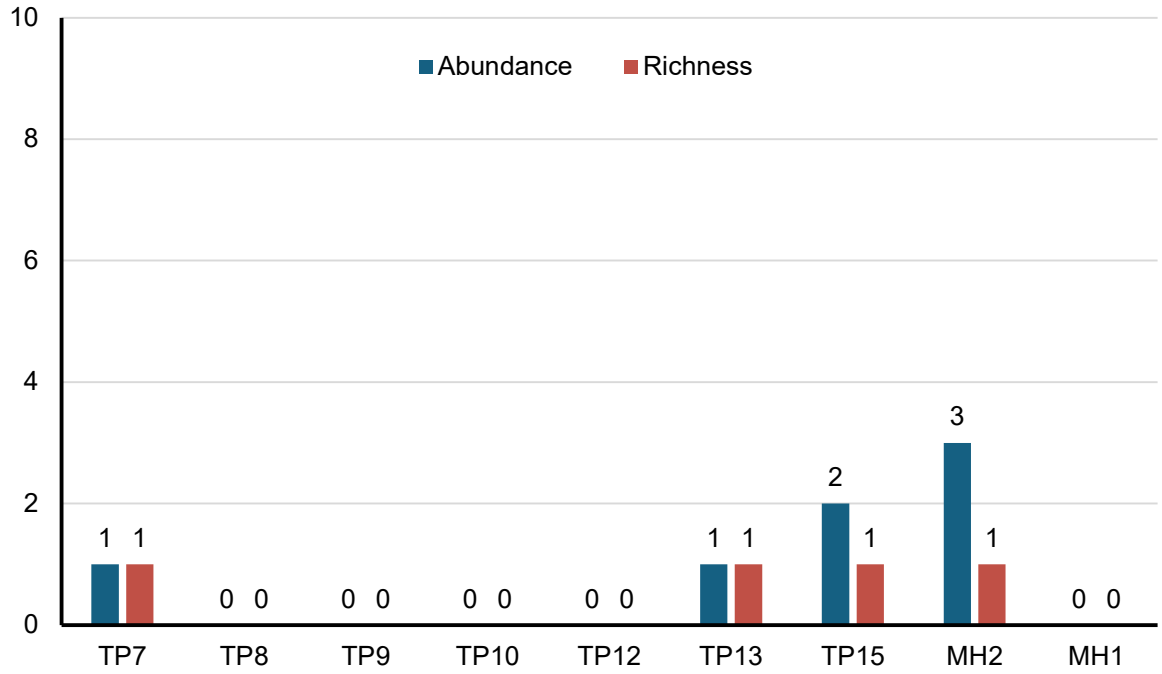
In the Summer 2024 Survey, Sherman trapping was conducted at a total of nine sampling locations at the Reko Diq Mine Site. A total of seven specimens of three species were

captured which include Long-eared Hedgehog (*Hemiechinus auratus*), Great Gerbil (*Rhombomys opimus*), and Sundevall's Jird (*Meriones crassus*). The highest abundance (three specimens of one species) of small mammals' species was recorded at Sampling Location MH2 located in the Built-up Area (Camp Site).

The habitats at the Reko Diq Mine Site are predominantly arid, characterized by minimal vegetation, limited shelter, and scarce food resources, which makes it a challenging environment for small mammal species. These species, however, have adapted to survive in this harsh terrain. Small mammals were captured from a variety of habitats within the Study Area, including Built-up Areas, Agricultural Areas, and Sandy Plains/Sand Dunes. The Built-up Areas may offer some additional shelter and foraging opportunities due to human structures, while Agricultural Areas could provide seasonal vegetation and water resources. In contrast, the Sandy Plains/Sand Dunes, being more exposed and barren, provide few resources, yet still support a resilient population of small mammals adapted to this extreme environment.

Exhibit 7.53 provides the abundance and richness of small mammals captured at the Reko Diq Mine Site in the Summer 2024 Survey.

Exhibit 7.53: Abundance and Richness of Small Mammals Captured at Reko Diq Mine Site in Summer 2024 Survey

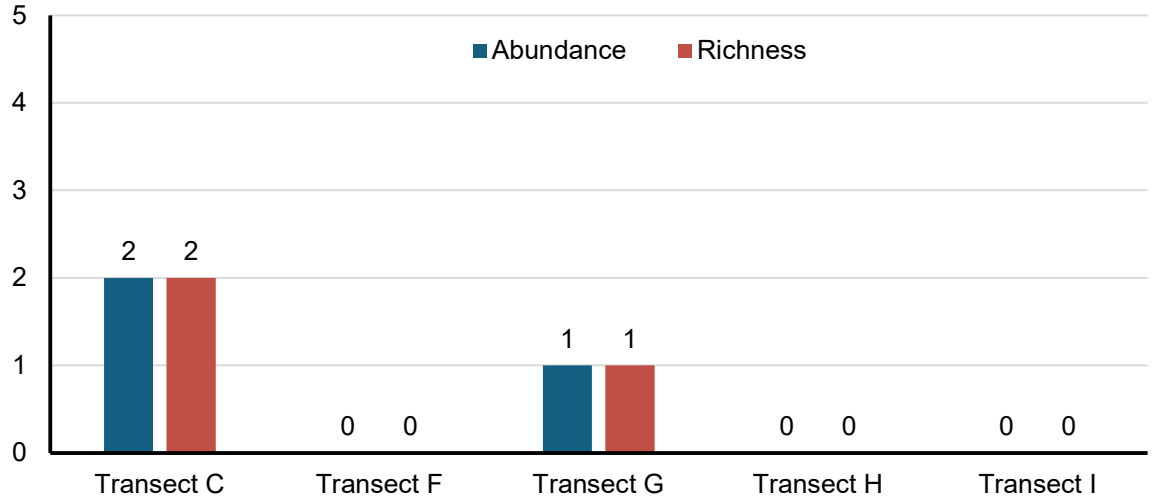


Nocturnal Survey

A total of three specimens of three species were observed along the five transects taken at Reko Diq Mine Site in Summer 2024 Survey. These species include Dwarf Gerbil (Gerbillus nanus), Great Gerbil (*Rhombomys opimus*), and Sundevall's Jird (*Meriones crassus*). The highest abundance (two specimens) and richness (two species) of small mammals were observed along the Transect C located near the Reko Diq Airport Area.

Exhibit 7.54 provides abundance and richness of small mammal's species observed in nocturnal surveys at Reko Diq Mine Site.

Exhibit 7.54: Abundance and Richness of Small Mammals Species Observed at Reko Diq Mine Site in Summer 2024 Survey



Northern Groundwater System

A total of four species of small mammals were captured along the Northern Groundwater System study area in Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys. Out of these, one species was captured in Spring 2023 and four species were captured in Summer 2024 surveys. However, no specimen of any species was captured in Post-Monsoon 2022 Survey.

Exhibit 7.55 provide list of small mammals species captured along the Northern Groundwater System in Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys along with the national and IUCN status.

Exhibit 7.55: Small Mammals Species Captured Along the Northern Groundwater System in Post-Monsoon 2022, Spring 2023 and Summer 2024 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*	*Summer 2024 Survey*
1	*Gerbillus cheesmani*	Cheesman's Gerbil	Least Concern	Vulnerable	-	-	✓
2	*Gerbillus gleadowi*	Indian Hairy-footed Gerbil	Least Concern	Near Threatened	-	-	✓
3	*Rhombomys opimus*	Great Gerbil	Least Concern	Near Threatened	-	✓	✓
4	*Meriones persicus*	Persian Jird	Least Concern	Least Concern	-	-	✓
Total					**0**	**1**	**4**

Post-Monsoon 2022 Survey

No specimens of any small mammals species were captured in the Post-Monson 2022 Survey. Therefore, the comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is not provided.

Spring 2023 Survey

Five specimens of one species i.e., Great Gerbil (*Rhombomys opimus)* were captured in the Spring 2023 Survey from one sampling location located within the Sandy Plains/ Sand Dunes habitat.

Summer 2024 Survey

In Summer 2024 Survey, trapping was conducted at total of six sampling locations along the Northern Groundwater System. A total of seven specimens of four species were captured through Sherman trapping method. None of the species was observed in the nocturnal surveys along the Northern Groundwater System.

Exhibit 7.56 provides the list of small species captured along the Northern Groundwater System through Sherman trapping in Summer 2024 Survey.

Exhibit 7.56: Small Mammals Species Captured along the Northern Groundwater System in Summer 2024 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*	*Northern Groundwater System*	
					Sherman Trapping	*Nocturnal Survey*
1	*Gerbillus cheesmani*	Cheesman's Gerbil	Least Concern	Vulnerable	✓	-
2	*Gerbillus gleadowi*	Indian Hairy-footed Gerbil	Least Concern	Near Threatened	✓	-
3	*Rhombomys opimus*	Great Gerbil	Least Concern	Near Threatened	✓	
4	*Meriones persicus*	Persian Jird	Least Concern	Least Concern	✓	-
Total					**4**	**0**

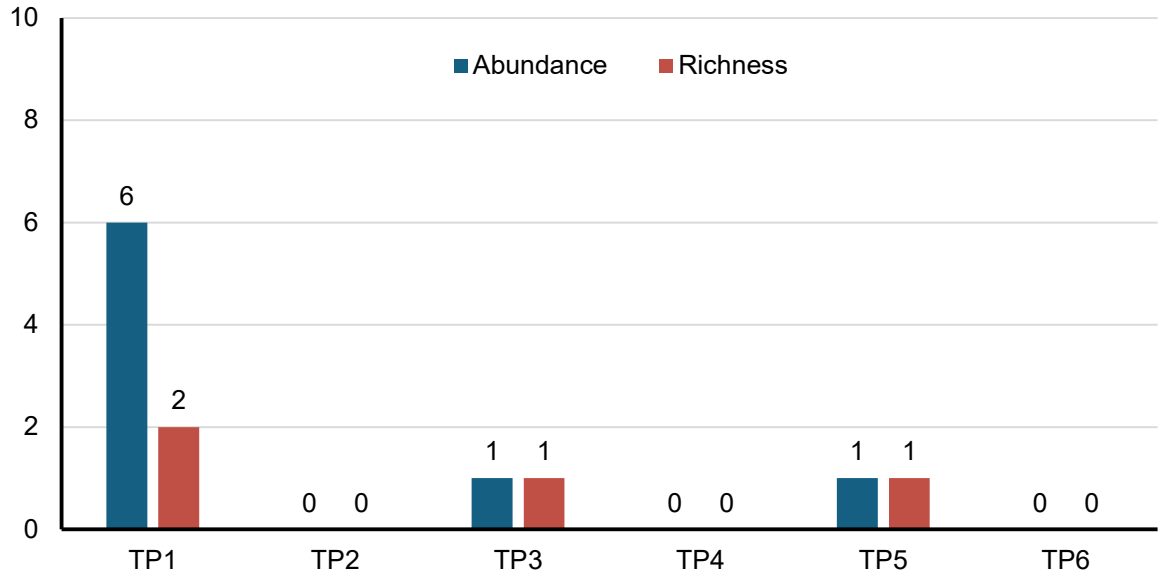
Sherman Trapping

In the Summer 2024 Survey, trapping was conducted at a total of six sampling locations along the Northern Groundwater System. A total of eight specimens of four species were captured which include Cheesman's Gerbil (*Gerbillus cheesmani*), Indian Hairy-footed Gerbil (*Gerbillus gleadowi*), Great Gerbil (*Rhombomys opimus*), and Persian Jird (*Meriones persicus*). The highest abundance (six specimens) and richness (two species) of small mammals was recorded at Sampling Location TP1 located in the Agricultural Areas and Mountains/Hills which can be attributed to the availability of ample food and refugia to the rodent species. The Mountains/Hills provide natural shelters like crevices,

and rocky outcrops which protect these species from the predator as well as the extreme weather.

Exhibit 7.57 provides the abundance and richness of small mammals captured along the Northern Groundwater System in the Summer 2024 Survey.

Exhibit 7.57: Abundance and Richness of Small Mammals Captured along the Northern Groundwater System in Summer 2024 Survey



Nocturnal Survey

No specimen of any species was observed along the two transects taken in Northern Groundwater System in Summer 2024 Survey.

Access Route to Reko Diq Mine Site

The sampling for small mammals was not conducted within the surveyed area along the Access Route to Reko Diq Mine Site in Post-Monsoon 2022 and Spring 2023 surveys. This was due to security restrictions not allowing sampling in these areas at the time. Therefore, the comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is not provided.

In Summer 2024 Survey, only one species of small mammals Cheesman's Gerbil (*Gerbillus cheesmani)* was captured along the Access Route to Reko Diq Mine site from four sampling locations.

Summer 2024 Survey

Only one species of small mammals Cheesman's Gerbil (*Gerbillus cheesmani)* was captured along the Access Route to Reko Diq Mine site during the Summer 2024 Surveys. No nocturnal surveys were conducted along the Access Route to Reko Diq Mine Site. Cheesman's Gerbil (*Gerbillus cheesmani*) is listed as Least Concern in the IUCN Red List of Threatened Species while it is listed as Vulnerable in Pakistan Mammals Red List.

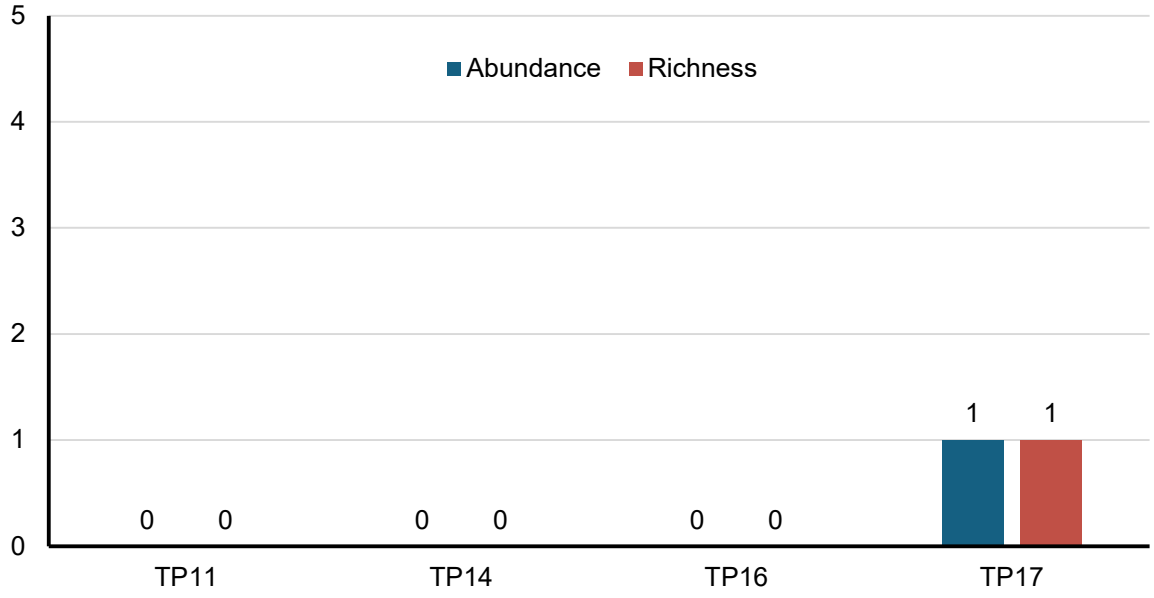
Sherman Trapping

In the Summer 2024 Survey, trapping was conducted at a total of four sampling locations along the Access Route to Reko Diq Mine Site. Only one specimen of Cheesman's Gerbil (*Gerbillus cheesmani*), was captured at Sampling Location TP17 located in Clayey Plains of Tozghai Lake.

The Clayey Plains of Tozghai Lake, interspersed with shifting sand dunes, present a unique and varied landscape that supports a range of vegetation types, from scattered patches to dense clusters. This vegetation plays a critical role in providing both shelter and food for rodent species in the area. The dense patches of shrubs, grasses, and other plant life offer cover from predators and harsh weather, creating secure habitats where rodents can nest and thrive. The vegetation also supports a food chain that includes seeds, roots, and insects, ensuring a steady food supply. Additionally, the shifting sand dunes create microhabitats where rodents can burrow and find further protection, enhancing their ability to survive and reproduce in an otherwise challenging, arid environment.

Exhibit 7.58 provides the abundance and richness of small mammals captured along the Access Route to Reko Diq Mine Site in the Summer 2024 Survey.

Exhibit 7.58: Abundance and Richness of Small Mammals Captured along the Access Route to Reko Diq Mine Site in Summer 2024 Survey



Nocturnal Survey

No nocturnal survey was conducted along the Access Route to Reko Diq Mine Site in Summer 2024 Survey.

Taftan Area

Summer 2024 Survey

A total of two species of small mammals were captured from Taftan Area in the Summer 2024 Surveys. All of these species were captured in Sherman traps; no nocturnal survey was conducted at Taftan Area in Summer 2024 Survey.

Exhibit 7.59 provides the list of small species captured at Taftan Area in Summer 2024 Survey.

Exhibit 7.59: Small Mammals Species Captured/Observed at Taftan Area in Summer 2024 Survey

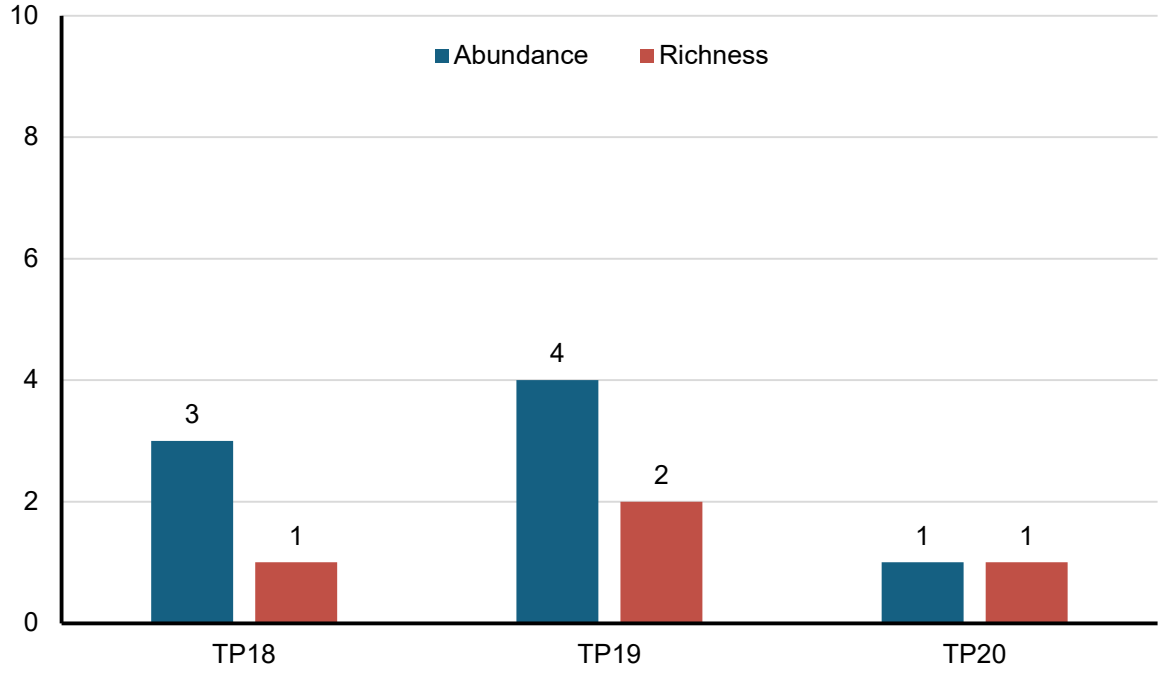
No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*	*Taftan Area*	
					Sherman Trapping	*Nocturnal Survey*
1	*Gerbillus cheesmani*	Cheesman's Gerbil	Least Concern	Vulnerable	✓	-
2	*Mus booduga*	Little Indian Field Mouse	Least Concern	Least Concern	✓	-
Total					**2**	**0**

Sherman Trapping

In the Summer 2024 Survey, trapping was conducted at a total of three sampling locations in Taftan Area. A total of eight specimens of two species were captured which include Cheesman's Gerbil (*Gerbillus cheesmani* and Little Indian Field Mouse (*Mus booduga*). The highest abundance (four specimens) and richness (two species) of small mammals was recorded at Sampling Location TP19 located in the Agricultural Areas, which can be attributed to the availability of ample food and refugia to the rodent species.

Exhibit 7.60 provides the abundance and richness of small mammals captured from the Taftan Area in the Summer 2024 Survey.

Exhibit 7.60: Abundance and Richness of Small Mammals Captured in Taftan Area in Summer 2024 Survey



Nocturnal Survey

No nocturnal surveys were conducted in the Taftan Area in Summer 2024 Survey.

Corridor

Summer 2024 Survey

A total of five species of small mammals were captured along the Corridor in the Summer 2024 Surveys. All of these species were captured in Sherman traps; no nocturnal surveys were conducted along the Corridor.

Exhibit 7.61 provides the list of small species captured along the Corridor in Summer 2024 Survey.

Exhibit 7.61: Small Mammals Species Captured/Observed along the Corridor in Summer 2024 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*
1	*Gerbillus nanus*	Dwarf Gerbil	Least Concern	Near Threatened
2	*Gerbillus cheesmani*	Cheesman's Gerbil	Least Concern	Vulnerable
3	*Meriones lybicus*	Libyan Jird	Not Assessed	Not Assessed
4	*Mus booduga*	Little Indian Field Mouse	Least Concern	Least Concern
5	*Hemiechinus auritus*	Long-eared Hedgehog	Least Concern	Least Concern

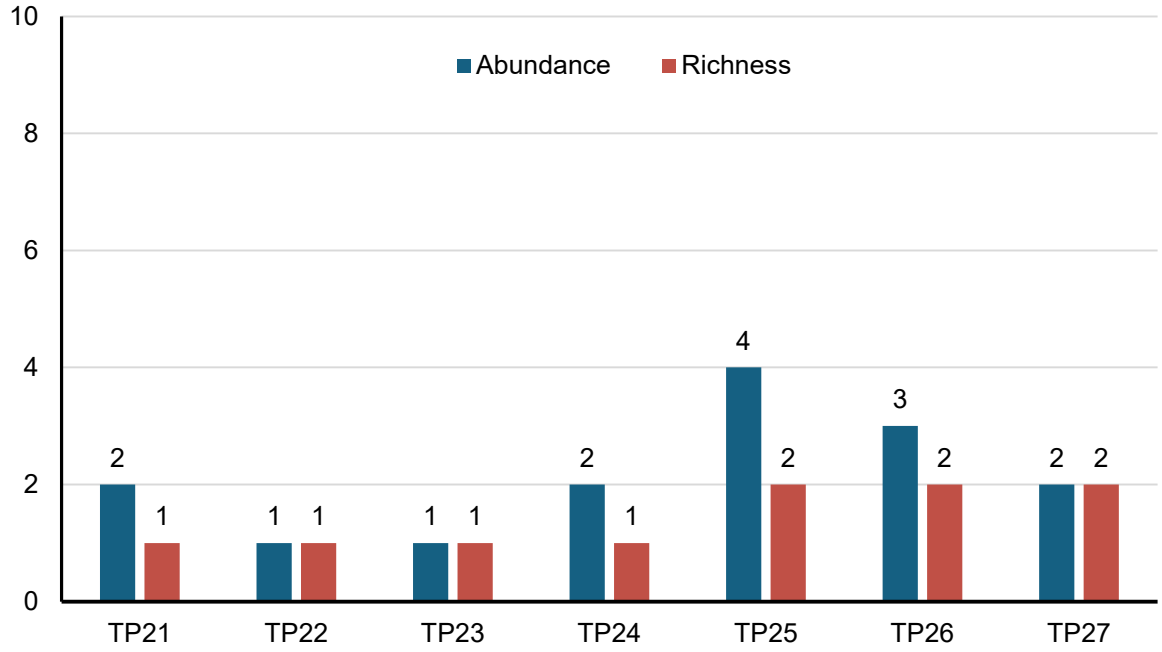
Sherman Trapping

In the Summer 2024 Survey, trapping was conducted at a total of seven sampling locations along Corridor. A total of 15 specimens of five species were captured which include Long-eared Hedgehog (*Hemiechinus auratus*), Dwarf Gerbil (*Gerbillus nanus*), Cheesman's Gerbil (*Gerbillus cheesmani*), Libyan Jird (*Meriones lybicus*) and Little Indian Field Mouse (*Mus booduga*). The highest abundance (four specimens) and richness (two species) of small mammals was recorded at Sampling Location TP25 located in the Sandy Plains/Sand Dunes and mix of Clayey Plains.

The Clayey Plains and Sandy Plains/Sand Dunes offered a promising habitat for rodents, despite the harsh arid environment and extreme heat. These areas were dominated by *Tamarix spp.* and resilient shrubs, which not only provided vital cover and shelter from predators but also helped mitigate the intense heat by offering shaded microhabitats. The vegetation also supported a reliable food source, enabling rodents to thrive in, an otherwise challenging, dry landscape where resources are typically scarce.

Exhibit 7.62 provides the abundance and richness of small mammals captured along the Corridor in the Summer 2024 Survey.

Exhibit 7.62: Abundance and Richness of Small Mammals Captured along the Corridor in Summer 2024 Survey



Nocturnal Survey

No nocturnal survey was conducted along the Corridor in Summer 2024 Survey.

Zangi Nawar Game Reserve

Summer 2024 Survey

A total of 10 species of small mammals were recorded at Zangi Nawar Game Reserve in the Summer 2024 Surveys through Sherman trapping method and nocturnal survey. Of

these, eight species were captured using Sherman trapping method and four species were observed in nocturnal surveys.

Exhibit 7.63 provides the list of small mammal's species captured at Zangi Nawar Game Reserve in Summer 2024 Survey.

Exhibit 7.63: Small Mammals Species Captured/Observed at Zangi Nawar Game Reserve in Summer 2024 Survey

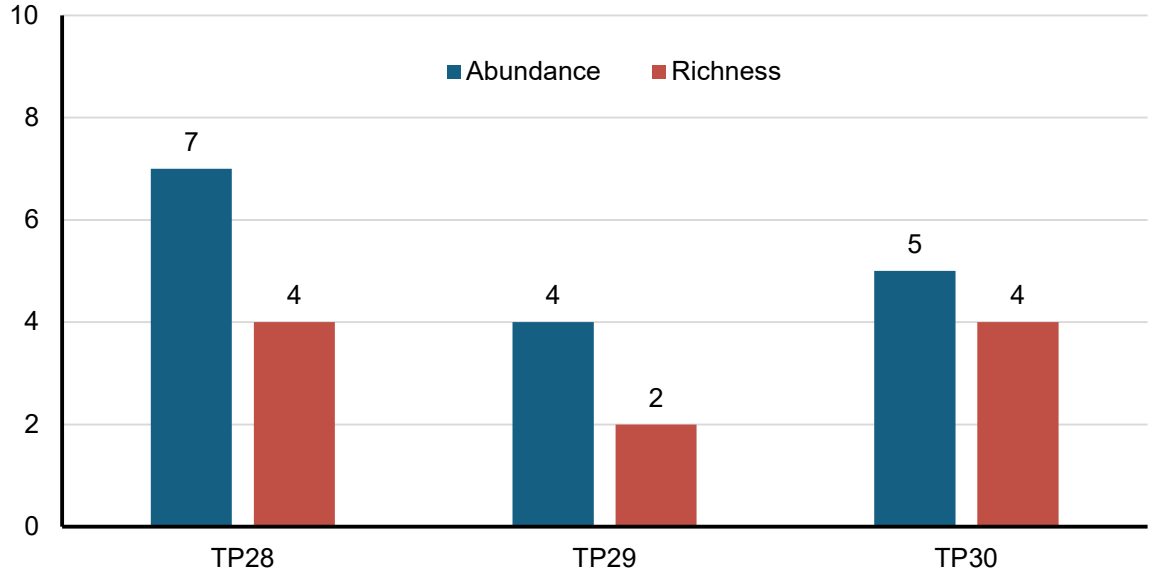
No.	*Scientific Name*	*Common Name*	*IUCN Red List Status*	*National Red List Status*	*Zangi Nawar Game Reserve*	
					Sherman Trapping	*Nocturnal Survey*
1	*Allactaga elater*	Small Five-toed Jerboa	Least Concern	Least Concern	✓	✓
2	*Allactaga hotsoni*	Hotson's Five-toed Jerboa	Least Concern	Least Concern	-	✓
3	*Gerbillus cheesmani*	Cheesman's Gerbil	Least Concern	Vulnerable	✓	✓
4	*Salpingotulus michaelis*	Baluchistan Pygmy Jerboa	Data Deficient	Not Assessed	-	✓
5	*Paraechinus hypomelas*	Brandt's Hedgehog	Least Concern	Not Assessed	✓	-
6	*Crocidura zarudnyi*	Zarudny's Rock Shrew	Least Concern	Least Concern	✓	-
7	*Meriones lybicus*	Libyan Jird	Not Assessed	Not Assessed	✓	-
8	*Gerbillus nanus*	Dwarf Gerbil	Least Concern	Near Threatened	✓	-
9	*Tatera indica*	Indian Gerbil	Least Concern	Least Concern	✓	-
10	*Mus musculas*	House Mouse	Not Assessed	Not Assessed	✓	-
Total					**8**	**4**

Sherman Trapping

In the Summer 2024 Survey, trapping was conducted at a total of three sampling locations at Zangi Nawar Game Reserve. A total of 16 specimens of eight species were captured which include Indian Gerbil (*Tatera indica*), Dwarf Gerbil (*Gerbillus nanus*), Libyan Jird (*Meriones lybicus*), Zarudny's Rock Shrew (*Crocidura zarudnyi*), Brandt's Hedgehog (*Paraechinus hypomelas*), Cheesman's Gerbil (*Gerbillus cheesmani)*, Small Five-toed Jerboa (*Allactaga elater*) and House mouse (*Mus musculas*). The highest abundance (seven specimens) and richness (four species) of small mammals was recorded at Sampling Location TP28 located in the Sandy Plains/Sand Dunes. This can be attributed to the dense vegetation clusters in the vicinity of Zangi Nawar Lake. These clusters provide critical resources, including shelter from predators and the harsh sun, as well as a consistent food supply in the form of seeds, roots, and insects. The presence of vegetation in this typically barren habitat creates microhabitats that support greater biodiversity, allowing small mammals to find refuge.

Exhibit 7.64 provides the abundance and richness of small mammals captured from the Zangi Nawar Game Reserve in the Summer 2024 Survey.

Exhibit 7.64: Abundance and Richness of Small Mammals Captured at Zangi Nawar Game Reserve in Summer 2024 Survey

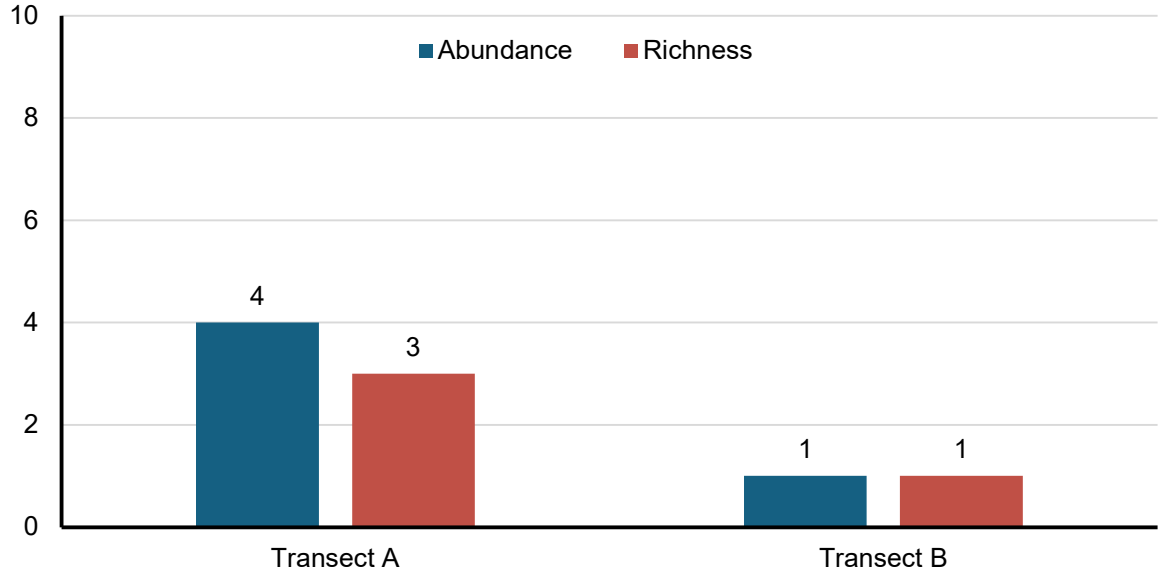


Nocturnal Survey

A total of five specimens of four species were observed along the two transects taken at Zangi Nawar Game Reserve in Summer 2024 Survey. These species include Baluchistan Pygmy Jerboa (*Salpingotulus Michaelis*), Cheesman's Gerbil (*Gerbillus cheesmani)* Hotson's Five-toed Jerboa (*Allactaga hotsoni*), and Small Five-toed Jerboa (*Allactaga elater*). The highest abundance (four specimens) and richness (three species) of small mammals were observed along the Transect A.

Exhibit 7.65 provides abundance and richness of small mammal's species observed at Zangi Nawar in Summer 2024 Surveys.

Exhibit 7.65: Abundance and Richness of Small Mammals Species Observed at Zangi Nawar Game Reserve in Summer 2024 Survey



Conservation Concern Species of Small Mammals

Conservation Concern Species at Reko Diq Mine Site and Associated Infrastructure

All species of small mammals captured/observed at the Reko Diq Mine Site, along Northern Groundwater System, along Access Route to Reko Diq Mine Site, are Least Concern in the IUCN Red List of Threatened Species.

Moreover, the species reported from the area in the literature review are also Least Concern according to the IUCN Red List of Threatened Species. The small mammalian species reported by IBAT are listed as Least Concern according to the IUCN Red List of Threatened Species.

Few nationally threatened species of small mammals were captured from Reko Diq Mine Site and Associated Infrastructure in Summer 2024 Survey in the Reko Diq Mine Site and Associated Infrastructure. These species include Cheesman's Gerbil (*Gerbillus cheesmani*) which is listed as Vulnerable, Dwarf Gerbil (*Gerbillus nanus*), Great Gerbil (*Rhombomys opimus*), Indian Hairy-footed Gerbil (*Gerbillus gleadowi*) and Sundevall's Jird (*Merioes crassus*) which are listed as Near Threatened in National Red List of Threatened Species.

Conservation Concern Species at Taftan Area, Corridor and Zangi Nawar Game Reserve

All species of small mammals captured/observed at Taftan Area, Corridor and Zangi Nawar are listed as Least Concern, Not Assessed and Data Deficient in the IUCN Red List of Threatened Species. In addition, one restricted range species i.e., Baluchistan Pygmy Jerboa (*Salpingotulus michaelis)* was observed at Zangi Nawar.

Few threatened species of small mammals are captured in Summer 2024 Survey. These species include Cheesman's Gerbil (*Gerbillus cheesmani*) which is listed as Vulnerable, Dwarf Gerbil (*Gerbillus nanus*), Great Gerbil (*Rhombomys opimus* and Sundevall's Jird

(*Merioes crassus*) which are listed as Near Threatened in National Red List of Threatened Species.

Discussion

The Reko Diq Mine Site is an exceptionally harsh environment for small mammals, characterized by its extreme dryness and minimal vegetation. The terrain is dominated by gravel plains and rugged mountainous areas, which offer very little shelter or food. This scarcity of resources significantly limits the ability of many small mammals to survive and thrive. Consequently, the survey found only a small number of species present. The Long-eared Hedgehog (*Hemiechinus auratus*), Great Gerbil (*Rhombomys opimus*), and Sundevall's Jird (*Meriones crassus*) were among the few captured, all of which are well-adapted to arid and harsh conditions. These species have unique traits that help them handle the extreme dryness and lack of resources at the Reko Diq Mine Site. For example, they have developed ways to conserve water and find food despite the scarce resources. Their ability to survive in such harsh conditions shows how well-adapted they are and emphasizes that only a few species can thrive in such an extreme environment.

The Northern Groundwater System features a diverse mix of habitats, including Clayey Plains, Mountains/Hills, Gravel Plains, Sandy Plains/Sand Dunes, as well as Agriculture Areas. This variety supports a wide range of small mammals. For example, the Cheesman's Gerbil (*Gerbillus cheesmani*) and the Indian Hairy-footed Gerbil (*Gerbillus gleadowi*) thrive in the sandy and gravelly terrains, where they can find suitable burrowing and foraging opportunities. The Great Gerbil (*Rhombomys opimus*) is adapted to the more open, sandy plains and dunes, while the Persian Jird (*Meriones persicus*) occupies both the gravel plains and agricultural areas. This blend of habitats provides essential resources and shelter, allowing a diverse array of small mammals to inhabit and thrive within the Northern Groundwater System.

The Sandy Plains/Sand Dunes around Zangi Nawar Lake are a key part of Balochistan's dry landscape. These areas are crucial for wildlife adapted to arid conditions. The sandy terrain provides essential shelter and nesting sites for various small mammals. For instance, the Gerbil (*Tatera indica*), Dwarf Gerbil (*Gerbillus nanus*), and Cheesman's Gerbil (*Gerbillus cheesmani*) are well-adapted to living in these sandy environments. They use the dunes for hiding and breeding. Similarly, small mammals like the Libyan Jird (*Meriones lybicus*), Brandt's Hedgehog (*Paraechinus hypomelas*), Zarudny's Rock Shrew (*Crocidura zarudnyi*), Small Five-toed Jerboa (*Allactaga elater*), and House Mouse (*Mus musculus*) also thrive in this habitat.

One notable species is the Balochistan Pygmy Jerboa (*Salpingotus michaelis*), which is restricted to this region and relies on the unique features of the sandy landscape for its survival. The sand dunes support both these small mammals and the specialized vegetation that can withstand the extreme dryness, making the area a vital part of the local ecosystem.

In the Summer 2024 Survey, a total of 10 rodent species were recorded at Zangi Nawar Game Reserve, but only one of these species is also found at the Reko Diq Mine Site. This low overlap indicates limited habitat affinities and ecosystem connections for small mammals between Zangi Nawar Game Reserve and Reko Diq. The stark contrast in species composition between these sites suggests that the environmental conditions and

ecological factors at Zangi Nawar Game Reserve and Reko Diq are significantly different, reducing the likelihood of shared species.

Similarly, the survey in Northern Groundwater System found only one species of small mammals common to both the Reko Diq Mine Site and the Zangi Nawar Game Reserve. Despite the Northern Groundwater System offering more favourable habitat conditions such as more vegetation and resources, the low overlap in species suggests that other factors, like specific habitat needs and environmental history, also play a role in determining which species are found in each area.

7.1.4 Herpetofauna

A total of 36 herpetofauna species were observed during the Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023, and Summer 2024 surveys conducted at the Reko Diq Mine Site and Associated Infrastructure, as well as the Port Qasim Marine Terminal. Of these, 14 species were observed during the Post-Monsoon 2022 survey, 11 species during the Spring 2023 survey, and 28 species during the Summer 2024 survey, all covering the Reko Diq Mine Site and Associated Infrastructure. Additionally, four species were exclusively observed at the Port Qasim Marine Terminal during the Post-Monsoon 2023 Survey.

Among the herpetofauna species observed during the surveys, only one species, the Baloch Green Toad (*Bufotes zugmayeri*), was identified as Near Threatened according to the IUCN Red List of Threatened Species. All remaining species were classified as either Least Concern or Not Assessed.

Exhibit 7.66 provides the list of herpetofauna species observed/captured in Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024 surveys.

Reko Diq Mine Site

A total of 25 herpetofauna species were observed/captured within the surveyed area at the Reko Diq Mine Site study area during the Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys. Out of these, seven species were observed in the Post-Monsoon 2022 Survey, four during the Spring 2023 Survey and 20 species in Summer 2024 Survey.

Exhibit 7.67 provides the list of species observed at the Reko Diq Mine Site study area in the Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys.

Exhibit 7.68 provides some of the photographs of species observed at the Reko Diq Mine Site study area in the Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys.

Exhibit 7.66: Herpetofauna Species Observed in the Baseline Surveys

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey Based Species			
					Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey
1	*Acanthodactylus blanfordii*	Blanford's Fringe–Fingered Lizard	Least Concern	2016	✓	✓	–	✓
2	*Acanthodactylus cantoris*	Indian Fringe-Fingered Lizard	Least Concern	2016	–	–	✓	–
3	*Acanthodactylus micropholis*	Yellow Tailed Fringe Fingered Lizard	Least Concern	2019	✓	–	–	–
4	*Agamura persica*	Persian Spider Gecko	Least Concern	2016	✓	–	–	–
5	*Bufotes zugmayeri*	Baloch Green Toad	Near Threatened	2020	–	–	–	✓
6	*Bunopus tuberculatus*	Baluch Ground Gecko	Least Concern	2016	–	–	–	✓
7	*Calotes versicolor*	Changeable Lizard	Least Concern	2019	–	–	✓	–
8	*Crossobamon eversmanni lumsdeni*	Lumsden's Fringe-Toed Gecko	Least Concern	2016	–	–	–	✓
9	*Cyrtopodion scabrum*	Rough Bent-Toed Gecko	Least Concern	2016	✓	–	–	–
10	*Cyrtopodion sistanense*	Sistan Angular-Toed Gecko	Least Concern	2008	–	–	–	✓
11	*Cyrtopodion sp*	-	-		–	–	–	✓
12	*Echis carinatus multisquamatus*	Transcaspian Saw-Scaled Viper	Least Concern	2016	–	✓	–	✓
13	*Eremias acutirostris*	Reticulated Desert Lacerta	Least Concern	2016	–	–	–	✓
14	*Eremias c.f scripta*[136]	-	Not Assessed	2016	–	✓	–	✓
15	*Eremias persica*	Persian Racerunner	Least Concern	2016	–	–	–	✓
16	*Eremias scripta*	Sand Racerunner	Least Concern	2016	–	✓	–	✓

[136] This species closely resembles *Eremias scripta* but exhibits distinct morphological differences, suggesting it may represent a new species. Blood and tissue samples have been collected and can be utilized for further confirmation if needed.

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey Based Species			
					Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey
17	*Eremias sp.*[137]	-	Not Assessed		–	✓	–	–
18	*Eumeces schneideri zarudnyi*	Orange–Tailed Mole Skink	Least Concern	2016	✓	–	–	✓
19	*Laudakia nupta fusca*	Large–Scaled Rock Gecko	Least Concern	2016	✓	–	–	✓
20	*Mesalina watsonana*	Long–Tailed Desert Lacerta	Least Concern	2016	✓	–	–	✓
21	*Ophiomorus tridactylus*	Indian Three–Toed Sand Swimmer	Least Concern	2016	✓	✓	–	✓
22	*Ophisops jerdonii*	Punjab-Snake-Eyed Lacerta	Least Concern	2019	–	–	✓	–
23	*Phrynocephalus clarkorum*	Clark's Toad– Headed Agama	Least Concern	2016	–	✓	–	✓
24	*Phrynocephalus euptilopus*	Alcock's Toad – Headed Agama	Least Concern	2016	✓	–	–	✓
25	*Phrynocephalus luteoguttatus*	Yellow–Speckled Toad–Headed Agama	Least Concern	2016	–	✓	–	✓
26	*Phrynocephalus maculatus*	Spotted Toad– Headed Agama	Least Concern	2022	✓	✓	–	✓
27	*Phrynocephalus ornatus*	Striped Toad– Headed Agama	Least Concern	2016	✓	✓	–	✓
28	*Phrynocephalus scutellatus*	Gray Toad– Headed Agama	Least Concern	2016	–	–	–	✓
29	*Platyceps karelini*	Spotted Desert Racer	Least Concern	2019	✓	–	–	–
30	*Psammophis schokari*	Afro–Asian Sand Snake	Least Concern	2016	✓	✓	✓	✓
31	*Rhinogekko femoralis*	Sharp Tailed Spider Gecko	Least Concern	2019	–	–	–	✓
32	*Teratoscincus keyserlingii*	Common Wonder Gecko	Least Concern	2018	–	–	–	✓
33	*Teratoscincus microlepis*	Small–Scaled Skink Gecko	Least Concern	2016	–	–	–	✓
34	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	2017	✓	–	–	✓
35	*Trapelus ruderatus*	Horny-Scaled Agama	Least Concern	2012	–	–	–	✓
36	*Varanus griseus caspius*	Desert Monitor Lizard	Least Concern	2016	–	–	–	✓

[137] This species seems to be a new species or subspecies.

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*IUCN Accessed Year*	*Survey Based Species*			
					Post-Monsoon 2022 Survey	*Spring 2023 Survey*	*Post-Monsoon 2023 Survey*	*Summer 2024 Survey*
Total					**14**	**11**	**4**	**28**

Exhibit 7.67: Herpetofauna Species Observed at Reko Diq Mine Site Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*	*Summer 2024 Survey*
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	Least Concern	-	✓	-	✓
2	*Agamura persica*	Persian Spider Gecko	Least Concern	-	✓	-	-
3	*Bunopus tuberculatus*	Baluch Ground Gecko	Least Concern	-	-	-	✓
4	*Crossobamon eversmanni*	Comb-toed Gecko	Least Concern	-	-	-	✓
5	*Cyrtopodion scabrum*	Rough Bent-toed Gecko	Least Concern	-	✓	-	-
6	*Cyrtopodion sp*	-	-	-	-	-	✓
7	*Echis carinatus multisquamatus*	Transcaspian Saw-scaled Viper	Least Concern	-	-	-	✓
8	*Eremias acutirostris*	Point-snouted Racerunner	Least Concern	-	-	-	✓
9	*Eremias cf scripta*	Sand Racerunner	-	-	-	-	✓
10	*Eremias scripta*	Sand Racerunner	Least Concern	-	-	-	✓
11	*Eremias sp.*	Sand Racerunner	-	-	-	✓	-
12	*Laudakia nupta fusca*	Large–scaled Rock Gecko	Least Concern	-	✓	-	-
13	*Mesalina watsonana*	Long–tailed Desert Lacerta	Least Concern	-	✓	-	-
14	*Ophiomorus tridactylus*	Indian Sand-swimmer	Least Concern	-	-	-	✓
15	*Phrynocephalus clarkorum*	Clark's Toad– headed Agama	Least Concern	-	-	✓	✓

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*	*Summer 2024 Survey*
16	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	Least Concern	-	-	-	✓
17	*Phrynocephalus luteoguttatus*	Yellow-speckled toad-headed Agama	Least Concern	-	-	✓	✓
18	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern	-	✓	✓	✓
19	*Phrynocephalus ornatus*	Striped Toad Agama	Least Concern	-	✓	-	✓
20	*Phrynocephalus scutellatus*	Gray Toad– headed Agama	Least Concern	-	-	-	✓
21	*Psammophis schokari*	Forskal's Sand Snake	Least Concern	-	-	-	✓
22	*Teratoscincus keyserlingii*	Common Wonder Gecko	Least Concern	-	-	-	✓
23	*Teratoscincus microlepis*	Small-scaled Wonder Gecko	Least Concern	-	-	-	✓
24	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	-	-	-	✓
25	*Trapelus ruderatus*	Horny-scaled Agama	Least Concern	-	-	-	✓
Total					**7**	**4**	**20**

Exhibit 7.68: Herpetofauna Species Observed at Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey and Spring 2023 Survey

a) Keyserling's Wonder Gecko (Teratoscincus keyserlingii)

b) Alcock's Toad-headed Agama (*Phrynocephalus euptilopus*)

c) Point-snouted Racerunner (Eremias acutirostris)

*d) Baluch Ground Gecko (*Bunopus tuberculatus*)*

e) Yellow-speckled Toad Agama *(Phrynocephalus luteoguttatus)*

f) Gray Toad-headed Agama *(Phrynocephalus scutellatus)*

g) Persian Spider Gecko *(Agamura persica)*

h) Clark's Toad-headed Agama *(Phrynocephalus clarkorum)*

i) Yellow-headed Rock Agama *(Laudakia nupta fusca)*

j) Black-tailed Toad-headed Agama *(Phrynocephalus maculatus)*

Post-Monsoon 2022 Survey

A total of 17 herpetofauna specimens belonging to seven species were observed from 20 sampling locations from the Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey. Species observed included the Blacktail Toad-headed Agama *(Phrynocephalus maculatus)*, Blanford's Fringe-fingered Lizard *(Acanthodactylus blanfordii)*, Indian Sand-Swimmer *(Ophiomorus tridactylus)*, Ornated Toad-headed Agama (*Phrynocephalus ornatus)*, Persian Long-tailed Desert Lizard *(Mesalina watsonana)*, Rough-tailed Bentoed Gecko (*Cyrtopodion scabrum*), Persian Spider Gecko *(Agamura persica)*, and Yellow-headed Rock Agama (*Laudakia fusca)*.

The highest density of herpetofauna was observed in the Sandy Plains/Sand Dunes (3.0), followed by Mountains/Hills (1.0), Dry Streambeds (0.8), and Gravel Plains (0.5). Similarly, the highest diversity of herpetofauna was also observed in the Sandy Plains/Sand Dunes (2.0) followed by Mountains/Hills (0.6), Dry Streambeds (0.3), and Gravel Plains (0.3). The highest abundance and richness were observed at Sampling Location E18 in Sandy Plains/Sand Dunes with three specimens belonging to two species: Persian Spider Gecko (*Agamura persica)* and Ornated Toad-headed Agama (*Phrynocephalus ornatus).*

Overall, the lower herpetofauna abundance and richness can be attributed to lower rainfall, resulting in drier habitats and limited food and shelter availability. The Sandy Plains/Sand Dunes emerged as the most promising habitat for herpetofauna, offering scattered vegetation for food and shelter. Additionally, many desert reptiles favor sun-exposed sandy sites for laying eggs, benefiting from easy access to food and protection from predators.

Exhibit 7.69 provides the abundance of herpetofauna species by habitat type observed at the Reko Diq Mine Site study area in the Post-Monsoon 2022 Survey.

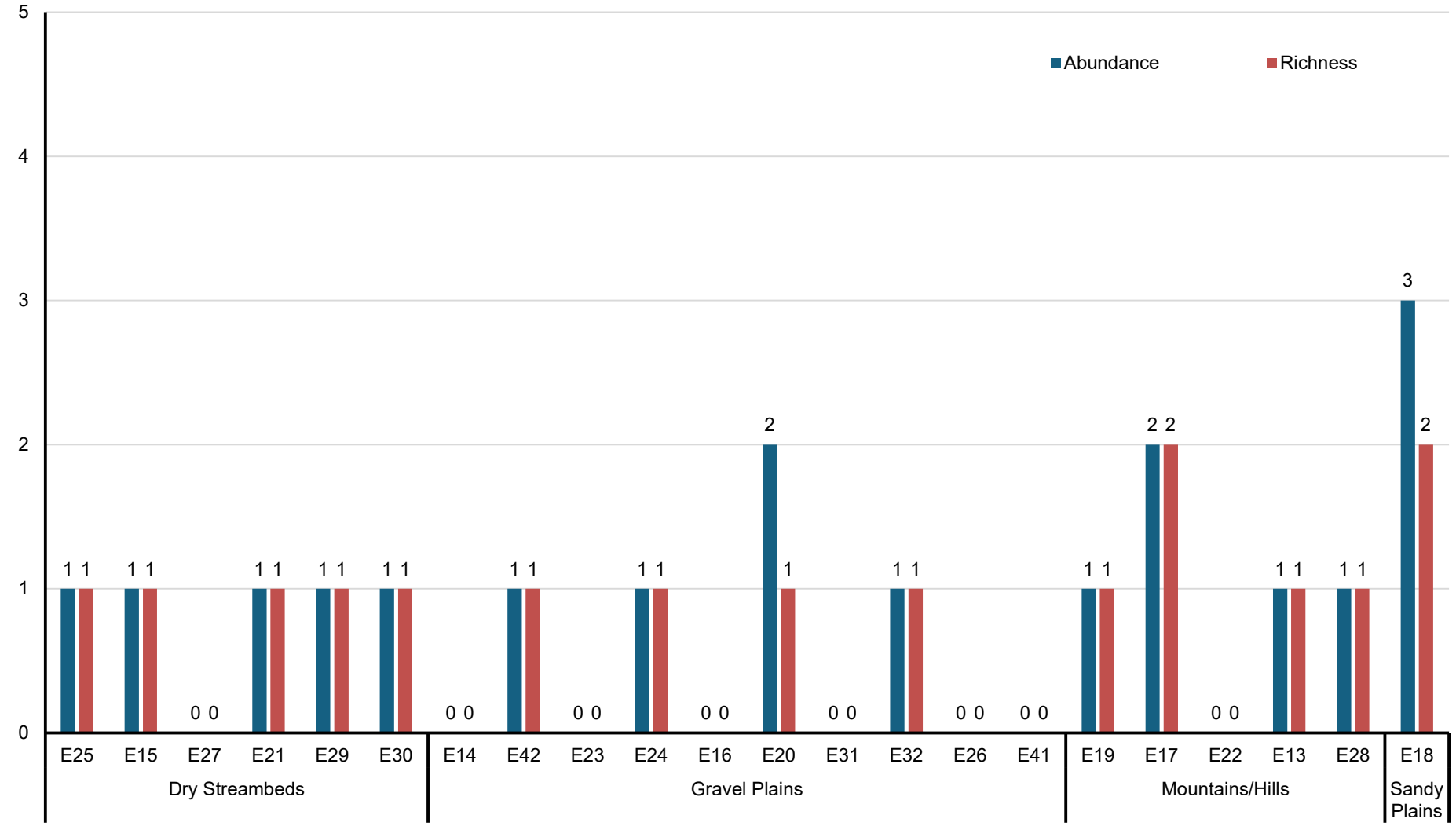
Exhibit 7.70 provides the abundance and richness of herpetofauna species by sampling locations observed at each sampling location along with their habitat types in the Post-Monsoon 2022 Survey.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.69: Abundance of Herpetofauna by Habitat Type Observed at the Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey

No.	*Scientific Names*	*Common Names*	*Habitat Type*				
			Dry Streambeds	*Sandy Plains/ Sand Dunes*	*Gravel Plains*	*Mountains/Hills*	*Total*
1	*Phrynocephalus maculatus*	Black-tailed Toad-headed Agama	3	-	3	-	**6**
2	*Acanthodactylus blanfordii*	Blanford's Fringe-fingered Lizard	2	-	-	-	**2**
3	*Phrynocephalus ornatus*	Ornated Toad-headed Agama	-	2	-	-	**2**
4	*Mesalina watsonana*	Persian Long-tailed Desert Lizard	-	-	1	-	**1**
5	*Cyrtopodion scabrum*	Rough-tailed Bentoed Gecko	-	-	-	1	**1**
6	*Agamura persica*	Persian Spider Gecko	-	1	-	1	**2**
7	*Laudakia fusca*	Yellow-headed Rock Agama	-	-	-	3	**3**
Abundance			**5**	**3**	**4**	**5**	**17**
Richness			**1**	**2**	**1**	**6**	**7**

Exhibit 7.70: Abundance and Richness of Herpetofauna Species by Sampling Location at the Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey



Spring 2023 Survey

A total of eight herpetofauna specimens belonging to four species were observed from 20 sampling locations during the Spring 2023 Survey. The species observed included the Racerunner (*Eremias sp)*, Clark's Toad-headed Agama (*Phynocephalus clarkorum)*, Yellow-speckled Toad-headed Agama (*Phrynocephalus luteoguttatus)*, and Black-tailed Toad-headed Agama (*Phrynocephalus maculatus).*

The highest density of herpetofauna was observed in the Mountains/Hills and Clayey Plains (1.0 each) followed by Dry Streambeds (0.3). Similarly, the highest diversity of herpetofauna was observed in the Clayey Plains (1.0), followed by Mountains/Hills (0.4) and Dry Streambeds (0.3). The absence of herpetofauna specimens in Gravel Plains and Sandy Plains habitats suggests unfavourable conditions in these habitats. The highest abundance and richness were observed at Sampling Location E17 in Mountains/Hills with four specimens of two species.

Exhibit 7.71 provides the abundance of herpetofauna species by habitat type observed at the Reko Diq Mine Site study area in the Spring 2023 Survey.

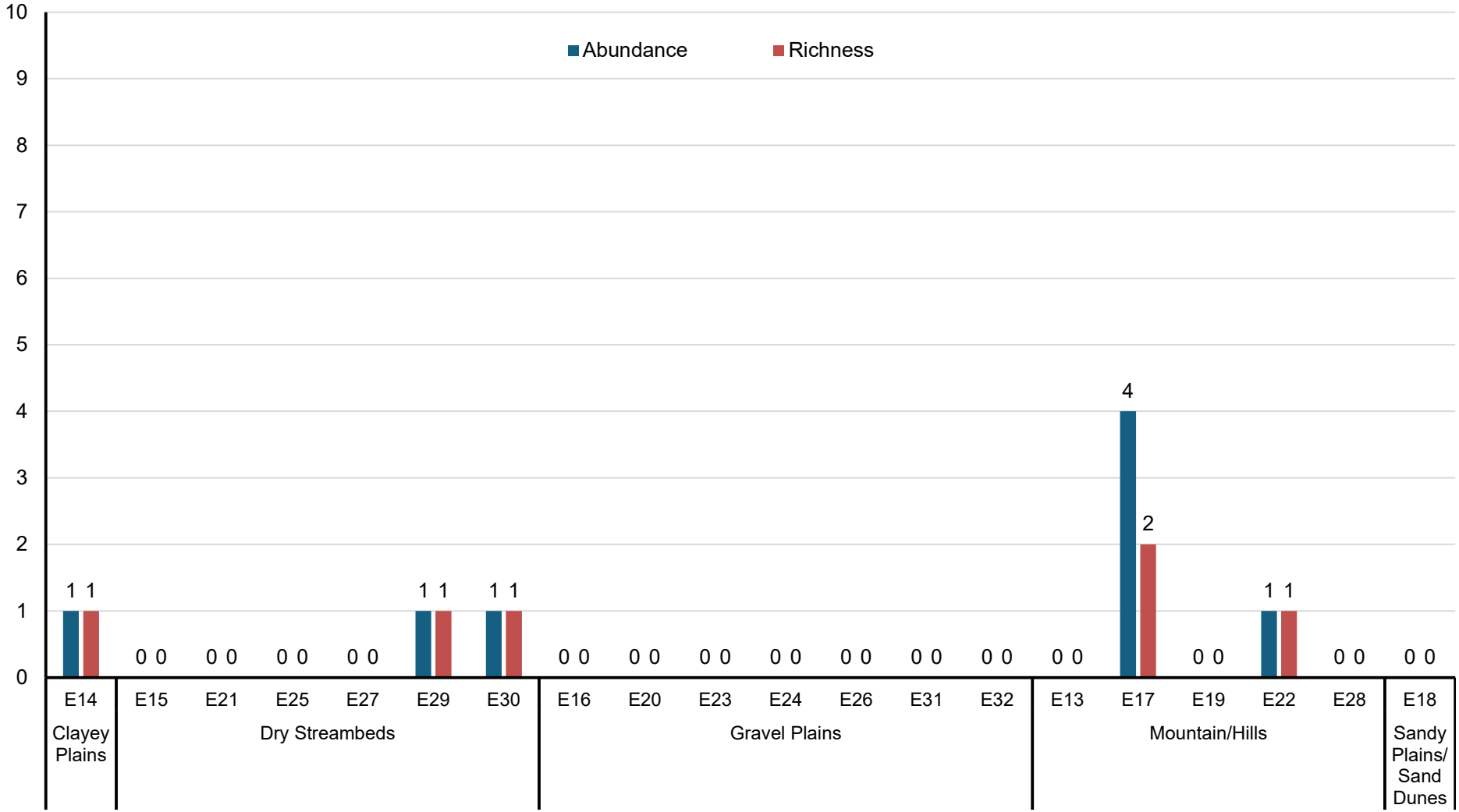
Exhibit 7.72 provides the abundance and richness of herpetofauna species by sampling locations at each sampling location along with their habitat types observed at the Reko Diq Mine Site study area in the Spring 2023 Survey.

The comparison of Spring 2023 Survey and Previous Spring Survey is provided in **Appendix H**.

Exhibit 7.71: Abundance of Herpetofauna by Habitat Type Observed at Reko Diq Mine Site Study Area in Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Habitat*					
			Dry Streambeds	*Sandy Plains*	*Gravel Plains*	*Mountain/Hills*	*Clayey Plains*	*Total*
1	*Eremias sp.*	Racerunner	1	-	-	-	1	**2**
2	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	-	-	-	4	-	**4**
3	*Phrynocephalus luteoguttatus*	Yellow-speckled Toad-headed Agama	-	-	-	1	-	**1**
4	*Phrynocephalus maculatus*	Black-tailed Toad-headed Agama	1	-	-	-	-	**1**
Abundance			**2**	**-**	**-**	**5**	**1**	**8**
Richness			**2**	**-**	**-**	**2**	**1**	**4**

Exhibit 7.72: Abundance and Richness of Herpetofauna Species by Sampling Location Observed at the Reko Diq Mine Site Study Area in Spring 2023 Survey



Summer 2024 Survey

A total of 16 herpetofauna species were recorded at the Reko Diq Mine Site study area in the Summer 2024 Survey through pitfall traps and nocturnal surveys. Of these, 14 species were captured using the pitfall trapping method, while four species were observed during the nocturnal survey.

Exhibit 7.73 provides the list of herpetofauna species captured/observed at Reko Diq Mine Site through pitfall trapping and nocturnal surveys in Summer 2024 Survey.

Exhibit 7.73: Herpetofauna Species Captured/Observed at Reko Diq Mine Site in Summer 2024 Survey

No	*Species List*	*Common Name*	*IUCN Status*	*Reko Diq Mine Site*	
				Pitfall Trapping	*Nocturnal Survey*
1	*Bunopus tuberculatus*	Baluch Ground Gecko	Least Concern	✓	✓
2	*Crossobamon eversmanni lumsdenii*	Comb-toed Gecko	Least Concern	✓	-
3	*Eremias acutirostris*	Point-snouted Racerunner	Least Concern	✓	
4	*Eremias cf. scripta*	Racerunner	-	✓	-
5	*Eremias scripta*	Sand Racerunner	Least Concern	✓	-
6	*Ophiomorus tridactylus*	Indian Sand-swimmer	Least Concern	✓	
7	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	Least Concern	✓	-
8	*Phrynocephalus luteoguttatus*	Yellow-Speckled Toad-headed Agama	Least Concern	✓	-
9	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern	✓	
10	*Phrynocephalus ornatus*	Striped Toad Agama	Least Concern	✓	-
11	*Psammophis schokari*	Forskål's Sand Snake	Least Concern	✓	-
12	*Rhinogekko femoralis*	Sharp-tailed Spider Gecko	Least Concern	-	✓
13	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	Least Concern	-	✓
14	*Teratoscincus microlepis*	Small-scaled Wonder Gecko	Least Concern	✓	-
15	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	✓	
16	*Trapelus ruderatus*	Horny-scaled Agama	Least Concern	✓	✓
Total				**14**	**4**

Pitfall Trapping

A total of 35 herpetofauna specimens belonging to 14 species were captured from eight sampling locations at the Reko Diq Mine Site in the Summer 2024 Survey.

The highest density of herpetofauna was observed in the Dry Streambeds (8.0), followed by Sandy Plains/Sand Dunes (6.0), Gravel Plains (3.0) and Mountains/Hills (3.0).

Similarly, the highest diversity of herpetofauna was also observed in Dry Streambeds (4.0), followed by Gravel Plains (3.0), Sandy Plains/Sand Dunes (2.0), and Mountains/Hills (1.8). The highest abundance of herpetofauna species was observed at Sampling Location TP13 located in Sandy Plains/Sand Dunes (nine specimens), whereas, the highest richness of herpetofauna species was observed at Sampling Location TP10 located in Dry Streambeds (four species).

In the dry arid environment of the Reko Diq Mine Site, the Dry Streambeds habitat type proved to be the most promising for herpetofauna species. These areas provide essential resources, such as moisture retention, which supports vegetation and insect life, offering both food and shelter for herpetofauna species. The sandy and loose soil in these areas allowed the reptiles to easily burrow for shelter, providing a safe and comfortable habitat despite the harsh desert conditions.

Exhibit 7.74 provides the abundance of herpetofauna species by habitat type captured at the Reko Diq Mine Site Study Area in the Summer 2024 Survey.

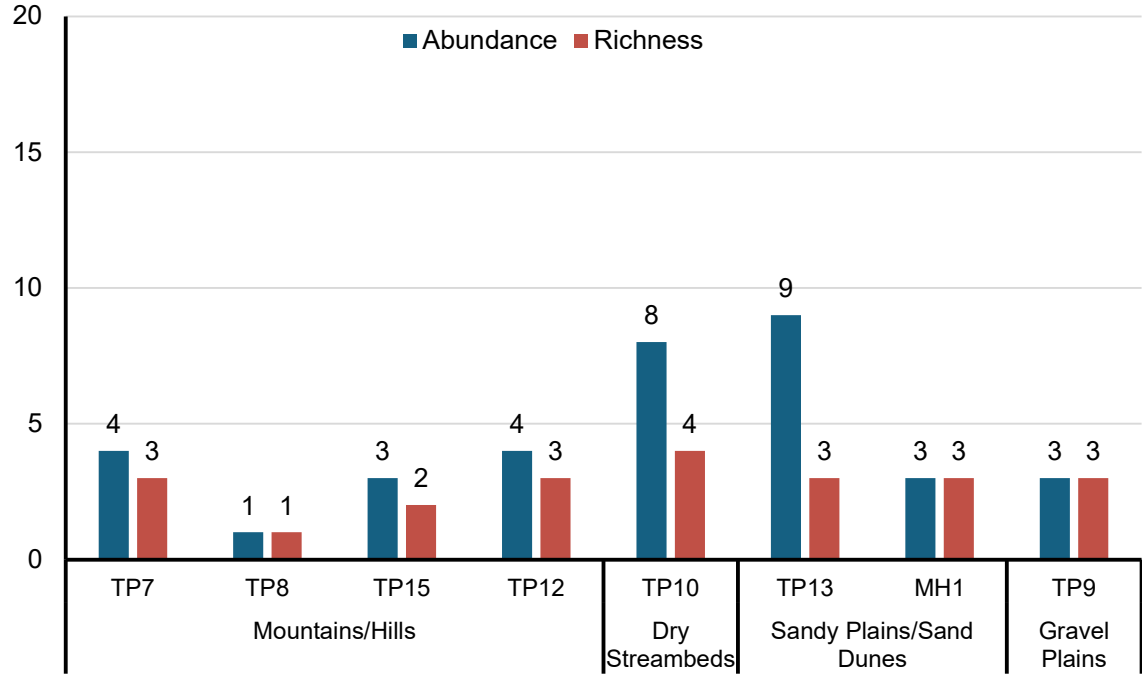
Exhibit 7.75 provides the abundance and richness of herpetofauna species by sampling locations observed at each sampling location along with their habitat types in the Summer 2024 Survey.

Exhibit 7.74: Abundance of Herpetofauna by Habitat Type Observed at the Reko Diq Mine Site in Summer 2024 Survey

No.	*Scientific Names*	*Common Names*	*Habitat Type*				
			Dry Streambeds	*Gravel Plains*	*Sandy Plains/Sand Dunes*	*Mountains/Hills*	***Total***
1	*Bunopus tuberculatus*	Baluch Ground Gecko	0	1	0	2	**3**
2	*Crossobamon eversmanni lumsdenii*	Comb-toed Gecko	0	0	0	2	**2**
3	*Eremias acutirostris*	Point-snouted Racerunner	0	0	3	0	**3**
4	*Eremias cf scripta*	Racerunner	0	1	0	0	**1**
5	*Eremias scripta*	Sand Racerunner	0	0	6	0	**6**
6	*Ophiomorus tridactylus*	Indian Sand-swimmer	0	0	0	1	**1**
7	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	0	0	2	0	**2**
8	*Phrynocephalus luteoguttatus*	Yellow-Speckled Toad-headed Agama	1	0	0	2	**3**
9	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	2	1	0	0	**3**
10	*Phrynocephalus ornatus*	Striped Toad Agama	1	0	0	3	**4**
11	*Psammophis schokari*	Forskal's Sand Snake	0	0	1	0	**1**
12	*Teratoscincus microlepis*	Small-Scaled Wonder Gecko	0	0	0	1	**1**
13	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	4	0	0	0	**4**
14	*Trapelus ruderatus*	Horny-scaled Agama	0	0	0	1	**1**

No.	Scientific Names	Common Names	Habitat Type				Total
			Dry Streambeds	Gravel Plains	Sandy Plains/Sand Dunes	Mountains/Hills	
Abundance			**8**	**3**	**12**	**12**	**35**
Richness			**4**	**3**	**4**	**7**	**14**

Exhibit 7.75: Abundance and Richness of Herpetofauna Species by Sampling Location Captured at Reko Diq Mine Site in Summer 2024 Survey



Nocturnal Survey

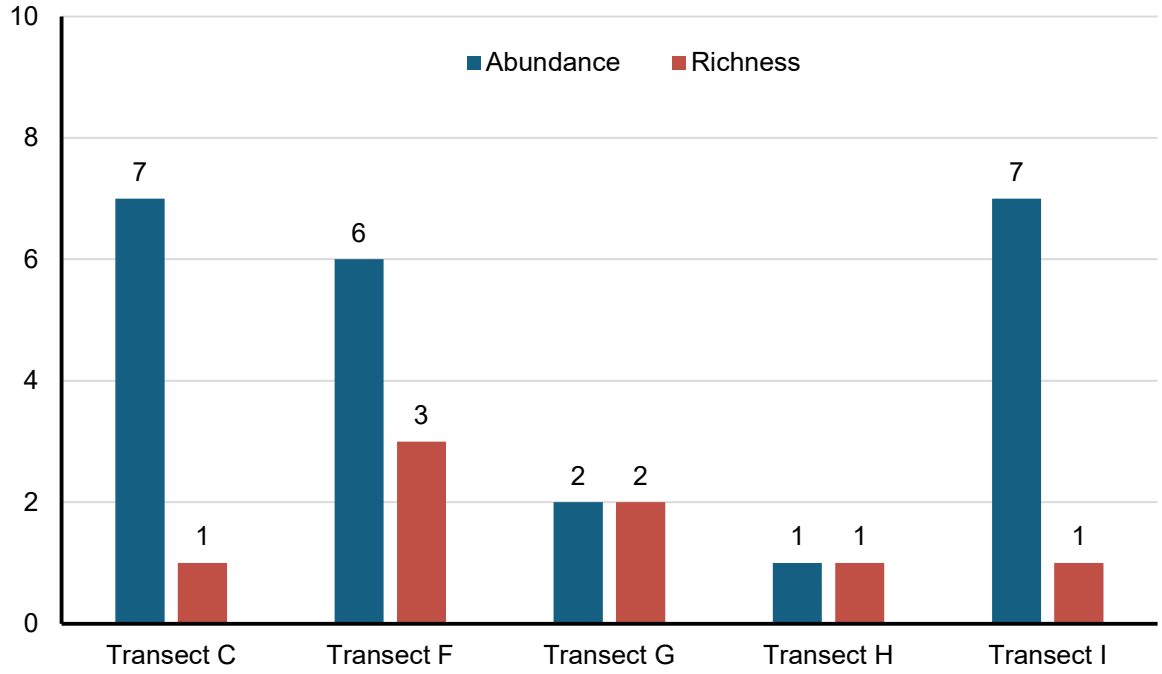
A total of 23 herpetofauna specimens belonging to four species were observed from four transects taken at the Reko Diq Mine Site in Summer 2024 Survey. These species include Baluch Ground Gecko *(Bunopus tuberculatus),* Horny-scaled Agama *(Trapelus ruderatus),* Sharp-tailed Spider Gecko *(Rhinogekko femoralis),* and Keyserling's Wonder Gecko *(Teratoscincus keyserlingi).* The highest abundance of herpetofauna species was observed along Transect I located near the Humai Village with a total of seven specimens of herpetofauna. Similarly, the highest richness of herpetofauna species was recorded along the Transect F located near the north of Tanjeel Ore Stockpile and East of Western Porphyries Ultimate Pit with a total of three species observed.

All of these herpetofauna species are strictly nocturnal, meaning they are primarily active during the night, a behavioural adaptation to the harsh desert environment. The extreme daytime temperatures and intense sunlight of desert habitats make daytime activity risky for these species, as it can lead to overheating and dehydration. By emerging at night, they avoid the heat and take advantage of the cooler temperatures. Additionally,

nighttime provides these species with better opportunities to forage for food, such as insects and small prey, which are also more active during the cooler hours. Their nocturnal behaviour allows them to efficiently conserve water and energy, which are the key survival strategies in the arid desert landscape.

Exhibit 7.76 provides the abundance and richness of herpetofauna species by sampling locations at each sampling location observed at the Reko Diq Mine Site in the Summer 2024 Survey.

Exhibit 7.76: Abundance and Richness of Herpetofauna Species Observed at Reko Diq Mine Site in Nocturnal Surveys



Northern Groundwater System

A total of 21 herpetofauna species were observed within the surveyed area in the Northern Groundwater System study area during the Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys. Of these, nine species were observed in the Post-Monsoon 2022 Survey, six species were observed in the Spring 2023 Survey and 14 were observed in Summer 2024 Survey. Some of the common herpetofauna species observed along the Northern Groundwater System include Black Tailed Toad-headed Agama (*Phrynocephalus maculatus),* Brilliant Ground Agama (*Trapelus agilis),* and Sand Racerunner (*Eremias scripta).*

Exhibit 7.88 provides the list of herpetofauna species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey, Spring 2023 Survey and Summer 2024 Survey.

Exhibit 7.89 provides the photographs of herpetofauna species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey , Spring 2023 Survey and Summer 2024 Survey.

Exhibit 7.77: Herpetofauna Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022, Spring 2023 and Summer 2024 Surveys

No.	Scientific Name	Common Name	IUCN Status	CITES Status	Post-Monsoon 2022 Survey	Spring 2023 Survey	Summer 2024 Survey
1	*Acanthodactylus micropholis*	Yellow Tailed Fringe Fingered Lizard	Least Concern	-	✓	-	-
2	*Bufotes zugmayeri*	Baloch Green Toad	Near Threatened	-	-	-	✓
3	*Bunopus tuberculatus*	Baluch Ground Gecko	Least Concern	-	-	-	✓
4	*Cyrtopodion sistanense*	Sistan Angular-toed Gecko	Least Concern	-	-	-	✓
5	*Cyrtopodion sp*	-	-	-	-	-	✓
6	*Echis carinatus multisquamatus*	Multiscale Saw-scaled viper	Least Concern	-	-	✓	-
7	*Eremias acutirostris*	Point-snouted Racerunner	Least Concern	-	-	-	✓
8	*Eremias persica*	Persian Racerunner	Least Concern	-	-	-	✓
9	*Eremias scripta*	Sand Racerunner	Least Concern	-	-	✓	-
10	*Eumeces schneiderii zarudnya*	Orange-tailed Skink	Least Concern	-	✓	-	✓
11	*Laudakia nupta fusca*	Yellow-headed Rock Agama	Least Concern	-	-	-	✓
12	*Mesalina watsonana*	Persian Long-tailed Desert Lizard	Least Concern	-	-	-	✓
13	*Ophiomorus tridactylus*	Indian Sand Swimmer	Least Concern	-	✓	✓	✓
14	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	Least Concern	-	✓	-	-
15	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern	-	✓	✓	✓
16	*Phrynocephalus ornatus*	Striped Toad Agama	Least Concern	-	✓	✓	-
17	*Platyceps karelini*	Spotted Desert Racer	Least Concern	-	✓	-	-
18	*Psammophis schokari*	Forskal's Sand Snake	Least Concern	-	✓	✓	-

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Post-Monsoon 2022 Survey*	*Spring 2023 Survey*	*Summer 2024 Survey*
19	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	-	✓	-	✓
20	*Trapelus ruderatus*	Horny-scaled Agama	Least Concern	-	-	-	✓
21	*Varanus griseus caspius*	Desert Monitor	Least Concern	Appendix I	-	-	✓
Total					**9**	**6**	**14**

Exhibit 7.78: Herpetofauna Species Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022, Spring 2023 and Summer 2024 Surveys

a) Sand Racerunner *(Eremias scripta)*

b) Alcock's or Chagai Toad-headed Agama *(Phrynocephalus euptilopus)*

c) Orange-tailed Skink (*Eumeces schneiderii zarudnya)*

d) Baloch Green Toad (*Bufotes zugmayeri*)

e) Brilliant Ground Agama *(Trapelus agilis)*

f) Yellow-speckled Toad-headed Agama (Phrynocephalus luteoguttatus)

g) Transcaspian Saw-scaled Viper *(Echis carinatus multisquamatus)*

h) Afghan Toad-headed Agama (Phrynocephalus clarkorum)

Post-Monsoon 2022 Survey

A total of 23 specimens belonging to nine species were observed from 13 sampling locations in the Northern Groundwater System Northern Groundwater System study area in Post-Monsoon 2022 Survey. The species observed include the Alcock's/Chagai Toad-headed Agama (*Phrynocephalus euptilopus),* Black Tailed Toad-headed Agama (*Phrynocephalus maculatus)*, Gold Skink (*Platyceps karelini)*, Indian Sand Swimmer (*Ophiomorus tridactylus)*, Ornated Toad-headed Agama (*Acanthodactylus micropholis)*, Spotted Desert Racer (*Eumeces zarudnyi*), Schokari Sand Racer (*Psammophis schokari),* and Ornated Toad-headed Agama (*Phrynocephalus ornatus)*. Of these species, the Alcock's/Chagai Toad-headed Agama (*Phrynocephalus euptilopus)* is a restricted range species. This species is primarily found in Chagai District of Baluchistan. As this species is known to have a restricted range such as sandy deserts, align well with the habitat preferences of this species, making its presence in the area plausible.

The highest density of herpetofauna was observed in the Sandy Plains/Sand Dunes (6.0), followed by Gravel Plains (1.8), Agricultural Areas/Date Palms (1.0), Clayey Plains (1.0), Dry Streambeds (0.3). Similarly, the highest diversity of herpetofauna was observed in the Sandy Plains/Sand Dunes (3.0), followed by Agricultural Areas/Date Palms (1.0), Gravel Plains (0.5), Clayey Plains (0.5) and Dry Streambeds (0.3).

No herpetofauna species were observed in the Mountains/Hills. Sandy Plains/Sand Dunes with little vegetation provide refuge and food compared to other habitats. On the other hand, the Mountains/Hills in the Northern Groundwater System study area were dry without any shelter, which is the reason for the absence of herpetofauna in this habitat. The highest abundance and richness (11 specimens of six species) were observed at Sampling Location E5, located in Sandy Plains/Sand Dunes along the Northern Groundwater System.

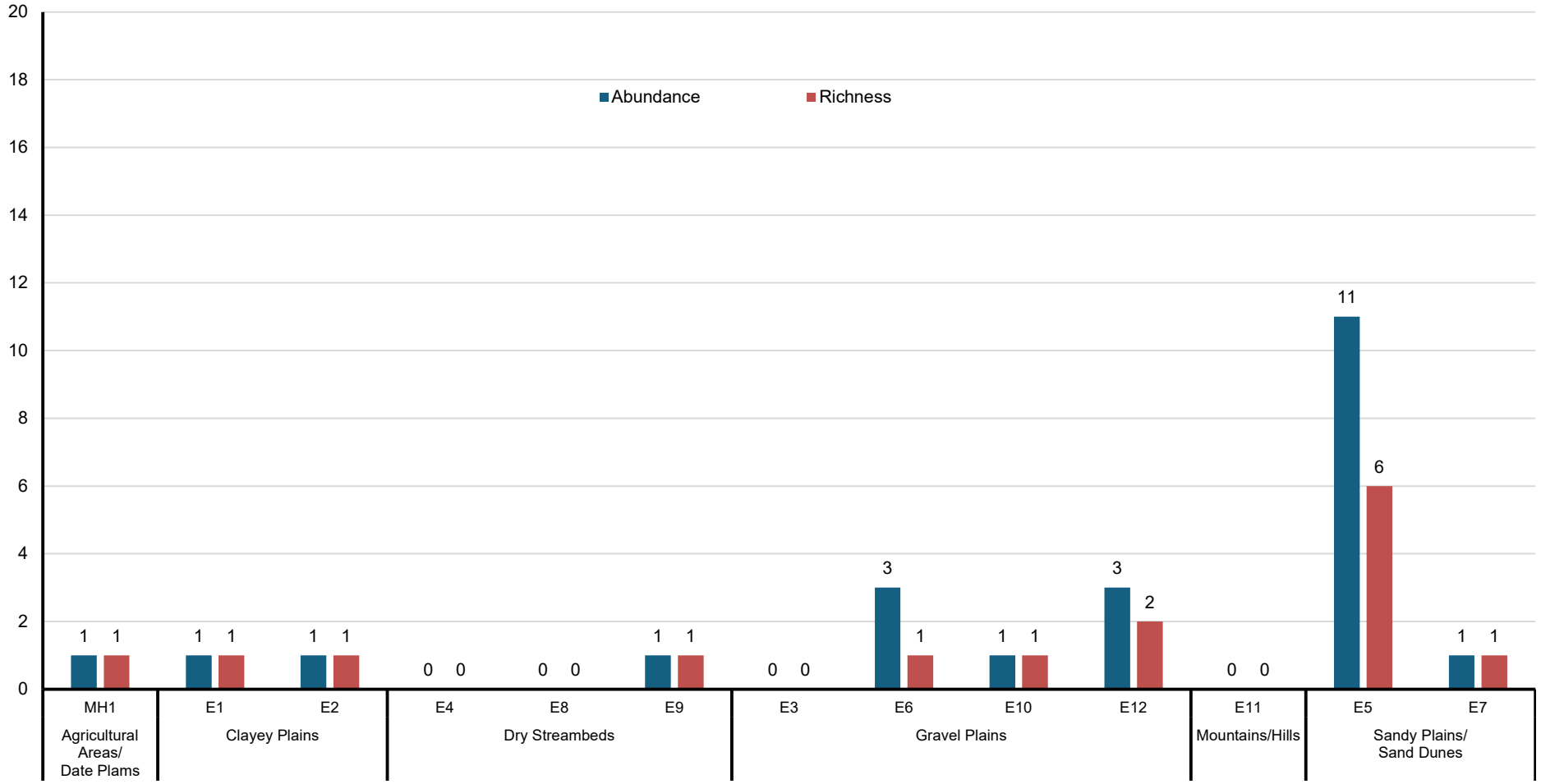
Exhibit 7.79 provides the abundance of herpetofauna species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey. **Exhibit 7.80** provides the abundance and richness of herpetofauna species observed in the Northern Groundwater System study area in the Post-Monsoon 2022 Survey.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.79: Herpetofauna Species by Habitat Type Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey

No.	Scientific Names	Common Names	Habitat						
			Clayey Plains	Gravel Plains	Dry Streambeds	Sandy Plains/Sand Dunes	Mountains/Hills	Agricultural Areas/Date Palms	Total
1	*Phrynocephalus maculatus*	Black-tailed Toad-headed Agama	2	6	-	4	-	-	**12**
2	*Trapelus agilis*	Brilliant Ground Agama	-	-	-	-	-	1	**1**
3	*Phrynocephalus euptilopus*	Chagai Toad-headed Agama	-	-	-	1	-	-	**1**
4	*Platyceps karelini*	Spotted Desert Racer	-	-	-	1	-	-	**1**
5	*Ophiomorus tridactylus*	Indian Sand Swimmer	-	-	-	4	-	-	**4**
6	*Acanthodactylus micropholis*	Yellowtail Fringe-fingered Lizard	-	-	-	1	-	-	**1**
7	*Eumeces zarudnyi*	Gold Skink	-	-	-	1	-	-	**1**
8	*Psammophis schokari*	Schokari Sand Racer	-	-	1	-	-	-	**1**
9	*Phrynocephalus ornatus*	Ornated Toad-headed Agama	-	1	-	-	-	-	**1**
Abundance			**2**	**7**	**1**	**12**	**-**	**1**	**23**
Richness			**1**	**2**	**1**	**6**	**0**	**1**	**9**

Exhibit 7.80: Abundance and Richness of Herpetofauna Species by Sampling Locations Observed in the Northern Groundwater System Study Area in Post-Monsoon 2022 Survey



Spring 2023 Survey

A total of 20 specimens belonging to six species were observed from 13 sampling locations in the Northern Groundwater System study area in the Spring 2023 Survey. The species observed include the Black-tailed Toad-headed Agama (*Phrynocephalus maculatus)*, Schokari Sand Racer (*Psammophis schokari)*, Sand Racerunner (*Eremias scripta)*, Indian Sand Swimmer (*Ophiomorus tridactylus)*, Saw-scaled Viper (*Echis carinatus multisquamatus)*, and Ornated Toad-headed Agama (*Phrynocephalus ornatus)*.

The highest density of herpetofauna was observed in the Sandy Plains/Sand Dunes (5.0), followed by Clayey Plains (1.5), Dry Streambeds (1.5), Gravel Plains (1.3), and Agricultural Areas/Date Palms (1.0). Similarly, the highest diversity of herpetofauna was also observed in the Sandy Plains/Sand Dunes (2.0), followed by Agricultural Areas/Date Palms (1.0), Gravel Plains (0.8), Clayey Plains and Dry Streambeds (0.5 each). However, no herpetofauna species were observed in the Mountains/Hills. The highest abundance (five specimens) and richness (two species) were observed at Sampling Location E5 located in Sandy Plains/Sand Dunes.

The Sandy Plains/Sand Dunes offer unique advantages in terms of predator protection for reptiles. The loose and shifting nature of the sand can create challenging terrain for predators to navigate prey, making it more difficult for them to access reptiles. In addition, the sandy substrate also provides excellent opportunities for reptiles to hide and burrow in extreme temperatures. This habitat experiences minimal disturbances, with only occasional grazing by camels. This low level of disruption allows reptiles to inhabit and navigate the sandy terrain for feeding, shelter, and reproduction.

Exhibit 7.81 provides the abundance of herpetofauna species observed in the Northern Groundwater System study area in the Spring 2023 Survey.

Exhibit 7.82 provides the abundance and richness of herpetofauna species observed in the Northern Groundwater System study area in the Spring 2023 Survey.

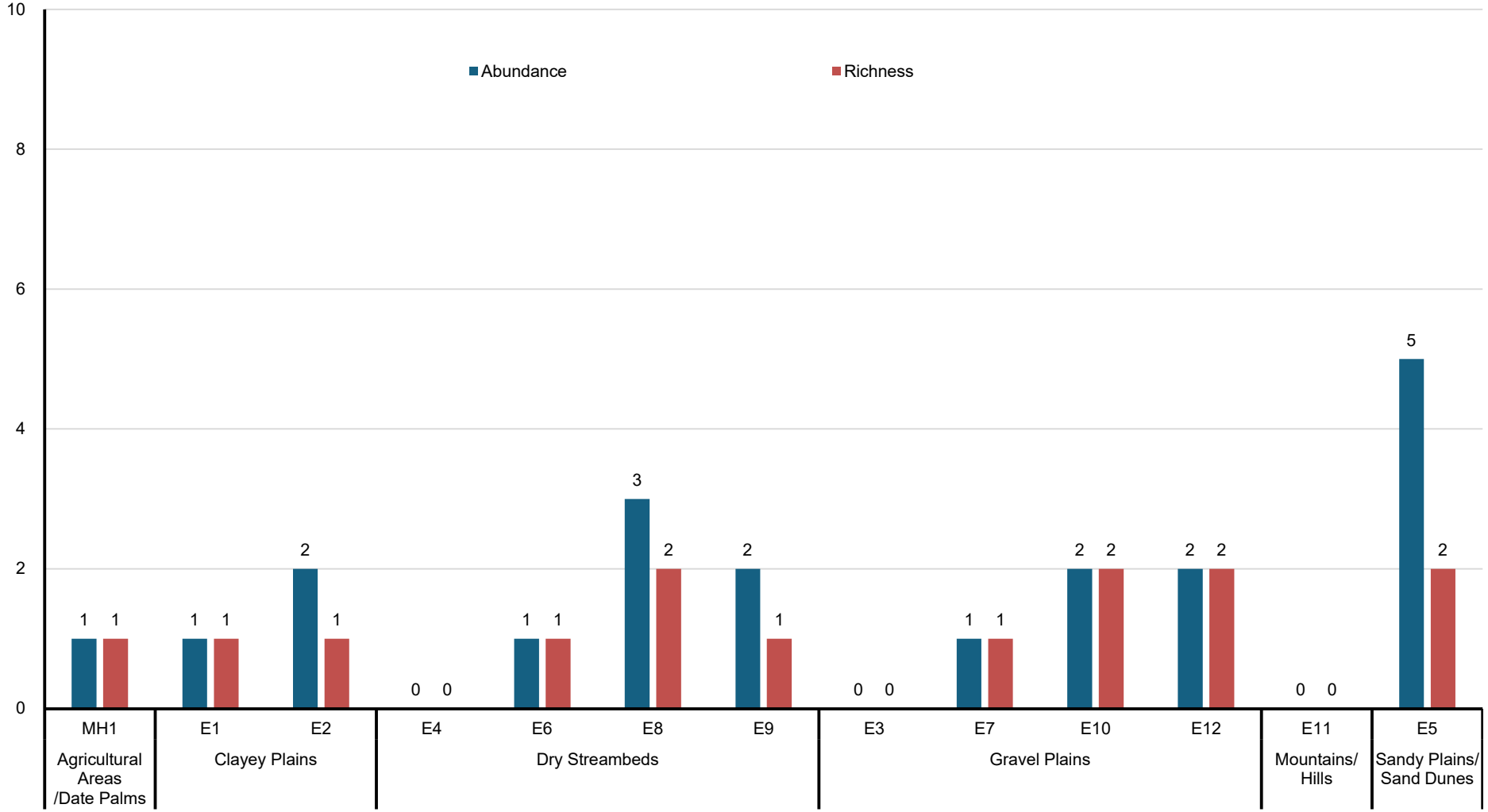
No sampling was conducted at the Northern Groundwater System study area in the Previous Spring Survey therefore, no comparison is provided.

Exhibit 7.81: Herpetofauna Species by Habitat Type Observed along Northern Groundwater System Study Area in Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Habitat*						
			Dry Streambeds	*Sandy Plains/ Sand Dunes*	*Gravel Plains*	*Mountains/Hills*	*Clayey Plains*	*Agricultural Areas/Date Palms*	*Total*
1	*Phrynocephalus maculatus*	Black-tailed Toad-headed Agama	5	3	3	-	3	-	**14**
2	*Psammophis schokari*	Schokari Sand Racer	-	-	1	-	-	-	**1**
3	*Eremias scripta*	Sand Racerunner	1	-	-	-	-	-	**1**
4	*Ophiomorus tridactylus*	Indian Sand-swimmer	-	2	-	-	-	-	**2**

No.	*Scientific Name*	*Common Name*	*Habitat*						
			Dry Streambeds	*Sandy Plains/ Sand Dunes*	*Gravel Plains*	*Mountains/Hills*	*Clayey Plains*	*Agricultural Areas/Date Palms*	*Total*
5	*Echis carinatus multisquamatus*	Saw-scaled Viper	-	-	-	-	-	1	**1**
6	*Phrynocephalus ornatus*	Ornated Toad-headed Agama	-	-	1	-	-	-	**1**
Abundance			**6**	**5**	**5**	**-**	**3**	**1**	**20**
Richness			**2**	**2**	**3**	**-**	**1**	**1**	**6**

Exhibit 7.82: Abundance and Richness of Herpetofauna Species by Sampling Locations Observed along Northern Groundwater System Study Area in Spring 2023 Survey



Summer 2024 Survey

A total of 15 herpetofauna species were captured/observe along the Northern Groundwater System in the Summer 2024 Survey through pitfall trapping and nocturnal surveys. Of these, 14 species were captured using the pitfall trapping method, while only one species was observed in the nocturnal surveys.

Exhibit 7.83 provides the list of herpetofauna species captured/observed along the Northern Groundwater System through pitfall trapping and nocturnal surveys in the Summer 2024 Survey.

Exhibit 7.83: Herpetofauna Species Captured/Observed along the Northern Groundwater System in Summer 2024 Survey

No	*Species List*	*Common Name*	*IUCN Status*	*Northern Groundwater System*	
				Pitfall Trapping	*Nocturnal Survey*
1	*Bufotes zugmayeri*	Baloch Green Toad	Near Threatened	✓	-
2	*Bunopus tuberculatus*	Baluch Ground Gecko	Least Concern	✓	-
3	*Cyrtopodion sistanense*	Sistan Angular-toed Gecko	Least Concern	✓	-
4	*Cyrtopodion sp*	-	-	✓	-
5	*Eremias acutirostris*	Point-snouted Racerunner	Least Concern	✓	-
6	*Eremias persica*	Persian Racerunner	Least Concern	✓	-
7	*Eumeces schneiderii zarudnya*	Orange-tailed Skink	Least Concern	✓	-
8	*Laudakia nupta fusca*	Yellow-headed Rock Agama	Least Concern	✓	-
9	*Mesalina watsonana*	Persian Long-tailed Desert Lizard	Least Concern	✓	-
10	*Ophiomorus tridactylus*	Indian Sand-swimmer	Least Concern	✓	-
11	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern	✓	-
12	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	Least Concern	-	✓
13	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	✓	-
14	*Trapelus ruderatus*	Horny-scaled Agama	Least Concern	✓	-
15	*Varanus griseus caspius*	Desert Monitor	Least Concern	✓	-
Total				**14**	**1**

Pitfall Trapping

A total of 52 herpetofauna specimens belonging to 14 species were captured from six sampling locations along the Northern Groundwater System in the Summer 2024 Survey.

The highest density of herpetofauna was recorded in the Mountains/Hills (9.7), followed by Sandy Plains/Sand Dunes (9.5) and Agricultural Areas (4.0). Similarly, the highest

diversity of herpetofauna species was also recorded in Mountains/Hills (3.3), followed by Agricultural Areas (3.0) and Sandy Plains/Sand Dunes (2.0). The highest abundance of herpetofauna species was recorded at Sampling Location TP1 (14 specimens) located in Mountains/Hills habitat type, whereas, the highest richness of herpetofauna species was observed at Sampling Location TP3 (seven species) located in Mountains/Hills.

The Mountains/Hills habitat type near Kachao, and Tang Kachao proved to be the most promising for herpetofauna species due to its unique environmental characteristics that offer essential resources for survival. In these terrains, the combination of rocky outcrops, crevices, and varied topography have created ample opportunities for shelter, providing protection from predators and extreme temperatures. These features offered ideal refugia for reptiles and amphibians, allowing them to regulate their body temperature by moving between sun-exposed and shaded areas.

The microhabitats found in mountainous regions near Sarzai Settlement also support a rich diversity of prey species, such as insects, which attract a variety of herpetofauna. The presence of natural water sources, like small pools; stagnant water in rocky depressions, further enhances the suitability of this habitat, particularly in arid environments where water is a limiting factor and key stone resource.

The varied elevation, and vegetation patterns, as well as agricultural land across mountains and hills, contribute to ecological diversity, supporting different species with specific habitat preferences, making this terrain a biodiversity hotspot for herpetofauna in the region.

Exhibit 7.84 provides the abundance and richness of herpetofauna species by habitat type observed along the Northern Groundwater System in the Summer 2024 Survey.

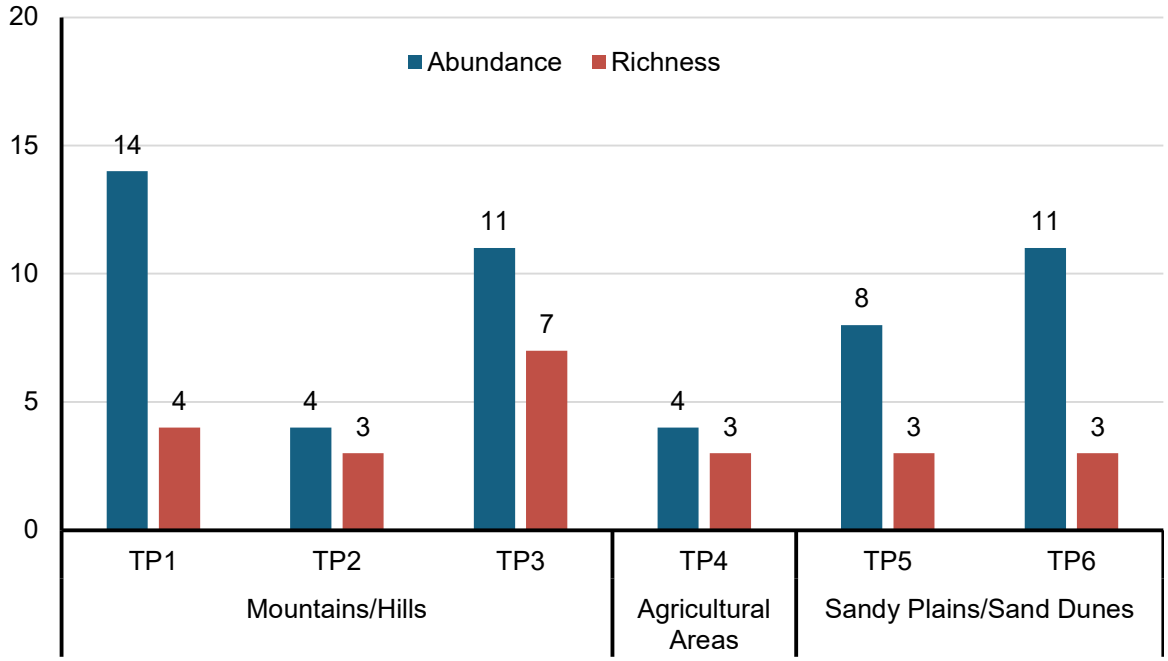
Exhibit 7.85 provides the abundance and richness of herpetofauna species by sampling locations observed at each sampling location along with their habitat types in Summer 2024 Survey.

Exhibit 7.84: Abundance of Herpetofauna by Habitat Type Captured along the Northern Groundwater System in Summer 2024 Survey

No.	*Scientific Names*	*Common Names*	*Habitat*			
			Agricultural Areas	*Mountains/Hills*	*Sand Dunes*	***Total***
1	*Bufotes zugmayeri*	Baloch Green Toad	0	9	0	**9**
2	*Bunopus tuberculatus*	Baloch Ground Gecko	1	0	0	**1**
3	*Cyrtopodion sistanense*	Sistan Angular-toed Gecko	2	1	1	**4**
4	*Cyrtopodion sp*	-	0	2	0	**2**
5	*Eremias acutirostris*	Point-snouted Racerunner	0	0	11	**11**
6	*Eremias persica*	Persian Racerunner	0	1	0	**1**

No.	Scientific Names	Common Names	Habitat			Total
			Agricultural Areas	Mountains/Hills	Sand Dunes	
7	*Eumeces schneiderii zarudnya*	Orange-tailed Skink	0	5	0	**5**
8	*Laudakia nupta fusca*	Yellow-headed Rock Agama	0	2	0	**2**
9	*Mesalina watsonana*	Persian Long-tailed Desert Lizard	0	3	0	**3**
10	*Ophiomorus tridactylus*	Indian Sand-swimmer	0	0	4	**4**
11	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	0	0	3	**3**
12	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	0	3	0	**3**
13	*Trapelus ruderatus*	Horny-scaled Agama	1	2	0	**3**
14	*Varanus griseus caspius*	Desert Monitor	0	1	0	**1**
Abundance			**4**	**29**	**19**	**52**
Richness			**3**	**10**	**4**	**14**

Exhibit 7.85: Abundance and Richness of Herpetofauna Species by Sampling Location Captured along the Northern Groundwater System in Summer 2024 Survey



Nocturnal Survey

A total of five herpetofauna specimens belonging to only one species, Keyserling's Wonder Gecko *(Teratoscincus keyserlingii)* was observed from two transects taken along the Northern Groundwater System during Summer 2024 Survey. All these specimens

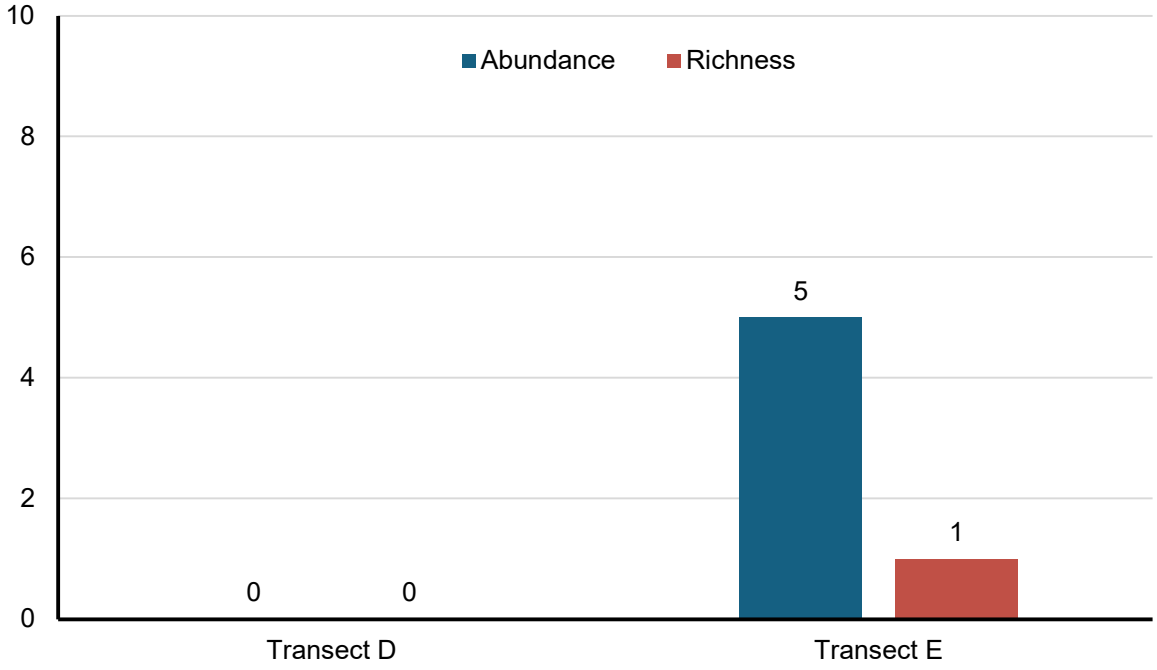
were observed from Transect E near Baghicha Fly Camp. No specimen of any species was observed from the Transect D located near Kirthaka FC Post.

This species is strictly nocturnal. It becomes active during the cooler evening and night hours to avoid the high daytime temperatures of its arid habitat. This behaviour helps the gecko regulate its body temperature and reduce water loss.

Keyserling's Wonder Gecko *(Teratoscincus keyserlingii)* is adapted to specific habitat conditions, which include low undulating sand dunes, and sandy plains with a relatively good cover of vegetation, predominantly grasses.

Exhibit 7.86 provides the abundance and richness of herpetofauna species by sampling locations observed along the Northern Groundwater System in the nocturnal surveys.

Exhibit 7.86: Abundance of Herpetofauna Observed along the Northern Groundwater System in Summer 2024 Survey



Access Route to Reko Diq Mine Site Study Area

A total of 17 herpetofauna species were observed within the surveyed area along the Access Route to Reko Diq Mine Site study area during the Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys. Of these, three species were observed in the Post-Monsoon 2022 Survey, five species in the Spring 2023 Survey and 16 species were observed in Summer 2024 Survey. Some of the common herpetofauna species observed along the Northern Groundwater System include Black Tailed Toad-headed Agama (*Phrynocephalus maculatus),* Brilliant Ground Agama (*Trapelus agilis),* and Sand Racerunner (*Eremias scripta).*

Exhibit 7.87 provides the list of herpetofauna species observed along the Access Route to Reko Diq Mine Site in Post-Monsoon 2022, Spring 2023 and Summer 2024 surveys.

Exhibit 7.87: Herpetofauna Species Observed along the Access Route to Reko Diq Mine Site Study Area in Post-Monsoon 2022, Spring 2023 and Summer 2024 Surveys

No	Scientific Name	Common name	IUCN Status	CITES Status	Post-Monsoon 2022 Survey	Spring 2023 Survey	Summer 2024 Survey
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	Least Concern	-	✓	✓	✓
2	*Crossobamon eversmanni*	Comb-toed Gecko	Least Concern	-	-	-	✓
3	*Cyrtopodion sp*	-	-	-	-	-	✓
4	*Echis carinatus multisquamatus*	Multiscale Saw-scaled viper	Least Concern	-	-	-	✓
5	*Eremias acutirostris*	Point-snouted Racerunner	Least Concern	-	-	-	✓
6	*Eremias cf. scripta*	Sand Racerunner	-	-	-	✓	✓
7	*Eremias scripta*	Sand Racerunner	Least Concern	-	-	-	✓
8	*Ophiomorus tridactylus*	Indian Sand Swimmer	Least Concern	-	✓	✓	-
9	*Phrynocephalus clarkorum*	Clark's toad-headed Agama	Least Concern	-	-	✓	✓
10	*Phrynocephalus luteoguttatus*	Yellow-speckled toad-headed Agama	Least Concern	-	-	-	✓
11	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern	-	✓	✓	✓
12	*Phrynocephalus ornatus*	Striped Toad Agama	Least Concern	-	-	-	✓
13	*Phrynocephalus scutellatus*	Gray Toad-headed Agama	Least Concern	-	-	-	✓
14	*Psammophis schokari*	Forskal's Sand Snake	Least Concern	-	-	-	✓
15	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	Least Concern	-	-	-	✓
16	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	-	-	-	✓
17	*Trapelus ruderatus*	Horny-scaled Agama	Least Concern	-	-	-	✓
Total					**3**	**5**	**16**

Post-Monsoon 2022 Survey

A total of five specimens belonging to three species were observed within the surveyed area from eight sampling locations. The species observed in the Access Route study area include the Black-tailed Toad-headed Agama (*Phrynocephalus maculatus)*, Indian Sand Swimmer (*Ophiomorus tridactylus)*, and Blanford's Fringe-fingered Lizard (*Acanthodactylus blanfordii)*.

The highest density of herpetofauna was observed in the Dry Streambeds (1.0), followed by Gravel Plains (1.8), Agricultural Areas/Date Palms (1.0), Clayey Plains (1.0), and Dry Streambeds (0.5). Similarly, the highest diversity of herpetofauna was also observed in the Dry Streambeds (0.7), followed by Gravel Plains (0.5). However, no herpetofauna species was observed in Mountain/Hills. Mountains/Hills along the Access Route were dry without any shelter which is the reason for the absence of herpetofauna.

Exhibit 7.88 provides the abundance of herpetofauna species observed along the Access Route to the Reko Diq Mine Site study area.

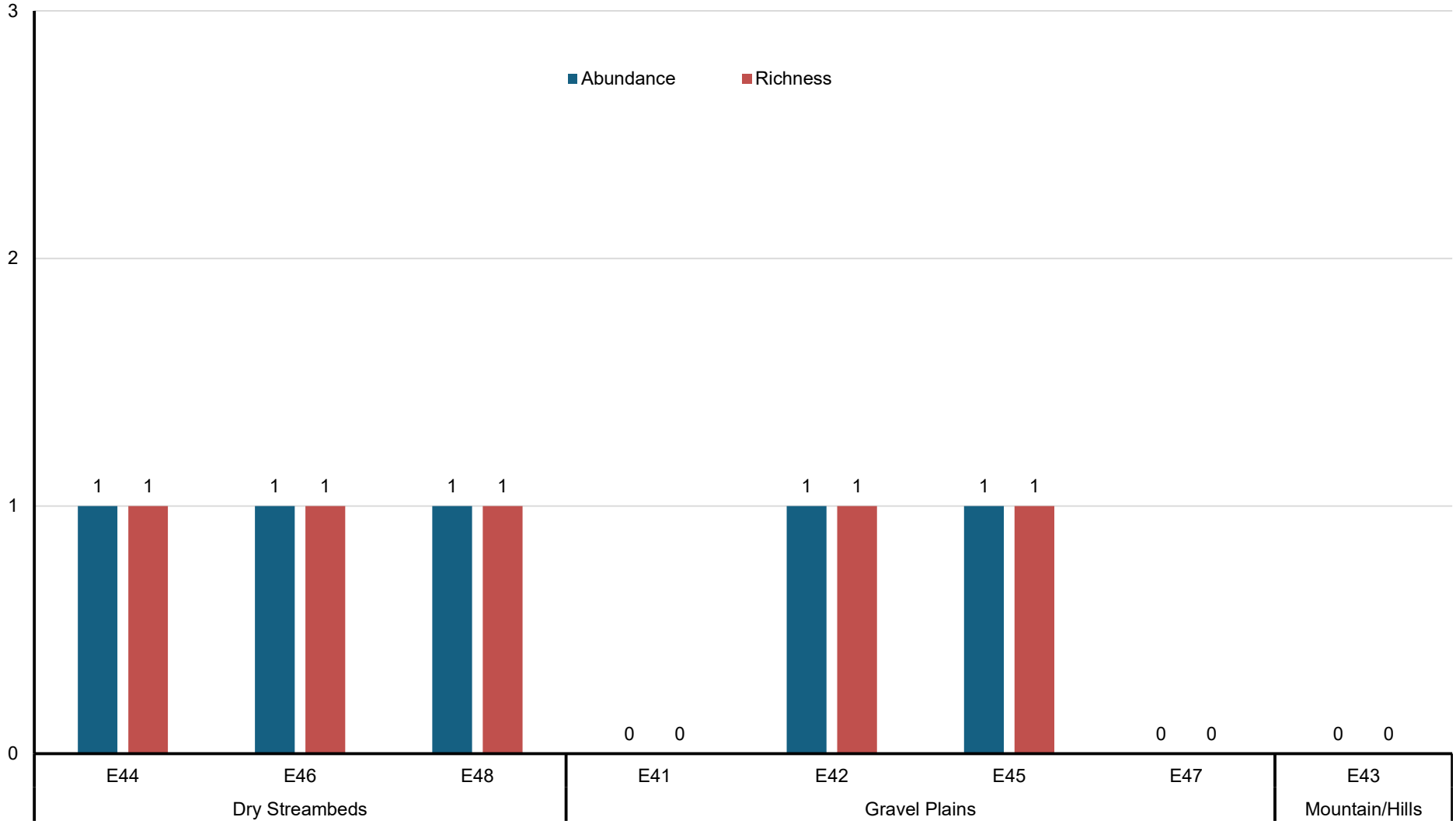
Exhibit 7.89 provides the abundance and richness of herpetofauna species observed along the Access Route to the Reko Diq Mine Site study area.

The comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is provided in **Appendix G**.

Exhibit 7.88: Herpetofauna Species by Habitat Type Observed along Access Route to the Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey

No.	*Scientific Names*	*Common Names*	*Habitat*			
			Gravel Plains	*Dry Streambeds*	*Mountains/Hills*	*Total*
1.	*Phrynocephalus maculatus*	Black-tailed Toad-headed Agama	1	2	-	**3**
2.	*Ophiomorus tridactylus*	Indian Sand Swimmer	1	-	-	**1**
3.	*Acanthodactylus blanfordii*	Blanford's Fringe-fingered Lizard	-	1	-	**1**
Abundance			**2**	**3**	**-**	**5**
Richness			**2**	**2**	**0**	**3**

Exhibit 7.89: Abundance and Richness of Herpetofauna Species by Sampling Locations Observed along Access Route to Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey



Spring 2023 Survey

A total of 10 specimens belonging to five species were observed from eight sampling locations along the Access Route to the Reko Diq Mine Site study area in the Spring 2023 Survey. The species observed include the Black-tailed Toad-headed Agama *Phrynocephalus maculatus*, Blanford's Fringe-fingered Lizard *Acanthodactylus blanfordii*, Clark's Toad-headed Agama *Phrynocephalus clarkorum*, Seistan Racerunner *Eremias fasciata*, and Indian Sand Swimmer *Ophiomorus tridactylus*.

The highest density of herpetofauna was observed in the Mountain/Hills (2.0), followed by Dry Streambeds (1.6). Similarly, the highest diversity of herpetofauna was also observed in the Mountain/Hills (2.0), followed by Dry Streambeds (0.6). However, no herpetofauna species were observed in Gravel Plains. The highest abundance (three specimens) and richness (two species) were observed at Sampling Location E48 located in Dry Streambeds.

Exhibit 7.90 provides the abundance of herpetofauna species observed along the Access Route to the Reko Diq Mine Site.

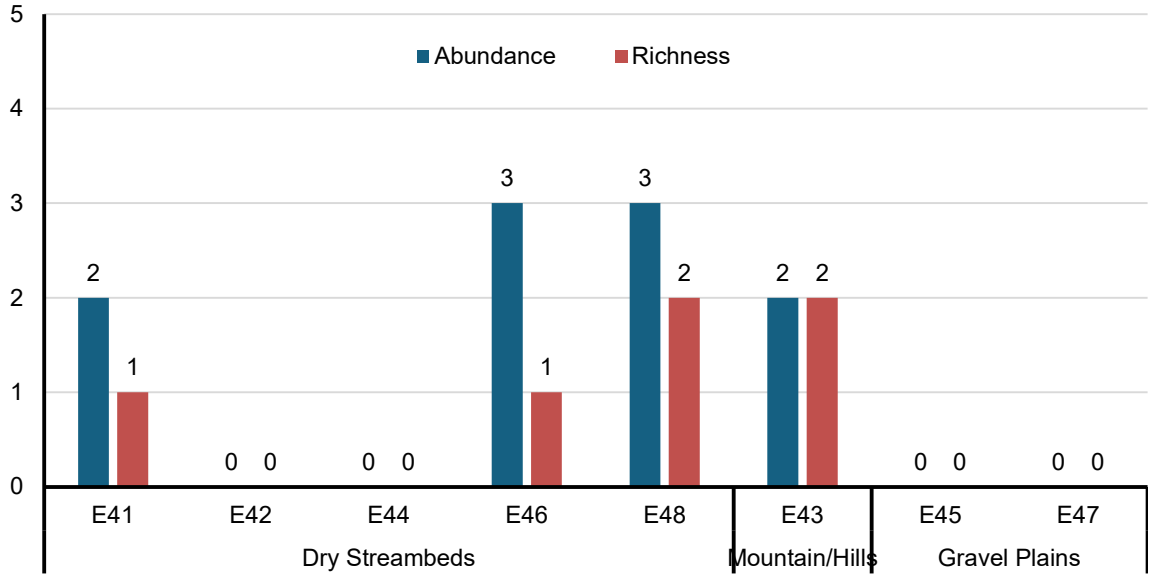
Exhibit 7.91 provides the abundance and richness of herpetofauna species observed along the Access Route to the Reko Diq Mine Site.

No sampling was conducted at the Access Route to Reko Diq Mine Site in the Previous Spring Survey, therefore, no comparison is provided.

Exhibit 7.90: Herpetofauna Species by Habitat Type Observed along Access Route to the Reko Diq Mine Site Study Area, Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Dry Streambeds*	*Gravel Plains*	*Mountain/Hills*	*Total*
1.	*Phrynocephalus maculatus*	Black-tailed Toad-headed Agama	2	-	-	**2**
2.	*Acanthodactylus blanfordii*	Blanford's Fringe-fingered Lizard	2	-	-	**2**
3.	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	-	-	1	**1**
4.	*Ophiomorus tridactylus*	Indian Sandswimmer	-	-	1	**1**
5.	*Eremias cf. scripta*	Sand Racerunner	4	-	-	**4**
Abundance			**8**	**-**	**2**	**10**
Richness			**3**	**-**	**2**	**5**

Exhibit 7.91: Abundance and Richness of Herpetofauna Species by Sampling Locations Observed along Access Route to Reko Diq Mine Site Study Area, Spring 2023 Survey



Summer 2024 Survey

A total of 16 herpetofauna species were captured along the Access Route to Reko Diq Mine Site in the Summer 2024 Survey. All of these species were captured in the pitfall traps. No nocturnal survey was conducted along the Access Route to Reko Diq Mine Site.

Exhibit 7.92 provides the list of herpetofauna species captured/observed along the Access Route to Reko Diq Mine Site in Summer 2024 Survey.

Exhibit 7.92: Herpetofauna Species Captured/Observed along the Access Route to Reko Diq Mine Site through Pitfall Trapping, Summer 2024 Survey

No	*Species List*	*Common Name*	*IUCN Status*
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	Least Concern
2	*Crossobamon eversmanni lumsdenii*	Comb-Toed Gecko	Least Concern
3	*Cyrtopodion sp*		-
4	*Echis carinatus multisquamatus*	Multiscale Saw-scaled Viper	Least Concern
5	*Eremias acutirostris*	Point-Snouted Racerunner	Least Concern
6	*Eremias cf scripta*	Racerunner	-
7	*Eremias scripta*	Sand Racerunner	Least Concern
8	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	Least Concern
9	*Phrynocephalus luteoguttatus*	Yellow-speckled Toad-headed Agama	Least Concern
10	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern

No	Species List	Common Name	IUCN Status
11	*Phrynocephalus ornatus*	Striped Toad Agama	Least Concern
12	*Phrynocephalus scutellatus*	Gray Toad-headed Agama	Least Concern
13	*Psammophis schokari*	Forskal's Sand Snake	Least Concern
14	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	Least Concern
15	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern
16	*Trapelus ruderatus*	Horny-scaled Agama	Least Concern

Pitfall Trapping

A total of 29 herpetofauna specimens belonging to 16 species were captured from four sampling locations along the Access Route to Reko Diq Mine Site in the Summer 2024 Survey.

The highest density of herpetofauna was recorded in the Sandy Plains/Sand Dunes (12.0), followed by Gravel Plains (8.0), Mountains/Hills (5.0) and Clayey Plains (4.0). Similarly, the highest diversity of herpetofauna species was also recorded in Sandy Plains/Sand Dunes (9.0), followed by Clayey Plains (4.0), Gravel Plains (4.0) and Mountains/Hills (3.0). The highest abundance (12 specimens) and richness (nine species) of herpetofauna species was recorded at Sampling Location TP14 located in Sandy Plains/Sand Dunes habitat type.

The Sandy Plains/Sand Dunes habitat type is a promising habitat for the survival of herpetofauna species especially geckos, as these species are highly adapted to the harsh and arid conditions. These geckos rely on camouflage, effective heat regulation, and specialized hunting techniques to thrive in their sandy habitats, demonstrating a high level of ecological specialization.

Exhibit 7.93 provides the abundance and richness of herpetofauna species by habitat type captured along the Access Route to Reko Diq Mine Site in the Summer 2024 Survey.

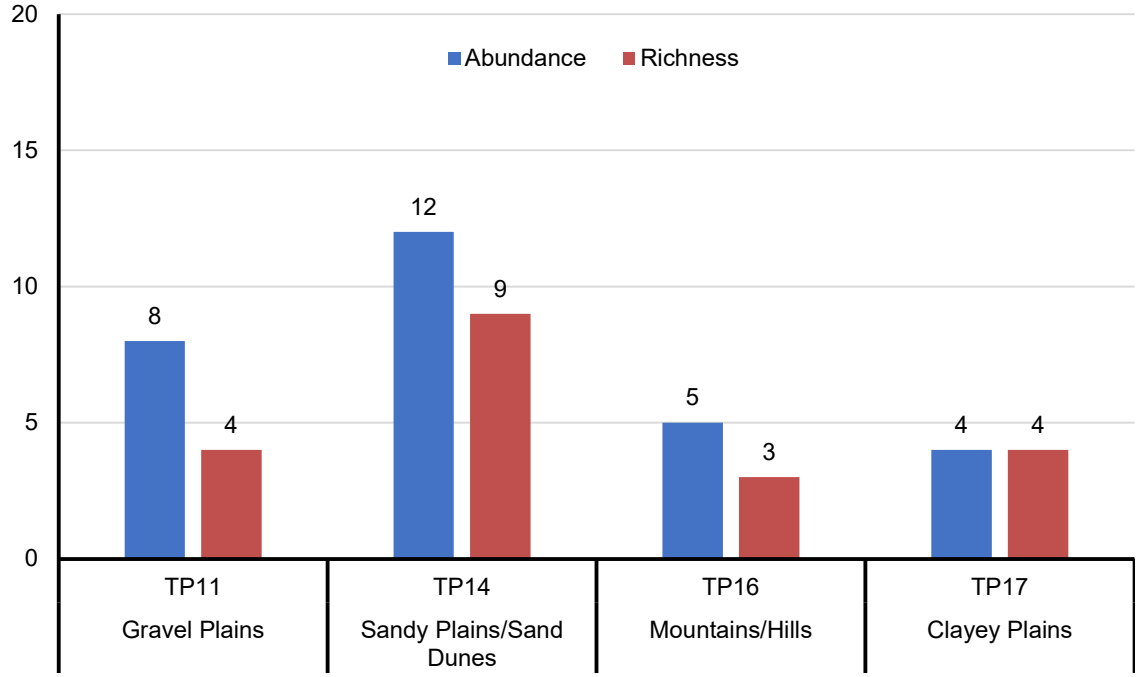
Exhibit 7.94 provides the abundance and richness of herpetofauna species by sampling locations captured at each sampling location along with their habitat types in Summer 2024 Survey.

Exhibit 7.93: Abundance of Herpetofauna by Habitat Type Captured along the Access Route to Reko Diq Mine Site in Summer 2024 Survey

No.	Scientific Names	Common Names	Habitat					Total
			Clayey Plains	Dry Streambeds	Gravel Plains	Sand Dunes	Mountains/Hills	
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	1	0	0	0	0	**1**
2	*Crossobamon eversmanni lumsdenii*	Comb-toed Gecko	1	0	0	0	0	**1**

No.	Scientific Names	Common Names	Habitat					Total
			Clayey Plains	Dry Streambeds	Gravel Plains	Sand Dunes	Mountains/Hills	
3	*Cyrtopodion sp*	-	0	0	0	1	0	**1**
4	*Echis carinatus multisquamatus*	Multiscale Saw-scaled Viper	0	0	1	0	0	**1**
5	*Eremias acutirostris*	Point-snouted Racerunner	0	0	0	1	0	**1**
6	*Eremias cf scripta*	Racerunner	0	0	4	0	0	**4**
7	*Eremias scripta*	Sand Racerunner	0	0	0	1	0	**1**
8	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	0	0	0	2	0	**2**
9	*Phrynocephalus luteoguttatus*	Yellow-Speckled Toad-headed Agama	0	0	0	2	0	**2**
10	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	1	0	2	1	0	**4**
11	*Phrynocephalus ornatus*	Striped Toad Agama	0	0	0	1	3	**4**
12	*Phrynocephalus scutellatus*	Gray Toad-headed Agama	0	0	0	1	0	**1**
13	*Psammophis schokari*	Forskal's Sand Snake	0	0	0	0	1	**1**
14	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	0	0	1	0	0	**1**
15	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	1	0	0	0	1	**2**
16	*Trapelus ruderatus*	Horny-scaled Agama	0	0	0	2	0	**2**
Abundance			**4**	**0**	**8**	**12**	**5**	**29**
Richness			**4**	**0**	**4**	**9**	**3**	**16**

Exhibit 7.94: Abundance and Richness of Herpetofauna Species by Sampling Location Captured along the Access Route to Reko Diq Mine in Summer 2024 Survey



Nocturnal Survey

No nocturnal survey was conducted along the Access Route to Reko Diq Mine Site.

Zangi Nawar Game Reserve

Summer 2024 Survey

A total of 20 herpetofauna species were captured/observed at Zangi Nawar Game Reserve in the Summer 2024 Survey through pitfall trapping and nocturnal surveys. Of these, 11 species of herpetofauna were captured using pitfall traps, and 18 species were observed during nocturnal surveys.

Exhibit 7.95 provides the list of herpetofauna species captured/observed at Zangi Nawar Game Reserve through pitfall trapping and nocturnal surveys in Summer 2024 Survey.

Exhibit 7.95: Herpetofauna Species Captured/Observed at Zangi Nawar Game Reserve in Summer 2024 Survey

No	*Scientific Species*	*Common Name*	*IUCN Status*	*Zangi Nawar Game Reserve*	
				Pitfall Trap	*Nocturnal Survey*
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	Least Concern	✓	✓
2	*Acanthodactylus micropholis*	Yellow-Tailed Fringe-fingered Lizard	Least Concern	✓	✓

No	Scientific Species	Common Name	IUCN Status	Zangi Nawar Game Reserve	
				Pitfall Trap	Nocturnal Survey
3	*Bunopus tuberculatus*	Baluch Ground Gecko	Least Concern	-	✓
4	*Calotes versicolor*	Changeable Lizard	Least Concern	-	✓
5	*Cyrtopodion watsoni*	Watson's Gecko	Least Concern	-	✓
6	*Echis carinatus multisquamatus*	Multiscale Saw-scaled Viper	Least Concern	-	✓
7	*Eremias scripta*	Sand Racerunner	Least Concern	✓	✓
8	*Eristicophis macmahoni*	Mcmahon's Desert Viper	Least Concern	-	✓
9	*Euphlyctis adolfi*	Bangladesh Skittering Frog	Least Concern	-	✓
10	*Lytorhynchus maynardi*	Maynard's Longnose Sand Snake	Least Concern	✓	✓
11	*Ophiomorus tridactylus*	Indian Sand-Swimmer	Least Concern	✓	-
12	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	Least Concern	✓	✓
13	*Phrynocephalus luteoguttatus*	Yellow-Speckled Toad-headed Agama	Least Concern	✓	✓
14	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	Least Concern	-	✓
15	*Phrynocephalus ornatus*	Striped Toad Agama	Least Concern	✓	✓
16	*Platyceps rhodorachis*	Wadi Racer	Least Concern	-	✓
17	*Psammophis schokari*	Forskål's Sand Snake	Least Concern	✓	-
18	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	Least Concern	✓	✓
19	*Teratoscincus microlepis*	Small-scaled Wonder Gecko	Least Concern	-	✓
20	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern	✓	✓
Total				**11**	**18**

Pitfall Trapping

A total of 45 herpetofauna specimens belonging to 11 species were captured from three sampling locations at Zangi Nawar Game Reserve in the Summer 2024 Survey. All these species were captured from the Sandy Plains/Sand Dunes habitat types and are highly adapted to the loose sandy habitats. The Sand Plains/Sand Dunes is the only major habitat; therefore, sampling was only conducted in this habitat. The highest abundance (26 specimens) and richness (seven species) of herpetofauna species was recorded at Sampling Location TP29 located in Sandy Plains/Sand Dunes at Zangi Nawar Game Reserve in Summer 2024 Survey.

The Sandy Plains/Sand Dunes surrounding Zangi Nawar Lake serve as microhabitat for various herpetofauna species. These loose sandy areas provide ideal conditions for species like Blandford's Fringe-toed Lizard (*Acanthodactylus blanfordii*), and Yellow-tailed Fringe-fingered Lizard (*Acanthodactylus micropholis*), which thrive in dynamic, shifting sands. Species such as Keyserling's Wonder Gecko (*Teratoscincus keyserlingii*) and Brilliant Ground Agama (*Trapelus agilis pakistanensis*) also rely on these microhabitats for shelter, thermoregulation, and foraging. The proximity of these sandy plains to the wetland enhances their importance, as the moisture from the wetland supports prey availability and creates favourable microclimates, making these habitats essential for the survival and diversity of herpetofauna in the region.

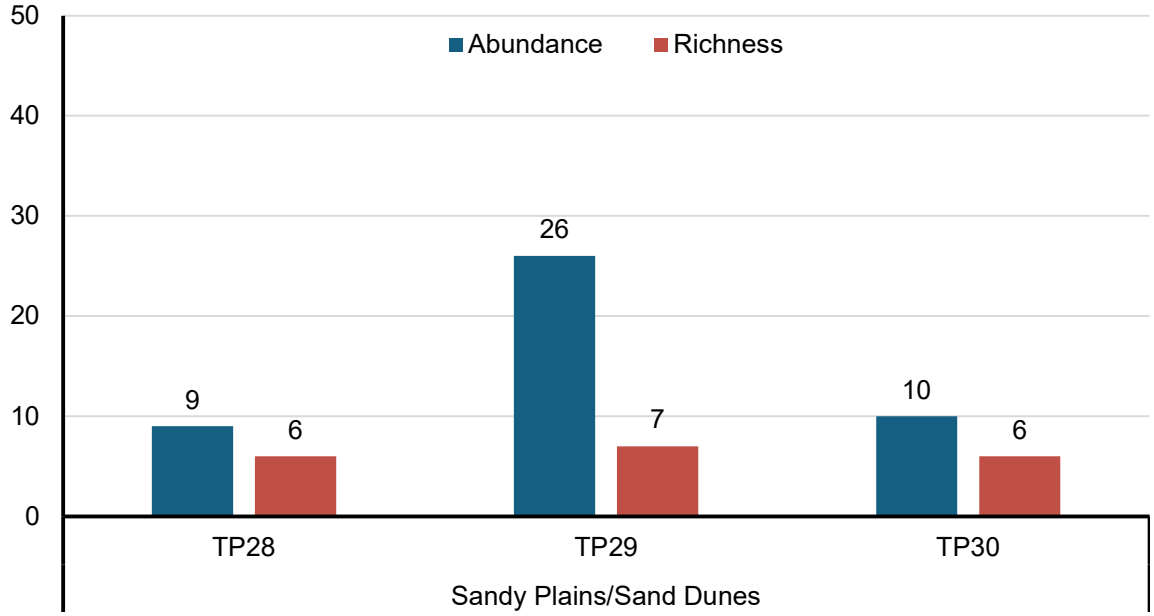
Exhibit 7.96 provides the abundance and richness of herpetofauna species by habitat type captured at Zangi Nawar Game Reserve in the Summer 2024 Survey

Exhibit 7.97 provides the abundance and richness of herpetofauna species by sampling locations captured at Zangi Nawar Game Reserve in Summer 2024 Survey.

Exhibit 7.96: Abundance and Richness of Herpetofauna by Habitat Type Captured at Zangi Nawar Game Reserve in Summer 2024 Survey

No.	*Scientific Name*	*Common Names*	***Total***
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	**8**
2	*Acanthodactylus micropholis*	Yellow-Tailed Fringe-fingered Lizard	**5**
3	*Eremias scripta*	Sand Racerunner	**5**
4	*Lytorhynchus maynardi*	Maynard's Longnose Sand Snake	**1**
5	*Ophiomorus tridactylus*	Indian Sand-swimmer	**6**
6	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	**3**
7	*Phrynocephalus luteoguttatus*	Yellow-Speckled Toad-headed Agama	**9**
8	*Phrynocephalus ornatus*	Striped Toad Agama	**2**
9	*Psammophis schokari*	Forskål's Sand Snake	**1**
10	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	**2**
11	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	**3**
Abundance			**45**
Richness			**11**

Exhibit 7.97: Abundance and Richness of Herpetofauna Species by Sampling Location Captured at Zangi Nawar Game Reserve in Summer 2024 Survey

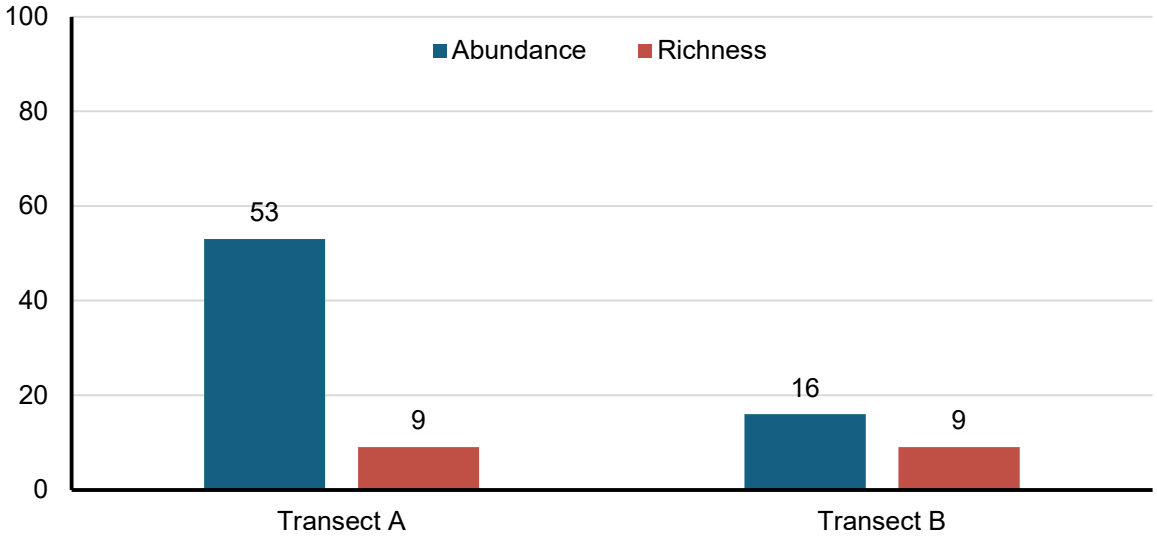


Nocturnal Survey

A total of 69 herpetofauna specimens belonging to 18 species were observed from the two transects taken at Zangi Nawar Game Reserve. The highest abundance (53 specimens) and richness (nine species) of herpetofauna species was observed along Transect A. All these species are highly adapted to the arid and sandy environment. Mostly these species are active from dusk till night and actively forage during that period to avoid extreme heat.

Exhibit 7.98 provides the abundance and richness of herpetofauna species by sampling locations observed at Zangi Nawar Game Reserve in the Summer 2024 Survey.

Exhibit 7.98: Abundance and Richness of Herpetofauna Observed at Zangi Nawar Game Reserve in Summer 2024 Survey



Corridor

Summer 2024 Survey

A total of 10 herpetofauna species were captured/observed along the Corridor in the Summer 2024 Survey. All of these species were captured using pitfall traps. No nocturnal survey was conducted along the Corridor.

Exhibit 7.99 provides the list of herpetofauna species captured/observed along the Corridor in Summer 2024 Survey.

Exhibit 7.99: Herpetofauna Species Captured/Observed along the Corridor through Pitfall Trapping in Summer 2024 Survey

No	*Species List*	*Common Name*	*IUCN Status*
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	Least Concern
2	*Acanthodactylus micropholis*	Yellow-Tailed Fringe-fingered Lizard	Least Concern
3	*Crossobamon eversmanni lumsdenii*	Comb-Toed Gecko	Least Concern
4	*Crossobamon mynardi*	-	Not Evaluated
5	*Cyrtopodion kirmanense*	Kirman Thin-toed Gecko	Least Concern
6	*Eremias scripta*	-	Least Concern
7	*Eumeces schneiderii zarudnya*	Orange-tailed Skink	Least Concern
8	*Mesalina watsonana*	Persian Long-tailed Desert Lizard	Least Concern
9	*Ophiomorus tridactylus*	Indian Sand-swimmer	Least Concern
10	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	Least Concern

Pitfall Trapping

A total of 30 herpetofauna specimens belonging to 10 species were captured from seven sampling locations along the Corridor in the Summer 2024 Survey. Species captured include; the Blandford's Fringe-toed Lizard (*Acanthodactylus blanfordii*), Yellow-tailed Fringe-fingered Lizard (*Acanthodactylus micropholis*), Comb-toed Gecko (*Crossobamon eversmanni*), Kirman Thin-toed Gecko (*Cyrtopodion kirmanense*), Orange-tailed Skink (*Eumeces schneiderii zarudnya*) Sand Racerunner (*Eremias scripta*), and Brilliant Ground Agama (*Trapelus agilis pakistanensis)*.

The highest density of herpetofauna was recorded in the Mountains/Hills (6.5), followed by Clayey Plains (4.0), Gravel Plains (4.0), Agricultural Areas (3.5) and Sandy Plains/Sand Dunes (2.0). Similarly, the highest diversity of herpetofauna species was recorded in Clayey Plains and Mountains/Hills (3.0 each) followed by Agricultural Areas, Gravel Plains and Sandy Plains/Sand Dunes (2.0 each). The highest abundance (10 specimens) and richness (four species) of herpetofauna species was recorded at Sampling Location TP27 located in Mountains/Hills near Ras Koh Range along the Corridor in Summer 2024 Survey.

At sampling location near the dry mountains of Ras Koh, the mix of agricultural and mountainous habitat for herpetofauna was notably unique due to the region's arid conditions and rugged terrain. This landscape offered a variety of microhabitats, including rocky outcrops, sparse to dense vegetation in agricultural areas, and steep slopes, which were crucial for supporting a specialized range of herpetofauna. Despite the overall dryness, these mountains provided essential refuges and ecological niches for various species. Geckos and lizards, adapted to the dry and rocky environment, found shelter in crevices and foraged for insects among the sparse vegetation. The altitude and climatic conditions created diverse microclimates, allowing for a range of species adapted to the harsh and variable conditions of Ras Koh.

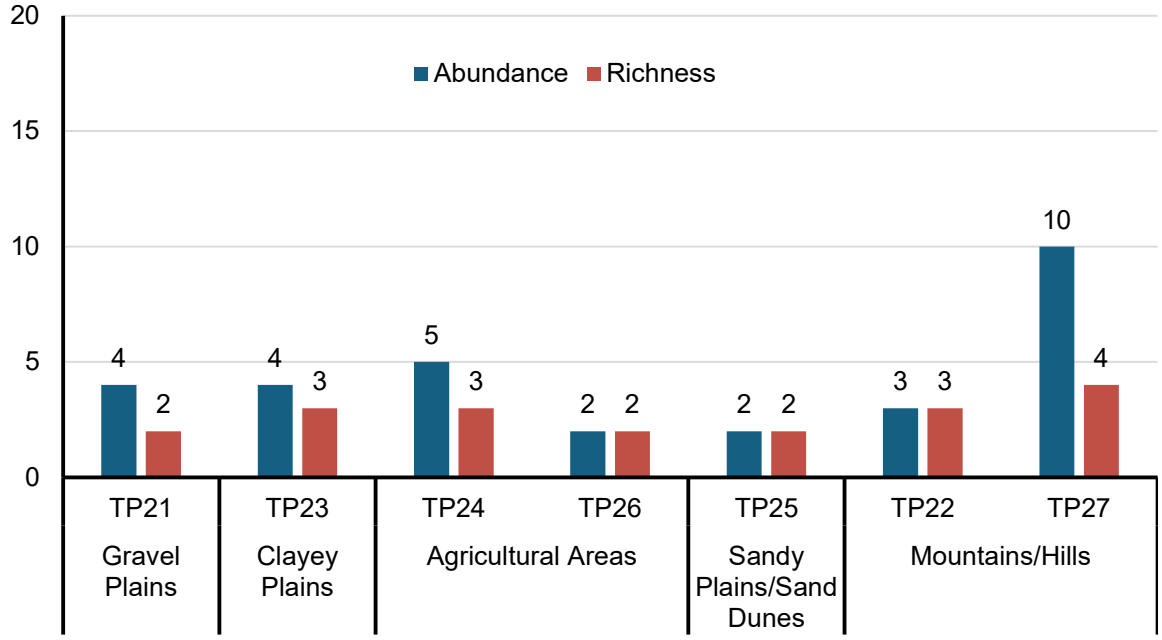
Exhibit 7.100 provides the abundance and richness of herpetofauna species by habitat type captured along the Corridor in the Summer 2024 Survey.

Exhibit 7.101 provides the abundance and richness of herpetofauna species by sampling locations captured along Corridor with their habitat types in Summer 2024 Survey.

Exhibit 7.100: Abundance and Richness of Herpetofauna by Habitat Type Captured along the Corridor in Summer 2024 Survey

No.	*Scientific Name*	*Common Names*	*Habitat*				
			Gravel Plains	*Mountains/Hills*	*Clayey Plains*	*Agricultural Areas*	*Sandy Plains/ Sand Dunes*
1	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	0	5	1	2	0
2	*Acanthodactylus micropholis*	Yellow-Tailed Fringe-fingered Lizard	0	0	0	0	1
3	*Crossobamon eversmanni lumsdenii*	Comb-toed Gecko	3	1	0	0	0
4	*Crossobamon mynardi*		0	0	0	2	0
5	*Cyrtopodion kirmanense*	Kirman Thin-toed Gecko	1	0	0	0	0
6	*Eremias scripta*		0	0	1	2	1
7	*Eumeces schneiderii zarudnya*	Orange-tailed Skink	0	1	0	0	0
8	*Mesalina watsonana*	Persian Long-tailed Desert Lizard	0	1	0	0	0
9	*Ophiomorus tridactylus*	Indian Sand Swimmer	0	2	2	1	0
10	*Trapelus agilis pakistanensis*	Brilliant Ground Agama	0	3	0	0	0
Abundance			**4**	**13**	**4**	**7**	**2**
Richness			**2**	**6**	**3**	**4**	**2**

Exhibit 7.101: Abundance and Richness of Herpetofauna Species by Sampling Location Captured along the Corridor in Summer 2024 Survey



Nocturnal Survey

No nocturnal survey was conducted along the Corridor in Summer 2024 Survey.

Potentially Undescribed Species

Three herpetofauna species observed in the RDMS surveys are considered to be potentially new species and as such, blood and tissue samples have been collected and will need to be analysed to confirm taxonomy (**Exhibit 7.102**).

Exhibit 7.102: Undescribed Species Observed in the RDMS Surveys

Species	Project Facility	Sampling Location	Coordinates	Abundance	Survey	
					Spring 2023 Survey	*Summer 2024 Survey*
Cyrtopodion sp.	Northern Groundwater System	TP3	29°28'43.92"N, 61°14'58.02"E	2		Yes
	Access Route to Reko Diq Mine Site	TP14	29°04'10.16"N, 62°24'38.67"E	1		Yes
Eremias sp	Reko Diq Mine Site	E14	29°8'54.034"N, 61°54'41.924"E	1	Yes	
	Reko Diq Mine Site	E29	29°4'57.94"N, 62°1'24.098"E	1	Yes	
Eremias cf. scripta	Reko Diq Mine Site	TP9	29°05'42.0"N, 62°02'51.4"E	1		Yes
	Access Route to Reko Diq Mine Site	TP11	29°01'07.7"N, 62°05'08.2"E	4		Yes
	Northern Groundwater System	E8	29°20'2.089"N, 61°45'12.97"E	1	Yes	

However, the specialist consultant's opinion at the time of the assessment, is that these species will be later confirmed as a new species based on distinct morphological differences from other known species, such as:

- *Cyrtopodion* sp. - The specimens collected exhibit morphological and meristic characters distinct from their closely related congeners, such as *Cyrtopodion scabrum* and *Cyrtopodion watsoni (***Exhibit 7.103**). Key differences include:

- Arrangement of tuberculated dorsal scales.
- Number of scales across the mid-belly.
- Number of intraorbital scales.
- Arrangement of subcaudal scales.

- *Eremias* sp. - Specimens of *Eremias* sp. members of the family Lacertidae, could not be assigned to any known *Eremias* taxa (**Exhibit 7.104**). The only resemblance they show were with *Eremias lineolata* in dorsal coloration, but notable differences with known *Eremias* taxa include:
  - Smaller snout-vent length and head-to-length ratio.
  - Fewer dorsal scales across the midbody.
  - Presence of dorsolateral stripes.
  - More ventral scales across the belly, along with distinct supra- and infralabials.
- *Eremias* cf. *scripta* - These specimens closely resemble *Eremias scripta* in dorsal coloration, but differ in size and specific morphological and scalation details (**Exhibit 7.104**), such as:
  - Longer snout-vent length than *Eremias scripta*
  - More precloacal pores than *Eremias scripta*.
  - Fewer dorsal scales across the midbody and ventral scales compared to those reported for *Eremias scripta*.

Exhibit 7.103: Map indicating locations of Unidentified species, Eremias cf scripta

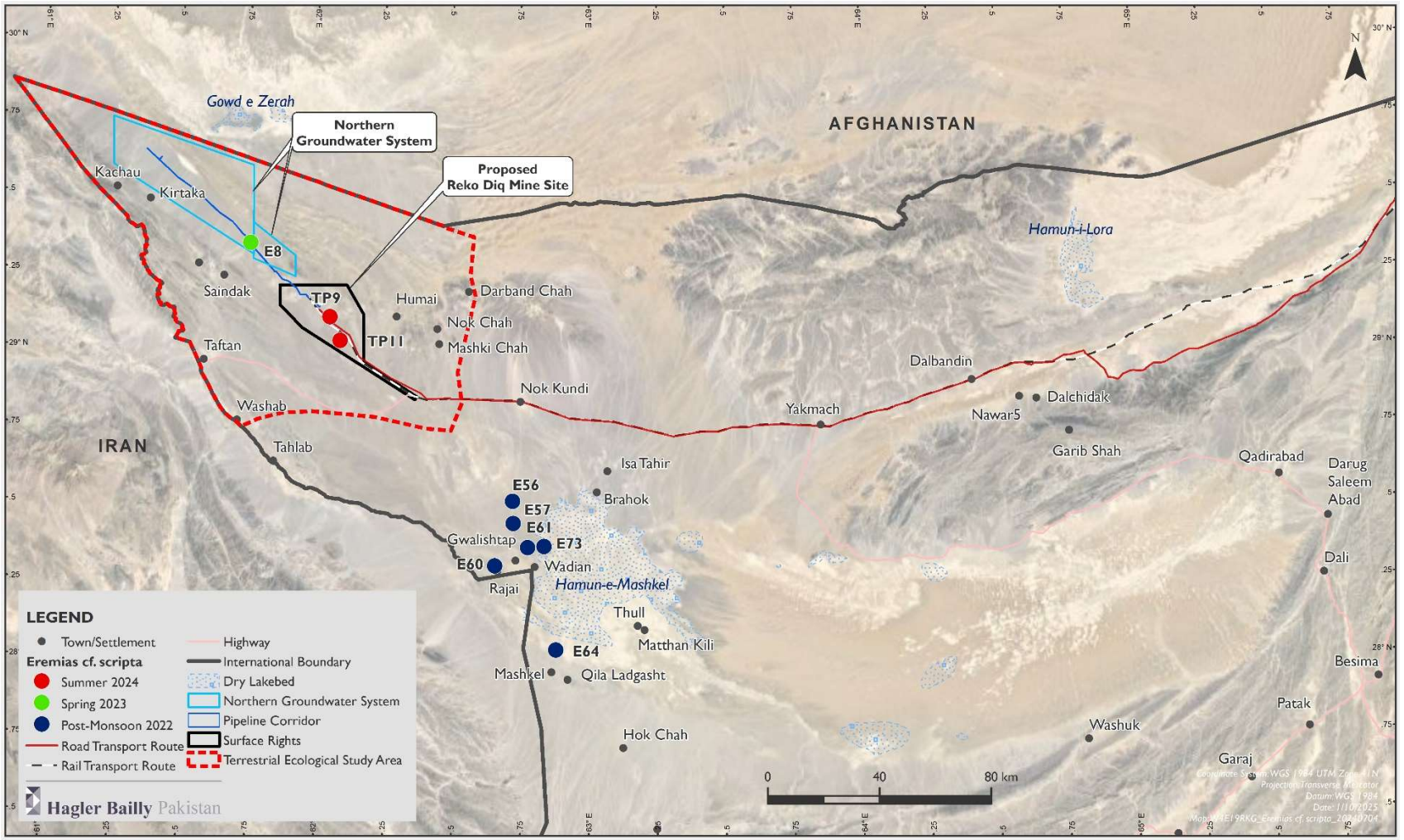
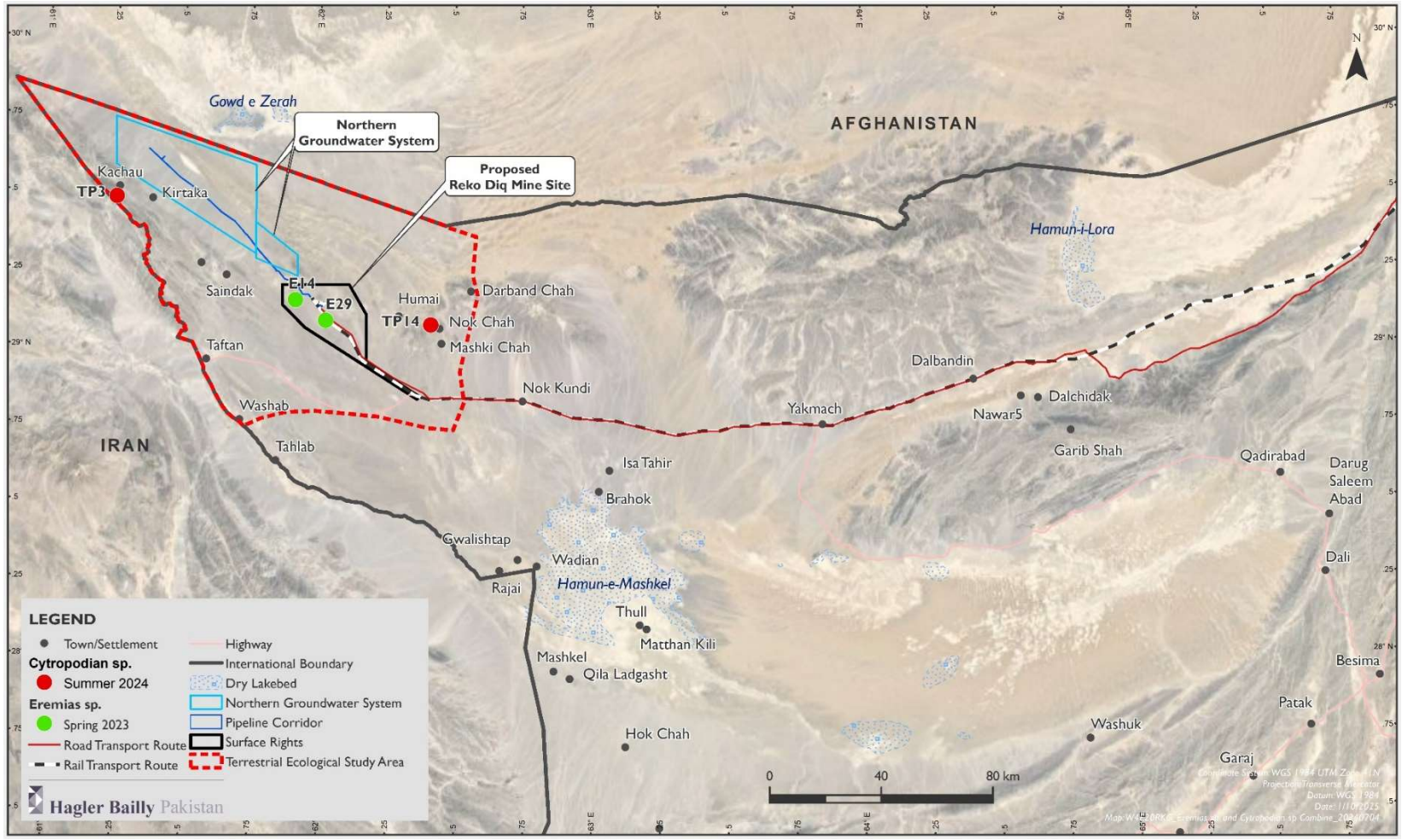


Exhibit 7.104: Map indicating locations of Unidentified species, *Eremias sp . and Cyrtopodion sp*



Port Qasim – Coastal Study Area

Post-Monsoon 2023 Survey

A total of seven herpetofauna specimens belonging to four species were observed within the surveyed area from three sampling locations (T1, T2 and T3) during the Post-Monsoon 2023 Survey. The species observed were the Indian Fringe-fingered Lizard (*Acanthodactylus cantoris)*, Jerdon's Cabrita (*Ophisops jerdonii)*, Oriental Garden Lizard (*Calotes versicolor)*, and Schokari Sand Racer (*Psammophis schokari)*.

The highest diversity of herpetofauna was observed in Vegetation Cluster (3.0) followed by Industrial Units (1.0). The highest density of herpetofauna was also observed in the Vegetation Cluster (6.0) followed by the Industrial Units (1.0). None of any specimens was observed in Barren Land. The higher diversity and density of herpetofauna in Vegetation Cluster was likely due to the availability of diverse food resources along creeks, such as insects, as well as suitable hiding places in the vegetation which creates a favourable environment for herpetofauna.

Exhibit 7.105 provides photographs of herpetofauna species observed along the Port Qasim Study Area during the Post-Monsoon 2023 Survey.

Exhibit 7.106 provides the abundance of herpetofauna species along with IUCN Red List of Threatened Species, CITES status, and distribution range by habitat type observed along Port Qasim Area in the Post-Monsoon 2023 Survey. **Exhibit 7.107** provides the abundance and richness of herpetofauna species by sampling locations observed along Port Qasim Study Area in the Post-Monsoon 2023 Survey.

Exhibit 7.105: Herpetofauna Species Observed along Port Qasim Study Area in Post-Monsoon 2023 Survey

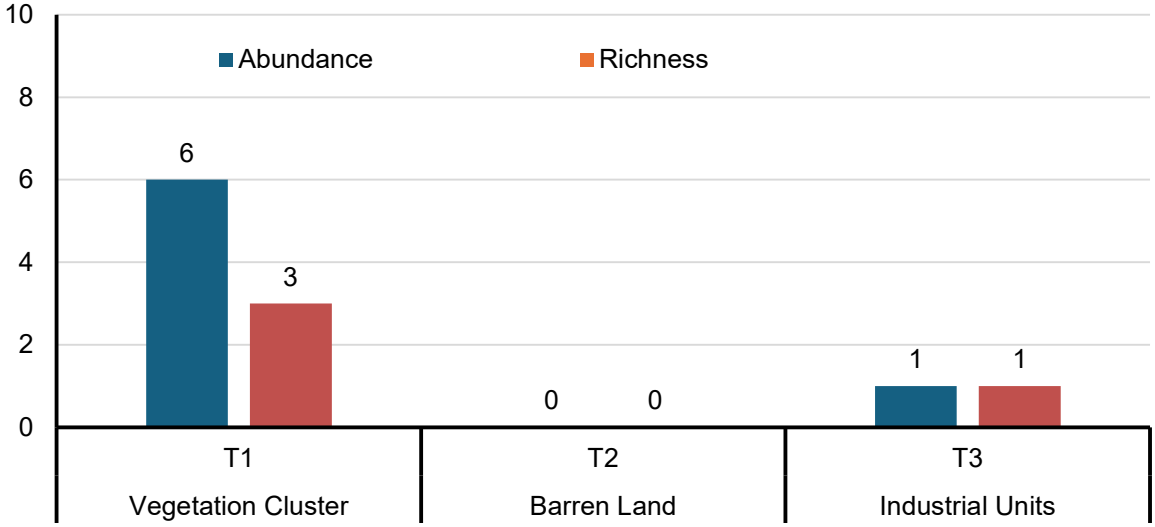
a) Indian Fringe-fingered Lizard *(Acanthodactylus cantoris)*

b) Jerdon's Cabrita *(Ophisops jerdonii)*

Exhibit 7.106: Herpetofauna Abundance, along with IUCN Red List of Threatened Species status, Distribution Range by Habitat Type Observed along Port Qasim Study Area in Post-Monsoon 2023 Survey

No.	Scientific Name	Common Name	IUCN Status	CITES Status	Distribution Range	Habitat			Total
						Vegetation Cluster	Barren Land	Industrial Units	
1	*Acanthodactylus cantoris*	Indian Fringe-fingered Lizard	Least Concern	-	Pakistan and India	3		-	3
2	*Calotes versicolor*	Oriental Garden Lizard	Least Concern	-	Iran, Pakistan, India, Nepal, Bangladesh, Burma, and Thailand	1	-	-	1
3	*Ophisops jerdonii*	Jerdon's Cabrita	Least Concern	-	Pakistan and India	2	-	-	2
4	*Psammophis schokari*	Schokari Sand Racer	Least Concern	-	Pakistan, Iran, UAE, and along the Sahara Desert	-	-	1	1
Total Abundance						**6**	**-**	**1**	**7**
Total (Richness)						**3**	**-**	**1**	**4**

Exhibit 7.107: Herpetofauna Abundance and Richness Observed along Port Qasim Study Area in Post-Monsoon 2023 Survey



Conservation Concern Species of Herpetofauna

All herpetofauna species observed at the Reko Diq Mine Site and Associated Infrastructure and Port Qasim study areas in the baseline surveys are listed as Least Concern or Data Deficient in the IUCN Red List of Threatened Species except for Baloch Green Toad (*Bufotes zugmayeri*) which is listed as Near Threatened and was observed in

Summer 2024 Survey from the Northern Groundwater System. Only one restricted range species i.e., Alcock's Toad-headed Agama (*Phrynocephalus euptilopus)* was observed along the Northern Groundwater System in Post-Monsoon 2022 Survey and at the Reko Diq Mine Site in Summer 2024 Survey.

Conservation Concern Species at Reko Diq Mine Site and Associated Infrastructure

One Near Threatened Indian Monitor Lizard (*Varanus bengalensis*) is reported from the area of the Reko Diq Mine Site and Associated Infrastructure which was not observed in the baseline surveys. Three Near Threatened species are reported by IBAT from the Reko Diq Mine Site and Associated Infrastructure (see **Exhibit 6.3**), which include the Central Asian Cobra (*Naja Oxiana*), Red Sand Boa (*Eryx johnii*), and Bengal Monitor Lizard (*Varanus bengalensis*). In addition to these, restricted range Alcock's Toad-headed Agama was also observed from the Northern Groundwater Syystem study area in Post-Monsoon Survey.

Conservation Concern Species along the Corridor and Zangi Nawar Game Reserve

All the species observed along the Corridor and at Zangi Nawar Game Reserve are listed as Least Concern in the IUCN Red List of Threatened Species.

Conservation Concern Species at Port Qasim

One Near Threatened Indian Monitor Lizard (*Varanus bengalensis*), One Endangered species, i.e., Green Sea Turtle (*Chelonia mydas japonica*) and Three Vulnerable species, i.e., Afghan Tortoise (*Testudo horsfieldi*), Indian Spiny–tailed Lizard (*Saara hardwickii*), and Mugger Crocodile (*Crocodylus palustris*) are reported from the Port Qasim were not observed in the baseline surveys.

The Green Sea Turtle (*Chelonia mydas japonica*), which is a marine species, was reported from Port Qasim. This species has nesting sites along the coastal areas of Pakistan. Although the marine habitat in creeks in the vicinity of Port Qasim is largely modified, the area still has the potential to host this species.

The possibility for the presence of Afghan Tortoise (*Testudo horsfieldi*), Indian Spiny–tailed Lizard (*Saara hardwickii*), and Mugger Crocodile (*Crocodylus palustris*) at Port Qasim is unlikely, as the habitat is largely modified, and specific environmental conditions for these species are not available.

Exhibit 7.108 provides herpetofauna f conservation concern reported in the literature review from the Reko Diq Mine Site and Associated Infrastructure and Port Qasim study areas along with reasons for their likely absence or limited presence based on habitat conditions.

Exhibit 7.108: Herpetofauna Conservation Concern Reported in the Literature Review and IBAT from the Reko Diq Mine Site and Associated Infrastructure and Port Qasim Study Areas

No	*Scientific Name*	*Common Name*	*IUCN Status*	*Location Reported*	*Preferred Habitat*	*Habitat Suitability & Reasons for Absence*
1.	*Varanus bengalensis*	Indian Monitor Lizard	NT	Reko Diq Mine Site	Grasslands, forests, agricultural lands,	Very low probability of survival due to dry conditions, low floral

No	*Scientific Name*	*Common Name*	*IUCN Status*	*Location Reported*	*Preferred Habitat*	*Habitat Suitability & Reasons for Absence*
				and Associated Infrastructure	scrublands, urban areas, areas with dense vegetation and water sources	diversity, and scarcity of prey (invertebrates). May survive in scattered vegetation patches near Port Qasim.
2.	*Naja oxiana*	Central Asian Cobra	NT	Reko Diq Mine Site and Associated Infrastructure	Rocky hillsides, arid and semi-arid regions, areas with sparse vegetation, near water sources	Unlikely to be present due to unsuitable habitat conditions for feeding and breeding.
3.	*Eryx johnii*	Red Sand Boa	NT	Reko Diq Mine Site and Associated Infrastructure	Semi-arid and arid regions, sandy plains, scrublands, dry grasslands, loose sandy soil for burrowing	Unlikely to be present due to unsuitable habitat conditions for feeding and breeding.
4.	*Varanus bengalensis*	Bengal Monitor Lizard	NT	Reko Diq Mine Site and Associated Infrastructure	Grasslands, forests, agricultural lands, scrublands, urban areas, areas with dense vegetation and water sources	Unlikely to be present due to unsuitable habitat conditions for feeding and breeding.
5.	*Chelonia mydas japonica*	Green Sea Turtle	EN	Port Qasim	Coastal areas, tropical and subtropical beaches for nesting, shallow waters, lagoons, bays, seagrass beds	Potential to be present as it has nesting sites along coastal areas of Pakistan, though the marine habitat near Port Qasim is largely modified.
6.	*Testudo horsfieldi*	Afghan Tortoise	VU	Port Qasim	Arid and semi-arid regions, deserts, rocky hillsides, dry grasslands, loose soil for burrowing	Little possibility of presence due to largely modified habitat and lack of suitable conditions.
7.	*Saara hardwickii*	Indian Spiny-tailed Lizard	VU	Port Qasim	Arid and semi-arid regions, deserts with sandy or stony soils, open spaces with sparse vegetation	Same as above
8.	*Crocodylus palustris*	Mugger Crocodile	VU	Port Qasim	Freshwater environments like rivers, lakes, ponds, marshes, man-made reservoirs, slow-moving or still water bodies	Same as above

Note: Endangered: (EN), Vulnerable: (VU), Near Threatened: (NT)

Discussion

In the arid and rugged landscape of Reko Diq Mine Site and Northern Groundwater System, herpetofauna exhibits diverse adaptations to the region's distinct habitat types. The Mountains and Hills offer rocky crevices and shaded areas, providing refuge for species such as the Clark's Toad-headed Agama (*Phrynocephalus clarkorum*), which thrives in these cooler, elevated environments. The Clayey and Gravel Plains, with their harder surfaces, support species like the Brilliant Ground Agama (*Phrynocephalus maculatus*), which is well-adapted to these barren and exposed habitats. Dry Streambeds, often featuring scattered vegetation and occasional moisture, attract species such as the Forskal's Sand Snake (*Psammophis schokari*), which utilizes these corridors for hunting and shelter. The Sandy Plains/Sand Dunes are crucial for sand-adapted species like the Blandford's Fringe-toed Lizard (*Acanthodactylus blanfordii*) and the Sand Racerunner (*Eremias scripta*), which burrow into the loose sand to escape extreme heat and find prey. Even agricultural areas, though human-modified, support opportunistic species that

benefit from the increased vegetation and water availability. The diversity of these habitat types, shaped by the arid climate and topography of the Study Area, creates a mosaic of microhabitats that support a wide range of herpetofauna, each adapted to the specific challenges of the desert environment.

The Sandy Plains/Sand Dunes surrounding Zangi Nawar Lake create an ideal habitat for a variety of herpetofauna species that are uniquely adapted to desert environments. Species like Blandford's Fringe-toed Lizard (*Acanthodactylus blanfordii*) and Yellow-tailed Fringe-fingered Lizard (*Acanthodactylus micropholis*) are perfectly suited to this habitat, using their fringed toes to run swiftly across the loose sand while burrowing into the cool substrate to regulate their body temperature. Similarly, the Sand Racerunner (*Eremias scripta*) thrives in the open, sandy plains, where its speed allows it to evade predators while foraging for insects. The Maynard's Longnose Sand Snake (*Lytorhynchus maynardi*) and Forskal's Sand Snake (*Psammophis schokari*) also benefit from the loose sand, using it to burrow and ambush prey, such as small lizards and rodents, which are abundant in this environment.

The Indian Sand-swimmer (*Ophiomorus tridactylus*), aptly named for its ability to "swim" through sand, relies on the shifting dunes to escape the harsh surface temperatures and predators, burrowing deep into the sand for protection. Similarly, Clark's Toad-headed Agama (*Phrynocephalus clarkorum*), Yellow-speckled Toad-headed Agama (*Phrynocephalus luteoguttatus*), and Striped Toad Agama (*Phrynocephalus ornatus*) utilize the sandy environment for camouflage and thermoregulation. Their ability to blend seamlessly into the desert landscape provides them with crucial protection from predators, while the loose sand offers an ideal place for burrowing and nesting.

Keyserling's Wonder Gecko (*Teratoscincus keyserlingii*), on the other hand, uses its sticky toe pads to navigate both the sand and nearby vegetation, taking advantage of the cool sands during the day and becoming active at night to hunt. The Brilliant Ground Agama (*Trapelus agilis pakistanensis*) also flourishes in this environment, using the open sandy terrain to bask in the sun and display its vibrant colors during territorial displays or courtship. Together, these species demonstrate the critical importance of the Sandy Plains/Sand Dunes around Zangi Nawar Lake, as they rely on this habitat for food, shelter, and reproduction.

The findings from the Summer 2024 Survey highlight the shared herpetofauna (amphibians and reptiles) between the Reko Diq Mine Site, Northern Groundwater System, and Zangi Nawar, indicating a notable ecological connection between these areas. At the Reko Diq Mine Site, a total of 16 species were recorded, 10 of which are also found at Zangi Nawar, suggesting a significant overlap in the species present at both locations. This overlap hints at similar environmental conditions or habitats that support these species.

Similarly, the Northern Groundwater System, where 15 species were recorded, shares five of its species with Zangi Nawar Game Reserve. Although the overlap is smaller compared to Reko Diq, it still points to a degree of ecological similarity between these areas. Additionally, the survey reveals that seven species are shared between the Reko Diq Mine Site and Northern Groundwater System, further suggesting that the almost identical topography of these regions supports similar herpetofauna populations. This

shared fauna across these areas highlights the interconnected nature of the ecosystems in the region.

7.1.5 Invertebrates

Reko Diq Mine Site

A total of five invertebrate taxa were observed within the surveyed area at the Reko Diq Mine Site study area in Post-Monsoon 2022 and Spring 2023 surveys. Of these, five taxa were observed in the Post-Monsoon 2022 Survey, while two were observed in the Spring 2023 Survey.

Exhibit 7.109 provides the list of species observed in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.110 provides some of the photographs of species observed in the Post-Monsoon 2022 Survey and Spring 2023 Survey.

Exhibit 7.109: List of Invertebrates Species Observed at Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey and Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Status*	*CITES Status*	*Post-Monsoon 2022 Survey*	*Spring 2022 Survey*
1	*Belenois aurota*	Caper White Butterfly	Least Concern	-	✓	-
2	*Blaps sp.*	-	NA	-	✓	✓
3	*Danaus chrysippus*	Plain Tiger	Least Concern	-	✓	✓
4	*Polyommatus icarus*	Meadow Blue	Least Concern	-	✓	-
5	*Tenebrionidae*	-	NA	-	✓	-
Total					**5**	**2**

Exhibit 7.110: Invertebrates Species Observed at Reko Diq Mine Site Study Area, Post-Monsoon 2022 Survey and Spring 2023 Survey

a) Blaps sp. (Tenebrionidae)

b) Plain Tiger (Danaus chrysippus)

Post-Monsoon 2022 Survey

The sampling for invertebrates was conducted using line transects and pitfall traps. None of the invertebrate specimens were captured in pitfall traps and those observed along the transect revealed a lower abundance in the Post-Monsoon 2022 Survey.

Key observations of the Post-Monsoon 2022 Survey are described below

- A total of 10 invertebrate specimens belonging to five taxa were observed in the Post-Monsoon 2022 Survey at the Reko Diq Mine Site. The observed species include *Belenois aurota, Blaps sp, Danaus chrysippus, Polyommatus icarus,* and *Tenebrionidae.*
- The most abundant taxa observed at the Reko Diq Mine Site was *Tenebrionidae* (four specimens) followed by *Blaps sp* (three specimens), Caper White Butterfly (*Belenois aurota)*, Plain Tiger (*Danaus chrysippus)*, and Meadow Blue (*Polyommatus icarus*) with one specimen each.
- These taxa were observed from those habitats having potential vegetation dominated by *Haloxylon stocksii* providing food and refugia.
- Overall, invertebrate abundance and species richness was low in the Ecological Study Area, this is because the habitat was completely dry, and lacking vegetation at most of the sampling locations. In addition, strong wind impeded their migration to other locations and resulted in mortality within their current environment.
- The biology of desert invertebrates is different compared to other habitats. To survive in that ecosystem, they manifested adaptation to seasons or times of day. Many invertebrates avoid heat by spending the day in shady places and procuring food at night.

Exhibit 7.111 provides a list of invertebrates observed in the Post-Monsoon 2022 Survey at the Reko Diq Mine Site study area.

The survey for invertebrates was not conducted in Previous Post-Monsoon Surveys Therefore, the comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is not provided.

Exhibit 7.111: Invertebrates Taxa along with IUCN Status Observed at Reko Diq Mine Site Study Area in Post-Monsoon 2022 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Status*
1	*Danaus chrysippus*	Plain Tiger	Least Concern
2	*Blaps sp.*	-	Not Evaluated
3	*Tenebrionidae*	-	Not Evaluated
4	*Belenois aurota*	Caper White Butterfly	Least Concern
5	*Polyommatus icarus*	Meadow Blue	Not Evaluated

Spring 2023 Survey

Key observations of the Spring 2023 Survey are described below.

- A total of two specimens belonging to two taxa were observed from the Reko Diq Mine Site study area. These taxa include (*Blaps sp)* and *Plain Tiger (Danaus chrysippus)*.
- These taxa were observed from those habitats having potential vegetation dominated by (*Haloxylon stocksii)* providing food, refugia, and water to invertebrate species.
- The overall lower abundance and species richness of invertebrates in the desert habitat can be attributed to several factors.
  - The habitat being completely dry and lacking vegetation at most sampling locations creates a challenging environment for many invertebrate species.
  - Invertebrates often rely on vegetation for food, shelter, and reproduction, so the scarcity of vegetation limits their ability to thrive and populate the area.
  - Another factor contributing to the lower abundance of invertebrates in the described habitat is the disturbance caused by strong winds.
  - Extreme temperature and strong winds are other reasons for the lower abundance of invertebrates in the Spring 2023 Survey.

Exhibit 7.112 provides a list of invertebrates observed at the Reko Diq Mine Site study area in the Spring 2023 Survey.

The survey for invertebrates was not conducted in Previous Spring Survey. Therefore, the comparison of Spring 2023 Survey and Previous Spring Survey is not provided.

Exhibit 7.112: Invertebrates Taxa along with IUCN Red List of Threatened Species status Observed at the Reko Diq Mine Site Study Area in Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*IUCN Status*
1	*Danaus chrysippus*	Plain Tiger	Least Concern
2	*Blaps sp.*	-	Not Evaluated

Northern Groundwater System

A total of seven invertebrate species were observed within the surveyed area at the Northern Groundwater System in Post-Monsoon 2022 Survey and Spring 2023 Survey. Of these, six species were observed in the Post-Monsoon 2022 Survey, and three species were observed in the Spring 2023 Survey. Some of the invertebrate species observed along the Northern Groundwater System include Plain Tiger (*Danaus chrysippus),* Pioneer White *(Belenois aurota),* Small Cabbage White *(Pieris rapae),* and Pea Blue *(Lampides boeticus)*. Overall, the diversity of invertebrates was lower due to extreme dry conditions in the area. Some of the butterfly species were specifically observed at Sampling Location MH1, a microhabitat, where the presence of the diverse flora facilitates their feeding and breeding.

Exhibit 7.113 provides a list of invertebrate species observed along the Northern Groundwater System study area in Post-Monsoon 2022 and Spring 2023 surveys.

Exhibit 7.114 provides photographs of invertebrate species observed along the Northern Groundwater System study area in Post-Monsoon 2022 and Spring 2023 surveys.

Exhibit 7.113: Invertebrates Species Observed along Northern Groundwater System Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

No.	*Taxa Name*	*Common Name*	*IUCN Status*	*Post-Monsoon 2022 Survey*	*CITES Status*	*Spring 2023 Survey*
1	*Danaus chrysippus*	Plain Tiger	Least Concern	✓	-	✓
2	*Blaps sp.,*	-	-	✓	-	✓
3	*Belenois aurota*	Pioneer White	Least Concern	✓	-	-
4	*Tenebrionidae*	-	-	✓	-	-
5	*Buprestidae*	Jewel Beetle Famliy	-	✓	-	-
6	*Pieris rapae*	Small Cabbage White	Not Evaluated	✓	-	-
7	*Lampides boeticus*	Pea Blue	Least Concern	-	-	✓
Total				**6**		**3**

Exhibit 7.114: Invertebrates Species Observed along Northern Groundwater System Study Area in Post-Monsoon 2022 and Spring 2023 Surveys

a) Blaps sp. (Tenebrionidae)

b) Jewel Beetle, (*Buprestidae)*, fore-wing

c) Pea Blue *(Lampides boeticus)*

d) Plain Tiger *(Danaus chrysippus)*

Post-Monsoon 2022 Survey

A total of 10 specimens belonging to six species were observed from 13 sampling locations, including one microhabitat in the Post-Monsoon 2022 Survey. The species observed along the Northern Groundwater System study area include the Plain Tiger (*Danaus chrysippus),* Pioneer White (*Belenois aurota),* Small Cabbage White (*Pieris rapae)* and Pea Blue (*Lampides boeticus).*

The survey for invertebrates was not conducted in Previous Post-Monsoon Surveys Therefore, the comparison of Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys is not provided.

Spring 2023 Survey

A total of five specimens belonging to three species were observed from 13 sampling locations, including one microhabitat identified in the field in the Spring 2023 Survey. The species observed along the Northern Groundwater System study area in the Spring 2023 Survey include the same species that were observed in the Post-Monsoon 2022 Survey.

Access Route to Reko Diq Mine Site

A total of four species were observed within the surveyed area along the Access Route the Reko Diq Mine Site study area in the Post-Monsoon 2022 and Spring 2023 surveys. Of these, three species were observed in the Post-Monsoon 2022 Survey and only one species was observed in the Spring 2023 Survey. No sampling was conducted for invertebrates in any of the previous surveys, therefore comparisons is not given for invertebrates.

Post-Monsoon 2022 Survey

A total of three specimens belonging to three species were observed from eight sampling locations in the Post-Monsoon 2022 Survey. The species observed along the Access Route to Reko Diq Mine Site study area include the Plain Tiger (*Danaus chrysippus),* Meadow Blue (*Polyommatus icarus),* and African Grass Jewel (*Freyeria trochylus).*

Spring 2023 Survey

A total of two specimens belonging to one species such as *Balps sp* was observed in the Spring 2023 Survey.

Port Qasim – Coastal Rail Transport Route Study Area

Sampling for terrestrial invertebrates was not conducted at Port Qasim.

Conservation Concern Species of invertebrate

Conservation Concern Species at Reko Diq Mine Site and Associated Infrasturcture

All the invertebrate species that were identified up to the species level in the baseline surveys are listed as Least Concern, Data Deficient, or Not Evaluated in the IUCN Red List of Threatened Species. Similarly, the literature review also reported no conservation concern species. The IBAT reported only one Near Threatened species, i.e., Freshwater

Crab (*Potamon ibericum),* however, this species is unlikely to be present in the area as there is no freshwater at Reko Diq Mine Site and Associated Infrastructure.

Conservation Concern Species at Port Qasim

The survey for invertebrates was not conducted at Port Qasim; therefore, the data of conservation concern species is not provided.

7.2 Marine and Coastal Fauna at Port Qasim

Sampling for the marine and coastal fauna was only conducted in the Post-Monsoon 2023 Survey at the Port Qasim Marine Terminal. No sampling was conducted along Port Qasim Marine Terminal previously; therefore, a comparison is not possible for marine and coastal fauna.

7.2.1 Marine Benthic Invertebrates (MBI)

During the Post-Monsoon 2023 Survey, a total of 93 specimens belonging to nine species were collected from the 13 sampling locations (MB1-MB13) located at Port Qasim. The maximum abundance was collected from sampling locations MB8 and MB9 (13 specimens in each), followed by sampling location MB10 (10 specimens) and sampling locations MB2, MB5, and MB12 (seven specimens each).

The lowest abundance was observed at location MB11, with three specimens collected, followed by MB1, where four specimens were collected. The collected group of MBI includes the Amphipod, Oligochaete, Isopod, Polychaetae, Broken Shells, Bivalve Shells, Gastropod Shells, Foraminifera, Broken Appendages, Nematode, and Arthropod.

Exhibit 7.115 shows the abundance and richness of MBI collected at the Port Qasim study area, while **Exhibit 7.116** provides the photographs of MBI collected along Port Qasim in the Post-Monsoon 2023 Survey.

Exhibit 7.117 provides the abundance and richness of MBI collected at the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.115: MBI Abundance and Richness Collected at the Port Qasim Study Area in Post-Monsoon 2023 Survey

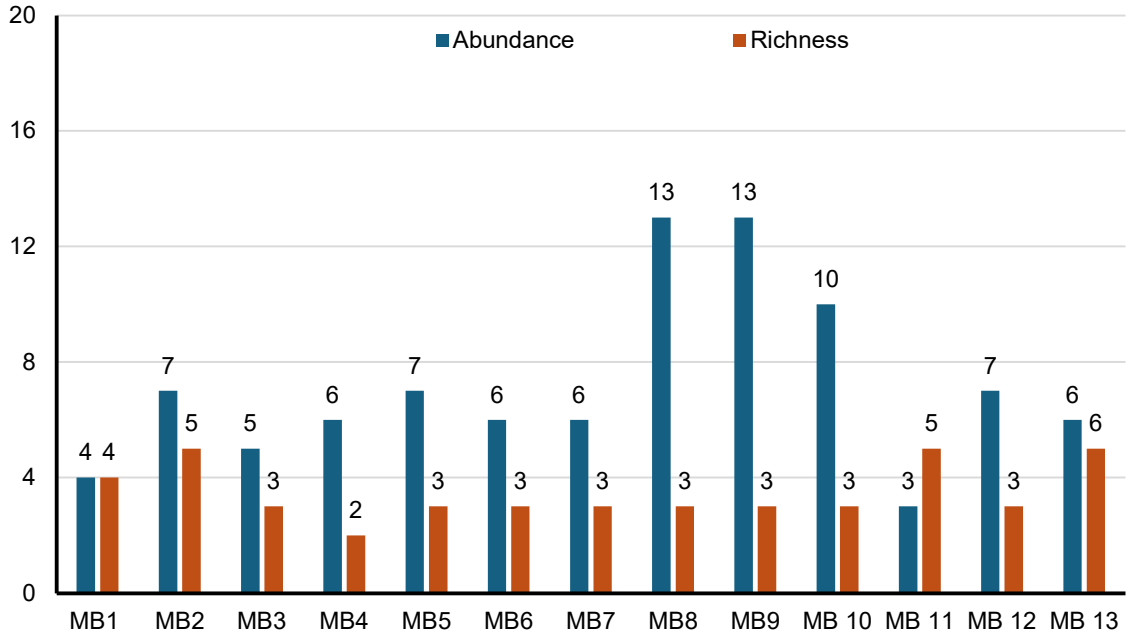
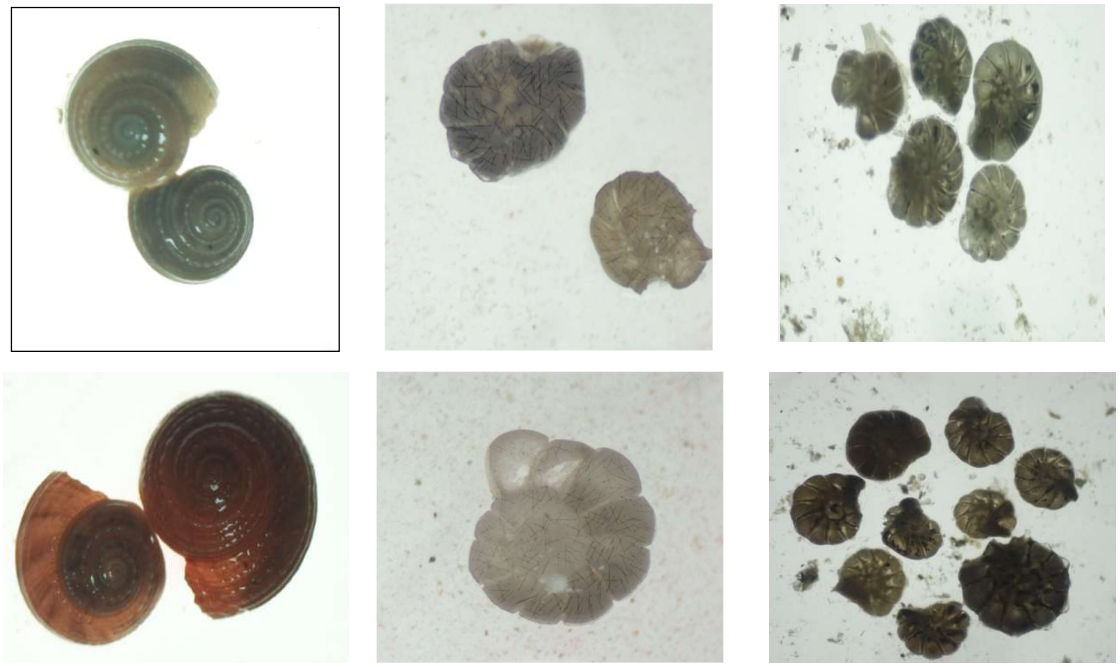


Exhibit 7.116: MBI Collected at the Port Qasim Study Area in Post-Monsoon 2023 Survey

Foraminiferas



Gastropods and Bivalves Shells

Cardium sp.

Scallop sp.

Bivalve sp.

Polychaetes Worms

Nereis sp.

Nereis phyllooce

Polychates

Neanthes sp.

Tubifix sp.

Sludge Worm/Black Ribbon Worm

Sludge Worm

Glycera sp.

Nematode

Gammarus sp.

Gammarus sp.

Isopod

Broken Crustacean Appendages

Broken Crustacean Appendages

Broken Shells

Exhibit 7.117: MBI Abundance and Richness Collected at the Port Qasim Study Area in Post-Monsoon 2023 Survey

No	*Group*	*MB1*	*MB2*	*MB3*	*MB4*	*MB5*	*MB6*	*MB7*	*MB8*	*MB9*	*MB 10*	*MB 11*	*MB 12*	*MB 13*	*Total*
1.	Amphipod	1	0	0	0	0	0	0	0	0	0	0	0	1	**2**
2.	Oligochatea	1	2	2	0	1	0	0	0	0	0	0	0	0	**6**
3.	Isopod	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
4.	Polychaete	1	1	0	0	0	0	0	0	0	0	1	1	0	**4**
5.	Bivalve Shell	0	2	2	5	5	4	4	5	10	1	1	5	1	**45**

No	Group	MB1	MB2	MB3	MB4	MB5	MB6	MB7	MB8	MB9	MB 10	MB 11	MB 12	MB 13	Total
6.	Gastropod Shell	0	0	0	0	0	1	1	1	1	1	1	1	1	**8**
7.	Forameniferans	0	0	0	0	1	1	1	7	2	8	0	0	1	**21**
8.	Nematode	0	1	1	0	0	0	0	0	0	0	0	0	1	**3**
9.	Arthropod	1	0	0	1	0	0	0	0	0	0	0	0	1	**3**
Abundance		**4**	**7**	**5**	**6**	**7**	**6**	**6**	**13**	**13**	**10**	**3**	**7**	**6**	**93**
Richness		**4**	**5**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**5**	**3**	**6**	**9**

7.2.2 Conservation Concern Species of MBI Observed in the Post-Monsoon 2023 Survey

All MBI species were identified at the family level, therefore, their conservation status could not be assessed according to the IUCN Red List of Threatened Species along the Port Qasim Marine Terminal in the Post-Monsoon 2023 Survey. Similarly, the literature review also reported no conservation concern species.

Epi Pelagic Fauna

During the Post-Monsoon 2023 Survey, a total of 178 specimens belonging to nine species were observed from the five sampling locations at the Port Qasim study area. The maximum abundance was observed at location M3 (63 specimens), followed by location M7 (46 specimens) and location M4 (43 specimens). The lowest abundance was observed at location M6. The maximum richness (nine species) was observed at locations M3 and M7. The observed species include (*Uca sp.), (Telescopium sp.), (Cerithium sp.),* Hermit Crab, Pea Crab, (*Balanus amphitrite),* Oyster Spats*, (Littorina sp.),* and (*Periophthalmus sp*.). *Uca sp*. (crab species) was the most abundant, followed by (*Telescopium sp.)*, Pea Crab, and (*Littorina sp*.), with a total of 92, 16, 15, and 14 specimens observed, respectively.

Exhibit 7.118 provides photographs of epipelagic fauna observed at the Port Qasim study area in the Post-Monsoon 2023 Survey. **Exhibit 7.119** provides the abundance and richness graph of epipelagic fauna, while **Exhibit 7.120** provides the abundance and richness of epipelagic fauna observed at the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.118: Epipelagic Fauna Observed at the Port Qasim Study Area in the Post-Monsoon 2023 Survey

a) Uca Crabs Foraging on Mangrove Detritus

b) Ubiquitous Uca Crab Borrows with Gastropods

c) Gastropod *Telescopium sp*

d) Gastropod *Cerethium sp*

e) Periophthalmus (Mud skipper)

f) Uca Crabs

g) Hermit Crab in Gastropod Shells

h) Oyster spats

Exhibit 7.119: Epipelagic Fauna Abundance and Richness Observed at the Port Qasim Study Area in the Post-Monsoon 2023 Survey

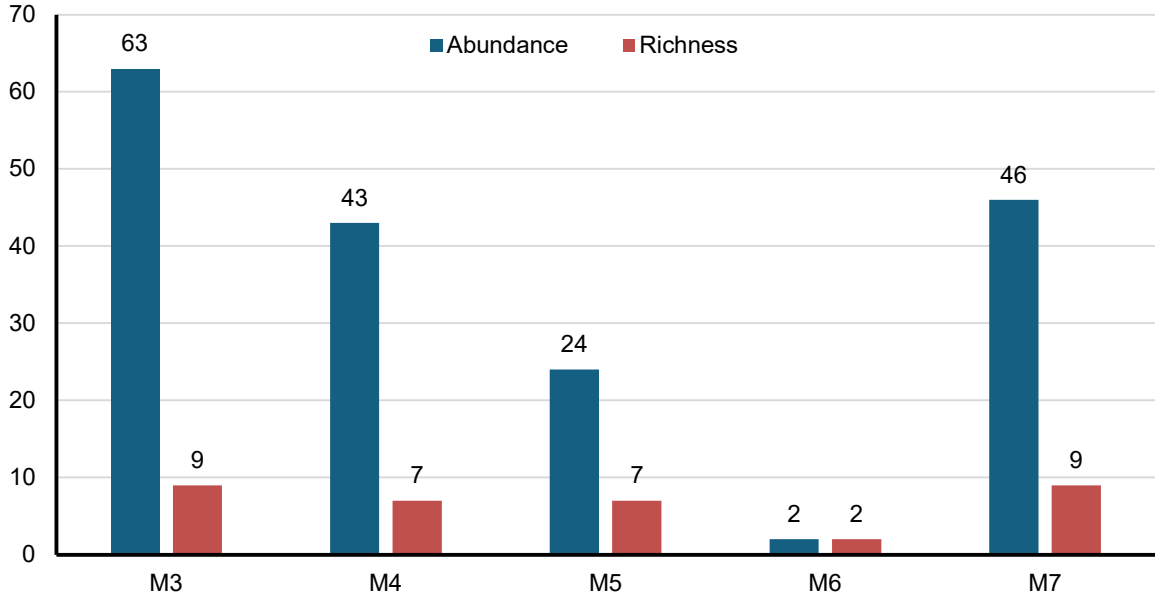


Exhibit 7.120: Epipelagic Fauna Abundance and Richness Observed at the Port Qasim Study Area in the Post-Monsoon 2023 Survey

Species	*M3*	*M4*	*M5*	*M6*	*M7*	*Total*
Crab (*Uca sp*)	32	24	13	1	22	**92**
Gastropod (*Telescopium sp*)	5	3	3	0	5	**16**
Gastropod (*Cerithium sp)*	6	1	1	0	4	**12**
Hermit Crab	1	0	0	0	1	**2**
Pea Crab	5	5	2	1	2	**15**
Barnacles (*Balanus amphitrite*)	5	3	3	0	2	**13**
Oyster Spats	3	0	0	0	3	**6**
Periwinkles (*Littorina sp*)	4	4	1	0	5	**14**
Mud Skipper (*Periophthalmus sp)*	2	3	1	0	2	**8**
Abundance	**63**	**43**	**24**	**2**	**46**	**178**
Richness	**9**	**7**	**7**	**2**	**9**	**9**

Conservation Concern Species of Epipelagic Fauna Observed in the Post-Monsoon 2023 Survey

All epipelagic fauna were identified at the genus level; therefore, their conservation status could not be assessed according to the IUCN Red List of Threatened Species at the Port Qasim study area in the Post-Monsoon 2023 Survey. Similarly, the literature review also reported no conservation concern species.

Pelagic Fish

During the Post-Monsoon 2023 Survey, pelagic fish sampling was conducted at three sampling locations, F1, F2, and F3, located in Korangi Fish Harbor, Gharo Creek near Port Qasim, and Keti Bandar, respectively. A total of 12 specimens belonging to eight species were captured from three sampling locations. Of these, four species were captured from each sampling location.

Fish species captured during the Post-Monsoon 2023 Survey were the Picnic Seabream (*Acanthopagrus berda)*, Shortnose Gizzard Shad (*Anodontostoma chacunda)*, Dory Snapper (*Lutjanus fulviflamma)*, Flathead Mullet (*Mugil cephalus)*, Banded Grunter (*Pomadasys furcatus)*, Olive Grunt (*Pomadasys olivaceus)*, Toli Shad (*Tenualosa toli)*, and Tiger Perch (*Terapon jarbua)*.

Exhibit 7.121 provides a list of pelagic fish species captured with the IUCN Red List of Threatened Species status at the Port Qasim Marine study area in the Post-Monsoon 2023 Survey.

Exhibit 7.122 provides photographs of pelagic fish species captured at the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.121: Pelagic Fish Species Captured at the Port Qasim study area in the Post-Monsoon 2023 Survey

Scientific Name	*Common Name*	*IUCN Status*	*CITES Status*
Acanthopagrus berda	Picnic Seabream	Least Concern	-
Anodontostoma chacunda	Short Nose Gizzard Shad	Least Concern	-
Lutjanus fulviflamma	Dory Snapper	Least Concern	-
Mugil cephalus	Flathead Mullet	Least Concern	-
Pomadasys furcatus	Banded Grunter	Least Concern	-
Pomadasys olivaceus	Olive Grunt	Least Concern	-
Tenualosa toli	Toli Shad	Vulnerable	-
Terapon jarbua	Tiger Perch	Least Concern	-

Exhibit 7.122: Pelagic Fish Species Captured at the Port Qasim study area in the Post-Monsoon 2023 Survey

a) Flathead Mullet *(Mugil cephalus)*

b) Olive Grunter *(Pomadasys olivaceus)*

c) Dory Snapper (*Lutjanus fulviflamma*)

d) Banded Grunter *(Pomadasys furcatus)*

e) Toli Shad *(Tenualosa toli)*

f) Tiger Perch *(Terapon jarbua)*

g) Short Nose Gizzard Shad *(Anodontostoma chacunda)*

h) Picnic Seabream *(Acanthopagrus berda)*

Fish Tissue Analysis for Metal Detection

Samples for four fish species from each sampling location were collected and preserved for metal detection. The metals detected from these fish species include Antimony, Cadmium, Copper, Lead, Nickel, Sliver, and Zinc using the American Public Health Association (APHA) 3120 B (2022)[138] method, and values are given in parts per billion (ppb) for each metal at each sampling location.

The key observations for each metal are provided below:

- Antimony was only detected at location F1 in *Pomadasys furcatus* species (13.2 ppb), while it was not detected (N.D) from any other sampling locations (F2 and F3)

[138] https://law.resource.org/pub/us/cfr/ibr/002/apha.method.3120.1992.pdf

- Cadmium was detected at varying concentrations across all sampling locations with the range of 22.8-89.63 ppb. The highest concentration was detected at location F2 (89.63 ppb)
- Copper was not detected in any fish species at any sampling location
- Lead was detected at all sampling locations with the range of 50.18- 283.14 ppb. The highest concentration was detected at locations F2 (171 ppb) and F3 (283.4 ppb)
- Nickel was detected at location F2 (17.48 ppb) and location F3 (56.79 ppb). Nickel was not detected at location F1
- Silver was detected at all sampling locations with the range of 11.24-37.72 ppb. The highest concentration was detected at location F3 (37.72 ppb)
- Zinc was detected at all locations with the range of 1335.0-5115.0 ppb. The highest concentrations were detected at F3 (5115.0 ppb) and F2 (3889.0 ppb)
- The species with the highest concentration of each metal includes *Pomadasys furcatus* having Antimony 13.2 ppb, Cadmium 19.31 ppb and Sliver 24.90 ppb, *Acanthopugrus berda* having Cadmium 89.63 ppb and Lead 283.4 ppb. The highest concentration of Nickel (17.48 ppb) was detected in *Anodontostoma chacunda,* while the highest concentration of Zinc (5115 ppb) was detected in *Terapon jarbua*. The differences in metal accumulation among pelagic fish species could be related to each species' unique physiology and ecological niches.

Metal Concentration in Commercial Fish

Fish may get contaminated with heavy metals either by direct ingestion of contaminated water or through absorption through epithelia like gills, epidermis, and alimentary canal. Moreover, the bioaccumulation and biomagnification processes are responsible for transmitting heavy metals from one fish species to another through the food chain. Ultimately, such absorption of heavy metals by fish puts humans at significant risk since fish occupy a large portion of daily human diets. The quantitative presence of various heavy metals (Ag, Cd, Cu, Ni, Sb, Pb, and Zn) in eight commercial fish tissues is evaluated, and the results are given in **Exhibit 7.124**.

Each parameter and its concentration, along with the World Health Organization (WHO) standard[139,140,141] and limit for metal concentration in marine water, [142] [143] are described below.

- Antimony (Sb): Antimony is a metalloid that, at high concentrations, can be toxic. The detected level is relatively low (13.2 ppb) in comparison with the value of Antimony recommended for marine water limits (270 ppb)
- Cadmium (Cd): Concentrations of cadmium were detected in all examined fish samples ranging from 22.8-89.63 ppb, which are lower than the permissible level of 1000 ppb fresh weight. The highest Cd content was observed in (*Acanthopugrus berda), (Pomadasys furcatus)* and (*Mugil cephalus)*
- Lead (Pb): The highest (126.5 ± 2.5 ppb) Pb concentration was observed in *Lutjanus fulviflamma,* which was lower than the recommended value of 2000 ppb by WHO. Lead levels in other fish species were within acceptable limits
- Nickel (Ni): The highest average level of Ni (56.79 ± 1.14) was detected in *Terapon jarbua* that was lower than the recommended level of 80,000 ppb. Nickel concetrations in other fish species were below the detectable limit.
- Silver (Ag): Silver is generally less toxic, and the observed concentrations (46.13+ 0.92 ppb) were higher in (*Terapon jarbua)* than the permitted marine water limit (1.4 ppb)
- Zinc (Zn): The average concentration of Zn ranged between 1335.0-5115.0 ppb. The highest Zn concentrations were measured in (*Terapon jarbua*) while the minimum Zn concentration was detected in (*Acanthopugrus berda)*. However, the analysed value of Zn in all fish samples was lower than the recommended concentrations (150,000 ppb) established by WHO.

Variations in metal concentrations among fish species are influenced by the unique bioconcentration capacities of each species and the biochemical characteristics of the metals. This highlights the need to consider the ecological and physiological impacts of metal accumulation in different fish species. In research on fish tissues conducted in Portugal, Belgium, and the North Adriatic, Antimony was detected in the range of

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[139] Kundu, G. K., Alauddin, M., Akter, M. S., Khan, M. S., Islam, M. M., Mondal, G., ... & Huque, A. (2017). Metal contamination of commercial fish feed and quality aspects of farmed tilapia (Oreochromis niloticus) in Bangladesh. Bioresearch Communications-(BRC), 3(1), 345-353.

[140] Alam, M., Rohani, M. F., & Hossain, M. S. (2023). Heavy metals accumulation in some important fish species cultured in commercial fish farm of Natore, Bangladesh and possible health risk evaluation. Emerging Contaminants, 9(4), 100254.

[141] Sarkar, M. M., Rohani, M. F., Hossain, M. A. R., & Shahjahan, M. (2022). Evaluation of heavy metal contamination in some selected commercial fish feeds used in Bangladesh. Biological Trace Element Research, 1-11.

[142] Abdulazeez M. Hammed, Ayodele, Akinterinwa, Hammed A. Yussuf, Kabir A. Sanusi (2023). Levels of Heavy Metals in Water and Nile Tilapia Fish (*Oreochromis niloticus*) of Eleyele Lake in Ibadan, Nigeria. Journal of Pure and Applied Sciences.

[143] Sundram, M. S. (1997). Basel Convention on Transboundary Movement of Hazardous Wastes: Total Ban Amendment. Pace Int'l L. Rev., 9, 1.

0.03 ppb, 0.31 ppb, and 45 ppb, respectively.[144] The lethal concentration of Nickel ranged from 3000 to 75000 ppb. The acceptable Copper concentration to protect fish is between 1 and 10 ppb. Zinc's lethal concentrations are approximately 100 ppb. Cadmium's acute lethal concentration for various fish species is 2000 to 20000 ppb, while for larvae, it can be as low as 2 ppb. The acute toxic concentrations of Lead in different water types fall within the range of 10000 to 100000 ppb. These findings highlight the variability in metal concentrations and their potential ecological implications in marine environments.[145]

Exhibit 7.123 provides commercially important fish species along with their length and weight, while **Exhibit 7.124** provides the metal concentration in fish species at each sampling location collected at the Port Qasim study area in the Post-Monsoon 2023 Survey.

Exhibit 7.123: Pelagic Fish Species Selected for Metal Detection along with Length and Weight Collected at the Port Qasim Study Area in Post-Monsoon 2023 Survey

ID	*Scientific Name*	*Common Name*	*Length (cm)*	*Weight (g)*
F1	*Terapon jarbua*	Tiger Perch	9.5	12
F1	*Pomadasys furcatus*	Banded Grunter	13	29
F1	*Anodontostoma chacunda*	Short Nose Gizzard Shad	12.5	23
F1	*Mugil cephalus*	Flathead Mullet	14.5	35
F2	*Terapon jarbua*	Tiger Perch	12	21
F2	*Pomadasys furcatus*	Banded Grunter	27	15
F2	*Acanthopagrus berda*	Picnic Seabream	27	296
F2	*Pomadasys olivaceus*	Olive Grunt	22.5	250
F3	*Mugil cephalus*	Flathead Mullet	22.5	104
F3	*Acanthopagrus berda*	Picnic Seabream	24	289
F3	*Tenualosa toli*	Toli Shad	30	514
F3	*Lutjanus fulviflamma*	Dory Snapper	18	98

Conservation Concern Species of Pelagic Fish Observed in the Post-Monsoon 2023 Survey

Only one species of conservation concern, Toli Shad (*Tenualosa toli*), which is listed as Vulnerable in the IUCN Red List of Threatened Species was captured at Port Qasim during the Post-Monsoon 2023 Survey. While several conservations concern pelagic fish species are reported from the coastal areas of Pakistan, however, very little information is available about their distribution in the creeks in the vicinity of Port Qasim.

Moreover, the habitat conditions and water quality are poor in these creeks however, these species are adapted in such condition through gradual exposure to environmental

[144] Toxicological Profile for Antimony and Compounds (September 1992), Agency for Toxic Substances and Disease Registry U.S. Public Health Service, Available at https://www.govinfo.gov/content/pkg/GOVPUB-HE20-PURL-gpo31641/pdf/GOVPUB-HE20-PURL-gpo31641.pdf.

[145] Svobodová, Z. (1993). *Water quality and fish health* (No. 54). Food & Agriculture Org.

changes, higher tolerance to pollution, and dietary flexibility. They may also benefit from reduced competition and predation, along with specialized niches and behavioral adaptations that help them survive despite the degraded habitat.

Exhibit 7.124: Metal Concentration Detected from Pelagic Fish Tissue Collected at the Port Qasim Study Area in Post-Monsoon 2023 Survey

Sampling Locations				*F1*				*F2*				*F3*			
Parameters (ppb)	*Test Method Used*	*Limits for Marine Water (ppb)*	*World Standard Metal Concentration in Commercial Fish (ppb) by WHO*	*Pomadasys furcatus*	*Anodontostoma chacunda*	*Terapon jarbua*	*Mugil cephalus*	*Pomadasys olivaceus*	*Pomadasys furcatus*	*Terapon jarbua*	*Acanthopugrus berda*	*Acanthopugrus berda*	*Tenualosa tilo*	*Mugil cephalus*	*Lutjanus fulviflamma*
Antimony (Sb)	APHA 3120 B (2022)	270	-	13.2±0.27	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D
Cadmium (Cd)	APHA 3120 B (2022)	5.5	1000	19.31±0.39	15.84±0.32	9.65±0.20	11.17±0.22	31.60±1.58	80.29±1.61	22.8±0.5	89.63±1.80	22.54±0.50	31.10±0.60	30.32±0.60	20.76±0.40
Copper (Cu)	APHA 3120 B (2022)	-	10000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Pb)	APHA 3120 B (2022)	4.4	2000	72.69±1.50	101.7±2.0	50.18±1.00	66.02±1.32	124±3	171±3	71.67±1.43	283.4±5.7	126.4±2.5	122.3±2.5	103.2±2.1	126.5±2.5
Nickel (Ni)	APHA 3120 B (2022)	-	80000	ND	17.48±0.35	56.79±1.14	5.13±1.10	4.87±0.10	ND	ND	ND	ND	ND	ND	ND
Silver (Ag)	APHA 3120 B (2022)	1.4	-	24.90±1.50	v	46.13±0.92	34.24±0.70	28.26±1.00	ND	11.24±0.23	37.72±0.80	21.39±0.40	ND	30.97±0.60	ND
Zinc (Zn)	APHA 3120 B (2022)	-	150000	1935±38.7	1345±27	3889±78	1465±29	2500±50	1899±38	5115±102	1652±33	1335±27	1885±38	2392±48	1702±34

Note: The literature review discusses metal concentration values based on WHO standards and marine water limits. Where values are absent in the reviewed studies, they are not provided in the above table.

"ND"= Not Detected"

7.3 Ecosystem Services

According to the World Resources Institute,[146] ecosystem services are the benefits that people get from nature. Examples include freshwater, timber, climate regulation, recreation, and aesthetic values. The local communities around the Reko Diq Mine Site and Associated Infrastructure benefit from the following ecosystem services provided by the natural resources in the area:

Hunting

The hunting of Asian Houbara Bustard, See-See Partridge, Cape Hare, Afghan Urial, Wild Goat and Goitered Gazelle is reported by the locals in and around the Reko Diq Mine Site and Associated Infrastructure. Locals hunt these animals and birds mainly for recreational purposes.

The Asia Houbara Bustard is hunted by the Arab dignities occasionally and permits for hunting of this species is issued by the Ministry of Foreign Affairs (MOFA).

Locals have no major dependency on hunting of wildlife.

Fuelwood Collection

The local communities in and around the Reko Diq Mine Site and Associated Infrastructure use fuelwood and shrubs collected from area for cooking and space heating with very limited number of households reliant on Liquid Petroleum Gas (LPG).

They collect different shrubs including *Salsola sp., Calligonum, Haloxylon* and *Tamarix*.

Grazing

In communities such as Humai, Nok Chah, Mashki Cha, and Darband Chah, some locals have limited dependence on livestock for their livelihood. They primarily raise goats and camels that graze outside the settlements, with only camel grazing observed near the Reko Diq Mine Site and Associated Infrastructure. A few herder huts are located around the Northern Groundwater System, though they are more commonly found in the Kirtaka and Kachao areas. The residents of Kirtaka and Kachao rely heavily on livestock as a primary source of livelihood, with larger herds, as the Kirtaka and Kachao mountains provide sufficient grazing land.

In contrast, scattered vegetation across most other areas around the Reko Diq Mine Site supports only minimal grazing, which limits livestock dependence among nearby communities. The dry, sparse vegetation in and around the mine site provides little support for livestock grazing, explaining the low reliance on livestock for income in adjacent communities.

The communities have very low dependency on these ecosystem services as these services are very limited due to extreme dry and arid conditions. Also, the communities are residing far away from the Project area, thus minimizing the impacts of Project on most of these ecosystem services.

[146] Ecosystem Services, A Guide for Decision Makers, World Resources Institute, ISBN 978-1-56973-669-2

Exhibit 7.125: Photographs of Ecosystem Services at Reko Diq Mine Site and Associated Infrastructure

a) Livestock near Access Route to Reko Diq Mine Site

b) Livestock near the Humai Settlement

c) Livestock grazing near the Kachau

d) Livestock near Humai Settlement

8. Conclusions and Recommendations

Baseline fauna information was collected from a variety of sources, including field surveys and published literature. The information collected was used to compose profiles of the fauna and habitats likely to be affected by the Project. The conservation concern species were observed at the Reko Diq Mine Site, Northern Groundwater System, and Port Qasim.

8.1 Summary of Fauna Baseline

- The fauna baseline report was prepared to provide an overview of baseline faunal conditions for the Reko Diq Mining Project and also assess the potential Project-related impacts on fauna, as well as to provide mitigation and monitoring measures to mitigate the impacts.
- The ecological studies for fauna were carried out at the Reko Diq Mine Site and Associated Infrastructure, including the Northern Groundwater System and Access Route to Reko Diq Mine Site connecting the N-40 highway and existing rail route to Reko Diq Mine Site. It also includes the proposed rail transport route and marine terminal at Port Qasim.
- Ecological studies were not carried out for the Rail Transport Route and road route from the Reko Diq Mine Site to Port Qasim, however a detailed literature review is conducted. As the biodiversity is already modified along these routes, and the Project impact on ecology will, therefore, be negligible. However, mining activities will contribute to increased traffic which may result in increased likelihood of roadkill and this aspect will be mitigated by the measures provided above.
- 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, with some irrigated cropland where there is increased water availability. The Marine Terminal at Port Qasim, fall within the broader context of the Indus Delta ecoregion, which is characterized by a complex network of tidal channels, mudflats, and mangrove forests.
- The Ecological Study Area at Reko Diq Mine Site and Associated Infrastructure was demarcated by applying a buffer of 10 km around these Associated Infrastructure. For additional baseline data collection, the Study Area around the Reko Diq Mine Site and Northern Groundwater System was expanded to the Iran-Afghanistan borders, including the Zangi Nawar Game Reserve and Corridor from Reko Diq Mine Site to Zangi Nawar Game Reserve, to record species and habitats extending beyond the initial 10 km buffer.

- A buffer of 100 m was defined along the proposed railway track at Port Qasim Industrial Units extending from the main railway line to the Marine Terminal at Port Qasim.
- A buffer of 10 km extending into the creeks and mangrove areas around the Marine Terminal at Port Qasim was defined to account for possible impacts of the Project on marine fauna.
- The Ecological Study Area was categorized into different habitat types based on **Google Earth™** satellite imagery which include the Mountains/Hills, Clayey Plains, Dry Streambeds, Gravel Plains, and Sandy Plains/Sand Dunes. The Gravel Plains and Mountains/Hills habitat types dominate the landscape, with Dry Streambeds running through the Gravel Plains.
- Data was collected for the terrestrial (birds, mammals, herpetofauna, and invertebrates) and marine and coastal (Marine Benthic Invertebrates, Epi Pelagic Fauna, and Pelagic Fish Communities) ecological resources in different seasons for different Project components.
- Three baseline surveys have been conducted, including the Post-Monsoon 2022 and Spring 2023 surveys, which were conducted only at the Reko Diq Mine Site and Associated Infrastructure, and the Post-Monsoon 2023 Survey, which was conducted only at Port Qasim. In addition, Summer 2024 Survey was conducted to the collect the additional baseline data at Reko Diq Mine Site, Northern Groundwater System, along the Access Route to Reko Diq Mine Site, Taftan Area, Corridor and Zangi Nawar Game Reserve for herpetofauna and small mammals in extended Study Area.
- A total of 20 sampling locations were sampled at the Reko Diq Mine Site, 13 along the Northern Groundwater System, eight along the Access Route to the Reko Diq Mine Site, and 11 along the rail route at Port Qasim for sampling terrestrial ecological resources.
- In Summer 2024 Survey, a total of nine sampling locations for Sherman trapping and pitfall trapping of small mammals and herpetofauna species respectively, at Reko Diq Mine Site, six along Northern Groundwater System, four along the Access Route to Reko Diq Mine Site, seven along the Corridor, and three sampling locations at Zangi Nawar Game Reserve were selected for the collection of additional baseline data. Furthermore, three sampling locations for Sherman trapping of small mammals were selected in the Taftan Area.
- The line transect sampling method was used to sample large mammals, birds, herpetofauna, and invertebrates. Sherman traps were used for small mammals, while pitfall traps were used for invertebrates and herpetofauna species. In addition, nocturnal were conducted for herpetofauna and small mammals species.
- A total of 13 sampling locations were sampled for marine benthic invertebrates (MBI), five for epi-pelagic fauna, and three for fish at Port Qasim, including one sampling location for each ecological resource at Keti Bandar, which was a reference point.

- Grab samples were collected for MBI, line transect was used for Epi-Pelagic Fauna, and gill nets and fishermen data were collected for the pelagic fish communities.
- 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. About 153 bird species are reported from the 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.
- According to the literature review, seven large mammal species are reported from the Reko Diq Mine Site, eleven along the Northern Groundwater System, and four along the Access Route to Reko Diq Mine Site. IBAT reported 45 mammalian species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure. Port Qasim appeared to be rich in mammalian diversity, with 34 species reported.
- 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*).
- According to the literature review, 11 species of small mammals are 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.

- Baseline surveys confirmed the presence of four species of small mammals at Reko Diq Mine Site, four along the Northern Groundwater System, one along the Access Route to Reko Diq Mine Site, two near Taftan Area, five along the Corridor, and 10 in the Zangi Nawar Game Reserve. 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. One restricted range species Baluchistan Pygmy Jerboa was captured from the Zangi Nawar Game Reserve.
- 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. 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 confirmed the presence of 25 herpetofauna species from the Reko Diq Mine Site, 21 along the Northern Groundwater System, 17 along the Access Route to the Reko Diq Mine Site, 11 along Corridor from Reko Diq Mine Site to Zangi Nawar Game Reserve and 20 species at Zangi Nawar Game Reserve. At Port Qasim, four herpetofauna species were observed.
- 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. In addition, the Green Sea Turtle (*Chelonia mydas*) is reported in the literature and is listed as Endangered in 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 and Diq Mine Site in the baseline surveys.
- No site-specific studies have previously been carried out for invertebrates at the Reko Diq Mine Site and Associated Infrastructure. IBAT reported 62 invertebrate species within a 50 km buffer of the Reko Diq Mine Site and Associated Infrastructure.
- Baseline surveys at the Reko Diq Mine Site confirmed the presence of five invertebrate species from the Reko Diq Mine Site, seven along the Northern Groundwater System, and four along the Access Route to the Reko Diq Mine Site. Sampling for invertebrates was not conducted at Port Qasim.
- All the invertebrate species observed in the baseline surveys are either Least Concern or Data Deficient, according to the IUCN Red List of Threatened Species.
- According to literature review, 509 species of avifauna, 90 species of herpetofauna, 34 species of small mammals and 39 species of mammals are reported along the Rail and Road Route Corridor.

- The IBAT reported 422 species of avifauna, 144 species of herpetofauna, 60 species of mammals, 38 species of small mammals and 140 species of invertebrates along the Rail and Road Route Corridor.
- According to the literature review, 26 species of MBI are reported from various sites in Sindh, including Sandspit, Port Qasim, and Clifton.
- Baseline surveys at Port Qasim Marine Terminal confirmed the presence of nine MBI species. All of these species are listed as Least Concern or Data Deficient.
- According to the literature review, 21 species of Epi-Pelagic Fauna are reported near Port Qasim.
- Baseline surveys at Port Qasim Marine Terminal confirmed the presence of nine Epi-Pelagic Fauna species. All of these species are listed as Least Concern or Data Deficient.
- According to the literature review, up to 50 Pelagic Fish species are reported from Port Qasim and its adjacent areas.
- Baseline surveys at Port Qasim Marine Terminal confirmed the presence of eight pelagic fish species. Only one species of conservation concern, Toli Shad (*Tenualosa toli*), which is listed as Vulnerable in the IUCN Red List of Threatened Species, during the baseline survey.

8.2 Assumptions, Exclusions, and Limitations

Baseline surveys at the Reko Diq Mine Site and Associated Infrastructure were carried out in different seasons to collect quality data. These surveys confirmed the presence of the most species reported in the area. However, there are still some limitations to the survey, which include the following.

- Ecological studies were not carried out for the Rail Transport Route consisting of existing railway lines that will be used for the transportation of the product from the Project to the port for export. The biodiversity along the main railway line has already been impacted over time, and the impacts of additional traffic due to the Project on ecology will, therefore, be expected to be negligible. However, a detailed and extensive literature review is done for the Rail and Road Route Corridor.
- Bird surveys were conducted in two seasons, Post-Monsoon and Spring, which confirmed the presence of several species. However, no survey was conducted in the Winter season when several migratory bird species may visit the area.
- A bat-specific study should be carried out in the area during favourable seasons.
- Several mammalian species were confirmed based on the sign surveys; however, camera tapping can be an effective way to confirm their presence and distribution in the area.

Appendix A: Desktop Based Land Cover Assessment along the Rail and Road Route Corridor

See the following pages.

Exhibit A.1: Land Cover for Segment 1

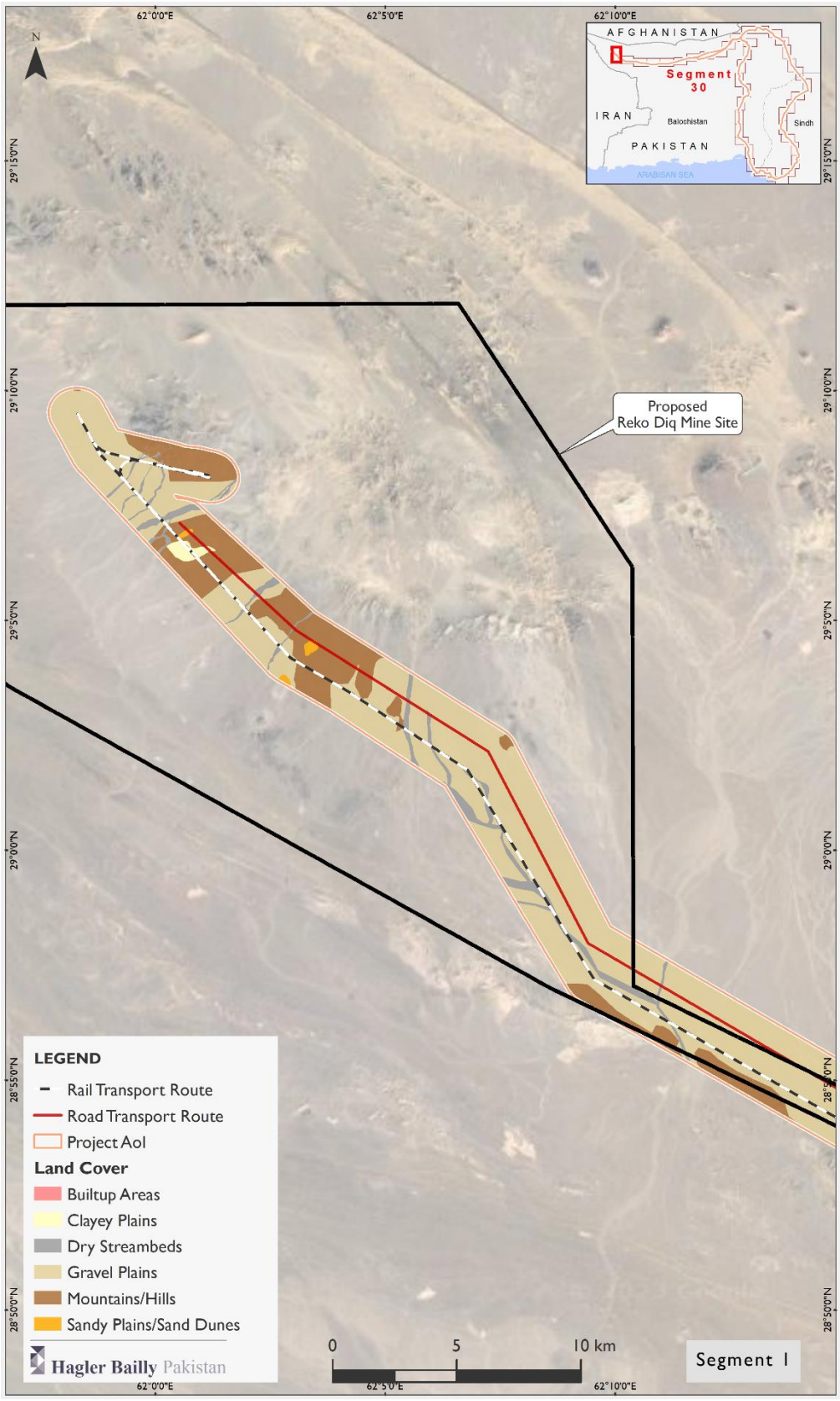


Exhibit A.2: Land Cover for Segment 2

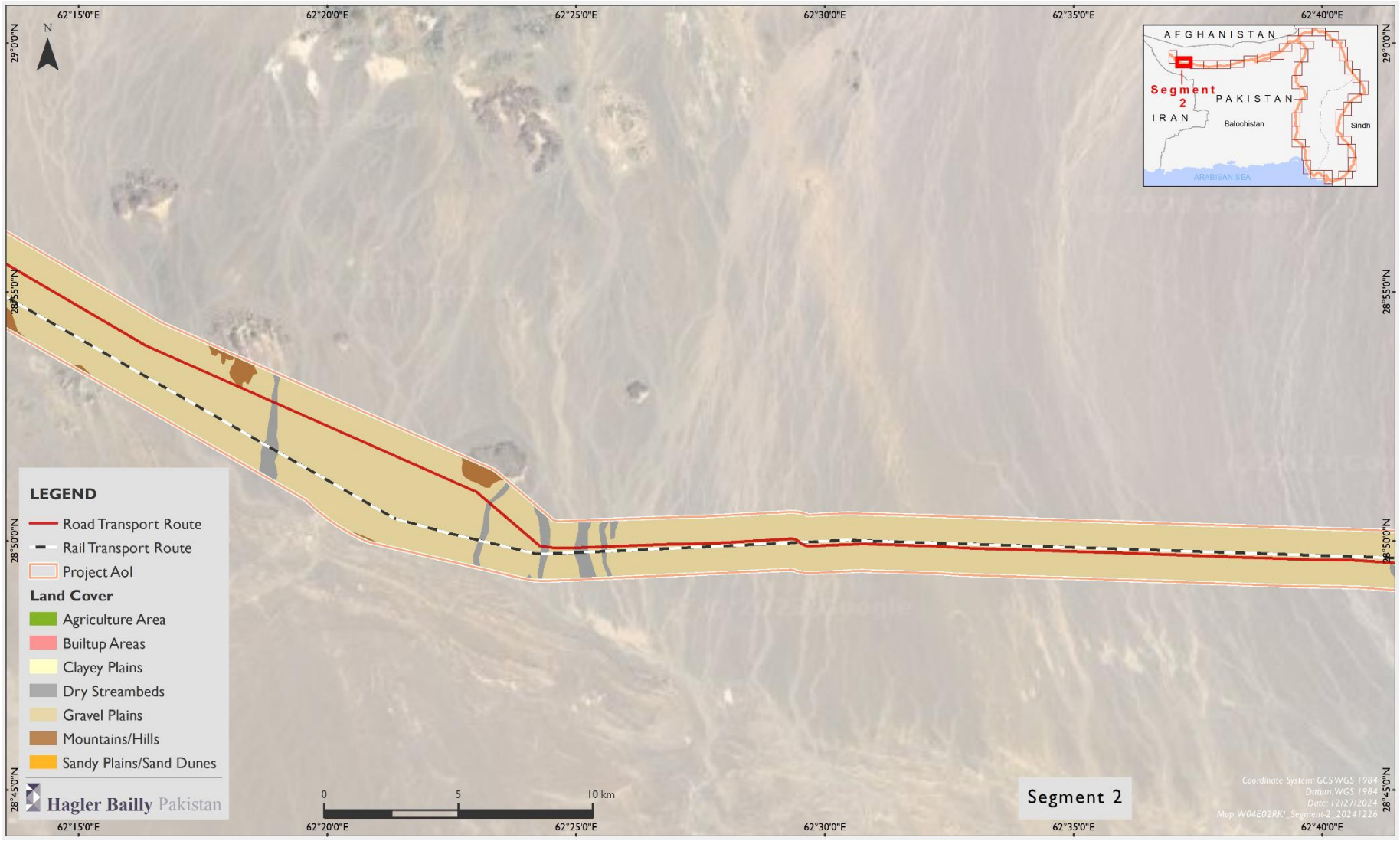


Exhibit A.3: Land Cover for Segment 3

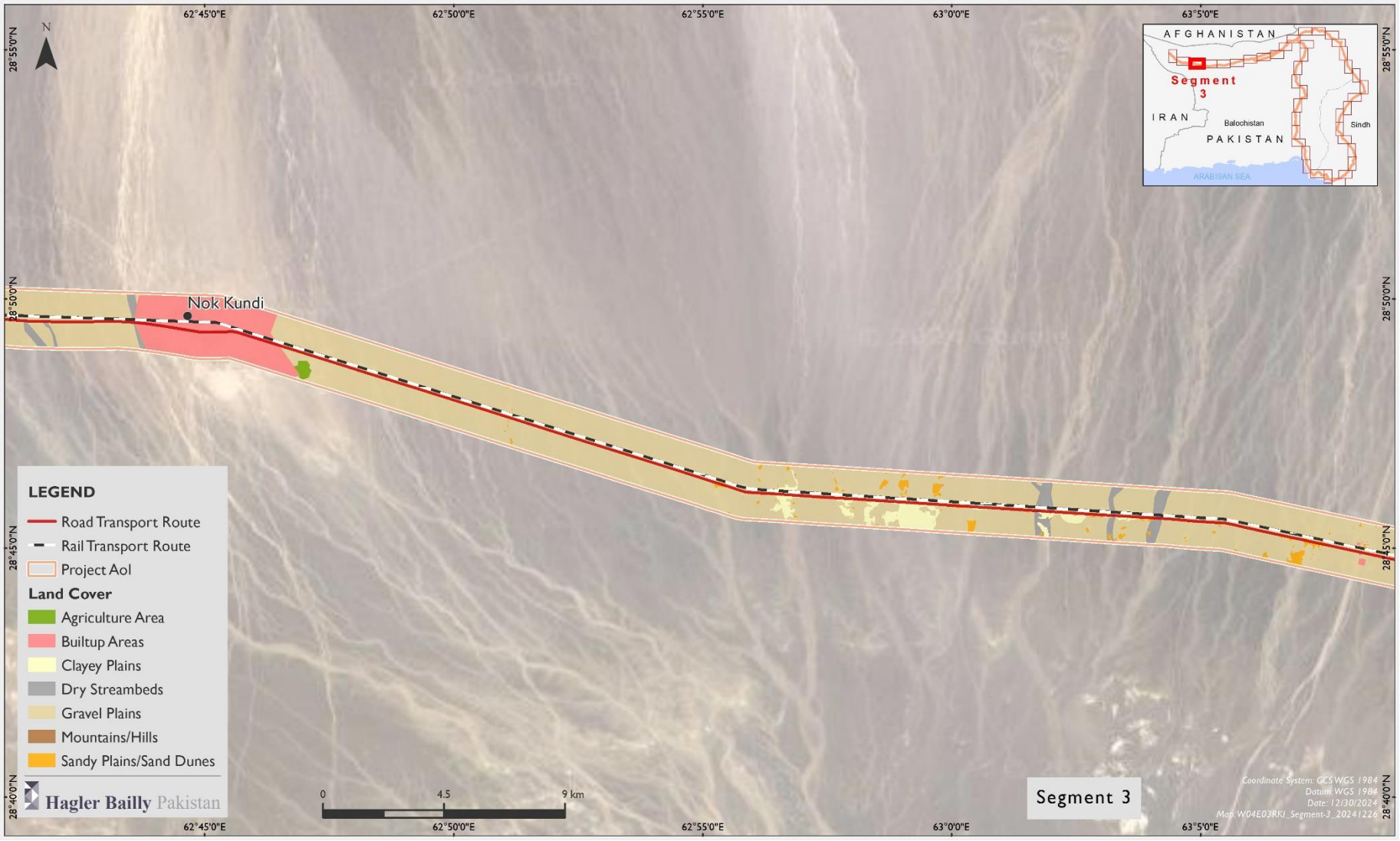


Exhibit A.4: Land Cover for Segment 4

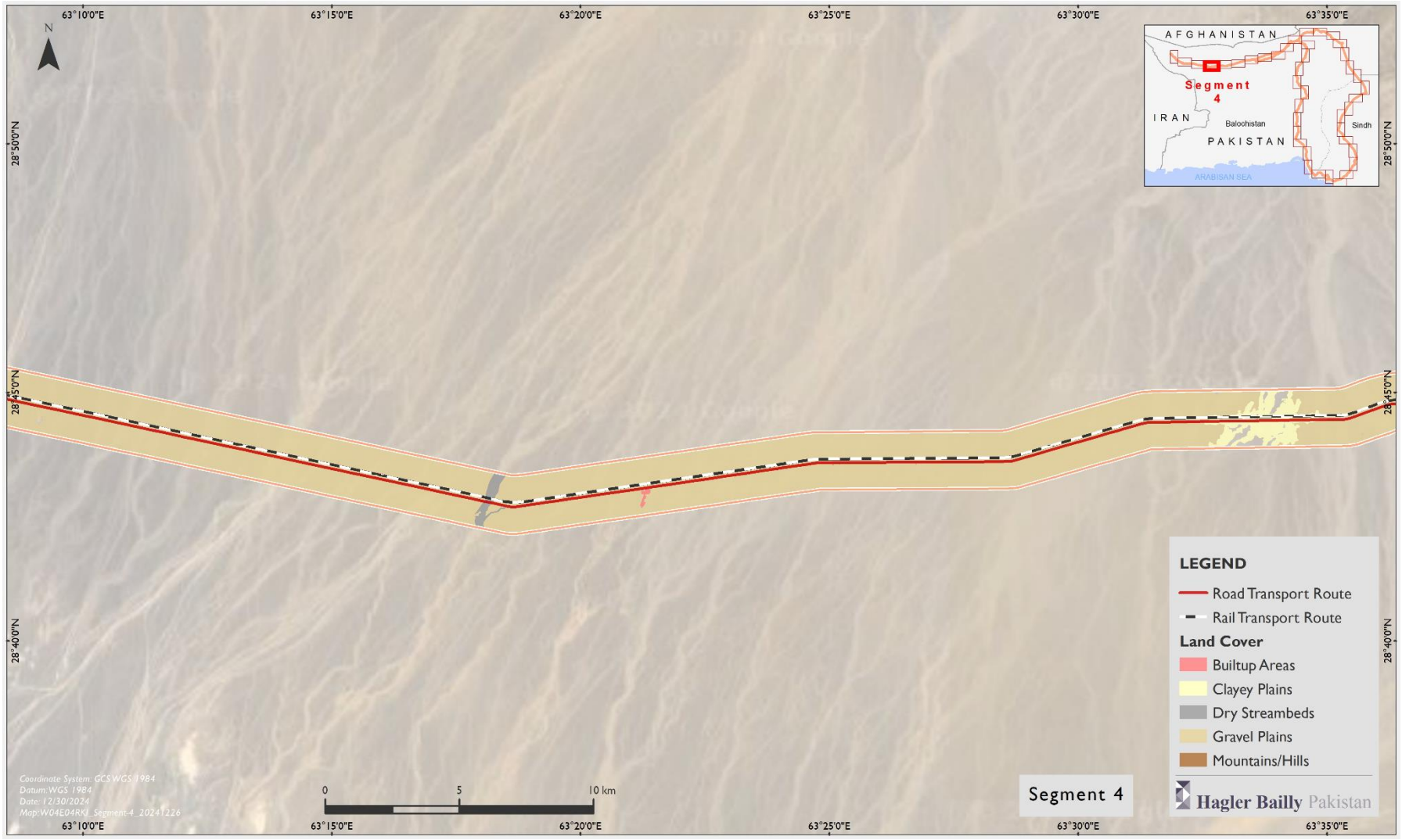


Exhibit A.5: Land Cover for Segment 5

Exhibit A.6: Land Cover for Segment 6

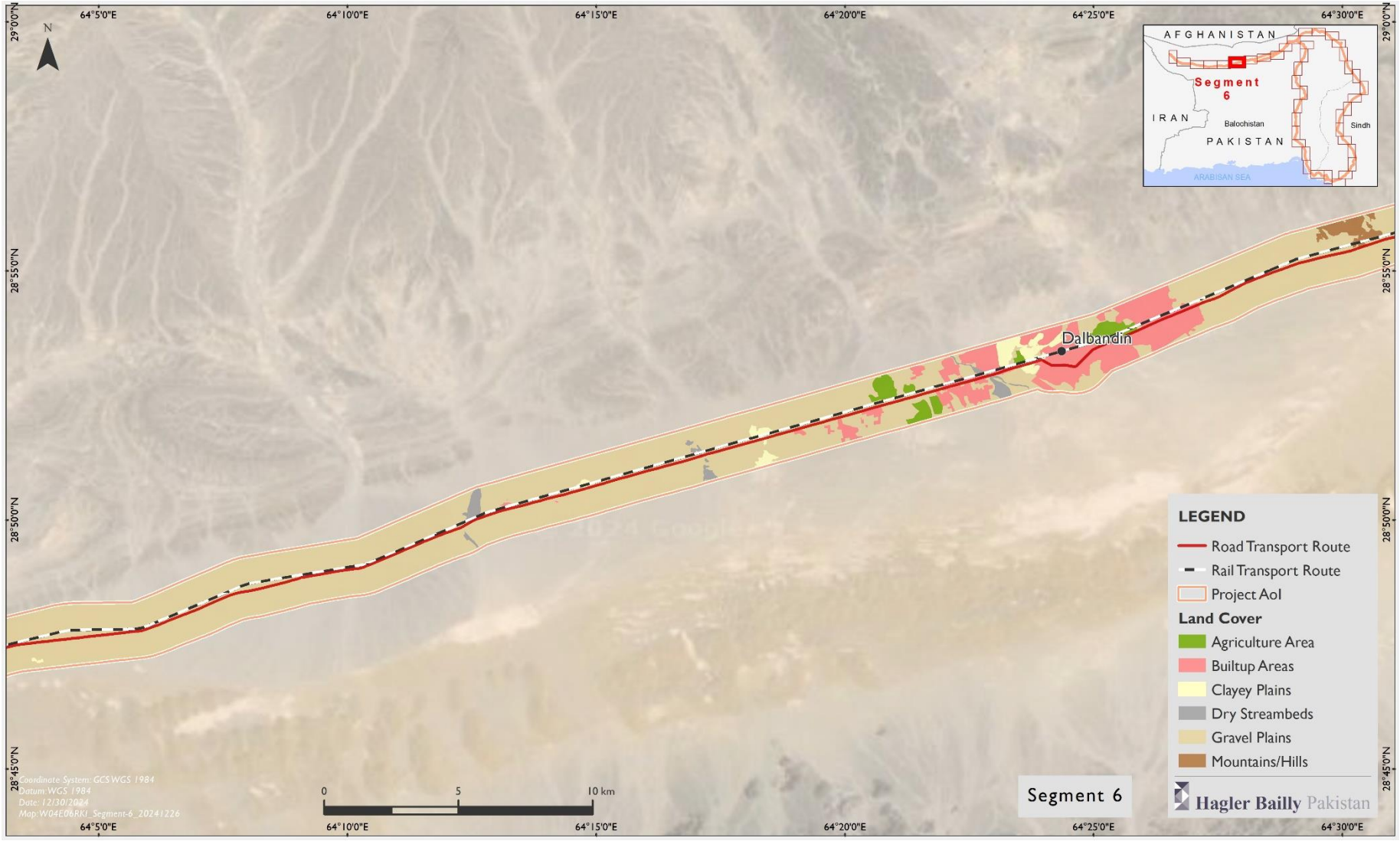


Exhibit A.7: Land Cover for Segment 7

Exhibit A.8: Land Cover for Segment 8

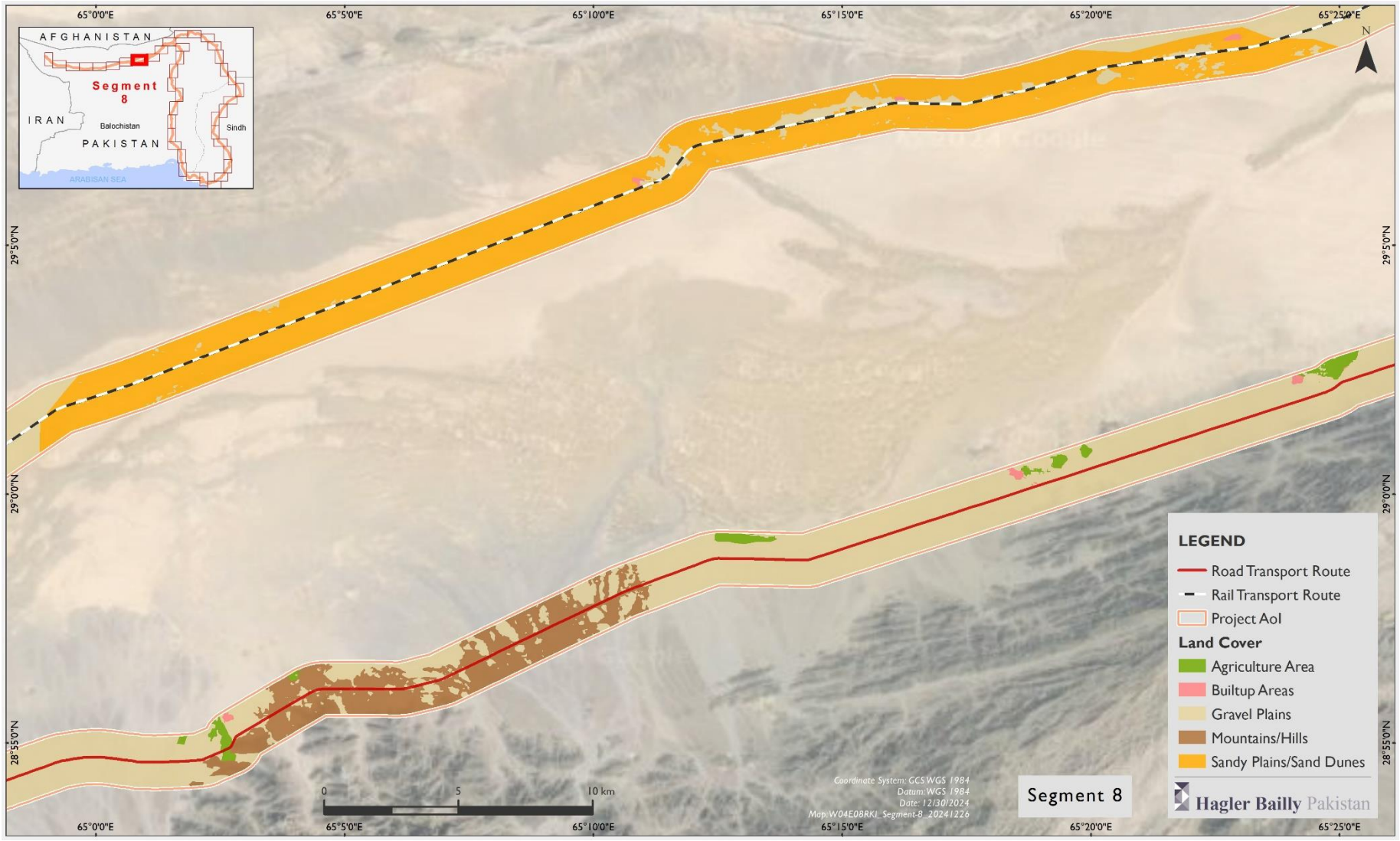


Exhibit A.9: Land Cover for Segment 9

Exhibit A.10: Land Cover for Segment 10

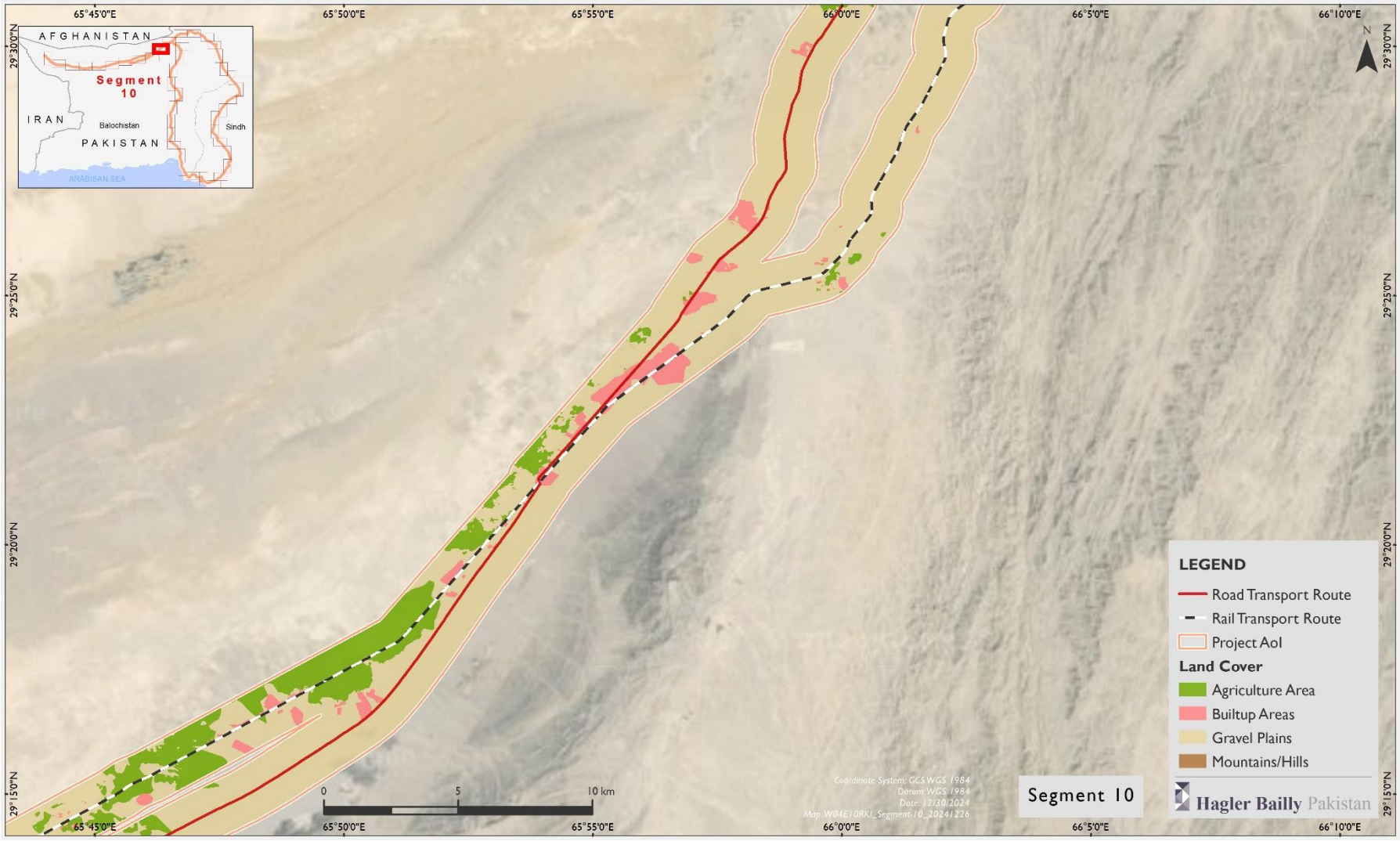
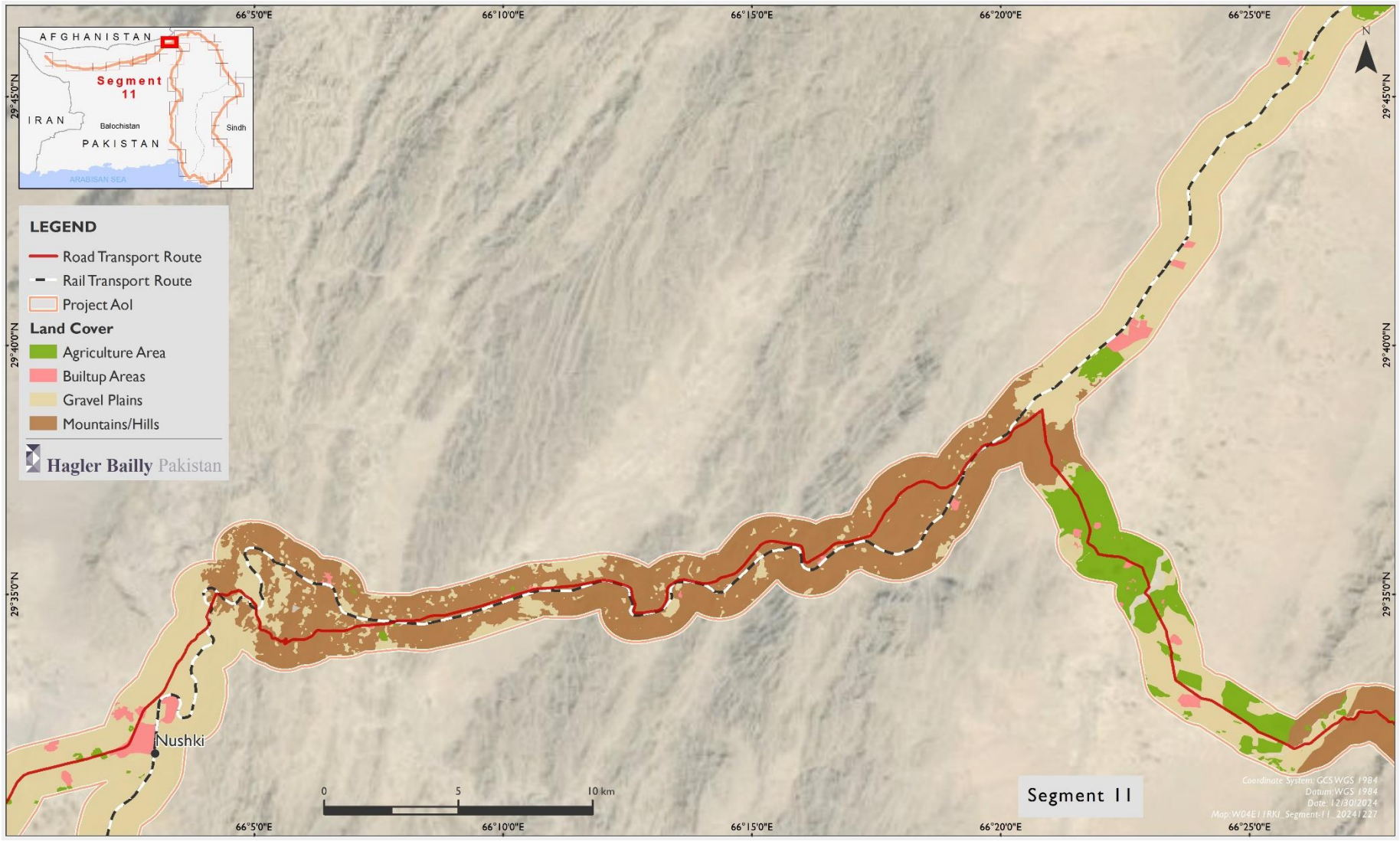


Exhibit A.11: Land Cover for Segment 11



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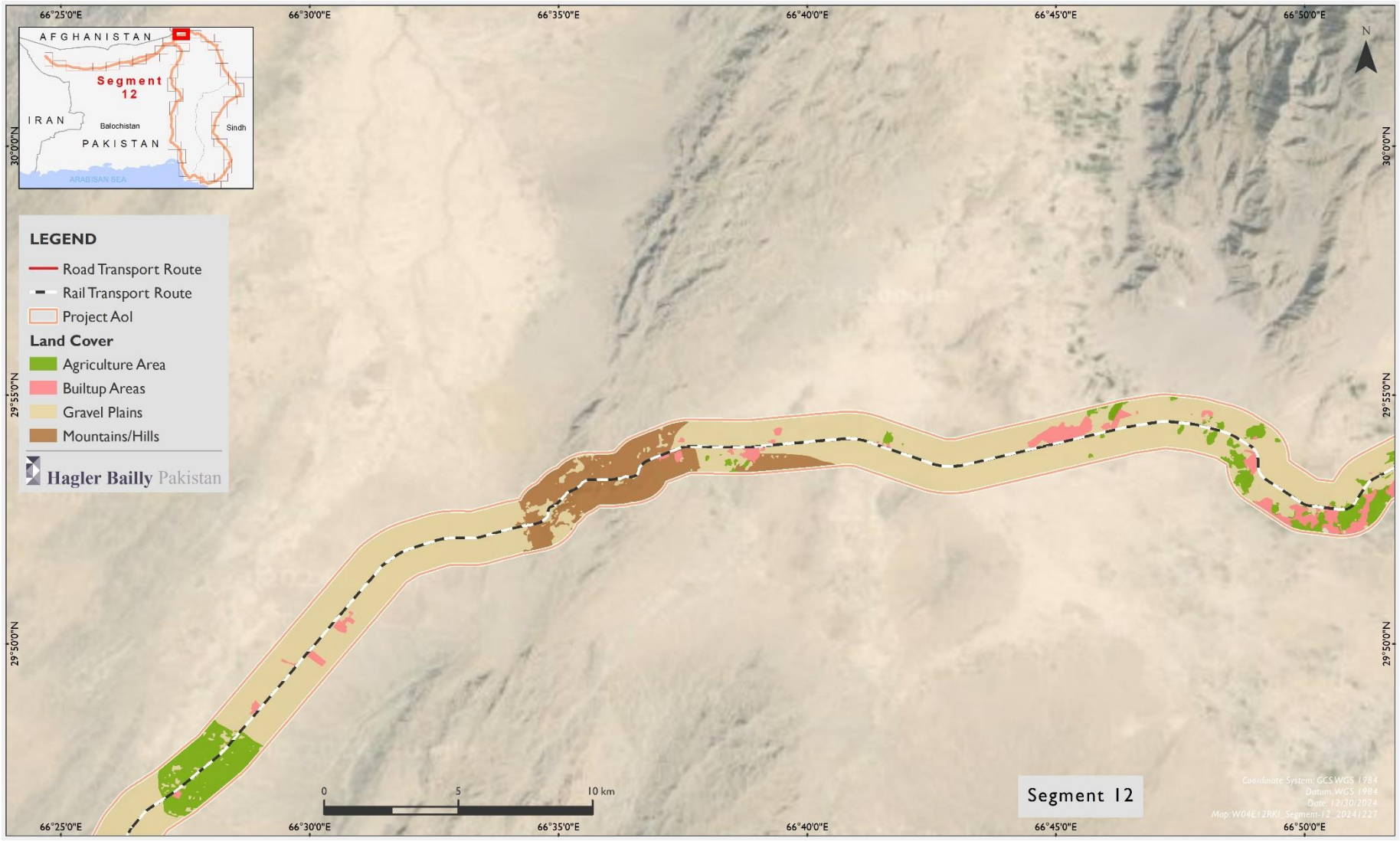
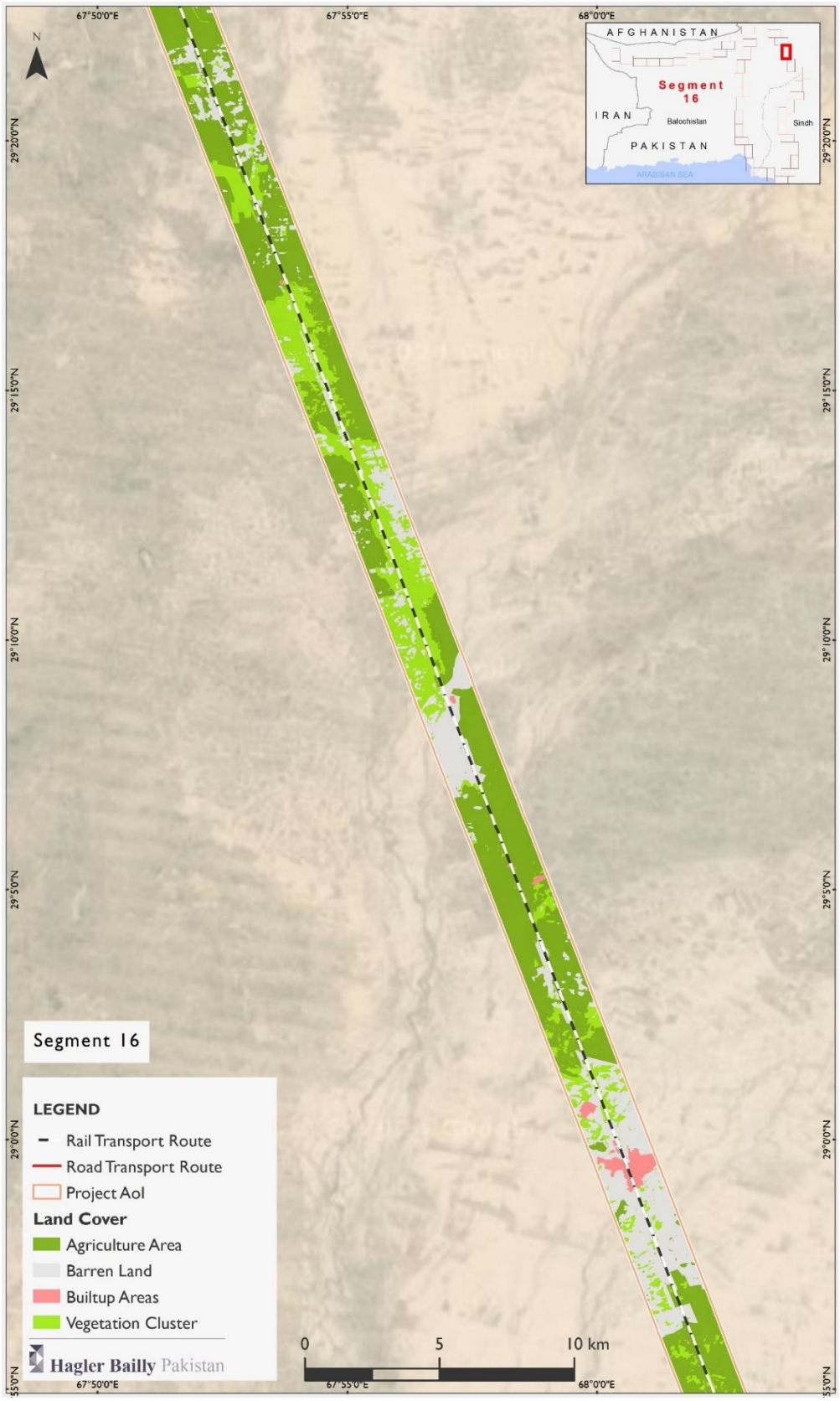


Exhibit A.13: Land Cover for Segment 13

Exhibit A.14: Land Cover for Segment 14

Exhibit A.15: Land Cover for Segment 15

Exhibit A.16: Land Cover for Segment 16



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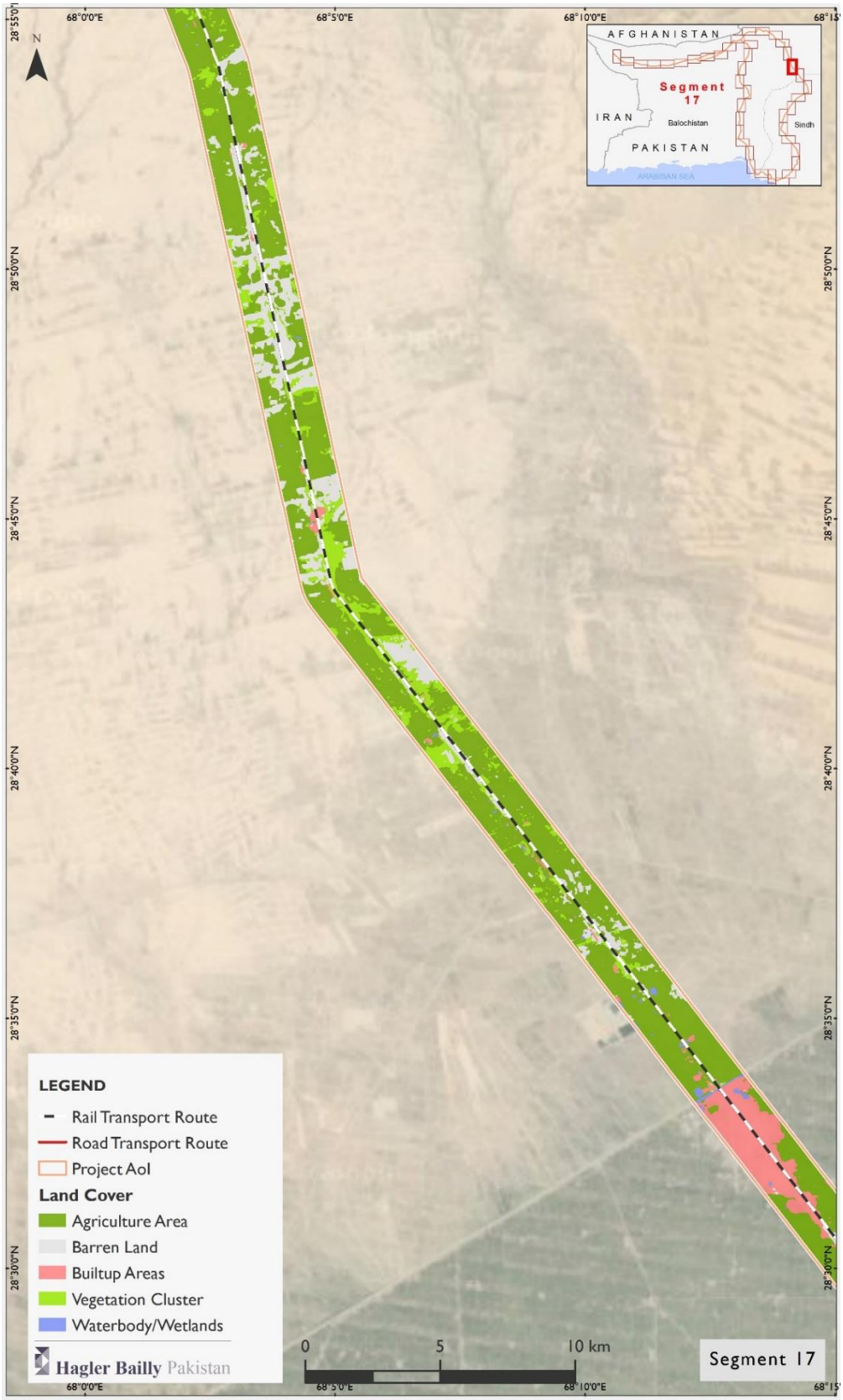

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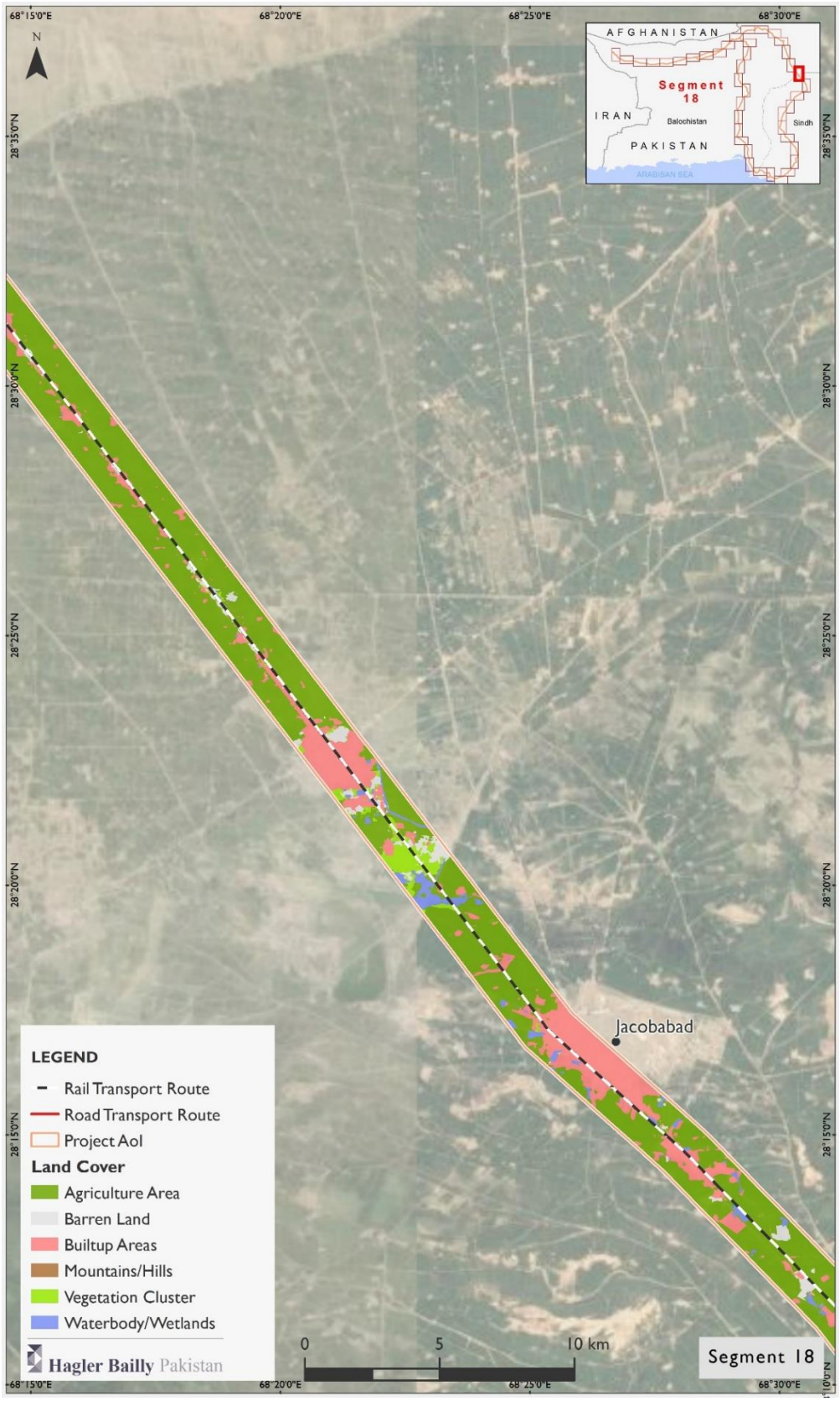

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Exhibit A.20: Land Cover for Segment 20

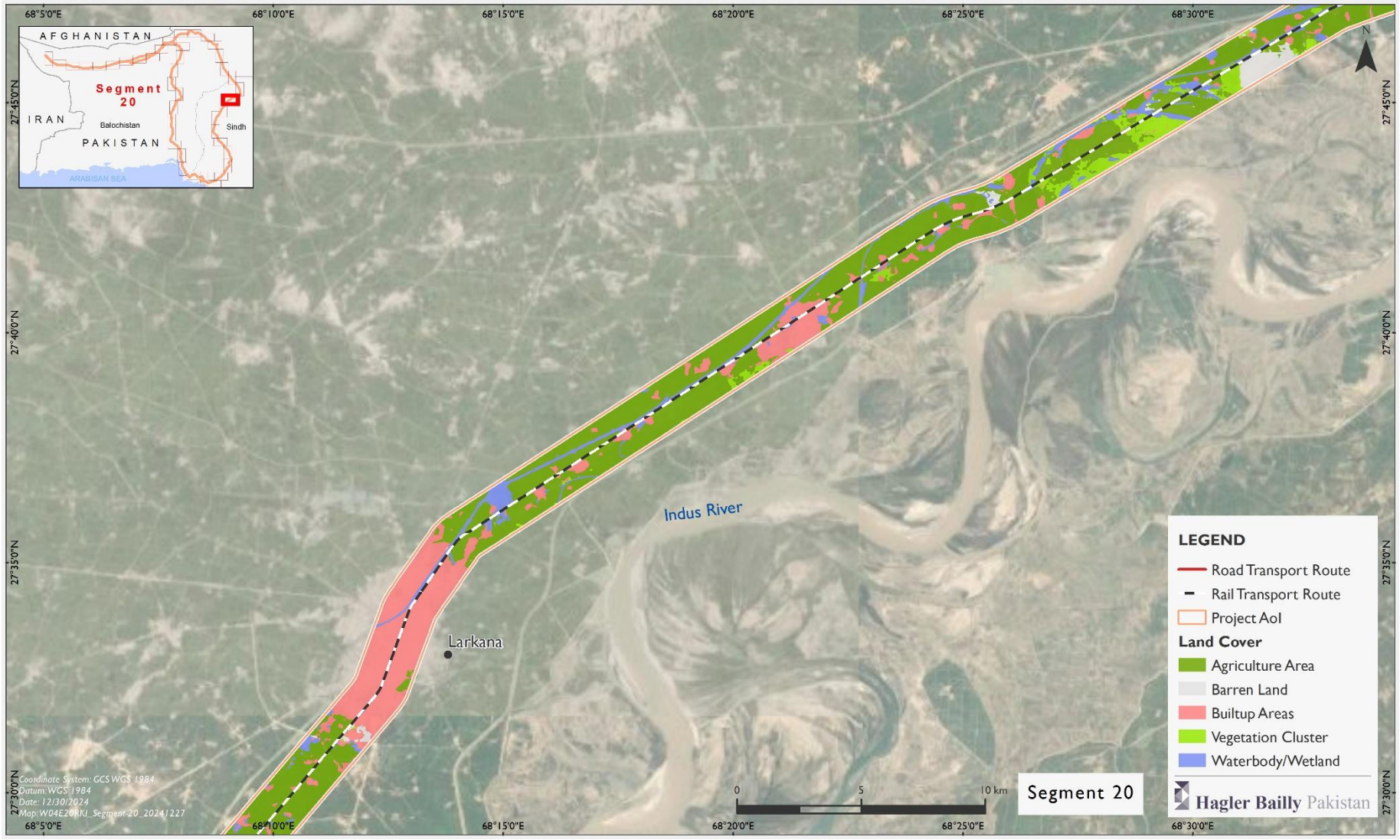
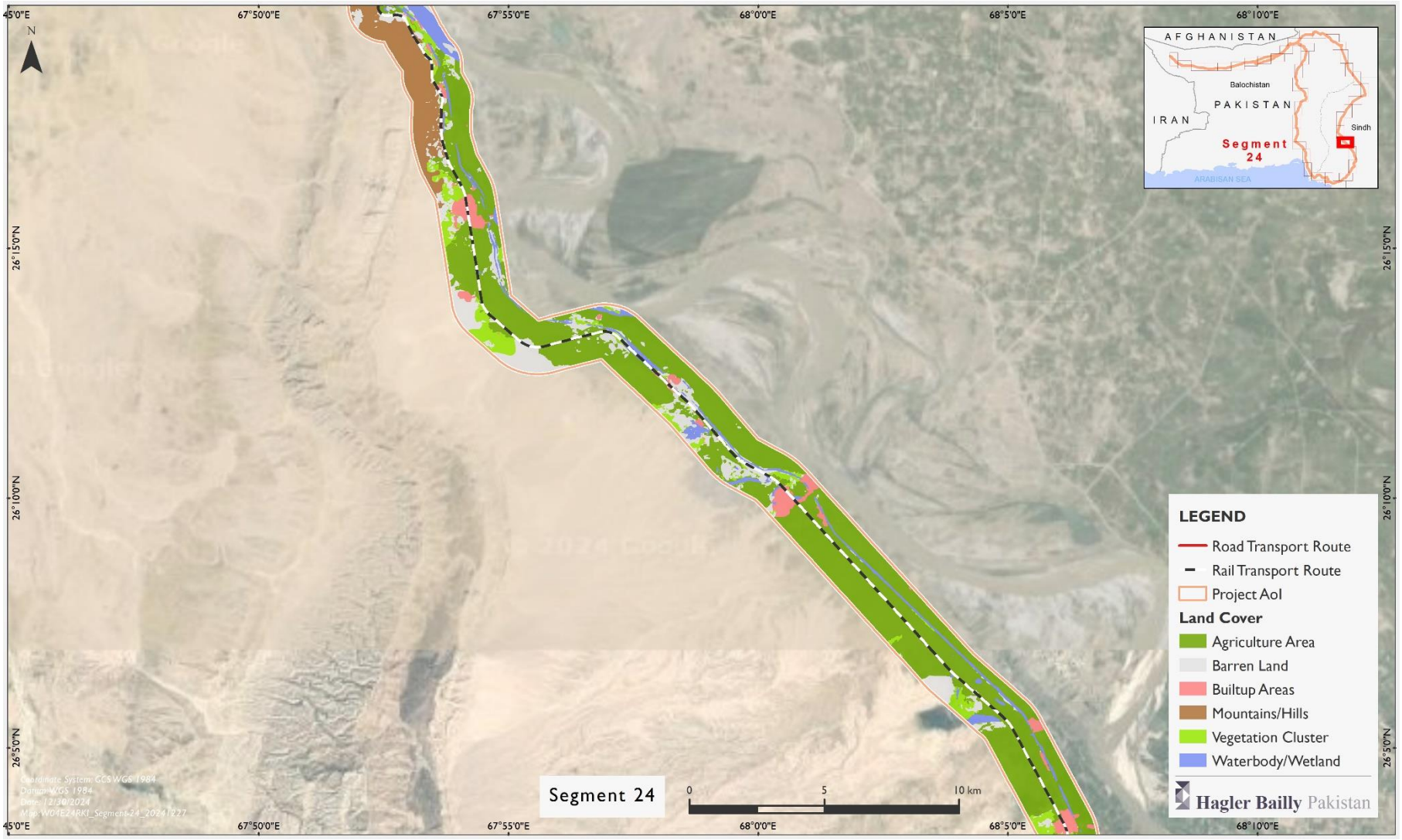


Exhibit A.21: Land Cover for Segment 21

Exhibit A.22: Land Cover for Segment 22

Exhibit A.23: Land Cover for Segment 23

Exhibit A.24: Land Cover for Segment 24



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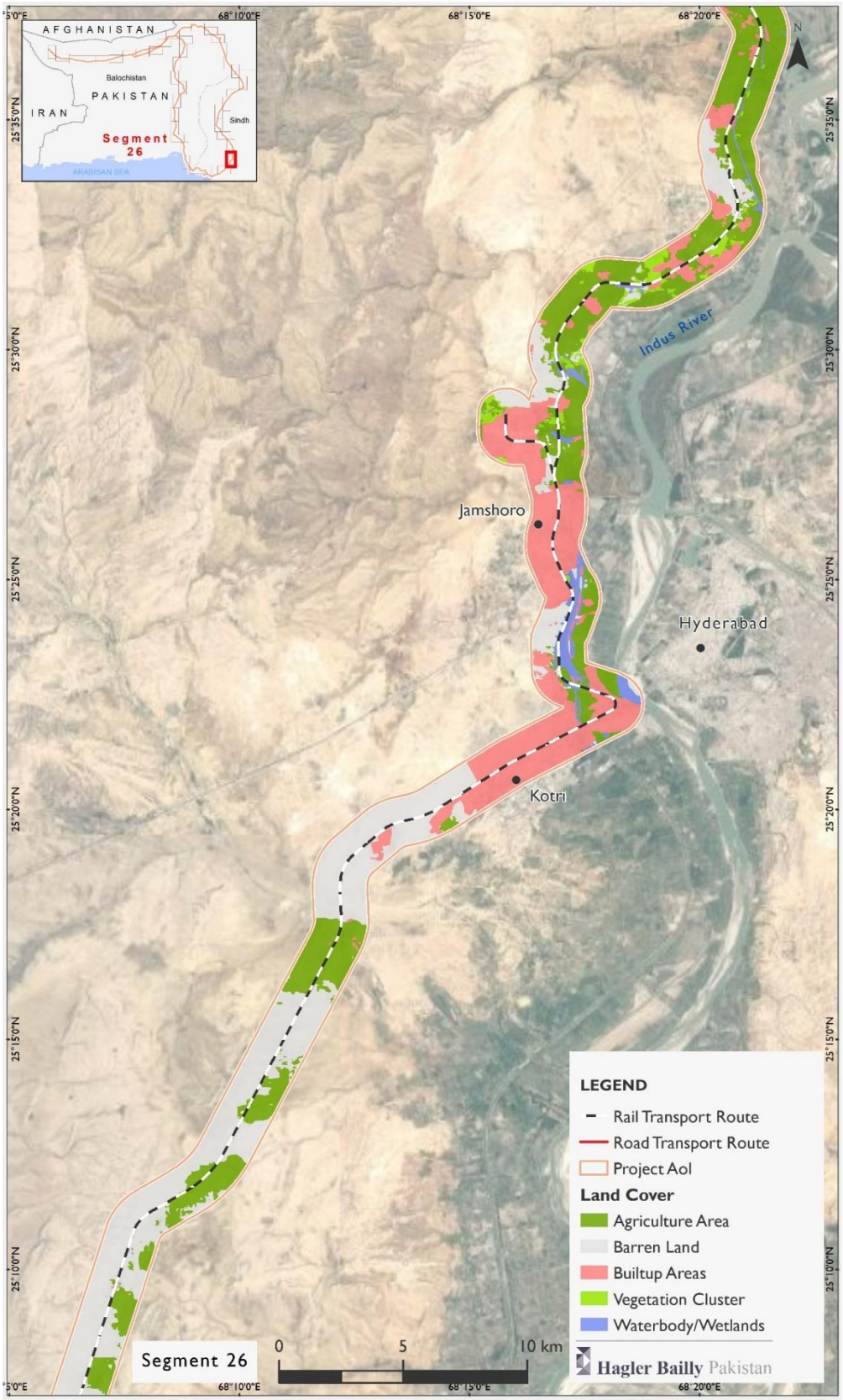

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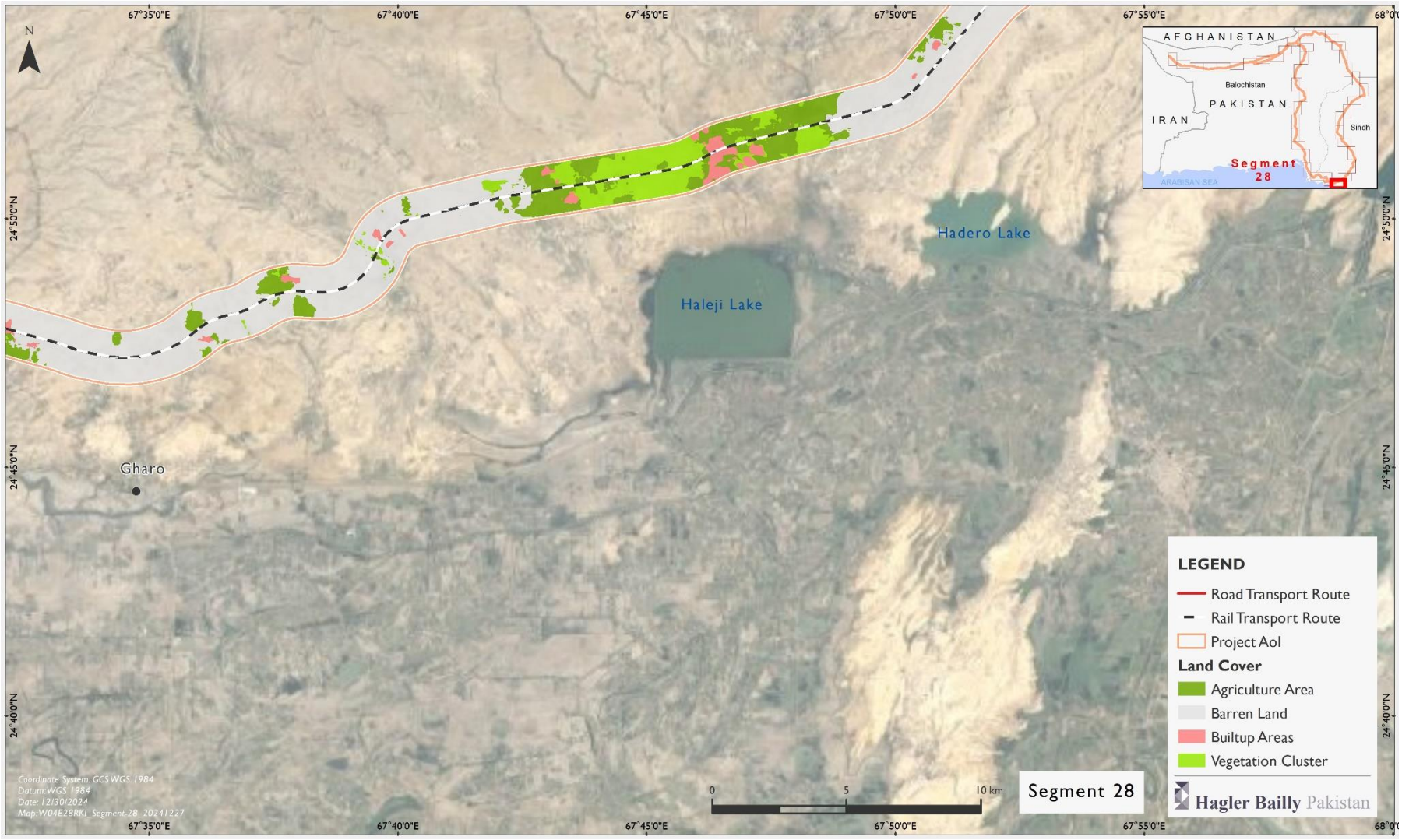
Exhibit A.28: Land Cover for Segment 28



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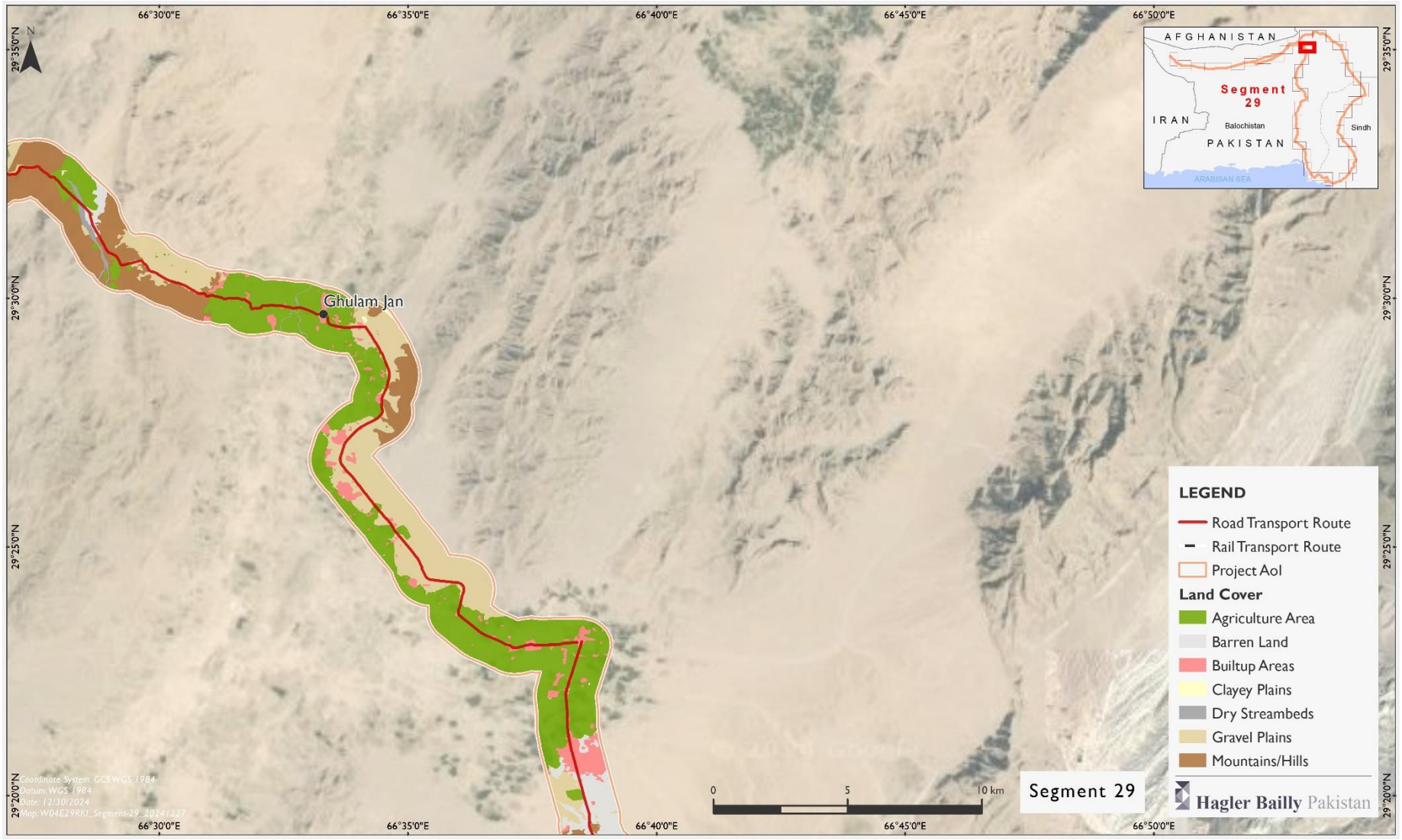

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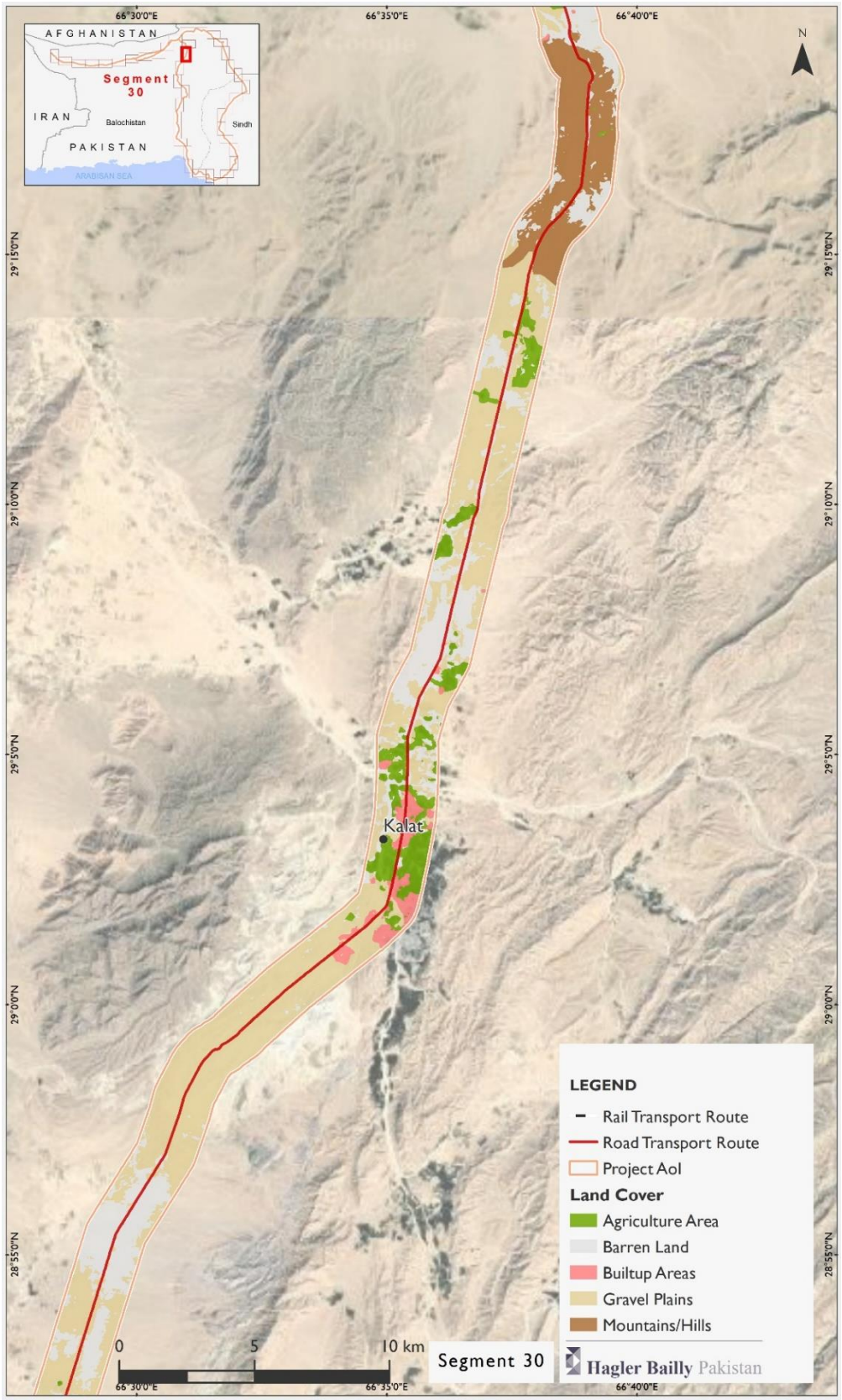

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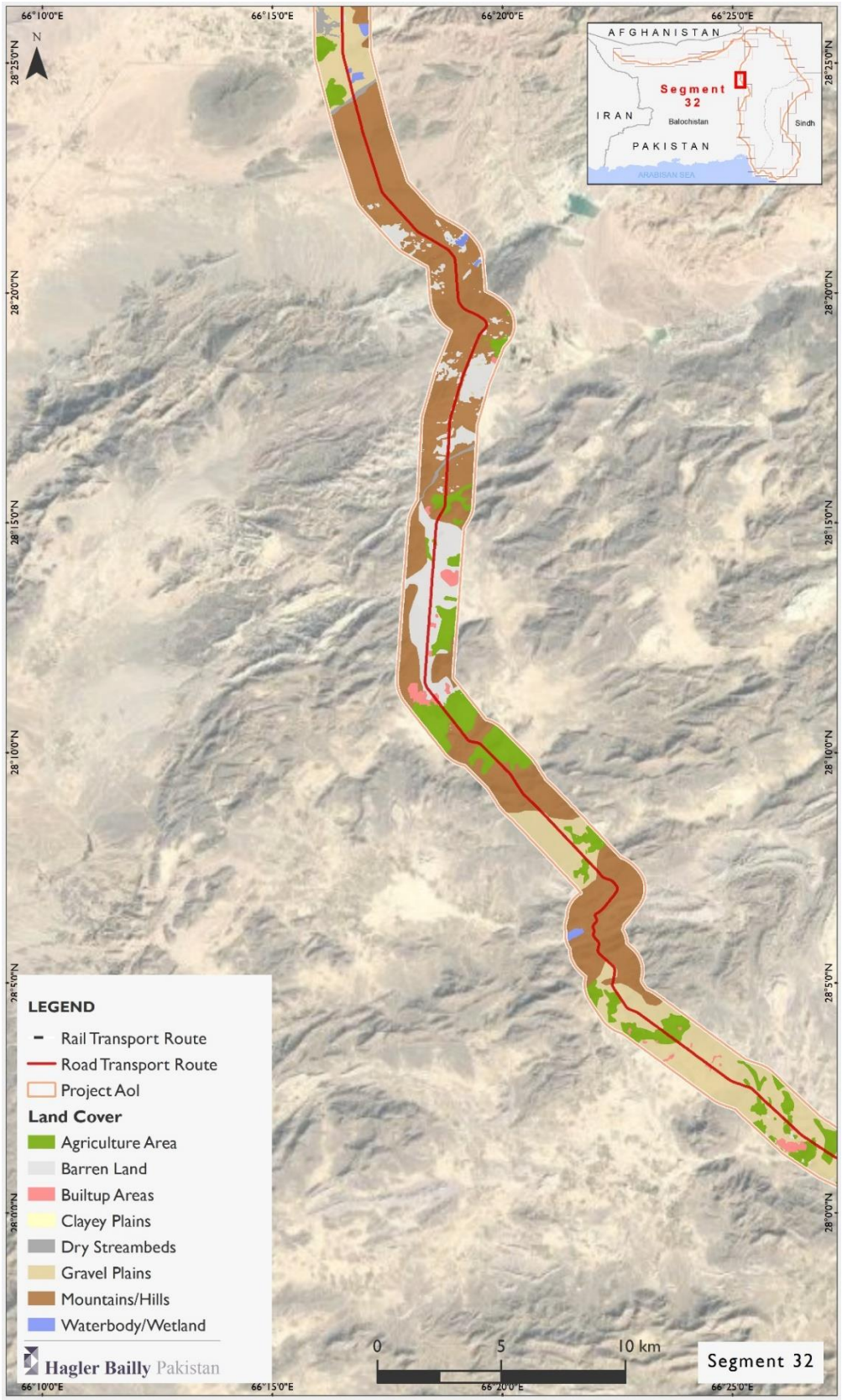
Exhibit A.32: Land Cover for Segment 32



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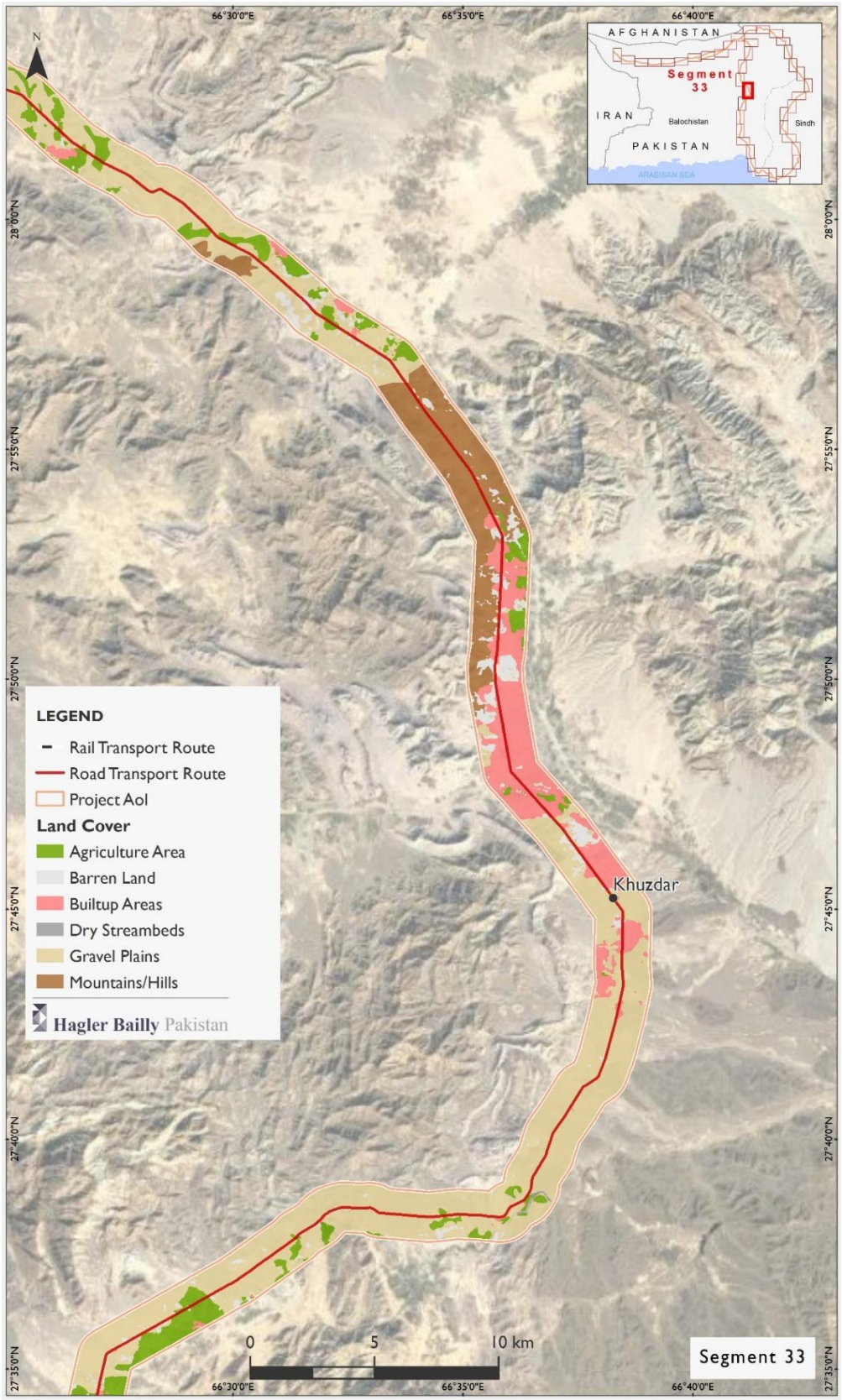
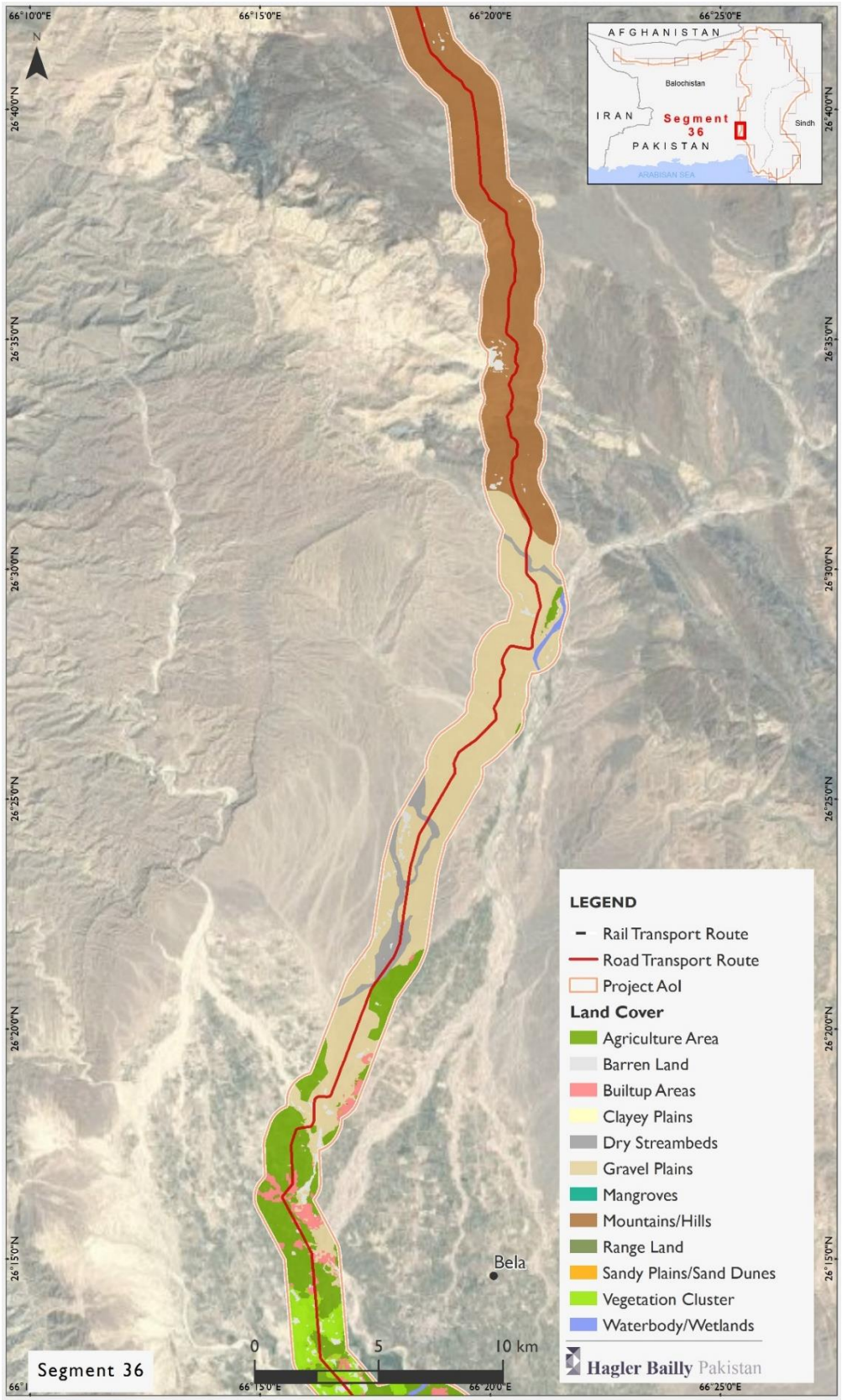


Exhibit A.34: Land Cover for Segment 34

Exhibit A.35: Land Cover for Segment 35

Exhibit A.36: Land Cover for Segment 36



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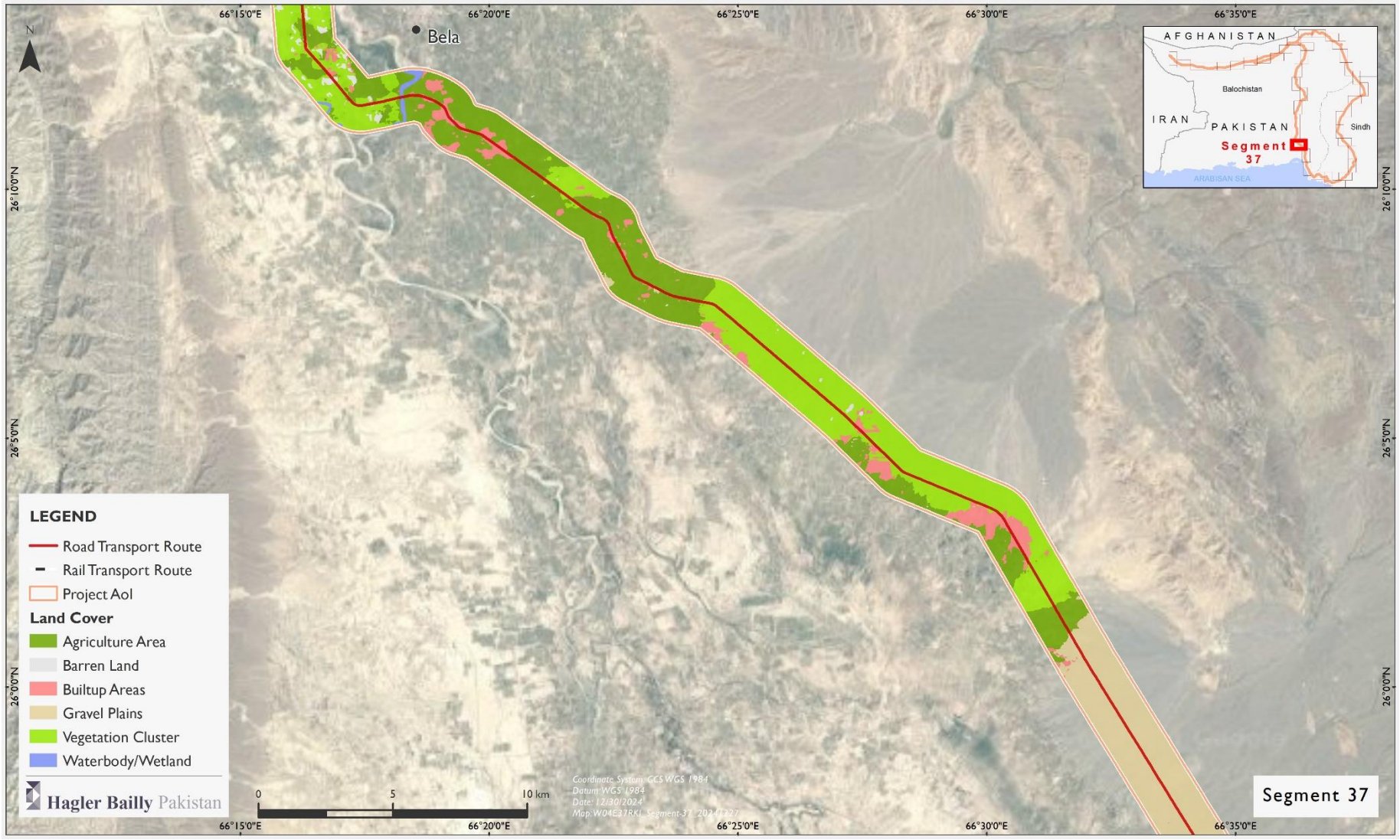

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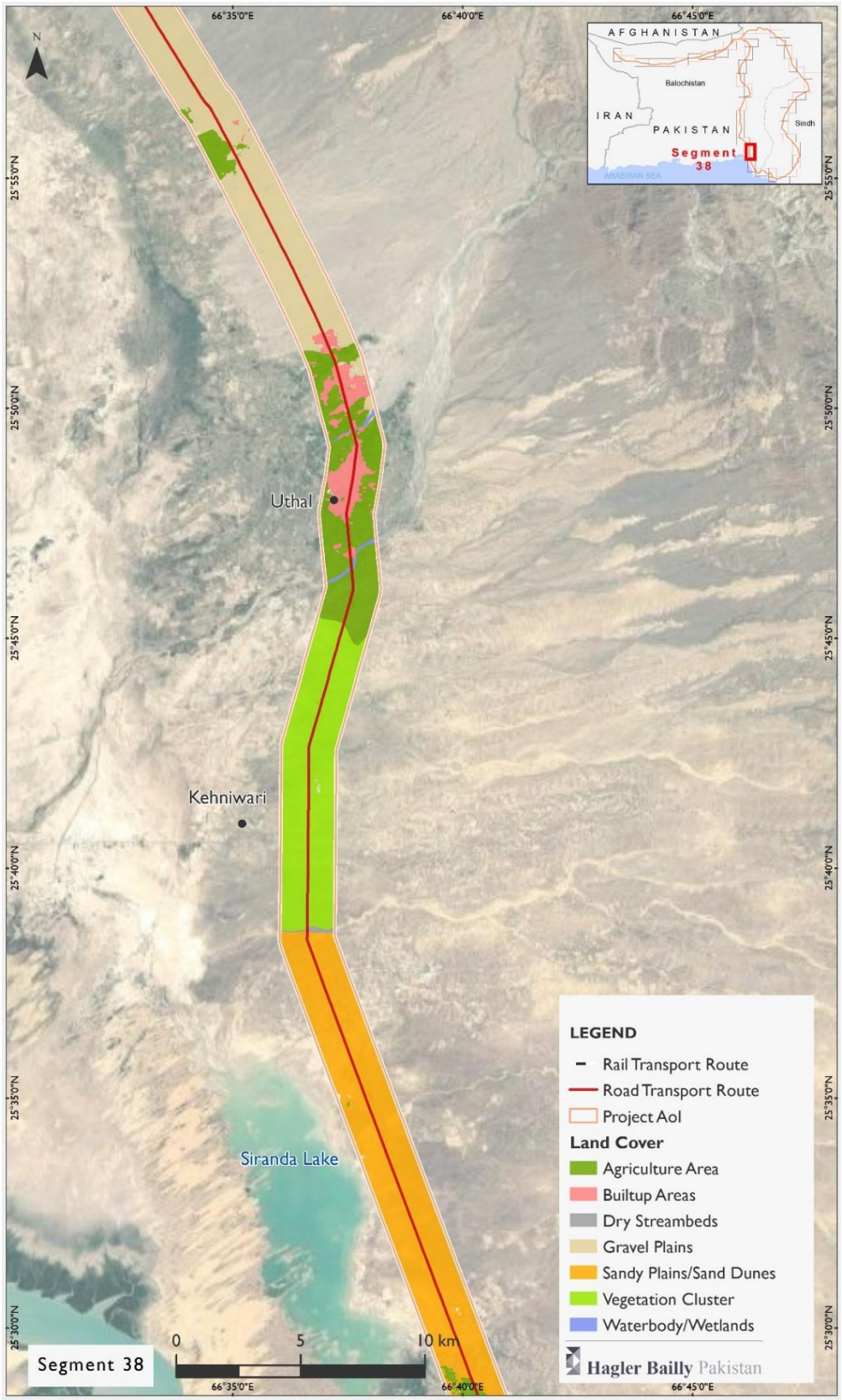

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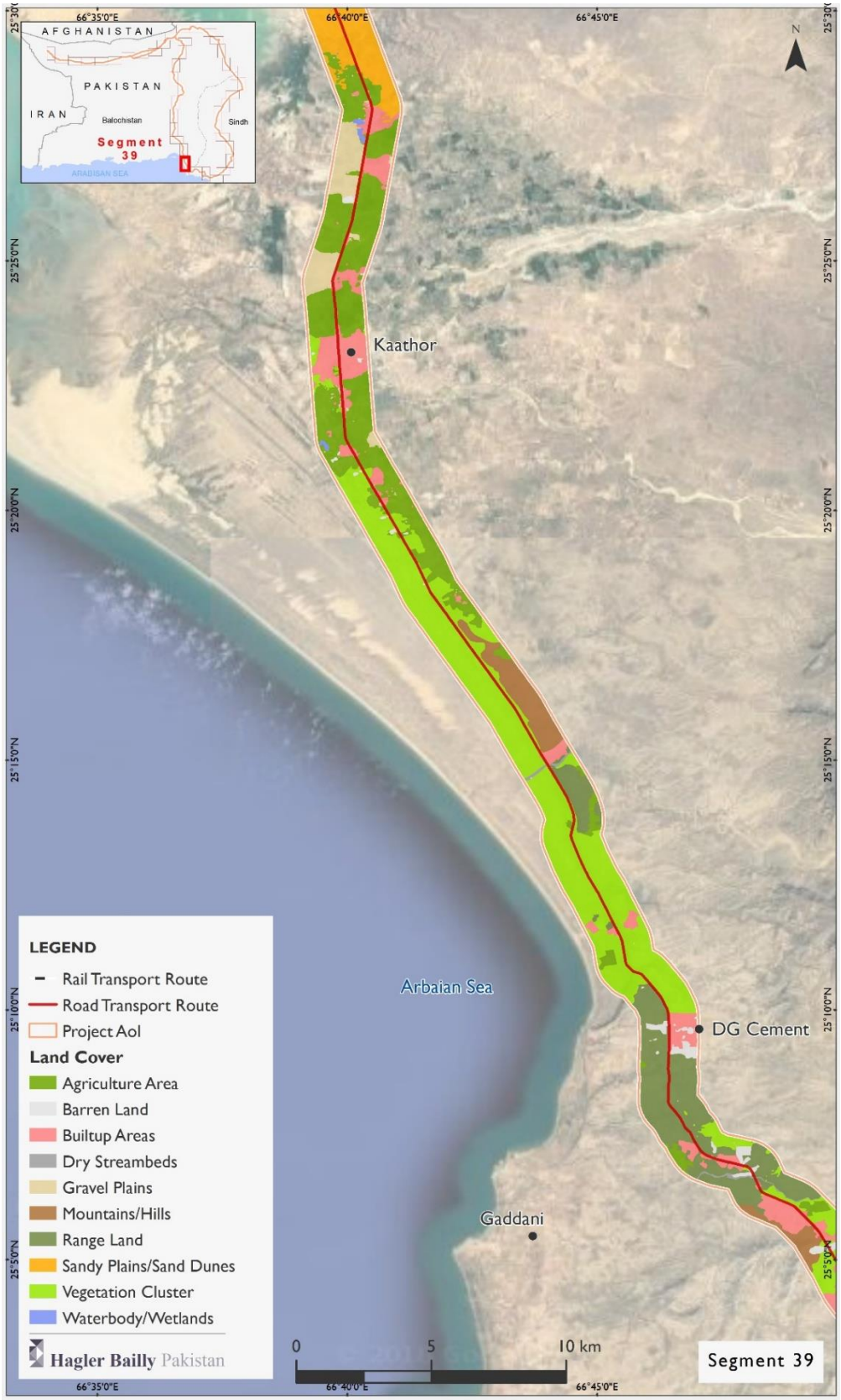


Exhibit A.40: Land Cover for Segment 40

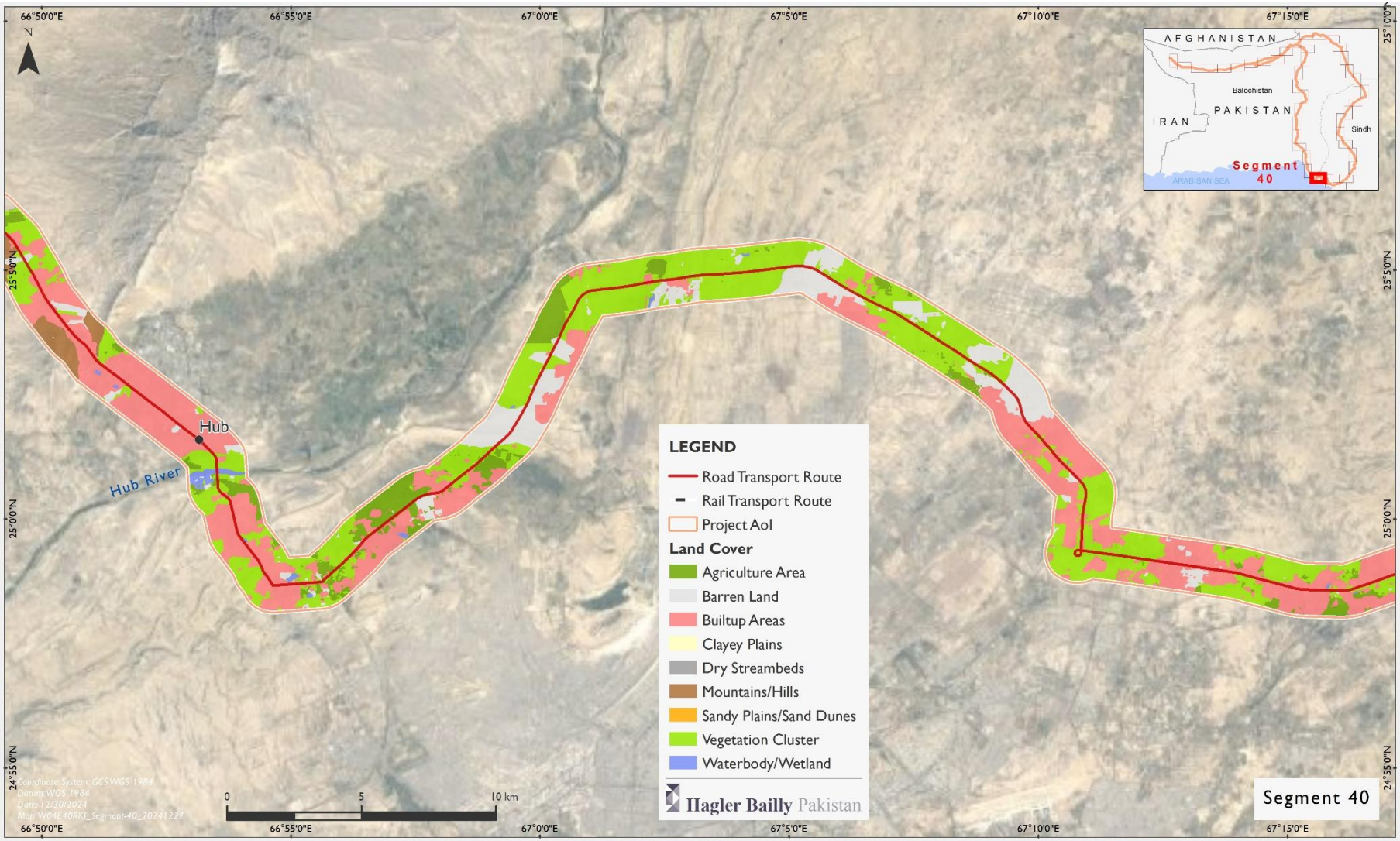
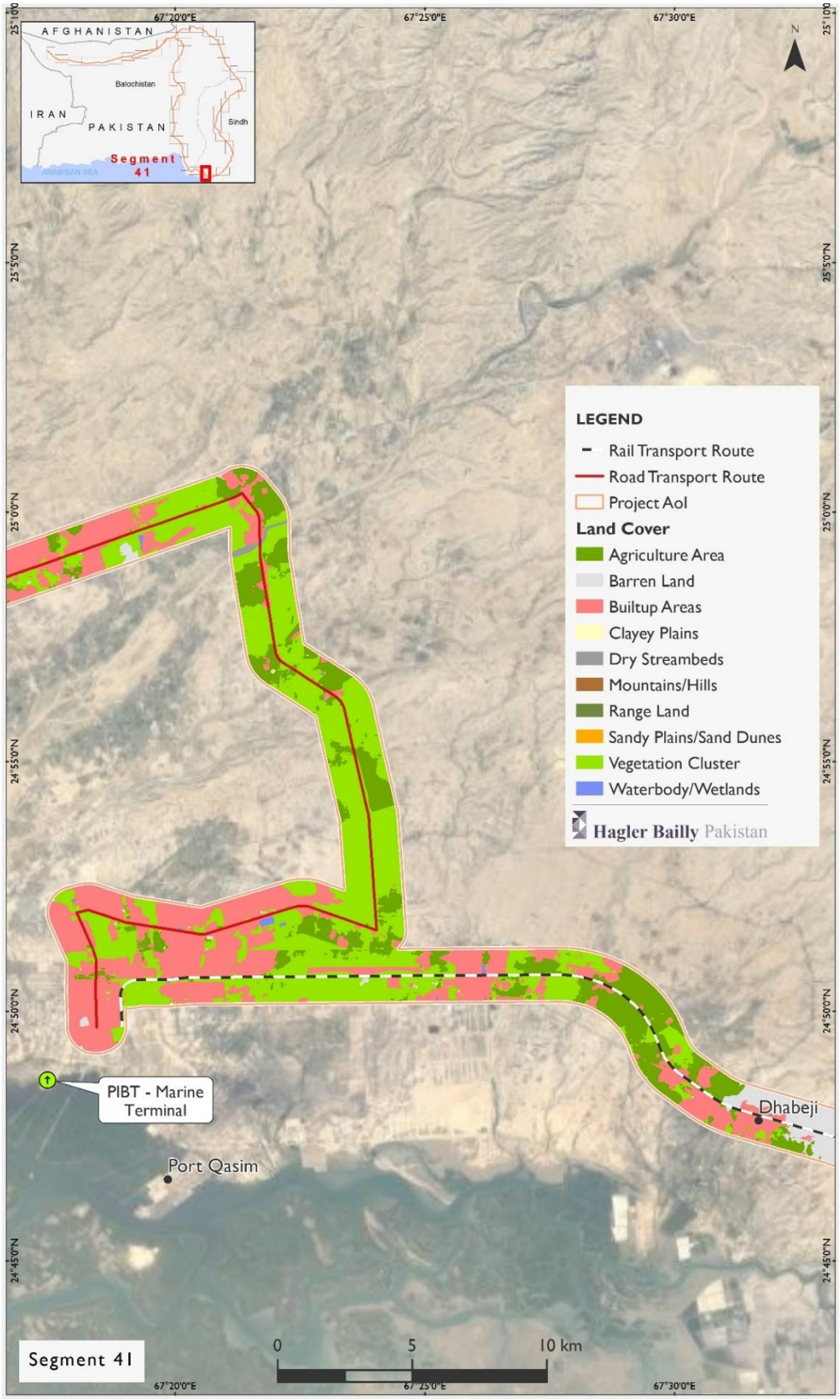


Exhibit A.41: Land Cover for Segment 41



Appendix B: Consultation Logs

B.1 Institutional Consultations Record

B.1.1 Methodology

The stakeholder consultations for the Project were carried out in three rounds, each designed to engage stakeholders at different stages and ensure their inputs were incorporated into the Project's planning and development.

In ***Round 1***, the primary objective was to inform stakeholders about the proposed Project and gather initial feedback. This was achieved through public meeting with Baluchistan Forest and Wildlife Department (BFWD) in October 2022, where the Project-related details were presented, followed by questions and answers sessions. The feedback gathered in this round helped identify key concerns and areas that required further engagement.

In ***Round 2***, the consultation process became more focused on the potential environmental and social impacts of the project, incorporating feedback from the first round. This round was carried out in September 2023 with Baluchistan Forest Department to address concerns raised in the previous round.

In ***Round 3***, the goal was to present the draft Environmental and Social Impact Assessment (ESIA) findings and address any remaining concerns. The consultation was carried out in June 2024 and December 2024 to ensure comprehensive input from relevant experts and departments. Key stakeholders, including the Forest & Wildlife (F&WL) Department, IUCN SSC Specialist Groups, Balochistan Forests and Wildlife Department (BFWD), Pakistan Museum of Natural History (PMNH), and WWF Pakistan, were consulted.

Each consultation session began with a presentation of the ESIA findings, including the identified environmental risks, potential impacts on biodiversity, and proposed mitigation measures. These presentations were followed by in-depth discussions, allowing stakeholders to raise concerns and provide recommendations specific to species conservation and project impacts. Stakeholders expressed concerns about the effects of the Project on vulnerable species, such as the Smooth-coated Otter, Indian Pangolin, and Goitered Gazelle, as well as the impact on avifauna, including the Asian Houbara Bustard and Egyptian Vulture. They also highlighted issues like roadkill, habitat fragmentation, and the need for additional surveys. Based on the feedback, follow-up actions were planned, including further surveys, adjustments to the biodiversity management approach, and incorporation of mitigation strategies into the final ESIA. The consultations ensured that stakeholder concerns were addressed, and the project team committed to cooperating with relevant departments to implement effective conservation strategies and safeguard biodiversity.

The findings, concerns, and recommendations were documented and provided in form consultation log, including the summary of the discussions from each round.

Exhibit B.1 provides the detail of stakeholder and agenda of discussion.

Exhibit B.1: Stakeholder Department and Agenda of Discussion

No.	*Stakeholder Name*	*Date*	*Agenda*
1.	Balochistan Forests and Wildlife Department (BFWD)	October 05, 2022	Consultation with Secretary Forest and Wildlife regarding biodiversity, conservation, and CSR initiatives.
2.	Balochistan Forest Department (BFD)	September 04, 2023	Consultation with Chief Conservator Forest to discuss project impacts on ecosystem, land use, and biodiversity.
3.	Balochistan Forests and Wildlife Department (BFWD)	June 26, 2024	ESIA presentation; cooperation on biodiversity management, focusing on ecosystem and biodiversity impacts.
4.	IUCN SSC Otter Specialist Group	December 02, 2024	ESIA presentation; assessment of project impacts on the Smooth-coated Otter population.
5.	IUCN SSC Pangolin Specialist Group	December 02, 2024	ESIA presentation; assessment of project impacts on Pangolin species, particularly along transport routes.
6.	IUCN SSC Antelope Specialist Group	December 04, 2024	ESIA presentation; assessment of impacts on Goitered Gazelle and conservation measures for habitat protection.
7.	Balochistan Forests and Wildlife Department (BFWD)	December 10, 2024	Discussion on key biodiversity values, threats to biodiversity, requirements under IFC PS6 including Critical Habitat, and approach to preparation of a BAP.
8.	Pakistan Museum of Natural History (PMNH)	December 11, 2024	ESIA presentation; discussion on flora, fauna, and impacts on biodiversity, including rodent, reptile, and plant species.
9.	Pakistan World Wide Fund for Nature (WWF)	December 12, 2024	ESIA presentation; discussion on conservation concerns for the Asian Houbara Bustard and Egyptian Vulture.

B.1.2 Round 1 – 2022 (ESIA Preparation)

Stakeholder/s:	Balochistan Forest and Wildlife Department (BFWD)		
Consultation:	Consultation with Secretary Forest and Wildlife		
Date:	October 05, 2022		
Time:	2:00 pm		
Meeting venue:	Office of the Secretary Forest and wildlife		
Attended by:	**Name**	**Designation**	**Contact**
	Mr. Abdul Wali	Government Employee	+92 312 8920046
	Mr. Imran Khan	Government Employee	
Conducted by:	• Mr. Yasir Asad (HBP representative) • Dr. Rafique (HBP representative) • Dr. Rafaqat (HBP representative) • Mr. Shakil (HBP representative)		
Recorded by:	Yasir Asad		
Language:	Balochi and Urdu		
Preamble:	The meeting started with an introduction between the HBP representative and the Secretary Forest and wildlife. After the introduction, the HBP representative briefed the objective of the Institutional consultations and provided information on the proposed development and its activities and the Client (RDMC). In the end, the HBP representative asked the participants to share their views, concerns, and recommendations regarding the proposed Project and explained the positive outcomes of their active participation in the meetings.		
Picture:			
Stakeholder views, concerns, and suggestions	**Concerns:** • Chaghi's limited biodiversity due to the region's infrequent rainfall, disruptions from local activities, and the impacts of significant developmental projects. • The potential conflict arising from trawl fishing activities conducted by fishermen from Sindh, posing a threat to local ecosystems. • The need for support from Reko Diq for the Forest and Wildlife Department in the form of Corporate Social Responsibility (CSR) initiatives to address conservation challenges.		

	Recommendations: ♦ Recognizing the intact habitats within the project's vicinity and emphasizing their potential role in preserving the region's biodiversity. ♦ Acknowledging and appreciating the Baluchistan Fisheries Department's implementation of stringent controls, particularly the disallowance of trawl fishing, as a significant step towards conservation. ♦ Suggesting collaborative management of the conflict arising from trawl fishing activities to ensure the protection of local ecosystems. ♦ Advocating for CSR initiatives from Reko Diq to support the Forest and Wildlife Department in establishing facilities at the port and enhancing their capabilities for better conservation practices. ♦ Commending the commitment to share the survey team's comprehensive report with the Forest and Wildlife Department as a step towards enhancing cooperation and collectively addressing challenges. ♦ Highlighting the potential of a collaborative approach and suggested CSR support to pave the way for more sustainable and effective management of Chaghi's ecological dynamics, ensuring the preservation of rare species and maintaining a delicate balance.

B.1.3 Round 2 – 2023 (ESIA Preparation)

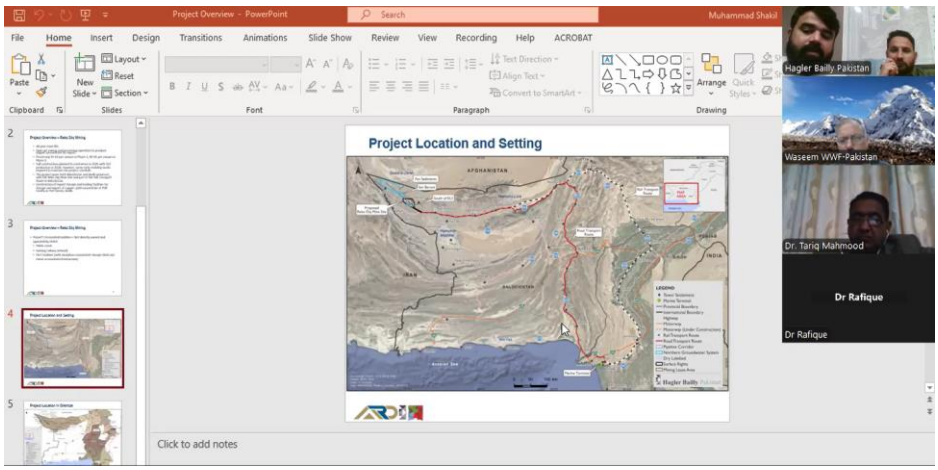
Stakeholder/s:	Balochistan Forest Department		
Consultation:	Consultation with Chief Conservator Forest		
Date:	September 04, 2023		
Time:	12:00 pm		
Meeting venue:	Serena Hotel, Quetta		
Attended by:	**Name**	**Designation**	**Contact**
	Abdul Jabbar	Chief Conservator Forest	+92 301 8118777
Conducted by:	Yasir Asad and Muhammad Arshad (HBP Representatives) Col (R) Ahmer Iqbal (RDMC Representative)		
Recorded by:	Muhammad Arshad		
Language:	Urdu/English		
Preamble:	The stakeholders were informed about the proposed project, its components and the purpose of the consultation. Information regarding the study was shared with the stakeholders and key points of discussion were recorded.		
Picture:			
Stakeholder views, concerns, and suggestions	**Concerns:** ♦ The stakeholder is concerned that project activities may alter the land use pattern, ultimately affecting the ecosystem and the current state of the area. ♦ There is a concern that the genetic coding of wild animals, such as the Houbara Bustard, may not adapt to changes caused by anthropogenic activities. The stakeholder mentioned that the Houbara Bustard travels from Russia to Nag, an area in the vicinity of the Reko Diq project, and could be significantly affected. The traditional migration routes of this species may be disrupted. ♦ The stakeholder expresses concern that project activities may have adverse effects on reptiles and other rodent populations. ♦ The stakeholder highlights the possibility that the project activities could raise hopes and expectations within the local community. They recommend that the construction company should manage these expectations wisely, involving the local people in the process. ♦ The stakeholder points out that there is a negative perception among local people regarding developmental companies influenced by political factors. They suggest that this perception should be minimized through social		

	mobilization, capacity building, and by undertaking positive actions that benefit the local community. **Recommendations:** ♦ It is recommended to actively involve the local community in project planning and decision-making. This approach fosters a sense of ownership and accountability among community members. ♦ Developing a comprehensive Biodiversity Action Plan is crucial to safeguard the diverse wildlife in the area. This plan should encompass waste management, ecological cycles, and the food chain. ♦ Regularly monitoring the Houbara population is advisable to assess spatial and temporal trends. ♦ Addressing the major threat of hunting to the Houbara population is vital. Law enforcement agencies should take measures to curb hunting, and the community should be educated about the value of Houbara and other biodiversity. ♦ Initiating collaborative efforts involving NGOs, local communities, the Wildlife Department, and law enforcement agencies to develop a conservation action plan for the Houbara is recommended. ♦ Developing and implementing an environmental education strategy at all levels can bring about positive changes in attitudes toward conservation. ♦ CSR funds should be properly utilized, either through local community organizations or by organizing local institutions first and then utilizing the funds through them. ♦ During the community assessment stage, categorizing the community into four groups—women, youth, children, and the elderly—and assessing the needs of each category is advised. Funds should be allocated based on these needs. ♦ Provide educational facilities to youth, offer health facilities and nutrition support to children, deliver skills training to women, and ensure the provision of drinking water supply at their doorsteps. ♦ Develop a watershed management plan that covers all relevant activities, such as constructing check dams and plantations, aligning with landscape needs. ♦ Construct check dams and promote the growth of plants along these dams to support local ecological balance and water resource management.

B.1.4 Round 3 – 2024 (ESIA Feedback and Follow-up Consultations)

Stakeholder/s:	Baluchistan Forest and Wildlife Department (BFWD)		
Consultation:	ESIA		
Date:	June 26, 2024		
Time:	3:30 pm		
Meeting venue:	RDMC, Serena Hotel, Quetta		
Attended by:	***Name***	***Designation***	***Contact***
	Ashley Price (AP)	ESIA Manager	-
	Mr Muhammad Ahmer		-
	Vaqar Zakaria (VZ)	Managing Director	-
	Mr Ali Imran (AI)	Chief Forest Conservator	-
	Mr Fawad	Forest Conservator	-
Conducted by:	Ashley Price (RDMC) Mr Muhammad Ahmer (RDMC) Vaqar Zakaria (HBP) Mr Ali Imran (F&WL Department) Mr Fawad (F&WL Department)		
Recorded by:	Ashley Price		
Language:	English		
Preamble:	AP presented the salient features of the Project, the process being followed for preparation of the ESIA, principle environmental and social concerns including biodiversity, water requirements and how the Project is planning to address them in the ESIA that is being prepared for the Project.		
Picture:	N/A		
Stakeholder concerns, views, and suggestions:	♦ AI presented role and scope of F&WL, and community development projects undertaken by the department inclusive of plantations and revegetation of barren areas using indigenous plants. ♦ AI highlighted the ongoing activities and projects of the department for uplift management of ecosystem and biodiversity in Chagai district. ♦ VZ provided a briefing on the approach being followed by RDMC for preparation of the BMP including need for surveys to collect additional data for design of offsets in the areas with biodiversity similar to that at the proposed mine site ♦ RDMC and F&WL Department agreed to cooperate on management of biodiversity and impact of the Project on it.		

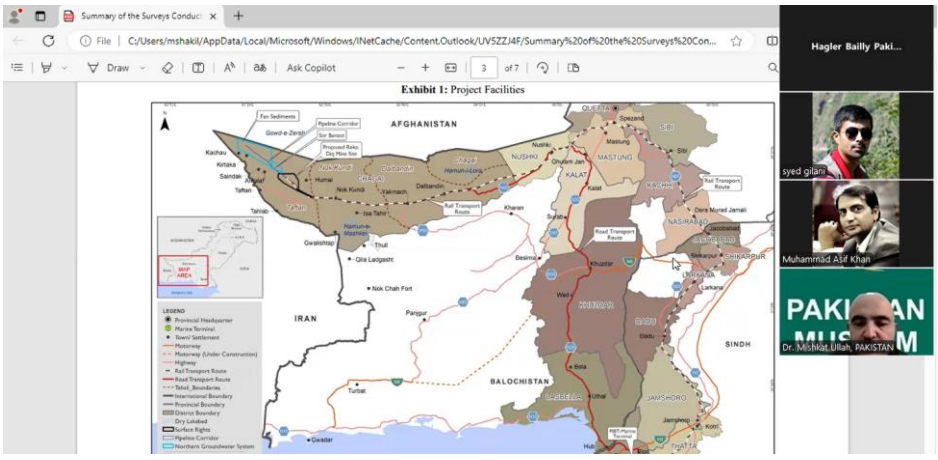
Stakeholder/s:	IUCN SSC Otter Specialist Group		
Consultation:	ESIA		
Date:	December 02, 2024		
Time:	2:00 pm		
Meeting venue:	Online Zoom Call		
Attended by:	***Name***	***Designation***	***Contact***
	Dr. Moazzam Khan	Otter Specialist	-
Conducted by:	Ahmed Shoaib (HBP) Muhammad Shakil (HBP)		
Recorded by:	Muhammad Shakil		
Language:	English/Urdu		
Preamble:	Ahmed Shoaib presented the salient features of the Project, detailing the process being followed for the preparation of the Environmental and Social Impact Assessment (ESIA). Key discussions focused on biodiversity conservation, such as assessing the potential impacts on species like the Smooth-coated Otter.		
Picture:	N/A		
Stakeholder concerns, views, and suggestions:	♦ The Smooth-coated Otter is the only species present in the lower Indus River, confined to freshwater habitats. ♦ There is no evidence of Otter presence in Port Qasim or marine environments. ♦ Given the Project's reliance on existing rail routes and the existing environmental disturbances in the Sukkur area, minimal interaction with Otters is expected. ♦ The Project is not anticipated to significantly impact the Smooth-coated Otter population due to the absence of notable Otter presence in the Project area.		

Stakeholder/s:	IUCN SSC Pangolin Specialist Group		
Consultation:	ESIA		
Date:	December 02, 2024		
Time:	4:00 pm		
Meeting venue:	Online Zoom Call		
Attended by:	***Name***	***Designation***	***Contact***
	Dr Tariq Mahmood	Pangolin Expert (University of Arid Agriculture, Rawalpindi)	
	Pir Mehr Ali Shah	Pangolin Expert (University of Arid Agriculture, Rawalpindi)	
	Faraz Akrim	Pangolin Expert (University of Kotli Azad Jammu & Kashmir)	
	Dr Muhammad Waseem	Pangolin Expert (WWF Pakistan)	
Conducted by:	Ahmed Shoaib (HBP) Muhammad Shakil (HBP)		
Recorded by:	Muhammad Shakil		
Language:	English/Urdu		
Preamble:	Key discussions focused on assessing the potential impacts on species like the Indian Pangolin.		
Picture:			
Stakeholder concerns, views, and suggestions:	♦ Pangolins have been reported in some areas along the transport route, including Lasbella, Sibi, and Jacobabad. However, no evidence or records suggest their presence near the Reko Diq Mine Site, as indicated by existing literature and IUCN distribution data. ♦ Surveys conducted over the past 15 years consistently confirm the absence of pangolins in the Project Area.		

	♦ Local communities in the vicinity also did not report sightings or evidence of the species. ♦ The working group requested additional information on survey methodologies, study areas, and recorded species to provide more comprehensive input. ♦ A summary of mammal surveys, including habitat conditions and ecological context, was shared with the group. ♦ The working group was tasked with reviewing the summary and providing further recommendations for incorporation into the baseline study. ♦ They were also asked to assess potential impacts along the transport corridor due to increased traffic. ♦ To date, the working group has not provided additional input based on the shared information.

Stakeholder/s:	IUCN SSC Antelope Specialist Group		
Consultation:	ESIA		
Date:	December 04, 2024		
Time:	3:30 pm		
Meeting venue:	Online Zoom Call		
Attended by:	***Name***	***Designation***	***Contact***
	Dr. David Mallon	IUCN SSC Antelope Specialist Group)	
Conducted by:	---		
Recorded by:	----		
Language:	English/Urdu		
Preamble:	Key discussions emphasized the need to assess potential impacts on species such as the Goitered Gazelle, particularly concerning habitat connectivity, movement barriers, and conservation measures within the Project area.		
Picture:	N/A		
Stakeholder concerns, views, and suggestions:	**Concern:** ♦ There is limited updated information on the status of the Goitered Gazelle in the Chagai District but the population is believed to be small and not significant in terms of the global population. ♦ The population in Pakistan forms part of a larger population in Iran and Afghanistan. ♦ Fence lines along the Afghanistan and Iranian border could negatively impact on the population of Goitered Gazelle in Pakistan. **Recommendations:** ♦ Additional fence lines along the rail corridor should be avoided as this could pose a barrier to Goitered Gazelle movements. ♦ Although Goitered Gazelle are likely to utilize a variety of habitat throughout the Chagai District, the rugged mountainous habitat along the Iran – Pakistan border provides the best refuge for Goitered Gazelle as they are more difficult to observe and pursue in this region.		

Stakeholder/s:	Balochistan Forests and Wildlife Department (BFWD)		
Consultation:	ESIA		
Date:	December 11, 2024		
Time:	10:30 am		
Meeting venue:	Serena Hotel, Quetta		
Attended by:	***Name***	***Designation***	***Contact***
	Mr Sharifuddin Baloch (BFWD)	Chief Conservator Wildlife	-
	Mr Imran (BFWD)	Chief Conservator of Forest	-
	Mr Ashley Price (RDMC)		-
	Col Ahmer (RDMC)		-
	Vaqar Zakaria (HBP)		-
Conducted by:	Vaqar Zakaria		
Recorded by:	Vaqar Zakaria		
Language:	English		
Preamble:	Based on findings of the baseline ecological surveys conducted for the ESIA of the Project, Vaqar Zakaria presented a summary of key biodiversity values, threats to biodiversity, requirements under IFC PS6 including Critical Habitat, and approach to preparation of a BAP. The following is a summary of discussions.		
Picture:	N/A		
Stakeholder concerns, views, and suggestions:	♦ The BFWD confirmed the notification of Saindak Community Game Reserve covering Tehsil Taftan. The BFWD will share the details of Reserve Forests and Protected Forests in the area. ♦ The BFWD mentioned the Kambran Wildlife Sanctuary and the Gut Wildlife Sanctuary, for which they will also provide the details including notifications. ♦ HBP and RDMC provided a briefing on the key findings of ecological surveys, species of conservation concern identified, and rationale and approach for development of Biodiversity Action Pan (BAP) for the Project. ♦ The BFWD recognized the importance of focusing the biodiversity conservation activities to distribution ranges of species of concern and their habitats. The protected areas previously notified can be adjusted to reflect the habitat and species distribution assessment conducted by the Project as a part of the ESIA baselines. Zoning of the protected area into core zone, conservation zone and buffer zones would be an appropriate strategy for conservation management. ♦ The BFWD is open to discussions on formulation of protection strategies based on the data collected by the Project and will cooperate with the Project for the development of the BAP. The area of management for the BAP can also be defined accordingly. ♦ Institutional arrangements for conservation will include representation from the Project and the local communities who will work with the BFWD for implementation of the BAP.		

Stakeholder/s:	Pakistan Museum of Natural History (PMNH)		
Consultation:	ESIA		
Date:	December 11, 2024		
Time:	4:00 pm		
Meeting venue:	Online Zoom Call		
Attended by:	***Name***	***Designation***	***Contact***
	Mr Muhammad Asif	Vegetation Expert	
	Dr Syed Aneel Gillani	Algal Flora Expert	
	Dr Mishkat Ullah	Invertebrates Expert	
	Dr Rafaqat Masroor	Herpetofauna Expert	
Conducted by:	Ahmed Shoaib (HBP) Muhammad Shakil (HBP)		
Recorded by:	Muhammad Shakil		
Language:	English/Urdu		
Preamble:	Key discussions focussed on potential impacts on flora and fauna with expert of PMNH.		
Picture:			
Stakeholder concerns, views, and suggestions:	**Concern:** ♦ The Project area has very fragile ecosystem with species adapted to the extreme conditions. ♦ Mangroves at Port Qasim are at high risk of to the Project activities ♦ Baluchistan is important for mammals especially the rodent's species, several fox species and sand cat. Asiatic Cheetah was only reported in the vicinity of the Project several years ago and current status is unknown ♦ Several ungulates and the Asiatic Cheetah are the flagship species ♦ The Project area is unexplored and no comprehensive studies conducted except those conducted for the Project ♦ Road kill is expected to increase at Mine Site and along the Transport Route		

	♦ Habitat modification and fragmentation are major threats for species survival while hunting is not as dangerous for the species survival ♦ Nomadic community also rely on the scant resources in specific area who will be affected ♦ In extreme dry conditions only few species of invertebrates survive like the beetles ♦ There are only few rains which create an entire ecosystem, attracting the migratory birds in the dry lake beds. ♦ Fencing along the Iran-Afghanistan borders has restricted the wildlife, however there are possibilities of the gene flow in few areas like nullahs ♦ The amphibians have very uncertain presence at Reko Diq Mine Site given dry and hot conditions as they need water ♦ Reptiles are diverse and abundant, well adapted and few are restricted range and endemic to the area ♦ Reptiles are also most vulnerable group due to Project activities ♦ Exotic rodent and non-native plant species can establish at the Project site due to increased traffic ♦ The area has several medicinal plants as well **Recommendations:** ♦ Plantation in the potential sites with proper plan using the native species including the tree and shrubs since the shrubs are good binder to control the soil degradation. ♦ Conservation measures are required for the species vulnerable to mining activities ♦ BAP is compulsory to mitigate the negative impacts and conservation of unique biodiversity. ♦ Vehicle movement to be restricted to the designated routes. ♦ Both in-situ and ex-situ conservation measures are recommended for biodiversity conservation ♦ New National Parks, Trans-Boundaries Reserves and Sanctuaries can be declared in the potential sites in consultation with Wildlife and Forest departments. ♦ Exotic species and Alien-Invasive Species Management Plan can best control the non-native species. ♦ Relocation plan can be adopted to ensure the safe relocation and monitoring of the vulnerable groups. ♦ Relocation of rodents can be challenging as they live in colonies and often hard to relocate however, it can be attempted.

Stakeholder/s:	World Wide Fund for Nature (WWF), Pakistan		
Consultation:	ESIA		
Date:	December 12, 2024		
Time:	10:30 am		
Meeting venue:	Online Zoom Call		
Attended by:	***Name***	***Designation***	***Contact***
	Jamshed Iqbal Chaudhry	Avifauna Expert	
Conducted by:	Ahmed Shoaib (HBP) Muhammad Shakil (HBP)		
Recorded by:	Muhammad Shakil		
Language:	English/Urdu		
Preamble:	Discussion with the WWF Pakistan expert focused on the avifauna specifically the Asian Houbara Bustard and Egyptian Vulture which are the conservation concern species. Key concerns and recommendations are given below.		
Picture:	N/A		
Stakeholder concerns, views, and suggestions:	**Concern:** ♦ Chagai host the wintering population of Asian Houbara Bustard however, there are very old literature records for its resident population in the Nag Valley which is far away from the Project site. ♦ Nag Valley is still a favourable site for the breeding of this species given there is not higher hunting and trapping pressure. Hunting and trapping can result in the disappearance of the species and change in its feeding and breeding sites. ♦ Wildlife Department has no census data for the Asian Houbara Bustard in Baluchistan. ♦ Asian Houbara Bustard migrates in varying number of group sizes, it can be few specimens to hundreds ♦ Birds have large home range so they can relocate and move to larger areas ♦ Climate change is not an issue so far for the breeding and change in resident sites for this species as there is only slight change in temperature and this species has been observed in the Cholistan Desert in extreme hot conditions. ♦ Major threat to Asian Houbara Bustard and other bird species in the area include the vehicle pollution, collision risk, reduction in food availability, hunting and trapping. ♦ Both Asian Houbara Bustard and Egyptian Vulture are equally vulnerable to the transmission line. Especially the Egyptian Vulture construct nest at high poles and becomes a victim of electrocution. ♦ Additional threats to the Egyptian Vultures and other raptors include the poisoning and use of Diclofenac, NSAIDs, pesticides. ♦ Egyptian Vulture has no nesting and only the carcass population is observed in the area. **Recommendations:**		

	♦ Short term and long-term mitigation measures are suggested for the conservation of the Asian Houbara Bustard, Egyptian Vulture and other avifauna species. ♦ Detailed assessment in the Nag Valley, if possible, to confirm the presence of the resident population of Asian Houbara Bustard in this area ♦ Captive breeding of Asian Houbara Bustard is attempted, however, it is not encouraged for the conservation of this species ♦ In-site conservation efforts including the awareness session, noise reduction, watch and ward programs, control of illegal hunting, waste management, proper monitoring, community campaigns, community leaders' engagement and plantation in the potential sites can be adopted for the long-term survival of this species. ♦ Wintering population can be focused and spray of different seeds of the native species can be done in the potential sites. ♦ Special recommendations and mitigation measures including the change in the design of the poles and other set-up is required to mitigate the transmission line effects.

Appendix C: Distribution Range of Key Species

C.1 Avifauna Key Species Distribution Maps

See the following pages.

Exhibit C.1: Distribution Range of Tawny Eagle *Aquila rapax*

Exhibit C.2: Distribution Range of Broad-billed Sandpiper *Calidris falcinellus*

Exhibit C.3: Distribution Range of Jerdon's Babbler *Chrysomma altirostre*

Exhibit C.4: Distribution Range of White- rumped Vulture *Gyps bengalensis*

Exhibit C.5: Distribution Range of Indian Vulture *Gyps indicus*

Exhibit C.6: Distribution Range of Black-capped Kingfisher *Halcyon pileata*

Exhibit C.7: Distribution Range of White-headed Duck *Oxyura leucocephala*

Exhibit C.8: Distribution Range of Grey Plover *Pluvialis squatarola*

Exhibit C.9: Distribution Range of Red-headed Vulture *Sarcogyps calvus*

Exhibit C.10: Distribution Range of White-browed Bushchat *Saxicola macrorhynchus*

Exhibit C.11: Distribution Range of Black-bellied Tern *Sterna acuticauda*

Exhibit C.12: Distribution Range of River Tern *Sterna aurantia*

Exhibit C.13: Distribution Range of Lesser Florican *Sypheotides indicus*

Exhibit C.14: Distribution Range of Egyptian Vulture *Neophron percnopterus*

Exhibit C.15: Distribution Range of Saker Falcon *Falco cherrug*

Exhibit C.16: Distribution Range of Imperial Eagle *Aquila heliaca*

Exhibit C.17: Distribution Range of Steppe Eagle *Aquila nipalensis*

Exhibit C.18: Distribution Range of Asian Houbara Bustard *Chlamydotis macqueenii*

Exhibit C.19: Distribution Range of Sociable Lapwing *Vanellus gregarius*

Exhibit C.20: Distribution Range of Cinereous Vulture *Aegypius monachus*

Exhibit C.21: Distribution Range of Golden Eagle *Aquila chrysaetos*

Exhibit C.22: Distribution Range of Common Pochard *Aythya ferina*

Exhibit C.23: Distribution Range of Ferruginous Duck *Aythya nyroca*

Exhibit C.24: Distribution Range of Red Knot *Calidris canutus*

Exhibit C.25: Distribution Range of Sharp-tailed Sandpiper *Calidris acuminata*

Exhibit C.26: Distribution Range of Curlew Sandpiper *Calidris ferruginea*

Exhibit C.27: Distribution Range of Great Knot *Calidris tenuirostris*

Exhibit C.28: Distribution Range of Pallid Harrier *Circus macrourus*

Exhibit C.29: Distribution Range of Yellow Eyed Pigeon *Columba eversmanni*

Exhibit C.30 Distribution Range of Pallid Merlin *Falco columbarius*

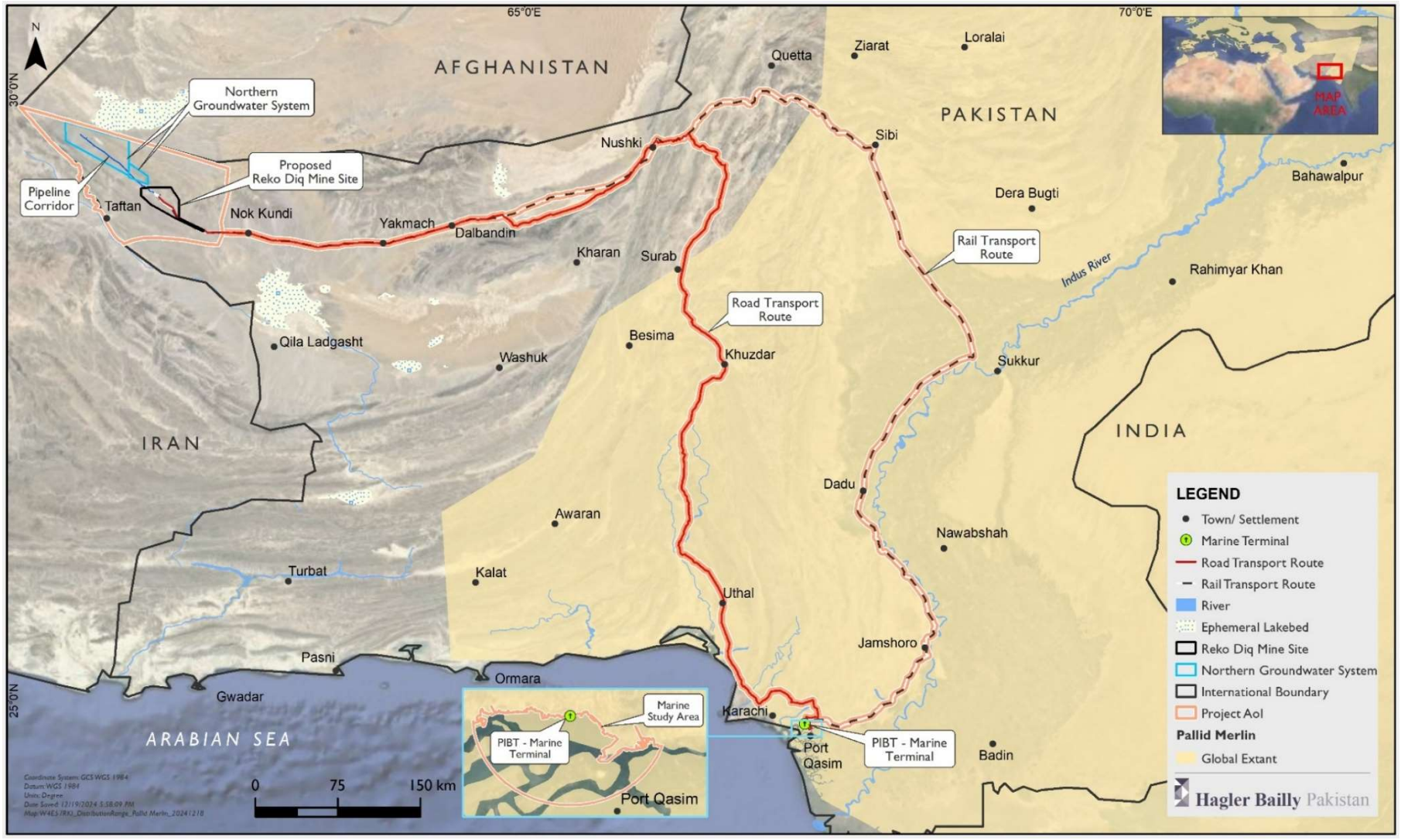


Exhibit C.31: Distribution Range of Peregrine Falcon *Falco peregrinus*

Exhibit C.32: Distribution Range of Eurasian Hobby *Falco subbuteo*

Exhibit C.33: Distribution Range of Wood Snipe *Gallinago nemoricola*

Exhibit C.34: Distribution Range of Common Gull-billed Tern *Gelochelidon nilotica*

Exhibit C.35: Distribution Range of Eurasian Oystercatcher *Haematopus ostralegus*

Exhibit C.36: Distribution Range of Pallas's Fish-eagle *Haliaeetus leucoryphus*

Exhibit C.37: Distribution Range of Booted Eagle *Hieraaetus pennatus*

Exhibit C.38: Distribution Range of Pallas's Gull *Larus ichthyaetus*

Exhibit C.39: Distribution Range of Grey Shrike *Lanius excubitor*

Exhibit C.40: Distribution Range of Bar-tailed Godwit *Limosa lapponica*

Exhibit C.41: Distribution Range of Black-tailed Godwit *Limosa limosa*

Exhibit C.42: Distribution Range of Yellow-legged Gull *Larus michahellis*

Exhibit C.43: Distribution Range of Lesser Black-backed Gull *Larus fuscus*

Exhibit C.44: Distribution Range of Marbel Teal *Marmaronetta angustirostris*

Exhibit C.45: Distribution Range of Blue-cheeked Bee-eater *Merops persicus*

Exhibit C.46: Distribution Range of Black Kite *Milvus migrans*

Exhibit C.47: Distribution Range of Dalmatian Pelican *Pelecanus crispus*

Exhibit C.48: Distribution Range of Greater Flamingo *Phoenicopterus roseus*

Exhibit C.49: Distribution Range of Indian Skimmer *Rynchops albicollis*

Exhibit C.50: Distribution Range of Little Tern *Sternula albifrons*

Exhibit C.51: Distribution Range of Greater Spotted Eagle *Clanga clanga*

Exhibit C.52: Distribution Range of Common Tern *Sterna hirundo*

Exhibit C.53: Distribution Range of White Ibis *Eudocimus albus*

Exhibit C.54: Distribution Range of Eurasian Hoopoe *Upupa epops*

Exhibit C.55: Distribution Range of Northern Lapwing *Vanellus vanellus*

C.2 Herpetofauna Key Species Distribution Maps

See the following pages.

Exhibit C.56: Distribution Range of Loggerhead Turtle *Caretta caretta*

Exhibit C.57: Distribution Range of Green Sea Turtle *Chelonia mydas*

Exhibit C.58: Distribution Range of Mugger *Crocodylus palustris*

Exhibit C.59: Distribution Range of Hawksbill Turtle *Eretmochelys imbricata*

Exhibit C.60: Distribution Range of Spotted Pond Turtle *Geoclemys hamiltonii*

Exhibit C.61: Distribution Range of Crowned River Turtle *Hardella thurjii*

Exhibit C.62: Distribution Range of Indian Flapshell Turtle *Lissemys punctata*

Exhibit C.63: Distribution Range of Indian Softshell Turtle *Nilssonia gangetica*

Exhibit C.64: Distribution Range of Indian Peacock Softshell Turtle *Nilssonia hurum*

Exhibit C.65: Distribution Range of Indian Roofed Turtle *Pangshura tecta*

Exhibit C.66: Distribution Range of Indian Spiny-tailed Lizard *Saara hardwickii*

Exhibit C.67: Distribution Range of Yellow Monitor *Varanus flavescens*

Exhibit C.68: Distribution Range of Painted Keelback *Xenochrophis cerasogaster*

Exhibit C.69: Distribution Range of Alcock's Toad – headed Agama *Phrynocephalus euptilopus*

Exhibit C.70: Distribution Range of Baloch Green Toad *Bufotes zugmayeri*

C.3 Large and Small Mammals Key Species Distribution Maps

See the following pages.

Exhibit C.71: Distribution Range of Indian Hog Deer *Axis porcinus*

Exhibit C.72: Distribution Range of Indian Pangolin *Manis crassicaudata*

Exhibit C.73: Distribution Range of Afghan Urial *Ovis vignei*

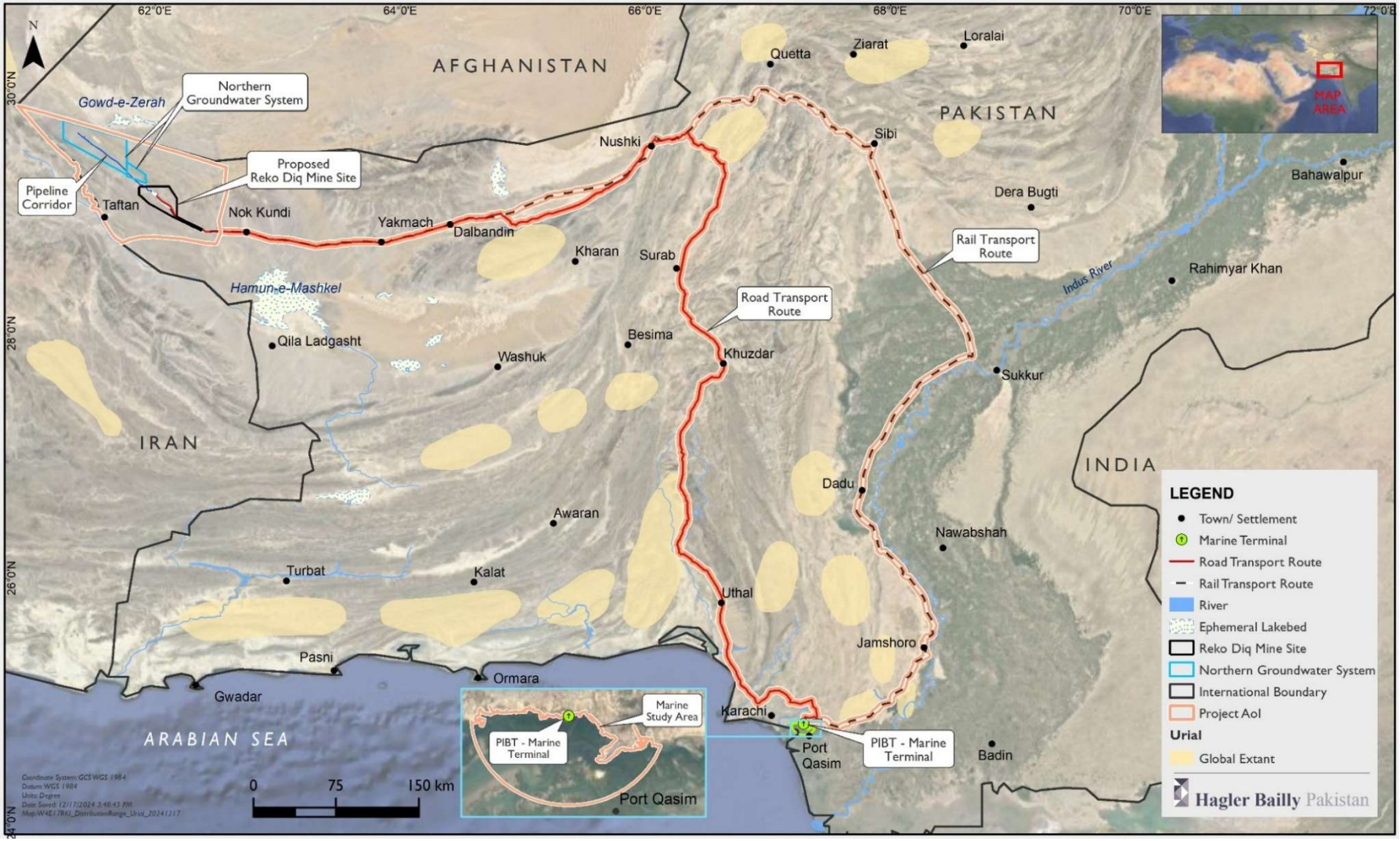


Exhibit C.74: Distribution Range of Persian Leopard *Panthera pardus tulliana*

Exhibit C.75: Distribution Range of Common Leopard *Panthera pardus*

Exhibit C.76: Distribution Range of Fishing Cat *Prionailurus viverrinus*

Exhibit C.77: Distribution Range of Asiatic Black Bear *Ursus thibetanus*

Exhibit C.78: Distribution Range of Sand Cat *Felis margarita*

Exhibit C.79: Distribution Range of Goitered Gazelle *Gazella subgutturosa*

Exhibit C.80: Distribution Range of Baluchistan Pygmy Jerboa *Salpingotulus michaelis*

Exhibit C.81: Distribution Range of Asiatic Cheetah *Acinonyx jubatus*

Exhibit C.82: Distribution Range of Grey *Wolf Canis lupus*

Exhibit C.83: Distribution Range of Sindh Ibex *Capra aegagrus blythi*

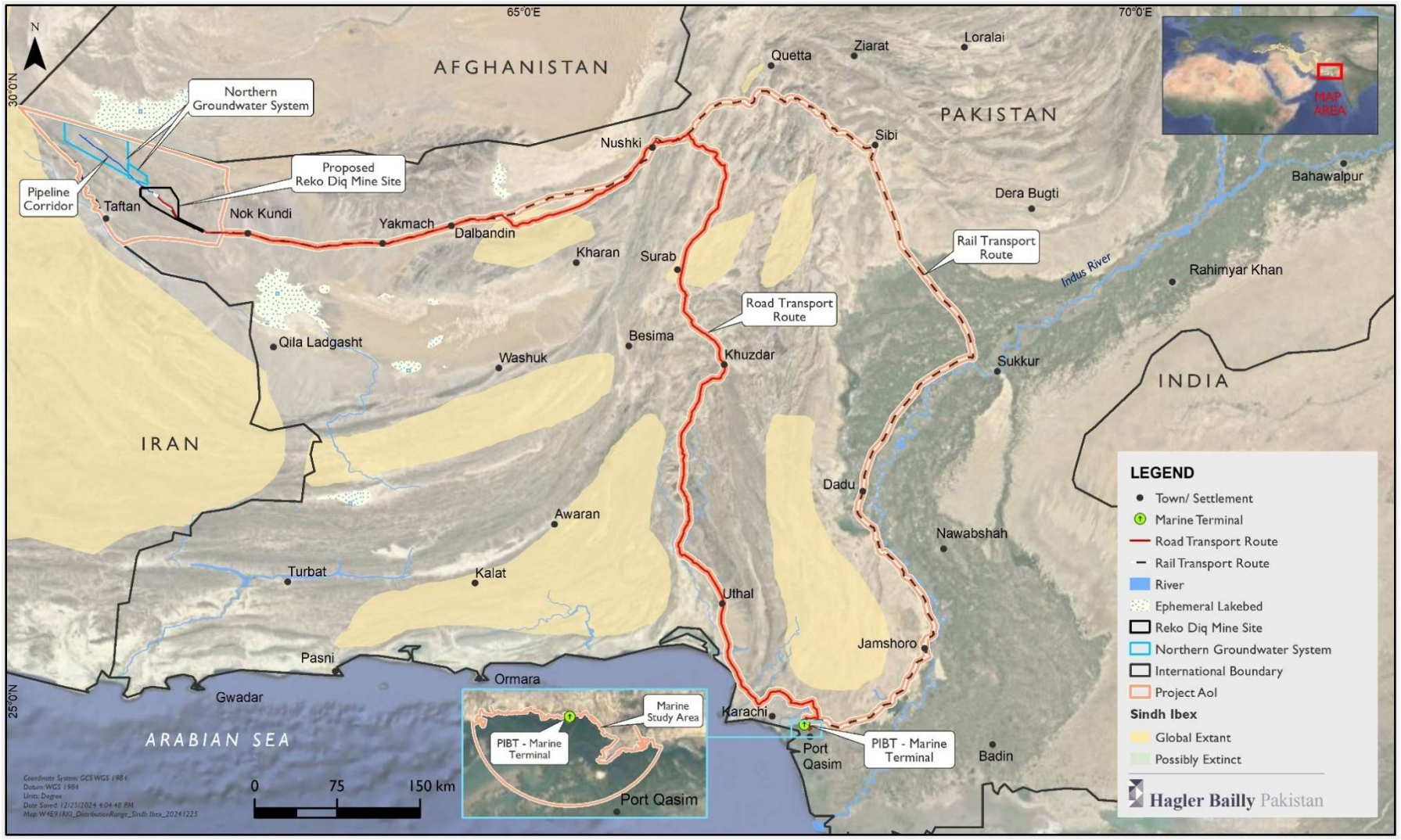


Exhibit C.84: Distribution Range of Marbled Pole Cat *Vormela peregusna*

Exhibit C.85: Distribution Range of Striped Hyena *Hyaena hyaena*

Appendix D: Literature and Survey Based List of Species

See the following pages.

D.1 Terrestrial Ecological Resources

D.1.1 Avifauna

List of Bird Species Reported in Literature, Previous EIA's (2010 and 2020), and Surveys (Post-Monsoon 2022, Spring 2023, and Post-Monsoon 2023) is provided below for Proposed Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, Rail and Road Route Corridor and Port Qasim.

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
1	*Phylloscopus humei*	Hume's Leaf Warbler	Least Concern	2016	–	–	–	–	–	–	–	✓
2	*Accipiter badius*	Shikra	Least Concern	2021	–	–	–	–	–	–	✓	✓
3	*Accipiter gentilis*	Northern Goshawk	Least Concern	2021	–	–	–	–	–	–	–	✓
4	*Accipiter nisus*	Eurasian Sparrowhawk	Least Concern	2021	–	–	–	–	–	✓	✓	✓
5	*Acridotheres fuscus*	Jungle Myna	Least Concern	2024	–	–	–	–	–	–	–	✓
6	*Acridotheres ginginianus*	Bank Myna	Least Concern	2018	–	–	–	–	–	–	✓	✓
7	*Acridotheres tristis*	Common Myna	Least Concern	2017	–	✓	–	–	–	✓	✓	✓
8	*Acrocephalus agricola*	Paddyfield Warbler	Least Concern	2017	–	–	–	–	–	–	–	✓
9	*Acrocephalus dumetorum*	Blyth's Reed Warbler	Least Concern	2016	–	–	–	–	–	–	–	✓
10	*Acrocephalus melanopogon*	Moustached Warbler	Least Concern	2018	–	–	–	✓	–	✓	–	✓
11	*Acrocephalus stentoreus*	Clamorous Reed-warbler	Least Concern	2022	–	–	–	✓	–	✓	–	✓
12	*Actitis hypoleucos*	Common Sandpiper	Least Concern	2016	–	–	–	–	–	–	✓	✓
13	*Aegithalos leucogenys*	White-cheeked Tit	Least Concern	2016	–	–	–	–	–	–	–	✓
14	*Aegypius monachus*	Cinereous Vulture	Near Threatened	2021	–	–	–	–	–	–	–	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
15	*Aethopyga siparaja*	Crimson Sunbird	Least Concern	2016	–	–	–	–	–	–	–	✓
16	*Alaemon alaudipes*	Greater Hoopoe-lark	Least Concern	2024	✓	✓	✓	✓	–	✓	–	✓
17	*Alauda arvensis*	Eurasian Skylark	Least Concern	2018	–	–	–	–	–	–	–	✓
18	*Alauda gulgula*	Oriental Skylark	Least Concern	2016	–	–	–	–	–	–	✓	✓
19	*Alaudala heinei*	Turkestan Short-toed Lark	Least Concern	2022	–	–	–	–	–	–	–	✓
20	*Alaudala raytal*	Sand Lark	Least Concern	2024	–	–	–	–	–	–	–	✓
21	*Alaudala rufescens*	Lesser Short-toed Lark	Least Concern	2022	✓	–	–	–	–	–	–	✓
22	*Alcedo atthis*	Common Kingfisher	Least Concern	2024	–	–	–	–	–	✓	✓	✓
23	*Alectoris chukar*	Chukar	Least Concern	2019	–	–	–	–	–	–	–	✓
24	*Amandava amandava*	Red Avadavat	Least Concern	2024	–	–	–	–	✓	–	–	✓
25	*Amaurornis phoenicurus*	White-breasted Waterhen	Least Concern	2024	–	–	–	–	–	–	–	✓
26	*Ammomanes cinctura*	Bar-tailed Lark	Least Concern	2024	✓	✓	✓	✓	–	✓	–	✓
27	*Ammomanes deserti*	Desert Lark	Least Concern	2018	✓	✓	✓	✓	–	✓	✓	✓
28	*Ammomanes phoenicura*	Rufous-tailed Lark	Least Concern	2016	–	–	–	–	–	–	–	✓
29	*Ammoperdix griseogularis*	See-see Partridge	Least Concern	2016	✓		✓	–	–	✓	–	✓
30	*Charadrius atrifrons*	Tibetan Sand-Plover	Least Concern	2023	–	–	–	–	–	–	–	✓
31	*Charadrius leschenaultii*	Greater Sand-Plover	Least Concern	2019	–	–	–	–	–	–	–	✓
32	*Anas acuta*	Northern Pintail	Least Concern	2019	–	–	–	–	–	–	✓	✓
33	*Anas crecca*	Common Teal	Least Concern	2020	–	–	–	–	–	–	✓	✓
34	*Anas platyrhynchos*	Mallard	Least Concern	2019	–	–	–	–	–	–	✓	✓
35	*Anas poecilorhyncha*	Indian Spot-billed Duck	Least Concern	2016	–	–	–	–	–	–	–	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
36	*Anastomus oscitans*	Asian Openbill	Least Concern	2016	–	–	–	–	–	–	–	✓
37	*Anhinga melanogaster*	Oriental Darter	Least Concern	2024	–	–	–	–	–	–	–	✓
38	*Anous stolidus*	Brown Noddy	Least Concern	2020	–	–	–	–	–	–	–	✓
39	*Anser albifrons*	Greater White-fronted Goose	Least Concern	2022	–	–	–	–	–	–	–	✓
40	*Anser anser*	Greylag Goose	Least Concern	2018	–	–	–	–	–	–	–	✓
41	*Anser indicus*	Bar-headed Goose	Least Concern	2018	–	–	–	–	–	–	–	✓
42	*Anthropoides virgo*	Demoiselle Crane	Least Concern	2018	–	–	–	–	–	–	–	✓
43	*Anthus campestris*	Tawny Pipit	Least Concern	2018	–	–	–	–	–	–	–	✓
44	*Anthus cervinus*	Red-throated Pipit	Least Concern	2018	–	–	–	–	–	–	–	✓
45	*Anthus hodgsoni*	Olive-backed Pipit	Least Concern	2016	–	–	–	–	–	–	–	✓
46	*Anthus richardi*	Richard's Pipit	Least Concern	2016	–	–	–	–	–	–	–	✓
47	*Anthus roseatus*	Rosy Pipit	Least Concern	2019	–	–	–	–	–	–	–	✓
48	*Anthus rufulus*	Paddyfield Pipit	Least Concern	2024						–	–	✓
49	*Anthus similis*	Long-billed Pipit	Least Concern	2024						–	–	✓
50	*Anthus spinoletta*	Water Pipit	Least Concern	2018						–	–	✓
51	*Anthus trivialis*	Tree Pipit	Least Concern	2018			✓			✓	–	✓
52	*Apus affinis*	Little Swift	Least Concern	2016						–	✓	✓
53	*Apus apus*	Common Swift	Least Concern	2016						–	–	✓
54	*Apus pallidus*	Pallid Swift	Least Concern	2018	–	–	–	–	–	–	–	✓
55	*Aquila chrysaetos*	Golden Eagle	Least Concern	2021						–	–	✓
56	*Aquila fasciata*	Bonelli's Eagle	Least Concern	2019						–	✓	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
57	*Aquila heliaca*	Eastern Imperial Eagle	Vulnerable	2019						–	–	✓
58	*Aquila nipalensis*	Steppe Eagle	Endangered	2021						–	✓	✓
59	*Aquila rapax*	Tawny Eagle	Vulnerable	2021						–	✓	✓
60	*Ardea alba*	Great White Egret	Least Concern	2019						–	–	✓
61	*Ardea cinerea*	Grey Heron	Least Concern	2019						–	–	✓
62	*Ardea intermedia*	Intermediate Egret	Least Concern	2020					✓	–	✓	✓
63	*Ardea purpurea*	Purple Heron	Least Concern	2019						–	✓	✓
64	*Ardenna carneipes*	Flesh-footed Shearwater	Near Threatened	2019						–	–	✓
65	*Ardenna pacifica*	Wedge-tailed Shearwater	Least Concern	2018						–	–	✓
66	*Ardeola grayii*	Indian Pond-heron	Least Concern	2024					✓	–	✓	✓
67	*Ardeola ralloides*	Squacco Heron	Least Concern	2018	–	–	–	–	–	–	–	✓
68	*Arenaria interpres*	Ruddy Turnstone	Near Threatened	2024						–	✓	✓
69	*Argya caudata*	Common Babbler	Least Concern	2018						–	✓	✓
70	*Argya earlei*	Striated Babbler	Least Concern	2018						–	–	✓
71	*Argya striata*	Sind Jungle Babbler	Least Concern	2024						–	✓	✓
72	*Asio flammeus*	Short-eared Owl	Least Concern	2021						–	–	✓
73	*Asio otus*	Long-eared Owl	Least Concern	2021						–	–	✓
74	*Athene brama*	Spotted Owlet	Least Concern	2024						–	✓	✓
75	*Athene noctua*	Little Owl	Least Concern	2019			✓			✓	–	✓
76	*Aythya ferina*	Common Pochard	Vulnerable	2021						–	✓	✓
77	*Aythya fuligula*	Tufted Duck	Least Concern	2016						–	–	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
78	*Aythya nyroca*	Ferruginous Duck	Near Threatened	2019						–	–	✓
79	*Bombycilla garrulus*	Bohemian Waxwing	Least Concern	2016	–	–	–	–	–	–	–	✓
80	*Botaurus stellaris*	Eurasian Bittern	Least Concern	2016						–	–	✓
81	*Bubo bengalensis*	Rock Eagle-owl	Least Concern	2024						–	–	✓
82	*Bubo bubo*	Eurasian Eagle-owl	Least Concern	2017						–	–	✓
83	*Bubo coromandus*	Dusky Eagle-owl	Least Concern	2016						–	–	✓
84	*Bubulcus coromandus*	Eastern Cattle Egret	Not Evaluated	–	–	–	–	–	–	–	–	✓
85	*Bubulcus ibis*	Cattle Egret	Least Concern	2019						–	✓	✓
86	*Bucanetes githagineus*	Trumpeter Finch	Least Concern	2024						–	–	✓
87	*Bucanetes mongolicus*	Mongolian Finch	Least Concern	2018						–	–	✓
88	*Bulweria fallax*	Jouanin's Petrel	Near Threatened	2018						–	–	✓
89	*Burhinus oedicnemus*	Eurasian Thick-knee	Least Concern	2018						–	–	✓
90	*Butastur teesa*	White-eyed Buzzard	Least Concern	2024						–	–	✓
91	*Buteo buteo*	Eurasian Buzzard	Least Concern	2021			✓			–	✓	✓
92	*Buteo rufinus*	Long-legged Buzzard	Least Concern	2021						–	–	✓
93	*Butorides striata*	Green-backed Heron	Least Concern	2022						–	✓	✓
94	*Calandrella acutirostris*	Hume's Lark	Least Concern	2024						–	–	✓
95	*Calandrella brachydactyla*	Greater Short-toed Lark	Least Concern	2018			✓	✓		✓	–	✓
96	*Calidris alba*	Sanderling	Least Concern	2024						–	✓	✓
97	*Calidris alpina*	Dunlin	Near Threatened	2024	–	–	–	–	–	–	✓	✓
98	*Calidris canutus*	Red Knot	Near Threatened	2024	–	–	–	–	–	–	–	✓

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99	*Calidris falcinellus*	Broad-billed Sandpiper	Vulnerable	2024	–	–	–	–	–	–	✓	✓
100	*Calidris ferruginea*	Curlew-Sandpiper	Vulnerable	2024	–	–	–	–	✓	–	✓	✓
101	*Calidris minuta*	Little Stint	Least Concern	2019	–	–	–	–	✓	–	✓	✓
102	*Calidris pugnax*	Ruff	Least Concern	2016	–	–	–	–	–	–	✓	✓
103	*Calidris ruficollis*	Red-necked Stint	Near Threatened	2016	–	–	–	–	–	–	–	✓
104	*Calidris temminckii*	Temminck's Stint	Least Concern	2019	–	–	–	–	–	–	✓	✓
105	*Calidris tenuirostris*	Great Knot	Endangered	2019	–	–	–	–	–	–	✓	✓
106	*Calliope pectoralis*	Himalayan Rubythroat	Least Concern	2018	–	–	–	–	–	–	–	✓
107	*Caprimulgus aegyptius*	Egyptian Nightjar	Least Concern	2018	–	–	–	–	–	–	–	✓
108	*Caprimulgus affinis*	Savanna Nightjar	Least Concern	2024	–	–	–	–	–	–	–	✓
109	*Caprimulgus asiaticus*	Indian Nightjar	Least Concern	2024	–	–	–	–	–	–	–	✓
110	*Caprimulgus europaeus*	European Nightjar	Least Concern	2016			✓			✓	–	✓
111	*Caprimulgus mahrattensis*	Sykes's Nightjar	Least Concern	2024	–	–	–	–	–	–	–	✓
112	*Carduelis carduelis*	European Goldfinch	Least Concern	2019	–	–	–	–	–	–	–	✓
113	*Carpodacus erythrinus*	Common Rosefinch	Least Concern	2024	–	–	–	–	–	–	–	✓
114	*Carpodacus grandis*	Blyth's Rosefinch	Not Evaluated	-	–	–	–	–	–	–	–	✓
115	*Cecropis daurica*	Red-rumped Swallow	Least Concern	2024	–	–	–	–	–	–	✓	✓
116	*Centropus sinensis*	Greater Coucal	Least Concern	2024	–	–	–	–	–	–	✓	✓
117	*Cephalopyrus flammiceps*	Fire-capped Tit	Least Concern	2024	–	–	–	–	–	–	–	✓
118	*Cercotrichas galactotes*	Rufous-tailed Scrub Robin	Least Concern	2019	–	–	✓	✓	–	✓	–	✓
119	*Certhia himalayana*	Bar-tailed Treecreeper	Least Concern	2024	–	–	–	–	–	–	–	✓

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120	*Ceryle rudis*	Pied Kingfisher	Least Concern	2017	–	–	–	–	–	–	✓	✓
121	*Cettia cetti*	Cetti's Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
122	*Charadrius alexandrinus*	Kentish Plover	Least Concern	2019	–	–	–	–	–	–	✓	✓
123	*Charadrius atrifrons*	Tibetan Sand Plover	Least Concern	2023	–	–	–	–	–	–	✓	–
124	*Charadrius dubius*	Little Ringed Plover	Least Concern	2019	–	–	–	–	–	–	✓	–
125	*Charadrius hiaticula*	Common Ringed Plover	Least Concern	2019	–	–	–	–	–	–	✓	–
126	*Charadrius leschenaultii*	Great Sand Plover	Least Concern	2019	–	–	–	–	–	–	✓	✓
127	*Chlamydotis macqueenii*	Asian Houbara Bustard	Vulnerable	2021	–	–	✓	–	–	✓	–	✓
128	*Chlidonias hybrida*	Whiskered Tern	Least Concern	2017	–	–	–	–	–	–	✓	✓
129	*Chlidonias leucopterus*	White Winged Black Tern	Least Concern	2016	–	–	–	–	–	–	✓	✓
130	*Chloris spinoides*	Yellow-breasted Greenfinch	Least Concern	2024	–	–	–	–	–	–	–	✓
131	*Chrysomma sinense*	Yellow-eyed Babbler	Least Concern	2024	–	–	–	–	–	–	–	✓
132	*Ciconia ciconia*	White Stork	Least Concern	2016	–	–	–	–	–	–	–	✓
133	*Ciconia nigra*	Black Stork	Least Concern	2017	–	–	–	–	–	–	–	✓
134	*Cinclus cinclus*	White-throated Dipper	Least Concern	2018	–	–	–	–	–	–	–	✓
135	*Cinclus pallasii*	Brown Dipper	Least Concern	2024	–	–	–	–	–	–	–	✓
136	*Cinnyris asiaticus*	Purple Sunbird	Least Concern	2024	–	–	–	–	✓	–	✓	✓
137	*Circaetus gallicus*	Short toed Snake-eagle	Least Concern	2021	–	–	–	–	–	–	✓	✓
138	*Circus aeruginosus*	Western Marsh-harrier	Least Concern	2021	–	–	–	–	–	–	–	✓
139	*Circus cyaneus*	Hen Harrier	Least Concern	2021	✓	–	–	–	–	–	–	✓
140	*Circus macrourus*	Pallid Harrier	Near Threatened	2021						–	–	✓

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141	*Circus pygargus*	Montagu's Harrier	Least Concern	2021	–	–	–	–	–	–	–	✓
142	*Cisticola juncidis*	Zitting Cisticola	Least Concern	2024	–	–	–	–	–	–	–	✓
143	*Clamator jacobinus*	Jacobin Cuckoo	Least Concern	2024	–	–	–	–	–	–	–	✓
144	*Clanga clanga*	Greater Spotted Eagle	Vulnerable	2021	–	–	–	–	–	–	✓	✓
145	*Columba eversmanni*	Yellow-eyed Pigeon	Vulnerable	2022	–	–	–	–	–	–	–	✓
146	*Columba livia*	Blue Rock Pigeon	Least Concern	2019	–	✓	–	–	✓	–	✓	✓
147	*Columba palumbus*	Common Woodpigeon	Least Concern	2018	–	–	–	–	–	–	–	✓
148	*Columba rupestris*	Hill Pigeon	Least Concern	2024	–	–	–	–	–	–	–	✓
149	*Copsychus fulicatus*	Indian Robin	Least Concern	2018	–	–	–	–	✓	–	–	✓
150	*Copsychus saularis*	Oriental Magpie-Robin	Least Concern	2020	–	–	–	–	–	–	–	✓
151	*Coracias benghalensis*	Indian Roller	Least Concern	2024	–	–	–	–	–	–	✓	✓
152	*Coracias garrulus*	Eurasian Roller	Least Concern	2019	–	–	✓	✓	–	✓	–	✓
153	*Corvus corax*	Common Raven	Least Concern	2017	–	✓	–	✓	–	✓	–	✓
154	*Corvus corone*	Carrion Crow	Least Concern	2024	–	–	–	–	–	–	–	✓
155	*Corvus frugilegus*	Rook	Least Concern	2017	–	–	–	–	–	–	–	✓
156	*Corvus macrorhynchos*	Large-billed Crow	Least Concern	2024	–	–	–	–	–	–	–	✓
157	*Corvus ruficollis*	Brown-necked Raven	Least Concern	2024	✓	✓	✓	✓		✓	–	✓
158	*Corvus splendens*	House Crow	Least Concern	2018	–	–	–	–	✓	–	✓	✓
159	*Coturnix coromandelica*	Rain Quail	Least Concern	2024	–	–	–	–	–	–	–	✓
160	*Coturnix coturnix*	Common Quail	Least Concern	2018	✓	–	–	–	–	–	–	✓
161	*Cuculus canorus*	Common Cuckoo	Least Concern	2024	–	–	–	–	–	–	–	✓

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162	*Cuculus saturatus*	Himalayan Cuckoo	Least Concern	2021	–	–	–	–	–	–	–	✓
163	*Culicicapa ceylonensis*	Grey-headed Canary-flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
164	*Curruca communis*	Common Whitethroat	Least Concern	2024	–	–	–	–	–	–	–	✓
165	*Curruca crassirostris*	Eastern Orphean Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
166	*Curruca curruca*	Lesser Whitethroat	Least Concern	2024	✓	–	✓	–	–	✓	–	✓
167	*Curruca mystacea*	Menetries`s Warbler	Least Concern	2016	–	–	✓	–	–	✓	–	✓
168	*Curruca nana*	Asian Desert Warbler	Least Concern	2017	–	–	✓	✓	–	✓	–	✓
169	*Cursorius coromandelicus*	Indian Courser	Least Concern	2016	–	–	–	–	–	–	–	✓
170	*Cursorius cursor*	Cream-coloured Courser	Least Concern	2019	–	–	–	–	–	–	–	✓
171	*Cyornis rubeculoides*	Blue-throated Blue Flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
172	*Delichon dasypus*	Asian House-Martin	Least Concern	2024	–	–	–	–	–	–	–	✓
173	*Delichon urbicum*	Northern House Martin	Least Concern	2024	–	–	–	–	–	–	–	✓
174	*Dendrocitta formosae*	Gray Treepie	Least Concern	2024	–	–	–	–	–	–	–	✓
175	*Dendrocitta vagabunda*	Rufous Treepie	Least Concern	2018	–	–	–	–	–	–	✓	✓
176	*Dendrocopos assimilis*	Sind Pied Woodpecker	Least Concern	2024	–	–	–	–	–	–	✓	✓
177	*Dendrocygna javanica*	Lesser Whistling-duck	Least Concern	2024	–	–	–	–	–	–	–	✓
178	*Dendronanthus indicus*	Forest Wagtail	Least Concern	2024	–	–	–	–	–	–	–	✓
179	*Dicrurus leucophaeus*	Ashy Drongo	Least Concern	2024	–	–	–	–	–	–	–	✓
180	*Dicrurus macrocercus*	Black Drongo	Least Concern	2024	–	–	–	–	✓	✓	✓	✓
181	*Dinopium benghalense*	Black-rumped Flameback	Least Concern	2024	–	–	–	–	–	–	–	✓
182	*Dromas ardeola*	Crab-plover	Least Concern	2024	–	–	–	–	–	–	✓	✓

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183	*Egretta alba*	Large Egret or Great Egret	Least Concern	2016	–	–	–	–	–	–	✓	–
184	*Egretta garzetta*	Little Egret	Least Concern	2016	–	–	–	–	✓	–	✓	✓
185	*Egretta gularis*	Western Reef-egret	Least Concern	2016	–	–	–	–	–	–	✓	✓
186	*Elanus caeruleus*	Black-winged Kite	Least Concern	2019	–	–	–	–	–	–	✓	✓
187	*Emberiza bruniceps*	Red-headed Bunting	Least Concern	2016	–	–	–	–	–	–	–	✓
188	*Emberiza buchanani*	Grey-necked Bunting	Least Concern	2024	–	–	–	–	–	–	–	✓
189	*Emberiza cia*	Rock Bunting	Least Concern	2024	–	–	–	–	–	–	–	✓
190	*Emberiza lathami*	Crested Bunting	Least Concern	2016	–	–	–	–	–	–	–	✓
191	*Emberiza leucocephalos*	Pine Bunting	Least Concern	2017	–	–	–	–	–	–	–	✓
192	*Emberiza melanocephala*	Black-headed Bunting	Least Concern	2024	–	–	–	–	–	–	–	✓
193	*Emberiza sahari*	House Bunting	Least Concern	2024	✓	–	–	–	–	–	–	✓
194	*Emberiza schoeniclus*	Reed Bunting	Least Concern	2019	–	–	–	–	–	–	–	✓
195	*Emberiza stewarti*	White-capped Bunting	Least Concern	2018	–	–	–	–	–	–	–	✓
196	*Emberiza striolata*	Striolated Bunting	Least Concern	2024	–	–	–	–	–	–	–	✓
197	*Ephippiorhynchus asiaticus*	Black-necked Stork	Near Threatened	2016	–	–	–	–	–	–	–	✓
198	*Eremophila alpestris*	Horned Lark	Least Concern	2018	–	–	–	–	–	–	–	✓
199	*Eremopterix grisea*	Ashy-crowned Sparrow–lark	Least Concern	2024	–	–	–	–	–	–	✓	–
200	*Eremopterix griseus*	Ashy-crowned Sparrow-lark	Least Concern	2024	–	–	–	–	–	–	–	✓
201	*Eremopterix nigriceps*	Black-crowned Sparrow–lark	Least Concern	2024	–	–	–	–	–	–	✓	✓
202	*Esacus recurvirostris*	Great Thick-knee	Near Threatened	2017	–	–	–	–	–	–	–	✓
203	*Eudynamys scolopaceus*	Western Koel	Least Concern	2016	–	–	–	–	–	–	✓	✓

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204	*Eumyias thalassinus*	Asian Verditer Flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
205	*Euodice malabarica*	Indian Silverbill	Least Concern	2018	–	–	–	–	–	–	✓	✓
206	*Eurystomus orientalis*	Dollarbird	Least Concern	2016	–	–	–	–	–	–	–	✓
207	*Falco amurensis*	Amur Falcon	Least Concern	2021	–	–	–	–	–	–	–	✓
208	*Falco cherrug*	Saker Falcon	Endangered	2021	–	–	–	–	–	–	–	✓
209	*Falco chicquera*	Red-headed Falcon	Near Threatened	2016	–	–	–	–	–	–	✓	✓
210	*Falco columbarius*	Pallid Merlin	Least Concern	2021	–	–	–	–	–	–	✓	✓
211	*Falco concolor*	Sooty Falcon	Vulnerable	2020	–	–	–	–	–	–	–	✓
212	*Falco jugger*	Laggar Falcon	Near Threatened	2020	–	–	–	–	–	–	–	✓
213	*Falco naumanni*	Lesser Kestrel	Least Concern	2021	–	–	–	–	–	–	–	✓
214	*Falco peregrinus*	Peregrine Falcon	Least Concern	2021	–	–	–	–	–	–	✓	✓
215	*Falco subbuteo*	Eurasian Hobby	Least Concern	2021	–	–	–	–	–	–	–	✓
216	*Falco tinnunculus*	Common Kestrel	Least Concern	2021	✓	✓	–	–	–	✓	✓	✓
217	*Ficedula albicilla*	Taiga Flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
218	*Ficedula parva*	Red-breasted Flycatcher	Least Concern	2018	–	–	✓	–	–	✓	–	✓
219	*Ficedula superciliaris*	Ultramarine Flycatcher	Least Concern	2020	–	–	–	–	–	–	–	✓
220	*Francolinus francolinus*	Black Partridge	Least Concern	2018	–	–	–	–	✓	–	✓	✓
221	*Fringilla coelebs*	Common Chaffinch	Least Concern	2018	–	–	–	–	–	–	–	✓
222	*Fringilla montifringilla*	Brambling	Least Concern	2024	–	–	–	–	–	–	–	✓
223	*Fulica atra*	Eurasian Coot	Least Concern	2019	–	–	–	–	–	–	–	✓
224	*Galerida cristata*	Crested Lark	Least Concern	2024	✓	✓	✓	–	–	–	–	✓

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225	*Gallicrex cinerea*	Watercock	Least Concern	2016	–	–	–	–	–	–	–	✓
226	*Gallinago gallinago*	Common Snipe	Least Concern	2019	–	–	–	–	–	–	–	✓
227	*Gallinago solitaria*	Solitary Snipe	Least Concern	2016	–	–	–	–	–	–	–	✓
228	*Gallinago stenura*	Pintail Snipe	Least Concern	2016	–	–	–	–	–	–	–	✓
229	*Gallinula chloropus*	Common Moorhen	Least Concern	2019	–	–	–	–	–	–	–	✓
230	*Gelochelidon nilotica*	Common Gull-billed Tern	Least Concern	2019	–	–	–	–	–	–	–	✓
231	*Glareola lactea*	Little Pratincole	Least Concern	2024	–	–	–	–	–	–	–	✓
232	*Glareola pratincola*	Collared Pratincole	Least Concern	2017	–	–	–	–	–	–	–	✓
233	*Glaucidium cuculoides*	Asian Barred Owlet	Least Concern	2024	–	–	–	–	–	–	–	✓
234	*Gracupica contra*	Asian Pied Starling	Least Concern	2022	–	–	–	–	–	–	–	✓
235	*Grus grus*	Common Crane	Least Concern	2016	–	–	–	–	–	–	–	✓
236	*Gymnoris xanthocollis*	Chestnut-shouldered Bush-sparrow	Least Concern	2019	–	–	–	–	–	–	✓	✓
237	*Gypaetus barbatus*	Bearded Vulture	Near Threatened	2021	–	–	–	–	–	–	–	✓
238	*Gyps bengalensis*	White-rumped Vulture	Critically Endangered	2021	–	–	–	–	–	–	✓	✓
239	*Gyps fulvus*	Indian Griffon Vulture	Least Concern	2021	–	–	–	–	–	–	✓	✓
240	*Gyps himalayensis*	Himalayan Vulture	Near Threatened	2021	–	–	–	–	–	–	–	✓
241	*Haematopus ostralegus*	Eurasian Oystercatcher	Near Threatened	2019	–	–	–	–	–	–	✓	✓
242	*Halcyon pileata*	Black-capped Kingfisher	Vulnerable	2022	–	–	–	–	–	–	–	✓
243	*Halcyon smyrnensis*	White-breasted Kingfisher	Least Concern	2017	–	–	–	–	–	–	✓	✓
244	*Haliaeetus albicilla*	White-tailed Sea-eagle	Least Concern	2021	–	–	–	–	–	–	–	✓

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245	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	Endangered	2021	–	–	–	–	–	–	–	✓
246	*Haliastur indus*	Brahminy Kite	Least Concern	2024	–	–	–	–	–	–	✓	✓
247	*Hieraaetus pennatus*	Booted Eagle	Least Concern	2021	–	–	–	–	–	–	–	✓
248	*Hierococcyx varius*	Common Hawk Cuckoo	Least Concern	2024	–	–	–	–	–	–	–	✓
249	*Himantopus himantopus*	Black-winged stilt	Least Concern	2019	–	–	–	–	✓	–	✓	✓
250	*Hippolais languida*	Upcher's Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
251	*Hirundo rustica*	Barn Swallow	Least Concern	2019	–	–	–	✓	–	✓	–	✓
252	*Hirundo smithii*	Wire-tailed Swallow	Least Concern	2024	–	–	–	–	–	–	–	✓
253	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	Least Concern	2024	–	–	–	–	–	–	–	✓
254	*Hydroprogne caspia*	Caspian Tern	Least Concern	2019	✓	–	–	–	–	–	✓	✓
255	*Hypocolius ampelinus*	Hypocolius	Least Concern	2019	–	–	–	–	–	–	–	✓
256	*Hypothymis azurea*	Black-naped Monarch	Least Concern	2024	–	–	–	–	–	–	–	✓
257	*Hypsipetes leucocephalus*	Black Bulbul	Least Concern	2024	–	–	–	–	–	–	–	✓
258	*Iduna caligata*	Booted Warbler	Least Concern	2020	✓	–	✓	✓	–	–	–	✓
259	*Iduna rama*	Sykes's Warbler	Least Concern	2017	–	–	–	–	–	–	–	✓
260	*Irania gutturalis*	White-throated Irania	Least Concern	2024	–	–	–	–	–	–	–	✓
261	*Ixobrychus cinnamomeus*	Cinnamon Bittern	Least Concern	2024	–	–	–	–	–	–	–	✓
262	*Ixobrychus flavicollis*	Black Bittern	Least Concern	2024	–	–	–	–	–	–	–	✓
263	*Ixobrychus minutus*	Little Bittern	Least Concern	2019	–	–	–	–	–	✓	–	✓
264	*Ixobrychus sinensis*	Yellow Bittern	Least Concern	2024	–	–	–	–	–	–	–	✓
265	*Jynx torquilla*	Northern Wryneck	Least Concern	2016	–	–	–	–	–	–	–	✓

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266	*Lalage melanoptera*	Black-headed Cuckooshrike	Least Concern	2024	–	–	–	–	–	–	–	✓
267	*Lanius collurio*	Red-backed Shrike	Least Concern	2024	–	–	–	–	–	–	–	✓
268	*Lanius cristatus*	Brown Shrike	Least Concern	2024	–	–	–	–	–	–	–	✓
269	*Lanius excubitor*	Grey Shrike	Least Concern	2024	–	✓	–	–	–	–	✓	✓
270	*Lanius isabellinus*	Rufous–tailed or Isabelline Shrike	Least Concern	2016	–	–	–	–	–	–	✓	✓
271	*Lanius minor*	Lesser Grey Shrike	Least Concern	2016	–	–	–	–	–	–	–	✓
272	*Lanius phoenicuroides*	Red-tailed Shrike	Least Concern	2024	–	–	–	–	–	–	–	✓
273	*Lanius schach*	Long-tailed Shrike	Least Concern	2024	–	–	–	–	–	–	–	✓
274	*Lanius vittatus*	Bay-backed Shrike	Least Concern	2024	–	–	–	–	–	–	✓	✓
275	*Larus argentatus*	European Herring Gull	Least Concern	2021	–	–	–	–	–	–	✓	–
276	*Larus brunnicephalus*	Brown-headed Gull	Least Concern	2018	–	–	–	–	–	–	–	✓
277	*Larus cachinnans*	Caspian Gull	Least Concern	2018	–	–	–	–	–	–	–	✓
278	*Larus fuscus*	Lesser Black-backed Gull	Least Concern	2019	–	–	–	–	–	–	✓	✓
279	*Larus genei*	Slender-billed Gull	Least Concern	2019	–	–	–	–	–	–	✓	✓
280	*Larus hemprichii*	Sooty Gull	Least Concern	2018	–	–	–	–	–	–	–	✓
281	*Larus ichthyaetus*	Pallas's Gull	Least Concern	2018	–	–	–	–	–	–	✓	✓
282	*Larus ridibundus*	Black-headed Gull	Least Concern	2018	–	–	–	–	–	–	✓	✓
283	*Laticilla burnesii*	Rufous-vented Grass-babbler	Near Threatened	2017	–	–	–	–	–	–	✓	✓
284	*Leiopicus mahrattensis*	Yellow-crowned Woodpecker	Least Concern	2016	–	–	–	–	–	–	–	✓
285	*Leptoptilos dubius*	Greater Adjutant	Near Threatened	2023	–	–	–	–	–	–	–	✓
286	*Limosa lapponica*	Bar-tailed Godwit	Near Threatened	2017	–	–	–	–	–	–	✓	✓

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287	*Limosa limosa*	Black-tailed Godwit	Near Threatened	2017	–	–	–	–	–	–	✓	✓
288	*Linaria cannabina*	Common Linnet	Least Concern	2018	–	–	–	–	–	–	–	✓
289	*Locustella caudata*	Long-tailed Grasshopper-warbler	Least Concern	2024	–	–	–	–	–	–	✓	–
290	*Locustella fluviatilis*	River Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
291	*Lonchura malacca*	Black-headed Munia	Least Concern	2018	–	–	–	–	–	–	–	✓
292	*Lonchura punctulata*	Scaly-breasted Munia	Least Concern	2016	–	–	–	–	–	–	–	✓
293	*Lophophorus impejanus*	Himalayan Monal	Least Concern	2024	–	–	–	–	–	–	–	✓
294	*Lophura leucomelanos*	Kalij Pheasant	Least Concern	2024	–	–	–	–	–	–	–	✓
295	*Luscinia svecica*	Bluethroat	Least Concern	2019	–	–	–	–	–	–	–	✓
296	*Lymnocryptes minimus*	Jack Snipe	Least Concern	2016	–	–	–	–	–	–	–	✓
297	*Mareca penelope*	Eurasian Wigeon	Least Concern	2017	–	–	–	–	–	–	✓	✓
298	*Mareca strepera*	Gadwall	Least Concern	2016	–	–	–	–	–	–	✓	✓
299	*Marmaronetta angustirostris*	Marbled Duck	Near Threatened	2022	–	–	–	–	–	–	–	✓
300	*Melanocorypha bimaculata*	Bimaculated Lark	Least Concern	2017	–	–	–	–	–	–	–	✓
301	*Mergellus albellus*	Smew	Least Concern	2016	–	–	–	–	–	–	–	✓
302	*Mergus merganser*	Goosander	Least Concern	2018	–	–	–	–	–	–	–	✓
303	*Mergus serrator*	Red-breasted Merganser	Least Concern	2018	–	–	–	–	–	–	–	✓
304	*Merops apiaster*	European Bee-eater	Least Concern	2024	–	–	–	–	–	–	–	✓
305	*Merops orientalis*	Asian Green Bee-eater	Least Concern	2024	–	–	–	–	✓	–	✓	✓
306	*Merops persicus*	Blue-cheeked Bee-eater	Least Concern	2024	–	–	–	–	–	–	✓	✓
307	*Metopidius indicus*	Bronze-winged Jacana	Least Concern	2024	–	–	–	–	–	–	–	✓

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308	*Microcarbo niger*	Little Cormorant	Least Concern	2024	–	–	–	–	–	–	✓	✓
309	*Milvus migrans*	Black Kite	Least Concern	2021	–	–	–	–	✓	–	✓	✓
310	*Mirafra cantillans*	Singing Bush Lark	Least Concern	2016	–	–	–	–	–	–	–	✓
311	*Mirafra erythroptera*	Indian Bushlark	Least Concern	2024	–	–	–	–	–	–	–	✓
312	*Mirafra javanica*	Horsfield's Bushlark	Least Concern	2017	–	–	–	–	–	–	–	✓
313	*Monticola saxatilis*	Rufous-tailed Rock Thrush	Least Concern	2024	–	–	–	✓	–	✓	–	✓
314	*Monticola solitarius*	Blue Rock-thrush	Least Concern	2024	–	–	–	–	–	–	–	✓
315	*Motacilla alba*	White or Pied Wagtail	Least Concern	2019	–	✓	✓	–	–	✓	✓	✓
316	*Motacilla cinerea*	Grey Wagtail	Least Concern	2017	–	–	–	–	–	–	✓	✓
317	*Motacilla citreola*	Citrine Wagatil	Least Concern	2019	–	–	–	–	–	–	✓	✓
318	*Motacilla flava*	Western Yellow Wagtail	Least Concern	2019	–	–	–	–	–	–	✓	✓
319	*Motacilla maderaspatensis*	White-browed Wagtail	Least Concern	2016	–	–	–	–	–	–	–	✓
320	*Muscicapa dauurica*	Asian Brown Flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
321	*Muscicapa muttui*	Brown-breasted Flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
322	*Muscicapa striata*	Spotted Flycatcher	Least Concern	2019	–	–	✓	–	–	✓	–	✓
323	*Mycerobas carnipes*	White-winged Grosbeak	Least Concern	2024	–	–	–	–	–	–	–	✓
324	*Mycteria leucocephala*	Painted Stork	Least Concern	2023	–	–	–	–	–	–	–	✓
325	*Myophonus caeruleus*	Blue Whistling-thrush	Least Concern	2024	–	–	–	–	–	–	–	✓
326	*Neophron percnopterus*	Egyptian Vulture	Endangered	2021	–	–	✓	–	–	✓	✓	✓
327	*Netta rufina*	Red-crested Pochard	Least Concern	2016	–	–	–	–	–	–	–	✓
328	*Nettapus coromandelianus*	Cotton Pygmy-goose	Least Concern	2024	–	–	–	–	–	–	–	✓

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329	*Nisaetus nipalensis*	Mountain Hawk-Eagle	Near Threatened	2021	–	–	–	–	–	–	–	✓
330	*Numenius arquata*	Eurasian Curlew	Near Threatened	2017	–	–	–	–	–	–	✓	✓
331	*Numenius phaeopus*	Whimbrel	Least Concern	2024	–	–	–	–	–	–	✓	✓
332	*Nycticorax nycticorax*	Black-crowned Night-heron	Least Concern	2019	–	–	–	–	–	–	✓	✓
333	*Oceanites oceanicus*	Wilson's Storm-petrel	Least Concern	2018	–	–	–	–	–	–	–	✓
334	*Oenanthe albonigra*	Hume's Wheatear	Least Concern	2019	–	–	–	–	–	–	–	✓
335	*Oenanthe chrysopygia*	Red-tailed Wheatear	Least Concern	2019	–	–	–	–	–	–	–	✓
336	*Oenanthe deserti*	Desert Wheatear	Least Concern	2016	✓	–	–	–	–	–	–	✓
337	*Oenanthe finschii*	Finsch's Wheatear	Least Concern	2024	–	–	–	–	–	–	–	✓
338	*Oenanthe fusca*	Brown Rock Chat	Least Concern	2018	–	–	–	–	–	–	–	✓
339	*Oenanthe isabellina*	Isabelline Wheatear	Least Concern	2024	–	–	–		–	–	✓	✓
340	*Oenanthe monacha*	Hooded Chat or Wheatear	Least Concern	2019	–	–	–	✓	–	✓	✓	✓
341	*Oenanthe picata*	Variable Wheatear	Least Concern	2019	✓	✓	–	–	–	–	✓	✓
342	*Oenanthe pleschanka*	Pied Wheatear	Least Concern	2024	–	✓	–	–	–	–	–	✓
343	*Oriolus chinensis*	Black-naped Oriole	Least Concern	2018	–	–	–	–	–	–	–	✓
344	*Oriolus kundoo*	Indian Golden Oriole	Least Concern	2020	–	–	✓	✓	–	✓	–	✓
345	*Oriolus oriolus*	Eurasian Golden Oriole	Least Concern	2024	–	–	–	–	–	–	–	✓
346	*Orthotomus sutorius*	Common Tailor Bird	Least Concern	2024	–	–	–	–		–	✓	✓
347	*Ortygornis pondicerianus*	Grey Francolin	Least Concern	2018	–	–	–	–	✓	–	✓	✓
348	*Otus bakkamoena*	Indian Scops-owl	Least Concern	2016	–	–	–	–	–	–	–	✓
349	*Otus brucei*	Pallid Scops-owl	Least Concern	2021	–	–	–	–	–	–	–	✓

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350	*Otus scops*	Eurasian Scops-owl	Least Concern	2021	–	–	–	–	–	–	–	✓
351	*Oxyura leucocephala*	White-headed Duck	Endangered	2017	–	–	–	–	–	–	–	✓
352	*Pandion haliaetus*	Osprey	Least Concern	2021	–	–	–	–	–	–	✓	✓
353	*Passer domesticus*	House Sparrow	Least Concern	2019	✓	✓	–	–	–	✓	✓	✓
354	*Passer hispaniolensis*	Spanish Sparrow	Least Concern	2019	–	–	–	–	–	–	–	✓
355	*Passer montanus*	Eurasian Tree Sparrow	Least Concern	2017	✓	–	–	–	–	–	–	✓
356	*Passer pyrrhonotus*	Sind Jungle Sparrow	Least Concern	2024	–	–	–	–	–	–	✓	✓
357	*Pastor roseus*	Rosy Starling	Least Concern	2016	–	–	✓	✓	–	✓	–	✓
358	*Pavo cristatus*	Indian Peafowl	Least Concern	2016	–	–	–	–	–	–	–	✓
359	*Pelecanus crispus*	Dalmatian Pelican	Near Threatened	2018	–	–	–	–	–	–	✓	✓
360	*Pelecanus onocrotalus*	White or Rosy Pelican	Least Concern	2021	–	–	–	–	–	–	✓	✓
361	*Pelecanus philippensis*	Spotted–billed Pelican	Near Threatened	2017	–	–	–	–	–	–	✓	–
362	*Pericrocotus cinnamomeus*	Sind Small Minivet	Least Concern	2024	–	–	–	–	–	–	✓	✓
363	*Pericrocotus ethologus*	Long-tailed Minivet	Least Concern	2018	–	–	–	–	–	–	–	✓
364	*Periparus rufonuchalis*	Rufous-naped Tit	Least Concern	2024	–	–	–	–	–	–	–	✓
365	*Pernis ptilorhynchus*	Oriental Honey-buzzard	Least Concern	2021	–	–	–	–	–	–	–	✓
366	*Petrochelidon fluvicola*	Streak-throated Swallow	Least Concern	2024	–	–	–	–	–	–	–	✓
367	*Petronia petronia*	Rock Sparrow	Least Concern	2024	–	–	–	–	–	–	–	✓
368	*Phaethon aethereus*	Red-billed Tropicbird	Least Concern	2019	–	–	–	–	–	–	–	✓
369	*Phalacrocorax carbo*	Great Cormorant	Least Concern	2019	–	–	–	–	–	–	✓	✓
370	*Phalacrocorax fuscicollis*	Indian Cormorant	Least Concern	2018	–	–	–	–	–	–	✓	✓

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371	*Phalaropus lobatus*	Red-necked Phalarope	Least Concern	2018	–	–	–	–	–	–	–	✓
372	*Phoeniconaias minor*	Lesser Flamingo	Near Threatened	2018	–	–	–	–	–	–	–	✓
373	*Phoenicopterus roseus*	Greater Flamingo	Least Concern	2019	–	–	–	–	–	–	✓	✓
374	*Phoenicurus erythronotus*	Eversmann's Redstart	Least Concern	2024	–	–	–	–	–	–	–	✓
375	*Phoenicurus frontalis*	Blue-fronted Redstart	Least Concern	2024	–	–	–	–	–	–	–	✓
376	*Phoenicurus ochruros*	Black Redstart	Least Concern	2019	–	–	–	–	–	–	✓	✓
377	*Phoenicurus phoenicurus*	Common Redstart	Least Concern	2024	–	–	–	–	–	–	✓	–
378	*Phylloscopus collybita*	Common Chiffchaff	Least Concern	2024	✓	–	–	–	✓	–	–	✓
379	*Phylloscopus griseolus*	Sulphur-bellied Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
380	*Phylloscopus neglectus*	Plain Leaf-warbler	Least Concern	2019	–	–	–	–	✓	–	–	✓
381	*Phylloscopus nitidus*	Green Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
382	*Phylloscopus sindianus*	Mountain Chiffchaff	Least Concern	2019	–	–	–	–	–	–	–	✓
383	*Phylloscopus trochiloides*	Greenish Warbler	Least Concern	2024	✓	–	–	–	–	✓	–	✓
384	*Phylloscopus trochiloides*	Greenish Leaf Warbler	Least Concern	2024	–	–	–	–	–	–	–	✓
385	*Pica pica*	Eurasian Magpie	Least Concern	2024	–	–	–	–	–	–	–	✓
386	*Picus squamatus*	Scaly-bellied Woodpecker	Least Concern	2024	–	–	–	–	–	–	–	✓
387	*Pitta brachyura*	Indian Pitta	Least Concern	2024	–	–	–	–	–	–	–	✓
388	*Platalea leucorodia*	Eurasian Spoonbill	Least Concern	2019	–	–	–	–	–	–	–	✓
389	*Plegadis falcinellus*	Glossy Ibis	Least Concern	2019	–	–	–	–	–	–	–	✓
390	*Ploceus benghalensis*	Black-breasted Weaver	Least Concern	2018	–	–	–	–	–	–	–	✓
391	*Ploceus manyar*	Streaked Weaver	Least Concern	2024	–	–	–	–	–	–	–	✓

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392	*Ploceus philippinus*	Baya Weaver	Least Concern	2024	–	–	–	–	–	–	–	✓
393	*Pluvialis fulva*	Pacific Golden Plover	Least Concern	2019	–	–	–	–	–	–	–	✓
394	*Pluvialis squatarola*	Grey Plover	Vulnerable	2024	–	–	–	–	–	–	✓	✓
395	*Podiceps auritus*	Horned Grebe	Vulnerable	2018	–	–	–	–	–	–	–	✓
396	*Podiceps cristatus*	Great Crested Grebe	Least Concern	2019	–	–	–	–	–	–	–	✓
397	*Podiceps nigricollis*	Black-necked Grebe	Least Concern	2018	–	–	–	–	–	–	–	✓
398	*Porphyrio poliocephalus*	Gray-headed Swamphen	Not Evaluated	-	–	–	–	–	–	–	–	✓
399	*Porphyrio porphyrio*	Purple Swamphen	Least Concern	2019	–	–	–	–	–	–	–	✓
400	*Porzana porzana*	Spotted Crake	Least Concern	2016	–	–	✓	–	–	–	–	✓
401	*Prinia buchanani*	Rufous-fronted Prinia	Least Concern	2016	–	–	–	–	–	–	✓	✓
402	*Prinia crinigera*	Striated Prinia	Least Concern	2024	–	–	–	–	–	–	–	✓
403	*Prinia flaviventris*	Yellow-bellied Prinia	Least Concern	2016	–	–	–	–	–	–	–	✓
404	*Prinia gracilis*	Graceful Prinia	Least Concern	2019	–	–	–	–	–	–	–	✓
405	*Prinia hodgsonii*	Grey-breasted Prinia	Least Concern	2024	–	–	–	–	–	–	–	✓
406	*Prinia inornata*	Plain Prinia	Least Concern	2024	–	–	–	–	–	–	–	✓
407	*Prinia lepida*	Delicate Prinia	Not Evaluated	-	–	–	–	–	–	–	–	✓
408	*Prinia socialis*	Ashy Prinia	Least Concern	2024	✓	–	–	–	–	–	–	✓
409	*Prunella atrogularis*	Black-throated Accentor	Least Concern	2016	–	–	–	–	–	–	–	✓
410	*Pseudibis papillosa*	Black Ibis	Least Concern	2016	–	–	–	–	–	–	✓	✓
411	*Psilopogon haemacephalus*	Coppersmith Barbet	Least Concern	2024	–	–	–	–	–	–	–	✓
412	*Psittacula cyanocephala*	Plum-headed Parakeet	Least Concern	2024	–	–	–	–	–	–	–	✓

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413	*Palaeornis eupatria*	Alexandrine Parakeet	Near Threatened	2017	–	–	–	–	–	–	–	✓
414	*Psittacula himalayana*	Slaty-headed Parakeet	Least Concern	2024	–	–	–	–	–	–	–	✓
415	*Alexandrinus krameri*	Rose-ringed Parakeet	Least Concern	2024	–	–	–	–	–	–	✓	✓
416	*Pterocles alchata*	Pin-tailed Sandgrouse	Least Concern	2019	–	–	–	–	–	–	–	✓
417	*Pterocles coronatus*	Crowned Sandgrouse	Least Concern	2024	✓	–	–	–	–	–	–	✓
418	*Pterocles exustus*	Chestnut-bellied Sandgrouse	Least Concern	2018	–	–	–	–	–	–	–	✓
419	*Pterocles indicus*	Painted Sandgrouse	Least Concern	2024	–	–	–	–	–	–	–	✓
420	*Pterocles lichtensteinii*	Lichtenstein's Sandgrouse	Least Concern	2024	–	–	–	–	–	–	–	✓
421	*Pterocles orientalis*	Imperial or Black–bellied Sandgrouse	Least Concern	2018	–	–	–	–	–	✓	–	✓
422	*Pterocles senegallus*	Spotted Sandgrouse	Least Concern	2024	–	–	–	–	–	–	–	✓
423	*Ptyonoprogne fuligula*	Rock Martin	Least Concern	2024	–	✓	–	–	–	–	–	✓
424	*Ptyonoprogne obsoleta*	Pale Rock Martin	Least Concern	2024	–	–	–	–	–	–	–	✓
425	*Ptyonoprogne rupestris*	Eurasian Cag Martin	Least Concern	2024	–	✓	✓			✓	–	✓
426	*Puffinus bailloni*	Tropical Shearwater	Least Concern	2018	–	–	–	–	–	–	–	✓
427	*Puffinus persicus*	Persian Shearwater	Least Concern	2019	–	–	–	–	–	–	–	✓
428	*Pycnonotus cafer*	Red-vented Bulbul	Least Concern	2018	–	–	–	✓	✓	✓	✓	✓
429	*Pycnonotus jocosus*	Red-whiskered Bulbul	Least Concern	2024	–	–	–	–	–	–	–	✓
430	*Pycnonotus leucogenys*	Himalayan Bulbul	Least Concern	2024	–	–	–	–	–	–	✓	✓
431	*Pycnonotus leucotis*	White-eared Bulbul	Least Concern	2018	✓		✓	✓	✓	✓	–	✓
432	*Pyrrhocorax graculus*	Yellow-billed Chough	Least Concern	2024	–	–	–	–	–	–	–	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
433	*Pyrrhocorax pyrrhocorax*	Red-billed Chough	Least Concern	2024	–	–	–	–	–	–	–	✓
434	*Rallus aquaticus*	Western Water Rail	Least Concern	2019	–	–	–	–	–	–	–	✓
435	*Recurvirostra avosetta*	Pied Avocet	Least Concern	2021	–	–	–	–	–	–	✓	✓
436	*Remiz pendulinus*	Eurasian Penduline-tit	Least Concern	2019	–	–	–	–	–	–	–	✓
437	*Rhipidura albicollis*	White-throated Fantail	Least Concern	2024	–	–	–	–	–	–	–	✓
438	*Rhipidura aureola*	White-browed Flycatcher	Least Concern	2024	–	–	–	–	–	–	✓	✓
439	*Riparia chinensis*	Asian Plain Martin	Least Concern	2024	–	–	–	–	–	–	–	✓
440	*Riparia diluta*	Pale Sand Martin	Least Concern	2024	–	–	–	–	–	–	–	✓
441	*Riparia paludicola*	African Plain Martin	Least Concern	2024	–	–	–	–	–	–	✓	✓
442	*Riparia riparia*	Sand Martin	Least Concern	2016	–	–	–	–	–	–	–	✓
443	*Rostratula benghalensis*	Greater Painted-snipe	Least Concern	2024	–	–	–	–	–	–	✓	✓
444	*Rynchops albicollis*	Indian Skimmer	Endangered	2020	–	–	–	–	–	–	–	✓
445	*Sarcogyps calvus*	Red-headed Vulture	Critically Endangered	2021	–	–	–	–	–	–	–	✓
446	*Saxicola caprata*	Pied Bushchat	Least Concern	2024	–	✓	✓	–	–	✓	✓	✓
447	*Saxicola leucurus*	White-tailed Stonechat	Least Concern	2024	–	–	–	–	–	–	–	✓
448	*Saxicola macrorhynchus*	White-browed Bushchat	Vulnerable	2017	–	–	–	–	–	–	–	✓
449	*Saxicola torquatus*	Siberian Stonechat	Least Concern	2020	–	–	✓	–	–	✓	–	✓
450	*Scolopax rusticola*	Eurasian Woodcock	Least Concern	2019	–	–	–	–	–	–	–	✓
451	*Scotocerca inquieta*	Streaked Scrub Warbler	Least Concern	2018	–	–	–	–	–	✓	–	✓
452	*Serinus pusillus*	Red-fronted Serin	Least Concern	2024	–	–	–	–	–	–	–	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
453	*Sitta cashmirensis*	Kashmir Nuthatch	Least Concern	2016	–	–	–	–	–	–	–	✓
454	*Sitta tephronota*	Eastern Rock Nuthatch	Least Concern	2024	–	–	–	–	–	–	–	✓
455	*Spatula clypeata*	Northern Shoveler	Least Concern	2019	–	–	–	–	–	–	✓	✓
456	*Spatula querquedula*	Garganey	Least Concern	2016	–	–	–	–	–	–	–	✓
457	*Spilopelia chinensis*	Spotted Dove	Least Concern	2024	–	–	–	–	–	–	–	✓
458	*Spilopelia senegalensis*	Laughing Dove	Least Concern	2018	–	–	✓	–	–	✓	✓	✓
459	*Spilornis cheela*	Crested Serpent Eagle	Least Concern	2016	–	–	–	–	–	–	–	✓
460	*Stercorarius parasiticus*	Arctic Jaeger	Least Concern	2018	–	–	–	–	–	–	✓	✓
461	*Stercorarius pomarinus*	Pomarine Jaeger	Least Concern	2018	–	–	–	–	–	–	–	✓
462	*Sterna acuticauda*	Black-bellied Tern	Endangered	2022	–	–	–	–	–	–	✓	✓
463	*Sterna albifrons*	Litter Tern	Least Concern	2018	–	–	–	–	–	–	✓	–
464	*Sterna aurantia*	River Tern	Vulnerable	2020	–	–	–	–	–	–	✓	✓
465	*Sterna hirundo*	Common Tern	Least Concern	2019	–	–	–	–	–	–	✓	✓
466	*Sterna repressa*	White-cheeked Tern	Least Concern	2019	–	–	–	–	–	–	✓	✓
467	*Sternula albifrons*	Little Tern	Least Concern	2019	–	–	–	–	–	–	–	✓
468	*Sternula saundersi*	Saunders's Tern	Least Concern	2019	–	–	–	–	–	–	–	✓
469	*Streptopelia decaocto*	Eurasian Collared-dove	Least Concern	2019	–	–	✓	✓	–	–	–	✓
470	*Streptopelia orientalis*	Oriental Turtle-Dove	Least Concern	2024	–	–	–	–	–	–	–	✓
471	*Streptopelia tranquebarica*	Red Collared-dove	Least Concern	2018	–	–	–	–	–	–	–	✓
472	*Sturnia malabarica*	Chestnut-tailed Starling	Least Concern	2016	–	–	–	–	–	–	–	✓
473	*Sturnia pagodarum*	Brahminy Starling	Least Concern	2018	–	–	–	–	–	–	–	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
474	*Sturnus vulgaris*	Common Starling	Least Concern	2019	–	–	–	–	–	–	✓	✓
475	*Sula dactylatra*	Masked Booby	Least Concern	2018	–	–	–	–	–	–	–	✓
476	*Sypheotides indicus*	Lesser Florican	Critically Endangered	2021	–	–	–	–	–	–	–	✓
477	*Taccocua leschenaultii*	Sirkeer Malkoha	Least Concern	2016	–	–	–	–	–	–	–	✓
478	*Tachybaptus ruficollis*	Little Grebe	Least Concern	2019	–	–	–	–	–	–	–	✓
479	*Tachymarptis melba*	Alpine Swift	Least Concern	2024	–	–	–	–	–	–	–	✓
480	*Tadorna ferruginea*	Ruddy Shelduck	Least Concern	2016	–	–	–	–	–	–	–	✓
481	*Tadorna tadorna*	Common Shelduck	Least Concern	2019	–	–	–	–	–	–	✓	✓
482	*Tephrodornis pondicerianus*	Common Woodshrike	Least Concern	2024	–	–	–	–	–	–	–	✓
483	*Terpsiphone paradisi*	Indian Paradise-flycatcher	Least Concern	2024	–	–	–	–	–	–	–	✓
484	*Tetraogallus himalayensis*	Himalayan Snowcock	Least Concern	2018	–	–	–	–	–	–	–	✓
485	*Tetrax tetrax*	Little Bustard	Near Threatened	2018	–	–	–	–	–	–	–	✓
486	*Thalasseus bengalensis*	Lesser Crested Tern	Least Concern	2018	–	–	–	–	–	–	✓	✓
487	*Thalasseus bergii*	Greater Crested Tern	Least Concern	2018	–	–	–	–	–	–	✓	✓
488	*Thalasseus sandvicensis*	Sandwich Tern	Least Concern	2019	–	–	–	–	–	–	✓	✓
489	*Threskiornis melanocephalus*	Black-headed Ibis	Least Concern	2024	–	–	–	–	–	–	–	✓
490	*Tichodroma muraria*	Wallcreeper	Least Concern	2019	–	–	–	–	–	–	–	✓
491	*Treron bicinctus*	Orange-breasted Green Pigeon	Least Concern	2024	–	–	–	–	–	–	–	✓
492	*Treron phoenicopterus*	Yellow-footed Green-pigeon	Least Concern	2024	–	–	–	–	–	–	–	✓
493	*Tringa erythropus*	Dusk Red Shank	Least Concern	2016	–	–	–	–	–	–	✓	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
494	*Tringa glareola*	Wood Sandpiper	Least Concern	2016	–	–	–	–	–	–	–	✓
495	*Tringa nebularia*	Common Greenshank	Least Concern	2016	–	–	–	–	–	–	✓	✓
496	*Tringa ochropus*	Green Sandpiper	Least Concern	2016	–	–	–	–	–	–	✓	✓
497	*Tringa stagnatilis*	Marsh Sandpiper	Least Concern	2016	–	–	–	–	–	–	✓	✓
498	*Tringa totanus*	Common Redshank	Least Concern	2016	–	–	–	–	–	–	✓	✓
499	*Trochalopteron lineatum*	Streaked Laughingthrush	Least Concern	2018	–	–	–	–	–	–	–	✓
500	*Troglodytes troglodytes*	Northern Wren	Least Concern	2018	–	–	–	–	–	–	–	✓
501	*Turdoides striata*	Jungle Babbler	Least Concern	2024	–	–	–	–	–	–	–	
502	*Turdus atrogularis*	Black-throated Thrush	Least Concern	2017	–	–	–	–	–	–	–	✓
503	*Turdus merula*	Eurasian Blackbird	Least Concern	2024	–	–	–	–	–	–	–	✓
504	*Turdus philomelos*	Song Thrush	Least Concern	2018	–	–	–	–	–	–	–	✓
505	*Turdus unicolor*	Tickell's Thrush	Least Concern	2024	–	–	–	–	–	–	–	✓
506	*Turdus viscivorus*	Mistle Thrush	Least Concern	2024	–	–	–	–	–	–	–	✓
507	*Turnix suscitator*	Barred Buttonquail	Least Concern	2024	–	–	–	–	–	–	–	✓
508	*Turnix sylvaticus*	Common Buttonquail	Least Concern	2016	–	–	–	–	–	–	–	✓
509	*Tyto alba*	Common Barn-owl	Least Concern	2019	–	–	–	–	–	–	–	✓
510	*Upupa epops*	Eurasian Hoopoe	Least Concern	2020	–	–	–	–	–	–	✓	✓
511	*Urocissa flavirostris*	Yellow-billed Blue-Magpie	Least Concern	2024	–	–	–	–	–	–	–	✓
512	*Vanellus gregarius*	Sociable Lapwing	Critically Endangered	2019	–	–	–	–	–	–	–	✓
513	*Vanellus indicus*	Red Wattled Lapwing	Least Concern	2016	–	–	–	–	✓	–	✓	✓

No	Scientific Name	Common Name	IUCN	Year of Assessment	Survey-Based					Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
514	*Vanellus leucurus*	White-tailed Lapwing	Least Concern	2020	–	–	–	–	–	–	✓	✓
515	*Vanellus malabaricus*	Yellow-wattled Lapwing	Least Concern	2016	–	–	–	–	✓	–	✓	✓
516	*Vanellus vanellus*	Northern Lapwing	Near Threatened	2017	–	–	–	–	–	–	–	✓
517	*Xenus cinereus*	Terek Sandpiper	Least Concern	2019	–	–	–	–	–	–	✓	✓
518	*Zapornia parva*	Little Crake	Least Concern	2016	–	–	–	–	–	–	–	✓
519	*Zapornia pusilla*	Baillon's Crake	Least Concern	2019	–	–	–	–	–	–	–	✓
520	*Zosterops palpebrosus*	Indian White-eye	Least Concern	2019	–	–	–	–	–	–	✓	✓
521	*Phylloscopus trochilus*	Willow Warbler	Least Concern	2024	✓	–	–	–	–	–	–	–
522	*Melanocorypha calandra*	Calandra Lark	Least Concern	2016	✓	–	–	–	–	–	–	–
523	*Progne chalybea*	Grey-breasted Martin	Least Concern	2020	–	–	–	✓	–	–	–	–
	Total				**25**	**17**	**31**	**21**	**22**	**43**	**153**	**509**

D.1.2 Mammals

List of Mammals Species Reported in Literature, Previous EIA's (2010 and 2020) and observed in Surveys (Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024) is provided below for Proposed Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, Rail and Road Route Corridor and Port Qasim.

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
1.	*Axis porcinus*	Hog Deer	Endangered	2014	Vulnerable	–	–	–	–	–	–	–	–	✓
2.	*Canis aureus*	Asiatic Jackal	Least Concern	2018	Near Threatened	✓	✓	–	–	✓	✓	✓	✓	✓
3.	*Canis lupus*	Grey Wolf	Least Concern	2018	Endangered	–	–	–	–	–	–	–	–	✓
4.	*Capra aegagrus blythi*	Sindh Ibex	Near Threatened	2020	Near Threatened	–	–	–	–	–	✓	✓	–	✓
5.	*Capra aegagrus chialtanensis*	Chiltan Wild Goat	Near Threatened	2020	Least Concern	–	–	–	–	–	–	✓	–	✓
6.	*Capra falconeri jerdoni*	Straight-horned Markhor	Near Threatened	2014	Vulnerable	–	–	–	–	–	–	–	–	✓
7.	*Caracal caracal*	Caracal	Least Concern	2014	Critically Endangered	–	–	–	–	–	–	–	–	✓
8.	*Felis chaus*	Jungle Cat	Least Concern	2014	Least Concern	–	–	–	–	–	–	–	✓	✓
9.	*Felis margarita*	Sand Cat or Dune Cat	Least Concern	2014	Critically Endangered	–	–	✓	✓	–	–	–	–	✓
10.	*Funambulus pennantii*	Five–striped Palm Squirrel	Least Concern	2016	Least Concern	–	–	–	–	✓	–	–	✓	✓
11.	*Gazella bennettii*	Chinkara/Indian Gazelle	Least Concern	2016	Vulnerable	–	–	–	–	–	–	–	–	✓

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
12.	*Gazella subgutturosa*	Goitred Gazelle	Vulnerable	2016	Critically Endangered	–	✓	–	✓	–	✓	✓	–	–
13.	*Herpestes edwardsii*	Indian Grey Mongoose	Least Concern	2015	Least Concern	–	–	–	–	–	–	–	–	✓
14.	*Herpestes javanicus*	Small Indian Mongoose	Least Concern	2014	Least Concern	–	–	–	–	–	–	✓	✓	✓
15.	*Hipposideros fulvus*	Fulvous Leaf–nosed Bat	Least Concern	2018	Least Concern	–	–	–	–	–	–	–	✓	–
16.	*Hyaena hyaena*	Striped Hyena	Near Threatened	2014	Critically Endangered	–	–	–	–	–	–	–	–	✓
17.	*Hystrix indica*	Indian Crested Porcupine	Least Concern	2016	Near Threatened	–	–	–	–	✓	✓	✓	✓	✓
18.	*Lepus capensis*	Cape Hare	Least Concern	2018	Vulnerable	–	✓	✓	✓	✓	✓	✓	–	✓
19.	*Lepus nigricollis*	Desert Hare / Indian Hare	Least Concern	2018	Least Concern	–	–	–	–	–	–	–	✓	✓
20.	*Lutrogale perspicillata*	Smooth Coated Otter	Vulnerable	2020	Near Threatened	–	–	–	–	–	–	–	–	✓
21.	*Manis crassicaudata*	Indian Pangolin	Endangered	2019	Vulnerable	–	–	–	–	–	–	–	–	✓
22.	*Martes foina*	Stone Marten	Least Concern	2015	Data Deficient	–	–	–	–	–	–	–	–	✓
23.	*Mellivora capensis*	Honey Badger	Least Concern	2015	Critically Endangered	–	–	–	–	–	–	–	✓	✓
24.	*Ovis vignei blanfordi*	Balochistan Urial	Vulnerable	2020	-	–	–	–	–	–	–	–	–	✓

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
25.	*Ovis vignei cycloceros*	Afghan Urial	Vulnerable	2020	Vulnerable	–	–	–	–	–	✓	✓	–	✓
26.	*Panthera pardus*	Common Leopard	Vulnerable	2023	Critically Endangered	–	–	–	–	–	–	–	–	✓
27.	*Pipistrellus ceylonicus*	Kelaarter Chamchika	Least Concern	2018	Least Concern	–	–	–	–	–	–	–	✓	–
28.	*Pipistrellus kuhlii*	Kuhl's Pipistrelle	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓
29.	*Platanista gangetica minor*	Indus Dolphin	Endangered	2021	Endangered	–	–	–	–	–	–	–	–	✓
30.	*Prionailurus viverrinus*	Fishing Cat	Vulnerable	2016	Near Threatened	–	–	–	–	–	–	–	✓	✓
31.	*Rhinolophus ferrumequinum*	Greater Horse Shoe Bat	Least Concern	2016	Vulnerable	–	–	–	–	–	–	–	–	✓
32.	*Rousettus aegyptiacus*	Egyptian Fruit Bat	Least Concern	2016	Vulnerable	–	–	–	–	–	–	–	✓	✓
33.	*Rousettus leschenaultii*	Fulvous Fruit Bat	Near Threatened	2021	Least Concern	–	–	–	–	–	–	–	✓	–
34.	*Scotophilus kuhlii*	Lesser House Bat	Least Concern	2018	Least Concern	–	–	–	–	–	–	–	–	✓
35.	*Scotophilus pallidus*	Yellow Desert Bat	Least Concern	2018	-	–	–	–	–	–	–	–	–	✓
36.	*Sus scrofa*	Wild Boar	Least Concern	2018	Least Concern	–	–	–	–	✓	–	–	✓	✓
37.	*Triaenops persicus*	Persian Trident Bat	Least Concern	2016	Vulnerable	–	–	–	–	–	–	–	✓	–
38.	*Ursus thibetanus gedrosianus*	Balochistan Black Bear	Vulnerable	2016	Critically Endangered	–	–	–	–	–	–	–	–	✓
39.	*Viverricula indica*	Small Indian Civet	Least Concern	2015	Near Threatened	–	–	–	–	–	–	–	✓	–
40.	*Vormela peregusna*	Marbled Pole Cat	Vulnerable	2015	Least Concern	–	–	–	–	–	–	–	–	✓

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
41.	*Vulpes bengalensis*	Indian Fox/ Bengal Fox	Least Concern	2016	Near Threatened	–	–	–	–	–	–	–	✓	✓
42.	*Vulpes cana*	King Fox	Least Concern	2015	Near Threatened	–	–	–	–	–	–	–	–	✓
43.	*Vulpes rueppellii*	Sand Fox	Least Concern	2015	Vulnerable	✓	–	✓	✓	–	✓	✓	–	✓
44.	*Vulpes vulpes*	Red Fox	Least Concern	2016	Near Threatened	✓	✓	✓	✓	–	✓	✓	✓	✓
45.	*Vulpes vulpes montana*	Hill Fox	Least Concern	2016	Data Deficient	–	–	–	–	–	–	–	–	✓
Total						**3**	**4**	**4**	**5**	**5**	**8**	**10**	**18**	**39**

D.1.3 Small Mammals

List of Small Mammals Species Reported in Literature, Previous EIA's (2010 and 2020) and observed in Surveys (Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024) is provided below for Proposed Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, Rail and Road Route Corridor and Port Qasim.

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
1	*Allactaga elater*	Small Five–toad Jerboa	Least Concern	2016	Least Concern	–	✓	–	–	–	–	✓	–	✓
2	*Acomys cahirinus*	Cairo Spiny Mouse	Least Concern	2016	Near Threatened	–	–	–	–	–	–	–	–	✓
3	*Acomys cineraceus*	Grey Spiny Mouse	Least Concern	2016	-	–	–	–	–	–	–	–	–	✓
4	*Allactaga hotsoni*	Hotson's Five-toed Jerboa	Least Concern	2016	Least Concern	–	–	–	–	–	–	✓	–	✓
5	*Bandicota bengalensis*	Indian Mole Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	–
6	*Calomyscus bailwardi*	Mouse like Hamster	Least Concern	2016	Least Concern	–	–	–	–	–	–	✓	–	✓
7	*Calomyscus baluchi*	Baluchi Mouse-like Hamster	Least Concern	2016	-	–	–	–	–	–	–	–	–	✓
8	*Cricetulus migratorius*	Migratory Hamster	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	–	✓
9	*Crocidura gmelini*	Balochistan Short Tailed Shrew	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	–	✓
10	*Crocidura zarudnyi*	Zarudny's Rock Shrew	Least Concern	2016	Least Concern	–	–	–	–	–	–	✓	–	✓
11	*Dryomys nitedula*	Forest Dormouse	Least Concern	2016	Vulnerable	–	–	–	–	–	–	–	–	✓
12	*Ellobius fuscocapillus*	Afghan Mole Vole	Least Concern	2016	Near Threatened	–	–	–	–	–	–	–	–	✓

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
13	*Gerbillus cheesmani*	Cheesman Gerbil	Least Concern	2016	Vulnerable	✓	–	–	–	–	✓	✓	–	✓
14	*Gerbillus gleadowi*	Indian Hairy Footed Gerbil	Least Concern	2016	Near Threatened	–	–	–	–	–	✓	✓	–	✓
15	*Gerbillus nanus*	Dwarf Gerbil	Least Concern	2016	Near Threatened	✓	✓	–	–	–	✓	–	✓	✓
16	*Golunda ellioti*	Indian Bush Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓
17	*Hemiechinus auritus*	Long Eared Hedgehoge	Least Concern	2016	Least Concern	–	✓	–	✓	–	✓	–	–	–
18	*Hemiechinus auritus megalotis*	Afghan Hedgehog	Least Concern	2016	Least Concern	✓	–	–	–	–	–	–	–	✓
19	*Hemiechinus collaris*	Long-eared Desert Hedgehog	Least Concern	2016	Least Concern	–	–	–	–	✓	–	✓	✓	✓
20	*Jaculus blanfordi*	Three–toed Jerboa	Least Concern	2016	Least Concern	✓	–	–	–	–	–	–	–	✓
21	*Meriones crassus*	Sundevall's Jird	Least Concern	2016	Near Threatened	–	–	–	–	–	✓	✓	–	✓
22	*Meriones hurrianae*	Indian Desert Jird	Least Concern	2016	Least Concern	–	✓	–	–	–	–	–	✓	✓
23	*Meriones libycus*	Libian Jird	Least Concern	2016	Least Concern	–	–	–	–	–	–	✓	–	✓
24	*Meriones persicus*	Persian Jird	Least Concern	2016	Least Concern	–	–	–	–	–	✓	–	–	✓
25	*Millardia gleadowi*	Sand Colored Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	–	✓
26	*Millardia meltada*	Soft Furred Field Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	–
27	*Mus booduga*	Little Indian Field Mouse	Least Concern	2016	Least Concern	–	–	–	–	–	✓	–	✓	✓
28	*Mus musculus*	House Mouse	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓

No.	Scientific Name	Common Name	IUCN Status	Year Last Assessed	National Status	Survey-Based						Literature-Based		
						EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Port Qasim	Rail and Road Route Corridor
29	*Mus saxicola*	Grey Spiny Mouse	Least Concern	2016	Data Deficient	–	–	–	–	–	–	–	✓	–
30	*Nesokia indica*	Short-tailed Mole Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓
31	*Ochotona rufescens*	Afghan Pika	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	–	✓
32	*Paraechinus hypomelas*	Brandt's Hedgehog	Least Concern	2016	-	–	–	–	–	–	–	–	–	✓
33	*Paraechinus micropus*	Indian Hedgehog	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓
34	*Rattus norvegicus*	Norway or Brown Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	–
35	*Rattus rattus*	House Rat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓
36	*Rhinopoma microphyllum*	Large Mouse tailed Bat	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	–
37	*Rhombomys opimus*	Great Gerbil	Least Concern	2016	Near Threatened	–	–	✓	✓	–	✓	✓	–	✓
38	*Salpingotus michaelis*	Balochistan Pygmy Jerboa	Data Defficient	2016	Least Concern	–	–	–	–	–	–	✓	–	✓
39	*Suncus murinus*	House Shrew	Least Concern	2016	Least Concern	–	–	–	–	–	–	–	✓	✓
40	*Tatera indica*	Indian Gerbil	Least Concern	2016	Least Concern	–	✓	–	–	–	–	–	✓	✓
Total						**4**	**5**	**1**	**2**	**1**	**8**	**11**	**16**	**34**

D.1.4 Herpetofauna

List of Herpetofauna Species Reported in Literature, Previous EIA's (2010 and 2020) and observed in Surveys (Post-Monsoon 2022, Spring 2023, Post-Monsoon 2023 and Summer 2024) is provided below for Proposed Reko Diq Mine Site, Northern Groundwater System, Access Route to Reko Diq Mine Site, Rail and Road Route Corridor and Port Qasim.

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
1	Ablepharus grayanus	Minor Snake-Eyed Skink	Least Concern	2019	–	–	–	–	–	–	–	✓	–
2	Acanthodactylus blanfordii	Blanford's Fringe–Fingered Lizard	Least Concern	2016	–	–	✓	✓	–	✓	✓	–	–
3	Acanthodactylus cantoris	Indian Fringe-Fingered Lizard	Least Concern	2016	✓	–	–	–	✓	–	–	✓	✓
4	Acanthodactylus micropholis	Yellow Tailed Fringe Fingered Lizard	Least Concern	2019	✓	–	✓	–	–	–	✓	✓	–
5	Agamura persica	Persian Spider Gecko	Least Concern	2016	✓	–	✓	–	–	–	✓	✓	–
6	Ablepharus pannonicus	Eastern Dwarf Skink	Least Concern	2012	–	–	–	–	–	–	–	✓	–
7	Boiga trigonata	Dark Headed Gamma Snake	Least Concern	2016	–	–	–	–	–	–	–	✓	✓
8	Bufotes zugmayeri	Baloch Green Toad	Near Threatened	2020	–	–	–	–	–	✓	–	–	–
9	Bungarus caeruleus	Indian Krait	Least Concern	2010	–	–	–	–	–	–	–	✓	✓
10	Bungarus sindanus	Sind Krait	Least Concern	2019	–	–	–	–	–	–	–	✓	–
11	Bunopus tuberculatus	Baluch Ground Gecko	Least Concern	2016	–	–	–	–	–	✓	✓	✓	–
12	Calotes versicolor	Changeable Lizard	Least Concern	2019	✓	–	–	–	✓	–	–	✓	✓
13	Chelonia mydas	Green Sea Turtle	Endangered	2004	–	–	–	–	–	–	–	–	✓

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
14	Coluber fasciolatus	Banded Racer	Least Concern	2019	–	–	–	–	–	–	–	✓	–
15	Coluber karelini	Spotted Desert Racer	Least Concern	2019	–	–	–	–	–	–	–	✓	–
16	Coluber ravergieri	Spotted Whip Snake	Least Concern	2016	–	–	–	–	–	–	–	✓	–
17	Coluber ventromaculatus	Glossy Bellied Racer	Least Concern	2016	–	–	–	–	–	–	–	–	✓
18	Crocodylus palustris	Marsh Crocodile	Vulnerable	2009	–	–	–	–	–	–	–	✓	–
19	Crossobamon eversmanni	Fringe–Toed Gecko	Least Concern	2016	–	–	–	–	–	–	✓	–	–
20	Crossobamon eversmanni lumsdeni	Lumsden's Fringe-Toed Gecko	Least Concern	2016	✓	–	–	–	–	✓	–	✓	–
21	Crossobamon orientalis	Sind Gecko	Least Concern	2019	✓	–	–	–	–	–	✓	✓	✓
22	Cyrtopodion kachhense	Warty Rock Gecko/ Kutck Gecko	Least Concern	2008	✓	–	–	–	–	–	–	✓	–
23	Cyrtopodion scabrum	Rough Bent-Toed Gecko	Least Concern	2016	✓	–	✓	–	–	–	✓	✓	–
24	Cyrtopodion sistanense	Sistan Angular-Toed Gecko	Least Concern	2008	–	–	–	–	–	✓	✓	–	–
25	Cyrtopodion sp	-	-		–	–	–	–	–	✓	–	–	–
26	Cyrtopodion watsoni	Thin–Toed Gecko	Least Concern	2019	–	✓	–	–	–	–	–	–	–
27	Daboia russelii	Russel's Viper	Least Concern	2019	–	–	–	–	–	–	–	–	✓
28	Duttaphrynus melanostictus	Common Asian Toad	Least Concern	2020	–	–	–	–	–	–	–	–	✓
29	Echis carinatus	Saw–Scaled Viper	Least Concern	2016	–	–	–	–	–	–	–	✓	–

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
30	Echis carinatus multisquamatus	Transcaspian Saw-Scaled Viper	Least Concern	2016	–	–	–	✓	–	✓	✓	–	–
31	Echis carinatus sochureki	Sochurek's Saw-Scaled Viper	Least Concern	2016	✓	–	–	–	–	–	–	–	✓
32	Eremias acutirostris	Reticulated Desert Lacerta	Least Concern	2016	✓	–	–	–	–	✓	✓	✓	–
33	Eremias c.f scripta	-	Not Assessed	2016	–	–	–	✓	–	✓	✓	–	–
34	Eremias persica	Persian Racerunner	Least Concern	2016	✓	–	–	–	–	✓	–	✓	–
35	Eremias scripta	Sand Racerunner	Least Concern	2016	✓	–	–	✓	–	✓	✓	✓	–
36	Eremias sp.	-	Not Assessed		–	–	–	✓	–	–	–	–	–
37	Eristicophis macmahoni	Mcmahon's Viper	Least Concern	2019	✓	–	–	–	–	–	✓	✓	–
38	Eryx conicus	Sand Boa	Near Threatened	2019	–	–	–	–	–	–	–	✓	✓
39	Eryx johnii	Common Sand Boa	Near Threatened	2019	–	–	–	–	–	–	–	✓	✓
40	Eryx tataricus	Tartary Sand Boa	Least Concern	2016	–	–	–	–	–	–	–	✓	–
41	Eublepharis macularius	Common Leopard Gecko	Least Concern	2019	–	–	–	–	–	–	–	✓	✓
42	Eumeces schneideri zarudnyi	Orange–Tailed Mole Skink	Least Concern	2016	–	–	✓	–	–	✓	✓	✓	–
43	Eumeces schneideri blythianus	Orange-Tailed Mole Skink	Least Concern	2016	–	–	–	–	–	–	–	✓	–
44	Eumeces taeniolatus	Ribbon Sided Skink	Least Concern	2016	–	–	–	–	–	–	–	✓	✓
45	Euphlyctis cyanophlyctis	Skittering Frog	Least Concern	2021	–	–	–	–	–	–	–	✓	✓
46	Firouzophrynus stomaticus	Marbled Toad	Least Concern	2021	–	–	–	–	–	–	–	–	✓

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
47	Fowlea piscator	Checkered Keel Back	Least Concern	2016	–	–	–	–	–	–	–	✓	✓
48	Hardella thurjii	Brahminy River Turtle	Endangered	2018	–	–	–	–	–	–	–	✓	–
49	Hemidactylus brookii	Spotted Indian House Gecko, Brook's Gecko	Least Concern	2012	–	–	–	–	–	–	–	✓	✓
50	Hemidactylus flaviviridis	Yellow–Bellied House Gecko	Least Concern	2021	–	–	–	–	–	–	–	✓	✓
51	Hemidactylus persicus	Persian House Gecko	Least Concern	2022	–	–	–	–	–	–	–	✓	–
52	Hemidactylus triedrus	Dakota's Leaf-toed Gecko	Least Concern	2019	–	–	–	–	–	–	–	✓	–
53	Hoplobatrachus tigerinus	Tiger Frog	Least Concern	2021	–	–	–	–	–	–	–	✓	✓
54	Hydrophis caerulescens	Blue Green Sea Snake	Least Concern	2009	–	–	–	–	–	–	–	–	✓
55	Hydrophis curtus	Spine–Bellied Sea Snake	Least Concern	2018	–	–	–	–	–	–	–	–	✓
56	Hydrophis cyanocinctus	Annulated Sea Snake	Least Concern	2009	–	–	–	–	–	–	–	–	✓
57	Hydrophis schistosus	Hook-Nosed Sea Snake	Least Concern	2009	–	–	–	–	–	–	–	–	✓
58	Hydrophis spiralis	Yellow Sea Snake	Least Concern	2009	–	–	–	–	–	–	–	–	✓
59	Indotyphlops braminus	Brahminy Blind Snake	Least Concern	2018	–	–	–	–	–	–	–	✓	–
60	Laudakia caucasia	Caucasian Rock Agama	Least Concern	2016	–	–	–	–	–	–	–	✓	–
61	Laudakia melanura	Black Rock Agama	Least Concern	2016	–	–	–	–	–	–	–	✓	–
62	Laudakia nupta fusca	Large–Scaled Rock Gecko	Least Concern	2016	–	✓	✓	–	–	✓	✓	✓	–
63	Leptotyphlops blanfordii	Sind Thread Snake	Data Deficient	2016	–	–	–	–	–	–	–	✓	–

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
64	Lycodon aulicus	Common Wolf Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	–
65	Lycodon striatus	Golden Wolf Snake	Least Concern	2016	–	–	–	–	–	–	–	✓	–
66	Lytorhynchus maynardi	Maynard's Awl– Headed Snake	Least Concern	2016	✓	–	–	–	–	–	–	✓	–
67	Lytorhynchus paradoxus	Sindh Awl-Headed Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	–
68	Lytorhynchus ridgewayi	Derafshi Snake	Least Concern	2016	–	–	–	–	–	–	–	✓	–
69	Macrovipera lebetinus	Levantine Viper	Least Concern	2019	–	–	–	–	–	–	–	✓	–
70	Mesalina watsonana	Long–Tailed Desert Lacerta	Least Concern	2016	✓	✓	✓	–	–	✓	✓	✓	–
71	Microcephalophis cantoris	Spotted Small Headed Sea Snake	Data Deficient	2009	–	–	–	–	–	–	–	–	✓
72	Myriopholis macrorhyncha	Hook-Snouted Worm Snake	Least Concern	2014	–	–	–	–	–	–	–	✓	–
73	Naja naja	Indian Cobra/ Spectated Cobra	Least Concern	2019	–	–	–	–	–	–	–	✓	✓
74	Naja oxiana	Caspian Cobra	Near Threatened	2016	–	–	–	–	–	–	–	✓	–
75	Oligodon taeniolatus	Streaked Kukri Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	✓
76	Ophiomorus blanfordi	Blanford's Snake Skink	Least Concern	2016	–	–	–	–	–	–	–	✓	–
77	Ophiomorus tridactylus	Indian Three–Toed Sand Swimmer	Least Concern	2016	✓	–	✓	✓	–	✓	✓	✓	✓
78	Ophisops jerdonii	Punjab-Snake-Eyed Lacerta	Least Concern	2019	–	–	–	–	✓	–	–	✓	✓
79	Paralaudakia caucasia	Caucasian Rock Agama	Least Concern	2016	–	–	–	–	–	–	–	✓	–
80	Phrynocephalus clarkorum	Clark's Toad– Headed Agama	Least Concern	2016	✓	–	–	✓	–	✓	✓	✓	–

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
81	Phrynocephalus euptilopus	Alcock's Toad – Headed Agama	Least Concern	2016	–	–	✓	–	–	✓	✓	✓	–
82	Phrynocephalus luteoguttatus	Yellow–Speckled Toad–Headed Agama	Least Concern	2016	✓	–	–	✓	–	✓	✓	✓	–
83	Phrynocephalus maculatus	Spotted Toad– Headed Agama	Least Concern	2022	✓	✓	✓	✓	–	✓	✓	✓	–
84	Phrynocephalus ornatus	Striped Toad– Headed Agama	Least Concern	2016	✓	–	✓	✓	–	✓	✓	✓	–
85	Phrynocephalus scutellatus	Gray Toad– Headed Agama	Least Concern	2016	✓	–	–	–	–	✓	✓	✓	–
86	Platyceps karelini	Spotted Desert Racer	Least Concern	2019	–	–	✓	–	–	–	✓	–	–
87	Platyceps rhodorachis	Cliff Racer	Least Concern	2019	✓	–	–	–	–	–	✓	✓	–
88	Platyceps ventromaculatus	Glossy-Bellied Racer/ Plain's Racer	Least Concern	2016	–	–	–	–	–	–	–	✓	✓
89	Psammophis condanarus	Indian Sand Snake/ Oriental Sand Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	✓
90	Psammophis leithii	Leith's Sand Snake	Least Concern	2016	–	–	–	–	–	–	–	✓	–
91	Psammophis lineolatus	Steppe Ribbon Racer	Least Concern	2016	–	–	–	–	–	–	–	✓	–
92	Psammophis schokari	Afro–Asian Sand Snake	Least Concern	2016	✓	✓	✓	✓	✓	✓	✓	✓	✓
93	Pseudocerastes persicus	Persian Horned Viper	Least Concern	2012	–	–	–	–	–	–	✓	✓	–
94	Ptyas mucosus	Dhaman / Rope Snake	Least Concern	2016	–	–	–	–	–	–	–	✓	–
95	Ramphotyphlops braminus	Brahminy Blind Snake	Least Concern	2018	–	–	–	–	–	–	–	✓	–
96	Rhinogekko femoralis	Sharp Tailed Spider Gecko	Least Concern	2019	–	–	–	–	–	✓	✓	✓	–
97	Saara asmussi	Saara Asmussi	Least Concern	2016	✓	–	–	–	–	–	✓	✓	–

No.	Scientific Name	Common Name	IUCN Status	IUCN Accessed Year	Survey-Based						Literature-Based		
					EIA 2010	EIA 2020	Post-Monsoon 2022 Survey	Spring 2023 Survey	Post-Monsoon 2023 Survey	Summer 2024 Survey	Proposed Reko Diq Mine Site and Associated Infrastructure	Rail Route and Road Transport	Port Qasim
98	Saara hardwickii	Indian Spiny-Tailed Lizard	Vulnerable	2019	–	–	–	–	–	–	–	✓	✓
99	Spalerosophis arenarius	Royal Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	✓
100	Spalerosophis atriceps	Royal Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	–
101	Spalerosophis diadema	Diadem Snake	Least Concern	2016	✓	–	–	–	–	–	✓	✓	✓
102	Sphaerotheca breviceps	Indian Burrowing Frog	Least Concern	2021	–	–	–	–	–	–	–	–	✓
103	Teratoscincus keyserlingii	Common Wonder Gecko	Least Concern	2018	✓	–	–	–	–	✓	✓	✓	–
104	Teratoscincus microlepis	Small–Scaled Skink Gecko	Least Concern	2016	✓	–	–	–	–	✓	✓	✓	–
105	Testudo horsfieldi	Afghan Tortoise	Vulnerable	1996	–	–	–	–	–	–	–	✓	–
106	Trapelus agilis pakistanensis	Brilliant Ground Agama	Least Concern	2017	✓	✓	✓	–	–	✓	✓	✓	✓
107	Trapelus megalonyx	Afghan Ground Agama	Least Concern	2016	✓	–	–	–	–	–	–	✓	–
108	Trapelus ruderatus	Horny-Scaled Agama	Least Concern	2012	–	–	–	–	–	✓	✓	–	–
109	Tropiocolotes depressus	Mountain Dwarf Gecko	Least Concern	2019	–	–	–	–	–	–	–	✓	–
110	Tropiocolotes helenae	Banded Dwarf Gecko	Data Deficient	2008	–	–	–	–	–	–	–	✓	–
111	Tropiocolotes persicus	Persian Dwarf Gecko	Least Concern	2019	–	–	–	–	–	–	–	✓	–
112	Typhlops porrectus	Stoliczka's Slender Blind Snake	Least Concern	2019	–	–	–	–	–	–	–	✓	–
113	Varanus bengalensis	Indian Monitor Lizard	Near Threatened	2018	–	–	–	–	–	–	–	✓	–
114	Varanus griseus caspius	Desert Monitor Lizard	Least Concern	2016	✓	–	–	–	–	✓	✓	✓	–
Total					**30**	**6**	**14**	**11**	**4**	**28**	**35**	**90**	**38**

D.2 Marine and Coastal Ecological Resources

D.2.1 Marine Benthic Invertebrates (MBI)

List of MBI Species Reported in Literature, Post-Monsoon 2022 and Post-Monsoon 2023 is provided below for Port Qasim.

No	*Phylum*	*Family*	*Species*	*Literature Based*	*Post-Monsoon 2023 Survey*
1.	Mollusca	Neritidae	*Nerita sp*	✓	-
2.		Naticidae	*Nautica didyma*	✓	-
3.		Littorinidae	*Nodilittorina picta*	✓	-
4.		Littorinidae	*Nodilittorina leucosticte*	✓	-
5.		Cypraeidae	*Natica lamarckii*	✓	-
6.		Potamididae	*Telescopium telescopium*	✓	-
7.		Costellariidae	*Ceratoxancus sp*	✓	-
8.		Muricidae	*Thais carinifera*	✓	-
9.		Laternulidae	*Laternula sp*	✓	-
10.		Plaucnidae	*Placuna placenta*	✓	-
11.		Haminoeidae	*Haloa japonica*	✓	-
12.		Ellobiidae	*Melampus nuxeastaneus*	✓	-
13.		Onchidiidae	*Onchidella sp*	✓	-
14.		Potamididae	*Cerithidea cingulatus*	✓	-
15.		Trochidae	*Monodonta sp*	✓	-
16.		Muricidae	*Thais sp*	✓	-
17.		Patellidae	*Cellana sp*	✓	-
18.		Cypraedae	*Cyprea sp*	✓	-
19.		Nassariidae	*Nassarius sp*	✓	-

No	*Phylum*	*Family*	*Species*	*Literature Based*	*Post-Monsoon 2023 Survey*
20.		Veneridae	*Mercenaria sp*	✓	-
21.		Doridídae	*Doris sp*	✓	-
22.		Mytillidae	*Perna viridis*	✓	-
23.		Pinnidae	*Pinna bicolor*	✓	-
24.		Pinnidae	*Atrina pectinata*	✓	-
25.		Mytilidae	*Perna viridis*	✓	-
26.		Pectinidae	*Mimachlamys townsendi*	✓	-
27.		Ostreidae	*Dendostrea sp*	✓	-
28.		Turbinidae	*Turbo bruneus*	✓	-
29.		Turbinidae	*Astralium semicostatum*	✓	-
30.		Crypraeoidae	*Erosaria turdus*	✓	-
31.		Babyloniidae	*Babylonia spirata*	✓	-
32.		Turbinellidae	*Turbinella pyrum*	✓	-
33.		Muricidae	*Purpura bufo*	✓	-
34.		Muricidae	*Purpura sp*	✓	-
35.		Buccinidae	*Cantharus sp*	✓	-
36.	Arthropoda	Portunidae	*Charybdis sp*	✓	-
37.		Balanidae	*Chelonibia patula (Barnacles)*	✓	-
38.		Portunidae	*Portunus sanguinolentus*	✓	-
39.		Sphaeromatidae	*Sphaeroma terebrans*	✓	-
40.		Xanthidae	*Atergatis sp*	✓	-
41.		Aoridae	*Microdeutopus sp*	✓	-
42.		Macrophthalmidae	*Illyograpsus paludicola*	✓	-

No	*Phylum*	*Family*	*Species*	*Literature Based*	*Post-Monsoon 2023 Survey*
43.		Dotillidae	*Illyoplax sp*	✓	-
44.		Macrophthalmidae	*Macrophthalmus depressus*	✓	-
45.		Isopod		-	✓
46.	Annelida	Sabellariidae	*Sabellaria sp*	✓	-
47.		Neridae	*Perinereis sp*	✓	-
48.		Eunicidae	*Marphysa sp*	✓	-
49.		Polychaetes		-	✓
50.		Oligochatea		-	✓
51.	Cnidaria	Zoanthidae	*Palythoa sp.1*	✓	-
52.		Zoanthidae	*Palythoa sp.2*	✓	-
53.		Boloceroididae	*Boloceroides sp*	✓	-
54.		Anenthemonae	*Sea anemone*	✓	-
55.	Porifera	Callyspongiidae	*Callyspongia sp.1*	✓	-
56.		Callyspongiidae	*Callyspongia sp.2*	✓	-
57.		Clionaidae	*Cliona sp*	✓	-
58.	Echinodermata	Echinometridae	*Echinometra mathaei*	✓	-
59.		Diadematidae	*Diadema setosum*	✓	-
60.		Holothuriidae	*Holothuria sp*	✓	-
61.		Bivalve shells		-	✓
62.		Gastropods shells		-	✓
63.		Foraminifera		-	✓
64.	Nematode			-	✓

D.2.2 Epipelagic Fauna

List of Epipelagic Fauna Species Reported in Literature and Surveyed Based (Post-Monsoon 2023) is provided below for Port Qasim.

No.	*Scientific Name*	*Common Name*	*Literature Based*	*Post-Monsoon 2023 Survey*	*Local Name*	*Family*	*IUCN Status*
Shrimps							
1.	*Exopalaemon styliferus*	Roshna Prawn	✓	-	–	Alaemonidae	Not Evaluated
2.	*Metapenaeus affinis*	Jinga Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
3.	*Metapenaeus brevicornis*	Yellow Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
4.	*Metapenaeus monoceros*	Speckled Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
5.	*Metapenaeus stebbingi*	Peregrine Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
6.	*Parapenaeopsis hardwickii*	Spear Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
7.	*Parapenaeopsis sculptilis*	Rainbow Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
8.	*Parapenaeopsis stylifera*	Kiddi Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
9.	*Parapenaeus longipes*	Flamingo Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
10.	*Penaeus canaliculatus*	Witch Prawn	✓	-	Jaira, Madak,Patas	Penaeidae	Not Evaluated
11.	*Penaeus indicus*	Indian White Prawn	✓	-	Jaira, Madak	Penaeidae	Not Evaluated
12.	*Penaeus merguiensis*	Banana Prawn	✓	-	Jaira, Madak,Patas	Penaeidae	Not Evaluated
13.	*Penaeus monodon*	Giant Tiger Prawn	✓	-	Jaira, Madak	Penaeidae	Not Evaluated
14.	*Penaeus penicillatus*	Redtail Prawn	✓	-	Jaira, Madak,Patas	Penaeidae	Not Evaluated
15.	*Penaeus pulchricaudatus*	Western Kuruma Prawn	✓	-	Jaira, Madak,Patas	Penaeidae	Not Evaluated
16.	*Penaeus semisulcatus*	Green Tiger Prawn	✓	-	Jaira, Madak, Patapati	Penaeidae	Not Evaluated

No.	*Scientific Name*	*Common Name*	*Literature Based*	*Post-Monsoon 2023 Survey*	*Local Name*	*Family*	*IUCN Status*
17.	*Solenocera choprai*	Ridgeback Shrimp	✓	-	Sore kiddi	Solenoceridae	Not Evaluated
18.	*Solenocera crassicornis*	Coastal Mud Shrimp	✓	-	Sore kiddi	Solenoceridae	Not Evaluated
19.	*Solenocera hextii*	Deep–Sea Mud Shrimp	✓	-	Sore kiddi	Solenoceridae	Not Evaluated
20.	*Trachysalambria aspera*	Indian Rough Shrimp	✓	-	Kalri, Madak	Penaeidae	Not Evaluated
Lobsters							
1.	*Panulirus homarus*	Scalloped Spiny Lobster	✓	-	Kika	Palinuridae	Least Concern
2.	*Panulirus ornatus*	Ornate Spiny Lobster	✓	-	Kika	Palinuridae	Least Concern
3.	*Panulirus polyphagus*	Mud Spiny Lobster	✓	-	Kika	Palinuridae	Least Concern
4.	*Panulirus versicolor*	Painted Spiny Lobster	✓	-	Kika	Palinuridae	Least Concern
5.	*Puerulus sewelli*	Arabian Whip Lobster	✓	-	Kika	Palinuridae	Least Concern
6.	*Scyllarides tridacnophaga*	Clam killer Slipper Lobster	✓	-	Riami Kika	Scyllaridae	Least Concern
7.	*Thenus indicus*	Indian Flathead Lobster	✓	-	Kika	Scyllaridae	Data Deficient
Crabs							
1	*Ashtoret lunaris*	Yellow Moon Crab	✓	-	Kukri	Matutidae	Not Evaluated
2	*Uca sp.*	Crabs	-	✓	-	-	-
3	*Thais tuberosa*	Hermit Crab	-	✓	-	Muricidae	Not Evaluated
4	-	Pea Crab	-	✓	-	-	-
5	*Grapsids sp*	Rocky Shore Crab	-	-	-	-	-
6	*Ocypoda sp*	Ghost Crab	-	-	-	-	-

No.	*Scientific Name*	*Common Name*	*Literature Based*	*Post-Monsoon 2023 Survey*	*Local Name*	*Family*	*IUCN Status*
7	*Charybdis callianassa*	Kukri Crab	✓	-	Kukri	Portunidae	Not Evaluated
8	*Charybdis feriatus*	Crucifix Crab	✓	-	Kukri	Portunidae	Not Evaluated
9	*Matuta planipes*	Flower Moon Crab	✓	-	Kukri	–	Not Evaluated
10	*Portunus sanguinolentus*	Three–spot Swimming Crab	✓	-	Kukri, Tikari	Portunidae	Not Evaluated
11	*Portunus segnis*	Arabian Flower Crab	✓	-	Kukri, Gogotanga	Portunidae	Not Evaluated
12	*Scylla olivacea*	Orange Mud Crab	✓	-	Kukri, Khunkhna	Portunidae	Not Evaluated
13	*Scylla tranquebarica*	Purple Mud crab	✓	-	Kukri,	Portunidae	Not Evaluated
Cuttlefishes							
1.	*Amphioctopus aegina*	Sandbird Octopus	✓	-	Mus	Octopodidae	Least Concern
2.	*Ancistrocheirus lesueurii*	Sharp–ear Nope Squid	✓	-	Mus	Ancistrocheiridae	Least Concern
3.	*Callistoctopus macropus*	White–spotted Octopus	✓	-	Mus	Octopodidae	Least Concern
4.	*Loliolus hardwickei*	Little Indian Squid	✓	-	Mus, Mayyah	Loliginidae	Data Deficient
5.	*Octopus cyanea*	Big Blue Octopus	✓	-	Mus	Octopodidae	Least Concern
6.	*Octopus vulgaris*	Common Octopus	✓	-	Mus	Octopodidae	Least Concern
7.	*Sepia arabica*	Arabian Cuttle Fish	✓	-	Mus	Sepiidae	Data Deficient
8.	*Sepia kobiensis*	Kobi Cuttle Fish	✓	-	Mus	Sepiidae	Data Deficient
9.	*Sepia omani*	Oman Cuttle Fish	✓	-	Mus	Sepiidae	Least Concern
10.	*Sepia pharaonis*	Pharaoh Cuttle Fish	✓	-	Mus	Sepiidae	Data Deficient
11.	*Sepia prashadi*	Hooded Cuttle Fish	✓	-	Mus	Sepiidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Literature Based*	*Post-Monsoon 2023 Survey*	*Local Name*	*Family*	*IUCN Status*
12.	*Sepia ramani*	Large Striped Cuttle Fish	✓	-	Mus	Sepiidae	Data Deficient
13.	*Sepia stellifera*	Starry Cuttle Fish	✓	-	Mus	Sepiidae	Data Deficient
14.	*Sepia trygonina*	Trident Cuttle Fish	✓	-	Mus	Sepiidae	Least Concern
15.	*Sepiella inermis*	Spineless Cuttle Fish	✓	-	Mus	Sepiidae	Data Deficient
16.	*Sepioteuthis lessoniana*	Big–fin Reef Squid	✓	-	Mus, Mayyah	Loliginidae	Data Deficient
17.	*Uroteuthis edulis*	Sword–tip Squid	✓	-	Mus, Mayyah	Loliginidae	Data Deficient
18.	*Uroteuthis duvaucelii*	Indian Squid	✓	-	Mus, Mayyah	Loliginidae	Not Evaluated
19.	*Uroteuthis singhalensis*	Long Barrel Squid	✓	-	Mus, Mayyah	Loliginidae	Data Deficient
Gastropods							
1	*Telescopium sp*	-	-	✓	-	Potamididae	Not Assessed
2	*Cerithium sp*	-	-	✓	-	Cerithiidae	Not Assessed
3	*Littorina sp*	Periwrinkles	-	✓	-	Littorinidae	Not Assessed
4	*Mitra sp.*	Miters	-	-	-	Mitridae	Not Assessed
5	*Turritella sp.*	-	-	-	-	Turritellidae	Not Assessed
6	*Diodora sp.*	-	-	-	-	Fissurellidae	Not Assessed
7	*Patella sp.*	-	-	-	-	Patellidae	Not Assessed
8	*Turridrupa sp*	-	-	-	-	Turridae	Not Assessed
9	*Trachycardium sp*	Cockles	-	-	-	Cardiidae	Not Assessed
10	*Solen sp.*	-	-	-	-	Solenidae	Not Assessed
11	*Donax sp.*	-	-	-	-	Donacidae	Not Assessed
12	*Nerita sp.*	-	-	-	-	Neritidae	Not Assessed

No.	*Scientific Name*	*Common Name*	*Literature Based*	*Post-Monsoon 2023 Survey*	*Local Name*	*Family*	*IUCN Status*
Arthropoda							
1	*Amphibalanus amphitrite*	Barancles	-	✓	-	Balanidae	Not Evaluated
Skippers							
1	*Periophthalmus sp*	Mud Skipper	-	✓	-	Oxudercidae	Not Assessed
Mollusca							
1	-	Oyster Spats	-	✓	-	Ostreidae	Not Assessed
2	*Turbo sp*	-	-	-	-	Turbinidae	Not Assessed
3	*Cantharus sp.*	Whelks	-	-	-	Pisaniidae	Not Assessed
4	*Cypraea sp*	Cowries	-	-	-	Cypraeidae	Not Assessed
5	Trochus sp.	-	-	-	-	Trochida	Not Assessed
6	*Dentalium sp.*	-	-	-	-	Dentaliidae	Not Assessed
7	Natica sp	-	-	-	-	Naticidae	Not Assessed
8	*Argopecten sp*	-	-	-	-	Pectinidae	Not Assessed
9	*Doris sp*	Sea Slug	-	-	-	Doridídae	Not Assessed
10	*Tellinella sp.*	Clams	-	-	-	Tellinidae	Not Assessed

D.2.3 Pelagic Fish Fauna

List of Pelagic Fauna Species Reported in Literature is provided below for Port Qasim.

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
1.	*Abalistes stellatus*	Starry Trigger Fish	Balistidae	Least Concern
2.	*Ablennes hians*	Flat Needle Fish	Belonidae	Least Concern
3.	*Abudefduf bengalensis*	Bengal Sergeant	Pomacentridae	Least Concern
4.	*Abudefduf sordidus*	Blackspot Sergeant	Pomacentridae	Least Concern
5.	*Abudefduf vaigiensis*	Indo–Pacific Sergeant	Pomacentridae	Least Concern
6.	*Acanthocepola indica*	Indian Band Fish	Cepolidae	Least Concern
7.	*Acanthocybium solandri*	Wahoo	Scombridae	Least Concern
8.	*Acanthopagrus arabicus*	Arabian Yellowfin Seabream	Sparidae	Least Concern
9.	*Acanthopagrus berda*	Gold Silk Seabream	Sparidae	Least Concern
10.	*Acanthopagrus catenula*	Bridled Seabream	Sparidae	Data Deficient
11.	*Acanthopagrus sheim*	Spotted Yellow Fin Seabream	Sparidae	Least Concern
12.	*Acanthurus mata*	Elongate Surgeon Fish	Acanthuridae	Least Concern
13.	*Acanthurus monroviae*	Monrovia Doctor Fish	Acanthuridae	Least Concern
14.	*Acanthurus nigricauda*	Epaulette Surgeon Fish	Acanthuridae	Least Concern
15.	*Acanthurus xanthopterus*	Yellowfin Surgeon Fish	Acanthuridae	Least Concern
16.	*Acropoma japonicum*	Glow Belly	Acropomatidae	Not Evaluated
17.	*Aesopia cornuta*	Unicorn Sole	Soleidae	Least Concern
18.	*Albula argentea*	Longjaw Bone Fish	Albulidae	Data Deficient
19.	*Alectis ciliaris*	African Pompano	Carangidae	Least Concern
20.	*Alectis indica*	Indian Thread Fish	Carangidae	Least Concern
21.	*Alepes djedaba*	Shrimp Scad	Carangidae	Least Concern
22.	*Alepes kleini*	Razor Belly Scad	Carangidae	Least Concern

No.	Scientific Name	Common Name	Family	IUCN Status
23.	*Alepes melanoptera*	Blackfin Scad	Carangidae	Least Concern
24.	*Alepes vari*	Herring Scad	Carangidae	Least Concern
25.	*Aluterus monoceros*	Unicorn Leatherjacket Filefish	Monacanthidae	Least Concern
26.	*Aluterus scriptus*	Scribbled Leatherjacket Filefish	Monacanthidae	Least Concern
27.	*Anodontostoma chacunda*	Short Nose Gizzard Shad	Clupeidae	Least Concern
28.	*Aphareus furca*	Small Toothed Job Fish	Lutjanidae	Least Concern
29.	*Aphareus rutilans*	Rusty Job Fish	Lutjanidae	Least Concern
30.	*Apistus carinatus*	Ocellated Wasp Fish	Apistidae	Least Concern
31.	*Aprion virescens*	Green Job Fish	Lutjanidae	Least Concern
32.	*Argyrops spinifer*	King Soldier Bream	Sparidae	Least Concern
33.	*Argyrosomus amoyensis*	Amoy Croaker	Sciaenidae	Endangered
34.	*Argyrosomus heinii*	Arabian Sea Meagre	Sciaenidae	Data Deficient
35.	*Argyrosomus japonicus*	Japanese Meagre	Sciaenidae	Endangered
36.	*Ariomma indicum*	Indian Drift Fish	Ariommatidae	Least Concern
37.	*Ariosoma gnanadossi*	Band Tooth Conger	Congridae	Data Deficient
38.	*Arius arius*	Threadfin Sea Catfish	Ariidae	Least Concern
39.	*Arius maculatus*	Spotted Catfish	Ariidae	Data Defecient
40.	*Arius subrostratus*	Shovelnose Sea Catfish	Ariidae	Not Evaluated
41.	*Arothron stellatus*	Stellate Puffer	Tetraodontidae	Least Concern
42.	*Aseraggodes umbratilis*	Secretive Sole	Bothidae	Least Concern
43.	*Atrobucca alcocki*	Large Head Croaker	Sciaenidae	Least Concern
44.	*Atropus atropos*	Cleft Belly Trevally	Carangidae	Least Concern
45.	*Atule mate*	Yellowtail Scad	Carangidae	Least Concern
46.	*Aulopareia ocellata*	Fat Tail Eyed Goby	Gobiidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
47.	*Aurigequula fasciata*	Striped Pony Fish	Leiognathidae	Least Concern
48.	*Aurigequula longispina*	Long Spine Pony Fish	Leiognathidae	Least Concern
49.	*Auxis rochei*	Bullet Tuna	Scombridae	Least Concern
50.	*Auxis thazard*	Frigate Tuna	Scombridae	Least Concern
51.	*Batrachocephalus mino*	Beardless Sea Catfish	Ariidae	Not Evaluated
52.	*Boleophthalmus dussumieri*	Dussumier's Mudskipper	Gobiidae	Least Concern
53.	*Bothus myriaster*	Indo–Pacific Oval Flounder	Bothidae	Least Concern
54.	*Bothus pantherinus*	Leopard Flounder	–	Least Concern
55.	*Brachirus orientalis*	Oriental Sole	Bothidae	Least Concern
56.	*Brachypterois serrulifer*	Saw Cheek Scorpionfish	Scorpaenidae	Least Concern
57.	*Brama dussumieri*	Lesser Bream	Bramidae	Least Concern
58.	*Caesio lunaris*	Lunar Fusilier	Caesionidae	Least Concern
59.	*Caesio varilineata*	Variable–Lined Fusilier	Caesionidae	Least Concern
60.	*Callionymus margaretae*	Margaret's Dragonet	Callionymidae	Not Evaluated
61.	*Cantherhines dumerilii*	White Spotted File Fish	Monacanthidae	Least Concern
62.	*Canthidermis macrolepis*	Largescale Trigger fish	Balistidae	Least Concern
63.	*Canthidermis maculata*	Ocean Trigger Fish	Balistidae	Least Concern
64.	*Carangoides armatus*	Longfin Trevally	Carangidae	Least Concern
65.	*Carangoides bajad*	Orange Spotted Trevally	Carangidae	Least Concern
66.	*Carangoides chrysophrys*	Longnose Trevally	Carangidae	Least Concern
67.	*Carangoides coeruleopinnatus*	Coastal Trevally	Carangidae	Least Concern
68.	*Carangoides ferdau*	Blue Trevally	Carangidae	Least Concern
69.	*Carangoides fulvoguttatus*	Yellow Spotted Trevally	Carangidae	Least Concern
70.	*Carangoides gymnostethus*	Bludger	Carangidae	Least Concern

No.	Scientific Name	Common Name	Family	IUCN Status
71.	*Carangoides hedlandensis*	Bump Nose Trevally	Carangidae	Least Concern
72.	*Carangoides malabaricus*	Malabar Trevally	Carangidae	Least Concern
73.	*Carangoides plagiotaenia*	Barcheek Trevally	Carangidae	Least Concern
74.	*Carangoides praeustus*	Brownback Trevally	Carangidae	Least Concern
75.	*Carangoides talamparoides*	Imposter Trevally	Carangidae	Least Concern
76.	*Caranx heberi*	Blacktip Trevally	Carangidae	Least Concern
77.	*Caranx ignobilis*	Giant Trevally	Carangidae	Least Concern
78.	*Caranx lugubris*	Black Jack	Carangidae	Least Concern
79.	*Caranx melampygus*	Bluefin Trevally	Carangidae	Least Concern
80.	*Caranx sexfasciatus*	Bigeye Trevally	Carangidae	Least Concern
81.	*Caranx tille*	Tille Trevally	Carangidae	Least Concern
82.	*Cephalopholis hemistiktos*	Yellowfin Hind	Serranidae	Least Concern
83.	*Cephalopholis sonnerati*	Tomato Hind	Serranidae	Least Concern
84.	*Cephalopsetta ventrocellata*	–	Paralichthyidae	Data Deficient
85.	*Chaetodon collare*	Collare Butterfly Fish	Chaetodontidae	Least Concern
86.	*Chaetodon pictus*	Horseshoe Butterfly Fish	Chaetodontidae	Least Concern
87.	*Champsodon omanensis*	–	Champsodontidae	Not Evaluated
88.	*Chanos chanos*	Milkfish	Chanidae	Least Concern
89.	*Cheilopogon furcatus*	Spotfin Flying Fish	Exocoetidae	Least Concern
90.	*Cheilopogon rapanouiensis*	Easter Island Flying Fish	Exocoetidae	Least Concern
91.	*Cheilopogon suttoni*	Sutton's Flying Fish	Exocoetidae	Not Evaluated
92.	*Cheimerius nufar*	Santer Seabream	Sparidae	Data Deficient
93.	*Chelidoperca occipitalis*	–	Serranidae	Least Concern
94.	*Chelon macrolepis*	Largescale Mullet	Mugilidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
95.	*Chelon melinopterus*	Otomebora Mullet	Mugilidae	Least Concern
96.	*Chelon parsia*	Gold–Spot Mullet	Mugilidae	Not Evaluated
97.	*Chelon tade*	Tade Mullet	Mugilidae	Least Concern
98.	*Chelonodontops patoca*	Milk Spotted Puffer	Tetraodontidae	Least Concern
99.	*Chirocentrus dorab*	Dorab Wolf Herring	Hirocentridae	Least Concern
100.	*Chirocentrus nudus*	Whitefin Wolf–Herring	Hirocentridae	Least Concern
101.	*Choridactylus multibarbus*	Orange Banded Stingfish	Synanceiidae	Least Concern
102.	*Chrysiptera unimaculata*	One Spot Demoiselle	Pomacentridae	Least Concern
103.	*Cociella punctata*	Spotted Flathead	Platycephalidae	Least Concern
104.	*Coilia dussumieri*	Gold Spotted Grenadier Anchovy	Engraulidae	Least Concern
105.	*Coilia neglecta*	Neglected Grenadier Anchovy	Engraulidae	Least Concern
106.	*Colletteichthys dussumieri*	Flat Toadfish	Batrachoididae	Least Concern
107.	*Colletteichthys occidentalis*	Arabian Toadfish	Batrachoididae	Least Concern
108.	*Conger cinereus*	Longfin African Conger	Congridae	Least Concern
109.	*Cookeolus japonicus*	Long-Finned Bullseye	Priacanthidae	Least Concern
110.	*Coryphaena equiselis*	Pompano Dolphinfish	Coryphaenidae	Least Concern
111.	*Coryphaena hippurus*	Common Dolphinfish	Coryphaenidae	Least Concern
112.	*Crenidens indicus*	–	Sparidae	Least Concern
113.	*Crossorhombus azureus*	Blue Flounder	–	Least Concern
114.	*Cubiceps whiteleggii*	Shadow Drift Fish	Nomeidae	Not Evaluated
115.	*Cyclichthys orbicularis*	Birdbeak Burr Fish	Diodontidae	Least Concern
116.	*Cyclichthys spilostylus*	Spotbase Burr Fish	Diodontidae	Not Evaluated
117.	*Cynoglossus arel*	Largescale Tongue Sole	Cynoglossidae	Data Deficient
118.	*Cynoglossus carpenteri*	Hooked Tongue Sole	Cynoglossidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
119.	*Cynoglossus cynoglossus*	Bengal Tongue Sole	Cynoglossidae	Least Concern
120.	*Cynoglossus dispar*	Roundhead Tongue Sole	Cynoglossidae	Data Deficient
121.	*Cynoglossus dubius*	Carrot Tongue Sole	Cynoglossidae	Data Deficient
122.	*Cynoglossus lachneri*	Lachner's Tongue Sole	Cynoglossidae	Least Concern
123.	*Cynoglossus puncticeps*	Speckled Tongue Sole	Cynoglossidae	Least Concern
124.	*Cynoglossus quadrilineatus*	Four-Lined Tongue Sole	Cynoglossidae	Least Concern
125.	*Dactyloptena gilberti*	Flat-Eared Helmet Gurnard	Dactylopteridae	Least Concern
126.	*Dactyloptena orientalis*	Oriental Flying Gurnard	Dactylopteridae	Least Concern
127.	*Dagetichthys commersonnii*	Commerson's Sole	Bothidae	Least Concern
128.	*Daysciaena albida*	Bengal Corvina	Sciaenidae	Least Concern
129.	*Decapterus macarellus*	Mackerel Scad	Carangidae	Least Concern
130.	*Decapterus macrosoma*	Shortfin Scad	Carangidae	Least Concern
131.	*Decapterus muroadsi*	Amber Stripe Scad	Carangidae	Least Concern
132.	*Decapterus russelli*	Indian Scad	Carangidae	Least Concern
133.	*Decapterus smithvanizi*	Slender Red Scad	Carangidae	Least Concern
134.	*Dendrophysa russelii*	Goatee Croaker	Sciaenidae	Least Concern
135.	*Diagramma pictum*	Painted Sweetlips	Haemulid	Not Evaluated
136.	*Dinoperca petersi*	Lampfish	Dinopercidae	Not Evaluated
137.	*Diodon holocanthus*	Long Spined Porcupinefish	Diodontidae	Least Concern
138.	*Diodon hystrix*	Spot–Fin Porcupinefish	Diodontidae	Least Concern
139.	*Diplodus capensis*	White Seabream	Sparidae	Least Concern
140.	*Diplodus omanensis*	Oman Seabream	Sparidae	Least Concern
141.	*Drepane longimana*	Concertina Fish	Drepanidae	Not Evaluated
142.	*Drepane punctata*	Spotted Sickle Fish	Drepanidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
143.	*Dussumieria acuta*	Hasselt's Sprat	Dussumieriidae	Least Concern
144.	*Dussumieria elopsoides*	Slender Rainbow Sardine	Dussumieriidae	Least Concern
145.	*Ebosia falcata*	Falcate Lionfish	Scorpaenidae	Least Concern
146.	*Echeneis naucrates*	Live Shark Sucker	Echeneidae	Least Concern
147.	*Echidna nebulosa*	Snowflake Eel	Muraenidae	Least Concern
148.	*Elagatis bipinnulata*	Rainbow Runner	Carangidae	Least Concern
149.	*Eleutheronema tetradactylum*	Four Finger Threadfin	Polynemidae	Not Evaluated
150.	*Ellochelon vaigiensis*	Squaretail Mullet	Mugilidae	Least Concern
151.	*Elops machnata*	Tenpounder	Elopidae	Least Concern
152.	*Engyprosopon grandisquama*	Largescale Flounder	–	Least Concern
153.	*Epinephelus areolatus*	Areolate Grouper	Serranidae	Least Concern
154.	*Epinephelus bleekeri*	Dusky Tail Grouper	Serranidae	Data Deficient
155.	*Epinephelus coioides*	Orange–Spotted Grouper	Serranidae	Least Concern
156.	*Epinephelus diacanthus*	Spiny Cheek Grouper	Serranidae	Least Concern
157.	*Epinephelus epistictus*	Dotted Grouper	Serranidae	Least Concern
158.	*Epinephelus erythrurus*	Cloudy Grouper	Serranidae	Least Concern
159.	*Epinephelus fuscoguttatus*	Brown–Marbled Grouper	Serranidae	Vulnerable
160.	*Epinephelus lanceolatus*	Giant Grouper	Serranidae	Data Deficient
161.	*Epinephelus latifasciatus*	Striped Grouper	Serranidae	Least Concern
162.	*Epinephelus malabaricus*	Malabar Grouper	Serranidae	Least Concern
163.	*Epinephelus morrhua*	Comet Grouper	Serranidae	Least Concern
164.	*Epinephelus multinotatus*	White–Blotched Grouper	Serranidae	Least Concern
165.	*Epinephelus polylepis*	Small Scaled Grouper	Serranidae	Least Concern
166.	*Epinephelus radiatus*	Oblique–Banded Grouper	Serranidae	Least Concern

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167.	*Epinephelus stoliczkae*	Epaulet Grouper	Serranidae	Least Concern
168.	*Epinephelus tukula*	Potato Grouper	Serranidae	Least Concern
169.	*Epinephelus undulosus*	Wavy–Lined Grouper	Serranidae	Least Concern
170.	*Equulites leuciscus*	Whipfin Pony Fish	Leiognathidae	Least Concern
171.	*Equulites oblongus*	Oblong Pony Fish	Leiognathidae	Least Concern
172.	*Erythrocles schlegelii*	Japanese Ruby Fish	Emmelichthydae	Least Concern
173.	*Escualosa thoracata*	White Sardine	Clupeidae	Least Concern
174.	*Etelis carbunculus*	Deep–Water Red Snapper	Lutjanidae	Least Concern
175.	*Etelis coruscans*	Deepwater Longtail Red Snapper	Lutjanidae	Least Concern
176.	*Eupleurogrammus glossodon*	Long-Tooth Hairtail	Trichiuridae	Not Evaluated
177.	*Eupleurogrammus muticus*	Small-Head Hairtail	Trichiuridae	Not Evaluated
178.	*Euthynnus affinis*	Kawakawa	Scombridae	Least Concern
179.	*Exocoetus monocirrhus*	Barbel Flying Fish	Exocoetidae	Not Evaluated
180.	*Exocoetus volitans*	Tropical Two–Wing Flying Fish	Exocoetidae	Least Concern
181.	*Fistularia commersonii*	Blue Spotted Cornet Fish	Fistulariidae	Least Concern
182.	*Fistularia petimba*	Red Cornet Fish	Fistulariidae	Least Concern
183.	*Gavialiceps taeniola*	Gavial Eel	Congridae	Least Concern
184.	*Gazza minuta*	Tooth Pony Fish	Leiognathidae	Least Concern
185.	*Gazza rhombea*	Rhomboid Tooth Pony	Leiognathidae	Least Concern
186.	*Gerres filamentosus*	Whip Fin Silver–Biddy	Gerreidae	Least Concern
187.	*Gerres infasciatus*	Non-Banded Whip Fin Mojarra	Gerreidae	Data Deficient
188.	*Gerres limbatus*	Saddleback Silver–Biddy	Gerreidae	Least Concern
189.	*Gerres macracanthus*	Long Spined Silver-Biddy	Gerreidae	Least Concern
190.	*Gerres oyena*	Common Silver–Biddy	Gerreidae	Least Concern

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191.	*Gerres phaiya*	Strong Spine Silver–Biddy	Gerreidae	Not Evaluated
192.	*Gnathanodon speciosus*	Golden Trevally	Carangidae	Least Concern
193.	*Grammoplites scaber*	Rough Flathead	Platycephalidae	Not Evaluated
194.	*Grammoplites suppositus*	Spot Fin Flathead	Platycephalidae	Least Concern
195.	*Gymnothorax phasmatodes*	Ghost Moray Eel	Muraenidae	Least Concern
196.	*Halichoeres nigrescens*	Bubble Fin Wrasse	Labridae	Least Concern
197.	*Halieutaea indica*	Indian Sea Bat	Ogcocephalidae	Least Concern
198.	*Harpadon nehereus*	Bombay Duck Lizardfish	Synodontidae	Near Threatened
199.	*Hemiarius sona*	Sona Sea Catfish	Ariidae	Not Evaluated
200.	*Hemiarius sumatranus*	Goat Catfish	Ariidae	Not Evaluated
201.	*Hemiramphus archipelagicus*	Jumping Halfbeak	Hemiramphidae	Not Evaluated
202.	*Hemiramphus far*	Black–Barred Halfbeak	Hemiramphidae	Not Evaluated
203.	*Heniochus acuminatus*	Longfin Bannerfish	Chaetodontidae	Least Concern
204.	*Herklotsichthys quadrimaculatus*	Blue Stripe Herring	Clupeidae	Least Concern
205.	*Hexanematichthys sagor*	Sagor Catfish	Ariidae	Not Evaluated
206.	*Hilsa kelee*	Kelee Shad	Clupeidae	Least Concern
207.	*Hirundichthys coromandelensis*	Coromandel Flying Fish	Exocoetidae	Not Evaluated
208.	*Hirundichthys indicus*	Indian Flying Fish	Exocoetidae	Not Evaluated
209.	*Hirundichthys speculiger*	Mirrorwing Flying Fish	Exocoetidae	Least Concern
210.	*Histiopterus typus*	Sailfin Armour Head	Pentacerotidae	Not Evaluated
211.	*Hyporhamphus limbatus*	Congaturi Halfbeak	Hemiramphidae	Least Concern
212.	*Hyporhamphus sindensis*	Sindh Halfbeak	Hemiramphidae	Not Evaluated
213.	*Hyporthodus octofasciatus*	Eight-Bar Grouper	Serranidae	Least Concern
214.	*Ilisha megaloptera*	Bigeye Ilisha	Pristigasteridae	Least Concern

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215.	*Ilisha melastoma*	Indian Ilisha	Pristigasteridae	Least Concern
216.	*Ilisha sirishai*	Lobe-Jaw Ilisha	Pristigasteridae	Data Deficient
217.	*Ilisha striatula*	Banded Ilisha	Pristigasteridae	Data Deficient
218.	*Istiompax indica*	Black Marlin	Istiophoridae	Data Deficient
219.	*Istiophorus platypterus*	Indo–Pacific Sailfish	Istiophoridae	Vulnerable
220.	*Johnius amblycephalus*	Bearded Croaker	Sciaenidae	Least Concern
221.	*Johnius belangerii*	Belanger's Croaker	Sciaenidae	Least Concern
222.	*Johnius borneensis*	Sharpnose Hammer Croaker	Sciaenidae	Least Concern
223.	*Johnius carouna*	Caroun Croaker	Sciaenidae	Least Concern
224.	*Johnius carutta*	Karut Croaker	Sciaenidae	Least Concern
225.	*Johnius dussumieri*	Sin Croaker	Sciaenidae	Least Concern
226.	*Johnius elongatus*	Spindle Croaker	Sciaenidae	Data Deficient
227.	*Johnius macrorhynus*	Bigsnout Croaker	Sciaenidae	Least Concern
228.	*Kajikia audax*	Striped Marlin	Istiophoridae	Least Concern
229.	*Karalla daura*	Golden Stripe Pony Fish	Leiognathidae	Least Concern
230.	*Kathala axillaris*	Kathala Croaker	Sciaenidae	Least Concern
231.	*Katsuwonus pelamis*	Skipjack Tuna	Scombridae	Least Concern
232.	*Kumococius rodericensis*	Spiny Flathead	Platycephalidae	Least Concern
233.	*Kyphosus bigibbus*	Brown Chub	Kyphosidae	Least Concern
234.	*Kyphosus cinerascens*	Blue Sea Chub	Kyphosidae	Least Concern
235.	*Kyphosus vaigiensis*	Brassy Chub	Kyphosidae	Least Concern
236.	*Lactarius lactarius*	False Trevally	Lactariidae	Not Evaluated
237.	*Lactoria cornuta*	Longhorn Cowfish	Ostraciidae	Least Concern
238.	*Laeops nigrescens*	Dark Finned Flounder	–	Data Deficient

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239.	*Lagocephalus guentheri*	Diamondback Puffer	Tetraodontidae	Least Concern
240.	*Lagocephalus inermis*	Smooth Blaasop	Tetraodontidae	Least Concern
241.	*Lagocephalus lagocephalus*	Oceanic Puffer	Tetraodontidae	Least Concern
242.	*Lagocephalus lunaris*	Lunar-Tail Puffer	Tetraodontidae	Least Concern
243.	*Lagocephalus spadiceus*	Half–Smooth Golden Pufferfish	Tetraodontidae	Least Concern
244.	*Lates calcarifer*	Barramundi	Latidae	Least Concern
245.	*Leiognathus equula*	Common Pony Fish	Leiognathidae	Least Concern
246.	*Lepidotrigla bispinosa*	Bullhorn Gurnard	Triglidae	Least Concern
247.	*Lepidotrigla faurei*	Scaly-Breast Gurnard	Triglidae	Least Concern
248.	*Lepidotrigla omanensis*	Oman Gurnard	Triglidae	Least Concern
249.	*Lepidotrigla spiloptera*	Spot-Wing Gurnard	Triglidae	Least Concern
250.	*Leptomelanosoma indicum*	Indian Threadfin	Polynemidae	Not Evaluated
251.	*Lepturacanthus savala*	Savalai Hairtail	Trichiuridae	Not Evaluated
252.	*Lethrinus borbonicus*	Snub Nose Emperor	Lethrinidae	Least Concern
253.	*Lethrinus harak*	Thumbprint Emperor	Lethrinidae	Least Concern
254.	*Lethrinus lentjan*	Pink Ear Emperor	Lethrinidae	Least Concern
255.	*Lethrinus microdon*	Small Tooth Emperor	Lethrinidae	Least Concern
256.	*Lethrinus nebulosus*	Spangled Emperor	Lethrinidae	Least Concern
257.	*Lethrinus obsoletus*	Orange–Striped Emperorn	Lethrinidae	Least Concern
258.	*Lethrinus olivaceus*	Long Face Emperor	Lethrinidae	Least Concern
259.	*Lethrinus ornatus*	Ornate Emperor	Lethrinidae	Least Concern
260.	*Lipocheilus carnolabrum*	Tang's Snapper	Lutjanidae	Least Concern
261.	*Liza subviridis*	Greenback Mullet	Mugilidae	Least Concern
262.	*Lobotes surinamensis*	Tripletail	Lobotidae	Least Concern

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263.	*Lophiomus setigerus*	Blackmouth Goosefish	Lophiidae	Least Concern
264.	*Lutjanus argentimaculatus*	Mangrove Red Snapper	Lutjanidae	Least Concern
265.	*Lutjanus bengalensis*	Bengal Snapper	Lutjanidae	Least Concern
266.	*Lutjanus bohar*	Two–Spot Red Snapper	Lutjanidae	Least Concern
267.	*Lutjanus coeruleolineatus*	Blueline Snapper	Lutjanidae	Least Concern
268.	*Lutjanus ehrenbergii*	Blackspot Snapper	Lutjanidae	Least Concern
269.	*Lutjanus erythropterus*	Crimson Snapper	Lutjanidae	Least Concern
270.	*Lutjanus fulviflamma*	Dory Snapper	Lutjanidae	Least Concern
271.	*Lutjanus fulvus*	Blacktail Snapper	Lutjanidae	Least Concern
272.	*Lutjanus gibbus*	Humpback Red Snapper	Lutjanidae	Least Concern
273.	*Lutjanus indicus*	Indian Snapper	Lutjanidae	Least Concern
274.	*Lutjanus johnii*	John’s Snapper	Lutjanidae	Least Concern
275.	*Lutjanus kasmira*	Common Blue Stripe Snapper	Lutjanidae	Least Concern
276.	*Lutjanus lemniscatus*	Yellow Streaked Snapper	Lutjanidae	Least Concern
277.	*Lutjanus lunulatus*	Lunar Tail Snapper	Lutjanidae	Least Concern
278.	*Lutjanus lutjanus*	Bigeye Snapper	Lutjanidae	Least Concern
279.	*Lutjanus malabaricus*	Malabar Blood Snapper	Lutjanidae	Least Concern
280.	*Lutjanus quinquelineatus*	Five–Lined Snapper	Lutjanidae	Least Concern
281.	*Lutjanus rivulatus*	Blubber Lip Snapper	–	Least Concern
282.	*Lutjanus sanguineus*	Humphead Snapper	Lutjanidae	Least Concern
283.	*Lutjanus sebae*	Emperor Red Snapper	Lutjanidae	Least Concern
284.	*Lutjanus vitta*	Humphead Snapper	Lutjanidae	Least Concern
285.	*Macolor niger*	Black And White Snapper	Lutjanidae	Least Concern
286.	*Makaira nigricans*	Blue Marlin	Istiophoridae	Vulnerable

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287.	*Megalaspis cordyla*	Torpedo Scad	Carangidae	Least Concern
288.	*Megalops cyprinoides*	Indo–Pacific Tarpon	Megalopidae	Data Deficient
289.	*Mene maculata*	Moonfish	Menidae	Not Evaluated
290.	*Minous dempsterae*	Oblique Banded Stingfish	Synanceiidae	Least Concern
291.	*Minous inermis*	Alcock's Scorpionfish	Synanceiidae	Least Concern
292.	*Minous monodactylus*	Grey Stingfish	Synanceiidae	Least Concern
293.	*Mola mola*	Ocean Sunfish	Molidae	Vulnerable
294.	*Monodactylus argenteus*	Silver Moony	Monodactylidae	Least Concern
295.	*Monodactylus falciformis*	Full Moony	Monodactylidae	Least Concern
296.	*Monotaxis grandoculis*	Hump Nose Big–Eye Bream	Lethrinidae	Least Concern
297.	*Moolgarda cunnesius*	Longarm Mullet	Mugilidae	Not Evaluated
298.	*Moolgarda perusii*	Longarm Mullet	Mugilidae	Least Concern
299.	*Moolgarda seheli*	Blue Spot Mullet	Mugilidae	Least Concern
300.	*Mugil cephalus*	Flathead Grey Mullet	Mugilidae	Least Concern
301.	*Mulloidichthys flavolineatus*	Yellow Stripe Goatfish	Mullidae	Least Concern
302.	*Mulloidichthys vanicolensis*	Yellowfin Goatfish	Mullidae	Least Concern
303.	*Myripristis botche*	Blacktip Soldierfish	Holocentridae	Least Concern
304.	*Naso brachycentron*	Humpback Unicorn Fish	Acanthuridae	Least Concern
305.	*Naso hexacanthus*	Sleek Unicorn Fish	Acanthuridae	Least Concern
306.	*Naso reticulatus*	Reticulate Unicorn Fish	Acanthuridae	Data Deficient
307.	*Naucrates ductor*	Pilotfish	Carangidae	Least Concern
308.	*Nemapteryx nenga*	Spot Fin Sea Catfish	Ariidae	Not Evaluated
309.	*Nematalosa arabica*	Arabian Gizzard Shad	Clupeidae	Data Deficient
310.	*Nematalosa nasus*	Bloch's Gizzard Shad	Clupeidae	Least Concern

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311.	*Nemipterus bipunctatus*	Delagoa Threadfin Bream	Nemipteridae	Least Concern
312.	*Nemipterus japonicus*	Japanese Threadfin Bream	Nemipteridae	Least Concern
313.	*Nemipterus peronii*	Notched Fin Threadfin Bream	Nemipteridae	Least Concern
314.	*Nemipterus randalli*	Randall's Threadfin Bream	Nemipteridae	Least Concern
315.	*Nemipterus zysron*	Slender Threadfin Bream	Nemipteridae	Least Concern
316.	*Neoepinnula orientalis*	Sack Fish	Gempylidae	Not Evaluated
317.	*Neopomacentrus sindensis*	Arabian Demoiselle	Pomacentridae	Not Evaluated
318.	*Netuma bilineata*	Bronze Catfish	Ariidae	Not Evaluated
319.	*Netuma thalassina*	Giant Catfish	Ariidae	Not Evaluated
320.	*Nibea maculata*	Kathala Croaker	Sciaenidae	Least Concern
321.	*Nibea soldado*	Soldier Croaker	Sciaenidae	Least Concern
322.	*Nuchequula blochii*	Two Blotch Pony Fish	Leiognathidae	Not Evaluated
323.	*Nuchequula gerreoides*	Decorated Pony Fish	Leiognathidae	Not Evaluated
324.	*Odonus niger*	Red–Toothed Trigger Fish	Balistidae	Least Concern
325.	*Onigocia pedimacula*	Broadband Flathead	Platycephalidae	Least Concern
326.	*Opisthopterus tardoore*	Longfin Shad	Pristigasteridae	Least Concern
327.	*Osteogeneiosus militaris*	Soldier Catfish	Ariidae	Least Concern
328.	*Osteomugil speigleri*	Speigler's Mullet	Mugilidae	Not Evaluated
329.	*Ostichthys acanthorhinus*	Spine Snout Soldierfish	Holocentridae	Not Evaluated
330.	*Ostracion rhinorhynchos*	Horn–Nosed Boxfish	Ostraciidae	Not Evaluated
331.	*Otolithes cuvieri*	Lesser Tiger Tooth Croaker	Sciaenidae	Least Concern
332.	*Otolithes ruber*	Tiger Tooth Crocker	Sciaenidae	Least Concern
333.	*Otolithoides biauritus*	Bronze Croaker	Sciaenidae	Data Deficient
334.	*Otolithoides pama*	Pama Croaker	Sciaenidae	Data Deficient

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335.	*Pagellus affinis*	Arabian Pandora	Sparidae	Least Concern
336.	*Pampus argenteus*	Silver Pomfret	Stromateidae	Not Evaluated
337.	*Pampus chinensis*	Chinese Silver Pomfret	Stromateidae	Not Evaluated
338.	*Paracaesio xanthura*	Yellowtail Blue Snapper	Lutjanidae	Least Concern
339.	*Parachaeturichthys polynema*	Tail-Eyed Goby	Gobiidae	Least Concern
340.	*Paranibea semiluctuosa*	Half–Mourning Croaker	Sciaenidae	Least Concern
341.	*Parapercis alboguttata*	White Spot Sand Smelt	Pinguipedidae	Not Evaluated
342.	*Parapercis robinsoni*	Small Scale Grub Fish		Not Evaluated
343.	*Paraplagusia bilineata*	Doublelined Tonguesole	Cynoglossidae	Least Concern
344.	*Parapterois macrura*	Large Head Fire Fish	Scorpaenidae	Least Concern
345.	*Parascolopsis aspinosa*	Smooth Dwarf Monocle Bream	Nemipteridae	Least Concern
346.	*Parascolopsis boesemani*	Redfin Dwarf Monocle Bream	Nemipteridae	Least Concern
347.	*Parascolopsis eriomma*	Rosy Dwarf Monocle Bream	Nemipteridae	Least Concern
348.	*Parascolopsis townsendi*	Scaly Dwarf Monocle Bream	Nemipteridae	Least Concern
349.	*Parastromateus niger*	Black Pomfret	Carangidae	Least Concern
350.	*Parupeneus cyclostomus*	Gold–Saddle Goatfish	Mullidae	Least Concern
351.	*Parupeneus heptacanthus*	Cinnabar Goatfish	Mullidae	Least Concern
352.	*Parupeneus indicus*	Indian Goatfish	Mullidae	Least Concern
353.	*Parupeneus macronemus*	Long–Barbel Goatfish	Mullidae	Least Concern
354.	*Parupeneus margaritatus*	Pearly Goatfish	Mullidae	Least Concern
355.	*Parupeneus rubescens*	Rosy Goatfish	Mullidae	Least Concern
356.	*Parupeneus trifasciatus*	Doublebar Goatfish	Mullidae	Least Concern
357.	*Pelates quadrilineatus*	Four Lined Terapon	Terapontidae	Not Evaluated
358.	*Pellona ditchela*	Indian Pellona	Pristigasteridae	Least Concern

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359.	*Pempheris malabarica*	Malabar Sweeper	Pempheridae	Not Evaluated
360.	*Pempheris russellii*	Russell's Sweeper	Pempheridae	Not Evaluated
361.	*Pennahia aneus*	Donkey Croaker	Sciaenidae	Least Concern
362.	*Pentaprion longimanus*	Longfin Silver Biddy	Gerreidae	Least Concern
363.	*Photopectoralis aureus*	Golden Pony Fish	Leiognathidae	Not Evaluated
364.	*Photopectoralis bindus*	Orangefin Pony Fish	Leiognathidae	Not Evaluated
365.	*Pinjalo pinjalo*	Pinjalo	Lutjanidae	Least Concern
366.	*Pisodonophis boro*	Rice–Paddy Eel	Ophichthidae	Least Concern
367.	*Pisodonophis cancrivorus*	Longfin Snake–Eel	Ophichthidae	Least Concern
368.	*Planiliza klunzingeri*	Klunzinger's Mullet	Mugilidae	Not Evaluated
369.	*Platax orbicularis*	Orbicular Batfish	Ephippidae	Least Concern
370.	*Platax teira*	Longfin Batfish	Ephippidae	Least Concern
371.	*Platybelone argalus*	Keeltail Needlefish	Belonidae	Least Concern
372.	*Platycephalus indicus*	Bar Tail Flathead	Platycephalidae	Data Deficient
373.	*Plectorhinchus flavomaculatus*	Lemonfish	Haemulid	Not Evaluated
374.	*Plectorhinchus gaterinus*	Blackspotted Rubber Lip	Haemulid	Least Concern
375.	*Plectorhinchus gibbosus*	Harry Hot Lips	Haemulid	Least Concern
376.	*Plectorhinchus pictus*	Trout Sweetlips	Haemulid	Least Concern
377.	*Plectorhinchus playfairi*	White-Barred Rubber Lip	Haemulid	Least Concern
378.	*Plectorhinchus schotaf*	Minstrel Sweetlips	Haemulid	Least Concern
379.	*Plectorhinchus sordidus*	Sordid Rubber Lip	Haemulid	Least Concern
380.	*Plectorhinchus vittatus*	Indian Ocean Oriental Sweetlips	Haemulid	Least Concern
381.	*Plicofollis dussumieri*	Blacktip Sea Catfish	Ariidae	Least Concern
382.	*Plicofollis layardi*	Thin Spine Sea Catfish	Ariidae	Not Evaluated

No.	Scientific Name	Common Name	Family	IUCN Status
383.	*Plicofollis platystomus*	Flat Mouth Catfish	Ariidae	Least Concern
384.	*Plotosus limbatus*	Dark Fin Eel Catfish	Plotosidae	Not Evaluated
385.	*Plotosus lineatus*	Striped Eel Catfish	Plotosidae	Not Evaluated
386.	*Polydactylus mullanin*	Arabian Blackspot Threadfin	Polynemidae	Not Evaluated
387.	*Polydactylus plebeius*	Striped Threadfin	Polynemidae	Not Evaluated
388.	*Polynemus paradiseus*	Aradise Threadfin	Polynemidae	Least Concern
389.	*Pomacanthus annularis*	Blue-Ringed Angelfish	Pomacanthidae	Least Concern
390.	*Pomacanthus maculosus*	Yellow Bar Angelfish	Pomacanthidae	Least Concern
391.	*Pomadasys aheneus*	Yellowback Grunt	Haemulid	Least Concern
392.	*Pomadasys argenteus*	Silver Grunt	Haemulid	Least Concern
393.	*Pomadasys argyreus*	Blue Cheek Silver Grunt	Haemulid	Least Concern
394.	*Pomadasys commersonnii*	Small Spotted Grunter	Haemulid	Least Concern
395.	*Pomadasys furcatus*	Banded Grunter	Haemulid	Least Concern
396.	*Pomadasys kaakan*	Javelin Grunter	Haemulid	Least Concern
397.	*Pomadasys maculatus*	Saddle Grunt	Haemulid	Least Concern
398.	*Pomadasys multimaculatus*	Cock Grunter	Haemulid	Least Concern
399.	*Pomadasys olivaceus*	Olive Grunt	Haemulid	Least Concern
400.	*Pomadasys stridens*	Striped Piggy	Haemulid	Least Concern
401.	*Pomatomus saltatrix*	Bluefish	Pomatomidae	Vulnerable
402.	*Priacanthus hamrur*	Moon Tail Bull Eye	Priacanthidae	Least Concern
403.	*Priacanthus prolixus*	Elongate Bull Eye	Priacanthidae	Least Concern
404.	*Priacanthus sagittarius*	Arrow Bull Eye	Priacanthidae	Least Concern
405.	*Pristipomoides filamentosus*	Crimson Job Fish	Lutjanidae	Least Concern
406.	*Pristipomoides multidens*	Gold Band Job Fish	Lutjanidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
407.	*Pristipomoides sieboldii*	Lavender Job Fish	Lutjanidae	Least Concern
408.	*Pristipomoides zonatus*	Oblique–Banded Snapper	Lutjanidae	Least Concern
409.	*Protonibea diacanthus*	Spotted Croaker	Sciaenidae	Near Threatened
410.	*Psenopsis cyanea*	Indian Ruff	Centrolophidae	Not Evaluated
411.	*Psettodes erumei*	Indian Halibut	Psettodidae	Data Deficient
412.	*Pseudanthias conspicuus*	–	Serranidae	Least Concern
413.	*Pseudanthias townsendi*	Townsend's Anthias	Serranidae	Least Concern
414.	*Pseudobalistes fuscus*	Yellow–Spotted Triggerfish	Balistidae	Least Concern
415.	*Pseudochromis aldabraensis*	Orange Dotty Back	Pseudochromidae	Least Concern
416.	*Pseudorhombus arsius*	Large Tooth Flounder	Paralichthyidae	Least Concern
417.	*Pseudorhombus elevatus*	Deep Flounder	Paralichthyidae	Least Concern
418.	*Pseudorhombus javanicus*	Javan Flounder	Paralichthyidae	Least Concern
419.	*Pseudorhombus triocellatus*	Three Spotted Flounder	Paralichthyidae	Least Concern
420.	*Pseudosynanceia melanostigma*	Blackfin Stonefish	Synanceiidae	Least Concern
421.	*Pseudotriacanthus strigilifer*	Long Spined Tripod Fish	Triacanthidae	Not Evaluated
422.	*Pterois mombasae*	Frill Fin Turkey Fish	Scorpaenidae	Least Concern
423.	*Pterois russelii*	Plain Tail Turkey Fish	Scorpaenidae	Least Concern
424.	*Pterygotrigla arabica*	Blackspotted Gurnard	Triglidae	Least Concern
425.	*Rachycentron canadum*	Cobia	Rachycentridae	Least Concern
426.	*Ranzania laevis*	Slender Mola	Molidae	Least Concern
427.	*Rastrelliger kanagurta*	Indian Mackerel	Scombridae	Least Concern
428.	*Remora albescens*	White Suckerfish	Echeneidae	Least Concern
429.	*Remora australis*	Whale Sucker	Echeneidae	Least Concern
430.	*Remora remora*	Common Remora	Echeneidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
431.	*Rhabdosargus haffara*	Haffara Seabream	Sparidae	Least Concern
432.	*Rhabdosargus sarba*	Gold Lined Seabream	Sparidae	Least Concern
433.	*Roa jayakari*	Jayakar's Butterflyfish	Chaetodontidae	Least Concern
434.	*Rogadius serratus*	Serrated Flathead	Platycephalidae	Least Concern
435.	*Sakura boulengeri*	Boulenger's Anthias	Serranidae	Least Concern
436.	*Samaris cristatus*	Cockatoo Righteye Flounder	Samaridae	Least Concern
437.	*Sarda orientalis*	Striped Bonito	Scombridae	Least Concern
438.	*Sardinella albella*	White Sardinella	Clupeidae	Least Concern
439.	*Sardinella gibbosa*	Gold Stripe Sardinella	Clupeidae	Least Concern
440.	*Sardinella longiceps*	Indian Oil Sardine	Clupeidae	Least Concern
441.	*Sardinella melanura*	Blacktip Sardinella	Clupeidae	Least Concern
442.	*Sardinella sindensis*	Sindh Sardine	Clupeidae	Least Concern
443.	*Sargocentron rubrum*	Redcoat	Holocentridae	Least Concern
444.	*Saurida longimanus*	Longfin Lizardfish	Synodontidae	Least Concern
445.	*Saurida tumbil*	Greater Lizardfish	Synodontidae	Least Concern
446.	*Scarus arabicus*	Arabian Parrotfish	Scaridae	Least Concern
447.	*Scarus ghobban*	Blue–Barred Parrotfish	Scaridae	Least Concern
448.	*Scarus zufar*	Dhofar Parrotfish	Scaridae	Data Deficient
449.	*Scatophagus argus*	Spotted Scat	Scatophagidae	Least Concern
450.	*Scolopsis bimaculata*	Thumbprint Monocle Bream	Nemipteridae	Least Concern
451.	*Scolopsis ghanam*	Arabian Monocle Bream	Nemipteridae	Least Concern
452.	*Scolopsis taeniata*	Black–Streaked Monocle Bream	Nemipteridae	Least Concern
453.	*Scolopsis vosmeri*	White Cheek Monocle Bream	Nemipteridae	Least Concern
454.	*Scomber australasicus*	Blue Mackerel	Scombridae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
455.	*Scomberoides commersonnianus*	Talang Queenfish	Carangidae	Least Concern
456.	*Scomberoides lysan*	Double Spotted Queenfish	Carangidae	Least Concern
457.	*Scomberoides tala*	Barred Queenfish	Carangidae	Least Concern
458.	*Scomberoides tol*	Needle Scaled Queenfish	Carangidae	Least Concern
459.	*Scomberomorus commerson*	Narrow–Barred Spanish Mackerel	Scombridae	Near Threatened
460.	*Scomberomorus guttatus*	Indo–Pacific King Mackerel	Scombridae	Data Deficient
461.	*Scomberomorus koreanus*	Korean Seer Fish	Scombridae	Least Concern
462.	*Scomberomorus lineolatus*	Streaked Seer Fish	Scombridae	Least Concern
463.	*Scorpaenodes investigatoris*	Investigator Scorpionfish	Scorpaenidae	Least Concern
464.	*Scorpaenodes muciparus*	Cave–Headed Scorpionfish	Scorpaenidae	Least Concern
465.	*Scorpaenopsis lactomaculata*	White Blotched Scorpionfish	Scorpaenidae	Least Concern
466.	*Scorpaenopsis ramaraoi*	Rama Rao's Scorpionfish	Scorpaenidae	Least Concern
467.	*Secutor insidiator*	Pug Nose Pony Fish	Leiognathidae	Not Evaluated
468.	*Secutor interruptus*	Pig–Nosed Pony–Fish	Leiognathidae	Least Concern
469.	*Selar crumenophthalmus*	Bigeye Scad	Carangidae	Least Concern
470.	*Selaroides leptolepis*	Yellow Stripe Scad	Carangidae	Least Concern
471.	*Seriola dumerili*	Greater Amberjack	Carangidae	Least Concern
472.	*Seriola rivoliana*	Longfin Yellowtail	Carangidae	Least Concern
473.	*Seriolina nigrofasciata*	Black Banded Trevally	Carangidae	Least Concern
474.	*Siganus canaliculatus*	White–Spotted Spinefoot	Siganidae	Least Concern
475.	*Siganus javus*	Java Rabbit Fish	Siganidae	Least Concern
476.	*Siganus luridus*	Dusky Spinefoot	Siganidae	Least Concern
477.	*Sillaginopodys chondropus*	Clubfoot Sillago	Sillaginidae	Not Evaluated
478.	*Sillaginopsis domina*	Flathead Sillago	Sillaginidae	Not Evaluated

No.	Scientific Name	Common Name	Family	IUCN Status
479.	*Sillago arabica*	Arabian Sillago	Sillaginidae	Least Concern
480.	*Sillago sihama*	Silver Sillago	Sillaginidae	Least Concern
481.	*Snyderina guentheri*	Günther's Wasp Fish	Tetrarogidae	Least Concern
482.	*Solea elongata*	Elongate Sole	Bothidae	Least Concern
483.	*Sorsogona melanoptera*	Obscure Flathead	Platycephalidae	Least Concern
484.	*Sorsogona prionota*	Half Spined Flathead	Platycephalidae	Least Concern
485.	*Sparidentex hasta*	Sobaity Seabream	Sparidae	Least Concern
486.	*Sparidentex jamalensis*	Fanged Seabream	Sparidae	Data Deficient
487.	*Sphyraena acutipinnis*	Sharp Fin Barracuda	Sphyraenidae	Not Evaluated
488.	*Sphyraena barracuda*	Great Barracuda	Sphyraenidae	Least Concern
489.	*Sphyraena forsteri*	Bigeye Barracuda	Sphyraenidae	Not Evaluated
490.	*Sphyraena jello*	Pick Handle Barracuda	Sphyraenidae	Not Evaluated
491.	*Sphyraena obtusata*	Obtuse Barracuda	Sphyraenidae	Not Evaluated
492.	*Sphyraena pinguis*	Red Barracuda	Sphyraenidae	Not Evaluated
493.	*Sphyraena putnamae*	Sawtooth Barracuda	Sphyraenidae	Not Evaluated
494.	*Sphyraena qenie*	Blackfin Barracuda	Sphyraenidae	Not Evaluated
495.	*Spratelloides delicatulus*	Delicate Round Herring	Clupeidae	Least Concern
496.	*Spratelloides gracilis*	Blue Sprat	Clupeidae	Least Concern
497.	*Stephanolepis diaspros*	Reticulated Leatherjacket	Monacanthidae	Least Concern
498.	*Stolephorus commersonnii*	Commerson's Anchovy	Engraulidae	Least Concern
499.	*Stolephorus indicus*	Indian Anchovy	Engraulidae	Least Concern
500.	*Strongylura leiura*	Yellowfin Needlefish	Belonidae	Not Evaluated
501.	*Strongylura strongylura*	Spot Tail Needlefish	Belonidae	Not Evaluated
502.	*Strophidon sathete*	Slender Giant Moray	Muraenidae	Least Concern

No.	Scientific Name	Common Name	Family	IUCN Status
503.	*Sufflamen fraenatum*	Masked Triggerfish	Balistidae	Least Concern
504.	*Synagrops adeni*	Aden Split Fin	Acropomatidae	Not Evaluated
505.	*Synodus indicus*	Indian Lizardfish	Synodontidae	Least Concern
506.	*Synodus macrops*	Triple Cross Lizardfish	Synodontidae	Least Concern
507.	*Taenioides nigrimarginatus*	Blackfin Eel Goby	Gobiidae	Not Evaluated
508.	*Takifugu oblongus*	Lattice Blaasop	Tetraodontidae	Least Concern
509.	*Taractichthys steindachneri*	Sickle Pomfret	Bramidae	Not Evaluated
510.	*Tentoriceps cristatus*	Crested Hairtail	Trichiuridae	Not Evaluated
511.	*Tenualosa ilisha*	Hilsa	Clupeidae	Least Concern
512.	*Tenualosa toli*	Toli Shad	Clupeidae	Vulnerable
513.	*Terapon jarbua*	Jarbua Terapon	Terapontidae	Least Concern
514.	*Terapon puta*	Small–Scaled Terapon	Terapontidae	Not Evaluated
515.	*Terapon theraps*	Largescaled Terapon	Terapontidae	Least Concern
516.	*Tetrapturus angustirostris*	Short Bill Spear Fish	Istiophoridae	Data Deficient
517.	*Tetrosomus gibbosus*	Humpback Box Fish	Ostraciidae	Least Concern
518.	*Thryssa dayi*	Day's Thryssa	Engraulidae	Data Deficient
519.	*Thryssa dussumieri*	Dussumier's Thryssa	Engraulidae	Least Concern
520.	*Thryssa hamiltonii*	Hamilton's Thryssa	Engraulidae	Least Concern
521.	*Thryssa malabarica*	Malabar Thryssa	Engraulidae	Data Deficient
522.	*Thryssa mystax*	Moustached Thryssa	Engraulidae	Least Concern
523.	*Thryssa setirostris*	Longjaw Thryssa	Engraulidae	Least Concern
524.	*Thryssa vitrirostris*	Orange Mouth Anchovy	Engraulidae	Least Concern
525.	*Thunnus albacares*	Yellowfin Tuna	Scombridae	Least Concern
526.	*Thunnus obesus*	Bigeye Tuna	Scombridae	Vulnerable

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
527.	*Thunnus tonggol*	Longtail Tuna	Scombridae	Data Deficient
528.	*Trachinocephalus myops*	Snakefish	Synodontidae	Least Concern
529.	*Trachinotus africanus*	African Pompano	Carangidae	Least Concern
530.	*Trachinotus baillonii*	Small Spotted Dart	Carangidae	Least Concern
531.	*Trachinotus blochii*	Snub Nose Pompano	Carangidae	Least Concern
532.	*Trachinotus botla*	Large Spotted Dart	Carangidae	Least Concern
533.	*Trachinotus mookalee*	Indian Pompano	Carangidae	Least Concern
534.	*Trachurus indicus*	Arabian Scad	Carangidae	Vulnerable
535.	*Triacanthus biaculeatus*	Short–Nosed Tripod Fish	Triacanthidae	Not Evaluated
536.	*Triacanthus nieuhofii*	Silver Tripod Fish	Triacanthidae	Not Evaluated
537.	*Trichiurus lepturus*	Large Head Hairtail	Trichiuridae	Least Concern
538.	*Tripterodon orbis*	African Spadefish	Ephippidae	Not Evaluated
539.	*Trypauchen vagina*	Pink Worm Goby	Gobiidae	Least Concern
540.	*Tylosurus acus*	Agujon Needlefish	Belonidae	Least Concern
541.	*Tylosurus crocodilus*	Hound Needlefish	Belonidae	Least Concern
542.	*Umbrina canariensis*	Canary Drum	Sciaenidae	Least Concern
543.	*Upeneus guttatus*	Two–Tone Goat Fish	Mullidae	Least Concern
544.	*Upeneus heemstra*	Heemstra Goat Fish	Mullidae	Least Concern
545.	*Upeneus moluccensis*	Gold Band Goat Fish	Mullidae	Least Concern
546.	*Upeneus sulphureus*	Sulphur Goat Fish	Mullidae	Least Concern
547.	*Upeneus supravittatus*	Long–Fin Goatfish	Mullidae	Least Concern
548.	*Upeneus vittatus*	Yellow Striped Goatfish	Mullidae	Least Concern
549.	*Uranoscopus dollfusi*	Dollfus' Stargazer	Uranoscopidae	Not Evaluated
550.	*Uraspis helvola*	White Tongue Jack	Carangidae	Least Concern

No.	*Scientific Name*	*Common Name*	*Family*	*IUCN Status*
551.	*Uraspis uraspis*	Whitemouth Jack	Carangidae	Least Concern
552.	*Xiphasia setifer*	Hairtail Blenny	Blennidae	Least Concern
553.	*Xiphias gladius*	Swordfish	Xiphiidae	Near Threatened
554.	*Zebrias synapturoides*	Indian Zebra Sole	Bothidae	Least Concern

Appendix E: IBAT Based Species

See the following pages.

E.1 Terrestrial Ecological Resources of Reko Diq Mine Site and Associated Infrastruture

E.1.1 Avifauna

List of Bird Species Reported by IBAT within 50 km buffer of the Reko Diq Mine Site, Northern Groundwater System and Access Route to Reko Diq Mine Site is provided below.

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
Charadriiformes	Charadriidae	Vanellus	*Vanellus gregarius*	Sociable Lapwing	CR	Decreasing	2019	8/7/2018	No	No	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Neophron	*Neophron percnopterus*	Egyptian Vulture	EN	Decreasing	2021	7/21/2021	No	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Aquila	*Aquila nipalensis*	Steppe Eagle	EN	Decreasing	2021	7/23/2021	No	No	Yes	Full Migrant	No
Falconiformes	Falconidae	Falco	*Falco cherrug*	Saker Falcon	EN	Decreasing	2021	7/5/2021	Yes	Yes	Yes	Full Migrant	No
Columbiformes	Columbidae	Columba	*Columba eversmanni*	Yellow-eyed Pigeon	VU	Decreasing	2022	5/31/2022	No	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Clanga	*Clanga clanga*	Greater Spotted Eagle	VU	Decreasing	2021	7/1/2021	No	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Aquila	*Aquila heliaca*	Eastern Imperial Eagle	VU	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Otidiformes	Otididae	Chlamydotis	*Chlamydotis macqueenii*	Asian Houbara	VU	Decreasing	2021	8/18/2021	No	No	Yes	Full Migrant	No
Anseriformes	Anatidae	Marmaronetta	*Marmaronetta angustirostris*	Marbled Teal	NT	Decreasing	2022	8/4/2022	Yes	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Aythya	*Aythya nyroca*	Ferruginous Duck	NT	Decreasing	2019	6/12/2019	Yes	Yes	Yes	Full Migrant	No
Otidiformes	Otididae	Tetrax	*Tetrax tetrax*	Little Bustard	NT	Decreasing	2018	8/7/2018	No	No	Yes	Full Migrant	No
Charadriiformes	Scolopacidae	Limosa	*Limosa limosa*	Black-tailed Godwit	NT	Decreasing	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Scolopacidae	Numenius	*Numenius arquata*	Eurasian Curlew	NT	Decreasing	2017	10/1/2017	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Haematopodidae	Haematopus	*Haematopus ostralegus*	Eurasian Oystercatcher	NT	Decreasing	2019	7/26/2019	Yes	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Aegypius	*Aegypius monachus*	Cinereous Vulture	NT	Decreasing	2021	6/23/2020	No	No	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Circus	*Circus macrourus*	Pallid Harrier	NT	Decreasing	2021	5/19/2021	No	Yes	Yes	Full Migrant	No
Pelecaniformes	Pelecanidae	Pelecanus	*Pelecanus crispus*	Dalmatian Pelican	NT	Decreasing	2018	10/1/2017	Yes	Yes	Yes	Full Migrant	No
Galliformes	Phasianidae	Ammoperdix	*Ammoperdix griseogularis*	See-see Partridge	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
Galliformes	Phasianidae	Francolinus	*Francolinus francolinus*	Black Francolin	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
Anseriformes	Anatidae	Anser	*Anser anser*	Greylag Goose	LC	Increasing	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Tadorna	*Tadorna ferruginea*	Ruddy Shelduck	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Mareca	*Mareca strepera*	Gadwall	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Spatula	*Spatula clypeata*	Northern Shoveler	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Anas	*Anas crecca*	Common Teal	LC	Unknown	2020	8/13/2020	No	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Netta	*Netta rufina*	Red-crested Pochard	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Anseriformes	Anatidae	Aythya	*Aythya fuligula*	Tufted Duck	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Piciformes	Picidae	Picus	*Picus squamatus*	Scaly-bellied Woodpecker	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
Bucerotiformes	Upupidae	Upupa	*Upupa epops*	Common Hoopoe	LC	Decreasing	2020	8/14/2020	No	No	Yes	Full Migrant	No
Coraciiformes	Coraciidae	Coracias	*Coracias garrulus*	European Roller	LC	Decreasing	2019	8/14/2019	No	No	Yes	Full Migrant	No
Coraciiformes	Meropidae	Merops	*Merops persicus*	Blue-cheeked Bee-eater	LC	Stable	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Cuculiformes	Cuculidae	Cuculus	*Cuculus canorus*	Common Cuckoo	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Caprimulgiformes	Apodidae	Tachymarptis	*Tachymarptis melba*	Alpine Swift	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Caprimulgiformes	Apodidae	Apus	*Apus apus*	Common Swift	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Strigiformes	Strigidae	Bubo	*Bubo bubo*	Eurasian Eagle-owl	LC	Decreasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
Strigiformes	Strigidae	Athene	*Athene noctua*	Little Owl	LC	Stable	2019	8/9/2018	No	No	Yes	Not a Migrant	No

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
Caprimulgiformes	Caprimulgidae	Caprimulgus	*Caprimulgus europaeus*	European Nightjar	LC	Decreasing	2016	10/1/2016	No	No	Yes	Full Migrant	No
Caprimulgiformes	Caprimulgidae	Caprimulgus	*Caprimulgus aegyptius*	Egyptian Nightjar	LC	Decreasing	2019	8/9/2018	No	No	Yes	Full Migrant	No
Caprimulgiformes	Caprimulgidae	Caprimulgus	*Caprimulgus mahrattensis*	Sykes's Nightjar	LC	Stable	2016	10/1/2016	Yes	No	Yes	Full Migrant	No
Columbiformes	Columbidae	Columba	*Columba livia*	Rock Dove	LC	Decreasing	2019	10/1/2016	No	No	Yes	Not a Migrant	No
Columbiformes	Columbidae	Spilopelia	*Spilopelia senegalensis*	Laughing Dove	LC	Stable	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
Gruiformes	Gruidae	Anthropoides	*Anthropoides virgo*	Demoiselle Crane	LC	Increasing	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
Gruiformes	Rallidae	Porphyrio	*Porphyrio porphyrio*	Purple Swamphen	LC	Unknown	2019	10/1/2016	Yes	Yes	Yes	Not a Migrant	No
Gruiformes	Rallidae	Fulica	*Fulica atra*	Common Coot	LC	Increasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
Pteroclifformes	Pteroclidae	Pterocles	*Pterocles senegallus*	Spotted Sandgrouse	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Pteroclifformes	Pteroclidae	Pterocles	*Pterocles orientalis*	Black-bellied Sandgrouse	LC	Decreasing	2018	8/7/2018	No	No	Yes	Full Migrant	No
Pteroclifformes	Pteroclidae	Pterocles	*Pterocles coronatus*	Crowned Sandgrouse	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
Charadriiformes	Scolopacidae	Tringa	*Tringa totanus*	Common Redshank	LC	Unknown	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Recurvirostridae	Recurvirostra	*Recurvirostra avosetta*	Pied Avocet	LC	Unknown	2021	9/4/2020	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Charadriidae	Charadrius	*Charadrius dubius*	Little Ringed Plover	LC	Stable	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Charadriidae	Charadrius	*Charadrius asiaticus*	Caspian Plover	LC	Decreasing	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Charadriidae	Vanellus	*Vanellus indicus*	Red-wattled Lapwing	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
Charadriiformes	Charadriidae	Vanellus	*Vanellus leucurus*	White-tailed Lapwing	LC	Unknown	2020	8/12/2020	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Glareolidae	Glareola	*Glareola pratincola*	Collared Pratincole	LC	Decreasing	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Laridae	Larus	*Larus fuscus*	Lesser Black-backed Gull	LC	Increasing	2019	8/8/2018	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Laridae	Larus	*Larus genei*	Slender-billed Gull	LC	Unknown	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Laridae	Hydroprogne	*Hydroprogne caspia*	Caspian Tern	LC	Increasing	2019	8/7/2018	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Laridae	Sternula	*Sternula albifrons*	Little Tern	LC	Decreasing	2019	8/7/2018	Yes	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Haliaeetus	*Haliaeetus albicilla*	White-tailed Sea-eagle	LC	Increasing	2021	8/20/2021	Yes	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Circus	*Circus aeruginosus*	Western Marsh-harrier	LC	Stable	2021	6/22/2021	No	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Circus	*Circus pygargus*	Montagu's Harrier	LC	Decreasing	2021	5/6/2021	No	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Accipiter	*Accipiter nisus*	Eurasian Sparrowhawk	LC	Stable	2021	4/9/2021	No	No	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Aquila	*Aquila chrysaetos*	Golden Eagle	LC	Stable	2021	5/27/2021	No	No	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Hieraaetus	*Hieraaetus pennatus*	Booted Eagle	LC	Stable	2021	8/12/2021	No	No	Yes	Full Migrant	No
Falconiformes	Falconidae	Falco	*Falco tinnunculus*	Common Kestrel	LC	Decreasing	2021	8/10/2021	No	No	Yes	Full Migrant	No
Falconiformes	Falconidae	Falco	*Falco subbuteo*	Eurasian Hobby	LC	Decreasing	2021	8/10/2021	No	Yes	Yes	Full Migrant	No
Podicipediformes	Podicipedidae	Tachybaptus	*Tachybaptus ruficollis*	Little Grebe	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Podicipediformes	Podicipedidae	Podiceps	*Podiceps cristatus*	Great Crested Grebe	LC	Unknown	2019	8/11/2019	Yes	Yes	Yes	Full Migrant	No
Podicipediformes	Podicipedidae	Podiceps	*Podiceps nigricollis*	Black-necked Grebe	LC	Unknown	2018	8/7/2018	Yes	Yes	Yes	Full Migrant	No
Pelecaniformes	Ardeidae	Ardea	*Ardea cinerea*	Grey Heron	LC	Unknown	2019	8/13/2019	Yes	Yes	Yes	Full Migrant	No
Pelecaniformes	Ardeidae	Ardea	*Ardea purpurea*	Purple Heron	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
Pelecaniformes	Ardeidae	Ardea	*Ardea alba*	Great White Egret	LC	Unknown	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Ciconiiformes	Ciconiidae	Ciconia	*Ciconia ciconia*	White Stork	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Laniidae	Lanius	*Lanius vittatus*	Bay-backed Shrike	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Corvidae	Corvus	*Corvus frugilegus*	Rook	LC	Decreasing	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Corvidae	Corvus	*Corvus ruficollis*	Brown-necked Raven	LC	Increasing	2017	10/1/2016	No	Yes	Yes	Not a Migrant	No

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
Passeriformes	Muscicapidae	Monticola	*Monticola solitarius*	Blue Rock-thrush	LC	Stable	2016	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Muscicapa	*Muscicapa striata*	Spotted Flycatcher	LC	Decreasing	2019	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Luscinia	*Luscinia svecica*	Bluethroat	LC	Stable	2019	11/1/2018	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Cercotrichas	*Cercotrichas galactotes*	Rufous-tailed Scrub-robin	LC	Stable	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Phoenicurus	*Phoenicurus erythronotus*	Eversmann's Redstart	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Phoenicurus	*Phoenicurus ochruros*	Black Redstart	LC	Increasing	2019	8/9/2018	Yes	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Phoenicurus	*Phoenicurus phoenicurus*	Common Redstart	LC	Increasing	2019	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Saxicola	*Saxicola torquatus*	Common Stonechat	LC	Stable	2020	8/12/2020	No	Yes	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Saxicola	*Saxicola caprata*	Pied Bushchat	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe albonigra*	Hume's Wheatear	LC	Stable	2019	8/9/2018	No	No	Yes	Not a Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe finschii*	Finsch's Wheatear	LC	Stable	2019	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe picata*	Variable Wheatear	LC	Stable	2019	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe deserti*	Desert Wheatear	LC	Stable	2016	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe isabellina*	Isabelline Wheatear	LC	Stable	2016	10/1/2016	Yes	No	Yes	Full Migrant	No
Passeriformes	Sturnidae	Sturnus	*Sturnus vulgaris*	Common Starling	LC	Decreasing	2019	10/31/2018	Yes	No	Yes	Full Migrant	No
Passeriformes	Sittidae	Sitta	*Sitta tephronota*	Eastern Rock Nuthatch	LC	Stable	2016	10/1/2016	No	Yes	Yes	Altitudinal Migrant	No
Passeriformes	Remizidae	Remiz	*Remiz coronatus*	White-crowned Penduline-tit	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Hirundinidae	Ptyonoprogne	*Ptyonoprogne rupestris*	Eurasian Crag Martin	LC	Stable	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Hirundinidae	Ptyonoprogne	*Ptyonoprogne obsoleta*	Pale Rock Martin	LC	Increasing	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Hirundinidae	Hirundo	*Hirundo rustica*	Barn Swallow	LC	Decreasing	2019	11/5/2018	No	Yes	Yes	Full Migrant	No
Passeriformes	Pycnonotidae	Pycnonotus	*Pycnonotus leucotis*	White-eared Bulbul	LC	Decreasing	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
Passeriformes	Hypocoliidae	Hypocolius	*Hypocolius ampelinus*	Hypocolius	LC	Unknown	2019	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Scotocercidae	Scotocerca	*Scotocerca inquieta*	Streaked Scrub-warbler	LC	Decreasing	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
Passeriformes	Cisticolidae	Prinia	*Prinia gracilis*	Graceful Prinia	LC	Stable	2019	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Locustellidae	Locustella	*Locustella fluviatilis*	River Warbler	LC	Decreasing	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Acrocephalidae	Acrocephalus	*Acrocephalus scirpaceus*	Common Reed-warbler	LC	Stable	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Acrocephalidae	Iduna	*Iduna rama*	Sykes's Warbler	LC	Stable	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Acrocephalidae	Hippolais	*Hippolais languida*	Upcher's Warbler	LC	Stable	2016	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Phylloscopidae	Phylloscopus	*Phylloscopus trochilus*	Willow Warbler	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Phylloscopidae	Phylloscopus	*Phylloscopus neglectus*	Plain Leaf-warbler	LC	Stable	2019	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Leiotrichidae	Argya	*Argya caudata*	Common Babbler	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
Passeriformes	Sylviidae	Sylvia	*Sylvia borin*	Garden Warbler	LC	Decreasing	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Sylviidae	Curruca	*Curruca communis*	Common Whitethroat	LC	Increasing	2019	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Sylviidae	Curruca	*Curruca mystacea*	Menetries's Warbler	LC	Stable	2016	10/1/2016	Yes	No	Yes	Full Migrant	No
Passeriformes	Alaudidae	Ammomanes	*Ammomanes cinctura*	Bar-tailed Lark	LC	Decreasing	2019	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Alaudidae	Ammomanes	*Ammomanes deserti*	Desert Lark	LC	Increasing	2018	8/7/2018	No	No	Yes	Not a Migrant	No
Passeriformes	Alaudidae	Alaemon	*Alaemon alaudipes*	Greater Hoopoe-lark	LC	Decreasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Alaudidae	Melanocorypha	*Melanocorypha bimaculata*	Bimaculated Lark	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Alaudidae	Galerida	*Galerida cristata*	Crested Lark	LC	Decreasing	2019	10/1/2016	Yes	No	Yes	Full Migrant	No

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
Passeriformes	Alaudidae	Alauda	*Alauda gulgula*	Oriental Skylark	LC	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Passeridae	Passer	*Passer hispaniolensis*	Spanish Sparrow	LC	Decreasing	2019	8/14/2019	No	No	Yes	Full Migrant	No
Passeriformes	Passeridae	Passer	*Passer moabiticus*	Dead Sea Sparrow	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Passeridae	Passer	*Passer montanus*	Eurasian Tree Sparrow	LC	Decreasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Passeridae	Gymnoris	*Gymnoris xanthocollis*	Chestnut-shouldered Bush-sparrow	LC	Stable	2019	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Passeridae	Carpospiza	*Carpospiza brachydactyla*	Pale Sparrow	LC	Stable	2018	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Motacillidae	Motacilla	*Motacilla alba*	White Wagtail	LC	Stable	2019	10/30/2018	No	Yes	Yes	Full Migrant	No
Passeriformes	Motacillidae	Motacilla	*Motacilla citreola*	Citrine Wagtail	LC	Increasing	2019	8/15/2019	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Motacillidae	Anthus	*Anthus campestris*	Tawny Pipit	LC	Stable	2018	8/7/2018	Yes	No	Yes	Full Migrant	No
Passeriformes	Motacillidae	Anthus	*Anthus trivialis*	Tree Pipit	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Motacillidae	Anthus	*Anthus spinoletta*	Water Pipit	LC	Stable	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Fringillidae	Linaria	*Linaria cannabina*	Common Linnet	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Fringillidae	Bucanetes	*Bucanetes githagineus*	Trumpeter Finch	LC	Stable	2019	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Fringillidae	Bucanetes	*Bucanetes mongolicus*	Mongolian Finch	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
Passeriformes	Emberizidae	Emberiza	*Emberiza stewarti*	White-capped Bunting	LC	Stable	2018	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Emberizidae	Emberiza	*Emberiza melanocephala*	Black-headed Bunting	LC	Unknown	2016	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Emberizidae	Emberiza	*Emberiza schoeniclus*	Reed Bunting	LC	Decreasing	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
Gruiformes	Rallidae	Rallus	*Rallus aquaticus*	Western Water Rail	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Charadriiformes	Charadriidae	Charadrius	*Charadrius alexandrinus*	Kentish Plover	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Circus	*Circus cyaneus*	Hen Harrier	LC	Decreasing	2021	5/21/2021	No	Yes	Yes	Full Migrant	No
Columbiformes	Columbidae	Streptopelia	*Streptopelia decaocto*	Eurasian Collared-dove	LC	Increasing	2019	8/14/2019	No	No	Yes	Not a Migrant	No
Charadriiformes	Recurvirostridae	Himantopus	*Himantopus himantopus*	Black-winged Stilt	LC	Increasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Phylloscopidae	Phylloscopus	*Phylloscopus sindianus*	Mountain Chiffchaff	LC	Stable	2019	8/7/2018	No	Yes	Yes	Full Migrant	No
Passeriformes	Phylloscopidae	Phylloscopus	*Phylloscopus nitidus*	Green Warbler	LC	Stable	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Circaetus	*Circaetus gallicus*	Short-toed Snake-eagle	LC	Stable	2021	6/18/2021	No	No	Yes	Full Migrant	No
Passeriformes	Acrocephalidae	Iduna	*Iduna pallida*	Olivaceous Warbler	LC	Stable	2019	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe chrysopygia*	Red-tailed Wheatear	LC	Stable	2019	8/15/2019	No	Yes	Yes	Full Migrant	No
Passeriformes	Sylviidae	Curruca	*Curruca curruca*	Lesser Whitethroat	LC	Stable	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
Pelecaniformes	Ardeidae	Ixobrychus	*Ixobrychus minutus*	Common Little Bittern	LC	Decreasing	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
Charadriiformes	Glareolidae	Cursorius	*Cursorius cursor*	Cream-coloured Courser	LC	Decreasing	2019	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Ficedula	*Ficedula parva*	Red-breasted Flycatcher	LC	Increasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Buteo	*Buteo rufinus*	Long-legged Buzzard	LC	Stable	2021	6/10/2021	No	No	Yes	Full Migrant	No
Charadriiformes	Burhinidae	Burhinus	*Burhinus oedicnemus*	Eurasian Thick-knee	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
Falconiformes	Falconidae	Falco	*Falco peregrinus*	Peregrine Falcon	LC	Increasing	2021	8/10/2021	Yes	Yes	Yes	Full Migrant	No
Charadriiformes	Laridae	Gelochelidon	*Gelochelidon nilotica*	Common Gull-billed Tern	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
Gruiformes	Rallidae	Gallinula	*Gallinula chloropus*	Common Moorhen	LC	Stable	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
Pelecaniformes	Ardeidae	Egretta	*Egretta garzetta*	Little Egret	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Alaudidae	Alauda	*Alauda arvensis*	Eurasian Skylark	LC	Decreasing	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Laniidae	Lanius	*Lanius isabellinus*	Isabelline Shrike	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Laniidae	Lanius	*Lanius phoenicuroides*	Red-tailed Shrike	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Laniidae	Lanius	*Lanius excubitor*	Great Grey Shrike	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
Passeriformes	Fringillidae	Carduelis	*Carduelis caniceps*	Eastern Goldfinch	LC	Stable	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Alaudidae	Calandrella	*Calandrella brachydactyla*	Greater Short-toed Lark	LC	Unknown	2018	8/9/2018	No	No	Yes	Full Migrant	No
Passeriformes	Muscicapidae	Oenanthe	*Oenanthe oenanthe*	Northern Wheatear	LC	Decreasing	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Passeridae	Passer	*Passer domesticus*	House Sparrow	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Not a Migrant	No
Passeriformes	Motacillidae	Anthus	*Anthus similis*	Long-billed Pipit	LC	Stable	2019	10/1/2016	No	No	Yes	Not a Migrant	No
Passeriformes	Motacillidae	Motacilla	*Motacilla flava*	Western Yellow Wagtail	LC	Decreasing	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
Passeriformes	Phylloscopidae	Phylloscopus	*Phylloscopus tristis*	Siberian Chiffchaff	LC	Unknown	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Phylloscopidae	Phylloscopus	*Phylloscopus trochiloides*	Greenish Warbler	LC	Increasing	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
Passeriformes	Sylviidae	Curruca	*Curruca nana*	Asian Desert Warbler	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Turdidae	Turdus	*Turdus merula*	Eurasian Blackbird	LC	Increasing	2016	10/1/2016	No	No	Yes	Full Migrant	No
Passeriformes	Prunellidae	Prunella	*Prunella ocularis*	Radde's Accentor	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
Passeriformes	Remizidae	Remiz	*Remiz pendulinus*	Eurasian Penduline-tit	LC	Increasing	2019	8/7/2019	Yes	Yes	Yes	Full Migrant	No
Accipitriformes	Accipitridae	Milvus	*Milvus migrans*	Black Kite	LC	Stable	2021	8/16/2021	Yes	Yes	Yes	Full Migrant	No
Passeriformes	Alaudidae	Alaudala	*Alaudala heinei*	Turkestan Short-toed Lark	LC	Stable	2022	8/26/2022	No	No	Yes	Full Migrant	No
Passeriformes	Acrocephalidae	Acrocephalus	*Acrocephalus stentoreus*	Clamorous Reed-warbler	LC	Stable	2022	8/30/2022	No	Yes	Yes	Full Migrant	No
Charadriiformes	Charadriidae	Charadrius	*Charadrius atrifrons*	Tibetan Sandplover	LC	Decreasing	2023	8/9/2023	Yes	Yes	Yes	Full Migrant	No

Note: Critically Endangered: (CR), Endangered: (EN), Vulnerable: (VU), Least Concern :(LC), Data Deficient: (DD), Near Threatened: (NT)

E.1.2 Large Mammals

List of Mammals Species Reported by IBAT within 50 km buffer of the Reko Diq Mine Site, Northern Groundwater System, and Access Route to Reko Diq Mine Site is provided below[1]

No	*Order*	*Family*	*Genus*	*Scientific name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome Marine*	*Biome Freshwater*	*Biome Terrestrial*	*Movement Pattern*	*Restricted Range*
1	Artiodactyla	Bovidae	Gazella	*Gazella subgutturosa*	Goitered Gazelle	VU	Decreasing	2017	8/8/2016	No	No	Yes	Unknown	No
2	Carnivora	Ursidae	Ursus	*Ursus thibetanus*	Asiatic Black Bear	VU	Decreasing	2020	3/17/2016	No	No	Yes		No
3	Carnivora	Mustelidae	Vormela	*Vormela peregusna*	Marbled Polecat	VU	Decreasing	2016	3/3/2015	No	No	Yes	Not A Migrant	No
4	Artiodactyla	Bovidae	Capra	*Capra aegagrus*	Wild Goat	NT	Stable	2020	3/22/2020	No	No	Yes	Altitudinal Migrant	No
5	Carnivora	Hyaenidae	Hyaena	*Hyaena hyaena*	Striped Hyaena	NT	Decreasing	2015	10/2/2014	No	No	Yes	Not A Migrant	No
6	Carnivora	Canidae	Canis	*Canis lupus*	Grey Wolf	LC	Stable	2023	8/30/2018	No	No	Yes		No
7	Carnivora	Felidae	Felis	*Felis chaus*	Jungle Cat	LC	Decreasing	2021	6/4/2014	No	No	Yes	Not A Migrant	No
8	Carnivora	Felidae	Felis	*Felis margarita*	Sand Cat	LC	Unknown	2016	4/20/2014	No	No	Yes	Not A Migrant	No
9	Artiodactyla	Bovidae	Gazella	*Gazella bennettii*	Chinkara	LC	Decreasing	2017	6/21/2016	No	No	Yes		No
10	Carnivora	Canidae	Vulpes	*Vulpes cana*	Blanford's Fox	LC	Stable	2015	7/22/2015	No	No	Yes		No
11	Carnivora	Canidae	Vulpes	*Vulpes rueppellii*	Ruppell's Fox	LC	Stable	2015	5/29/2015	No	No	Yes		No
12	Carnivora	Canidae	Vulpes	*Vulpes vulpes*	Red Fox	LC	Stable	2021	3/1/2016	No	No	Yes		No
13	Carnivora	Mustelidae	Martes	*Martes foina*	Beech Marten	LC	Stable	2016	3/3/2015	No	No	Yes	Not A Migrant	No
14	Carnivora	Herpestidae	Herpestes	*Herpestes edwardsii*	Indian Grey Mongoose	LC	Stable	2016	3/3/2015	No	No	Yes	Not A Migrant	No
15	Artiodactyla	Suidae	Sus	*Sus scrofa*	Wild Boar	LC	Unknown	2019	5/8/2018	No	No	Yes		No
16	Carnivora	Herpestidae	Herpestes	*Herpestes auropunctatus*	Small Indian Mongoose	LC	Unknown	2016	10/28/2014	No	No	Yes		No
17	Carnivora	Canidae	Canis	*Canis aureus*	Golden Jackal	LC	Increasing	2018	1/10/2018	No	No	Yes		No

Note: Vulnerable: (VU), Least Concern :(LC), Near Threatened: (NT)

[1] Some of the species reported by the IBAT within 50 km buffer are unlikely to be found in the area such as Asiatic Black Bear, Beech Marten, Stripped Hyaena, and Chinkara as conditions are not favorable in the area.

E.1.3 Small Mammals

List of Small Mammals Species Reported by IBAT within 50 km buffer of the Reko Diq Mine Site, Northern Groundwater System, and Access Route to Reko Diq Mine Site is provided below

No.	*Order*	*Family*	*Genus*	*Scientific name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome Marine*	*Biome Freshwater*	*Biome Terrestrial*	*Movement Pattern*	*Restricted Range*
1.	Rodentia	Dipodidae	Allactaga	*Allactaga hotsoni*	Hotson's Five-Toed Jerboa	LC	Unknown	2016	9/9/2016	No	No	Yes	Unknown	No
2.	Rodentia	Calomyscidae	Calomyscus	*Calomyscus hotsoni*	Hotson's Brush-Tailed Mouse	LC	Unknown	2016	9/5/2016	No	No	Yes	Unknown	No
3.	Rodentia	Cricetidae	Nothocricetulus	*Nothocricetulus migratorius*	Grey Dwarf Hamster	LC	Unknown	2016	9/10/2016	No	No	Yes	Unknown	No
4.	Rodentia	Muridae	Gerbillus	*Gerbillus aquilus*		LC	Unknown	2016	9/1/2016	No	No	Yes	Unknown	No
5.	Rodentia	Muridae	Gerbillus	*Gerbillus nanus*	Dwarf Gerbil	LC	Stable	2016	2/2/2016	No	No	Yes	Unknown	No
6.	Rodentia	Hystricidae	Hystrix	*Hystrix indica*	Indian Crested Porcupine	LC	Stable	2021	9/11/2016	No	No	Yes	Unknown	No
7.	Rodentia	Dipodidae	Jaculus	*Jaculus blanfordi*	Blanford's Jerboa	LC	Decreasing	2016	9/11/2016	No	No	Yes	Unknown	No
8.	Rodentia	Muridae	Meriones	*Meriones crassus*	Sundevall's Jird	LC	Unknown	2016	9/1/2016	No	No	Yes	Unknown	No
9.	Rodentia	Muridae	Meriones	*Meriones libycus*	Libyan Jird	LC	Stable	2016	9/1/2016	No	No	Yes	Unknown	No
10.	Rodentia	Muridae	Meriones	*Meriones persicus*	Persian Jird	LC	Unknown	2016	2/2/2016	No	No	Yes	Unknown	No
11.	Rodentia	Muridae	Mus	*Mus musculus*	House Mouse	LC	Stable	2021	9/11/2016	No	No	Yes	Unknown	No
12.	Rodentia	Muridae	Nesokia	*Nesokia indica*	Short-Tailed Bandicoot Rat	LC	Unknown	2016	8/5/2016	No	No	Yes	Unknown	No
13.	Rodentia	Muridae	Rhombomys	*Rhombomys opimus*	Great Gerbil	LC	Stable	2016	8/28/2016	No	No	Yes	Unknown	No
14.	Rodentia	Muridae	Tatera	*Tatera indica*	Indian Gerbil	LC	Unknown	2017	9/17/2016	No	No	Yes	Unknown	No
15.	Eulipotyphla	Erinaceidae	Paraechinus	*Paraechinus hypomelas*	Brandt's Hedgehog	LC	Unknown	2016	8/30/2016	No	No	Yes	Unknown	No
16.	Lagomorpha	Ochotonidae	Ochotona	*Ochotona rufescens*	Afghan Pika	LC	Stable	2016	7/9/2016	No	No	Yes	Unknown	No
17.	Lagomorpha	Leporidae	Lepus	*Lepus capensis*	Cape Hare	LC	Decreasing	2019	6/30/2018	No	No	Yes	Unknown	No
18.	Eulipotyphla	Soricidae	Crocidura	*Crocidura gmelini*		LC	Unknown	2017	12/23/2016	No	No	Yes	Unknown	No
19.	Eulipotyphla	Soricidae	Crocidura	*Crocidura zarudnyi*		LC	Unknown	2016	9/9/2016	No	No	Yes	Unknown	No
20.	Rodentia	Dipodidae	Scarturus	*Scarturus elater*	Small Five-Toed Jerboa	LC	Decreasing	2016	9/8/2016	No	No	Yes	Unknown	No
21.	Chiroptera	Vespertilionidae	Rhyneptesicus	*Rhyneptesicus nasutus*	Sind Serotine Bat	LC	Unknown	2019	8/31/2018	No	No	Yes	Unknown	No
22.	Chiroptera	Vespertilionidae	Myotis	*Myotis emarginatus*	Geoffroy's Bat	LC	Stable	2016	4/25/2016	No	No	Yes	Unknown	No
23.	Chiroptera	Vespertilionidae	Pipistrellus	*Pipistrellus kuhlii*	Kuhl's Pipistrelle	LC	Unknown	2016	4/25/2016	No	No	Yes	Unknown	No
24.	Chiroptera	Rhinolophidae	Rhinolophus	*Rhinolophus ferrumequinum*	Greater Horseshoe Bat	LC	Decreasing	2016	4/25/2016	No	No	Yes	Unknown	No
25.	Chiroptera	Rhinopomatidae	Rhinopoma	*Rhinopoma muscatellum*	Small Mouse-Tailed Bat	LC	Unknown	2019	8/31/2018	No	No	Yes	Unknown	No
26.	Chiroptera	Hipposideridae	Asellia	*Asellia tridens*	Geoffroy's Trident Leaf-Nosed Bat	LC	Stable	2017	8/31/2016	No	No	Yes	Unknown	No
27.	Chiroptera	Rhinopomatidae	Rhinopoma	*Rhinopoma hardwickii*	Lesser Mouse-Tailed Bat	LC	Stable	2017	8/31/2016	No	No	Yes	Unknown	No
28.	Chiroptera	Vespertilionidae	Eptesicus	*Eptesicus pachyomus*		LC	Unknown	2019	8/31/2018	No	No	Yes	Unknown	No

Note: Least Concern :(LC)

E.1.4 Herpetofauna

List of Herpetofauna Species Reported by IBAT within 50 km buffer of the Reko Diq Mine Site, Northern Groundwater System, and Access Route to Reko Diq Mine Site is provided below.

Class	*Order*	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome Marine*	*Biome Freshwater*	*Biome Terrestrial*	*Is Restricted Range*
Amphibia	Anura	Bufonidae	Bufotes	*Bufotes oblongus*	Eastern Persian toad	LC	Decreasing	2023	3/8/2021	No	Yes	Yes	No
Amphibia	Anura	Bufonidae	Firouzophrynus	*Firouzophrynus olivaceus*	Olive Toad	LC	Stable	2023	11/8/2021	No	Yes	Yes	No
Amphibia	Anura	Bufonidae	Firouzophrynus	*Firouzophrynus stomaticus*	Marbled Toad	LC	Stable	2023	11/8/2021	No	Yes	Yes	No
Amphibia	Anura	Bufonidae	Bufotes	*Bufotes surdus*	Pakistan Toad	LC	Decreasing	2023	8/10/2021	No	Yes	Yes	No
Amphibia	Anura	Ranidae	Pelophylax	*Pelophylax bedriagae*	Bedriaga's Frog	LC	Stable	2022	12/6/2021	No	Yes	Yes	No
Amphibia	Anura	Dicroglossidae	Euphlyctis	*Euphlyctis cyanophlyctis*	Skipper Frog	LC	Stable	2023	10/5/2021	No	Yes	Yes	No
Reptilia	Squamata	Varanidae	Varanus	*Varanus bengalensis*	Bengal Monitor Lizard	NT	Decreasing	2021	6/8/2018	No	Yes	Yes	No
Reptilia	Squamata	Elapidae	Naja	*Naja oxiana*	Central Asian Cobra	NT	Decreasing	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Boidae	Eryx	*Eryx johnii*	Red Sand Boa	NT	Decreasing	2021	9/5/2019	No	No	Yes	No
Reptilia	Squamata	Varanidae	Varanus	*Varanus griseus*	Desert Monitor	LC	Decreasing	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Boidae	Eryx	*Eryx jaculus*	Javelin Sand Boa	LC	Decreasing	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Hemorrhois	*Hemorrhois ravergieri*	Spotted Whip Snake	LC	Stable	2017	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Scincidae	Eumeces	*Eumeces schneiderii*	Orange-tailed Skink	LC	Stable	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Lytorhynchus	*Lytorhynchus ridgewayi*	Derafshi Snake	LC	Unknown	2017	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Lytorhynchus	*Lytorhynchus maynardi*	Maynard's Longnose Sand Snake	LC	Unknown	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Saara	*Saara asmussi*		LC	Unknown	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Phrynocephalus	*Phrynocephalus scutellatus*		LC	Stable	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Trapelus	*Trapelus megalonyx*	Afghan Ground Agama	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Agamura	*Agamura persica*	Persian Spider Gecko	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Spalerosophis	*Spalerosophis diadema*	Diadem Snake	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Lacertidae	Acanthodactylus	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Paralaudakia	*Paralaudakia microlepis*		LC	Stable	2017	4/4/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Trapelus	*Trapelus agilis*		LC	Stable	2021	10/27/2017	No	No	Yes	No
Reptilia	Squamata	Colubridae	Platyceps	*Platyceps rhodorachis*	Wadi Racer	LC	Stable	2021	9/8/2019	No	No	Yes	No
Reptilia	Squamata	Colubridae	Platyceps	*Platyceps karelini*		LC	Unknown	2021	9/8/2019	No	No	Yes	No
Reptilia	Squamata	Psammophiidae	Psammophis	*Psammophis lineolatus*	Steppe Ribbon Racer	LC	Unknown	2021	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Sphaerodactylidae	Teratoscincus	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	LC	Stable	2019	9/27/2018	No	No	Yes	No
Reptilia	Squamata	Lacertidae	Eremias	*Eremias persica*	Persian Racerunner	LC	Stable	2021	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Phrynocephalus	*Phrynocephalus luteoguttatus*		LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Viperidae	Pseudocerastes	*Pseudocerastes persicus*	Persian Horned Viper	LC	Decreasing	2021	2/9/2012	No	No	Yes	No
Reptilia	Squamata	Colubridae	Ptyas	*Ptyas mucosa*		LC	Decreasing	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Lacertidae	Acanthodactylus	*Acanthodactylus micropholis*	Yellow-tailed Fringe-fingered Lizard	LC	Stable	2021	4/12/2019	No	No	Yes	No
Reptilia	Squamata	Lacertidae	Eremias	*Eremias fasciata*		LC	Stable	2021	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Boiga	*Boiga trigonata*	Indian Gamma Snake	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Lacertidae	Mesalina	*Mesalina watsonana*		LC	Stable	2021	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Scincidae	Ophiomorus	*Ophiomorus brevipes*		LC	Stable	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Calotes	*Calotes versicolor*	Changeable Lizard	LC	Stable	2021	9/5/2019	No	No	Yes	No
Reptilia	Squamata	Scincidae	Ophiomorus	*Ophiomorus tridactylus*	Indian Sand-swimmer	LC	Stable	2021	4/6/2016	No	No	Yes	No

Class	*Order*	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome Marine*	*Biome Freshwater*	*Biome Terrestrial*	*Is Restricted Range*
Reptilia	Squamata	Agamidae	Laudakia	*Laudakia nupta*		LC	Stable	2021	4/4/2016	No	No	Yes	No
Reptilia	Squamata	Viperidae	Echis	*Echis carinatus*		LC	Stable	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Eirenis	*Eirenis persicus*		LC	Unknown	2021	4/10/2016	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Tenuidactylus	*Tenuidactylus longipes*	Nikolsky's Long-toed Gecko	LC	Stable	2017	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Psammophiidae	Psammophis	*Psammophis schokari*	Schokari Sand Racer	LC	Unknown	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Viperidae	Eristicophis	*Eristicophis macmahoni*	McMahons Desert Viper	LC	Unknown	2021	9/8/2019	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Cyrtopodion	*Cyrtopodion agamuroides*	Nikolsky's Spider Gecko	LC	Unknown	2021	9/4/2019	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Bunopus	*Bunopus tuberculatus*	Baluch Ground Gecko	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Scincidae	Eurylepis	*Eurylepis taeniolatus*	Ribbon-sided Skink	LC	Stable	2021	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Sphaerodactylidae	Teratoscincus	*Teratoscincus microlepis*	Small-scaled Wonder Gecko	LC	Stable	2021	4/7/2016	No	No	Yes	No
Reptilia	Squamata	Scincidae	Ablepharus	*Ablepharus pannonicus*	Asian Snake-eyed Skink	LC	Unknown	2021	2/8/2012	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Cyrtopodion	*Cyrtopodion scabrum*	Rough Bent-toed Gecko	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Rhinogekko	*Rhinogekko femoralis*	Sharp-tailed Spider Gecko	LC	Unknown	2021	12/23/2019	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Crossobamon	*Crossobamon eversmanni*	Comb-toed Gecko	LC	Stable	2021	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Leptotyphlopidae	Myriopholis	*Myriopholis macrorhyncha*	Hooked Blind Snake	LC	Stable	2021	1/27/2014	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Cyrtopodion	*Cyrtopodion kirmanense*		LC	Stable	2009	12/14/2008	No	No	Yes	No
Reptilia	Squamata	Gekkonidae	Tenuidactylus	*Tenuidactylus voraginosus*		LC	Unknown	2017	4/5/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Phrynocephalus	*Phrynocephalus clarkorum*		LC	Unknown	2021	4/4/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Phrynocephalus	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	LC	Unknown	2017	4/4/2016	No	No	Yes	Yes
Reptilia	Squamata	Gekkonidae	Crossobamon	*Crossobamon orientalis*	Sind Gecko	LC	Unknown	2021	8/9/2019	No	No	Yes	No
Reptilia	Squamata	Agamidae	Phrynocephalus	*Phrynocephalus ornatus*	Striped Toad Agama	LC	Stable	2021	4/4/2016	No	No	Yes	No
Reptilia	Squamata	Agamidae	Phrynocephalus	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	LC	Stable	2023	12/1/2022	No	No	Yes	No
Reptilia	Squamata	Leptotyphlopidae	Myriopholis	*Myriopholis blanfordii*		DD	Unknown	2021	4/6/2016	No	No	Yes	No
Reptilia	Squamata	Colubridae	Telescopus	*Telescopus rhinopoma*	Indian Desert Tiger Snake	DD	Unknown	2017	4/7/2016	No	No	Yes	No

Note: Least Concern :(LC), Data Deficient: (DD), Near Threatened: (NT)

E.1.5 Invertebrates

List of Invertebrate Species Reported by IBAT within 50 km buffer of the Reko Diq Mine Site, Northern Groundwater System, and Access Route to Reko Diq Mine Site is provided below.

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome Marine*	*Biome Freshwater*	*Biome Terrestrial*	*Movement Pattern*	*Is Restricted Range*
Odonata	Aeshnidae	Anax	*Anax ephippiger*	Vagrant Emperor	LC	Unknown	2016	3/4/2015	No	Yes	Yes	Full Migrant	No
Odonata	Aeshnidae	Anax	*Anax imperator*	Blue Emperor	LC	Stable	2016	3/4/2015	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Crocothemis	*Crocothemis erythraea*	Broad Scarlet	LC	Increasing	2016	10/28/2015	No	Yes	Yes		No
Odonata	Libellulidae	Diplacodes	*Diplacodes lefebvrii*	Black Percher	LC	Stable	2016	10/19/2015	No	Yes	Yes	Nomadic	No
Odonata	Coenagrionidae	Ischnura	*Ischnura senegalensis*	Tropical Bluetail	LC	Stable	2016	4/9/2015	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Orthetrum	*Orthetrum chrysostigma*	Epaulet Skimmer	LC	Stable	2016	11/6/2015	No	Yes	Yes	Not a Migrant	No
Odonata	Libellulidae	Tramea	*Tramea basilaris*	Keyhole Glider	LC	Unknown	2016	11/12/2015	No	Yes	Yes	Full Migrant	No
Odonata	Libellulidae	Trithemis	*Trithemis annulata*	Violet Dropwing	LC	Increasing	2016	11/12/2015	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Trithemis	*Trithemis arteriosa*	Red-veined Dropwing	LC	Stable	2016	11/13/2015	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Trithemis	*Trithemis kirbyi*	Orange-winged Dropwing	LC	Increasing	2016	11/13/2015	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Zygonyx	*Zygonyx torridus*	Ringed Cascader	LC	Unknown	2016	11/26/2015	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Orthetrum	*Orthetrum coerulescens*	Keeled Skimmer	LC	Stable	2020	12/4/2019	No	Yes	Yes		No
Odonata	Platycnemididae	Platycnemis	*Platycnemis dealbata*	Ivory Featherleg	LC	Stable	2020	12/4/2019	No	Yes	Yes		No
Odonata	Libellulidae	Orthetrum	*Orthetrum brunneum*	Southern Skimmer	LC	Increasing	2020	12/3/2019	No	Yes	Yes		No
Odonata	Libellulidae	Trithemis	*Trithemis festiva*	Indigo Dropwing	LC	Unknown	2020	12/3/2019	No	Yes	Yes		No
Odonata	Libellulidae	Orthetrum	*Orthetrum sabina*	Slender Skimmer	LC	Stable	2020	6/5/2019	No	Yes	Yes	Not a Migrant	No
Odonata	Libellulidae	Nannophya	*Nannophya pygmaea*	Hachou-tombo	LC	Stable	2020	6/6/2019	No	Yes	Yes		No
Odonata	Coenagrionidae	Agriocnemis	*Agriocnemis pygmaea*	Wandering Midget	LC	Unknown	2020	5/8/2019	No	Yes	Yes	Nomadic	No
Odonata	Libellulidae	Orthetrum	*Orthetrum luzonicum*	-	LC	Unknown	2010	3/21/2010	No	Yes	Yes		No
Odonata	Libellulidae	Orthetrum	*Orthetrum japonicum*	Taiwan-shioya-tombo	LC	Unknown	2010	10/9/2009	No	Yes	Yes		No
Odonata	Libellulidae	Trithemis	*Trithemis pallidinervis*	Dancing Dropwing	LC	Unknown	2010	2/20/2010	No	Yes	Yes		No
Odonata	Coenagrionidae	Ischnura	*Ischnura aurora*	Gossamer Damselfly	LC	Stable	2020	5/14/2019	No	Yes	Yes	Full Migrant	No
Odonata	Lestidae	Lestes	*Lestes thoracicus*		LC	Unknown	2010	10/14/2009	No	Yes	Yes		No
Odonata	Libellulidae	Trithemis	*Trithemis aurora*		LC	Unknown	2010	2/20/2010	No	Yes	Yes		No
Odonata	Coenagrionidae	Ceriagrion	*Ceriagrion cerinorubellum*		LC	Unknown	2020	3/12/2019	No	Yes	Yes		No
Odonata	Platycnemididae	Indocnemis	*Indocnemis orang*		LC	Unknown	2010	2/22/2010	No	Yes	Yes		No
Lepidoptera	Nymphalidae	Vanessa	*Vanessa cardui*	Painted Lady	LC	Unknown	2020	5/4/2020	No	No	Yes	Full Migrant	No
Mantodea	Eremiaphilidae	Iris	*Iris oratoria*	Mediterranean Mantis	LC	Unknown	2020	12/19/2019	No	No	Yes	Not a Migrant	No
Orthoptera	Gryllidae	Eumodicogryllus	*Eumodicogryllus bordigalensis*	Verge Cricket	LC	Increasing	2019	12/23/2018	No	No	Yes		No
Mantodea	Mantidae	Hierodula	*Hierodula tenuidentata*	Giant Asian Mantis	LC	Increasing	2020	7/3/2018	No	No	Yes	Not a Migrant	No
Odonata	Coenagrionidae	Ischnura	*Ischnura rubilio*		LC	Unknown	2022	3/4/2021	No	Yes	Yes		No
Mantodea	Empusidae	Empusa	*Empusa fasciata*	Devil's Mare	DD	Unknown	2020	7/3/2018	No	No	Yes	Not a Migrant	No
Mantodea	Rivetinidae	Bolivaria	*Bolivaria brachyptera*	Bolivar's Short Winged Mantis	DD	Unknown	2020	7/3/2018	No	No	Yes	Not a Migrant	No
Hygrophila	Lymnaeidae	Radix	*Radix auricularia*		LC	Stable	2014	1/31/2014	No	Yes	No	Not a Migrant	No
Odonata	Coenagrionidae	Ceriagrion	*Ceriagrion coromandelianum*		LC	Unknown	2009	3/1/2007	No	Yes	No		No
Hygrophila	Bulinidae	Indoplanorbis	*Indoplanorbis exustus*		LC	Unknown	2012	1/8/2010	No	Yes	No		No

Order	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome Marine*	*Biome Freshwater*	*Biome Terrestrial*	*Movement Pattern*	*Is Restricted Range*
Venerida	Cyrenidae	Corbicula	*Corbicula striatella*		LC	Stable	2010	1/29/2010	No	Yes	No		No
Hygrophila	Planorbidae	Gyraulus	*Gyraulus convexiusculus*		LC	Increasing	2014	1/17/2013	No	Yes	No		No
Hygrophila	Lymnaeidae	Lymnaea	*Lymnaea luteola*		LC	Stable	2010	3/3/2010	No	Yes	No		No
Unionida	Unionidae	Parreysia	*Parreysia caerulea*	Jhinukh	LC	Unknown	2010	1/7/2010	No	Yes	No	Nomadic	No
Hygrophila	Lymnaeidae	Lymnaea	*Lymnaea acuminata*		LC	Unknown	2010	1/11/2010	No	Yes	No		No
Littorinimorpha	Bithyniidae	Bithynia	*Bithynia cerameopoma*		LC	Unknown	2010	1/9/2010	No	Yes	No		No
Architaenioglossa	Viviparidae	Bellamya	*Bellamya bengalensis*		LC	Stable	2010	1/9/2010	No	Yes	No		No
Cycloneritida	Neritidae	Clithon	*Clithon reticulare*		LC	Unknown	2010	1/11/2010	Yes	Yes	No		No
Hygrophila	Lymnaeidae	Lymnaea	*Lymnaea persica*		LC	Unknown	2010	9/30/2009	No	Yes	No		No
Hygrophila	Planorbidae	Gyraulus	*Gyraulus euphraticus*		LC	Stable	2010	1/9/2010	No	Yes	No		No
Littorinimorpha	Bithyniidae	Gabbia	*Gabbia orcula*		LC	Unknown	2010	1/9/2010	No	Yes	No		No
Sorbeoconcha	Thiaridae	Melanoides	*Melanoides pyramis*		LC	Unknown	2010	1/22/2010	No	Yes	No		No
Littorinimorpha	Clenchiellidae	Clenchiella	*Clenchiella microscopica*		LC	Unknown	2014	7/26/2010	Yes	Yes	No	Not a Migrant	No
Hygrophila	Lymnaeidae	Lymnaea	*Lymnaea tenera*		LC	Unknown	2011	7/22/2011	No	Yes	No		No
Hygrophila	Lymnaeidae	Lymnaea	*Lymnaea rectilabrum*		LC	Unknown	2011	7/22/2011	No	Yes	No		No
Venerida	Cyrenidae	Corbicula	*Corbicula lamarckiana*		LC	Unknown	2016	6/21/2016	No	Yes	No		No
Hygrophila	Lymnaeidae	Galba	*Galba schirazensis*		LC	Unknown	2011	7/22/2011	No	Yes	No		No
Venerida	Cyrenidae	Corbicula	*Corbicula fluminalis*	Asian Clam	LC	Increasing	2016	6/29/2016	No	Yes	No		No
Hygrophila	Planorbidae	Trochorbis	*Trochorbis anastasiae*		DD	Unknown	2011	7/22/2011	No	Yes	No		Yes
Littorinimorpha	Hydrobiidae	Falsipyrgula	*Falsipyrgula bakhtarana*		DD	Unknown	2011	7/22/2011	No	Yes	No		No
Decapoda	Potamidae	Potamon	*Potamon ibericum*		NT	Decreasing		1/1/2008	No	Yes	No		No
Decapoda	Potamidae	Himalayapotamon	*Himalayapotamon koolooense*		LC	Stable		1/1/2008	No	Yes	No		No
Decapoda	Potamidae	Potamon	*Potamon gedrosianum*		LC	Stable		1/1/2008	No	Yes	No		No
Decapoda	Potamidae	Potamon	*Potamon ruttneri*		LC	Stable		1/1/2008	No	Yes	No		No
Decapoda	Potamidae	Potamon	*Potamon persicum*		LC	Unknown		1/1/2008	No	Yes	No		No
Decapoda	Gecarcinucidae	Sartoriana	*Sartoriana blanfordi*		LC	Unknown		1/1/2008	No	Yes	No		No

Note: Least Concern :(LC), Data Deficient: (DD), Near Threatened: (NT)

E.2 Terrestrial Ecological Resources Rail and Road Route Corridor

E.2.1 Avifauna

List of Bird Species Reported by IBAT within 50 km buffer of the Rail and Road Route Corridor is provided below.

No	*Order*	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
1	OTIDIFORMES	OTIDIDAE	Sypheotides	*Sypheotides indicus*	Lesser Florican	CR	Decreasing	2021	8/12/2021	No	No	Yes	Full Migrant	No
2	CHARADRIIFORMES	CHARADRIIDAE	Vanellus	*Vanellus gregarius*	Sociable Lapwing	CR	Decreasing	2019	8/7/2018	No	No	Yes	Full Migrant	No
3	ACCIPITRIFORMES	ACCIPITRIDAE	Gyps	*Gyps bengalensis*	White-rumped Vulture	CR	Decreasing	2021	7/7/2021	No	No	Yes	Nomadic	No
4	ACCIPITRIFORMES	ACCIPITRIDAE	Sarcogyps	*Sarcogyps calvus*	Red-headed Vulture	CR	Decreasing	2021	7/15/2021	No	No	Yes	Not a Migrant	No
5	ACCIPITRIFORMES	ACCIPITRIDAE	Gyps	*Gyps indicus*	Indian Vulture	CR	Decreasing	2021	7/9/2021	No	No	Yes	Not a Migrant	No
6	ANSERIFORMES	ANATIDAE	Oxyura	*Oxyura leucocephala*	White-headed Duck	EN	Decreasing	2017	10/1/2017	No	Yes	Yes	Full Migrant	No
7	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris tenuirostris*	Great Knot	EN	Decreasing	2019	10/1/2016	Yes	No	Yes	Full Migrant	No
8	CHARADRIIFORMES	LARIDAE	Rynchops	*Rynchops albicollis*	Indian Skimmer	EN	Decreasing	2020	7/9/2020	No	Yes	Yes	Full Migrant	No
9	CHARADRIIFORMES	LARIDAE	Sterna	*Sterna acuticauda*	Black-bellied Tern	EN	Decreasing	2022	9/17/2021	No	Yes	Yes	Not a Migrant	No
10	ACCIPITRIFORMES	ACCIPITRIDAE	Haliaeetus	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	EN	Decreasing	2021	4/6/2021	No	Yes	Yes	Full Migrant	No
11	ACCIPITRIFORMES	ACCIPITRIDAE	Neophron	*Neophron percnopterus*	Egyptian Vulture	EN	Decreasing	2021	7/21/2021	No	Yes	Yes	Full Migrant	No
12	ACCIPITRIFORMES	ACCIPITRIDAE	Aquila	*Aquila nipalensis*	Steppe Eagle	EN	Decreasing	2021	7/23/2021	No	No	Yes	Full Migrant	No
13	FALCONIFORMES	FALCONIDAE	Falco	*Falco cherrug*	Saker Falcon	EN	Decreasing	2021	7/5/2021	Yes	Yes	Yes	Full Migrant	No
14	ANSERIFORMES	ANATIDAE	Aythya	*Aythya ferina*	Common Pochard	VU	Decreasing	2021	8/18/2021	Yes	Yes	Yes	Full Migrant	No
15	CORACIIFORMES	ALCEDINIDAE	Halcyon	*Halcyon pileata*	Black-capped Kingfisher	VU	Decreasing	2022	1/10/2022	Yes	Yes	Yes	Full Migrant	No
16	COLUMBIFORMES	COLUMBIDAE	Columba	*Columba eversmanni*	Yellow-eyed Pigeon	VU	Decreasing	2022	5/31/2022	No	Yes	Yes	Full Migrant	No
17	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris ferruginea*	Curlew Sandpiper	VU	Decreasing	2024	7/3/2024	Yes	Yes	Yes	Full Migrant	No
18	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris falcinellus*	Broad-billed Sandpiper	VU	Decreasing	2024	7/3/2024	Yes	Yes	Yes	Full Migrant	No
19	CHARADRIIFORMES	CHARADRIIDAE	Pluvialis	*Pluvialis squatarola*	Grey Plover	VU	Decreasing	2024	7/10/2024	Yes	Yes	Yes	Full Migrant	No
20	CHARADRIIFORMES	LARIDAE	Sterna	*Sterna aurantia*	River Tern	VU	Decreasing	2020	7/27/2020	Yes	Yes	Yes	Not a Migrant	No
21	ACCIPITRIFORMES	ACCIPITRIDAE	Clanga	*Clanga clanga*	Greater Spotted Eagle	VU	Decreasing	2021	7/1/2021	No	Yes	Yes	Full Migrant	No
22	ACCIPITRIFORMES	ACCIPITRIDAE	Aquila	*Aquila rapax*	Tawny Eagle	VU	Decreasing	2021	6/28/2021	No	Yes	Yes	Nomadic	No
23	ACCIPITRIFORMES	ACCIPITRIDAE	Aquila	*Aquila heliaca*	Eastern Imperial Eagle	VU	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
24	PASSERIFORMES	MUSCICAPIDAE	Saxicola	*Saxicola macrorhynchus*	White-browed Bushchat	VU	Decreasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
25	PASSERIFORMES	PARADOXORNITHIDAE	Chrysomma	*Chrysomma altirostre*	Jerdon's Babbler	VU	Decreasing	2021	8/3/2020	No	Yes	Yes	Not a Migrant	Yes
26	OTIDIFORMES	OTIDIDAE	Chlamydotis	*Chlamydotis macqueenii*	Asian Houbara	VU	Decreasing	2021	8/18/2021	No	No	Yes	Full Migrant	No
27	ANSERIFORMES	ANATIDAE	Marmaronetta	*Marmaronetta angustirostris*	Marbled Duck	NT	Decreasing	2022	8/4/2022	Yes	Yes	Yes	Full Migrant	No
28	ANSERIFORMES	ANATIDAE	Aythya	*Aythya nyroca*	Ferruginous Duck	NT	Decreasing	2019	6/12/2019	Yes	Yes	Yes	Full Migrant	No
29	PSITTACIFORMES	PSITTACIDAE	Palaeornis	*Palaeornis eupatria*	Alexandrine Parakeet	NT	Decreasing	2017	10/1/2016	No	No	Yes	Nomadic	No
30	OTIDIFORMES	OTIDIDAE	Tetrax	*Tetrax tetrax*	Little Bustard	NT	Decreasing	2018	8/7/2018	No	No	Yes	Full Migrant	No
31	CHARADRIIFORMES	SCOLOPACIDAE	Limosa	*Limosa limosa*	Black-tailed Godwit	NT	Decreasing	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
32	CHARADRIIFORMES	SCOLOPACIDAE	Limosa	*Limosa lapponica*	Bar-tailed Godwit	NT	Decreasing	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
33	CHARADRIIFORMES	SCOLOPACIDAE	Numenius	*Numenius arquata*	Eurasian Curlew	NT	Decreasing	2017	10/1/2017	Yes	Yes	Yes	Full Migrant	No
34	CHARADRIIFORMES	SCOLOPACIDAE	Arenaria	*Arenaria interpres*	Ruddy Turnstone	NT	Decreasing	2024	7/1/2024	Yes	Yes	Yes	Full Migrant	No
35	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris canutus*	Red Knot	NT	Decreasing	2024	7/10/2024	Yes	Yes	Yes	Full Migrant	No
36	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris alpina*	Dunlin	NT	Decreasing	2024	3/14/2024	Yes	Yes	Yes	Full Migrant	No

No	*Order*	*Family*	*Genus*	*Scientific Name*	*Common Name*	*Category*	*Population Trend*	*Publication*	*Assessment Date*	*Biome - Marine*	*Biome - Freshwater*	*Biome - Terrestrial*	*Movement Pattern*	*Restricted Range*
37	CHARADRIIFORMES	BURHINIDAE	Esacus	*Esacus recurvirostris*	Great Thick-knee	NT	Decreasing	2017	10/1/2017	Yes	Yes	Yes	Not a Migrant	No
38	CHARADRIIFORMES	HAEMATOPODIDAE	Haematopus	*Haematopus ostralegus*	Eurasian Oystercatcher	NT	Decreasing	2019	7/26/2019	Yes	Yes	Yes	Full Migrant	No
39	CHARADRIIFORMES	CHARADRIIDAE	Vanellus	*Vanellus vanellus*	Northern Lapwing	NT	Decreasing	2017	10/1/2016	Yes	No	Yes	Full Migrant	No
40	ACCIPITRIFORMES	ACCIPITRIDAE	Gypaetus	*Gypaetus barbatus*	Bearded Vulture	NT	Decreasing	2021	7/26/2021	No	No	Yes	Not a Migrant	No
41	ACCIPITRIFORMES	ACCIPITRIDAE	Aegypius	*Aegypius monachus*	Cinereous Vulture	NT	Decreasing	2021	6/23/2020	No	No	Yes	Full Migrant	No
42	ACCIPITRIFORMES	ACCIPITRIDAE	Circus	*Circus macrourus*	Pallid Harrier	NT	Decreasing	2021	5/19/2021	No	Yes	Yes	Full Migrant	No
43	FALCONIFORMES	FALCONIDAE	Falco	*Falco jugger*	Laggar Falcon	NT	Decreasing	2020	8/11/2020	No	No	Yes	Not a Migrant	No
44	PELECANIFORMES	PELECANIDAE	Pelecanus	*Pelecanus crispus*	Dalmatian Pelican	NT	Decreasing	2018	10/1/2017	Yes	Yes	Yes	Full Migrant	No
45	CICONIIFORMES	CICONIIDAE	Ephippiorhynchus	*Ephippiorhynchus asiaticus*	Black-necked Stork	NT	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Not a Migrant	No
46	CICONIIFORMES	CICONIIDAE	Leptoptilos	*Leptoptilos dubius*	Greater Adjutant	NT	Increasing	2023	8/8/2023	No	Yes	Yes	Not a Migrant	No
47	PROCELLARIIFORMES	PROCELLARIIDAE	Bulweria	*Bulweria fallax*	Jouanin's Petrel	NT	Unknown	2018	8/7/2018	Yes	No	Yes	Full Migrant	No
48	PROCELLARIIFORMES	PROCELLARIIDAE	Ardenna	*Ardenna carneipes*	Flesh-footed Shearwater	NT	Decreasing	2019	8/7/2018	Yes	No	Yes	Full Migrant	No
49	FALCONIFORMES	FALCONIDAE	Falco	*Falco chicquera*	Red-headed Falcon	NT	Decreasing	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
50	PASSERIFORMES	PELLORNEIDAE	Laticilla	*Laticilla burnesii*	Rufous-vented Grass-babbler	NT	Decreasing	2017	10/1/2016	No	Yes	Yes	Not a Migrant	No
51	GALLIFORMES	PHASIANIDAE	Ammoperdix	*Ammoperdix griseogularis*	See-see Partridge	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
52	GALLIFORMES	PHASIANIDAE	Alectoris	*Alectoris chukar*	Chukar	LC	Stable	2019	8/9/2018	No	No	Yes	Not a Migrant	No
53	GALLIFORMES	PHASIANIDAE	Francolinus	*Francolinus francolinus*	Black Francolin	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
54	GALLIFORMES	PHASIANIDAE	Ortygornis	*Ortygornis pondicerianus*	Grey Francolin	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
55	GALLIFORMES	PHASIANIDAE	Coturnix	*Coturnix coturnix*	Common Quail	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
56	GALLIFORMES	PHASIANIDAE	Coturnix	*Coturnix coromandelica*	Rain Quail	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
57	ANSERIFORMES	ANATIDAE	Dendrocygna	*Dendrocygna javanica*	Lesser Whistling-duck	LC	Decreasing	2024	7/22/2024	Yes	Yes	Yes	Not a Migrant	No
58	ANSERIFORMES	ANATIDAE	Anser	*Anser albifrons*	Greater White-fronted Goose	LC	Unknown	2022	2/9/2022	Yes	Yes	Yes	Full Migrant	No
59	ANSERIFORMES	ANATIDAE	Anser	*Anser anser*	Greylag Goose	LC	Increasing	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
60	ANSERIFORMES	ANATIDAE	Anser	*Anser indicus*	Bar-headed Goose	LC	Decreasing	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
61	ANSERIFORMES	ANATIDAE	Tadorna	*Tadorna ferruginea*	Ruddy Shelduck	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
62	ANSERIFORMES	ANATIDAE	Tadorna	*Tadorna tadorna*	Common Shelduck	LC	Increasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
63	ANSERIFORMES	ANATIDAE	Nettapus	*Nettapus coromandelianus*	Cotton Pygmy-goose	LC	Unknown	2024	7/22/2024	No	Yes	Yes	Full Migrant	No
64	ANSERIFORMES	ANATIDAE	Mareca	*Mareca strepera*	Gadwall	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
65	ANSERIFORMES	ANATIDAE	Mareca	*Mareca penelope*	Eurasian Wigeon	LC	Decreasing	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
66	ANSERIFORMES	ANATIDAE	Anas	*Anas platyrhynchos*	Mallard	LC	Increasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
67	ANSERIFORMES	ANATIDAE	Spatula	*Spatula clypeata*	Northern Shoveler	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
68	ANSERIFORMES	ANATIDAE	Anas	*Anas acuta*	Northern Pintail	LC	Decreasing	2019	8/13/2019	Yes	Yes	Yes	Full Migrant	No
69	ANSERIFORMES	ANATIDAE	Spatula	*Spatula querquedula*	Garganey	LC	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
70	ANSERIFORMES	ANATIDAE	Anas	*Anas crecca*	Common Teal	LC	Unknown	2020	8/13/2020	No	Yes	Yes	Full Migrant	No
71	ANSERIFORMES	ANATIDAE	Netta	*Netta rufina*	Red-crested Pochard	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
72	ANSERIFORMES	ANATIDAE	Aythya	*Aythya fuligula*	Tufted Duck	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
73	ANSERIFORMES	ANATIDAE	Mergellus	*Mergellus albellus*	Smew	LC	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
74	ANSERIFORMES	ANATIDAE	Mergus	*Mergus serrator*	Red-breasted Merganser	LC	Stable	2018	8/7/2018	Yes	Yes	Yes	Full Migrant	No
75	ANSERIFORMES	ANATIDAE	Mergus	*Mergus merganser*	Goosander	LC	Unknown	2018	8/7/2018	Yes	Yes	Yes	Full Migrant	No
76	CHARADRIIFORMES	TURNICIDAE	Turnix	*Turnix sylvaticus*	Common Buttonquail	LC	Decreasing	2016	10/1/2016	No	No	Yes	Not a Migrant	No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
77	CHARADRIIFORMES	TURNICIDAE	Turnix	*Turnix tanki*	Yellow-legged Buttonquail	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
78	PICIFORMES	PICIDAE	Leiopicus	*Leiopicus mahrattensis*	Yellow-crowned Woodpecker	LC	Stable	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
79	PICIFORMES	PICIDAE	Dendrocopos	*Dendrocopos assimilis*	Sind Woodpecker	LC	Decreasing	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
80	PICIFORMES	PICIDAE	Picus	*Picus squamatus*	Scaly-bellied Woodpecker	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
81	BUCEROTIFORMES	UPUPIDAE	Upupa	*Upupa epops*	Common Hoopoe	LC	Decreasing	2020	8/14/2020	No	No	Yes	Full Migrant	No
82	CORACIIFORMES	CORACIIDAE	Coracias	*Coracias garrulus*	European Roller	LC	Decreasing	2019	8/14/2019	No	No	Yes	Full Migrant	No
83	CORACIIFORMES	ALCEDINIDAE	Alcedo	*Alcedo atthis*	Common Kingfisher	LC	Decreasing	2024	5/14/2024	Yes	Yes	Yes	Full Migrant	No
84	CORACIIFORMES	ALCEDINIDAE	Ceryle	*Ceryle rudis*	Pied Kingfisher	LC	Unknown	2017	10/1/2016	Yes	Yes	Yes	Not a Migrant	No
85	CORACIIFORMES	MEROPIDAE	Merops	*Merops persicus*	Blue-cheeked Bee-eater	LC	Increasing	2024	5/14/2024	Yes	Yes	Yes	Full Migrant	No
86	CORACIIFORMES	MEROPIDAE	Merops	*Merops apiaster*	European Bee-eater	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
87	CUCULIFORMES	CUCULIDAE	Clamator	*Clamator jacobinus*	Jacobin Cuckoo	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
88	CUCULIFORMES	CUCULIDAE	Cuculus	*Cuculus canorus*	Common Cuckoo	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
89	CUCULIFORMES	CUCULIDAE	Eudynamys	*Eudynamys scolopaceus*	Western Koel	LC	Stable	2016	10/1/2016	No	No	Yes	Full Migrant	No
90	CUCULIFORMES	CUCULIDAE	Taccocua	*Taccocua leschenaultii*	Sirkeer Malkoha	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
91	CUCULIFORMES	CUCULIDAE	Centropus	*Centropus sinensis*	Greater Coucal	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
92	PSITTACIFORMES	PSITTACIDAE	Alexandrinus	*Alexandrinus krameri*	Rose-ringed Parakeet	LC	Increasing	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
93	CAPRIMULGIFORMES	APODIDAE	Tachymarptis	*Tachymarptis melba*	Alpine Swift	LC	Unknown	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
94	CAPRIMULGIFORMES	APODIDAE	Apus	*Apus apus*	Common Swift	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
95	CAPRIMULGIFORMES	APODIDAE	Apus	*Apus affinis*	Little Swift	LC	Increasing	2016	10/1/2016	No	No	Yes	Full Migrant	No
96	STRIGIFORMES	TYTONIDAE	Tyto	*Tyto alba*	Common Barn-owl	LC	Stable	2019	10/1/2016	No	Yes	Yes	Not a Migrant	No
97	STRIGIFORMES	STRIGIDAE	Otus	*Otus brucei*	Pallid Scops-owl	LC	Stable	2021	8/12/2021	No	No	Yes	Full Migrant	No
98	STRIGIFORMES	STRIGIDAE	Bubo	*Bubo bubo*	Eurasian Eagle-owl	LC	Decreasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
99	STRIGIFORMES	STRIGIDAE	Bubo	*Bubo bengalensis*	Rock Eagle-owl	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
100	STRIGIFORMES	STRIGIDAE	Bubo	*Bubo coromandus*	Dusky Eagle-owl	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
101	STRIGIFORMES	STRIGIDAE	Ketupa	*Ketupa zeylonensis*	Brown Fish-owl	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
102	STRIGIFORMES	STRIGIDAE	Athene	*Athene noctua*	Little Owl	LC	Stable	2019	8/9/2018	No	No	Yes	Not a Migrant	No
103	STRIGIFORMES	STRIGIDAE	Athene	*Athene brama*	Spotted Owlet	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
104	STRIGIFORMES	STRIGIDAE	Asio	*Asio otus*	Long-eared Owl	LC	Decreasing	2021	5/7/2021	No	No	Yes	Full Migrant	No
105	STRIGIFORMES	STRIGIDAE	Asio	*Asio flammeus*	Short-eared Owl	LC	Decreasing	2021	6/17/2021	No	Yes	Yes	Full Migrant	No
106	CAPRIMULGIFORMES	CAPRIMULGIDAE	Caprimulgus	*Caprimulgus europaeus*	European Nightjar	LC	Decreasing	2016	10/1/2016	No	No	Yes	Full Migrant	No
107	CAPRIMULGIFORMES	CAPRIMULGIDAE	Caprimulgus	*Caprimulgus mahrattensis*	Sykes's Nightjar	LC	Stable	2024	6/12/2024	Yes	No	Yes	Full Migrant	No
108	CAPRIMULGIFORMES	CAPRIMULGIDAE	Caprimulgus	*Caprimulgus asiaticus*	Indian Nightjar	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
109	COLUMBIFORMES	COLUMBIDAE	Columba	*Columba livia*	Rock Dove	LC	Decreasing	2019	10/1/2016	No	No	Yes	Not a Migrant	No
110	COLUMBIFORMES	COLUMBIDAE	Columba	*Columba palumbus*	Common Woodpigeon	LC	Increasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
111	COLUMBIFORMES	COLUMBIDAE	Spilopelia	*Spilopelia senegalensis*	Laughing Dove	LC	Stable	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
112	COLUMBIFORMES	COLUMBIDAE	Streptopelia	*Streptopelia tranquebarica*	Red Collared-dove	LC	Decreasing	2018	8/7/2018	No	No	Yes	Full Migrant	No
113	COLUMBIFORMES	COLUMBIDAE	Treron	*Treron phoenicopterus*	Yellow-footed Green-pigeon	LC	Increasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
114	GRUIFORMES	GRUIDAE	Anthropoides	*Anthropoides virgo*	Demoiselle Crane	LC	Increasing	2018	8/9/2018	No	Yes	Yes	Full Migrant	No
115	GRUIFORMES	GRUIDAE	Grus	*Grus grus*	Common Crane	LC	Increasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
116	GRUIFORMES	RALLIDAE	Amaurornis	*Amaurornis phoenicurus*	White-breasted Waterhen	LC	Unknown	2024	7/22/2024	Yes	Yes	Yes	Full Migrant	No
117	GRUIFORMES	RALLIDAE	Zapornia	*Zapornia parva*	Little Crake	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No

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118	GRUIFORMES	RALLIDAE	Zapornia	*Zapornia pusilla*	Baillon's Crake	LC	Unknown	2019	8/15/2019	Yes	Yes	Yes	Full Migrant	No
119	GRUIFORMES	RALLIDAE	Porzana	*Porzana porzana*	Spotted Crake	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
120	GRUIFORMES	RALLIDAE	Gallicrex	*Gallicrex cinerea*	Watercock	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
121	GRUIFORMES	RALLIDAE	Porphyrio	*Porphyrio porphyrio*	Purple Swamphen	LC	Unknown	2019	10/1/2016	Yes	Yes	Yes	Not a Migrant	No
122	GRUIFORMES	RALLIDAE	Fulica	*Fulica atra*	Eurasian Coot	LC	Increasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
123	PTEROCLIFORMES	PTEROCLIDAE	Pterocles	*Pterocles alchata*	Pin-tailed Sandgrouse	LC	Stable	2019	8/7/2018	No	No	Yes	Full Migrant	No
124	PTEROCLIFORMES	PTEROCLIDAE	Pterocles	*Pterocles exustus*	Chestnut-bellied Sandgrouse	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
125	PTEROCLIFORMES	PTEROCLIDAE	Pterocles	*Pterocles senegallus*	Spotted Sandgrouse	LC	Stable	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
126	PTEROCLIFORMES	PTEROCLIDAE	Pterocles	*Pterocles orientalis*	Black-bellied Sandgrouse	LC	Decreasing	2018	8/7/2018	No	No	Yes	Full Migrant	No
127	PTEROCLIFORMES	PTEROCLIDAE	Pterocles	*Pterocles coronatus*	Crowned Sandgrouse	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
128	PTEROCLIFORMES	PTEROCLIDAE	Pterocles	*Pterocles lichtensteinii*	Lichtenstein's Sandgrouse	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
129	CHARADRIIFORMES	SCOLOPACIDAE	Scolopax	*Scolopax rusticola*	Eurasian Woodcock	LC	Stable	2019	10/1/2016	No	No	Yes	Full Migrant	No
130	CHARADRIIFORMES	SCOLOPACIDAE	Gallinago	*Gallinago solitaria*	Solitary Snipe	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
131	CHARADRIIFORMES	SCOLOPACIDAE	Gallinago	*Gallinago gallinago*	Common Snipe	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
132	CHARADRIIFORMES	SCOLOPACIDAE	Lymnocryptes	*Lymnocryptes minimus*	Jack Snipe	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
133	CHARADRIIFORMES	SCOLOPACIDAE	Numenius	*Numenius phaeopus*	Whimbrel	LC	Decreasing	2024	7/4/2024	Yes	Yes	Yes	Full Migrant	No
134	CHARADRIIFORMES	SCOLOPACIDAE	Tringa	*Tringa erythropus*	Spotted Redshank	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
135	CHARADRIIFORMES	SCOLOPACIDAE	Tringa	*Tringa totanus*	Common Redshank	LC	Unknown	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
136	CHARADRIIFORMES	SCOLOPACIDAE	Tringa	*Tringa nebularia*	Common Greenshank	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
137	CHARADRIIFORMES	SCOLOPACIDAE	Tringa	*Tringa ochropus*	Green Sandpiper	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
138	CHARADRIIFORMES	SCOLOPACIDAE	Tringa	*Tringa glareola*	Wood Sandpiper	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
139	CHARADRIIFORMES	SCOLOPACIDAE	Xenus	*Xenus cinereus*	Terek Sandpiper	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
140	CHARADRIIFORMES	SCOLOPACIDAE	Actitis	*Actitis hypoleucos*	Common Sandpiper	LC	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
141	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris alba*	Sanderling	LC	Decreasing	2024	7/5/2024	Yes	Yes	Yes	Full Migrant	No
142	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris minuta*	Little Stint	LC	Increasing	2019	11/21/2018	Yes	Yes	Yes	Full Migrant	No
143	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris temminckii*	Temminck's Stint	LC	Unknown	2019	11/21/2018	Yes	Yes	Yes	Full Migrant	No
144	CHARADRIIFORMES	SCOLOPACIDAE	Calidris	*Calidris pugnax*	Ruff	LC	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
145	CHARADRIIFORMES	JACANIDAE	Hydrophasianus	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	LC	Unknown	2024	7/22/2024	No	Yes	Yes	Full Migrant	No
146	CHARADRIIFORMES	JACANIDAE	Metopidius	*Metopidius indicus*	Bronze-winged Jacana	LC	Unknown	2024	7/22/2024	No	Yes	Yes	Not a Migrant	No
147	CHARADRIIFORMES	RECURVIROSTRIDAE	Recurvirostra	*Recurvirostra avosetta*	Pied Avocet	LC	Unknown	2021	9/4/2020	Yes	Yes	Yes	Full Migrant	No
148	CHARADRIIFORMES	CHARADRIIDAE	Pluvialis	*Pluvialis fulva*	Pacific Golden Plover	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
149	CHARADRIIFORMES	CHARADRIIDAE	Charadrius	*Charadrius hiaticula*	Common Ringed Plover	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
150	CHARADRIIFORMES	CHARADRIIDAE	Charadrius	*Charadrius dubius*	Little Ringed Plover	LC	Stable	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
151	CHARADRIIFORMES	CHARADRIIDAE	Charadrius	*Charadrius leschenaultii*	Greater Sandplover	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
152	CHARADRIIFORMES	CHARADRIIDAE	Charadrius	*Charadrius asiaticus*	Caspian Plover	LC	Decreasing	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
153	CHARADRIIFORMES	CHARADRIIDAE	Vanellus	*Vanellus malabaricus*	Yellow-wattled Lapwing	LC	Stable	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
154	CHARADRIIFORMES	CHARADRIIDAE	Vanellus	*Vanellus indicus*	Red-wattled Lapwing	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
155	CHARADRIIFORMES	CHARADRIIDAE	Vanellus	*Vanellus leucurus*	White-tailed Lapwing	LC	Unknown	2020	8/12/2020	Yes	Yes	Yes	Full Migrant	No
156	CHARADRIIFORMES	DROMADIDAE	Dromas	*Dromas ardeola*	Crab-plover	LC	Stable	2024	7/22/2024	Yes	No	Yes	Full Migrant	No
157	CHARADRIIFORMES	GLAREOLIDAE	Cursorius	*Cursorius coromandelicus*	Indian Courser	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No

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158	CHARADRIIFORMES	GLAREOLIDAE	Glareola	*Glareola pratincola*	Collared Pratincole	LC	Decreasing	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
159	CHARADRIIFORMES	GLAREOLIDAE	Glareola	*Glareola maldivarum*	Oriental Pratincole	LC	Stable	2024	7/22/2024	Yes	Yes	Yes	Full Migrant	No
160	CHARADRIIFORMES	GLAREOLIDAE	Glareola	*Glareola lactea*	Little Pratincole	LC	Unknown	2024	7/22/2024	Yes	Yes	Yes	Full Migrant	No
161	CHARADRIIFORMES	STERCORARIIDAE	Stercorarius	*Stercorarius pomarinus*	Pomarine Jaeger	LC	Stable	2018	8/7/2018	Yes	Yes	Yes	Full Migrant	No
162	CHARADRIIFORMES	LARIDAE	Larus	*Larus hemprichii*	Sooty Gull	LC	Decreasing	2018	8/8/2018	Yes	No	Yes	Full Migrant	No
163	CHARADRIIFORMES	LARIDAE	Larus	*Larus fuscus*	Lesser Black-backed Gull	LC	Increasing	2019	8/8/2018	Yes	Yes	Yes	Full Migrant	No
164	CHARADRIIFORMES	LARIDAE	Larus	*Larus ichthyaetus*	Pallas's Gull	LC	Increasing	2018	8/8/2018	Yes	Yes	Yes	Full Migrant	No
165	CHARADRIIFORMES	LARIDAE	Larus	*Larus brunnicephalus*	Brown-headed Gull	LC	Stable	2018	8/8/2018	Yes	Yes	Yes	Full Migrant	No
166	CHARADRIIFORMES	LARIDAE	Larus	*Larus ridibundus*	Black-headed Gull	LC	Unknown	2018	8/17/2018	Yes	Yes	Yes	Full Migrant	No
167	CHARADRIIFORMES	LARIDAE	Larus	*Larus genei*	Slender-billed Gull	LC	Unknown	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
168	CHARADRIIFORMES	LARIDAE	Hydroprogne	*Hydroprogne caspia*	Caspian Tern	LC	Increasing	2019	8/7/2018	Yes	Yes	Yes	Full Migrant	No
169	CHARADRIIFORMES	LARIDAE	Thalasseus	*Thalasseus bengalensis*	Lesser Crested Tern	LC	Stable	2018	8/7/2018	Yes	No	Yes	Full Migrant	No
170	CHARADRIIFORMES	LARIDAE	Thalasseus	*Thalasseus bergii*	Greater Crested Tern	LC	Stable	2018	8/7/2018	Yes	No	Yes	Full Migrant	No
171	CHARADRIIFORMES	LARIDAE	Thalasseus	*Thalasseus sandvicensis*	Sandwich Tern	LC	Stable	2019	8/15/2019	Yes	No	Yes	Full Migrant	No
172	CHARADRIIFORMES	LARIDAE	Sterna	*Sterna hirundo*	Common Tern	LC	Unknown	2019	8/7/2018	Yes	Yes	Yes	Full Migrant	No
173	CHARADRIIFORMES	LARIDAE	Sternula	*Sternula albifrons*	Little Tern	LC	Decreasing	2019	8/7/2018	Yes	Yes	Yes	Full Migrant	No
174	CHARADRIIFORMES	LARIDAE	Sternula	*Sternula saundersi*	Saunders's Tern	LC	Decreasing	2019	8/7/2018	Yes	No	Yes	Full Migrant	No
175	CHARADRIIFORMES	LARIDAE	Sterna	*Sterna repressa*	White-cheeked Tern	LC	Decreasing	2019	8/15/2019	Yes	No	Yes	Full Migrant	No
176	CHARADRIIFORMES	LARIDAE	Onychoprion	*Onychoprion fuscatus*	Sooty Tern	LC	Unknown	2020	2/19/2020	Yes	No	Yes	Full Migrant	No
177	CHARADRIIFORMES	LARIDAE	Chlidonias	*Chlidonias hybrida*	Whiskered Tern	LC	Stable	2017	10/1/2016	Yes	Yes	Yes	Full Migrant	No
178	CHARADRIIFORMES	LARIDAE	Chlidonias	*Chlidonias leucopterus*	White-winged Tern	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
179	ACCIPITRIFORMES	PANDIONIDAE	Pandion	*Pandion haliaetus*	Osprey	LC	Increasing	2021	8/17/2021	Yes	Yes	Yes	Full Migrant	No
180	ACCIPITRIFORMES	ACCIPITRIDAE	Pernis	*Pernis ptilorhynchus*	Oriental Honey-buzzard	LC	Decreasing	2021	4/7/2021	No	No	Yes	Full Migrant	No
181	ACCIPITRIFORMES	ELANIDAE	Elanus	*Elanus caeruleus*	Black-winged Kite	LC	Stable	2019	6/10/2019	No	No	Yes	Not a Migrant	No
182	ACCIPITRIFORMES	ACCIPITRIDAE	Haliastur	*Haliastur indus*	Brahminy Kite	LC	Decreasing	2024	6/12/2024	Yes	Yes	Yes	Not a Migrant	No
183	ACCIPITRIFORMES	ACCIPITRIDAE	Haliaeetus	*Haliaeetus albicilla*	White-tailed Sea-eagle	LC	Increasing	2021	8/20/2021	Yes	Yes	Yes	Full Migrant	No
184	ACCIPITRIFORMES	ACCIPITRIDAE	Gyps	*Gyps fulvus*	Griffon Vulture	LC	Increasing	2021	8/11/2021	No	No	Yes	Full Migrant	No
185	ACCIPITRIFORMES	ACCIPITRIDAE	Circus	*Circus aeruginosus*	Western Marsh-harrier	LC	Stable	2021	6/22/2021	No	Yes	Yes	Full Migrant	No
186	ACCIPITRIFORMES	ACCIPITRIDAE	Circus	*Circus pygargus*	Montagu's Harrier	LC	Decreasing	2021	5/6/2021	No	Yes	Yes	Full Migrant	No
187	ACCIPITRIFORMES	ACCIPITRIDAE	Accipiter	*Accipiter badius*	Shikra	LC	Stable	2021	3/11/2021	No	No	Yes	Full Migrant	No
188	ACCIPITRIFORMES	ACCIPITRIDAE	Accipiter	*Accipiter nisus*	Eurasian Sparrowhawk	LC	Stable	2021	4/9/2021	No	No	Yes	Full Migrant	No
189	ACCIPITRIFORMES	ACCIPITRIDAE	Butastur	*Butastur teesa*	White-eyed Buzzard	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
190	ACCIPITRIFORMES	ACCIPITRIDAE	Aquila	*Aquila chrysaetos*	Golden Eagle	LC	Stable	2021	5/27/2021	No	No	Yes	Full Migrant	No
191	ACCIPITRIFORMES	ACCIPITRIDAE	Aquila	*Aquila fasciata*	Bonelli's Eagle	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Not a Migrant	No
192	ACCIPITRIFORMES	ACCIPITRIDAE	Hieraaetus	*Hieraaetus pennatus*	Booted Eagle	LC	Stable	2021	8/12/2021	No	No	Yes	Full Migrant	No
193	FALCONIFORMES	FALCONIDAE	Falco	*Falco tinnunculus*	Common Kestrel	LC	Decreasing	2021	8/10/2021	No	No	Yes	Full Migrant	No
194	FALCONIFORMES	FALCONIDAE	Falco	*Falco columbarius*	Merlin	LC	Stable	2021	8/12/2021	Yes	No	Yes	Full Migrant	No
195	FALCONIFORMES	FALCONIDAE	Falco	*Falco subbuteo*	Eurasian Hobby	LC	Decreasing	2021	8/10/2021	No	Yes	Yes	Full Migrant	No
196	PODICIPEDIFORMES	PODICIPEDIDAE	Tachybaptus	*Tachybaptus ruficollis*	Little Grebe	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
197	PODICIPEDIFORMES	PODICIPEDIDAE	Podiceps	*Podiceps cristatus*	Great Crested Grebe	LC	Unknown	2019	8/11/2019	Yes	Yes	Yes	Full Migrant	No
198	PODICIPEDIFORMES	PODICIPEDIDAE	Podiceps	*Podiceps nigricollis*	Black-necked Grebe	LC	Unknown	2018	8/7/2018	Yes	Yes	Yes	Full Migrant	No

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199	PHAETHONTIFORMES	PHAETHONTIDAE	Phaethon	*Phaethon aethereus*	Red-billed Tropicbird	LC	Decreasing	2019	8/1/2019	Yes	No	Yes	Not a Migrant	Yes
200	SULIFORMES	ANHINGIDAE	Anhinga	*Anhinga melanogaster*	Oriental Darter	LC	Increasing	2024	6/3/2024	No	Yes	Yes	Not a Migrant	No
201	SULIFORMES	PHALACROCORACIDAE	Microcarbo	*Microcarbo niger*	Little Cormorant	LC	Unknown	2024	7/22/2024	No	Yes	Yes	Not a Migrant	No
202	SULIFORMES	PHALACROCORACIDAE	Phalacrocorax	*Phalacrocorax fuscicollis*	Indian Cormorant	LC	Unknown	2018	8/8/2018	Yes	Yes	Yes	Not a Migrant	No
203	SULIFORMES	PHALACROCORACIDAE	Phalacrocorax	*Phalacrocorax carbo*	Great Cormorant	LC	Increasing	2019	8/9/2018	Yes	Yes	Yes	Full Migrant	No
204	PELECANIFORMES	ARDEIDAE	Ardea	*Ardea cinerea*	Grey Heron	LC	Unknown	2019	8/13/2019	Yes	Yes	Yes	Full Migrant	No
205	PELECANIFORMES	ARDEIDAE	Ardea	*Ardea purpurea*	Purple Heron	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
206	PELECANIFORMES	ARDEIDAE	Ardea	*Ardea alba*	Great White Egret	LC	Unknown	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
207	PELECANIFORMES	ARDEIDAE	Bubulcus	*Bubulcus ibis*	Cattle Egret	LC	Increasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
208	PELECANIFORMES	ARDEIDAE	Ardeola	*Ardeola grayii*	Indian Pond Heron	LC	Unknown	2024	7/22/2024	Yes	Yes	Yes	Not a Migrant	No
209	PELECANIFORMES	ARDEIDAE	Nycticorax	*Nycticorax nycticorax*	Black-crowned Night Heron	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
210	PELECANIFORMES	ARDEIDAE	Ixobrychus	*Ixobrychus sinensis*	Yellow Bittern	LC	Unknown	2024	7/22/2024	No	Yes	Yes	Full Migrant	No
211	PELECANIFORMES	ARDEIDAE	Ixobrychus	*Ixobrychus cinnamomeus*	Cinnamon Bittern	LC	Unknown	2024	7/22/2024	No	Yes	Yes	Full Migrant	No
212	PELECANIFORMES	ARDEIDAE	Ixobrychus	*Ixobrychus flavicollis*	Black Bittern	LC	Unknown	2024	7/22/2024	Yes	Yes	Yes	Full Migrant	No
213	PELECANIFORMES	ARDEIDAE	Botaurus	*Botaurus stellaris*	Eurasian Bittern	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
214	PHOENICOPTERIFORMES	PHOENICOPTERIDAE	Phoenicopterus	*Phoenicopterus roseus*	Greater Flamingo	LC	Increasing	2019	8/7/2018	Yes	Yes	Yes	Full Migrant	No
215	PELECANIFORMES	THRESKIORNITHIDAE	Plegadis	*Plegadis falcinellus*	Glossy Ibis	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
216	PELECANIFORMES	THRESKIORNITHIDAE	Threskiornis	*Threskiornis melanocephalus*	Black-headed Ibis	LC	Increasing	2024	6/3/2024	No	Yes	Yes	Not a Migrant	No
217	PELECANIFORMES	THRESKIORNITHIDAE	Pseudibis	*Pseudibis papillosa*	Red-naped Ibis	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
218	PELECANIFORMES	THRESKIORNITHIDAE	Platalea	*Platalea leucorodia*	Eurasian Spoonbill	LC	Unknown	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
219	PELECANIFORMES	PELECANIDAE	Pelecanus	*Pelecanus onocrotalus*	Great White Pelican	LC	Unknown	2021	9/4/2020	Yes	Yes	Yes	Full Migrant	No
220	CICONIIFORMES	CICONIIDAE	Mycteria	*Mycteria leucocephala*	Painted Stork	LC	Increasing	2023	7/26/2023	Yes	Yes	Yes	Not a Migrant	No
221	CICONIIFORMES	CICONIIDAE	Anastomus	*Anastomus oscitans*	Asian Openbill	LC	Unknown	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
222	CICONIIFORMES	CICONIIDAE	Ciconia	*Ciconia nigra*	Black Stork	LC	Unknown	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
223	CICONIIFORMES	CICONIIDAE	Ciconia	*Ciconia ciconia*	White Stork	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
224	PROCELLARIIFORMES	PROCELLARIIDAE	Ardenna	*Ardenna pacifica*	Wedge-tailed Shearwater	LC	Decreasing	2018	8/7/2018	Yes	No	Yes	Full Migrant	No
225	PROCELLARIIFORMES	PROCELLARIIDAE	Puffinus	*Puffinus persicus*	Persian Shearwater	LC	Decreasing	2019	8/7/2018	Yes	No	Yes	Full Migrant	No
226	PROCELLARIIFORMES	OCEANITIDAE	Oceanites	*Oceanites oceanicus*	Wilson's Storm-petrel	LC	Stable	2018	8/7/2018	Yes	No	Yes	Full Migrant	Yes
227	PROCELLARIIFORMES	OCEANITIDAE	Fregetta	*Fregetta tropica*	Black-bellied Storm-petrel	LC	Decreasing	2018	8/7/2018	Yes	No	Yes	Full Migrant	Yes
228	PASSERIFORMES	LANIIDAE	Lanius	*Lanius vittatus*	Bay-backed Shrike	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
229	PASSERIFORMES	LANIIDAE	Lanius	*Lanius schach*	Long-tailed Shrike	LC	Unknown	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
230	PASSERIFORMES	CORVIDAE	Dendrocitta	*Dendrocitta vagabunda*	Rufous Treepie	LC	Decreasing	2018	8/6/2018	No	No	Yes	Not a Migrant	No
231	PASSERIFORMES	CORVIDAE	Pyrrhocorax	*Pyrrhocorax pyrrhocorax*	Red-billed Chough	LC	Unknown	2024	5/14/2024	Yes	No	Yes	Not a Migrant	No
232	PASSERIFORMES	CORVIDAE	Pyrrhocorax	*Pyrrhocorax graculus*	Yellow-billed Chough	LC	Unknown	2024	5/14/2024	No	No	Yes	Not a Migrant	No
233	PASSERIFORMES	CORVIDAE	Corvus	*Corvus splendens*	House Crow	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
234	PASSERIFORMES	CORVIDAE	Corvus	*Corvus frugilegus*	Rook	LC	Decreasing	2017	10/1/2016	No	No	Yes	Full Migrant	No

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235	PASSERIFORMES	CORVIDAE	Corvus	*Corvus corone*	Carrion Crow	LC	Stable	2024	5/14/2024	Yes	Yes	Yes	Full Migrant	No
236	PASSERIFORMES	CORVIDAE	Corvus	*Corvus ruficollis*	Brown-necked Raven	LC	Increasing	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
237	PASSERIFORMES	CORVIDAE	Corvus	*Corvus corax*	Common Raven	LC	Increasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
238	PASSERIFORMES	CAMPEPHAGIDAE	Pericrocotus	*Pericrocotus cinnamomeus*	Small Minivet	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
239	PASSERIFORMES	CAMPEPHAGIDAE	Pericrocotus	*Pericrocotus ethologus*	Long-tailed Minivet	LC	Decreasing	2018	8/7/2018	No	No	Yes	Full Migrant	No
240	PASSERIFORMES	RHIPIDURIDAE	Rhipidura	*Rhipidura aureola*	White-browed Fantail	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
241	PASSERIFORMES	DICRURIDAE	Dicrurus	*Dicrurus macrocercus*	Black Drongo	LC	Unknown	2024	6/12/2024	No	No	Yes	Full Migrant	No
242	PASSERIFORMES	MUSCICAPIDAE	Monticola	*Monticola saxatilis*	Rufous-tailed Rock-thrush	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
243	PASSERIFORMES	MUSCICAPIDAE	Monticola	*Monticola solitarius*	Blue Rock-thrush	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
244	PASSERIFORMES	MUSCICAPIDAE	Myophonus	*Myophonus caeruleus*	Blue Whistling-thrush	LC	Decreasing	2024	6/12/2024	No	Yes	Yes	Altitudinal Migrant	No
245	PASSERIFORMES	TURDIDAE	Turdus	*Turdus unicolor*	Tickell's Thrush	LC	Decreasing	2024	6/12/2024	No	No	Yes	Full Migrant	No
246	PASSERIFORMES	MUSCICAPIDAE	Muscicapa	*Muscicapa striata*	Spotted Flycatcher	LC	Decreasing	2019	8/9/2018	No	No	Yes	Full Migrant	No
247	PASSERIFORMES	MUSCICAPIDAE	Ficedula	*Ficedula ruficauda*	Rusty-tailed Flycatcher	LC	Decreasing	2024	6/12/2024	No	No	Yes	Full Migrant	No
248	PASSERIFORMES	STENOSTIRIDAE	Culicicapa	*Culicicapa ceylonensis*	Grey-headed Canary-flycatcher	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
249	PASSERIFORMES	MUSCICAPIDAE	Luscinia	*Luscinia svecica*	Bluethroat	LC	Stable	2019	11/1/2018	Yes	Yes	Yes	Full Migrant	No
250	PASSERIFORMES	MUSCICAPIDAE	Cercotrichas	*Cercotrichas galactotes*	Rufous-tailed Scrub-robin	LC	Stable	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
251	PASSERIFORMES	MUSCICAPIDAE	Copsychus	*Copsychus fulicatus*	Indian Robin	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
252	PASSERIFORMES	MUSCICAPIDAE	Phoenicurus	*Phoenicurus erythronotus*	Eversmann's Redstart	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
253	PASSERIFORMES	MUSCICAPIDAE	Phoenicurus	*Phoenicurus ochruros*	Black Redstart	LC	Increasing	2019	8/9/2018	Yes	No	Yes	Full Migrant	No
254	PASSERIFORMES	MUSCICAPIDAE	Phoenicurus	*Phoenicurus phoenicurus*	Common Redstart	LC	Increasing	2024	5/14/2024	No	No	Yes	Full Migrant	No
255	PASSERIFORMES	MUSCICAPIDAE	Saxicola	*Saxicola torquatus*	Common Stonechat	LC	Stable	2020	8/12/2020	No	Yes	Yes	Full Migrant	No
256	PASSERIFORMES	MUSCICAPIDAE	Saxicola	*Saxicola leucurus*	White-tailed Stonechat	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
257	PASSERIFORMES	MUSCICAPIDAE	Saxicola	*Saxicola caprata*	Pied Bushchat	LC	Stable	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
258	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe monacha*	Hooded Wheatear	LC	Stable	2019	8/9/2018	No	Yes	Yes	Not a Migrant	No
259	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe albonigra*	Hume's Wheatear	LC	Stable	2019	8/9/2018	No	No	Yes	Not a Migrant	No
260	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe finschii*	Finsch's Wheatear	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
261	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe picata*	Variable Wheatear	LC	Stable	2019	8/9/2018	No	No	Yes	Full Migrant	No
262	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe deserti*	Desert Wheatear	LC	Stable	2016	10/1/2016	No	No	Yes	Full Migrant	No
263	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe isabellina*	Isabelline Wheatear	LC	Unknown	2024	5/14/2024	Yes	No	Yes	Full Migrant	No
264	PASSERIFORMES	STURNIDAE	Sturnia	*Sturnia malabarica*	Chestnut-tailed Starling	LC	Unknown	2016	10/1/2016	No	No	Yes	Not a Migrant	No
265	PASSERIFORMES	STURNIDAE	Sturnia	*Sturnia pagodarum*	Brahminy Starling	LC	Unknown	2018	8/9/2018	No	No	Yes	Full Migrant	No
266	PASSERIFORMES	STURNIDAE	Sturnus	*Sturnus vulgaris*	Common Starling	LC	Decreasing	2019	10/31/2018	Yes	No	Yes	Full Migrant	No
267	PASSERIFORMES	STURNIDAE	Acridotheres	*Acridotheres tristis*	Common Myna	LC	Increasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
268	PASSERIFORMES	STURNIDAE	Acridotheres	*Acridotheres ginginianus*	Bank Myna	LC	Increasing	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
269	PASSERIFORMES	SITTIDAE	Sitta	*Sitta cashmirensis*	Kashmir Nuthatch	LC	Decreasing	2016	10/1/2016	No	No	Yes	Not a Migrant	No
270	PASSERIFORMES	SITTIDAE	Sitta	*Sitta tephronota*	Eastern Rock Nuthatch	LC	Unknown	2024	5/14/2024	No	Yes	Yes	Altitudinal Migrant	No
271	PASSERIFORMES	SITTIDAE	Tichodroma	*Tichodroma muraria*	Wallcreeper	LC	Stable	2019	8/9/2018	No	No	Yes	Full Migrant	No
272	PASSERIFORMES	CERTHIIDAE	Certhia	*Certhia himalayana*	Bar-tailed Treecreeper	LC	Decreasing	2024	6/12/2024	No	No	Yes	Altitudinal Migrant	No
273	PASSERIFORMES	REMIZIDAE	Remiz	*Remiz coronatus*	White-crowned Penduline-tit	LC	Decreasing	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
274	PASSERIFORMES	PARIDAE	Periparus	*Periparus rufonuchalis*	Rufous-naped Tit	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
275	PASSERIFORMES	AEGITHALIDAE	Aegithalos	*Aegithalos leucogenys*	White-cheeked Tit	LC	Stable	2016	10/1/2016	No	No	Yes	Altitudinal Migrant	No

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276	PASSERIFORMES	HIRUNDINIDAE	Ptyonoprogne	*Ptyonoprogne rupestris*	Eurasian Crag Martin	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
277	PASSERIFORMES	HIRUNDINIDAE	Ptyonoprogne	*Ptyonoprogne obsoleta*	Pale Rock Martin	LC	Increasing	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
278	PASSERIFORMES	HIRUNDINIDAE	Hirundo	*Hirundo rustica*	Barn Swallow	LC	Decreasing	2019	11/5/2018	No	Yes	Yes	Full Migrant	No
279	PASSERIFORMES	HIRUNDINIDAE	Hirundo	*Hirundo smithii*	Wire-tailed Swallow	LC	Increasing	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
280	PASSERIFORMES	HIRUNDINIDAE	Petrochelidon	*Petrochelidon fluvicola*	Streak-throated Swallow	LC	Increasing	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
281	PASSERIFORMES	PYCNONOTIDAE	Pycnonotus	*Pycnonotus leucotis*	White-eared Bulbul	LC	Decreasing	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
282	PASSERIFORMES	PYCNONOTIDAE	Pycnonotus	*Pycnonotus cafer*	Red-vented Bulbul	LC	Increasing	2018	8/9/2018	No	No	Yes	Not a Migrant	No
283	PASSERIFORMES	HYPOCOLIIDAE	Hypocolius	*Hypocolius ampelinus*	Hypocolius	LC	Unknown	2019	8/9/2018	No	No	Yes	Full Migrant	No
284	PASSERIFORMES	CISTICOLIDAE	Cisticola	*Cisticola juncidis*	Zitting Cisticola	LC	Unknown	2024	5/14/2024	Yes	Yes	Yes	Not a Migrant	No
285	PASSERIFORMES	SCOTOCERCIDAE	Scotocerca	*Scotocerca inquieta*	Streaked Scrub-warbler	LC	Decreasing	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
286	PASSERIFORMES	CISTICOLIDAE	Prinia	*Prinia crinigera*	Striated Prinia	LC	Stable	2024	6/12/2024	No	No	Yes	Altitudinal Migrant	No
287	PASSERIFORMES	CISTICOLIDAE	Prinia	*Prinia buchanani*	Rufous-fronted Prinia	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
288	PASSERIFORMES	CISTICOLIDAE	Prinia	*Prinia gracilis*	Graceful Prinia	LC	Stable	2019	10/1/2016	No	No	Yes	Not a Migrant	No
289	PASSERIFORMES	CISTICOLIDAE	Prinia	*Prinia inornata*	Plain Prinia	LC	Stable	2024	6/12/2024	Yes	Yes	Yes	Altitudinal Migrant	No
290	PASSERIFORMES	SCOTOCERCIDAE	Cettia	*Cettia cetti*	Cetti's Warbler	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
291	PASSERIFORMES	LOCUSTELLIDAE	Locustella	*Locustella fluviatilis*	River Warbler	LC	Decreasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
292	PASSERIFORMES	ACROCEPHALIDAE	Acrocephalus	*Acrocephalus melanopogon*	Moustached Warbler	LC	Stable	2018	8/6/2018	No	Yes	Yes	Full Migrant	No
293	PASSERIFORMES	ACROCEPHALIDAE	Acrocephalus	*Acrocephalus agricola*	Paddyfield Warbler	LC	Decreasing	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
294	PASSERIFORMES	ACROCEPHALIDAE	Acrocephalus	*Acrocephalus scirpaceus*	Common Reed-warbler	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
295	PASSERIFORMES	ACROCEPHALIDAE	Iduna	*Iduna rama*	Sykes's Warbler	LC	Stable	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
296	PASSERIFORMES	ACROCEPHALIDAE	Hippolais	*Hippolais languida*	Upcher's Warbler	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
297	PASSERIFORMES	CISTICOLIDAE	Orthotomus	*Orthotomus sutorius*	Common Tailorbird	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
298	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus trochilus*	Willow Warbler	LC	Decreasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
299	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus neglectus*	Plain Leaf-warbler	LC	Stable	2019	10/1/2016	No	No	Yes	Full Migrant	No
300	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus griseolus*	Sulphur-bellied Warbler	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
301	PASSERIFORMES	PARADOXORNITHIDAE	Chrysomma	*Chrysomma sinense*	Yellow-eyed Babbler	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
302	PASSERIFORMES	LEIOTRICHIDAE	Argya	*Argya caudata*	Common Babbler	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
303	PASSERIFORMES	LEIOTRICHIDAE	Argya	*Argya earlei*	Striated Babbler	LC	Decreasing	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
304	PASSERIFORMES	SYLVIIDAE	Sylvia	*Sylvia borin*	Garden Warbler	LC	Decreasing	2024	5/14/2024	No	No	Yes	Full Migrant	No
305	PASSERIFORMES	SYLVIIDAE	Curruca	*Curruca communis*	Common Whitethroat	LC	Increasing	2024	5/14/2024	No	No	Yes	Full Migrant	No
306	PASSERIFORMES	SYLVIIDAE	Curruca	*Curruca mystacea*	Menetries's Warbler	LC	Stable	2016	10/1/2016	Yes	No	Yes	Full Migrant	No
307	PASSERIFORMES	ALAUDIDAE	Mirafra	*Mirafra erythroptera*	Indian Bushlark	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
308	PASSERIFORMES	ALAUDIDAE	Eremopterix	*Eremopterix nigriceps*	Black-crowned Sparrow-lark	LC	Increasing	2024	6/12/2024	No	No	Yes	Nomadic	No
309	PASSERIFORMES	ALAUDIDAE	Eremopterix	*Eremopterix griseus*	Ashy-crowned Sparrow-lark	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
310	PASSERIFORMES	ALAUDIDAE	Ammomanes	*Ammomanes cinctura*	Bar-tailed Lark	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
311	PASSERIFORMES	ALAUDIDAE	Ammomanes	*Ammomanes deserti*	Desert Lark	LC	Increasing	2018	8/7/2018	No	No	Yes	Not a Migrant	No
312	PASSERIFORMES	ALAUDIDAE	Alaemon	*Alaemon alaudipes*	Greater Hoopoe-lark	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
313	PASSERIFORMES	ALAUDIDAE	Melanocorypha	*Melanocorypha bimaculata*	Bimaculated Lark	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
314	PASSERIFORMES	ALAUDIDAE	Calandrella	*Calandrella acutirostris*	Hume's Lark	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
315	PASSERIFORMES	ALAUDIDAE	Alaudala	*Alaudala raytal*	Sand Lark	LC	Stable	2024	6/12/2024	Yes	Yes	Yes	Not a Migrant	No

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316	PASSERIFORMES	ALAUDIDAE	Galerida	*Galerida cristata*	Crested Lark	LC	Decreasing	2024	5/14/2024	Yes	No	Yes	Full Migrant	No
317	PASSERIFORMES	ALAUDIDAE	Alauda	*Alauda gulgula*	Oriental Skylark	LC	Decreasing	2016	10/1/2016	Yes	Yes	Yes	Full Migrant	No
318	PASSERIFORMES	NECTARINIIDAE	Cinnyris	*Cinnyris asiaticus*	Purple Sunbird	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
319	PASSERIFORMES	PASSERIDAE	Passer	*Passer hispaniolensis*	Spanish Sparrow	LC	Decreasing	2019	8/14/2019	No	No	Yes	Full Migrant	No
320	PASSERIFORMES	PASSERIDAE	Passer	*Passer pyrrhonotus*	Sind Sparrow	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
321	PASSERIFORMES	PASSERIDAE	Passer	*Passer moabiticus*	Dead Sea Sparrow	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
322	PASSERIFORMES	PASSERIDAE	Passer	*Passer montanus*	Eurasian Tree Sparrow	LC	Decreasing	2017	10/1/2016	No	No	Yes	Not a Migrant	No
323	PASSERIFORMES	PASSERIDAE	Gymnoris	*Gymnoris xanthocollis*	Chestnut-shouldered Bush-sparrow	LC	Stable	2019	10/1/2016	No	No	Yes	Not a Migrant	No
324	PASSERIFORMES	PASSERIDAE	Petronia	*Petronia petronia*	Rock Sparrow	LC	Increasing	2024	5/14/2024	No	No	Yes	Not a Migrant	No
325	PASSERIFORMES	PASSERIDAE	Carpospiza	*Carpospiza brachydactyla*	Pale Sparrow	LC	Stable	2018	8/9/2018	No	No	Yes	Full Migrant	No
326	PASSERIFORMES	MOTACILLIDAE	Motacilla	*Motacilla alba*	White Wagtail	LC	Stable	2019	10/30/2018	No	Yes	Yes	Full Migrant	No
327	PASSERIFORMES	MOTACILLIDAE	Motacilla	*Motacilla citreola*	Citrine Wagtail	LC	Increasing	2019	8/15/2019	Yes	Yes	Yes	Full Migrant	No
328	PASSERIFORMES	MOTACILLIDAE	Motacilla	*Motacilla cinerea*	Grey Wagtail	LC	Stable	2017	10/1/2016	No	Yes	Yes	Full Migrant	No
329	PASSERIFORMES	MOTACILLIDAE	Anthus	*Anthus rufulus*	Paddyfield Pipit	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
330	PASSERIFORMES	MOTACILLIDAE	Anthus	*Anthus campestris*	Tawny Pipit	LC	Stable	2018	8/7/2018	Yes	No	Yes	Full Migrant	No
331	PASSERIFORMES	MOTACILLIDAE	Anthus	*Anthus trivialis*	Tree Pipit	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
332	PASSERIFORMES	MOTACILLIDAE	Anthus	*Anthus spinoletta*	Water Pipit	LC	Stable	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
333	PASSERIFORMES	PRUNELLIDAE	Prunella	*Prunella atrogularis*	Black-throated Accentor	LC	Stable	2016	10/1/2016	No	No	Yes	Full Migrant	No
334	PASSERIFORMES	PLOCEIDAE	Ploceus	*Ploceus benghalensis*	Black-breasted Weaver	LC	Stable	2018	8/9/2018	No	Yes	Yes	Not a Migrant	No
335	PASSERIFORMES	PLOCEIDAE	Ploceus	*Ploceus manyar*	Streaked Weaver	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
336	PASSERIFORMES	PLOCEIDAE	Ploceus	*Ploceus philippinus*	Baya Weaver	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
337	PASSERIFORMES	ESTRILDIDAE	Amandava	*Amandava amandava*	Red Avadavat	LC	Stable	2024	6/12/2024	No	Yes	Yes	Not a Migrant	No
338	PASSERIFORMES	ESTRILDIDAE	Euodice	*Euodice malabarica*	Indian Silverbill	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
339	PASSERIFORMES	FRINGILLIDAE	Fringilla	*Fringilla montifringilla*	Brambling	LC	Decreasing	2024	5/14/2024	No	No	Yes	Full Migrant	No
340	PASSERIFORMES	FRINGILLIDAE	Serinus	*Serinus pusillus*	Red-fronted Serin	LC	Unknown	2024	5/14/2024	No	No	Yes	Altitudinal Migrant	No
341	PASSERIFORMES	FRINGILLIDAE	Linaria	*Linaria cannabina*	Common Linnet	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
342	PASSERIFORMES	FRINGILLIDAE	Bucanetes	*Bucanetes githagineus*	Trumpeter Finch	LC	Unknown	2024	5/14/2024	No	No	Yes	Not a Migrant	No
343	PASSERIFORMES	FRINGILLIDAE	Bucanetes	*Bucanetes mongolicus*	Mongolian Finch	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
344	PASSERIFORMES	FRINGILLIDAE	Rhodospiza	*Rhodospiza obsoleta*	Desert Finch	LC	Stable	2016	10/1/2016	No	No	Yes	Not a Migrant	No
345	PASSERIFORMES	FRINGILLIDAE	Carpodacus	*Carpodacus erythrinus*	Common Rosefinch	LC	Decreasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
346	PASSERIFORMES	FRINGILLIDAE	Carpodacus	*Carpodacus rhodochlamys*	Red-mantled Rosefinch	LC	Stable	2018	8/9/2018	No	No	Yes	Altitudinal Migrant	No
347	PASSERIFORMES	FRINGILLIDAE	Mycerobas	*Mycerobas carnipes*	White-winged Grosbeak	LC	Stable	2024	6/12/2024	No	No	Yes	Altitudinal Migrant	No
348	PASSERIFORMES	EMBERIZIDAE	Emberiza	*Emberiza leucocephalos*	Pine Bunting	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
349	PASSERIFORMES	EMBERIZIDAE	Emberiza	*Emberiza stewarti*	White-capped Bunting	LC	Stable	2018	8/9/2018	No	No	Yes	Full Migrant	No
350	PASSERIFORMES	EMBERIZIDAE	Emberiza	*Emberiza buchanani*	Grey-necked Bunting	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
351	PASSERIFORMES	EMBERIZIDAE	Emberiza	*Emberiza melanocephala*	Black-headed Bunting	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
352	PASSERIFORMES	EMBERIZIDAE	Emberiza	*Emberiza schoeniclus*	Reed Bunting	LC	Decreasing	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
353	GRUIFORMES	RALLIDAE	Rallus	*Rallus aquaticus*	Western Water Rail	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Full Migrant	No
354	CORACIIFORMES	ALCEDINIDAE	Halcyon	*Halcyon smyrnensis*	White-throated Kingfisher	LC	Increasing	2017	10/1/2016	Yes	Yes	Yes	Not a Migrant	No
355	CORACIIFORMES	MEROPIDAE	Merops	*Merops orientalis*	Asian Green Bee-eater	LC	Increasing	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
356	CORACIIFORMES	CORACIIDAE	Coracias	*Coracias benghalensis*	Indian Roller	LC	Increasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
357	CHARADRIIFORMES	CHARADRIIDAE	Charadrius	*Charadrius alexandrinus*	Kentish Plover	LC	Decreasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
358	PELECANIFORMES	ARDEIDAE	Ardea	*Ardea intermedia*	Intermediate Egret	LC	Decreasing	2020	8/13/2020	Yes	Yes	Yes	Full Migrant	No
359	ACCIPITRIFORMES	ACCIPITRIDAE	Circus	*Circus cyaneus*	Hen Harrier	LC	Decreasing	2021	5/21/2021	No	Yes	Yes	Full Migrant	No
360	COLUMBIFORMES	COLUMBIDAE	Streptopelia	*Streptopelia decaocto*	Eurasian Collared-dove	LC	Increasing	2019	8/14/2019	No	No	Yes	Not a Migrant	No
361	CHARADRIIFORMES	RECURVIROSTRIDAE	Himantopus	*Himantopus himantopus*	Black-winged Stilt	LC	Increasing	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
362	PELECANIFORMES	ARDEIDAE	Butorides	*Butorides striata*	Green-backed Heron	LC	Stable	2022	12/6/2019	Yes	Yes	Yes	Full Migrant	No
363	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus sindianus*	Mountain Chiffchaff	LC	Stable	2019	8/7/2018	No	Yes	Yes	Full Migrant	No
364	PELECANIFORMES	ARDEIDAE	Egretta	*Egretta gularis*	Western Reef-egret	LC	Stable	2016	10/1/2016	Yes	Yes	Yes	Not a Migrant	No
365	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus nitidus*	Green Warbler	LC	Increasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
366	ACCIPITRIFORMES	ACCIPITRIDAE	Circaetus	*Circaetus gallicus*	Short-toed Snake-eagle	LC	Stable	2021	6/18/2021	No	No	Yes	Full Migrant	No
367	PASSERIFORMES	ACROCEPHALIDAE	Iduna	*Iduna pallida*	Eastern Olivaceous Warbler	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
368	PASSERIFORMES	SYLVIIDAE	Curruca	*Curruca crassirostris*	Eastern Orphean Warbler	LC	Unknown	2024	5/14/2024	No	No	Yes	Full Migrant	No
369	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe chrysopygia*	Red-tailed Wheatear	LC	Stable	2019	8/15/2019	No	Yes	Yes	Full Migrant	No
370	PASSERIFORMES	SYLVIIDAE	Curruca	*Curruca curruca*	Lesser Whitethroat	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
371	PASSERIFORMES	EMBERIZIDAE	Emberiza	*Emberiza striolata*	Striolated Bunting	LC	Increasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
372	PASSERIFORMES	LEIOTRICHIDAE	Trochalopteron	*Trochalopteron lineatum*	Streaked Laughingthrush	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
373	PELECANIFORMES	ARDEIDAE	Ixobrychus	*Ixobrychus minutus*	Common Little Bittern	LC	Decreasing	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
374	CHARADRIIFORMES	ROSTRATULIDAE	Rostratula	*Rostratula benghalensis*	Greater Painted-snipe	LC	Unknown	2024	7/22/2024	Yes	Yes	Yes	Not a Migrant	No
375	CHARADRIIFORMES	GLAREOLIDAE	Cursorius	*Cursorius cursor*	Cream-coloured Courser	LC	Decreasing	2019	10/1/2016	No	No	Yes	Full Migrant	No
376	PASSERIFORMES	MUSCICAPIDAE	Ficedula	*Ficedula parva*	Red-breasted Flycatcher	LC	Increasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
377	CHARADRIIFORMES	LARIDAE	Larus	*Larus cachinnans*	Caspian Gull	LC	Increasing	2018	8/8/2018	Yes	Yes	Yes	Full Migrant	No
378	PASSERIFORMES	PARIDAE	Parus	*Parus major*	Great Tit	LC	Stable	2024	5/14/2024	No	No	Yes	Not a Migrant	No
379	PASSERIFORMES	HIRUNDINIDAE	Riparia	*Riparia diluta*	Pale Sand Martin	LC	Unknown	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
380	PASSERIFORMES	TURDIDAE	Turdus	*Turdus atrogularis*	Black-throated Thrush	LC	Unknown	2017	10/1/2016	No	No	Yes	Full Migrant	No
381	ANSERIFORMES	ANATIDAE	Anas	*Anas poecilorhyncha*	Indian Spot-billed Duck	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
382	ACCIPITRIFORMES	ACCIPITRIDAE	Buteo	*Buteo rufinus*	Long-legged Buzzard	LC	Stable	2021	6/10/2021	No	No	Yes	Full Migrant	No
383	CHARADRIIFORMES	BURHINIDAE	Burhinus	*Burhinus oedicnemus*	Eurasian Thick-knee	LC	Decreasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
384	FALCONIFORMES	FALCONIDAE	Falco	*Falco peregrinus*	Peregrine Falcon	LC	Increasing	2021	8/10/2021	Yes	Yes	Yes	Full Migrant	No
385	PICIFORMES	PICIDAE	Dinopium	*Dinopium benghalense*	Black-rumped Flameback	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
386	STRIGIFORMES	STRIGIDAE	Otus	*Otus bakkamoena*	Indian Scops-owl	LC	Stable	2016	10/1/2016	No	Yes	Yes	Altitudinal Migrant	No
387	CHARADRIIFORMES	LARIDAE	Gelochelidon	*Gelochelidon nilotica*	Common Gull-billed Tern	LC	Decreasing	2019	8/14/2019	Yes	Yes	Yes	Full Migrant	No
388	GRUIFORMES	RALLIDAE	Gallinula	*Gallinula chloropus*	Common Moorhen	LC	Stable	2019	10/1/2016	Yes	Yes	Yes	Full Migrant	No
389	PELECANIFORMES	ARDEIDAE	Egretta	*Egretta garzetta*	Little Egret	LC	Increasing	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
390	PASSERIFORMES	ALAUDIDAE	Alauda	*Alauda arvensis*	Eurasian Skylark	LC	Decreasing	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
391	PASSERIFORMES	ORIOLIDAE	Oriolus	*Oriolus kundoo*	Indian Golden Oriole	LC	Unknown	2020	4/20/2020	No	No	Yes	Full Migrant	No
392	PASSERIFORMES	VANGIDAE	Tephrodornis	*Tephrodornis pondicerianus*	Common Woodshrike	LC	Decreasing	2024	6/12/2024	No	No	Yes	Not a Migrant	No
393	PASSERIFORMES	MONARCHIDAE	Terpsiphone	*Terpsiphone paradisi*	Indian Paradise-flycatcher	LC	Stable	2024	6/12/2024	No	No	Yes	Full Migrant	No
394	PASSERIFORMES	LANIIDAE	Lanius	*Lanius isabellinus*	Isabelline Shrike	LC	Stable	2016	10/1/2016	No	Yes	Yes	Full Migrant	No
395	PASSERIFORMES	LANIIDAE	Lanius	*Lanius phoenicuroides*	Red-tailed Shrike	LC	Stable	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
396	PASSERIFORMES	LANIIDAE	Lanius	*Lanius excubitor*	Great Grey Shrike	LC	Decreasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
397	PASSERIFORMES	CORVIDAE	Pica	*Pica pica*	Eurasian Magpie	LC	Stable	2024	5/14/2024	No	No	Yes	Not a Migrant	No
398	PASSERIFORMES	FRINGILLIDAE	Carduelis	*Carduelis caniceps*	Grey-capped Goldfinch	LC	Stable	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
399	PASSERIFORMES	ALAUDIDAE	Mirafra	*Mirafra javanica*	Horsfield's Bushlark	LC	Stable	2017	10/1/2016	No	No	Yes	Nomadic	No
400	PASSERIFORMES	ALAUDIDAE	Calandrella	*Calandrella brachydactyla*	Greater Short-toed Lark	LC	Unknown	2018	8/9/2018	No	No	Yes	Full Migrant	No
401	PASSERIFORMES	MUSCICAPIDAE	Oenanthe	*Oenanthe oenanthe*	Northern Wheatear	LC	Decreasing	2018	8/9/2018	Yes	Yes	Yes	Full Migrant	No
402	PASSERIFORMES	CISTICOLIDAE	Prinia	*Prinia flaviventris*	Yellow-bellied Prinia	LC	Decreasing	2016	10/1/2016	No	Yes	Yes	Not a Migrant	No
403	PASSERIFORMES	HIRUNDINIDAE	Delichon	*Delichon urbicum*	Northern House Martin	LC	Stable	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
404	PASSERIFORMES	HIRUNDINIDAE	Cecropis	*Cecropis daurica*	Red-rumped Swallow	LC	Increasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
405	PASSERIFORMES	HIRUNDINIDAE	Riparia	*Riparia chinensis*	Asian Plain Martin	LC	Decreasing	2024	6/12/2024	No	Yes	Yes	Full Migrant	No
406	PASSERIFORMES	PASSERIDAE	Passer	*Passer domesticus*	House Sparrow	LC	Decreasing	2019	10/1/2016	No	Yes	Yes	Not a Migrant	No
407	PASSERIFORMES	MOTACILLIDAE	Anthus	*Anthus similis*	Long-billed Pipit	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
408	PASSERIFORMES	MOTACILLIDAE	Motacilla	*Motacilla flava*	Western Yellow Wagtail	LC	Decreasing	2019	8/9/2018	No	Yes	Yes	Full Migrant	No
409	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus tristis*	Siberian Chiffchaff	LC	Decreasing	2024	5/14/2024	No	No	Yes	Full Migrant	No
410	PASSERIFORMES	PHYLLOSCOPIDAE	Phylloscopus	*Phylloscopus trochiloides*	Greenish Warbler	LC	Increasing	2024	5/14/2024	No	Yes	Yes	Full Migrant	No
411	PASSERIFORMES	LEIOTRICHIDAE	Argya	*Argya striata*	Jungle Babbler	LC	Stable	2024	6/12/2024	No	No	Yes	Not a Migrant	No
412	PASSERIFORMES	SYLVIIDAE	Curruca	*Curruca nana*	Asian Desert Warbler	LC	Stable	2017	10/1/2016	No	No	Yes	Full Migrant	No
413	PASSERIFORMES	TROGLODYTIDAE	Troglodytes	*Troglodytes troglodytes*	Northern Wren	LC	Increasing	2018	8/9/2018	No	No	Yes	Full Migrant	No
414	PASSERIFORMES	TURDIDAE	Turdus	*Turdus merula*	Eurasian Blackbird	LC	Increasing	2024	5/14/2024	No	No	Yes	Full Migrant	No
415	PASSERIFORMES	PRUNELLIDAE	Prunella	*Prunella ocularis*	Radde's Accentor	LC	Stable	2018	8/9/2018	No	No	Yes	Not a Migrant	No
416	STRIGIFORMES	STRIGIDAE	Otus	*Otus scops*	Eurasian Scops-owl	LC	Decreasing	2021	8/13/2021	No	No	Yes	Full Migrant	No
417	PASSERIFORMES	ZOSTEROPIDAE	Zosterops	*Zosterops palpebrosus*	Indian White-eye	LC	Decreasing	2019	8/2/2019	No	No	Yes	Unknown	No
418	PASSERIFORMES	REMIZIDAE	Remiz	*Remiz pendulinus*	Eurasian Penduline-tit	LC	Increasing	2019	8/7/2019	Yes	Yes	Yes	Full Migrant	No
419	ACCIPITRIFORMES	ACCIPITRIDAE	Milvus	*Milvus migrans*	Black Kite	LC	Stable	2021	8/16/2021	Yes	Yes	Yes	Full Migrant	No
420	PASSERIFORMES	ALAUDIDAE	Alaudala	*Alaudala heinei*	Turkestan Short-toed Lark	LC	Stable	2022	8/26/2022	No	No	Yes	Full Migrant	No
421	PASSERIFORMES	ACROCEPHALIDAE	Acrocephalus	*Acrocephalus stentoreus*	Clamorous Reed-warbler	LC	Stable	2022	8/30/2022	No	Yes	Yes	Full Migrant	No
422	CHARADRIIFORMES	CHARADRIIDAE	Charadrius	*Charadrius atrifrons*	Tibetan Sandplover	LC	Decreasing	2023	8/9/2023	Yes	Yes	Yes	Full Migrant	No

Note: Critically Endangered: (CR), Endangered: (EN), Vulnerable: (VU), Least Concern :(LC), Data Deficient: (DD), Near Threatened: (NT)

E.2.2 Large Mammals

List of Large Mammals Species Reported by IBAT within 50 km buffer of the Rail and Road Route Corridor is provided below.

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
1	PHOLIDOTA	MANIDAE	Manis	*Manis crassicaudata*	Indian Pangolin	EN	Decreasing	2019	5/10/2019	No	No	Yes	Not a Migrant	No
2	CARNIVORA	FELIDAE	Panthera	*Panthera pardus ssp. tulliana*	Persian Leopard	EN	Decreasing	2024	5/11/2023	No	No	Yes	Altitudinal Migrant	No
3	ARTIODACTYLA	CERVIDAE	Axis	*Axis porcinus*	Hog Deer	EN	Decreasing	2015	12/3/2014	No	Yes	Yes		No
4	ARTIODACTYLA	BOVIDAE	Gazella	*Gazella subgutturosa*	Goitered Gazelle	VU	Decreasing	2017	8/8/2016	No	No	Yes	Unknown	No
5	CARNIVORA	FELIDAE	Panthera	*Panthera pardus*	Leopard	VU	Decreasing	2024	11/29/2023	No	No	Yes		No
6	CARNIVORA	FELIDAE	Prionailurus	*Prionailurus viverrinus*	Fishing Cat	VU	Decreasing	2016	6/21/2016	No	Yes	Yes	Not a Migrant	No
7	CARNIVORA	URSIDAE	Ursus	*Ursus thibetanus*	Asiatic Black Bear	VU	Decreasing	2020	3/17/2016	No	No	Yes		No
8	CARNIVORA	MUSTELIDAE	Vormela	*Vormela peregusna*	Marbled Polecat	VU	Decreasing	2016	3/3/2015	No	No	Yes	Not a Migrant	No
9	ARTIODACTYLA	BOVIDAE	Ovis	*Ovis vignei*	Urial	VU	Decreasing	2020	3/16/2020	No	No	Yes	Full Migrant	No
10	ARTIODACTYLA	BOVIDAE	Capra	*Capra aegagrus*	Wild Goat	NT	Stable	2020	3/22/2020	No	No	Yes	Altitudinal Migrant	No
11	ARTIODACTYLA	BOVIDAE	Capra	*Capra falconeri*	Markhor	NT	Increasing	2015	9/20/2014	No	No	Yes	Altitudinal Migrant	No
12	CARNIVORA	HYAENIDAE	Hyaena	*Hyaena hyaena*	Striped Hyaena	NT	Decreasing	2015	10/2/2014	No	No	Yes	Not a Migrant	No
13	CHIROPTERA	PTEROPODIDAE	Pteropus	*Pteropus medius*	Indian Flying Fox	NT	Decreasing	2024	6/11/2024	No	No	Yes	Full Migrant	No
14	CHIROPTERA	PTEROPODIDAE	Rousettus	*Rousettus leschenaultii*	Leschenaultas Rousette	NT	Decreasing	2021	7/14/2021	No	No	Yes		No
15	CHIROPTERA	MINIOPTERIDAE	Miniopterus	*Miniopterus pallidus*	Pale Bent-wing Bat	NT	Decreasing	2021	4/21/2021	No	No	Yes		No
16	CARNIVORA	CANIDAE	Canis	*Canis lupus*	Grey Wolf	LC	Stable	2023	8/30/2018	No	No	Yes		No
17	CARNIVORA	FELIDAE	Caracal	*Caracal caracal*	Caracal	LC	Unknown	2016	5/9/2014	No	No	Yes	Not a Migrant	No
18	CHIROPTERA	PTEROPODIDAE	Cynopterus	*Cynopterus sphinx*	Greater Shortnosed Fruit Bat	LC	Increasing	2019	7/6/2019	No	No	Yes		No
19	CHIROPTERA	VESPERTILIONIDAE	Rhyneptesicus	*Rhyneptesicus nasutus*	Sind Serotine Bat	LC	Unknown	2019	8/31/2018	No	No	Yes		No
20	CARNIVORA	FELIDAE	Felis	*Felis chaus*	Jungle Cat	LC	Decreasing	2021	6/4/2014	No	No	Yes	Not a Migrant	No
21	CARNIVORA	FELIDAE	Felis	*Felis margarita*	Sand Cat	LC	Unknown	2016	4/20/2014	No	No	Yes	Not a Migrant	No
22	ARTIODACTYLA	BOVIDAE	Gazella	*Gazella bennettii*	Chinkara	LC	Decreasing	2017	6/21/2016	No	No	Yes		No
23	CHIROPTERA	HIPPOSIDERIDAE	Hipposideros	*Hipposideros fulvus*	Fulvus Leaf-nosed Bat	LC	Stable	2019	8/31/2018	No	No	Yes		No
24	PRIMATES	CERCOPITHECIDAE	Macaca	*Macaca mulatta*	Rhesus Monkey	LC	Unknown	2024	11/20/2015	No	No	Yes		No
25	CHIROPTERA	MEGADERMATIDAE	Lyroderma	*Lyroderma lyra*	Greater No Vampire	LC	Unknown	2020	8/31/2018	No	No	Yes		No
26	CHIROPTERA	VESPERTILIONIDAE	Myotis	*Myotis emarginatus*	Geoffroy's Bat	LC	Stable	2016	4/25/2016	No	No	Yes		No
27	CARNIVORA	FELIDAE	Otocolobus	*Otocolobus manul*	Pallas's Cat	LC	Decreasing	2020	11/6/2019	No	No	Yes		No
28	CHIROPTERA	VESPERTILIONIDAE	Pipistrellus	*Pipistrellus kuhlii*	Kuhl's Pipistrelle	LC	Unknown	2016	4/25/2016	No	No	Yes		No
29	CHIROPTERA	VESPERTILIONIDAE	Pipistrellus	*Pipistrellus ceylonicus*	Kelaart's Pipistrelle	LC	Stable	2019	8/31/2018	No	No	Yes		No
30	CHIROPTERA	VESPERTILIONIDAE	Scotozous	*Scotozous dormeri*		LC	Stable	2019	8/31/2018	No	No	Yes		No
31	CHIROPTERA	RHINOLOPHIDAE	Rhinolophus	*Rhinolophus ferrumequinum*	Greater Horseshoe Bat	LC	Decreasing	2016	4/25/2016	No	No	Yes		No
32	CHIROPTERA	RHINOPOMATIDAE	Rhinopoma	*Rhinopoma microphyllum*	Greater Mouse-tailed Bat	LC	Stable	2017	8/31/2016	No	No	Yes	Full Migrant	No
33	CHIROPTERA	RHINOPOMATIDAE	Rhinopoma	*Rhinopoma muscatellum*	Small Mouse-tailed Bat	LC	Unknown	2019	8/31/2018	No	No	Yes		No
34	CHIROPTERA	VESPERTILIONIDAE	Scotoecus	*Scotoecus pallidus*	Desert Yellow Lesser House Bat	LC	Unknown	2019	8/31/2018	No	No	Yes		No
35	CHIROPTERA	VESPERTILIONIDAE	Scotophilus	*Scotophilus heathii*	Greater Asiatic Yellow House Bat	LC	Stable	2019	8/31/2018	No	No	Yes		No
36	CHIROPTERA	VESPERTILIONIDAE	Scotophilus	*Scotophilus kuhlii*	Lesser Asiatic Yellow House Bat	LC	Stable	2019	8/31/2018	No	No	Yes		No
37	CHIROPTERA	MOLOSSIDAE	Tadarida	*Tadarida teniotis*	European Free-tailed Bat	LC	Unknown	2016	4/25/2016	No	No	Yes		No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
38	CHIROPTERA	MOLOSSIDAE	Tadarida	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	LC	Unknown	2017	8/31/2016	No	No	Yes		No
39	CHIROPTERA	EMBALLONURIDAE	Taphozous	*Taphozous nudiventris*	Naked-rumped Tomb Bat	LC	Stable	2017	8/31/2016	No	No	Yes	Full Migrant	No
40	CHIROPTERA	EMBALLONURIDAE	Taphozous	*Taphozous perforatus*	Egyptian Tomb Bat	LC	Stable	2020	8/31/2016	No	No	Yes		No
41	CARNIVORA	CANIDAE	Vulpes	*Vulpes bengalensis*	Bengal Fox	LC	Decreasing	2016	3/1/2016	No	No	Yes		No
42	CARNIVORA	CANIDAE	Vulpes	*Vulpes cana*	Blanford's Fox	LC	Stable	2015	7/22/2015	No	No	Yes		No
43	CARNIVORA	CANIDAE	Vulpes	*Vulpes rueppellii*	Ruppell's Fox	LC	Stable	2015	5/29/2015	No	No	Yes		No
44	CARNIVORA	CANIDAE	Vulpes	*Vulpes vulpes*	Red Fox	LC	Stable	2021	3/1/2016	No	No	Yes		No
45	CARNIVORA	MUSTELIDAE	Martes	*Martes foina*	Beech Marten	LC	Stable	2024	3/3/2015	No	No	Yes	Not a Migrant	No
46	LAGOMORPHA	LEPORIDAE	Lepus	*Lepus capensis*	Cape Hare	LC	Decreasing	2019	6/30/2018	No	No	Yes		No
47	LAGOMORPHA	LEPORIDAE	Lepus	*Lepus nigricollis*	Indian Hare	LC	Unknown	2019	6/30/2018	No	No	Yes		No
48	LAGOMORPHA	LEPORIDAE	Lepus	*Lepus tibetanus*	Desert Hare	LC	Unknown	2019	5/15/2018	No	No	Yes		No
49	CARNIVORA	HERPESTIDAE	Urva	*Urva edwardsii*	Indian Grey Mongoose	LC	Stable	2024	3/3/2015	No	No	Yes	Not a Migrant	No
50	CARNIVORA	MUSTELIDAE	Mellivora	*Mellivora capensis*	Honey Badger	LC	Decreasing	2016	2/28/2015	No	No	Yes		No
51	CARNIVORA	VIVERRIDAE	Viverricula	*Viverricula indica*	Small Indian Civet	LC	Stable	2024	3/3/2015	No	No	Yes	Not a Migrant	No
52	ARTIODACTYLA	SUIDAE	Sus	*Sus scrofa*	Wild Boar	LC	Unknown	2019	5/8/2018	No	No	Yes		No
53	CARNIVORA	HERPESTIDAE	Urva	*Urva auropunctata*	Small Indian Mongoose	LC	Unknown	2016	10/28/2014	No	No	Yes		No
54	CHIROPTERA	HIPPOSIDERIDAE	Asellia	*Asellia tridens*	Geoffroy's Trident Leaf-nosed Bat	LC	Stable	2017	8/31/2016	No	No	Yes		No
55	CHIROPTERA	RHINONYCTERIDAE	Triaenops	*Triaenops persicus*	Persian Trident Bat	LC	Unknown	2017	8/31/2016	No	No	Yes		No
56	CHIROPTERA	RHINOPOMATIDAE	Rhinopoma	*Rhinopoma hardwickii*	Lesser Mouse-tailed Bat	LC	Stable	2017	8/31/2016	No	No	Yes		No
57	CHIROPTERA	VESPERTILIONIDAE	Eptesicus	*Eptesicus pachyomus*		LC	Unknown	2019	8/31/2018	No	No	Yes		No
58	CARNIVORA	CANIDAE	Canis	*Canis aureus*	Golden Jackal	LC	Increasing	2018	1/10/2018	No	No	Yes		No
59	CARNIVORA	FELIDAE	Felis	*Felis lybica*	Afro-Asiatic Wildcat	LC	Unknown	2022	6/3/2019	No	No	Yes		No
60	CARNIVORA	FELIDAE	Prionailurus	*Prionailurus bengalensis*	Mainland Leopard Cat	LC	Stable	2023	12/29/2021	No	No	Yes	Not a Migrant	No

Note: Endangered: (EN), Vulnerable: (VU), Least Concern :(LC), Near Threatened: (NT)

E.2.3 Small Mammals

List of Small Mammals Species Reported by IBAT within 50 km buffer of the Rail and Road Route Corridor is provided below.

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
1	RODENTIA	DIPODIDAE	Allactaga	*Allactaga hotsoni*	Hotsonas Five-toed Jerboa	LC	Unknown	2016	9/9/2016	No	No	Yes	Unknown	No
2	RODENTIA	MURIDAE	Apodemus	*Apodemus rusiges*	Kashmir Field Mouse	LC	Unknown	2016	6/8/2016	No	No	Yes	Unknown	No
3	RODENTIA	MURIDAE	Bandicota	*Bandicota bengalensis*	Lesser Bandicoot Rat	LC	Increasing	2016	9/10/2016	No	No	Yes	Unknown	No
4	RODENTIA	CALOMYSCIDAE	Calomyscus	*Calomyscus baluchi*	Baluchi Brush-tailed Mouse	LC	Unknown	2016	9/10/2016	No	No	Yes	Unknown	No
5	RODENTIA	CALOMYSCIDAE	Calomyscus	*Calomyscus hotsoni*	Hotson's Brush-tailed Mouse	LC	Unknown	2016	9/5/2016	No	No	Yes	Unknown	No
6	RODENTIA	CRICETIDAE	Nothocricetulus	*Nothocricetulus migratorius*	Grey Dwarf Hamster	LC	Unknown	2016	9/10/2016	No	No	Yes	Unknown	No
7	RODENTIA	GLIRIDAE	Dryomys	*Dryomys nitedula*	Forest Dormouse	LC	Unknown	2016	9/11/2016	No	No	Yes	Unknown	No
8	RODENTIA	SCIURIDAE	Funambulus	*Funambulus pennantii*	Five-striped Palm Squirrel	LC	Unknown	2016	9/7/2016	No	No	Yes	Unknown	No
9	RODENTIA	MURIDAE	Gerbillus	*Gerbillus aquilus*		LC	Unknown	2016	9/1/2016	No	No	Yes	Unknown	No
10	RODENTIA	MURIDAE	Gerbillus	*Gerbillus nanus*	Dwarf Gerbil	LC	Stable	2016	2/2/2016	No	No	Yes	Unknown	No
11	RODENTIA	MURIDAE	Golunda	*Golunda ellioti*	Indian Bush-rat	LC	Stable	2016	9/11/2016	No	No	Yes	Unknown	No
12	RODENTIA	HYSTRICIDAE	Hystrix	*Hystrix indica*	Indian Crested Porcupine	LC	Stable	2021	9/11/2016	No	No	Yes	Unknown	No
13	RODENTIA	DIPODIDAE	Jaculus	*Jaculus blanfordi*	Blanfordâ€™s Jerboa	LC	Decreasing	2016	9/11/2016	No	No	Yes	Unknown	No
14	RODENTIA	MURIDAE	Meriones	*Meriones crassus*	Sundevall's Jird	LC	Unknown	2016	9/1/2016	No	No	Yes	Unknown	No
15	RODENTIA	MURIDAE	Meriones	*Meriones hurrianae*	Indian Desert Gerbil	LC	Unknown	2016	8/5/2016	No	No	Yes	Unknown	No
16	RODENTIA	MURIDAE	Meriones	*Meriones libycus*	Libyan Jird	LC	Stable	2016	9/1/2016	No	No	Yes	Unknown	No
17	RODENTIA	MURIDAE	Meriones	*Meriones persicus*	Persian Jird	LC	Unknown	2016	2/2/2016	No	No	Yes	Unknown	No
18	RODENTIA	MURIDAE	Millardia	*Millardia gleadowi*	Sand-coloured Metad	LC	Unknown	2016	8/11/2016	No	No	Yes	Unknown	No
19	RODENTIA	MURIDAE	Millardia	*Millardia meltada*	Soft-furred Metad	LC	Stable	2016	8/9/2016	No	No	Yes	Unknown	No
20	RODENTIA	MURIDAE	Mus	*Mus musculus*	House Mouse	LC	Stable	2021	9/11/2016	No	No	Yes	Unknown	No
21	RODENTIA	MURIDAE	Mus	*Mus saxicola*	Brown Spiny Mouse	LC	Stable	2016	8/24/2016	No	No	Yes	Unknown	No
22	RODENTIA	MURIDAE	Nesokia	*Nesokia indica*	Short-tailed Bandicoot Rat	LC	Unknown	2016	8/5/2016	No	No	Yes	Unknown	No
23	RODENTIA	MURIDAE	Rattus	*Rattus norvegicus*	Brown Rat	LC	Stable	2016	9/1/2016	No	No	Yes	Unknown	No
24	RODENTIA	MURIDAE	Rhombomys	*Rhombomys opimus*	Great Gerbil	LC	Stable	2016	8/28/2016	No	No	Yes	Unknown	No
25	RODENTIA	MURIDAE	Tatera	*Tatera indica*	Indian Gerbil	LC	Unknown	2017	9/17/2016	No	No	Yes	Unknown	No
26	RODENTIA	MURIDAE	Acomys	*Acomys dimidiatus*	Arabian Spiny Mouse	LC	Unknown	2016	9/8/2016	No	No	Yes	Unknown	No
27	RODENTIA	DIPODIDAE	Scarturus	*Scarturus elater*	Small Five-toed Jerboa	LC	Decreasing	2016	9/8/2016	No	No	Yes	Unknown	No
28	RODENTIA	DIPODIDAE	Salpingotulus	*Salpingotulus michaelis*		DD	Unknown	2017	9/20/2016	No	No	Yes	Unknown	Yes
29	EULIPOTYPHLA	ERINACEIDAE	Hemiechinus	*Hemiechinus auritus*	Long-eared Hedgehog	LC	Unknown	2021	9/11/2016	No	No	Yes	Unknown	No
30	EULIPOTYPHLA	ERINACEIDAE	Hemiechinus	*Hemiechinus collaris*		LC	Unknown	2016	1/31/2016	No	No	Yes	Unknown	No
31	EULIPOTYPHLA	ERINACEIDAE	Paraechinus	*Paraechinus micropus*		LC	Decreasing	2016	1/25/2016	No	No	Yes	Unknown	No
32	EULIPOTYPHLA	ERINACEIDAE	Paraechinus	*Paraechinus hypomelas*	Brandt's Hedgehog	LC	Unknown	2016	8/30/2016	No	No	Yes	Unknown	No
33	LAGOMORPHA	OCHOTONIDAE	Ochotona	*Ochotona rufescens*	Afghan Pika	LC	Stable	2016	7/9/2016	No	No	Yes	Unknown	No
34	EULIPOTYPHLA	SORICIDAE	Crocidura	*Crocidura gmelini*		LC	Unknown	2017	12/23/2016	No	No	Yes	Unknown	No
35	EULIPOTYPHLA	SORICIDAE	Crocidura	*Crocidura zarudnyi*		LC	Unknown	2016	9/9/2016	No	No	Yes	Unknown	No
36	EULIPOTYPHLA	SORICIDAE	Suncus	*Suncus murinus*	House Shrew	LC	Stable	2016	2/1/2016	No	No	Yes	Unknown	No
37	EULIPOTYPHLA	SORICIDAE	Suncus	*Suncus stoliczkanus*		LC	Unknown	2016	2/1/2016	No	No	Yes	Unknown	No
38	EULIPOTYPHLA	SORICIDAE	Suncus	*Suncus etruscus*	Pygmy White-toothed Shrew	LC	Unknown	2017	9/5/2016	No	No	Yes	Unknown	No

Note: Least Concern :(LC)

E.2.4 Herpetofauna

List of Herpetofauna Species Reported by IBAT within 50 km buffer of the Rail and Road Route Corridor is provided below.

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
1	TESTUDINES	CHELONIIDAE	Eretmochelys	*Eretmochelys imbricata*	Hawksbill Turtle	CR	Decreasing	2008	6/30/2008	Yes	No	Yes	Full Migrant	No
2	TESTUDINES	CHELONIIDAE	Chelonia	*Chelonia mydas*	Green Turtle	EN	Decreasing	2023	4/30/2004	Yes	No	Yes	Full Migrant	No
3	TESTUDINES	GEOEMYDIDAE	Geoclemys	*Geoclemys hamiltonii*	Spotted Pond Turtle	EN	Decreasing	2019	3/14/2018	No	Yes	Yes		No
4	TESTUDINES	GEOEMYDIDAE	Hardella	*Hardella thurjii*	Crowned River Turtle	EN	Decreasing	2021	3/13/2018	No	Yes	Yes		No
5	SQUAMATA	VARANIDAE	Varanus	*Varanus flavescens*	Yellow Monitor	EN	Decreasing	2021	9/8/2019	No	No	Yes		No
6	TESTUDINES	TRIONYCHIDAE	Nilssonia	*Nilssonia gangetica*	Indian Softshell Turtle	EN	Decreasing	2021	3/13/2018	No	Yes	Yes		No
7	TESTUDINES	TRIONYCHIDAE	Nilssonia	*Nilssonia hurum*	Indian Peacock Softshell Turtle	EN	Decreasing	2021	3/13/2018	No	Yes	Yes		No
8	TESTUDINES	CHELONIIDAE	Caretta	*Caretta caretta*	Loggerhead Turtle	VU	Decreasing	2017	8/23/2015	Yes	No	Yes	Full Migrant	No
9	CROCODYLIA	CROCODYLIDAE	Crocodylus	*Crocodylus palustris*	Mugger	VU	Stable	2013	6/30/2009	No	Yes	Yes		No
10	TESTUDINES	CHELONIIDAE	Lepidochelys	*Lepidochelys olivacea*	Olive Ridley Turtle	VU	Decreasing	2008	6/30/2008	Yes	No	Yes	Full Migrant	No
11	TESTUDINES	GEOEMYDIDAE	Pangshura	*Pangshura tecta*	Indian Roofed Turtle	VU	Decreasing	2021	3/13/2018	No	Yes	Yes		No
12	SQUAMATA	AGAMIDAE	Saara	*Saara hardwickii*	Indian Spiny-tailed Lizard	VU	Decreasing	2022	9/8/2019	No	No	Yes		No
13	TESTUDINES	TRIONYCHIDAE	Lissemys	*Lissemys punctata*	Indian Flapshell Turtle	VU	Decreasing	2021	3/12/2018	No	Yes	Yes		No
14	SQUAMATA	NATRICIDAE	Xenochrophis	*Xenochrophis cerasogaster*	Painted Keelback	VU	Decreasing	2022	9/8/2019	No	Yes	No		No
15	TESTUDINES	GEOEMYDIDAE	Pangshura	*Pangshura smithii*	Brown Roofed Turtle	NT	Decreasing	2021	3/12/2018	No	Yes	Yes		No
16	SQUAMATA	VARANIDAE	Varanus	*Varanus bengalensis*	Bengal Monitor Lizard	NT	Decreasing	2021	6/8/2018	No	Yes	Yes		No
17	SQUAMATA	ELAPIDAE	Naja	*Naja oxiana*	Central Asian Cobra	NT	Decreasing	2021	4/5/2016	No	No	Yes		No
18	SQUAMATA	BOIDAE	Eryx	*Eryx johnii*	Red Sand Boa	NT	Decreasing	2021	9/5/2019	No	No	Yes		No
19	ANURA	BUFONIDAE	Bufotes	*Bufotes zugmayeri*	Baloch Green Toad	NT	Decreasing	2023	12/1/2020	No	Yes	Yes	Not a Migrant	Yes
20	SQUAMATA	PYTHONIDAE	Python	*Python molurus*	Indian Rock Python	NT	Decreasing	2021	9/5/2019	No	Yes	Yes		No
21	ANURA	BUFONIDAE	Bufotes	*Bufotes oblongus*	Eastern Persian toad	LC	Decreasing	2023	3/8/2021	No	Yes	Yes	Not a Migrant	No
22	ANURA	BUFONIDAE	Firouzophrynus	*Firouzophrynus olivaceus*	Olive Toad	LC	Stable	2023	11/8/2021	No	Yes	Yes	Not a Migrant	No
23	ANURA	BUFONIDAE	Firouzophrynus	*Firouzophrynus stomaticus*	Marbled Toad	LC	Stable	2023	11/8/2021	No	Yes	Yes	Not a Migrant	No
24	ANURA	BUFONIDAE	Bufotes	*Bufotes surdus*	Pakistan Toad	LC	Decreasing	2023	8/10/2021	No	Yes	Yes	Not a Migrant	No
25	ANURA	DICROGLOSSIDAE	Hoplobatrachus	*Hoplobatrachus tigerinus*	Indian Bullfrog	LC	Stable	2023	2/18/2021	No	Yes	Yes	Not a Migrant	No
26	ANURA	DICROGLOSSIDAE	Chrysopaa	*Chrysopaa sternosignata*	Murray's Frog	LC	Decreasing	2023	3/16/2021	No	Yes	No	Not a Migrant	No
27	SQUAMATA	ELAPIDAE	Naja	*Naja naja*	Indian Cobra	LC	Stable	2021	9/5/2019	No	No	Yes		No
28	SQUAMATA	VARANIDAE	Varanus	*Varanus griseus*	Desert Monitor	LC	Decreasing	2021	4/7/2016	No	No	Yes		No
29	SQUAMATA	BOIDAE	Eryx	*Eryx jaculus*	Javelin Sand Boa	LC	Decreasing	2021	4/5/2016	No	No	Yes		No
30	SQUAMATA	SCINCIDAE	Chalcides	*Chalcides ocellatus*	Ocellated Skink	LC	Stable	2021	4/7/2016	No	No	Yes		No
31	SQUAMATA	COLUBRIDAE	Hemorrhois	*Hemorrhois ravergieri*	Spotted Whip Snake	LC	Stable	2017	4/6/2016	No	No	Yes		No
32	SQUAMATA	SCINCIDAE	Eumeces	*Eumeces schneiderii*	Orange-tailed Skink	LC	Stable	2021	4/7/2016	No	No	Yes		No
33	SQUAMATA	VIPERIDAE	Macrovipera	*Macrovipera lebetinus*	Levantine Viper	LC	Decreasing	2021	9/8/2019	No	No	Yes		No
34	SQUAMATA	COLUBRIDAE	Lytorhynchus	*Lytorhynchus ridgewayi*	Derafshi Snake	LC	Unknown	2017	4/5/2016	No	No	Yes		No
35	SQUAMATA	COLUBRIDAE	Lytorhynchus	*Lytorhynchus maynardi*	Maynard's Longnose Sand Snake	LC	Unknown	2021	4/5/2016	No	No	Yes		No
36	SQUAMATA	AGAMIDAE	Saara	*Saara asmussi*		LC	Unknown	2021	4/5/2016	No	No	Yes		No
37	SQUAMATA	AGAMIDAE	Phrynocephalus	*Phrynocephalus scutellatus*		LC	Stable	2021	4/7/2016	No	No	Yes		No
38	SQUAMATA	AGAMIDAE	Trapelus	*Trapelus megalonyx*	Afghan Ground Agama	LC	Stable	2021	4/5/2016	No	No	Yes		No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
39	SQUAMATA	GEKKONIDAE	Agamura	*Agamura persica*	Persian Spider Gecko	LC	Stable	2021	4/5/2016	No	No	Yes		No
40	SQUAMATA	COLUBRIDAE	Spalerosophis	*Spalerosophis diadema*	Diadem Snake	LC	Stable	2021	4/5/2016	No	No	Yes		No
41	SQUAMATA	LACERTIDAE	Acanthodactylus	*Acanthodactylus blanfordii*	Blandford's Fringe-toed Lizard	LC	Stable	2021	4/5/2016	No	No	Yes		No
42	SQUAMATA	AGAMIDAE	Paralaudakia	*Paralaudakia microlepis*		LC	Stable	2017	4/4/2016	No	No	Yes		No
43	SQUAMATA	AGAMIDAE	Trapelus	*Trapelus agilis*		LC	Stable	2021	10/27/2017	No	No	Yes		No
44	SQUAMATA	COLUBRIDAE	Platyceps	*Platyceps rhodorachis*	Wadi Racer	LC	Stable	2021	9/8/2019	No	No	Yes		No
45	SQUAMATA	AGAMIDAE	Paralaudakia	*Paralaudakia caucasia*	Caucasian Rock Agama	LC	Stable	2017	4/4/2016	No	No	Yes		No
46	SQUAMATA	COLUBRIDAE	Platyceps	*Platyceps karelini*		LC	Unknown	2021	9/8/2019	No	No	Yes		No
47	SQUAMATA	PSAMMOPHIIDAE	Psammophis	*Psammophis lineolatus*	Steppe Ribbon Racer	LC	Unknown	2021	4/6/2016	No	No	Yes		No
48	SQUAMATA	SPHAERODACTYLIDAE	Teratoscincus	*Teratoscincus keyserlingii*	Keyserling's Wonder Gecko	LC	Stable	2019	9/27/2018	No	No	Yes		No
49	SQUAMATA	LACERTIDAE	Eremias	*Eremias persica*	Persian Racerunner	LC	Stable	2021	4/6/2016	No	No	Yes		No
50	SQUAMATA	LACERTIDAE	Eremias	*Eremias scripta*	Sand Racerunner	LC	Stable	2017	4/6/2016	No	No	Yes		No
51	SQUAMATA	AGAMIDAE	Phrynocephalus	*Phrynocephalus luteoguttatus*		LC	Stable	2021	4/5/2016	No	No	Yes		No
52	SQUAMATA	GEKKONIDAE	Microgecko	*Microgecko persicus*	Persian Dwarf GeckoÂ	LC	Unknown	2021	9/7/2019	No	No	Yes		No
53	SQUAMATA	VIPERIDAE	Pseudocerastes	*Pseudocerastes persicus*	Persian Horned Viper	LC	Decreasing	2021	2/9/2012	No	No	Yes		No
54	SQUAMATA	COLUBRIDAE	Ptyas	*Ptyas mucosa*		LC	Decreasing	2021	4/5/2016	No	No	Yes		No
55	SQUAMATA	LACERTIDAE	Acanthodactylus	*Acanthodactylus micropholis*	Yellow-tailed Fringe-fingered Lizard	LC	Stable	2021	4/12/2019	No	No	Yes		No
56	SQUAMATA	COLUBRIDAE	Lycodon	*Lycodon striatus*	Barred Wolf Snake	LC	Stable	2021	4/5/2016	No	No	Yes		No
57	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus robustus*	Red Sea House Gecko	LC	Increasing	2023	9/21/2014	No	No	Yes		No
58	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus flaviviridis*	Yellow-bellied House Gecko	LC	Increasing	2021	2/8/2012	No	No	Yes		No
59	SQUAMATA	GEKKONIDAE	Cyrtopodion	*Cyrtopodion kachhense*	Kachh Gecko	LC	Unknown	2021	12/14/2008	No	No	Yes		No
60	SQUAMATA	LACERTIDAE	Eremias	*Eremias fasciata*		LC	Stable	2021	4/6/2016	No	No	Yes		No
61	SQUAMATA	COLUBRIDAE	Boiga	*Boiga trigonata*	Indian Gamma Snake	LC	Stable	2021	4/5/2016	No	No	Yes		No
62	SQUAMATA	AGAMIDAE	Laudakia	*Laudakia melanura*	Black Rock Agama	LC	Stable	2021	4/4/2016	No	No	Yes		No
63	SQUAMATA	LACERTIDAE	Mesalina	*Mesalina watsonana*		LC	Stable	2021	4/6/2016	No	No	Yes		No
64	SQUAMATA	SCINCIDAE	Ophiomorus	*Ophiomorus brevipes*		LC	Stable	2021	4/7/2016	No	No	Yes		No
65	SQUAMATA	AGAMIDAE	Calotes	*Calotes versicolor*	Changeable Lizard	LC	Stable	2021	9/5/2019	No	No	Yes		No
66	SQUAMATA	SCINCIDAE	Ophiomorus	*Ophiomorus tridactylus*	Indian Sand-swimmer	LC	Stable	2021	4/6/2016	No	No	Yes		No
67	SQUAMATA	COLUBRIDAE	Platyceps	*Platyceps ventromaculatus*	Hardwicke's Rat Snake	LC	Stable	2021	4/10/2016	No	No	Yes		No
68	SQUAMATA	LACERTIDAE	Eremias	*Eremias acutirostris*		LC	Stable	2021	4/6/2016	No	No	Yes		No
69	SQUAMATA	AGAMIDAE	Laudakia	*Laudakia nupta*		LC	Stable	2021	4/4/2016	No	No	Yes		No
70	SQUAMATA	VIPERIDAE	Echis	*Echis carinatus*		LC	Stable	2021	4/7/2016	No	No	Yes		No
71	SQUAMATA	COLUBRIDAE	Eirenis	*Eirenis persicus*		LC	Unknown	2021	4/10/2016	No	No	Yes		No
72	SQUAMATA	COLUBRIDAE	Oligodon	*Oligodon taeniolatus*	Streaked Kukri Snake	LC	Stable	2021	9/5/2019	No	No	Yes		No
73	SQUAMATA	PSAMMOPHIIDAE	Psammophis	*Psammophis schokari*	ForskÃ¥l's Sand Snake	LC	Unknown	2021	4/7/2016	No	No	Yes		No
74	SQUAMATA	VIPERIDAE	Eristicophis	*Eristicophis macmahoni*	McMahons Desert Viper	LC	Unknown	2021	9/8/2019	No	No	Yes		No
75	SQUAMATA	GEKKONIDAE	Cyrtopodion	*Cyrtopodion agamuroides*	Nikolsky's Spider Gecko	LC	Unknown	2021	9/4/2019	No	No	Yes		No
76	SQUAMATA	GEKKONIDAE	Bunopus	*Bunopus tuberculatus*	Baluch Ground Gecko	LC	Stable	2021	4/5/2016	No	No	Yes		No
77	SQUAMATA	SCINCIDAE	Eurylepis	*Eurylepis taeniolatus*	Ribbon-sided Skink	LC	Stable	2021	4/6/2016	No	No	Yes		No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
78	SQUAMATA	LACERTIDAE	Mesalina	*Mesalina brevirostris*		LC	Stable	2021	2/9/2012	No	No	Yes		No
79	SQUAMATA	SPHAERODACTYLIDAE	Teratoscincus	*Teratoscincus microlepis*	Small-scaled Wonder Gecko	LC	Stable	2021	4/7/2016	No	No	Yes		No
80	SQUAMATA	EUBLEPHARIDAE	Eublepharis	*Eublepharis macularius*	Common Leopard Gecko	LC	Stable	2021	8/7/2019	No	No	Yes		No
81	SQUAMATA	SCINCIDAE	Ablepharus	*Ablepharus pannonicus*	Asian Snake-eyed Skink	LC	Unknown	2021	2/8/2012	No	No	Yes		No
82	SQUAMATA	GEKKONIDAE	Cyrtopodion	*Cyrtopodion scabrum*	Rough Bent-toed Gecko	LC	Stable	2021	4/5/2016	No	No	Yes		No
83	SQUAMATA	GEKKONIDAE	Rhinogekko	*Rhinogekko femoralis*	Sharp-tailed Spider Gecko	LC	Unknown	2021	12/23/2019	No	No	Yes		No
84	SQUAMATA	GEKKONIDAE	Crossobamon	*Crossobamon eversmanni*	Comb-toed Gecko	LC	Stable	2021	4/5/2016	No	No	Yes		No
85	SQUAMATA	SCINCIDAE	Ophiomorus	*Ophiomorus blanfordi*	Blanford's Snake Skink	LC	Unknown	2021	4/7/2016	No	No	Yes		No
86	SQUAMATA	LEPTOTYPHLOPIDAE	Myriopholis	*Myriopholis macrorhyncha*	Hook-snouted Worm Snake	LC	Stable	2021	1/27/2014	No	No	Yes		No
87	SQUAMATA	GEKKONIDAE	Cyrtopodion	*Cyrtopodion kirmanense*		LC	Stable	2009	12/14/2008	No	No	Yes		No
88	SQUAMATA	AGAMIDAE	Calotes	*Calotes minor*	Hardwicke's Bloodsucker	LC	Decreasing	2021	9/4/2019	No	No	Yes		No
89	SQUAMATA	PSAMMOPHIIDAE	Psammophis	*Psammophis leithii*	Leith's Sand Snake	LC	Unknown	2021	4/7/2016	No	No	Yes		No
90	SQUAMATA	TYPHLOPIDAE	Indotyphlops	*Indotyphlops porrectus*	Stoliczkaâ€™s Slender Blind Snake	LC	Unknown	2021	9/5/2019	No	No	Yes		No
91	SQUAMATA	ELAPIDAE	Bungarus	*Bungarus sindanus*	Sind Krait	LC	Unknown	2021	9/6/2019	No	No	Yes		No
92	SQUAMATA	NATRICIDAE	Fowlea	*Fowlea piscator*	Chequered Keelback	LC	Stable	2021	4/7/2016	No	Yes	Yes		No
93	SQUAMATA	COLUBRIDAE	Argyrogena	*Argyrogena fasciolata*	Banded Racer	LC	Stable	2021	9/16/2019	No	No	Yes		No
94	SQUAMATA	NATRICIDAE	Amphiesma	*Amphiesma stolatum*	Buff Striped Keelback	LC	Stable	2021	9/5/2019	No	Yes	Yes		No
95	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus leschenaultii*	Leschenaultâ€™s Gecko	LC	Stable	2021	9/15/2019	No	No	Yes		No
96	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus brookii*	Brooke's House Gecko	LC	Unknown	2019	5/23/2017	No	No	Yes		No
97	SQUAMATA	COLUBRIDAE	Lycodon	*Lycodon aulicus*	Common Wolf Snake	LC	Stable	2021	9/16/2019	No	No	Yes		No
98	SQUAMATA	VIPERIDAE	Daboia	*Daboia russelii*	Western Russelâ€™s Viper	LC	Decreasing	2021	9/16/2019	No	No	Yes		No
99	SQUAMATA	HOMALOPSIDAE	Mintonophis	*Mintonophis pakistanicus*	Sind River Mud Snake	LC	Unknown	2021	12/23/2019	No	Yes	Yes		Yes
100	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis stokesii*	Stokes' Sea Snake	LC	Unknown	2018	2/15/2009	Yes	No	No		No
101	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis viperinus*	Viperine Sea Snake	LC	Unknown	2018	2/15/2009	Yes	No	No		No
102	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis caerulescens*	Dwarf Sea Snake	LC	Unknown	2010	2/15/2009	Yes	No	No		No
103	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis spiralis*	Yellow Sea Snake	LC	Unknown	2010	2/15/2009	Yes	No	No		No
104	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis schistosus*	Beaked Sea Snake	LC	Stable	2018	2/15/2009	Yes	Yes	No		No
105	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis cyanocinctus*	Annulated Sea Snake	LC	Unknown	2010	2/15/2009	Yes	No	No		No
106	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis ornatus*	Ornate Reef Sea Snake	LC	Unknown	2010	2/15/2009	Yes	No	No		No
107	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis platurus*	Yellow-bellied Sea Snake	LC	Stable	2017	2/15/2009	Yes	No	No		No
108	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis lapemoides*	Arabian Gulf Sea Snake	LC	Unknown	2010	2/15/2009	Yes	No	No		No
109	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis curtus*	Spine-bellied Sea Snake	LC	Unknown	2021	3/28/2018	Yes	Yes	No		No
110	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis gracilis*	Graceful Small-headed Sea Snake	LC	Unknown	2010	2/15/2009	Yes	No	No		No
111	SQUAMATA	GEKKONIDAE	Microgecko	*Microgecko depressus*	Low Lying Gecko	LC	Unknown	2021	12/23/2019	No	No	Yes		No
112	SQUAMATA	LACERTIDAE	Ophisops	*Ophisops jerdonii*	Punjab-snake-eyed Lacerta	LC	Stable	2021	9/9/2019	No	No	Yes		No
113	SQUAMATA	SCINCIDAE	Ophiomorus	*Ophiomorus raithmai*	Three-fingered Sand-fish	LC	Unknown	2021	9/9/2019	No	No	Yes		No
114	SQUAMATA	SCINCIDAE	Eutropis	*Eutropis dissimilis*	Striped Grass Mabuya	LC	Unknown	2021	9/9/2019	No	No	Yes		No
115	SQUAMATA	SCINCIDAE	Eumeces	*Eumeces blythianus*		LC	Unknown	2021	12/23/2019	No	No	Yes		No
116	SQUAMATA	NATRICIDAE	Fowlea	*Fowlea schnurrenbergeri*	Bar-necked Keelback	LC	Unknown	2021	9/9/2019	No	Yes	No		No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
117	SQUAMATA	COLUBRIDAE	Spalerosophis	*Spalerosophis arenarius*	Red Spotted Royal Snake	LC	Stable	2021	8/7/2019	No	No	Yes		No
118	SQUAMATA	LACERTIDAE	Acanthodactylus	*Acanthodactylus cantoris*	Indian Fringe-fingered Lizard	LC	Unknown	2021	4/5/2016	No	No	Yes		No
119	SQUAMATA	PSAMMOPHIIDAE	Psammophis	*Psammophis condanarus*	Sand Snake	LC	Unknown	2022	9/9/2019	No	No	Yes		No
120	SQUAMATA	GEKKONIDAE	Cyrtopodion	*Cyrtopodion watsoni*	Watson's Gecko	LC	Unknown	2021	12/19/2019	No	No	Yes		No
121	SQUAMATA	AGAMIDAE	Phrynocephalus	*Phrynocephalus clarkorum*		LC	Unknown	2021	4/4/2016	No	No	Yes		No
122	SQUAMATA	AGAMIDAE	Phrynocephalus	*Phrynocephalus euptilopus*	Alcock's Toad-headed Agama	LC	Unknown	2017	4/4/2016	No	No	Yes		Yes
123	SQUAMATA	SCINCIDAE	Ablepharus	*Ablepharus grayanus*	Minor Snake-eyed Skink	LC	Stable	2021	9/9/2019	No	No	Yes		No
124	SQUAMATA	GEKKONIDAE	Crossobamon	*Crossobamon orientalis*	Sind Gecko	LC	Unknown	2021	8/9/2019	No	No	Yes		No
125	ANURA	RANIDAE	Pelophylax	*Pelophylax bedriagae*	Bedriaga's Frog	LC	Stable	2022	12/6/2021	No	Yes	Yes	Not a Migrant	No
126	ANURA	DICROGLOSSIDAE	Euphlyctis	*Euphlyctis cyanophlyctis*	Skipper Frog	LC	Stable	2023	10/5/2021	No	Yes	Yes	Not a Migrant	No
127	ANURA	DICROGLOSSIDAE	Sphaerotheca	*Sphaerotheca breviceps*	Indian Burrowing Frog	LC	Stable	2023	4/30/2021	No	Yes	Yes	Not a Migrant	No
128	SQUAMATA	AGAMIDAE	Phrynocephalus	*Phrynocephalus ornatus*	Striped Toad Agama	LC	Stable	2021	4/4/2016	No	No	Yes		No
129	SQUAMATA	COLUBRIDAE	Lytorhynchus	*Lytorhynchus paradoxus*	Sindh Awl-headed Snake	LC	Unknown	2021	8/7/2019	No	No	Yes		No
130	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus sahgali*	Sahgalâ€™s Termite Hill Gecko	LC	Unknown	2021	9/9/2019	No	No	Yes		No
131	SQUAMATA	AGAMIDAE	Phrynocephalus	*Phrynocephalus maculatus*	Spotted Toad-headed Agama	LC	Stable	2023	12/1/2022	No	No	Yes	Not a Migrant	No
132	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus persicus*	Persian Gecko	LC	Unknown	2023	10/15/2022	No	No	Yes	Not a Migrant	No
133	SQUAMATA	LEPTOTYPHLOPIDAE	Myriopholis	*Myriopholis blanfordii*		DD	Unknown	2021	4/6/2016	No	No	Yes		No
134	SQUAMATA	COLUBRIDAE	Telescopus	*Telescopus rhinopoma*	Indian Desert Tiger Snake	DD	Unknown	2017	4/7/2016	No	No	Yes		No
135	SQUAMATA	AGAMIDAE	Trapelus	*Trapelus rubrigularis*	Red-throated Agama	DD	Unknown	2021	12/18/2019	No	No	Yes		No
136	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis cantoris*	Gunther's Sea Snake	DD	Unknown	2010	2/15/2009	Yes	No	No		No
137	SQUAMATA	ELAPIDAE	Hydrophis	*Hydrophis mamillaris*	Bombay Sea Snake	DD	Unknown	2010	2/15/2009	Yes	No	No		No
138	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus gleadowi*	Gleadowâ€™s House Gecko	DD	Unknown	2021	12/19/2019	No	No	Yes		No
139	SQUAMATA	GEKKONIDAE	Hemidactylus	*Hemidactylus kushmorensis*	Kushmore House Gecko	DD	Unknown	2021	12/19/2019	No	No	Yes		No
140	SQUAMATA	GEKKONIDAE	Cyrtopodion	*Cyrtopodion belaense*		DD	Unknown	2021	12/19/2019	No	No	Yes		No
141	ANURA	DICROGLOSSIDAE	Sphaerotheca	*Sphaerotheca strachani*	Pakistan Bullfrog	DD	Unknown	2022	10/14/2020	No	Yes	Yes	Not a Migrant	No
142	SQUAMATA	PHYLLODACTYLIDAE	Ptyodactylus	*Ptyodactylus homolepis*	Pakistan Fan-fingered Gecko	DD	Unknown	2021	12/23/2019	No	No	Yes		No
143	SQUAMATA	COLUBRIDAE	Platyceps	*Platyceps noeli*		DD	Unknown	2021	12/18/2019	No	No	Yes		No
144	SQUAMATA	COLUBRIDAE	Platyceps	*Platyceps sindhensis*		DD	Unknown	2021	12/2/2019	No	No	Yes		No

Note: Critically Endangered: (CR), Endangered: (EN), Vulnerable: (VU), Least Concern :(LC), Data Deficient: (DD), Near Threatened: (NT)

E.2.5 Invertebrates

List of Invertebrates Species Reported by IBAT within 50 km buffer of the Rail and Road Route Corridor is provided below.

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
1	DECAPODA	POTAMIDAE	Potamon	*Potamon ibericum*		NT	Decreasing		1/1/2008	No	Yes	No		No
2	ODONATA	AESHNIDAE	Anax	*Anax ephippiger*	Vagrant Emperor	LC	Unknown	2016	3/4/2015	No	Yes	Yes	Full Migrant	No
3	ODONATA	AESHNIDAE	Anax	*Anax imperator*	Blue Emperor	LC	Stable	2016	3/4/2015	No	Yes	Yes	Nomadic	No
4	ODONATA	LIBELLULIDAE	Crocothemis	*Crocothemis erythraea*	Broad Scarlet	LC	Increasing	2016	10/28/2015	No	Yes	Yes		No
5	ODONATA	LIBELLULIDAE	Diplacodes	*Diplacodes lefebvrii*	Black Percher	LC	Stable	2016	10/19/2015	No	Yes	Yes	Nomadic	No
6	ODONATA	COENAGRIONIDAE	Ischnura	*Ischnura senegalensis*	Tropical Bluetail	LC	Stable	2016	4/9/2015	No	Yes	Yes	Nomadic	No
7	ODONATA	LIBELLULIDAE	Orthetrum	*Orthetrum chrysostigma*	Epaulet Skimmer	LC	Stable	2016	11/6/2015	No	Yes	Yes	Not a Migrant	No
8	ODONATA	LIBELLULIDAE	Pantala	*Pantala flavescens*	Wandering Glider	LC	Stable	2016	11/6/2015	No	Yes	Yes	Full Migrant	No
9	ODONATA	LIBELLULIDAE	Tholymis	*Tholymis tillarga*	Old World Twister	LC	Unknown	2016	11/12/2015	No	Yes	Yes	Full Migrant	No
10	ODONATA	LIBELLULIDAE	Tramea	*Tramea basilaris*	Keyhole Glider	LC	Unknown	2016	11/12/2015	No	Yes	Yes	Full Migrant	No
11	ODONATA	LIBELLULIDAE	Tramea	*Tramea limbata*	Ferruginous Glider	LC	Unknown	2016	11/12/2015	No	Yes	Yes	Full Migrant	No
12	ODONATA	LIBELLULIDAE	Trithemis	*Trithemis annulata*	Violet Dropwing	LC	Increasing	2016	11/12/2015	No	Yes	Yes	Nomadic	No
13	ODONATA	LIBELLULIDAE	Trithemis	*Trithemis arteriosa*	Red-veined Dropwing	LC	Stable	2016	11/13/2015	No	Yes	Yes	Nomadic	No
14	ODONATA	LIBELLULIDAE	Trithemis	*Trithemis kirbyi*	Orange-winged Dropwing	LC	Increasing	2016	11/13/2015	No	Yes	Yes	Nomadic	No
15	ODONATA	LIBELLULIDAE	Zygonyx	*Zygonyx torridus*	Ringed Cascader	LC	Unknown	2016	11/26/2015	No	Yes	Yes	Nomadic	No
16	DECAPODA	POTAMIDAE	Himalayapotamon	*Himalayapotamon koolooense*		LC	Stable		1/1/2008	No	Yes	No		No
17	DECAPODA	POTAMIDAE	Potamon	*Potamon gedrosianum*		LC	Stable		1/1/2008	No	Yes	No		No
18	DECAPODA	POTAMIDAE	Potamon	*Potamon ruttneri*		LC	Stable		1/1/2008	No	Yes	No		No
19	DECAPODA	GECARCINUCIDAE	Sartoriana	*Sartoriana spinigera*		LC	Stable		1/1/2008	No	Yes	No		No
20	DECAPODA	POTAMIDAE	Potamon	*Potamon persicum*		LC	Unknown		1/1/2008	No	Yes	No		No
21	DECAPODA	GECARCINUCIDAE	Sartoriana	*Sartoriana blanfordi*		LC	Unknown		1/1/2008	No	Yes	No		No
22	HYGROPHILA	LYMNAEIDAE	Radix	*Radix auricularia*		LC	Stable	2014	1/31/2014	No	Yes	No	Not a Migrant	No
23	ODONATA	LIBELLULIDAE	Orthetrum	*Orthetrum coerulescens*	Keeled Skimmer	LC	Stable	2020	12/4/2019	No	Yes	Yes		No
24	ODONATA	PLATYCNEMIDIDAE	Platycnemis	*Platycnemis dealbata*	Ivory Featherleg	LC	Stable	2020	12/4/2019	No	Yes	Yes		No
25	ODONATA	LIBELLULIDAE	Orthetrum	*Orthetrum brunneum*	Southern Skimmer	LC	Increasing	2020	12/3/2019	No	Yes	Yes		No
26	ODONATA	LIBELLULIDAE	Trithemis	*Trithemis festiva*	Indigo Dropwing	LC	Unknown	2020	12/3/2019	No	Yes	Yes		No
27	ODONATA	CHLOROCYPHIDAE	Heliocypha	*Heliocypha biforata*		LC	Unknown	2018	6/25/2007	No	Yes	No		No
28	ODONATA	COENAGRIONIDAE	Ceriagrion	*Ceriagrion coromandelianum*		LC	Unknown	2009	3/1/2007	No	Yes	No		No
29	ODONATA	LIBELLULIDAE	Cratilla	*Cratilla metallica*		LC	Unknown	2009	6/15/2007	No	Yes	No		No
30	ODONATA	CALOPTERYGIDAE	Neurobasis	*Neurobasis chinensis*		LC	Unknown	2009	6/26/2007	No	Yes	No		No
31	ODONATA	LIBELLULIDAE	Orthetrum	*Orthetrum sabina*	Slender Skimmer	LC	Stable	2020	6/5/2019	No	Yes	Yes	Not a Migrant	No
32	ODONATA	COENAGRIONIDAE	Ischnura	*Ischnura elegans*	Common Bluetail	LC	Stable	2020	12/6/2018	No	Yes	Yes		No
33	ODONATA	LIBELLULIDAE	Urothemis	*Urothemis signata*		LC	Unknown	2010	3/27/2010	No	Yes	No		No
34	HYGROPHILA	BULINIDAE	Indoplanorbis	*Indoplanorbis exustus*		LC	Unknown	2012	1/8/2010	No	Yes	No		No
35	VENERIDA	CYRENIDAE	Corbicula	*Corbicula striatella*		LC	Stable	2010	1/29/2010	No	Yes	No		No
36	HYGROPHILA	PLANORBIDAE	Gyraulus	*Gyraulus convexiusculus*		LC	Increasing	2014	1/17/2013	No	Yes	No		No
37	HYGROPHILA	LYMNAEIDAE	Lymnaea	*Lymnaea luteola*		LC	Stable	2010	3/3/2010	No	Yes	No		No
38	UNIONIDA	UNIONIDAE	Parreysia	*Parreysia caerulea*	Jhinukh	LC	Unknown	2010	1/7/2010	No	Yes	No	Nomadic	No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
39	HYGROPHILA	LYMNAEIDAE	Lymnaea	*Lymnaea acuminata*		LC	Unknown	2010	1/11/2010	No	Yes	No		No
40	UNIONIDA	UNIONIDAE	Lamellidens	*Lamellidens corrianus*	Mattah	LC	Unknown	2010	1/9/2010	No	Yes	No		No
41	CYCLONERITIDA	NERITIDAE	Neritina	*Neritina violacea*	Red-mouth Nerite Snail	LC	Unknown	2010	1/11/2010	Yes	Yes	No		No
42	LITTORINIMORPHA	BITHYNIIDAE	Bithynia	*Bithynia cerameopoma*		LC	Unknown	2010	1/9/2010	No	Yes	No		No
43	UNIONIDA	UNIONIDAE	Parreysia	*Parreysia corrugata*		LC	Stable	2010	10/9/2009	No	Yes	No	Nomadic	No
44	ARCHITAENIOGLOSSA	VIVIPARIDAE	Bellamya	*Bellamya bengalensis*		LC	Stable	2010	1/9/2010	No	Yes	No		No
45	CYCLONERITIDA	NERITIDAE	Clithon	*Clithon reticulare*		LC	Unknown	2010	1/11/2010	Yes	Yes	No		No
46	HYGROPHILA	PLANORBIDAE	Pettancylus	*Pettancylus verruca*		LC	Unknown	2010	1/14/2010	No	Yes	No		No
47	HYGROPHILA	LYMNAEIDAE	Lymnaea	*Lymnaea persica*		LC	Unknown	2010	9/30/2009	No	Yes	No		No
48	HYGROPHILA	PLANORBIDAE	Gyraulus	*Gyraulus euphraticus*		LC	Stable	2010	1/9/2010	No	Yes	No		No
49	LITTORINIMORPHA	BITHYNIIDAE	Gabbia	*Gabbia orcula*		LC	Unknown	2010	1/9/2010	No	Yes	No		No
50	UNIONIDA	UNIONIDAE	Parreysia	*Parreysia rajahensis*		LC	Unknown	2010	1/8/2010	No	Yes	No	Nomadic	No
51	LITTORINIMORPHA	BITHYNIIDAE	Bithynia	*Bithynia pulchella*		LC	Unknown	2010	1/8/2010	No	Yes	No		No
52	ARCHITAENIOGLOSSA	VIVIPARIDAE	Mekongia	*Mekongia crassa*		LC	Unknown	2010	1/9/2010	No	Yes	No		No
53	ODONATA	LIBELLULIDAE	Nannophya	*Nannophya pygmaea*	Hachou-tombo	LC	Stable	2020	6/6/2019	No	Yes	Yes		No
54	ODONATA	COENAGRIONIDAE	Agriocnemis	*Agriocnemis pygmaea*	Wandering Midget	LC	Unknown	2020	5/8/2019	No	Yes	Yes	Nomadic	No
55	ODONATA	LIBELLULIDAE	Orthetrum	*Orthetrum luzonicum*		LC	Unknown	2010	3/21/2010	No	Yes	Yes		No
56	ODONATA	COENAGRIONIDAE	Ischnura	*Ischnura nursei*		LC	Unknown	2021	6/28/2020	No	Yes	Yes		No
57	ODONATA	LIBELLULIDAE	Orthetrum	*Orthetrum japonicum*	Taiwan-shioya-tombo	LC	Unknown	2010	10/9/2009	No	Yes	Yes		No
58	ODONATA	LIBELLULIDAE	Trithemis	*Trithemis pallidinervis*	Dancing Dropwing	LC	Unknown	2010	2/20/2010	No	Yes	Yes		No
59	ODONATA	COENAGRIONIDAE	Ischnura	*Ischnura aurora*	Gossamer Damselfly	LC	Stable	2020	5/14/2019	No	Yes	Yes	Full Migrant	No
60	ODONATA	LESTIDAE	Lestes	*Lestes thoracicus*		LC	Unknown	2010	10/14/2009	No	Yes	Yes		No
61	ODONATA	LIBELLULIDAE	Trithemis	*Trithemis aurora*		LC	Unknown	2010	2/20/2010	No	Yes	Yes		No
62	ODONATA	COENAGRIONIDAE	Ceriagrion	*Ceriagrion cerinorubellum*		LC	Unknown	2020	3/12/2019	No	Yes	Yes		No
63	ODONATA	PLATYCNEMIDIDAE	Indocnemis	*Indocnemis orang*		LC	Unknown	2010	2/22/2010	No	Yes	Yes		No
64	DECAPODA	PALINURIDAE	Panulirus	*Panulirus penicillatus*	Pronghorn Spiny Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
65	DECAPODA	PALINURIDAE	Panulirus	*Panulirus versicolor*	Painted Spiny Lobster	LC	Stable	2011	12/3/2009	Yes	No	No		No
66	DECAPODA	SCYLLARIDAE	Scammarctus	*Scammarctus batei*	Soft Locust Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
67	DECAPODA	PALINURIDAE	Panulirus	*Panulirus ornatus*	Ornate Spiny Lobster	LC	Stable	2011	12/3/2009	Yes	No	No		No
68	DECAPODA	PALINURIDAE	Panulirus	*Panulirus polyphagus*	Mud Spiny Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
69	DECAPODA	SCYLLARIDAE	Scyllarides	*Scyllarides tridacnophaga*	Clamkiller Slipper Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
70	DECAPODA	SCYLLARIDAE	Eduarctus	*Eduarctus martensii*	Striated Locust Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
71	DECAPODA	PALINURIDAE	Panulirus	*Panulirus homarus*	Scalloped Spiny Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
72	SPHAERIIDA	SPHAERIIDAE	Odhneripisidium	*Odhneripisidium prasongi*		LC	Unknown	2022	4/12/2010	No	Yes	No		No
73	SORBEOCONCHA	THIARIDAE	Melanoides	*Melanoides pyramis*		LC	Unknown	2010	1/22/2010	No	Yes	No		No
74	SORBEOCONCHA	THIARIDAE	Thiara	*Thiara rudis*		LC	Unknown	2010	1/23/2010	No	Yes	No		No
75	LEPIDOPTERA	NYMPHALIDAE	Vanessa	*Vanessa cardui*	Painted Lady	LC	Unknown	2020	5/4/2020	No	No	Yes	Full Migrant	No
76	LITTORINIMORPHA	CLENCHIELLIDAE	Clenchiella	*Clenchiella microscopica*		LC	Unknown	2014	7/26/2010	Yes	Yes	No	Not a Migrant	No
77	DECAPODA	POLYCHELIDAE	Stereomastis	*Stereomastis nana*		LC	Stable	2011	12/3/2009	Yes	No	No		No
78	DECAPODA	POLYCHELIDAE	Polycheles	*Polycheles typhlops*		LC	Stable	2011	12/3/2009	Yes	No	No		No
79	DECAPODA	SCYLLARIDAE	Acantharctus	*Acantharctus ornatus*		LC	Unknown	2011	12/3/2009	Yes	No	No		No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
80	DECAPODA	SCYLLARIDAE	Biarctus	*Biarctus sordidus*	Pygmy Slipper Lobster	LC	Unknown	2011	12/3/2009	Yes	No	No		No
81	HYGROPHILA	LYMNAEIDAE	Lymnaea	*Lymnaea tenera*		LC	Unknown	2011	7/22/2011	No	Yes	No		No
82	HYGROPHILA	LYMNAEIDAE	Lymnaea	*Lymnaea rectilabrum*		LC	Unknown	2011	7/22/2011	No	Yes	No		No
83	LITTORINIMORPHA	LITTORINIDAE	Littoraria	*Littoraria undulata*		LC	Unknown	2011	7/22/2011	Yes	Yes	No		No
84	VENERIDA	CYRENIDAE	Corbicula	*Corbicula lamarckiana*		LC	Unknown	2016	6/21/2016	No	Yes	No		No
85	HYGROPHILA	LYMNAEIDAE	Galba	*Galba schirazensis*		LC	Unknown	2011	7/22/2011	No	Yes	No		No
86	NEOGASTROPODA	CONIDAE	Conus	*Conus maldivus*	Maldive Cone	LC	Unknown	2013	10/27/2011	Yes	No	No		No
87	NEOGASTROPODA	CONIDAE	Conus	*Conus textile*		LC		2013	10/28/2011	Yes	No	No		No
88	NEOGASTROPODA	CONIDAE	Conus	*Conus nussatella*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
89	NEOGASTROPODA	CONIDAE	Conus	*Conus striatus*		LC	Stable	2013	10/28/2011	Yes	No	No		No
90	NEOGASTROPODA	CONIDAE	Conus	*Conus milneedwardsi*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
91	NEOGASTROPODA	CONIDAE	Conus	*Conus catus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
92	NEOGASTROPODA	CONIDAE	Conasprella	*Conasprella stocki*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
93	NEOGASTROPODA	CONIDAE	Conus	*Conus litoglyphus*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
94	NEOGASTROPODA	CONIDAE	Conus	*Conus biliosus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
95	NEOGASTROPODA	CONIDAE	Conus	*Conus rattus*		LC	Unknown	2013	8/8/2011	Yes	No	No		No
96	NEOGASTROPODA	CONIDAE	Conasprella	*Conasprella coromandelica*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
97	NEOGASTROPODA	CONIDAE	Conus	*Conus inscriptus*	Engraved Cone	LC	Unknown	2013	10/28/2011	Yes	No	No		No
98	NEOGASTROPODA	CONIDAE	Conus	*Conus parvatus*		LC		2013	10/27/2011	Yes	No	No		No
99	NEOGASTROPODA	CONIDAE	Conus	*Conus flavidus*	Yellow Pacific cone	LC	Unknown	2013	10/27/2011	Yes	No	No		No
100	NEOGASTROPODA	CONIDAE	Conus	*Conus aulicus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
101	NEOGASTROPODA	CONIDAE	Conus	*Conus terebra*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
102	NEOGASTROPODA	CONIDAE	Conus	*Conus miliaris*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
103	NEOGASTROPODA	CONIDAE	Conus	*Conus hyaena*	Hyena Cone	LC		2013	10/28/2011	Yes	No	No		No
104	NEOGASTROPODA	CONIDAE	Conus	*Conus miles*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
105	NEOGASTROPODA	CONIDAE	Conus	*Conus coronatus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
106	NEOGASTROPODA	CONIDAE	Conus	*Conus episcopatus*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
107	NEOGASTROPODA	CONIDAE	Conus	*Conus sponsalis*	Sponsal Cone	LC	Stable	2013	10/28/2011	Yes	No	No		No
108	NEOGASTROPODA	CONIDAE	Conasprella	*Conasprella dictator*		LC	Stable	2013	10/26/2011	Yes	No	No		No
109	NEOGASTROPODA	CONIDAE	Conus	*Conus striatellus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
110	NEOGASTROPODA	CONIDAE	Conus	*Conus eburneus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
111	NEOGASTROPODA	CONIDAE	Conus	*Conus acutangulus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
112	NEOGASTROPODA	CONIDAE	Conus	*Conus achatinus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
113	NEOGASTROPODA	CONIDAE	Conus	*Conus canonicus*		LC	Unknown	2013	10/26/2011	Yes	No	No		No
114	NEOGASTROPODA	CONIDAE	Conus	*Conus tessulatus*		LC	Stable	2013	10/28/2011	Yes	No	No		No
115	NEOGASTROPODA	CONIDAE	Conus	*Conus geographus*		LC	Unknown	2013	10/27/2011	Yes	No	No		No
116	NEOGASTROPODA	CONIDAE	Conus	*Conus vexillum*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
117	NEOGASTROPODA	CONIDAE	Conus	*Conus quercinus*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
118	NEOGASTROPODA	CONIDAE	Conus	*Conus virgo*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
119	NEOGASTROPODA	CONIDAE	Conasprella	*Conasprella elegans*		LC	Unknown	2013	10/28/2011	Yes	No	No		No
120	NEOGASTROPODA	CONIDAE	Conus	*Conus arenatus*	Sand-dusted Cone	LC	Unknown	2013	10/26/2011	Yes	No	No		No

No	Order	Family	Genus	Scientific Name	Common Name	Category	Population Trend	Publication	Assessment Date	Biome - Marine	Biome - Freshwater	Biome - Terrestrial	Movement Pattern	Restricted Range
121	DECAPODA	SCYLLARIDAE	Gibbularctus	*Gibbularctus gibberosus*		LC	Unknown	2011	12/2/2009	Yes	No	No		No
122	DECAPODA	PALAEMONIDAE	Macrobrachium	*Macrobrachium rosenbergii*	Giant River Prawn	LC	Unknown	2013	3/27/2012	No	Yes	No	Full Migrant	Yes
123	DECAPODA	PALAEMONIDAE	Macrobrachium	*Macrobrachium malcolmsonii*		LC	Unknown	2013	1/21/2013	No	Yes	No	Unknown	No
124	OSTREIDA	GRYPHAEIDAE	Saccostrea	*Saccostrea scyphophilla*		LC	Unknown	2017	10/6/2011	Yes	No	No		No
125	MANTODEA	EREMIAPHILIDAE	Iris	*Iris oratoria*	Mediterranean Mantis	LC	Unknown	2020	12/19/2019	No	No	Yes	Not a Migrant	No
126	ORTHOPTERA	GRYLLIDAE	Eumodicogryllus	*Eumodicogryllus bordigalensis*	Verge Cricket	LC	Increasing	2019	12/23/2018	No	No	Yes		No
127	VENERIDA	CYRENIDAE	Corbicula	*Corbicula fluminalis*	Asian Clam	LC	Increasing	2016	6/29/2016	No	Yes	No		No
128	MANTODEA	MANTIDAE	Hierodula	*Hierodula tenuidentata*	Giant Asian Mantis	LC	Increasing	2020	7/3/2018	No	No	Yes	Not a Migrant	No
129	LEPIDOPTERA	PAPILIONIDAE	Pachliopta	*Pachliopta aristolochiae*	Common Rose	LC	Unknown	2020	1/11/2019	No	No	Yes		No
130	ODONATA	COENAGRIONIDAE	Ischnura	*Ischnura rubilio*		LC	Unknown	2022	3/4/2021	No	Yes	Yes		No
131	ODONATA	COENAGRIONIDAE	Enallagma	*Enallagma cyathigerum*	Common Blue Damselfly	LC	Stable	2020	4/28/2020	No	Yes	Yes		No
132	ODONATA	LESTIDAE	Lestes	*Lestes umbrinus*		DD	Unknown	2009	6/1/2007	No	Yes	No		No
133	DECAPODA	SCYLLARIDAE	Thenus	*Thenus parindicus*		DD	Unknown	2011	12/3/2009	Yes	No	No		No
134	HYGROPHILA	PLANORBIDAE	Trochorbis	*Trochorbis anastasiae*		DD	Unknown	2011	7/22/2011	No	Yes	No		Yes
135	LITTORINIMORPHA	HYDROBIIDAE	Falsipyrgula	*Falsipyrgula bakhtarana*		DD	Unknown	2011	7/22/2011	No	Yes	No		No
136	NEOGASTROPODA	CONIDAE	Conus	*Conus milesi*		DD	Unknown	2013	10/27/2011	Yes	No	No		No
137	OSTREIDA	GRYPHAEIDAE	Nicaisolopha	*Nicaisolopha tridacnaeformis*		DD	Unknown	2017	10/6/2011	Yes	No	No		No
138	MANTODEA	EMPUSIDAE	Empusa	*Empusa fasciata*	Devil's Mare	DD	Unknown	2020	7/3/2018	No	No	Yes	Not a Migrant	No
139	MANTODEA	RIVETINIDAE	Bolivaria	*Bolivaria brachyptera*	Bolivar's Short Winged Mantis	DD	Unknown	2020	7/3/2018	No	No	Yes	Not a Migrant	No
140	ODONATA	COENAGRIONIDAE	Ischnura	*Ischnura inarmata*		DD	Unknown	2021	6/23/2020	No	Yes	Yes		No

Note: Least Concern :(LC), Data Deficient: (DD)

Appendix F: Field Data

See the following pages.

F.1 Reko Diq Mine Site

F.1.1 Avifauna

Post-Monsoon 2022 Survey

Location ID	Date	Coordinates		Habitat	Ammomanes cinctura	Iduna caligate	Corvus ruficollis	Curruca mystacea	Ptyonoprogne rupestris	Calandrella brachydactyla	Alaemon alaudipes	Sylvia curruca	Athene noctua	Cercotrichas galactotes)	Ammopardix griseogularis	Saxicola maura	Anthus trivialis	Total	Species Count	Percentages
		Latitude	Longitude		Bar–tailed Lark	Booted Warbler	Brown–necked Raven	Menetries's Warbler	Crag Martin	Greater Short–Toed Lark	Hoopoe Lark	Lesser Whitethroat	Little Owl	Rufous–tailed Scrub Robin	Seesee Partridge	Siberian Stonechat	Tree Pipit			
E13	9/15/22	29°09' 30.3"	61°59' 31.2"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E14	9/15/22	29°08' 54.1"	61°54' 42.5"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E15	9/14/22	29°10' 12.3"	62°01' 06.7"	Dry Streambeds	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**	**1**	**1.61**
E16	9/14/22	29°10' 32.7"	62°02' 08.5"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**	**1.61**
E17	9/14/22	29°11' 07.7"	62°03' 00.5"	Mountains/ Hills	0	0	0	0	2	0	1	0	1	0	4	0	0	**8**	**4**	**12.90**
E18	9/13/22	29°12' 41.8"	62°08' 01.9"	Sandy Plains/ Sand Dunes	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E19	9/13/22	29°10' 07.2"	62°06' 16.1"	Mountains/ Hills	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.61**
E20	9/14/22	29°09' 16.3"	62°02' 04.6"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E21	9/15/22	29°07' 19.9"	62°00' 28.7"	Dry Streambeds	1	0	0	1	0	0	0	1	0	0	0	0	0	**3**	**3**	**4.84**
E22	9/14/22	29°08' 04.4"	62°02' 49.9"	Mountains/ Hills	0	0	4	0	0	0	0	0	0	0	0	0	0	**4**	**1**	**6.45**
E23	9/13/22	29°08' 19.0"	62°06' 03.1"	Gravel Plains	0	0	25	0	0	0	0	0	0	0	0	0	0	**25**	**1**	**40.32**
E24	9/13/22	29°07' 20.6"	62°07' 05.6"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E25	9/13/22	29°05' 44.3"	62°06' 19.3"	Dry Streambeds	0	1	0	0	0	0	1	0	0	0	0	0	0	**2**	**2**	**3.23**

Location ID	Date	Coordinates		Habitat	*Ammomanes cinctura*	*Iduna caligate*	*Corvus ruficollis*	*Curruca mystacea*	*Ptyonoprogne rupestris*	*Calandrella brachydactyla*	*Alaemon alaudipes*	*Sylvia curruca*	*Athene noctua*	*Cercotrichas galactotes)*	*Ammopardix griseogularis*	*Saxicola maura*	*Anthus trivialis*	**Total**	**Species Count**	**Percentages**
		Latitude	Longitude		*Bar–tailed Lark*	*Booted Warbler*	*Brown–necked Raven*	*Menetries's Warbler*	*Crag Martin*	*Greater Short–Toed Lark*	*Hoopoe Lark*	*Lesser Whitethroat*	*Little Owl*	*Rufous–tailed Scrub Robin*	*Seesee Partridge*	*Siberian Stonechat*	*Tree Pipit*			
E26	9/16/22	29°06' 09.2"	62°05' 04.3"	Gravel Plains	0	0	2	0	0	0	0	0	0	0	0	0	0	**2**	**1**	**3.23**
E27	9/14/22	29°06' 46.8"	62°03' 01.3"	Dry Streambeds	0	0	8	0	0	2	0	2	0	0	0	0	0	**12**	**3**	**19.35**
E28	9/16/22	29°06' 36.6"	62°01' 54.9"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E29	9/16/22	29°05' 15.8"	62°01' 57.1"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**1**	**1.61**
E30	9/16/22	29°06' 07.5"	61°59' 17.1"	Dry Streambeds	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.61**
E31	9/15/22	29°06' 49.6"	61°57' 50.7"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E32	9/15/22	29°03' 01.2"	61°59' 34.2"	Gravel Plains	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.61**
Total					**3**	**1**	**40**	**1**	**2**	**2**	**3**	**3**	**1**	**0**	**4**	**1**	**1**	**62**	**12**	**100**

Spring 2023 Survey

Location ID	*Coordinates*		*Date*	*Habitat*	*Sylvia nana*	*Ammomanes cinctura*	*Iduna caligate*	*Corvus ruficollis*	*Corvus corax*	*Ammomanes deserti*	*Calandrella brachydactyla*	*Alaemon alaudipes*	*Acrocephalus melanopogon*	*Cercotrchas galactotes*			
	Latitude	*Longitude*			*Asian Desert Warbler*	*Bar–tailed Lark*	*Booted Warbler*	*Brown–necked Raven*	*Common Raven*	*Desert Lark*	*Greater Short–toed Lark*	*Hoopoe Lark*	*Moustached Warbler*	*Rufous–tailed Scrub Robin*	***Total***	***Species Count***	***Percentages***
E13	29° 9' 31.21"	61° 59' 43.1"	5/2/2023	Mountain/ Hills	1	–	–	7	–	–	–	–	–	–	**8**	2	**32.00**
E14	29° 8' 48.03"	61° 54' 48.6"	4/30/2023	Clayey Plains	1	–	–	–	–	–	–	–	–	2	**3**	2	**12.00**
E15	29° 10' 4.65"	62° 01' 3.6"	4/30/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E16	29° 10' 40.22"	62° 01' 55.9"	5/2/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E17	29° 12' 55.75"	62° 02' 06.3"	5/1/2023	Mountain/ Hills	–	–	–	4	–	–	1	–	2	–	**7**	3	**28.00**
E18	29° 12' 32.92"	62° 08' 12.0"	5/1/2023	Sandy Plains	–	–	–	–	3	–	–	–	–	–	**3**	1	**12.00**
E19	29° 10' 7.17"	62° 06' 03.5"	5/1/2023	Mountain/ Hills	–	–	1	–	–	1	–	–	–	–	**2**	2	**8.00**
E20	29° 9' 23.55"	62° 01' 56.1"	5/2/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E21	29° 7' 17.05"	62° 00' 14.1"	5/3/2023	Dry Streambeds	–	–	–	–	–	–	–	1	–	–	**1**	1	**4.00**
E22	29° 7' 57.42"	62° 02' 12.6"	5/2/2023	Mountain/ Hills	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E23	29° 8' 15.44"	62° 06' 13.9"	5/2/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E24	29° 7' 11.89"	62° 07' 01.0"	5/1/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E25	29° 05' 37.1"	62° 06' 15.3"	5/1/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E26	29° 06' 0.8"	62° 05' 10.6"	4/30/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E27	29° 06' 38.7"	62° 02' 57.5"	5/2/2023	Dry Streambeds	–	1	–	–	–	–	–	–	–	–	**1**	1	**4.00**
E28	29° 06' 24.3"	62° 01' 14.9"	5/3/2023	Mountain/ Hills	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E29	29° 05' 05.4"	62° 01' 15.4"	5/3/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**

Location ID	Coordinates		Date	Habitat	*Sylvia nana*	*Ammomanes cinctura*	*Iduna caligate*	*Corvus ruficollis*	*Corvus corax*	*Ammomanes deserti*	*Calandrella brachydactyla*	*Alaemon alaudipes*	*Acrocephalus melanopogon*	*Cercotrchas galactotes*	**Total**	**Species Count**	**Percentages**
	Latitude	*Longitude*			*Asian Desert Warbler*	*Bar–tailed Lark*	*Booted Warbler*	*Brown–necked Raven*	*Common Raven*	*Desert Lark*	*Greater Short–toed Lark*	*Hoopoe Lark*	*Moustached Warbler*	*Rufous–tailed Scrub Robin*			
E30	29° 05' 57.5"	61° 59' 09.8"	5/3/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E31	29° 06' 44.6"	61° 57' 43.3"	5/3/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
E32	29° 02' 54.3"	61° 59' 40.4"	5/3/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	**–**	–	**0.00**
Total					**2**	**1**	**1**	**11**	**3**	**1**	**1**	**1**	**2**	**2**	**25**	**10**	**100.00**

F.1.2 Herpetofauna

Post-Monsoon 2022 Survey

Location ID	Date	Coordinates		Habitat	Phrynocephalus maculatus	Acanthodactylus blanfordii	Ophiomorus tridactylus	Phrynocephalus ornatus	Mesalina watsonana	Cyrtopodion scabrum	Agamura cruralis	Laudakia fusca	Total	Species Count	Percentages
		Latitude	Longitude		Blacktailed Toad–headed Agama	Blanford's Fringe–fingered Lizard	Indian Sand–swimmer	Ornated Toad–headed Agama	Persian Long–tailed Desert Lizard	Rough–tailed Bentoed Gecko	Spider Gecko	Yellow–headed Rock Agama			
E13	9/15/22	29°9' 30.3"	61°59' 31.2"	Mountains/ Hills	0	0	0	0	0	0	1	0	**1**	**1**	**5.88**
E14	9/15/22	29°8' 54"	61°54' 42.5"	Gravel Plains	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E15	9/14/22	29°10' 12.3"	62°1' 6.7"	Dry Streambeds	1	0	0	0	0	0	0	0	**1**	**1**	**5.88**
E16	9/14/22	29°10' 32.7"	62°2' 8.5"	Gravel Plains	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E17	9/14/22	29°12' 47.9"	62°2' 14.1"	Mountains/ Hills	0	0	0	0	0	1	0	1	**2**	**2**	**11.76**
E18	9/13/22	29°12' 41.8"	62°8' 1.9"	Sandy Plains/Sand Dunes	0	0	0	2	0	0	1	0	**3**	**2**	**17.65**
E19	9/13/22	29°10' 7.2"	62°6' 16.1"	Mountains/ Hills	0	0	0	0	0	0	0	1	**1**	**1**	**5.88**
E20	9/14/22	29°9' 16.3"	62°2' 4.6"	Gravel Plains	2	0	0	0	0	0	0	0	**2**	**1**	**11.76**
E21	9/15/22	29°7' 19.9"	62°0' 28.7"	Dry Streambeds	1	0	0	0	0	0	0	0	**1**	**1**	**5.88**
E22	9/14/22	29°8' 4.4"	62°2' 49.9"	Mountains/ Hills	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E23	9/13/22	29°8' 19"	62°6' 3"	Gravel Plains	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E24	9/13/22	29°7' 20.6"	62°7' 5.6"	Gravel Plains	1	0	0	0	0	0	0	0	**1**	**1**	**5.88**
E25	9/13/22	29°5' 44.3"	62°6' 19.3"	Dry Streambeds	0	1	0	0	0	0	0	0	**1**	**1**	**5.88**
E26	9/16/22	29°6' 9.2"	62°5' 4.3"	Gravel Plains	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E27	9/14/22	29°6' 46.8"	62°3' 1.3"	Dry Streambeds	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E28	9/16/22	29°6' 36.6"	62°1' 54.9"	Mountains/ Hills	0	0	0	0	0	0	0	1	**1**	**1**	**5.88**
E29	9/16/22	29°5' 15.8"	62°1' 57.1"	Dry Streambeds	0	1	0	0	0	0	0	0	**1**	**1**	**5.88**
E30	9/16/22	29°6' 7"	61°59' 17.1"	Dry Streambeds	1	0	0	0	0	0	0	0	**1**	**1**	**5.88**
E31	9/15/22	29°06' 49.6"	61°57' 50.7"	Gravel Plains	0	0	0	0	0	0	0	0	**0**	**0**	**–**
E32	9/15/22	29°03' 01"	61°59' 34"	Gravel Plains	0	0	0	0	1	0	0	0	**1**	**1**	**5.88**
					6	**2**	**0**	**2**	**1**	**1**	**2**	**3**	**17**	**7**	**100**

Spring 2023 Survey

Location ID	*Coordinates*	*Date*	*Habitat*	*Eremias sp.*	*Phrynocephalus clarkorum*	*Phrynocephalus luteoguttatus*	*Phrynocephalus maculatus*	***Total***	***Species Count***
				Racerunner	*Clark's Toad–headed Agama*	*Yellow–speckled Toad–headed Agama*	*Black–tailed Toadheaded Agama*		
E13	29° 9' 31.21" 61° 59' 43.08"	5/2/2023	Mountain/ Hills	–	–	–	–	**–**	**–**
E14	29° 8' 48.03" 61° 54' 48.61"	4/30/2023	Clayey Plains	1	–	–	–	**1**	**1**
E15	29° 10' 4.65" 62° 1' 3.64"	4/30/2023	Dry Streambeds	–	–	–	–	**–**	**–**
E16	29° 10' 40.22" 62° 1' 55.97"	5/2/2023	Gravel Plains	–	–	–	–	**–**	**–**
E17	29° 12' 55.75" 62° 2' 6.3"	5/1/2023	Mountain/ Hills	–	3	1	–	**4**	**2**
E18	29° 12' 32.92" 62° 8' 12.04"	5/1/2023	Sandy Plains	–	–	–	–	**–**	**–**
E19	29° 10' 7.17" 62° 6' 3.52"	5/1/2023	Mountain/ Hills	–	–	–	–	**–**	**–**
E20	29° 9' 23.55" 62° 1' 56.15"	5/2/2023	Gravel Plains	–	–	–	–	**–**	**–**
E21	29° 7' 17.05" 62° 0' 14.09"	5/3/2023	Dry Streambeds	–	–	–	–	**–**	**–**
E22	29° 7' 57.42" 62° 2' 12.66"	5/2/2023	Mountain/ Hills	–	1	–	–	**1**	**1**
E23	29° 8' 15.44" 62° 6' 13.9"	5/2/2023	Gravel Plains	–	–	–	–	**–**	**–**
E24	29° 7' 11.89" 62° 7' 1.04"	5/1/2023	Gravel Plains	–	–	–	–	**–**	**–**
E25	29° 5' 37.13" 62° 6' 15.31"	5/1/2023	Dry Streambeds	–	–	–	–	**–**	**–**
E26	29° 6' 0.83" 62° 5' 10.65"	4/30/2023	Gravel Plains	–	–	–	–	**–**	**–**

Location ID	*Coordinates*	*Date*	*Habitat*	*Eremias sp.*	*Phrynocephalus clarkorum*	*Phrynocephalus luteoguttatus*	*Phrynocephalus maculatus*	***Total***	***Species Count***
				Racerunner	*Clark's Toad–headed Agama*	*Yellow–speckled Toad–headed Agama*	*Black–tailed Toadheaded Agama*		
E27	29° 6' 38.75" 62° 2' 57.56"	5/2/2023	Dry Streambeds	–	–	–	–	**–**	**–**
E28	29° 6' 24.33" 62° 1' 14.9"	5/3/2023	Mountain/ Hills	–	–	–	–	**–**	**–**
E29	29° 5' 5.42" 62° 1' 15.42"	5/3/2023	Dry Streambeds	1	–	–	–	**1**	**1**
E30	29° 5' 57.53" 61° 59' 9.88"	5/3/2023	Dry Streambeds	–	–	–	1	**1**	**1**
E31	29° 6' 44.67" 61° 57' 43.29"	5/3/2023	Gravel Plains	–	–	–	–	**–**	**–**
E32	29° 2' 54.29" 61° 59' 40.47"	5/3/2023	Gravel Plains	–	–	–	–	**–**	**–**
				2	**4**	**1**	**1**	**8**	**4**

Summer 2024 Survey

Location ID	*Coordinates*	*Habitat*	*Bunopus tuberculatus*	*Crossobamon eversmanni*	*Eremias acutirostris*	*Eremias cf scripta*	*Eremias scripta*	*Ophiomorus tridactylus*	*Phrynocephalus euptilopus*	*Phrynocephalus luteoguttatus*	*Phrynocephalus maculatus*	*Phrynocephalus ornatus*	*Psammophis schokari*	*Teratoscincus microlepis*	*Trapelus agilis pakistanensis*	*Trapelus ruderatus*	***Total Specimens***	***Species Count***
TP7	29°09'18.1"N 61°55'06.8"E	Mountains/Hills	1	0	0	0	0	1	0	0	0	2	0	0	0	0	**4**	**3**
TP8	29°11'01.8"N 62°00'42.4"E	Mountains/Hills	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**
TP9	29°05'42.0"N 62°02'51.4"E	Gravel Plains	1	0	0	1	0	0	0	0	1	0	0	0	0	0	**3**	**3**
TP10	29°07'25.3"N 62°05'12.6"E	Dry Streambed	0	0	0	0	0	0	0	1	2	1	0	0	4	0	**8**	**4**
TP12	29°07'53.5"N 62°13'56.7"E	Mountains/Hills	0	2	0	0	0	0	0	0	0	1	0	1	0	0	**4**	**3**
TP13	29°21'00.46"N 62°07'17.53"E	Sand Dunes	0	0	2	0	6	0	1	0	0	0	0	0	0	0	**9**	**3**
TP15	29°07'26.49"N 62°17'45.64"E	Mountains/Hills	0	0	0	0	0	0	0	2	0	0	0	0	0	1	**3**	**2**
MH1	29°15'13.46"N 62°08'48.22"E	Sand Dunes	0	0	1	0	0	0	1	0	0	0	1	0	0	0	**3**	**3**
Total			**3**	**2**	**3**	**1**	**6**	**1**	**2**	**3**	**3**	**4**	**1**	**1**	**4**	**1**	**35**	**14**

F.1.3 Mammals

Post-Monsoon 2022 Survey

Location ID	Date	Coordinates		Habitat	*Lepus capensis*			*Vulpes vulpes*			*Vulpes rueppellii*			*Felis margarita*			Sighting		Signs		Combine Sighting and Sign	Species Count
					Desert Hare			Red Fox			Ruppell's fox			Sand Cat							Total	
		Latitude	Longitude		Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Total	Species Count	Total	Species Count		
E13	9/15/22	29°9' 30.3"	61°59' 31.2"	Mountains/ Hills	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
E14	9/15/22	29°8' 54"	61°54' 42.5"	Gravel Plains	0	0	0	0	3	3	0	0	0	0	0	0	0	1	3	1	3	1
E15	9/14/22	29°10' 12.3"	62°1' 6.7"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E16	9/14/22	29°10' 32.7"	62°2' 8.5"	Gravel Plains	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1
E17	9/14/22	29°12' 47.9"	62°2' 14.1"	Mountains/ Hills	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1
E18	9/13/22	29°12' 41.8"	62°8' 1.9"	Sandy Plains/ Sand Dunes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E19	9/13/22	29°10' 7.2"	62°6' 16.1"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1
E20	9/14/22	29°9' 16.3"	62°2' 4.6"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E21	9/15/22	29°7' 19.9"	62°0' 28.7"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E22	9/14/22	29°8' 4.4"	62°2' 49.9"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E23	9/13/22	29°8' 19"	62°6' 3"	Gravel Plains	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	1	1
E24	9/13/22	29°7' 20.6"	62°7' 5.6"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E25	9/13/22	29°5' 44.3"	62°6' 19.3"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E26	9/16/22	29°6' 9.2"	62°5' 4.3"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E27	9/14/22	29°6' 46.8"	62°3' 1.3"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E28	9/16/22	29°6' 36.6"	62°1' 54.9"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E29	9/16/22	29°5' 15.8"	62°1' 57.1"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E30	9/16/22	29°6' 7"	61°59' 17.1"	Dry Streambeds	0	0	0	0	0	0	1	3	4	0	0	0	1	1	3	1	4	1
E31	9/15/22	29°6' 49.6"	61°57' 50.7"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E32	9/15/22	29°3' 1"	61°59' 34"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					0	**1**	**1**	**0**	**5**	**5**	**1**	**4**	**5**	**0**	**1**	**1**	**1**	**7**	**11**	**4**	**12**	**4**

Spring 2023 Survey

Location ID	Coordinates	Date	Habitat	Lepus capensis			Vulpes vulpes			Felis margarita			Sighting		Signs		Combine Sighting and Sign	
				Cape Hare			Red Fox			Sand Cat			Total	Species Count	Total	Species Count	Total	Species Count
				Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total						
E13	29° 9' 31.21" 61° 59' 43.08"	05/02/23	Mountain/ Hills	–	2	2	–	1	1	–	–	–	–	–	3	2	3	2
E14	29° 8' 48.03" 61° 54' 48.61"	04/30/23	Clayey Plains	–	–	–	–	–	–	–	1	1	–	–	1	1	1	1
E15	29° 10' 4.65" 62° 1' 3.64"	04/30/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E16	29° 10' 40.22" 62° 1' 55.97"	05/02/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E17	29° 12' 55.75" 62° 2' 6.3"	05/01/23	Mountain/ Hills	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E18	29° 12' 32.92" 62° 8' 12.04"	05/01/23	Sandy Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E19	29° 10' 7.17" 62° 6' 3.52"	05/01/23	Mountain/ Hills	–	3	3	–	1	1	–	1	1	–	–	5	3	5	3
E20	29° 9' 23.55" 62° 1' 56.15"	05/02/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E21	29° 7' 17.05" 62° 0' 14.09"	05/03/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E22	29° 7' 57.42" 62° 2' 12.66"	05/02/23	Mountain/ Hills	–	1	1	–	–	–	–	–	–	–	–	1	1	1	1
E23	29° 8' 15.44" 62° 6' 13.9"	05/02/23	Gravel Plains	–	–	–	–	1	1	–	–	–	–	–	1	1	1	1
E24	29° 7' 11.89" 62° 7' 1.04"	05/01/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E25	29° 5' 37.13" 62° 6' 15.31"	05/01/23	Dry Streambeds	–	–	–	–	1	1	–	–	–	–	–	1	1	1	1
E26	29° 6' 0.83" 62° 5' 10.65"	04/30/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Location ID	Coordinates	Date	Habitat	*Lepus capensis*			*Vulpes vulpes*			*Felis margarita*			Sighting		Signs		Combine Sighting and Sign	
				Cape Hare			Red Fox			Sand Cat			Total	Species Count	Total	Species Count	Total	Species Count
				Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total						
E27	29° 6' 38.75" 62° 2' 57.56"	05/02/23	Dry Streambeds	–	1	1	–	–	–	–	–	–	–	–	1	1	1	1
E28	29° 6' 24.33" 62° 1' 14.9"	05/03/23	Mountain/ Hills	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E29	29° 5' 5.42" 62° 1' 15.42"	05/03/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E30	29° 5' 57.53" 61° 59' 9.88"	05/03/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E31	29° 6' 44.67" 61° 57' 43.29"	05/03/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E32	29° 2' 54.29" 61° 59' 40.47"	05/03/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
				–	**7**	**7**	**–**	**4**	**4**	**–**	**2**	**2**	**–**	**–**	**13**	**3**	**13**	**3**

F.1.4 Small Mammals

Post-Monsoon 2022 Survey

Transect ID	*Date*	*Coordinates*	*Habitat*	*Rhombomys opimus*			*Sighting*		*Signs*		*Combine Sighting and Sign*	
				Great Gerbil			*Total*	*Species Count*	*Total*	*Species Count*	*Total*	*Species Count*
				Sighting	*Signs*	*Total*						
BM3	09/17/22	29°31'43.1" 61°33'46.2"	Built-up Areas	5	-	**5**	5	**-**	**-**	**-**	**5**	**1**
BM4	09/17/22	-	Built-up Areas	2	-	**2**	2	**-**	**-**	**-**	**2**	**1**
BM5	09/17/22	29°28'22.6"	Built-up Areas	-	-	-	-	-	-	-	-	-
Total				**7**	**-**	**7**	**7**	**-**	**-**	**-**	**7**	**1**

Spring 2023 Survey

Location ID	*Date*	*Coordinates*	*Habitat*	*Rhombomys opimus*			*Sighting*		*Signs*		*Combine Sighting and Sign*	
				Great Gerbil			*Total*	*Species Count*	*Total*	*Species Count*	*Total*	*Species Count*
				Sighting	*Signs*	*Total*						
BM3	05/01/23	29° 6'55.04" 62° 6'34.87"	Clayey Plains	3	–	2	2	–	–	–	5	1
Total				**3**	**–**	**2**	**6**	**–**	**–**	**–**	**5**	**1**

Summer 2024 Survey

Location ID	*Coordinates*	*Hemiechinus auritus*	*Rhombomys opimus*	*Meriones crassus*	***Total***	***Species Count***
TP7	29°09'18.10"N 61°55'06.8"E	1	-	-	**1**	**1**
TP8	29°11'01.8"N 62°00'42.4"E	-	-	-	**-**	**0**
TP9	29°05'42.0"N 62°02'51.4"E	-	-	-	**-**	**0**
TP10	29°07'25.3"N 62°05'12.6"E	-	-	-	**-**	**0**
TP12	29°07'53.5"N 62°13'56.7"E	-	-	-	**-**	**0**
TP13	29°21'00.46"N 62°07'17.53"E	-	-	1	**1**	**1**
TP15	29°07'26.49"N 62°17'45.64"E	-	2	-	**2**	**1**
Camp Site	29° 8'23.29"N 62° 6'49.29"E	-	3	-	**3**	**1**
MH1	29°15'13.46"N 62°08'48.22"E	-	-	-	**-**	**0**
Total		**1**	**5**	**1**	**7**	**3**

F.2 Northern Groundwater System

F.2.1 Avifauna

Post-Monsoon 2022 Survey

Location ID	Date	Coordinates		Habitat	Curruca nana	Chlamydotis macqueenii	Ammomanes cinctura	Corvus ruficollis	Buteo buteo vulpinus	Ptyonoprogne rupestris	Galerida cristata	Ammomanes deserti	Neophron percnopterus	Caprimuleus europaeus	Coracias garrulus	Spilopelia senegalensis	Calandrella brachydactyla	Alaemon alaudipes	Oriolus kundoo	Spilopelia senegalensis	Sylvia curruca	Saxicola caprata	Ficedula parva	Pastor roseus	Muscicapa striata	Motacilla alba	Pycnonotus leucotis	Total	Species Count	Percentages2
		Latitude	Longitude		Asian Desert Warbler	Asian Houbara (Macqueen`s Bustard)	Bar–tailed Lark	Brown–necked Raven	Common Buzzard	Crag Martin	Crested Lark	Desert Lark	Egyptian Vulture	Eurasian Nightjar	Eurasian Roller	European Bee–eater	Greater Short–Toed Lark	Hoopoe Lark	Indian Golden Oriole	Laughing Dove	Lesser Whitethroat	Pied Bushchat	Red–throated Flycatcher	Rosy Starling	Spotted Flycatcher	White Wagtail	White–eared Bulbul			
E1	9/17/22	29°38' 9.1"	61°27' 28"	Clayey Plains	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.44**
E2	9/17/22	29°33' 59.7"	61°31' 30.7"	Clayey Plains	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.44**
E3	9/17/22	29°31' 43.1"	61°33' 46.2"	Gravel Plains	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.44**
E4	9/17/22	29°30' 37.8"	61°31' 26.1"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
E5	9/18/22	29°28' 22.7"	61°37' 52.2"	Sandy Plains/Sand Dunes	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0	0	0	0	0	**4**	**3**	**5.79**
E6	9/18/22	29°25' 53.7"	61°37' 53.8"	Gravel Plains	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**2**	**2**	**2.89**
E7	9/18/22	29°24' 10.4"	61°44' 31.2"	Sandy Plains/Sand Dunes	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	**4**	**2**	**5.79**
E8	9/18/22	29°21' 3.4"	61°44' 30.3"	Dry Streambeds	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**3**	**3**	**4.34**

Location ID	*Date*	*Coordinates*		*Habitat*	*Curruca nana*	*Chlamydotis macqueenii*	*Ammomanes cinctura*	*Corvus ruficollis*	*Buteo buteo vulpinus*	*Ptyonoprogne rupestris*	*Galerida cristata*	*Ammomanes deserti*	*Neophron percnopterus*	*Caprimuleus europaeus*	*Coracias garrulus*	*Spilopelia senegalensis*	*Calandrella brachydactyla*	*Alaemon alaudipes*	*Oriolus kundoo*	*Spilopelia senegalensis*	*Sylvia curruca*	*Saxicola caprata*	*Ficedula parva*	*Pastor roseus*	*Muscicapa striata*	*Motacilla alba*	*Pycnonotus leucotis*	***Total***	***Species Count***	***Percentages2***
		Latitude	*Longitude*		*Asian Desert Warbler*	*Asian Houbara (Macqueen`s Bustard)*	*Bar–tailed Lark*	*Brown–necked Raven*	*Common Buzzard*	*Crag Martin*	*Crested Lark*	*Desert Lark*	*Egyptian Vulture*	*Eurasian Nightjar*	*Eurasian Roller*	*European Bee–eater*	*Greater Short–Toed Lark*	*Hoopoe Lark*	*Indian Golden Oriole*	*Laughing Dove*	*Lesser Whitethroat*	*Pied Bushchat*	*Red–throated Flycatcher*	*Rosy Starling*	*Spotted Flycatcher*	*White Wagtail*	*White–eared Bulbul*			
E9	9/19/22	29°19' 20.6"	61°45' 49.6"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1.44**
E10	9/19/22	29°16' 55.3"	61°50' 19.5"	Gravel Plains	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	**4**	**4**	**5.79**
E11	9/19/22	29°28' 22.6"	61°23' 15.5"	Mountains/ Hills	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**2**	**4.34**
E12	9/19/22	29°11' 9.3"	61°55' 7.7"	Gravel Plains	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**2**	**4.34**
MH 1	9/17/22	29°28' 22.6"	61°23' 15.5"	Agricultural Areas/ Date Palms	0	0	0	0	0	6	1	0	0	0	0	10	0	0	11	2	1	0	1	1	0	1	8	**42**	**10**	**60.8**
					1	**1**	**1**	**2**	**1**	**6**	**4**	**2**	**2**	**1**	**1**	**10**	**4**	**1**	**11**	**2**	**3**	**1**	**1**	**1**	**3**	**2**	**8**	**69**	**23**	**100**

Spring 2023 Survey

Location ID	*Coordinates*	*Date*	*Habitat*	*Curruca nana* / *Asian Desert Warbler*	*Hirundo rustica* / *Barn Swallow*	*Corvus ruficollis* / *Brown–necked Raven*	*Acrocephalus stentoreus* / *Clamorous Reed Warbler*	*Streptopelia decaocto* / *Collared Dove*	*Ammomanes deserti* / *Desert Lark*	*Coracias garrulus* / *European Roller*	*Calandrella brachydactyla* / *Greater Short–toed Lark*	*Progne chalybea* / *Grey–breasted Martin*	*Oenanthe monacha* / *Hooded Wheatear*	*Alaemon alaudipes* / *Hoopoe Lark*	*Oriolus kundoo* / *Indian Golden Oriole*	*Acrocephalus melanopogon* / *Moustached Warbler*	*Pycnonotus cafer* / *Red Vented Bulbul*	*Pastor roseus* / *Rosy Starling*	*Monticola saxatilis* / *Rufous–tailed Rock Thrush*	*Pycnonotus leucotis* / *White–eared Bulbul*	***Total***	***Species Count***	***Percentages***
E1	29° 38' 9.16" 61° 27' 19.43"	4/29/2023	Clayey Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**0.00**
E2	29° 34' 40.62" 61° 30' 39.88"	4/29/2023	Clayey Plains	–	–	–	1	–	–	–	–	–	–	5	–	–	–	–	–	–	**6**	**2**	**12.00**
E3	29° 31' 42.42" 61° 34' 1.09"	4/29/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**0.00**
E4	29° 30' 46.4" 61° 31' 32.53"	4/29/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**0.00**
E5	29° 28' 30.27" 61° 37' 49.15"	4/29/2023	Sandy Plains	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	**2**	**2**	**4.00**
E6	29° 26' 5.3" 61° 37' 59.04"	4/28/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**0.00**
E7	29° 24' 13.57" 61° 44' 26.002"	4/28/2023	Gravel Plains	–	–	–	–	–	–	4	1	–	–	–	–	–	–	–	–	–	**5**	**2**	**10.00**
E8	29° 21' 11.35" 61° 44' 26.5"	4/28/2023	Dry Streambeds	–	–	1	–	–	4	–	–	–	–	–	–	–	–	–	–	–	**5**	**2**	**10.00**
E9	29° 19' 28.11" 61° 45' 47.14"	4/28/2023	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**0.00**

Location ID	*Coordinates*	*Date*	*Habitat*	*Curruca nana*	*Hirundo rustica*	*Corvus ruficollis*	*Acrocephalus stentoreus*	*Streptopelia decaocto*	*Ammomanes deserti*	*Coracias garrulus*	*Calandrella brachydactyla*	*Progne chalybea*	*Oenanthe monacha*	*Alaemon alaudipes*	*Oriolus kundoo*	*Acrocephalus melanopogon*	*Pycnonotus cafer*	*Pastor roseus*	*Monticola saxatilis*	*Pycnonotus leucotis*	***Total***	***Species Count***	***Percentages***
				Asian Desert Warbler	*Barn Swallow*	*Brown–necked Raven*	*Clamorous Reed Warbler*	*Collared Dove*	*Desert Lark*	*European Roller*	*Greater Short–toed Lark*	*Grey–breasted Martin*	*Hooded Wheatear*	*Hoopoe Lark*	*Indian Golden Oriole*	*Moustached Warbler*	*Red Vented Bulbul*	*Rosy Starling*	*Rufous–tailed Rock Thrush*	*White–eared Bulbul*			
E10	29° 16' 51.46" 61° 50' 27.89"	4/28/2023	Gravel Plains	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**	**1**	**4.00**
E11	29° 14' 42.02" 61° 51' 50.67"	4/30/2023	Mountain/ Hills	2	–	2	–	–	1	–	–	–	1	–	–	–	–	–	1	–	**7**	**5**	**14.00**
E12	29° 11' 1.26" 61° 55' 11.91"	4/30/2023	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**0.00**
MH1	29° 28' 22.86" 61° 23' 10.34"	4/29/2023	Agricultural Area/ Date Palms	1	3	–	–	4	–	–	–	–	–	5	1	1	4	1	–	3	**23**	**9**	**46.00**
				3	**3**	**5**	**1**	**4**	**5**	**4**	**1**	**1**	**1**	**11**	**1**	**1**	**4**	**1**	**1**	**3**	**50**	**17**	**100.0**

F.2.2 Herpetofauna

Post-Monsoon 2022 Survey

Location ID	Date	Coordinates		Habitat	Phrynocephalus maculatus	Trapelus agilis	Phrynocephalus euptilopus	Platyceps karelini	Ophiomorus tridactylus	Acanthodactylus micropholis	Eumeces zarudnyi	Psammophis schokari	Phrynocephalus ornatus	Total	Species Count	Percentage
		Latitude	Longitude		Alcoks's/ Chagai Toad–headed Agama	Blacktailed Toad–headed Agama	Brilliant Ground Agama	Gold Skink	Indian Sand–swimmer	Ornated Toad–headed Agama	Schokari Sand Racer	Spotted Desert Racer	Yellowtail Fringe–fingered Lizard			
E1	9/17/22	29°38' 9.1"	61°27' 28"	Clayey Plains	0	1	0	0	0	0	0	0	0	**1**	**1**	**4.34**
E2	9/17/22	29°33' 59.7"	61°31' 30.7"	Clayey Plains	0	1	0	0	0	0	0	0	0	**1**	**1**	**4.34**
E3	9/17/22	29°31' 43.1"	61°33' 46.2"	Gravel Plains	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
E4	9/17/22	29°30' 37.8"	61°31' 26.1"	Dry Streambeds	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
E5	9/18/22	29°28' 22.7"	61°37' 52.2"	Sandy Plains/ Sand Dunes	1	4	0	1	3	0	0	1	1	**11**	**6**	**47.82**
E6	9/18/22	29°25' 53.7"	61°37' 53.8"	Gravel Plains	0	3	0	0	0	0	0	0	0	**3**	**1**	**13.04**
E7	9/18/22	29°24' 10.4"	61°44' 31.2"	Sandy Plains/Sand Dunes	0	0	0	0	1	0	0	0	0	**1**	**1**	**4.34**
E8	9/18/22	29°21' 3.4"	61°44' 30.3"	Dry Streambeds	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
E9	9/19/22	29°19' 20.6"	61°45' 49.6"	Dry Streambeds	0	0	0	0	0	0	1	0	0	**1**	**1**	**4.34**
E10	9/19/22	29°16' 55.3"	61°50' 19.5"	Gravel Plains	0	1	0	0	0	0	0	0	0	**1**	**1**	**4.34**
E11	9/19/22	29°28' 22.6"	61°23' 15.5"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
E12	9/19/22	29°11' 9.3"	61°55' 7.7"	Gravel Plains	0	2	0	0	0	1	0	0	0	**3**	**2**	**13.04**
MH1	9/17/22	29°28' 22.6"	61°23' 15.5"	Agricultural Areas/Date Palms	0	0	1	0	0	0	0	0	0	**1**	**1**	**4.34**
Total					**1**	**12**	**1**	**1**	**4**	**1**	**1**	**1**	**1**	**23**	**9**	**100**

Spring 2023 Survey

Location ID	*Coordinates*	*Date*	*Habitat*	*Phrynocephalus maculatus*	*Psammophis schokari*	*Eremias cf. scripta*	*Ophiomorus tridactylus*	*Echis carinatus multisquamatus*	*Phrynocephalus ornatus*	***Total***	***Species Count***	***Percentages***
				Blacktailed Toadheaded Agama	*Schokari Sand Racer*	*Sand Racerunner*	*Indian Sandswimmer*	*Saw–scaled Viper*	*Ornated Toadheaded Agama*			
E1	29° 38' 9.16" 61° 27' 19.43"	4/29/2023	Clayey Plains	1	–	–	–	–	–	**1**	**1**	**5.00**
E2	29° 34' 40.62" 61° 30' 39.88"	4/29/2023	Clayey Plains	2	–	–	–	–	–	**2**	**1**	**10.00**
E3	29° 31' 42.42" 61° 34' 1.09"	4/29/2023	Gravel Plains	–	–	–	–	–	–	**–**	**–**	**0.00**
E4	29° 30' 46.4" 61° 31' 32.53"	4/29/2023	Dry Streambeds	–	–	–	–	–	–	**–**	**–**	**0.00**
E5	29° 28' 30.27" 61° 37' 49.15"	4/29/2023	Sandy Plains	3	–	–	2	–	–	**5**	**2**	**25.00**
E6	29° 26' 5.3" 61° 37' 59.04"	4/28/2023	Dry Streambeds	1	–	–	–	–	–	**1**	**1**	**5.00**
E7	29° 24' 13.57" 61° 44' 26.002"	4/28/2023	Gravel Plains	1	–	–	–	–	–	**1**	**1**	**5.00**
E8	29° 21' 11.35" 61° 44' 26.5"	4/28/2023	Dry Streambeds	2	–	1	–	–	–	**3**	**2**	**15.00**
E9	29° 19' 28.11" 61° 45' 47.14"	4/28/2023	Dry Streambeds	2	–	–	–	–	–	**2**	**1**	**10.00**
E10	29° 16' 51.46" 61° 50' 27.89"	4/28/2023	Gravel Plains	1	1	–	–	–	–	**2**	**2**	**10.00**
E11	29° 14' 42.02" 61° 51' 50.67"	4/30/2023	Mountain/ Hills	–	–	–	–	–	–	**–**	**–**	**0.00**
E12	29° 11' 1.26" 61° 55' 11.91"	4/30/2023	Gravel Plains	1	–	–	–	–	1	**2**	**2**	**10.00**
MH1	29° 28' 22.86" 61° 23' 10.34"	4/29/2023	Agricultural Area/ Date Palms	–	–	–	–	1	–	**1**	**1**	**5.00**
				14	**1**	**1**	**2**	**1**	**1**	**20**	**6**	**85.00**

Summer 2024 Survey

Location ID	Coordinates	Habitat	*Bufotes zugmayeri*	*Bunopus tuberculatus*	*Cyrtopodion sistanense*	*Cyrtopodion sp*	*Eremias acutirostris*	*Eremias persica*	*Eumeces schneiderii zarudnya*	*Laudakia nupta fusca*	*Mesalina watsonana*	*Ophiomorus tridactylus*	*Phrynocephalus maculatus*	*Trapelus agilis pakistanensis*	*Trapelus ruderatus*	*Varanus griseus caspius*	**Total Specimens**	**Species Count**
TP1	29°34'35.30"N 61°10'59.76"E	Mountains/Hills	7	0	0	0	0	1	4	0	0	0	0	0	2	0	**14**	**4**
TP2	29°32'30.37"N 61°17'16.14"E	Mountains/Hills	0	0	1	0	0	0	0	1	2	0	0	0	0	0	**4**	**3**
TP3	29°28'43.92"N 61°14'58.02"E	Mountains/Hills	2	0	0	2	0	0	1	1	1	0	0	3	0	1	**11**	**7**
TP4	29°28'22.6"N 61°23'15.5"E	Agricultural Areas	0	1	2	0	0	0	0	0	0	0	0	0	1	0	**4**	**3**
TP5	29°28'26.81"N 61°37'57.54"E	Sand Dunes	0	0	0	0	3	0	0	0	0	2	3	0	0	0	**8**	**3**
TP6	29°35'51.61"N 61°30'46.69"E	Sand Dunes	0	0	1	0	8	0	0	0	0	2	0	0	0	0	**11**	**3**
Total			**9**	**1**	**4**	**2**	**11**	**1**	**5**	**2**	**3**	**4**	**3**	**3**	**3**	**1**	**52**	**14**

F.2.3 Mammals

Post-Monsoon 2022 Survey

Transect ID	Date	Coordinates		Habitat	Vulpus vulpus			Lepus capensis			Vulpes rueppellii			Sighting		Signs		Combine Sighting and Sign	
					Red Fox			Desert Hare			Ruppell's Fox								
		Latitude	Longitude		Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Total	Species Count	Total	Species Count	Total	Species Count
E1	9/17/22	29°38' 9.1"	61°27' 28"	Clayey Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2	9/17/22	29°33' 59.7"	61°31' 30.7"	Clayey Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E3	9/17/22	29°31' 43.1"	61°33' 46.2"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E4	9/17/22	29°30' 37.8"	61°31' 26.1"	Dry Streambeds	0	0	0	0	0	0	0	2	2	0	1	2	1	2	1
E5	9/18/22	29°28' 22.7"	61°37' 52.2"	Sandy Plains/Sand Dunes	0	2	2	0	0	0	0	0	0	0	1	2	1	2	1
E6	9/18/22	29°25' 53.7"	61°37' 53.8"	Gravel Plains	0	0	0	0	1	1	0	0	0	0	1	1	1	1	1
E7	9/18/22	29°24' 10.4"	61°44' 31.2"	Sandy Plains/Sand Dunes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E8	9/18/22	29°21' 3.4"	61°44' 30.3"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E9	9/19/22	29°19' 20.6"	61°45' 49.6"	Dry Streambeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E10	9/19/22	29°16' 55.3"	61°50' 19.5"	Gravel Plains	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1
E11	9/19/22	29°28' 22.6"	61°23' 15.5"	Mountains/ Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E12	9/19/22	29°11' 9.3"	61°55' 7.7"	Gravel Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MH1	9/17/22	29°28' 22.6"	61°23' 15.5"	Agricultural Areas/Date Palms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					0	**3**	**3**	**0**	**1**	**1**	**0**	**2**	**2**	**0**	**4**	**6**	**3**	**6**	**3**

Spring 2023 Survey

Location ID	Coordinates	Date	Habitat	*Lepus capensis*			*Gazella subgutturosa*			*Hemiechinus auritus*			*Vulpes vulpes*			*Vulpes rueppellii*			*Felis margarita*			Sighting		Signs		Combine Sighting and Sign	
				Cape Hare			Goitered Gazelle			Long Eared Hedgehoge			Red Fox			Ruppel Fox			Sand Cat								
				Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Total	Species Count	Total	Species Count	Total	Species Count
E1	29° 38' 9.16" 61° 27' 19.43"	04/29/23	Clayey Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E2	29° 34' 40.62" 61° 30' 39.88"	04/29/23	Clayey Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E3	29° 31' 42.42" 61° 34' 1.09"	04/29/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E4	29° 30' 46.4" 61° 31' 32.53"	04/29/23	Dry Streambeds	–	–	–	–	2	2	–	–	–	–	–	–	–	1	1	–	–	–	–	–	3	2	3	2
E5	29° 28' 30.27" 61° 37' 49.15"	04/29/23	Sandy Plains	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	1	1	1	1
E6	29° 26' 5.3" 61° 37' 59.04"	04/28/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E7	29° 24' 13.57" 61° 44' 26.002"	04/28/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	1	1	1	1
E8	29° 21' 11.35" 61° 44' 26.5"	04/28/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	1	1	1	1
E9	29° 19' 28.11" 61° 45' 47.14"	04/28/23	Dry Streambeds	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	1	1	1	1
E10	29° 16' 51.46" 61° 50' 27.89"	04/28/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	1	1	1	1
E11	29° 14' 42.02" 61° 51' 50.67"	04/30/23	Mountain/ Hills	–	2	2	–	–	–	–	–	–	–	–	–	–	1	1	–	1	1	–	–	4	3	4	3
E12	29° 11' 1.26" 61° 55' 11.91"	04/30/23	Gravel Plains	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	1	1	1	1
MH1	29° 28' 22.86" 61° 23' 10.34"	04/29/23	Agricultural Area/ Date Palms	–	–	–	–	–	–	–	1	1	–	1	1	–	–	–	–	–	–	–	–	2	2	2	2
				–	**2**	**2**	**–**	**2**	**2**	**–**	**1**	**1**	**–**	**5**	**5**	**–**	**2**	**2**	**–**	**3**	**3**	**–**	**–**	**15**	**6**	**15**	**6**

F.2.4 Small Mammals

Post-Monsoon 2022 Survey

No small mammals were captured in the Post-Monson 2022 Survey.

Spring 2023 Survey

Transect ID	*Date*	*Coordinates*	*Habitat*	*Rhombomys opimus*			*Sighting*		*Signs*		*Combine Sighting and Sign*	
				Great Gerbil			*Total*	*Species Count*	*Total*	*Species Count*	*Total*	*Species Count*
				Sighting	*Signs*	*Total*						
BM1	09/17/22	29°38'9.1" 61°27'28"	Sandy Plains	5	-	-	-	-	-	-	-	-
Total				**5**	**-**	**5**	**5**	**1**	**-**	**-**	**5**	**1**

Summer 2024 Survey

Location ID	*Coordinates*	*Gerbillus cheesmani*	*Rhombomys opimus*	*Gerbillus gleadowi*	*Meriones persicus*	***Total***	***Species Count***
TP1	29°34'35.30"N 61°10'59.76"E	2	4	0	0	**6**	**2**
TP2	29°30'40.21"N 61°15'37.71"E	0	0	0	0	**-**	**0**
TP3	29°28'43.92"N 61°14'58.02"E	0	0	0	1	**1**	**1**
TP4	29°28'22.6"N 61°23'15.5"E	0	0	0	0	**-**	**0**
TP5	29°28'26.81"N 61°37'57.54"E	0	0	1	0	**1**	**1**
TP6	29°35'51.61"N 61°30'46.69"E	0	0	0	0	**-**	**0**
Total		**2**	**4**	**1**	**1**	**8**	**4**

F.2.5 Invertebrates

Post-Monsoon 2022 Survey

Project Facility	*ID*	*Danaus chrysippus*	*Blaps sp.*	*Belenois aurota*		*Buprestidae*	*Pieris rapae*	*Polyommatus icarus*	*Lampides boeticus*	*Zizeeria karsandra*	*Colotis fausta*	*Gegenes nostrodamus*	*Brediphium exilis*	*Hasora chromus*	*Freyeria trochylus*	*Chilades parrhasius*	***Total***	***Species Count***
		Plain Tiger			*Tenebrionidae*	*Jewel Beetle*	*Small Cabbage White*	*Meadow Blue*	*Pea Blue*	*Dark Grass Blue*	*Large Salmon Arab*	*Dingy Swift*	*Western Pygmy Blue*	*Common Banded Awl*	*African Grass Jewel*	*Small Cupid*		
Northern Groundwater System	E1																**0**	**0**
	E2		1														**1**	**1**
	E3																**0**	**0**
	E4																**0**	**0**
	E5	1	1		1				1								**4**	**4**
	E6																**0**	**0**
	E7		1														**1**	**1**
	E8				1												**1**	**1**
	E9		1														**1**	**1**
	E10																**0**	**0**
	E11																**0**	**0**
	E12																**0**	**0**
	MH1					1	1										**2**	**2**
Reko Diq Mine Site	E13																**0**	**0**
	E14		1														**1**	**1**
	E15																**0**	**0**
	E16																**0**	**0**
	E17																**0**	**0**
	E18		1		1												**2**	**2**
	E19				1												**1**	**1**
	E20																**0**	**0**
	E21				1												**1**	**1**

Project Facility	*ID*	*Danaus chrysippus*	*Blaps sp.*	*Belenois aurota*		*Buprestidae*	*Pieris rapae*	*Polyommatus icarus*	*Lampides boeticus*	*Zizeeria karsandra*	*Colotis fausta*	*Gegenes nostrodamus*	*Brediphium exilis*	*Hasora chromus*	*Freyeria trochylus*	*Chilades parrhasius*	***Total***	***Species Count***
		Plain Tiger			*Tenebrionidae*	*Jewel Beetle*	*Small Cabbage White*	*Meadow Blue*	*Pea Blue*	*Dark Grass Blue*	*Large Salmon Arab*	*Dingy Swift*	*Western Pygmy Blue*	*Common Banded Awl*	*African Grass Jewel*	*Small Cupid*		
	E22																**0**	**0**
	E23																**0**	**0**
	E24	1						1									**2**	**2**
	E25		1														**1**	**1**
	E26																**0**	**0**
	E27			1	1												**2**	**2**
	E28																**0**	**0**
	E29																**0**	**0**
	E30																**0**	**0**
	E31																**0**	**0**
	E32																**0**	**0**
Access Route to Reko Diq Mine Site	E41																**0**	**0**
	E42							1									**1**	**1**
	E43																**0**	**0**
	E44																**0**	**0**
	E45																**0**	**0**
	E46														1		**1**	**1**
	E47																**0**	**0**
	E48	1															**1**	**1**
		3	**7**	**1**	**6**	**1**	**1**	**2**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**24**	**10**

Spring 2023 Survey

No.	*Order/Suborder*	*Family/Subfamily*	*Genus*	*Proposed Reko Dik Mine Site*	*Northern Groundwater System*	*Access Route to Reko Diq Mine Site*	*Total*
1	Coleoptera	Tenebrionidae	*Balps* sp.	1	2	2	8
2	Coleoptera	Tenebrionidae					0
3	Coleoptera	Buprestidae	*Julodis* sp.				2
4	Hymenoptera	Ampulicidae	*Prionyx* sp.				0
5	Mantidae						2
6	Acrididae						0
7			*Belenois aurota*		1		2
8			*Danaus chrysippus*	1	2		6
9			*Lampides boeticus*				2
Abundance				**2**	**5**	**2**	**20**
Richness				**2**	**3**	**1**	**3**

F.3 Access Route to Reko Diq Mine Site

F.3.1 Avifauna

Post-Monsoon 2022 Survey

Location ID	*Date*	*Coordinates*		*Habitat*	*Ammomanes cinctura*	*Corvus ruficollis*	*Galerida cristata*	*Caprimulgus europaeus*	*Calandrella brachydactyla*	*Alaemon alaudipes*	Cercotrichas galactotes	Porzana porzana			
		Latitude	*Longitude*		*Bar–tailed Lark*	*Brown–necked Raven*	*Crested Lark*	*Eurasian Nightjar*	*Greater Short–Toed Lark*	*Hoopoe Lark*	*Rufous-tailed Scrub Robin*	*Siberian StoneChat*	***Total***	***Species Count***	***Percentages***
E41	9/16/2022	29°0' 22.5"	62°3' 3.8"	Gravel Plains	0	0	0	0	0	0	0	0	**25**	**2**	**73.53**
E42	9/16/2022	28°58' 53.4"	62°6' 19.9"	Gravel Plains	1	0	0	0	0	0	**1**	**1**	**-**	**-**	**0.00**
E43	9/22/2022	28°57' 43.3"	62°7' 38.4"	Mountain/Hills	0	2	0	0	23	0	0	0	**3**	**3**	**8.82**
E44	9/22/2022	28°55' 27.3"	62°11' 32.1"	Dry Streambeds	0	0	0	0	0	1	0	0	**1**	**1**	**2.94**
E45	9/23/2022	28°54' 28.5"	62°14' 30"	Gravel Plains	0	0	0	0	0	0	0	0	**1**	**1**	**2.94**
E46	9/23/2022	28°51' 34"	62°18' 38.4"	Dry Streambeds	0	0	1	0	0	0	0	0	**1**	**1**	**2.94**
E47	9/23/2022	28°50' 27.5"	62°21' 32.7"	Gravel Plains	0	0	0	0	3	0	0	0	**3**	**1**	**8.82**
E48	9/23/2022	28°49' 53"	62°25' 1.7"	Dry Streambeds	0	0	0	1	0	0	0	0	**-**	**-**	**0.00**
Total					**1**	**2**	**1**	**1**	**26**	**1**	**1**	**1**	**34**	**8**	**100.00**

Spring 2023 Survey

Location ID	*Coordinates*	*Date*	*Habitat*	*Hirundo rustica*	*Calandrella brachydactyla*	*Oriolus kundoo*	*Cercotrchas galactotes*	***Total***	***Species Count***	***Percentages***
				Barn Swallow	*Greater Short–toed Lark*	*Indian Golden Oriole*	*Rufous–tailed Scrub Robin*			
E41	29° 0' 28.81" 62° 3' 8.65"	5/5/2023	Dry Streambeds	–	–	–	–	**-**	**-**	**0**
E42	28° 58' 54.75" 62° 6' 19.85"	5/5/2023	Dry Streambeds	–	1	–	–	**1**	**1**	**25**
E43	28° 57' 40.24" 62° 7' 12.06"	5/5/2023	Mountain/Hills	–	–	–	–	**-**	**-**	**0**
E44	28° 55' 15.05" 62° 11' 39.22"	5/7/2023	Dry Streambeds	–	–	1	–	**1**	**1**	**25**
E45	28° 54' 34.44" 62° 14' 23.86"	5/7/2023	Gravel Plains	–	–	–	–	**-**	**-**	**0**
E46	28° 51' 39.99" 62° 18' 41.52"	5/7/2023	Dry Streambeds	–	–	–	–	**-**	**-**	**0**
E47	28° 50' 32.34" 62° 21' 25.27"	5/7/2023	Gravel Plains	–	–	–	–	**-**	**-**	**0**
E48	28° 50' 1.13" 62° 25' 0.88"	5/7/2023	Dry Streambeds	1	–	–	1	**2**	**2**	**50**
Total				**1**	**1**	**1**	**1**	**4**	**4**	**100**

F.3.2 Herpetofauna

Post-Monsoon 2022 Survey

Location ID	*Date*	*Coordinates*		*Habitat*	*Phrynocephalus maculatus*	*Acanthodactylus blanfordii*	*Ophiomorus tridactylus*	***Total***	***Species Count***	***Percentages***
		Latitude	*Longitude*		*Blacktailed Toad–headed Agama*	*Blanford's Fringe–fingered Lizard*	*Indian Sand–swimmer*			
E41	9/16/22	29°0' 22.5"	62°3' 3.8"	Gravel Plains	0	0	0	**0**	**0**	**0**
E42	9/16/22	28°58' 53.4"	62°6' 19.9"	Gravel Plains	0	0	1	**1**	**1**	**4**
E43	9/22/22	28°57' 43.3"	62°7' 38.4"	Mountain/ Hills	0	0	0	**0**	**0**	**0**
E44	9/22/22	28°55' 27.3"	62°11' 32.1"	Dry Streambeds	0	1	0	**1**	**1**	**4**
E45	9/23/22	28°54' 28.5"	62°14' 30"	Gravel Plains	1	0	0	**1**	**1**	**4**
E46	9/23/22	28°51' 34"	62°18' 38.4"	Dry Streambeds	1	0	0	**1**	**1**	**4**
E47	9/23/22	28°50' 27.5"	62°21' 32.7"	Gravel Plains	0	0	0	**0**	**0**	**0**
E48	9/23/22	28°49' 53"	62°25' 1.7"	Dry Streambeds	1	0	0	**1**	**1**	**4**
Total					**3**	**1**	**1**	**5**	**3**	**100**

Spring 2023 Survey

Location ID	*Coordinates*	*Date*	*Habitat*	*Phrynocephalus maculatus*	*Acanthodactylus blanfordii*	*Phrynocephalus clarkorum*	*Ophiomorus tridactylus*	*Eremias sp.*	*Total*	*Species Count*	*Percentages*
				Blacktailed Toadheaded Agama	*Blanford's Fringefingered Lizard*	*Clark's Toad–headed Agama*	*Indian Sandswimmer*	*Racerunner*			
E41	29° 0' 28.81" 62° 3' 8.65"	5/5/2023	Dry Streambeds	2	–	–	–	–	2	1	4.17
E42	28° 58' 54.75" 62° 6' 19.85"	5/5/2023	Dry Streambeds	–	–	–	–	–	–	–	0.00
E43	28° 57' 40.24" 62° 7' 12.06"	5/5/2023	Mountain/ Hills	–	–	1	1	–	2	2	4.17
E44	28° 55' 15.05" 62° 11' 39.22"	5/7/2023	Dry Streambeds	–	–	–	–	–	–	–	0.00
E45	28° 54' 34.44" 62° 14' 23.86"	5/7/2023	Gravel Plains	–	–	–	–	–	–	–	0.00
E46	28° 51' 39.99" 62° 18' 41.52"	5/7/2023	Dry Streambeds	–	–	–	–	3	3	1	6.25

Location ID	*Coordinates*	*Date*	*Habitat*	*Phrynocephalus maculatus*	*Acanthodactylus blanfordii*	*Phrynocephalus clarkorum*	*Ophiomorus tridactylus*	*Eremias sp.*	*Total*	*Species Count*	*Percentages*
				Blacktailed Toadheaded Agama	*Blanford's Fringefingered Lizard*	*Clark's Toad–headed Agama*	*Indian Sandswimmer*	*Racerunner*			
E47	28° 50' 32.34" 62° 21' 25.27"	5/7/2023	Gravel Plains	–	–	–	–	–	–	–	0.00
E48	28° 50' 1.13" 62° 25' 0.88"	5/7/2023	Dry Streambeds	–	2	–	–	1	3	2	6.25
Total				**2**	**2**	**1**	**1**	**4**	**10**	**4**	**100.00**

Summer 2024 Survey

Location ID	*Coordinates*	*Habitat*	*Acanthodactylus blanfordii*	*Crossobamon eversmanni*	*Cyrtopodion sp*	*Echis carinatus multisquamatus*	*Eremias acutirostris*	*Eremias cf scripta*	*Eremias scripta*	*Phrynocephalus clarkorum*	*Phrynocephalus luteoguttatus*	*Phrynocephalus maculatus*	*Phrynocephalus ornatus*	*Phrynocephalus scutellatus*	*Psammophis schokari*	*Teratoscincus keyserlingii*	*Trapelus agilis pakistanensis*	*Trapelus ruderatus*	***Total Specimens***	***Species Count***
TP11	29°01'07.7"N 62°05'08.2"E	Gravel Plains	0	0	0	1	0	4	0	0	0	2	0	0	0	1	0	0	**8**	**4**
TP14	29°04'10.16"N, 62°24'38.67"E	Sand Dunes	0	0	1	0	1	0	1	2	2	1	1	1	0	0	0	2	**12**	**9**
TP16	29°02'40.17"N, 62°17'48.47"E	Mountains/Hills	0	0	0	0	0	0	0	0	0	0	3	0	1	0	1	0	**5**	**3**
TP17	28°50'16.95"N 62°15'43.99"E	Clayey Plains	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	**4**	**4**
Total			**1**	**1**	**1**	**1**	**1**	**4**	**1**	**2**	**2**	**4**	**4**	**1**	**1**	**1**	**2**	**2**	**29**	**16**

F.3.3 Mammals

Post-Monsoon 2022 Survey

Location ID	*Date*	*Coordinates*		*Habitat*	*Lepus capensis*			*Vulpes vulpes*			*Sighting*		*Signs*		*Combine Sighting and Sign*	
					Desert Hare			*Red Fox*			*Total*	*Species Count*	*Total*	*Species Count*	*Total*	*Species Count*
		Latitude	*Longitude*		*Sighting*	*Signs*	*Total*	*Sighting*	*Signs*	*Total*						
E41	9/16/2022	29°0' 22.5"	62°3' 3.8"	Gravel Plain	0	0	0	0	0	0	0	0	0	0	0	0
E42	9/16/2022	28°58' 53.4"	62°6' 19.9"	Gravel Plain	0	0	0	0	1	1	0	1	1	1	1	1
E43	9/22/2022	28°57' 43.3"	62°7' 38.4"	Hill/Mountain	0	2	2	0	0	0	0	1	2	1	2	1
E44	9/22/2022	28°55' 27.3"	62°11' 32.1"	Dry Streambed	0	0	0	0	0	0	0	0	0	0	0	0
E45	9/23/2022	28°54' 28.5"	62°14' 30"	Gravel Plain	0	0	0	0	0	0	0	0	0	0	0	0
E46	9/23/2022	28°51' 34"	62°18' 38.4"	Dry Streambed	0	0	0	0	0	0	0	0	0	0	0	0
E47	9/23/2022	28°50' 27.5"	62°21' 32.7"	Gravel Plain	0	0	0	0	0	0	0	0	0	0	0	0
E48	9/23/2022	28°49' 53"	62°25' 1.7"	Dry Streambed	0	0	0	0	0	0	0	0	0	0	0	0
Total					**0**	**2**	**2**	**0**	**1**	**1**	**-**	**2**	**3**	**2**	**3**	**2**

Spring 2023 Survey

Location ID	*Coordinates*	*Date*	*Habitat*	*Lepus capensis*			*Vulpes vulpes*			*Felis margarita*			***Sighting***		***Signs***		***Combine Sighting and Sign***	
				Cape Hare			*Red Fox*			*Sand Cat*			***Total***	***Species Count***	***Total***	***Species Count***	***Total***	***Species Count***
				Sighting	*Signs*	***Total***	*Sighting*	*Signs*	***Total***	*Sighting*	*Signs*	***Total***						
E41	29° 0' 28.81" 62° 3' 8.65"	05/05/23	Dry Streambeds	–	1	**1**	–	–	**–**	–	1	**1**	**-**	**-**	**2**	**2**	**2**	**2**
E42	28° 58' 54.75" 62° 6' 19.85"	05/05/23	Dry Streambeds	–	–	**–**	–	1	**1**	–	–	**–**	**-**	**-**	**1**	**1**	**1**	**1**
E43	28° 57' 40.24" 62° 7' 12.06"	05/05/23	Mountain/Hills	–	1	**1**	–	–	**–**	–	–	**–**	**-**	**-**	**1**	**1**	**1**	**1**
E44	28° 55' 15.05" 62° 11' 39.22"	05/07/23	Dry Streambeds	–	–	**–**	–	1	**1**	–	–	**–**	**-**	**-**	**1**	**1**	**1**	**1**
E45	28° 54' 34.44" 62° 14' 23.86"	05/07/23	Gravel Plains	–	–	**–**	–	–	**–**	–	–	**–**	**-**	**-**	**-**	**-**	**-**	**-**
E46	28° 51' 39.99" 62° 18' 41.52"	05/07/23	Dry Streambeds	–	–	**–**	–	–	**–**	–	–	**–**	**-**	**-**	**-**	**-**	**-**	**-**
E47	28° 50' 32.34" 62° 21' 25.27"	05/07/23	Gravel Plains	–	–	**–**	–	–	**–**	–	–	**–**	**-**	**-**	**-**	**-**	**-**	**-**
E48	28° 50' 1.13" 62° 25' 0.88"	05/07/23	Dry Streambeds	–	–	**–**	–	–	**–**	–	–	**–**	**-**	**-**	**-**	**-**	**-**	**-**
Total				**-**	**2**	**2**	**-**	**2**	**2**	**-**	**1**	**1**	**-**	**0**	**5**	**3**	**5**	**3**

F.3.4 Small Mammals

Summer 2024 Survey

Location ID	*Coordinates*	*Gerbillus cheesmani*	***Total***	***Species Count***
TP11	28°58'54.5"N 62°6'20.0"E	-	-	**0**
TP14	29°04'10.16"N 62°24'38.67"E	-	-	**0**
TP16	29°02'40.17"N 62°17'48.47"E	-	-	**0**
TP17	28°50'16.95"N 62°15'43.99"E	1	**1**	**1**
Total		**1**	**1**	**1**

F.4 Corridor

F.4.1 Herpetofauna

Summer 2024 Survey

Location ID	*Coordinates*	*Habitat*	*Acanthodactylus blanfordii*	*Acanthodactylus micropholis*	*Crossobamon eversmanni*	*Crossobamon mynardi*	*Cyrtopodion kimanense*	*Eremias scripta*	*Eumeces schneiderii zarudnya*	*Mesalina watsonana*	*Ophiomorus tridactylus*	*Trapelus agilis pakistanensis*	***Total Specimens***	***Species Count***
TP21	28°54'47.67"N 63°04'15.93"E	Gravel Plains	0	0	3	0	1	0	0	0	0	0	**4**	**2**
TP22	28°58'7.44"N 63°56'28.25"E	Mountains/Hills	0	0	0	0	0	0	1	1	0	1	**3**	**3**
TP23	28°35'11.19"N 63°01'57.18"E	Clayey Plains	1	0	0	0	0	1	0	0	2	0	**4**	**3**
TP24	28°44'52.98"N 63°51'15.63"E	Agricultural Areas	1	0	0	2	0	2	0	0	0	0	**5**	**3**
TP25	28°53'34.89"N 64°32'18.31"E	Sand Dunes	0	1	0	0	0	1	0	0	0	0	**2**	**2**
TP26	29° 7'44.06"N 64°40'50.21"E	Agricultural Areas	1	0	0	0	0	0	0	0	1	0	**2**	**2**
TP27	28°55'41.84"N 65° 4'20.37"E	Mountains/Hills	5	0	1	0	0	0	0	0	2	2	**10**	**4**
Total			**8**	**1**	**4**	**2**	**1**	**4**	**1**	**1**	**5**	**3**	**30**	**10**

F.4.2 Small Mammals

Summer 2024 Survey

Location ID	*Coordinates*	*Gerbillus nanus*	*Gerbillus cheesmani*	*Meriones lybicus*	*Mus booduga*	*Hemiechinus auritus*	***Total***	***Species Count***
TP21	28°54'47.67"N 63°04'15.93"E	0	2	0	0	0	**2**	**1**
TP22	28°58'07.44"N 63°56'28.25"E	1	0	0	0	0	**1**	**1**
TP23	28°35'11.19"N 63°01'57.18"E	0	1	0	0	0	**1**	**1**
TP24	28°44'52.98"N 63°51'15.63"E	0	2	0	0	0	**2**	**1**
TP25	28°53'34.89"N 64°32'18.31"E	0	3	0	0	1	**4**	**2**
TP26	29°07'44.06"N 64°40'50.21"E	0	1	2	0	0	**3**	**2**
TP27	28°55'41.84"N 65° 4'20.37"E	0	0	1	1	0	**2**	**2**
Total		**1**	**9**	**3**	**1**	**1**	**15**	**5**

F.5 Zangi Nawar

F.5.1 Herpetofauna

Summer 2024 Survey

Location ID	*Coordinates*	*Habitat*	*Acanthodactylus blanfordii*	*Acanthodactylus micropholis*	*Eremias scripta*	*Lytorhynchus maynardi*	*Ophiomorus tridactylus*	*Phrynocephalus clarkorum*	*Phrynocephalus luteoguttatus*	*Phrynocephalus ornatus*	*Psammophis schokari*	*Teratoscincus keyserlingii*	*Trapelus agilis pakistanensis*	***Total Specimens***	***Species Count***
TP28	29°25'37.21"N 65°45'57.33"E	Sand Dunes	0	0	1	0	3	0	2	0	1	1	1	**9**	**6**
TP29	29°27'12.19"N 65°48'22.78"E	Sand Dunes	6	5	4	0	2	0	5	2	0	0	2	**26**	**7**
TP30	29°27'14.26"N 65°40'26.64"E	Sand Dunes	2	0	0	1	1	3	2	0	0	1	0	**10**	**6**
Total			**8**	**5**	**5**	**1**	**6**	**3**	**9**	**2**	**1**	**2**	**3**	**45**	**11**

F.5.2 Small Mammals

Summer 2024 Survey

Location ID	*Coordinates*	*Tatera indica*	*Mus musculas*	*Gerbillus nanus*	*Gerbillus cheesmani*	*Meriones lybicus*	*Allactaga elater*	*Crocidura zarudnyi*	*Paraechinus hypomelas*	***Total***	***Species Count***
TP28	29°25'47.89"N 65°46'2.85"E	2	3	1	1	0	0	0	0	**7**	**4**
TP29	29°27'12.19"N 65°48'22.78"E	0	0	0	3	0	0	0	1	**4**	**2**
TP30	29°25'30.69"N 65°43'2.83"E	0	0	0	1	1	2	1	0	**5**	**4**
Total		**2**	**3**	**1**	**5**	**1**	**2**	**1**	**1**	**16**	**8**

F.6 Taftan Area

F.6.1 Small Mammals

Summer 2024 Survey

Location ID	*Coordinates*	*Gerbillus cheesmani*	*Mus booduga*	***Total Specimens***	***Species Count***
TP18	28°51'37.1"N 61°40'03.8"E	3	0	**3**	**1**
TP19	28°49'28.89"N 61°39'03.12"E	3	1	**4**	**2**
TP20	28°45'27.14"N 61°42'47.12"E	0	1	**1**	**1**
Total		**6**	**2**	**8**	**2**

F.7 Port Qasim - Coastal Rail Transport Route Study Area

F.7.1 Avifauna

Post-Monsoon 2023 Survey

Location ID	*Date*	*Coordinates*		*Habitat*	*Dicrurus macrocercus*	*Francolinus francolinus*	*Milvus migrans*	*Himantopus himantopus*	*Phylloscopus collybita*	*Calidris ferruginea*	*Merops orientalis*	*Francolinus pondicerianus*	*Corvus splendens*	*Ardeola grayii*	*Saxicoloides fulicatus*	*Ardea intermedia*	*Egretta garzetta*	*Calidris minuta*	*Phylloscopus neglectus*	*Cinnyris asiaticus*	*Amandava amandava*	*Pycnonotus cafer*	*Vanellus indicus*	*Columba livia*	*Pycnonotus leucotis*	*Vanellus malabaricus*	***Total***	***Species Count***	***Percentages***
		Latitude	*Longitude*		Black Drango	Black Francolin	Black Kite	Black-winged Stilt	Common Chiffchaff	Curlew Sandpiper	Green Bee-eater	Grey Francolin	House Crow	Indian Pond Heron	Indian Robin	Intermediate Egret	Little Egret	Little Stint	Plain Warbler	Purple Sunbird	Red Avadavat	Red Vented Bulbul	Red-wattled Lapwing	Rock Pigeon	White Cheeked Bulbul	Yellow-wattled Lapwing			
T1	12/10/2023	24° 47' 45.33" N	67° 19' 33.45" E	Vegetation Cluster	**2**	**-**	**1**	**-**	**2**	**-**	**5**	**-**	**-**	**-**	**4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**18**	**7**	**2**	**2**	**43**	**9**	**20.77**
T2	12/10/2023	24° 46' 21.66" N	67° 20' 01.28" E	Barren Land	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**2**	**-**	**-**	**5**	**-**	**21**	**9**	**10.14**
T3	12/10/2023	24° 46' 47.72" N	67° 20' 41.66" E	Industrial Units	**-**	**1**	**1**	**55**	**-**	**6**	**-**	**-**	**3**	**10**	**-**	**15**	**12**	**22**	**-**	**-**	**-**	**1**	**3**	**12**	**2**	**-**	**143**	**13**	**69.08**
Abundance					**2**	**1**	**4**	**55**	**2**	**6**	**7**	**1**	**6**	**10**	**4**	**15**	**12**	**22**	**3**	**2**	**1**	**3**	**21**	**19**	**9**	**2**	**207**	**22**	**100.0**

F.7.2 Herpetofauna

Post-Monsoon 2023 Survey

Location ID	*Date*	*Coordinates*		*Habitat*	*Acanthodactylus cantoris*	*Ophisops jerdonii*	*Calotes versicolor*	*Psammophis schokari*	***Total***	***Species Count***	***Percentage***
		Latitude	*Longitude*		*Indian Fringe-fingered Lizard*	*Jerdon's Cabrita*	*Oriental Garden Lizard*	*Schokari Sand Racer*			
T1	12/10/2023	24° 47' 45.33" N	67° 19' 33.45" E	Vegetation Cluster	**3**	**2**	**1**	**-**	**6**	**3**	**85.71**
T2	12/10/2023	24° 46' 21.66" N	67° 20' 01.28" E	Barren Land	**-**	**-**	**-**	**-**	**-**	**-**	**0.00**
T3	12/10/2023	24° 46' 47.72" N	67° 20' 41.66" E	Industrial Units	**-**	**-**	**-**	**1**	**1**	**1**	**14.29**
Abundance					**3**	**2**	**1**	**1**	**7**	**4**	**100.00**

F.7.3 Mammals

Post-Monsoon 2023 Survey

Location ID	*Date*	*Coordinates*		*Habitat*	*Canis aureus*			*Lepus capensis*			*Funambulus pennantii*			*Hystrix indica*		
					Asiatic Jackal			*Cape Hare*			*Five-striped Palm Squirrel*			*Indian Crested Porcupine*		
		Latitude	*Longitude*		*Sighting*	*Signs*	*Total*	*Sighting*	*Signs*	*Total*	*Sighting*	*Signs*	*Total*	*Sighting*	*Signs*	*Total*
T1	12/10/2023	24°47'45.33" N	67°19'33.45" E	Vegetation Cluster	-	2	2	-	1	1	2	-	2	-	1	1
T2	12/10/2023	24°46'21.66" N	67°20'01.28" E	Barren Land	-	1	1	-	-	-	-	-	-	-	-	-
T3	12/10/2023	24°46'47.72" N	67°20'41.66" E	Industrial Units	-	1	1	-	-	-	-	-	-	-	-	-
Abundance					**-**	**4**	**4**	**-**	**1**	**1**	**2**	**-**	**2**	**-**	**1**	**1**

Transect ID	Date	Coordinates		Habitat	*Hemiechinus collaris*			*Sus scrofa*			Sighting		Signs		Combine Sighting and Sign	
					Indian long-eared hedgehog			Wild Boar			Total	Species Count	Total	Species Count	Total	Species Count
		Latitude	Longitude		Sighting	Signs	Total	Sighting	Signs	Total						
T1	12/10/2023	24° 47' 45.33" N	67° 19' 33.45" E	Vegetation Cluster	-	3	3	-	3	3	2	1	10	5	12	6
T2	12/10/2023	24° 46' 21.66" N	67° 20' 01.28" E	Barren Land	-	-	-	-	1	1	-	-	2	2	2	2
T3	12/10/2023	24° 46' 47.72" N	67° 20' 41.66" E	Industrial Units	-	-	-	-	-	-	-	-	1	1	1	1
Abundance					**-**	**3**	**3**	**-**	**4**	**4**	**2**	**1**	**13**	**5**	**15**	**6**

Appendix G:Comparison of Post-Monsoon 2022 Survey with Previous Post-Monsoon Surveys for Terrestrial Fauna

This appendix provides a comparison of the terrestrial fauna (avifauna, mammals, small mammals, and herpetofauna) surveys conducted in Post-Monsoon 2022 Survey with Previous Post-Monsoon Surveys conducted in November 2008, September 2009, and August 2020, referred hereafter as Previous Post-Monsoon Surveys. Results are only compared for the common sampling locations that were sampled in the comparable seasons. The comparison is only provided for the terrestrial fauna for the Reko Diq Mine Site and Associated Infrastructure, as sampling was not conducted for terrestrial fauna, in Port Qasim previously.

A total of 41 sampling locations were sampled in Post-Monsoon 2022 Survey. Of these, 35 sampling locations are common with Previous Post-Monsoon Surveys. This includes 14 common sampling locations for Reko Diq Mine Site, 13 for Northern Groundwater System, and eight for the Access Route to the Reko Diq Mine Site. The results of Post-Monsoon 2022 Survey (conducted in September-October 2022) for common sampling locations are compared with Previous Post-Monsoon Surveys that were carried out in similar seasons, i.e., November 2008, September 2009, and August 2020 surveys. The weather conditions were almost comparable with the current survey season. Therefore, the results for common sampling locations using a common sampling method (line transect and Sherman Traps) were used to compare these surveys.

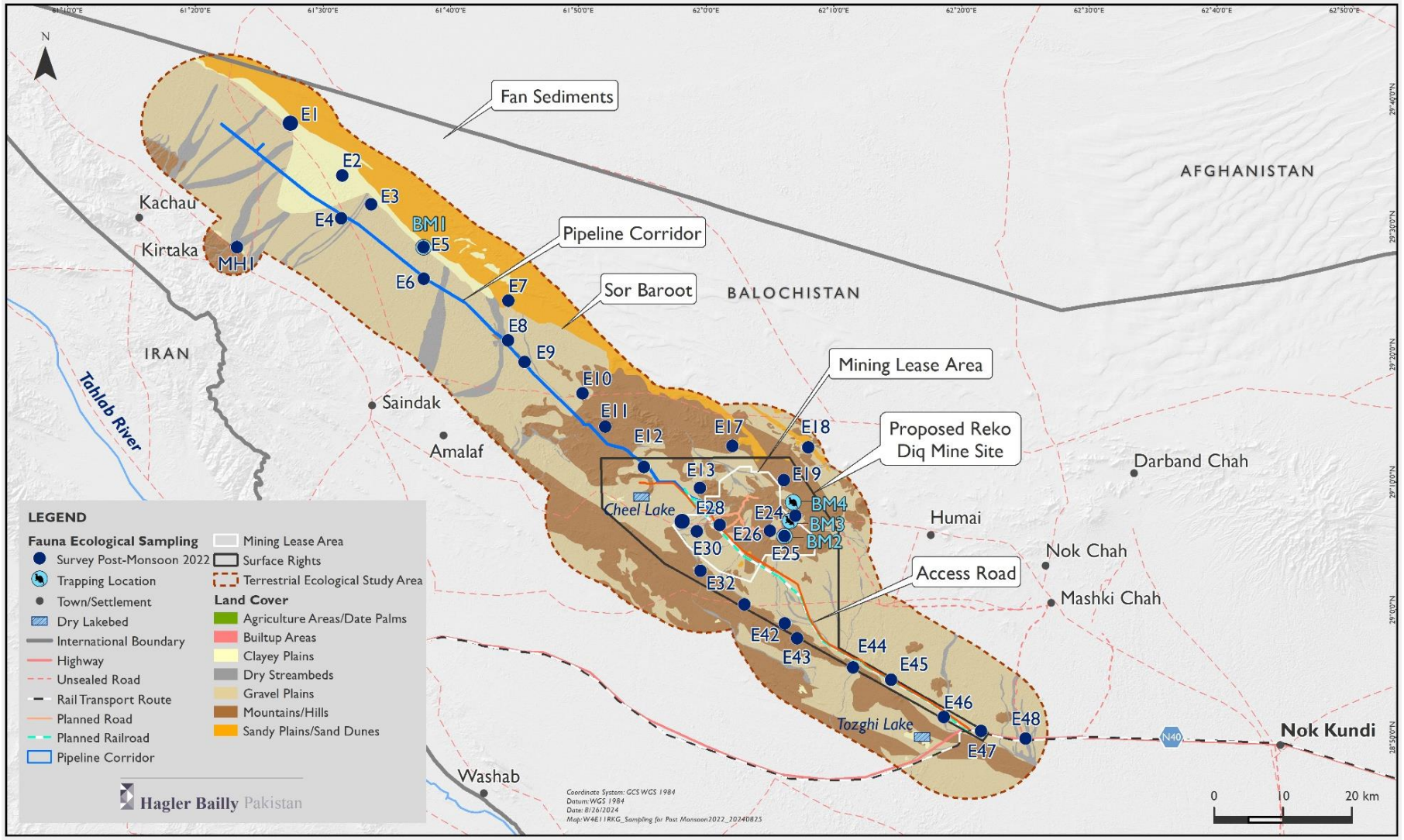
Exhibit G.1 provides comparisons of the total number of common sampling locations for each area/site where sampling was conducted in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.2 provides a map of the common sampling locations.

Exhibit G.1: Common Sampling Locations Between Post-Monsoon 2022 and Previous Post-Monsoon Surveys

Project Facilities	*Total Sampling Locations in Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*	*Common Location for the two Surveys*
	November 2008	*September 2009*	*August 2020*		
Reko Diq Mine Site	6	4	7	20	14
Northern Groundwater System	15	6	6	13	13
Access Route to Reko Diq Mine Site	27	11	0	8	8
Total	**48**	**21**	**13**	**41**	**35**

Exhibit G.2: Common Sampling Locations Sampled in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey



G.1 Avifauna

Overall, 54 bird species have been observed at the Reko Diq Mine Site, along the Northern Groundwater Systema, and along the Access Route to the Reko Diq Mine Site. Of these, 33 bird species were observed from the common sampling locations in Previous Post-Monsoon Surveys compared to 29 species observed in the Post-Monsoon 2022 Survey. This shows slightly higher species richness in Previous Post-Monsoon Surveys.

Exhibit G.3 provides the list of bird's species reported in different surveys conducted in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.3: Bird Species Observed in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

No.	*Scientific Name*	*Common Name*	*Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*
			November 2008 Survey	*September 2009 Survey*	*August 2020 Survey*	
1	*Acridotheres tristis*	Common Myna	-	-	✓	-
2	*Alaemon alaudipes*	Hoopoe Lark	✓	-	✓	✓
3	*Ammomanes cinctura*	Bar-tailed Lark	✓	✓	✓	✓
4	*Ammomanes deserti*	Desert Lark	-	-	✓	✓
5	*Ammopardix griseogularis*	See-see Partridge	✓	-	-	✓
6	*Anthus trivialis*	Tree Pipit	-	-	-	✓
7	*Athene noctua*	Little Owl	-	-	-	✓
8	*Buteo vulpinus*	Common Buzzard	-	-	-	✓
9	*Calandrella brachydactyla*	Greater Short-Toed Lark	-	✓	-	✓
10	*Calandrella rufescens*	Lesser Short-toed Lark	✓	-	-	-
11	*Caprimulgus europaeus*	Eurasian Nightjar	-	-		✓
12	*Cercotrichas galactotes*	Rufous-tailed Scrub Robin	-	-	-	✓
13	*Chlamydotis macqueenii*	Asian Houbara (Macqueen`s Bustard)	-	-	-	✓
14	*Circus cyaneus*	Hen Harrier	✓	-	-	-
15	*Columba livia*	Rock Pigeon	-	-	✓	-
16	*Coracias garrulus*	Eurasian Roller	-	-	-	✓
17	*Corvus corax*	Common Raven	-	-	✓	-
18	*Corvus ruficollis*	Brown-necked Raven	✓	✓	✓	✓

No.	*Scientific Name*	*Common Name*	*Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*
			November 2008 Survey	*September 2009 Survey*	*August 2020 Survey*	
19	*Coturnix coturnix*	Common Quail	-	✓	-	-
20	*Falco tinnunculus*	Common Kestrel	✓	-	✓	-
21	*Ficedula parva*	Red-throated Flycatcher	-	-	-	✓
22	*Galerida cristata*	Crested Lark	✓	-	✓	✓
23	*Hirundo rustica*	Barn Swallow	-	-	✓	-
24	*Hydroprogne caspia*	Caspian Tern	✓	-	-	-
25	*Iduna caligate*	Booted Warbler	✓			✓
26	*Lanius excubitor*	Great Grey Shrike	-	-	✓	-
27	*Melanocorypha calandra*	Calandra Lark	✓	-	-	-
28	*Motacilla alba*	White Wagtail	-	-		✓
29	*Motacilla cinerea*	Grey Wagtail	-	-	✓	-
30	*Motacilla citreola*	Citrine Wagtail	-	-		-
31	*Muscicapa striata*	Spotted Flycatcher	-		-	✓
32	*Neophron percnopterus*	Egyptian Vulture	-	-	-	✓
33	*Oenanthe picata*	Variable Wheatear	✓	-	✓	-
34	*Oenanthe pleschanka*	Pied Wheatear	-	-	✓	-
35	*Oriolus kundoo*	Indian Golden Oriole	-	-		✓
36	*Passer domesticus*	House Sparrow	-	-	✓	-
37	*Passer montanus*	Tree Sparrow	✓	-	-	-
38	*Pastor roseus*	Rosy Starling	-	-	-	✓
39	*Phylloscopus collybita*	Commomn Chiffchaff	✓	-	-	-
40	*Phylloscopus trochiloides*	Greenish Warbler	✓	-	-	-
41	*Phylloscopus trochilus*	Willow Warbler	✓	-	-	-
42	*Porzana porzana*	Spotted Crake	-	-	-	✓
43	*Prinia socialis*	Ashy Prinia	✓	-	-	-
44	*Progne chalybea*	Grey-breasted Martin	-	-	✓	-
45	*Pterocles coronatus*	Crowned Sandgrouse	✓	-	-	-
46	*Ptyonoprogne rupestris*	Crag Martin	-	-	-	✓

No.	*Scientific Name*	*Common Name*	*Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*
			November 2008 Survey	*September 2009 Survey*	*August 2020 Survey*	
47	*Pycnonotus leucotis*	White-eared Bulbul	✓	-	-	✓
48	*Saxicola caprata*	Pied Bushchat	-	-	✓	✓
49	*Saxicola maurus*	Siberian Stonechat	-	-	-	✓
50	*Spilopelia senegalensis*	European Bee-eater	-	-	-	✓
51	*Spilopelia senegalensis*	Laughing Dove	-	-	-	✓
52	*Sylvia curruca*	Lesser Whitethroat	✓	-	-	✓
53	*Sylvia nana*	Asian Desert Warbler	-	-	-	-
54	*Upapa epops*	Eurasian Hoopoe	-	-	-	-
Total			**20**	**4**	**17**	**29**
Total (combined total for Previous Post-Monsoon Surveys) and Post-Monsoon 2022 Survey			**33**			**29**

G.1.1 Reko Diq Mine Site

The compassion of abundance and diversity of avifauna species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) focused on the proposed Reko Diq Mine Site which is discussed here.

Since the Previous Post-Monsoon Surveys were conducted exclusively at the Reko Diq Mine Site, the comparison was therefore limited to only 14 common locations, which include E13, E15, E16, E17, E18, E19, E23, E24, E25, E26, E28, E30, E31 and E32. Among the 14 common sampling locations, six were in Gravel Plains, four in Mountains/Hills, three in Dry Streambeds, and one in Sandy Plains habitat.

An increase in both birds' abundance and species richness was observed in the Post-Monsoon 2022 Survey compared to the Previous Post-Monsoon Surveys. This increase can be attributed to the availability of food and, to some extent, the shelter at the Project campsite and other security forces camps, which usually attract the generalist species.

A total of 15 bird specimens belonging to four species were observed in the Previous Post-Monsoon Surveys compared to 42 bird specimens of nine species in the Post-Monsoon 2022 Survey at the Reko Diq Mine Site. This shows that bird abundance and species richness were higher during the Post-Monsoon 2022 Survey. This can be attributed to the availability of food and shelter at the Reko Diq Mine Site during the Post-Monsoon 2022 Survey compared to Previous Post-Monsoon Surveys, as some Project facilities and camps are established in the area, which are the source of food for these species.

In the Previous Post-Monsoon Surveys, maximum bird abundance was observed at Sampling Location E17 (seven specimens), followed by E19 (four specimens) and E18

(three specimens). In the Post Monsoon 2022 Survey, maximum bird abundance was observed at sampling locations E 23 (25 specimens), followed by E17 (eight specimens), E26 and E25 (two specimens each). During both surveys, bird species richness was highest at Sampling Location E17, with four species observed in both surveys.

Average Diversity and Density: The average diversity (0.4) and density (1.1) was observed in Previous Post-Monsoon Surveys as compared to the average diversity (0.6) and density (2.1) in Post-Monsoon 2022 Survey in the Reko Diq Mine Site. This shows that both the average density and diversity in Post-Monsoon 2022 Survey were higher as compared to the Previous Post-Monsoon Surveys.

Average Diversity by Habitat The highest average (diversity per sampling location for each survey) bird diversity was observed in the Mountains/Hills and Sandy Plains habitat (1.0 each), followed by Gravel plains (0.2) and no specimen of any bird species was observed from Dry Streambeds in Previous Post-Monsoon Surveys whereas in Post-Monsoon 2022 Survey the highest bird diversity was observed in Dry Streambeds (1.3) followed by Mountains/Hills (1.0), Gravel Plains (0.4) and no specimen of any bird species was observed from Sandy Plains habitat type.

Average Density by Habitat The highest average bird density (density per sampling location for each survey) was observed in Sandy Plains (3.0), followed by Mountains/Hills (2.8), Gravel Plains (0.2) and no specimen of any bird species was observed from the Dry Streambeds habitat type in Previous Post-Monsoon Surveys, whereas in Post Monsoon 2022 Survey, the highest density of birds was observed in the Gravel Plains habitat (3.6) followed by Dry Streambeds (3.3), Mountains/Hills (2.6) and no specimen of any bird species was observed from the Sandy Plains habitat type.

Exhibit G.4 provides a comparison of the average density and diversity of bird species observed at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.5 provides a comparison of species abundance by sampling locations at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.6 provides a comparison of species richness by sampling locations at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.4: Comparison of Average Diversity and Density of Birds Observed at Reko Diq Mine Site, Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Dry Streambeds	0.0	1.3	0.0	3.3
Gravel Plains	0.2	0.4	0.2	3.6
Mountains/Hills	1.0	1.0	2.8	2.6
Sandy Plains	1.0	0.0	3.0	0.0

Exhibit G.5: Comparison of Bird's Abundance Observed at the Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys

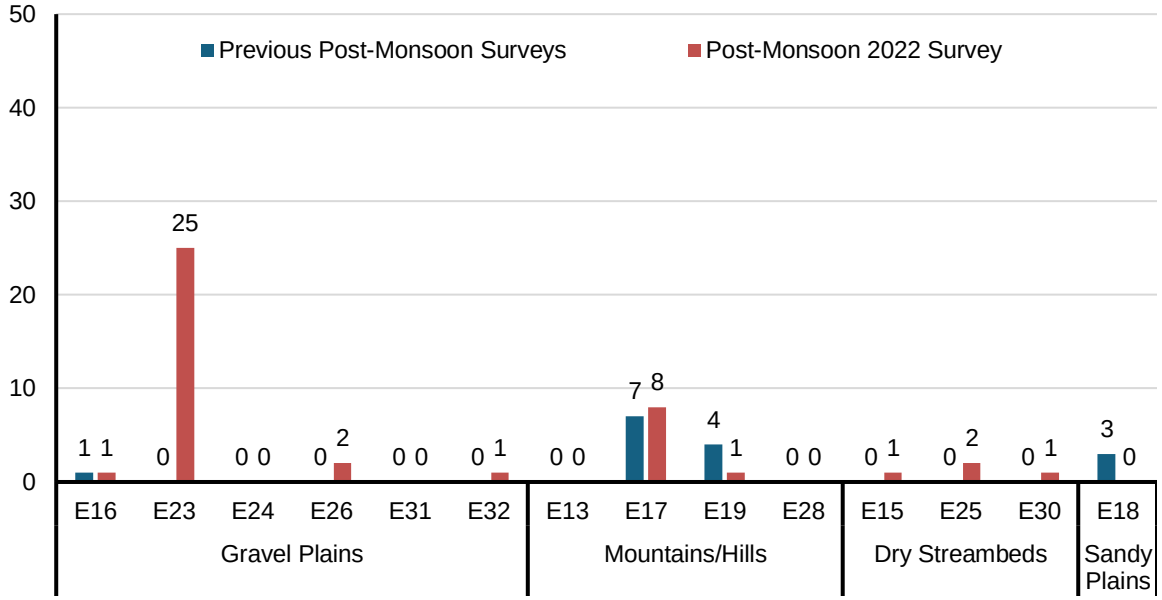
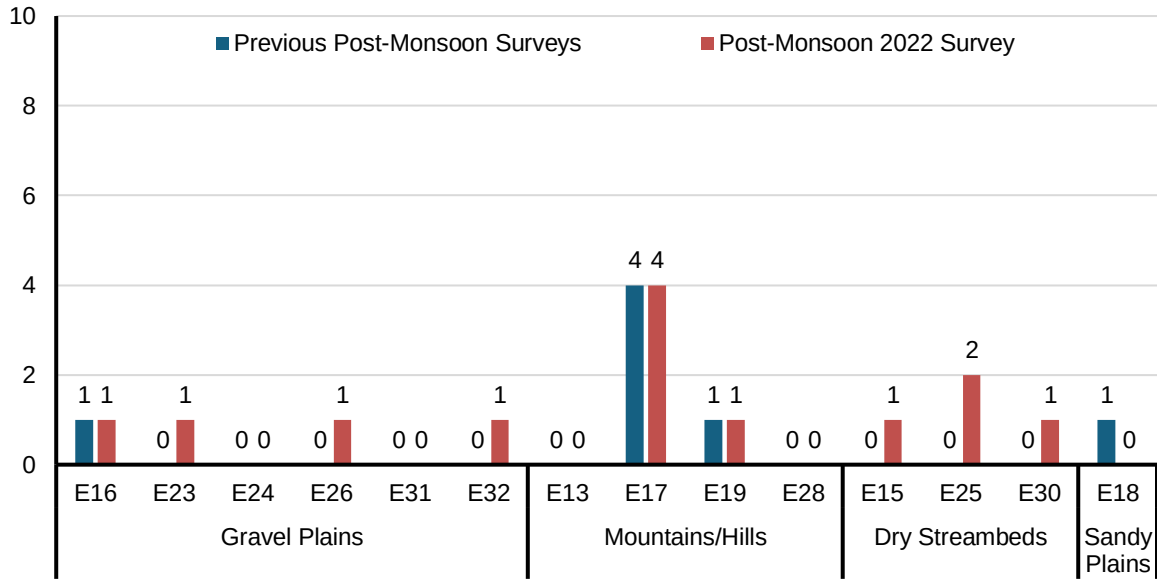


Exhibit G.6: Comparison of Bird's Richness Observed at the Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys



G.1.2 Northern Groundwater System

The compassion of abundance and diversity of avifauna species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) focused along the Northern Groundwater System, which is discussed here.

Birds' abundance and richness at 13 common sampling locations along Northern Groundwater System are compared for Post-Monsoon 2022 Survey and Previous Post-

Monsoon Surveys which include E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12 and MH1. Among the 13 common sampling locations, four were in the Gravel Plains habitat, three in Dry Streambeds, two each in Sandy Plains/Sand Dunes and Clayey Plains, and one each in the Mountains/Hills and Agricultural Areas/Date Palms habitat.

Both the bird abundance and species richness have increased in the Post-Monsoon 2022 Survey compared to the Previous Post-Monsoon Surveys. This increase was more significant at Date Palm/Agricultural Area, where the availability of water, dense vegetation, and food provided conducive conditions for birds.

A total of 33 bird specimens of 13 species were observed in the Previous Post-Monsoon Surveys from common sampling locations compared to 69 specimens belonging to 23 species in the Post-Monsoon 2022 Survey along the Northern Groundwater System. Both birds' abundance and richness were significantly higher in the Post-Monsoon 2022 Survey in comparison with Previous Post-Monsoon Surveys. This can be attributed to the lower level of disturbance and comparatively better vegetation. The lower disturbance was due to fencing on the Pak-Afghan and Pak-Iran borders, which restricted vehicle movement to a specific route. The Agricultural Areas/Date Palms habitat is considered a better habitat as the highest abundance and richness were observed in both surveys, i.e., Post-Monsoon 2022 and Previous Post-Monsoon Surveys.

In the Previous Post-Monsoon Surveys, maximum bird abundance was observed at Sampling Location MH1 (25 specimens), followed by E12 (four specimens) and E1 (two specimens). During the Post-Monsoon 2022 Survey, maximum abundance was also observed at Sampling Location MH1 (42 specimens), followed by E5, E7, and E10, with four specimens at each sampling location. Bird species richness was highest at MH1 (nine species) during both surveys (Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey).

Average Diversity and Density: The average diversity (1.0) and density (2.5) in Previous Post-Monsoon Surveys was lower as compared to average diversity (1.8) and density (5.3) in Post-Monsoon 2022 Survey along the Northern Groundwater System.

Average Diversity by Habitat: In the Previous Post-Monsoon Surveys, the highest average bird diversity (diversity per sampling location for each survey) was observed in Agricultural Areas/Date Palms (9.0), followed by Dry Streambeds (1.3), Mountains/Hills (1.0), and Gravel Plains (0.3). Similarly, in the Post-Monsoon 2022 Survey, the highest diversity of birds was also observed in the Agricultural Areas/Date Palms habitat (10.0), followed by Sandy Plains/Sand Dunes (2.5), Mountains/Hills (2.0), Gravel Plains (1.8), Dry Streambeds (1.3), and Clayey Plains (1.0).

Average Density by Habitat: In the Previous Post-Monsoon Surveys, the highest average bird density (density per sampling location for each survey) was observed in Agricultural Areas/Date Palms (25.0), followed by Mountains/Hills (2.0), Dry Streambeds (1.3), and Gravel Plains (0.3). Similarly, in the Post-Monsoon 2022 Survey, the highest density of birds was also observed in Agricultural Areas/Date Palms habitat (42.0), followed by Sandy Plains/Sand Dunes (4.0), Mountains/Hills (3.0), Gravel Plains (2.5), Dry Streambeds (1.7), and Clayey Plains (1.0) habitat.

Exhibit G.7 provides a comparison of the average diversity and average density of birds observed along the Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.8 provides a comparison of species abundance observed along the Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.9 provides a comparison of species richness observed along the Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.7: Average Diversity and Density of Birds Observed along Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Agricultural Areas/ Date Palm	9.0	10.0	25.0	42.0
Dry Streambeds	1.3	1.3	1.7	1.3
Clayey Plains	0.0	1.0	0.0	1.0
Gravel Plains	0.3	1.8	0.3	2.5
Mountains/Hills	1.0	2.0	2.0	3.0
Sandy Plains/Sand Dunes	0.0	2.5	0.0	4.0

Exhibit G.8: Comparison of Birds Abundance Observed along Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

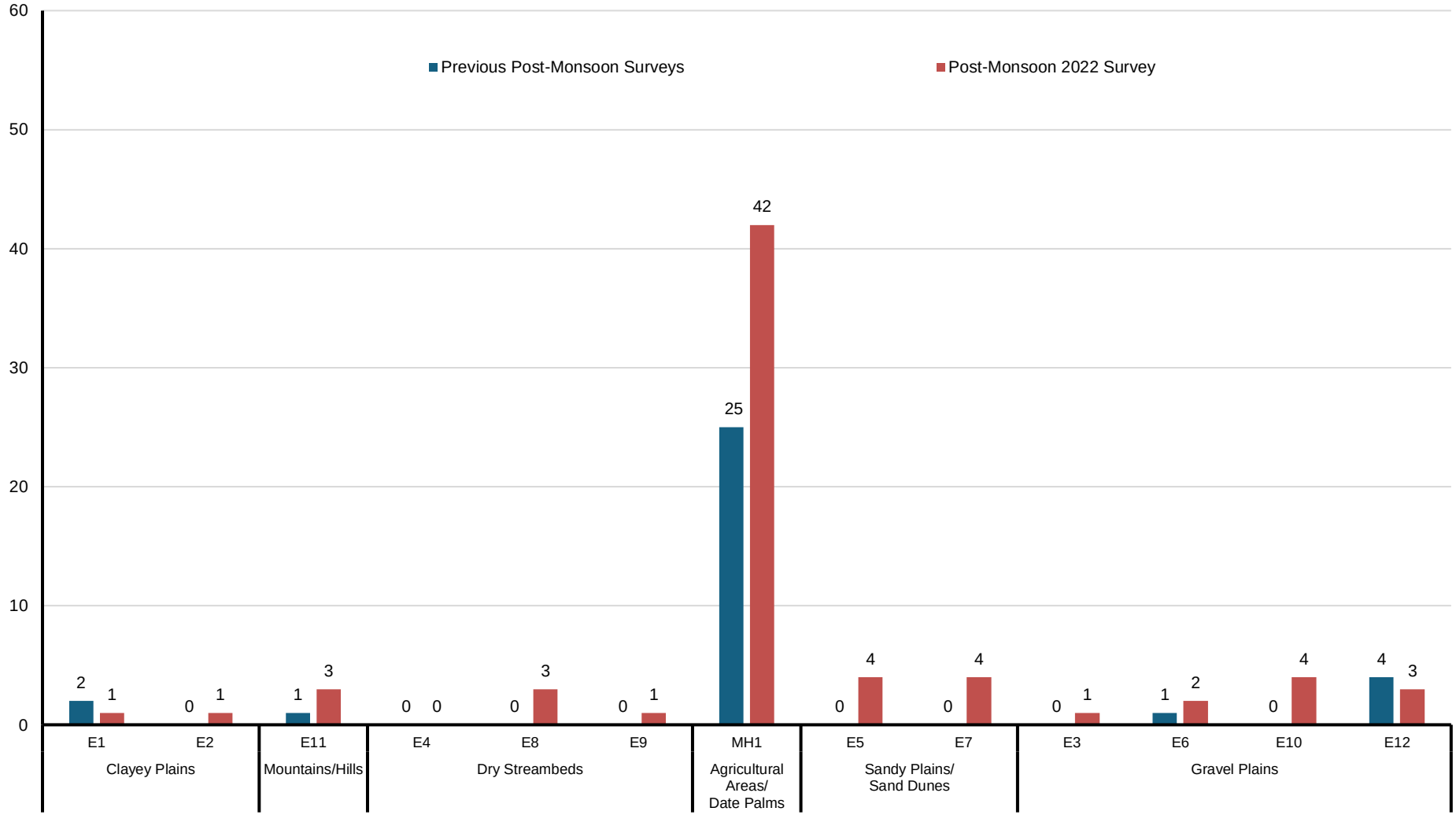
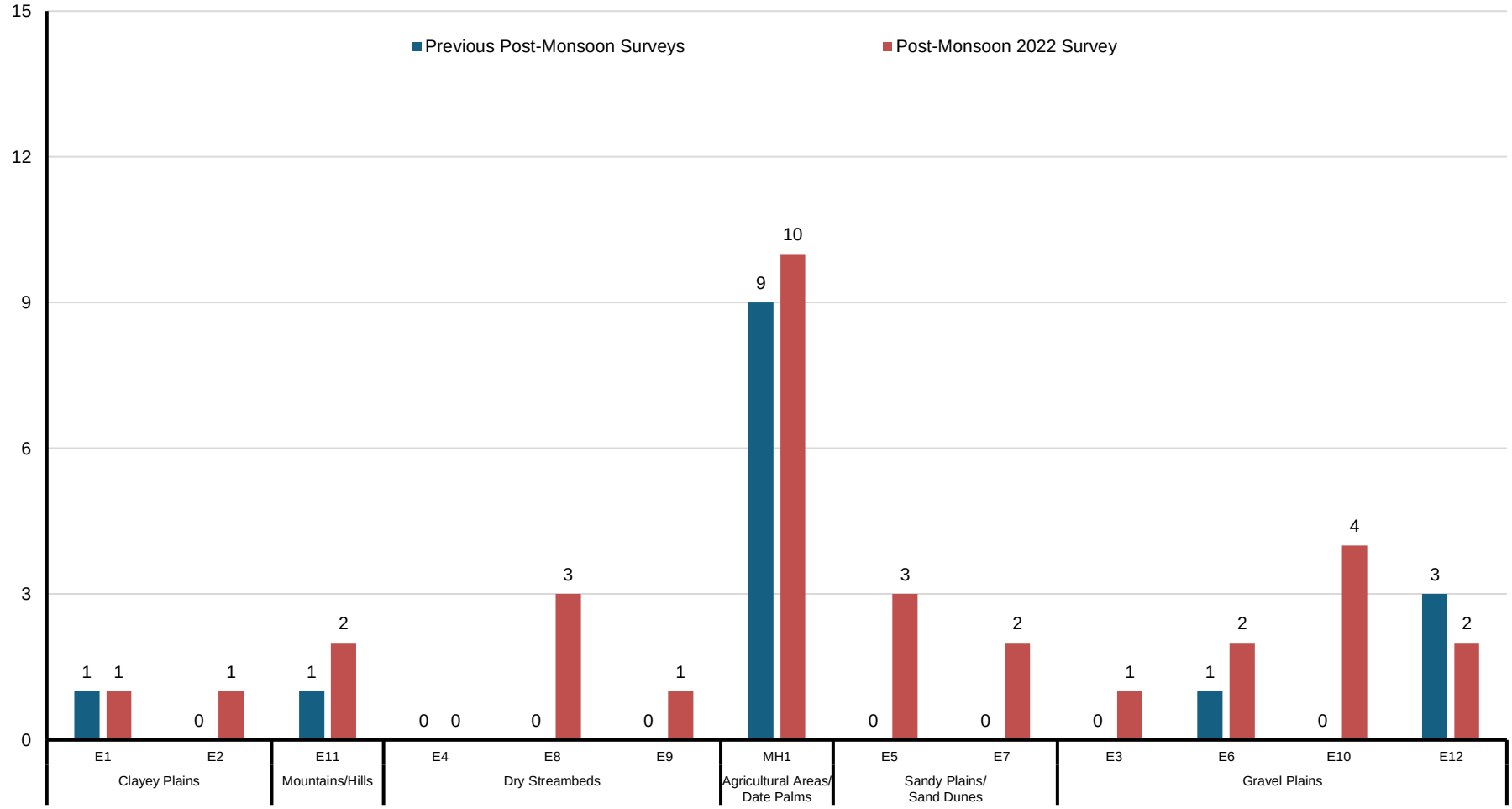


Exhibit G.9: Comparison of Bird Species Richness Observed along Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey



G.1.3 Access Route to Reko Diq Mine Site

The compassion of abundance and diversity of avifauna species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) focused along the Access Route to Reko Diq Mine Site, which is discussed here.

The birds' abundance and richness at eight common sampling locations along the Access Route to Reko Diq Mine Site are compared for Post-Monsoon 2022 and Previous Post-Monsoon Surveys, which include E41, E42, E43, E44, E45, E46, E47, and E48. Among these common sampling locations, four were in the Gravel Plains habitat, three in Dry Streambeds, two each in Sandy Plains/Sand Dunes and Clayey Plains, and one in the Mountains/Hills habitat.

A total of 47 bird specimens of seven species were observed in the Post-Monsoon 2022 Survey as compared to five bird specimens of only one bird species in Previous Post-Monsoon Surveys from the common sampling locations along the Access Route to Reko Diq Mine Site. Both birds' abundance and richness were significantly higher in the Post-Monsoon 2022 Survey in comparison with Previous Post-Monsoon Surveys. . The reason for this increase is the same as stated above for the Reko Diq Mine Site.

In the Previous Post-Monsoon Surveys, maximum bird abundance was observed at Sampling Location E46 (five specimens), whereas in the Post-Monsoon 2022 Survey, maximum abundance was E44 (25 specimens), followed by E43 (13 specimens) and E42 (four specimens). Bird species richness was highest at E46 (one species) in Previous Post-Monsoon Surveys, whereas it was highest at Sampling Location E42 (four species) in Post-Monsoon 2022 Survey.

Average Diversity and Density: The average diversity (0.1) and average density of (0.6) in Previous Post-Monsoon Surveys was lower as compared to the average diversity (0.9) and average density (4.1) in Post-Monsoon 2022 Survey along the Access Route to Reko Diq Mine Site.

Average Diversity by Habitat: In the Previous Post-Monsoon Surveys, the highest average bird diversity (diversity per sampling location for each survey) was observed in Dry Streambeds (0.3). Similarly, in the Post-Monsoon 2022 Survey, the highest diversity of birds was also observed in the Mountains/Hills (2.0), followed by Gravel Plains (1.0), and Dry Streambeds (1.0).

Average Density by Habitat: In the Previous Post-Monsoon Surveys, the highest average bird density (density per sampling location for each survey) was observed in Dry Streambeds (1.7). Similarly, in the Post-Monsoon 2022 Survey, the highest density of birds was also observed in Mountains/Hills (25.0), followed by Gravel Plains (1.5) and Dry Streambeds (1.0).

Exhibit G.10 provides a comparison of the average diversity and average density of birds observed along the Access Route to Reko Diq Mine Site in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.11 provides a comparison of species abundance observed along the Access Route to Reko Diq Mine Site in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.12 provides a comparison of species richness observed along the Access Route to Reko Diq Mine Site in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.10: Average Diversity and Density of Birds Observed along Access Route to Reko Diq Mine Site in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Dry Streambeds	0.3	1.0	1.7	1.0
Gravel Plains	0.0	1.0	0.0	1.5
Mountains/Hills	0.0	2.0	0.0	25.0

Exhibit G.11: Comparison of Birds Abundance Observed along Access Route to Reko Diq Mine Site in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

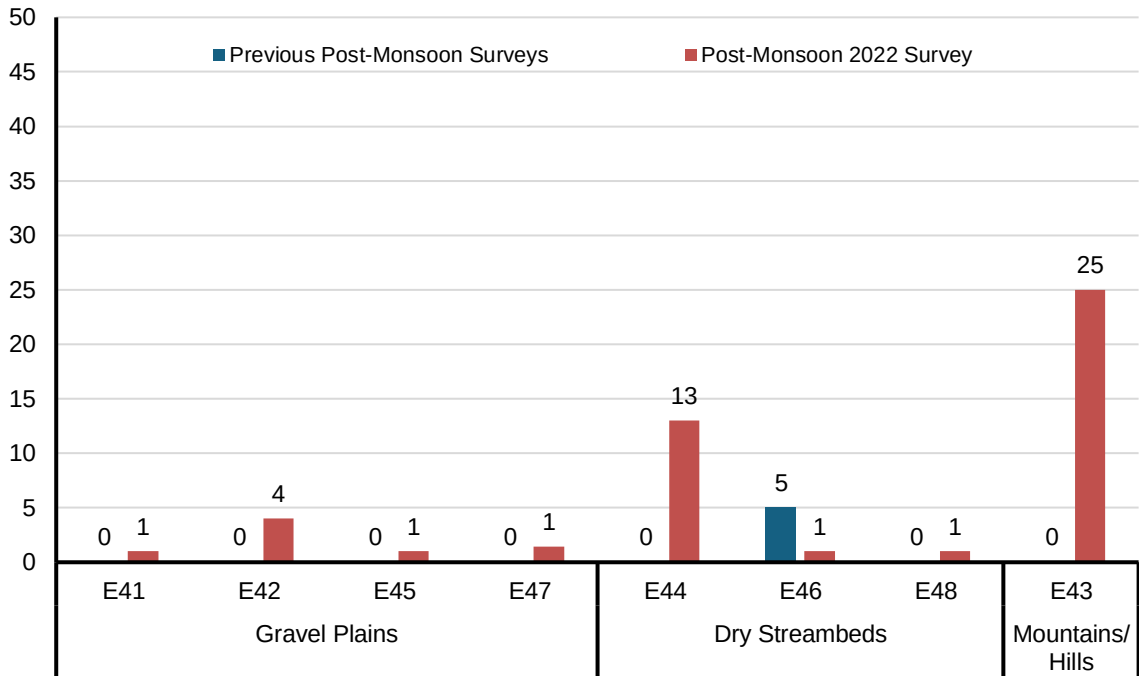
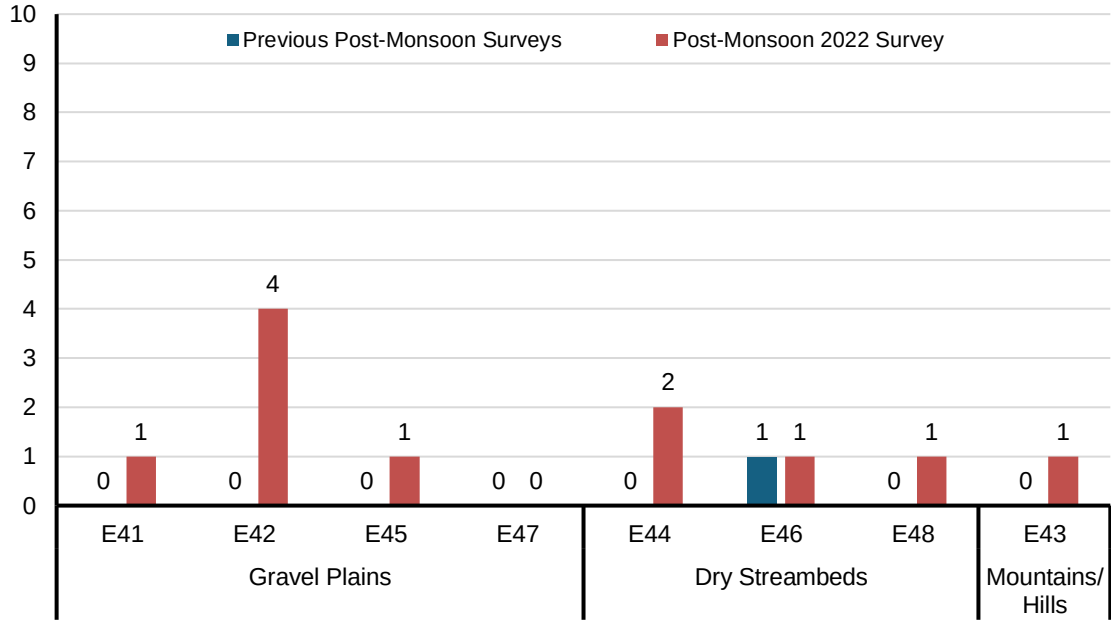


Exhibit G.12: Comparison of Bird Species Richness Observed along Access Route to Reko Diq Mine Site in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey



G.2 Mammals

Overall, seven mammalian species have been observed at the Reko Diq Mine Site, along the Northern Groundwater Systema, and along the Access Route to the Reko Diq Mine Site. Of these, five mammalian species were observed in the Previous Post-Monsoon Surveys and six species were observed in the Post-Monsoon 2022 Survey. Goitered Gazelle, which was observed during the Previous Post-Monsoon Surveys was not observed during the Post-Monsoon 2022 Survey. Similarly, Sand Cat, which was recorded in the Post-Monsoon 2022 Survey, was not observed during the Previous Post-Monsoon Surveys. The reason for the disappearance of the Goitered Gazelle during the Post-Monsoon 2022 Survey may be fencing along the border and hunting of this species as discussed in the main report.

Exhibit G.13 provides comparison of mammalian species observed in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.13: Mammalian Species Observed in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

No.	*Scientific Name*	*Common Name*	*Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*
			September 2008 Survey	*November 2009 Survey*	*August 2020 Survey*	
1.	*Canis aureus*	Asiatic Jackal	✓	✓	✓	✓
2.	*Lepus capensis*	Cape Hare	-	-	✓	✓
3.	*Hemiechinus auritus*	Long Eared Hedgehog	✓	✓	✓	✓

No.	*Scientific Name*	*Common Name*	*Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*
			September 2008 Survey	*November 2009 Survey*	*August 2020 Survey*	
4.	*Vulpes vulpes*	Red Fox	✓	✓	✓	✓
5.	*Vulpes rueppellii*	Ruppell's Fox	-	-	-	✓
6.	*Gazella subgutturosa*	Goitered Gazelle	-	-	✓	-
7.	*Felis margarita*	Sand Cat	-	-	-	✓
Total			**3**	**3**	**5**	**6**
Total (combined total for Previous Post-Monsoon Surveys) and Post-Monsoon 2022 Survey			**5**			**6**

G.2.1 Reko Diq Mine Site

The compassion of abundance and diversity of mammalian species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) on the Reko Diq Mine Site, which is discussed here.

Since the Previous Post-Monsoon Surveys were conducted exclusively at the Reko Diq Mine Site, the comparison was therefore limited to only 14 common locations, which include E13, E15, E16, E17, E18, E19, E23, E24, E25, E26, E28, E30, E31 and E32. Among the 14 common sampling locations, six were in Gravel Plains, four in Mountains/Hills, three in Dry Streambeds, and one in Sandy Plains habitat.

A total of two mammalian species were observed at the Reko Diq Mine in the Previous Post-Monsoon Surveys including Asiatic Jackal, and Red Fox. However, in the Post-Monsoon 2022 Survey, a total of four mammalian species were observed which include Cape Hare, Red Fox, Ruppell's Fox, and Sand Cat. During the Previous Post-Monsoon Surveys, Red Fox was the most sighted mammalian species whilst the highest signs and sightings of Red Fox and Ruppell's Fox were observed in the Post-Monsoon 2022 Survey.

Average Diversity and Density: The average density (0.6) in Pre-Monsoon 2022 Survey was similar to that recorded in Previous Pre-Monsoon Surveys for Reko Diq Mine Site. Similarly, the average diversity (0.3) in the Post-Monsoon 2022 Survey was higher as compared to average diversity (0.1) in Previous Post-Monsoon Surveys.

Average Diversity by Habitat: The highest average mammal diversity (diversity per sampling location for each survey) was observed in Dry Streambeds (0.7) at the Reko Diq Mine Site in the Previous Post-Monsoon Survey, followed by Gravel Plains (0.3) and Mountains/Hills (0.3). Meanwhile, in the Post-Monsoon 2022 Survey, the highest diversity of mammals was observed in Mountains/Hills (0.8), followed by Gravel Plains (0.3) and Dry Streambeds (0.3).

Average Density by Habitat: The highest average mammal density (density per sampling location for each survey) in the Previous Post-Monsoon Surveys was recorded in Gravel Plains (0.8), followed by Dry Streambeds (0.7) and Mountains/Hills (0.5). Whereas, in the Post-Monsoon 2022 Survey, the highest density was observed in Dry Streambeds, which was (1.3), followed by Mountains/Hills (0.8) and Gravel Plains (0.3).

Maximum abundance of mammalian species was observed at Sampling Location E31 (five signs/sightings) followed by E25 (two signs/sightings) in the Previous Post-Monsoon Surveys, while in the Post-Monsoon 2022 Survey, the highest abundance was observed at Sampling Location E30, located in Dry Streambeds. Similarly, in the Previous Post-Monsoon Surveys, the highest richness was observed (two species) at sampling locations E31 and E25. In the Post-Monsoon 2022 Survey, only one species was observed at sampling locations E13, E17, E19, and E30 in Mountains/Hills and Dry Streambeds.

Exhibit G.14 provides a comparison of the average diversity and density of mammalian species by habitat type observed at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.15 provides a comparison of species abundance by sampling locations at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.16 provides a comparison of species richness by sampling locations at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.14: Comparison of Average Diversity and Density by Habitat Type at Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Dry Streambeds	0.7	0.3	0.7	1.3
Gravel Plains	0.3	0.3	0.8	0.3
Mountains/Hills	0.3	0.8	0.5	0.8
Sandy Plains	0.0	0.0	0.0	0.0

Exhibit G.15: Comparison of Mammals Abundance by Sampling Location at Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys

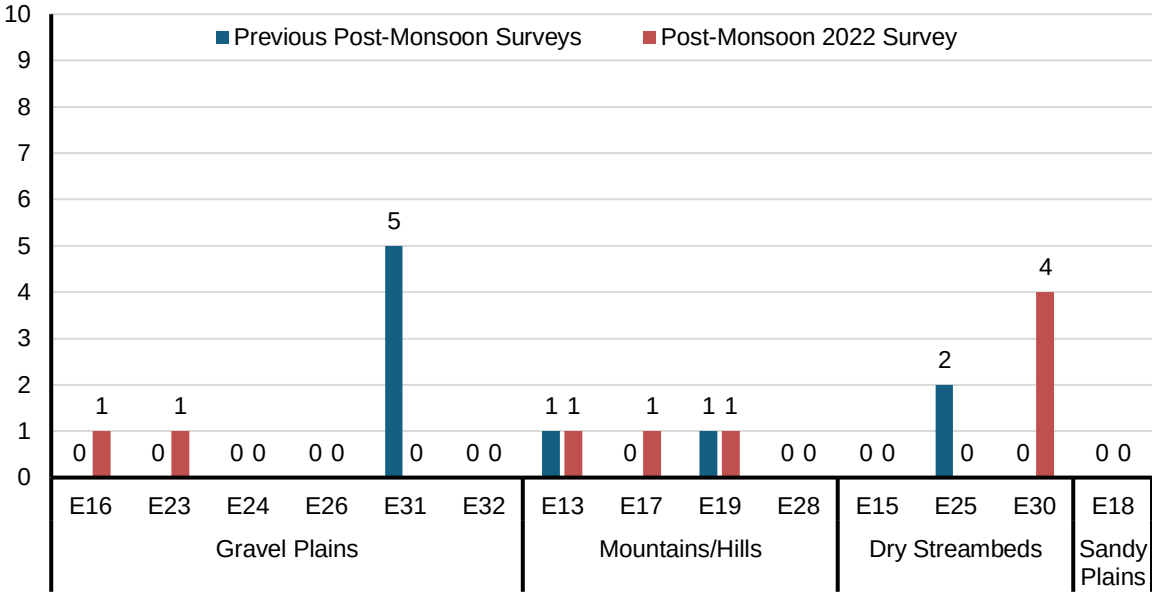
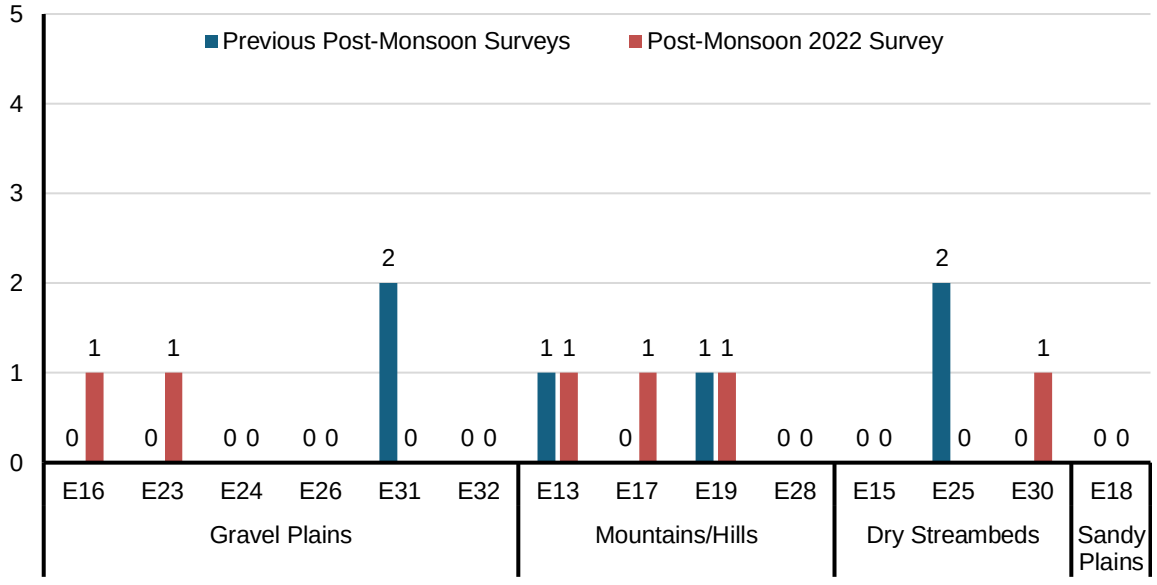


Exhibit G.16: Comparison of Mammals Richness by Sampling Location at Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys



G.2.2 Northern Groundwater System

The compassion of abundance and diversity of mammalian species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) along the Northern Groundwater System, which is discussed here.

Mammalian abundance and richness at 13 common sampling locations along Northern Groundwater System are compared for Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys which include E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12 and

MH1. Among the 13 common sampling locations, four were in the Gravel Plains habitat, three in Dry Streambeds, two each in Sandy Plains/Sand Dunes and Clayey Plains, and one each in the Mountains/Hills and Agricultural Areas/Date Palms habitat.

A decline in mammalian diversity was observed especially for the large and conservation concern mammals like Goitered Gazelle. Hunting and prevailing dry conditions in the area are the main reasons for the disappearance of this species. Now, this species only occasionally visits the area, and most of the time, it is killed by the locals. A total of five mammalian species were observed along the Northern Groundwater System in the Previous Post-Monsoon Surveys, which include the Asiatic Jackal, Red Fox, Goitered Gazelle, Cape Hare and Long-eared Hedgehog. Similarly, in the Post-Monsoon 2022 Survey, a total of three mammalian species were observed along the Northern Groundwater System, which include Red Fox (*Vulpes vulpes*), Cape Hare (*Lepus capensis)*, and Ruppell's Fox (*Vulpes rueppellii)*. Red Fox was the most sighted mammalian species in both surveys, i.e., Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Average Diversity and Density: The average density (density per sampling location for each survey) (0.5) and diversity (0.2) of mammalian species observed along the Northern Groundwater System in the Post-Monsoon 2022 Survey was lower compared to the average density (5.4) and diversity (0.4) in the Previous Post-Monsoon Surveys.

Average Diversity by Habitat: In the Previous Post-Monsoon Surveys, the highest average mammal diversity (diversity per sampling location for each survey) was observed in Agricultural Areas/Date Palms (3.0), followed by Dry Streambeds (1.6), Gravel Plains and Mountains/Hills (1.0) and Clayey Plains (0.5), however in the Post Monsoon 2022 Survey, the highest diversity of mammals was observed in Sandy Plains/Sand Dunes (0.5) and Gravel Plains (0.5) followed by Dry Streambeds (0.3). In the Previous Post-Monsoon Surveys, the maximum density was observed in Agricultural Areas/Date Palms (29.0), followed by Dry Streambeds (10.5), Gravel Plains (8.0), Clayey Pains (3.0), and Mountains/Hills (2.0), during the Post-Monsoon 2022 Survey the highest density was observed in Sandy Plains/Sand Dunes (1.0) followed by Dry Streambeds (0.7) and Gravel Plains (0.5).

Average Density by Habitat: In the Previous Post-Monsoon Surveys, the highest average mammal density (density per sampling location for each survey) (10.0) was observed in Agricultural Areas/Date Palms, whereas in the Post-Monsoon 2022 Survey, the highest density (1.0) was observed in Sandy Plains/Sand Dunes. These results indicate that both the abundance and species richness of mammals were lower in the Post-Monsoon 2022 Survey.

The highest abundance of mammals was observed at Sampling Location E3 (22 signs/sightings), followed by E11 (15 signs/sightings) and MH1 (10 signs/sightings) in the Previous Post-Monsoon Surveys. However, maximum signs and sightings were observed at sampling locations E4 and E5 (two signs each at both locations) in the Post-Monsoon 2022 Survey. The maximum richness was observed at Sampling Location E4 (five species), followed by E10 and MH1 (three species at each location) in the Previous Post-Monsoon Surveys. In contrast, only one species each was observed at sampling locations E4, E5, E6, and E10 in the Post-Monsoon 2022 Survey.

These results indicate that both the abundance and species richness of mammals were lower in the Post-Monsoon 2022 Survey. This can be attributed to the extremely arid conditions due to prolonged dry conditions due to less rainfall as well as fencing along the border which has restricted the species' migration route.

Exhibit G.17 provides a comparison of the average diversity and density of mammalian species observed during the Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey along the Northern Groundwater System.

Exhibit D.18 provides the graph for comparisons of mammal abundance observed by sampling locations along the Northern Groundwater System for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.19 provides the graph for comparisons of mammal species richness observed by sampling locations along the Northern Groundwater System for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.17: Comparison of Average Diversity and Density of Mammalian Species Observed along Northern Groundwater System in Previous Post-Monsoon and Post-Monsoon 2022 Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Agricultural Area/Date Palm	6.0	0.0	29.0	0.0
Clayey Plains	1.0	0.0	3.0	0.0
Dry Streambeds	2.0	0.3	10.5	0.7
Gravel Plains	1.5	0.5	8.0	0.5
Mountains/Hills	1.0	0.0	2.0	0.0
Sandy Plains/Sand Dunes	0.0	0.5	0.0	1.0

Exhibit G.18: Comparison of Mammals Abundance by Sampling Location Observed along Northern Groundwater System for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

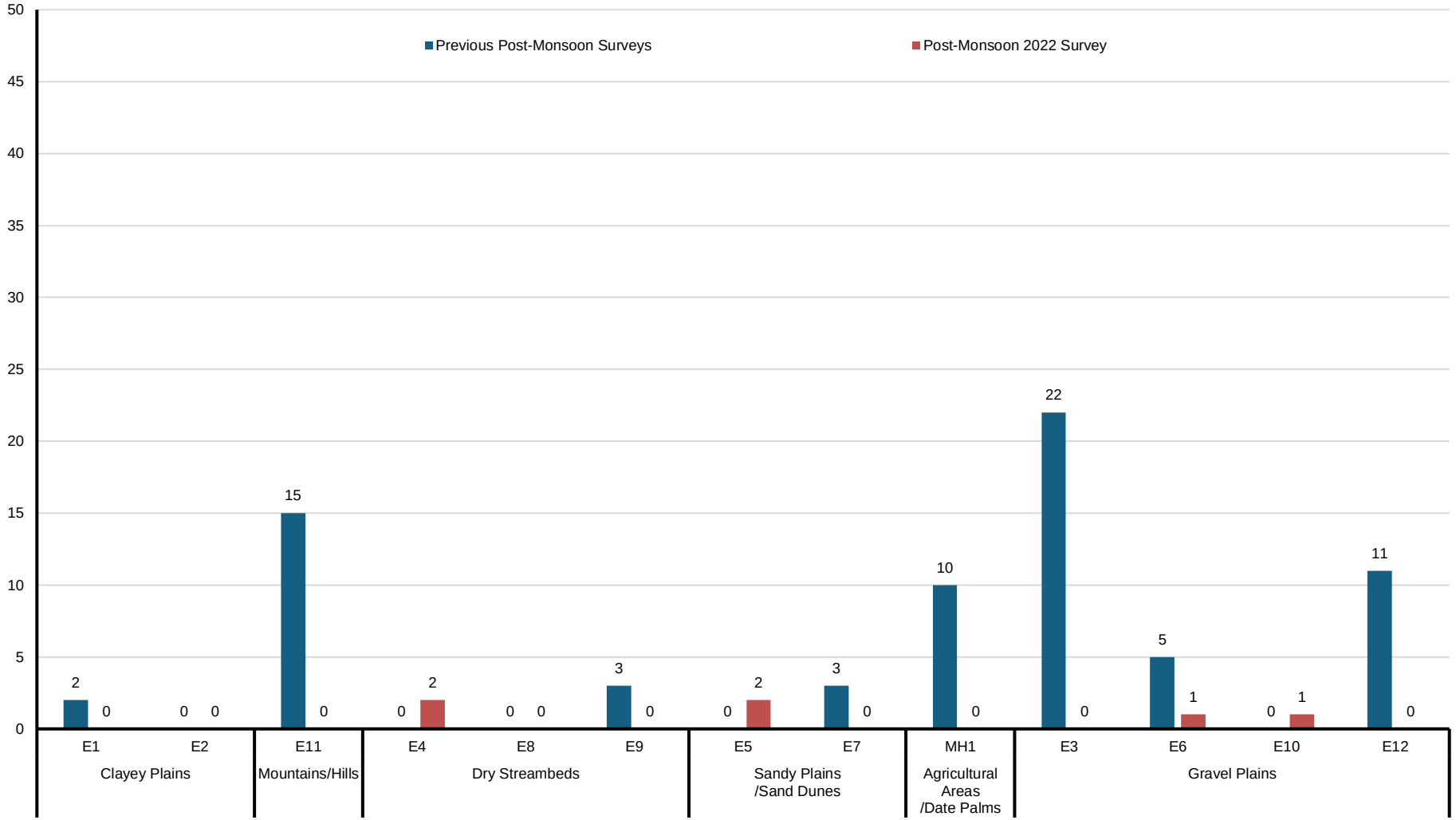
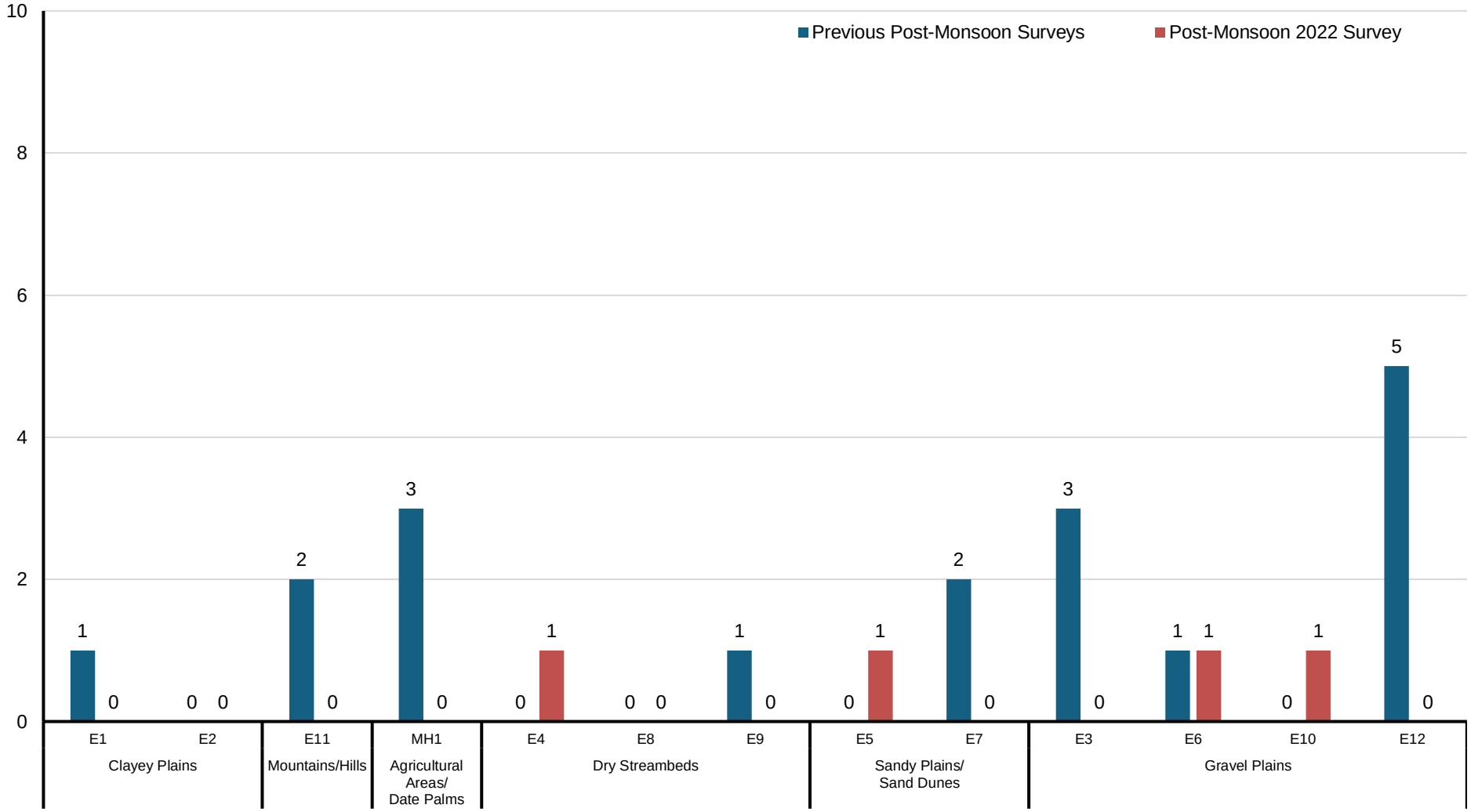


Exhibit G.19: Comparison of Mammals Species Richness by Sampling Location Observed along Northern Groundwater System for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey



G.2.3 Access Route to Reko Diq Mine Site

The compassion of abundance and diversity of mammalian species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) along the Access Route to Reko Diq Mine Site, which is discussed here.

The mammalian abundance and richness at eight common sampling locations along Access Route to Reko Diq Mine Site are compared for Post-Monsoon 2022 and Previous Post-Monsoon Surveys, which include E41, E42, E43, E44, E45, E46, E47, and E48. Among these common sampling locations, four were in the Gravel Plains habitat, three in Dry Streambeds, two each in Sandy Plains/Sand Dunes and Clayey Plains, and one in the Mountains/Hills habitat.

An increase in the mammalian diversity was observed along the Access Route to Reko Diq Mine Site in the Post-Monsoon 2022 Survey however, mammalian abundance has decreased as compared to the Previous Post-Monsoon Surveys. Two mammalian species were observed along the Access Route to the Reko Diq Mine Site in the Previous Post-Monsoon Surveys which include Red Fox and Long-eared Hedgehog. Whereas in the Post-Monsoon 2022 Survey, three mammalian species were observed along the Access Route to the Reko Diq Mine Site including Desert Hare, Long-eared Hedgehog, and Red Fox. Red Fox was the most sighted mammalian species in the Previous Post-Monsoon Surveys; however, the Desert Hare was the most sighted mammalian species along the Access Route to Reko Diq Mine Site during the Post-Monsoon 2022 Survey.

In the Previous Post-Monsoon Surveys, the highest abundance was observed at Sampling Location E47 (nine signs/sightings), followed by E42 and E48 (four signs/sightings each). Whereas, in the Post-Monsoon 2022 Survey, maximum signs were observed at sampling locations E42 (two signs/sightings). Similarly, in the Previous Post-Monsoon Surveys, the highest species richness was observed at sampling locations E42 and E47 (two species each), while in the Post-Monsoon 2022 Survey, only one species was observed from sampling locations E42 and E43.

Average Diversity and Density: The average density (0.4) of mammalian species observed along the Access Route to Reko Diq Mine in the Post-Monsoon 2022 Survey was lower compared to the average density (2.5) in the Previous Post-Monsoon Surveys. However, the average diversity (0.3) is same for Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Average Diversity by Habitat: In the Previous Post-Monsoon Surveys, the highest mammal average diversity (diversity per sampling location for each survey) was recorded in Mountains/Hills (1.0), followed by Gravel Plains (0.5) and Dry Streambeds (0.33), while in the Post-Monsoon 2022 Survey the highest diversity of mammals was observed in Mountains/Hills (1.0), followed by Gravel Plains (0.3).

Average Density by Habitat: In the Previous Post-Monsoon Surveys, the highest average mammal density (density per sampling location for each survey) was recorded in Gravel Plains that was (3.3) followed by Mountains/Hills (2.0) and Dry Streambeds (1.7), while in the Post-Monsoon 2022 Survey, the highest density was observed in Mountains/Hills (2.0), followed by Gravel Plains (0.3). No specimens of any mammalian

species were recorded from Dry Streambeds along the Access Route to the Reko Diq Mine Site in the Post-Monsoon 2022 Survey.

Exhibit G.20 provides a comparison of the average diversity and density of mammalian species observed during the Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey along the Access Route to the Reko Diq Mine Site.

Exhibit G.21 provides the graph for comparisons of mammal abundance observed by sampling locations along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.22 provides the graph for comparisons of mammal species richness observed by sampling locations along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.20: Comparison of Average Diversity and Density of Mammalian Species Observed along the Access Route to the Reko Diq Mine Site in Previous Post-Monsoon and Post-Monsoon 2022 Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Dry Streambeds	0.3	0.0	1.7	0.0
Gravel Plains	0.5	0.3	3.3	0.3
Mountains/Hills	1.0	1.0	2.0	2.0

Exhibit G.21: Comparison of Mammals Abundance by Sampling Location Observed along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

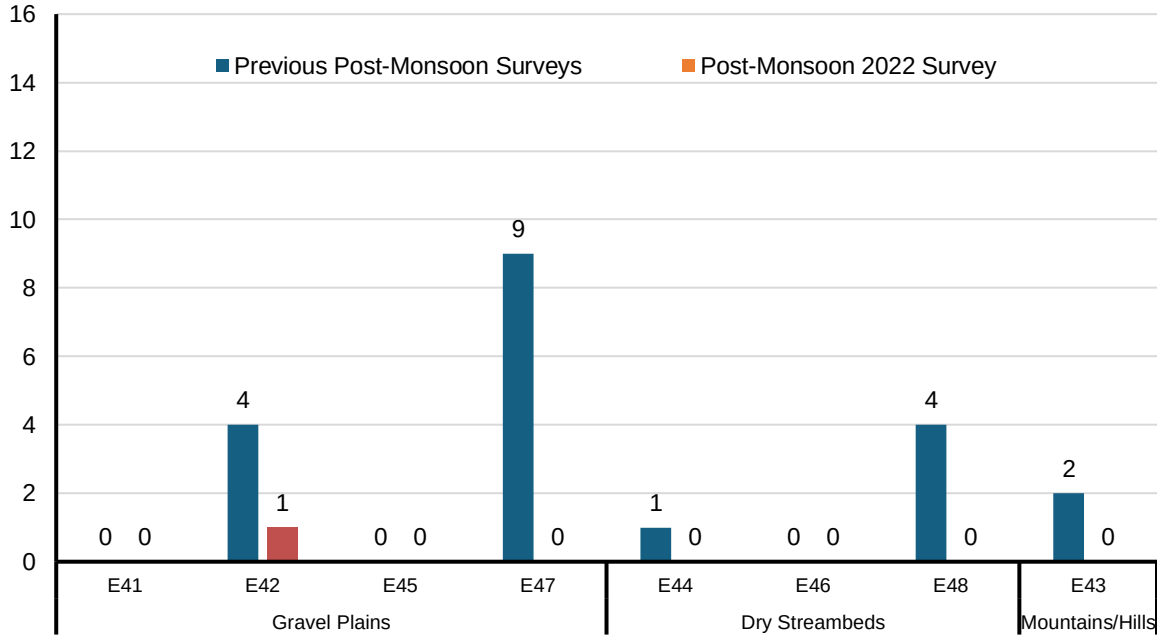
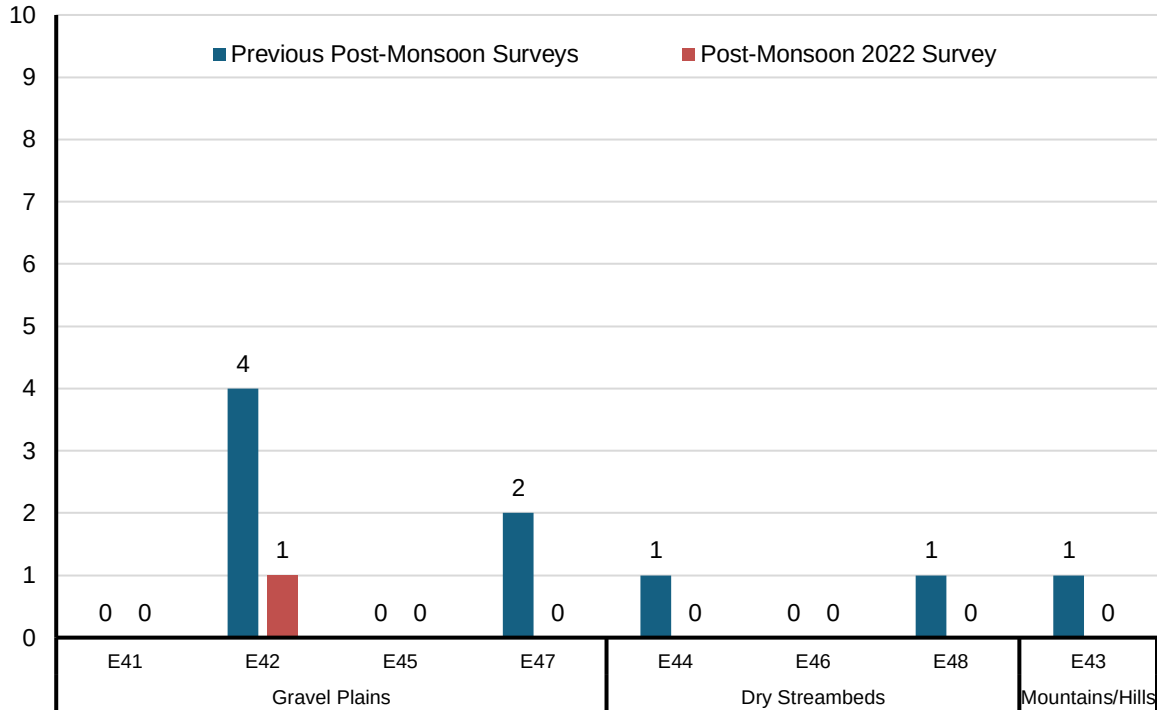


Exhibit G.22: Comparison of Mammals Species Richness by Sampling Location Observed along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey



G.3 Small Mammals

The live trapping for small mammals was also conducted during the Previous Post-Monsoon Surveys such as in November 2008, and September 2009 at the proposed Reko Diq Mine Site and along the Access Route to the Reko Diq Mine Site. A comparison of abundance and richness for the Post-Monsoon 2022 Survey with Previous Post-Monsoon Surveys is provided in this section. A comparison of small mammals is given for the Reko Diq Mine Site only.

In the November 2008 Survey, a higher abundance and richness of small mammals were observed compared to the September 2009 and Post-Monsoon 2022 Survey. A total of 12 specimens belonging to five species of small mammals were captured in the November 2008 Survey compared to three specimens of three species captured in the September 2009 Survey, however, six specimens of only one species were captured during the Post-Monsoon 2022 Survey.

In the Previous Post-Monsoon Surveys, small mammals were captured from Gravel Plains and Clayey Plains however, they were captured only from the Built-up Area in the Post-Monsoon 2022 Survey. The species observed during both Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey were the Cheesman's Gerbil (*Gerbillus cheesmani),* Blanford's Jerboa *(Jaculus blanfordi),* Balochistan Gerbil *(Gerbillus nanus),* Libyan Jird *(Meriones libycus),* Indian Hairy Footed Gerbil (*Gerbillus gleadowi)* and Great Gerbil (*Rhombomys opimus).* Only one species was captured in the Post-Monsoon 2022 Survey.

Exhibit G.23 provides small mammals species, habitat, abundance, and richness observed in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.23: Small Mammals Captured in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey from Reko Diq Mine Site and Northern Groundwater System

Surveys Years	*Common Name*	*Scientific Name*	*No. of Sampling Locations*	*Habitat*	*Abundance*	*Total Abundance*	*Total Species Richness*
November 2008 Survey	Cheesman's Gerbil	*Gerbillus cheesmani*	7	Gravel Plain	2	12	5
	Blanford's Jerboa	*Jaculus blanfordi*		Gravel Plain	3		
	Libyan Jird	*Meriones libycus*		Clayey Plain	3		
	Balochistan Gerbil	*Gerbillus nanus*		Clayey Plain	3		
	Indian Hairy Footed Gerbil	*Gerbillus gleadowi*		Clayey Plain	1		
September 2009 Survey	Blanford's Jerboa	*Jaculus blanfordi*	6	Gravel Plain	1	3	3
	Balochistan Gerbil	*Gerbillus nanus*		Gravel Plain	1		
	Cheesman's Gerbil	*Gerbillus cheesmani*		Gravel Plain	1		
Post-Monsoon 2022 Survey	Great Gerbil	*Rhombomys opimus*	6	Built up Areas	7	7	1

G.3.1 Reko Diq Mine Site

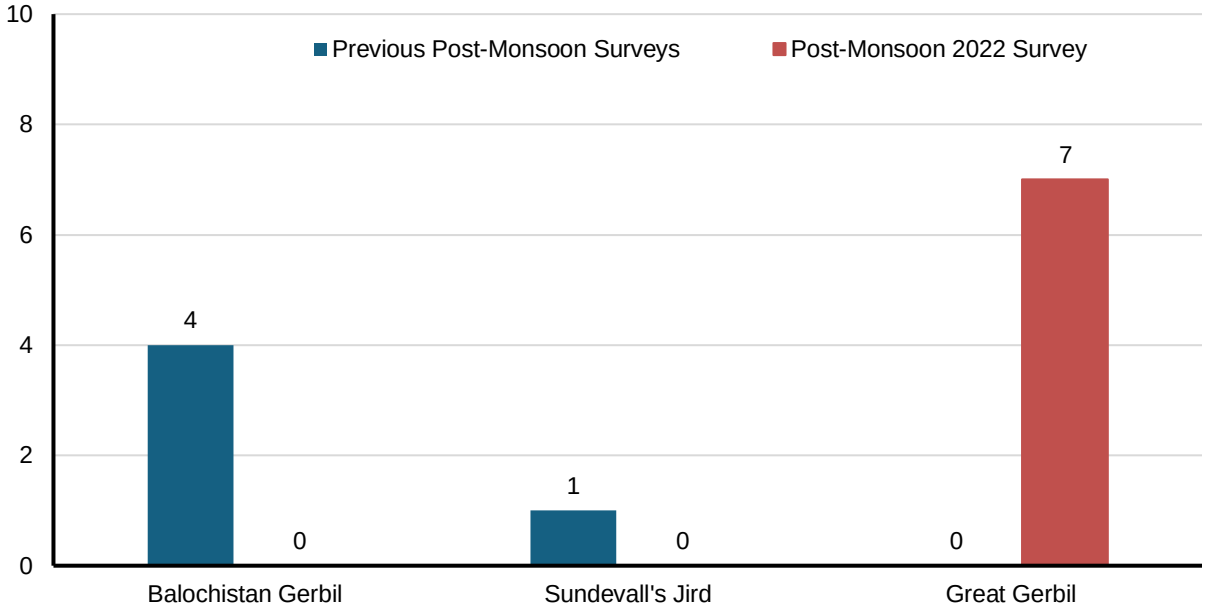
In Previous Post-Monsoon Surveys, two species were captured; however, in the Post-Monsoon 2022 Survey, only one species was captured. This is attributed to the extreme drought and dry conditions resulting in the shortage of food for small mammals so only one species dominated the area and managed to survive under such harsh conditions.

Abundance and Richness in the Overall Survey: A total of five specimens of small mammals belonging to two species were captured from the Reko Diq Mine Site in Previous Post-Monsoon Surveys. Whereas, in Post-Monsoon 2022 Survey, total of seven specimens belonging to only one species were captured from the Reko Diq Mine Site.

Abundance and Richness by Habitat: In Previous Post-Monsoon Surveys, all the specimens of small mammals were captured from Clayey Plains habitat (Cheel Lake), whereas in Post-Monsoon 2022 Survey, all the specimens are captured from the Built-up Areas habitat.

Exhibit G.24 provides a comparison of species abundance at the Reko Diq Mine in the Previous Post-Monsoon Surveys and the Post-Monsoon 2022 Survey.

Exhibit G.24: Comparison of Species Abundance by Survey at the Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys



G.3.2 Northern Groundwater System

No specimens of any small mammal species were captured in the Post-Monsoon 2022 Survey. Therefore, the comparison is not provided.

G.3.3 Access Route to Reko Diq Mine Site

The sampling for small mammals was not conducted along the Access Route to Reko Diq Mine Site in Post-Monsoon 2022 Survey. This is due to security restrictions not allowing to carry out samplings in these areas. Therefore, the comparison is not provided.

G.4 Herpetofauna

Overall, 25 herpetofauna species have been observed at the Reko Diq Mine Site, along the Northern Groundwater Systema, and along the Access Route to the Reko Diq Mine Site. Of these, 15 herpetofauna species were observed from common sampling locations during the Post-Monsoon 2022 Survey, whereas during the Previous Post-Monsoon Surveys, 19 species were recorded from the Reko Diq Mine Site, Northern Groundwater System, and along the Access Route to Reko Diq Mine Site. The lower species richness during the Post-Monsoon 2022 Survey can be attributed to a survey limitation, as a previously nocturnal survey was also conducted, which was not feasible during the Post-Monsoon 2022 Survey.

Exhibit G.25 provides comparison of mammalian species observed in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.25: Comparison of Herpetofauna Species Observed in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

No.	*Scientific Name*	*Common Name*	*Previous Post-Monsoon Surveys*			*Post-Monsoon 2022 Survey*
			September 2008 Survey	*November 2009 Survey*	*August 2020 Survey*	
1.	*Acanthodactylus cantoris*	Indian fringe-fingered Lizard	✓	✓	-	-
2.	*Agamura persica*	Persian Spider Gecko	✓	✓	-	-
3.	*Acanthodactylus blanfordii*	Blanford's Fringe-fingered Lizard	-	-	-	✓
4.	*Acanthodactylus micropholis*	Ornated Toad-headed Agama	-	-	-	✓
5.	*Agamura cruralis*	Spider Gecko	-	-	-	✓
6.	*Cyrtopodion scabrum*	Rough-tailed Bentoed Gecko	-	✓	-	✓
7.	*Echis carinatus multisquamatus*	Saw-scaled Viper	✓	-	-	-
8.	*Eremias scripta*	Sand Racerunner	✓	✓	-	-
9.	*Eristicophis macmahonii*	Asian Sand Viper	✓	✓	-	-
10.	*Eumeces zarudnyi*	Schokari Sand Racer	-	-	-	✓
11.	*Laudakia fusca*	Yellow-headed Rock Agama	-	-	-	✓
12.	*Lytorhynchus maynardi*	Long Nosed Snake	✓	-	-	-
13.	*Mesalina watsonana*	Persian long-tailed Desert Lizard	-	✓	✓	✓
14.	*Ophiomorus tridactylus*	Three-toed Snake Skink	✓	-	-	✓
15.	*Phrynocephalus clarkorum*		-	✓	-	
16.	*Phrynocephalus euptilopus*		-	-	-	✓
17.	*Phrynocephalus luteoguttatus*	Yellow-speckled Toad-headed Agama	✓	✓	-	-
18.	*Phrynocephalus maculatus*	Blacktail Toadhead Agama	✓	✓	✓	✓
19.	*Phrynocephalus ornatus*	Ornated Toad-headed Agama	✓	✓	-	✓
20.	*Platyceps karelini*	-	-	-	-	✓
21.	*Psammophis schokari*	Schokari Sand Racer	✓	✓	✓	✓
22.	*Spalerosophis diadema*	Diadem Snake	✓	-	-	-
23.	*Teratoscincus microlepis*	Small-scaled Wonder Gecko	✓	-	-	-
24.	*Trapelus agilis*	Brilliant Ground Agama	✓	✓	✓	✓
25.	*Trapelus megalonyx*	Afghan Ground Agama	✓	✓	-	-
Total			**16**	**13**	**4**	**14**
Total (combined total for Previous Post-Monsoon Surveys) and Post-Monsoon 2022			**19**			**14**

G.4.1 Reko Diq Mine Site

The compassion of abundance and diversity of herpetofauna species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) on the Reko Diq Mine Site, which is discussed here.

Since the Previous Post-Monsoon Surveys were conducted exclusively at the Reko Diq Mine Site, the comparison was therefore limited to only 14 common locations, which include E13, E15, E16, E17, E18, E19, E23, E24, E25, E26, E28, E30, E31 and E32. Among the 14 common sampling locations, six were in Gravel Plains, four in Mountains/Hills, three in Dry Streambeds, and one in Sandy Plains habitat.

Only a slight change in the diversity and abundance of the herpetofauna was observed in Post-Monsoon 2022 and Previous Post-Monsoon Surveys. A total of 13 specimens of seven species were observed in Post-Monsoon 2022 Survey, whereas, in Previous Post-Monsoon Surveys, 15 specimens of herpetofauna belonging to seven species were observed from common sampling locations at Reko Diq Mine Site.

Average Diversity and Density in the Overall Survey: The average diversity (diversity per sampling location for each survey) of 0.5 and density of 0.9 was recorded in the Post-Monsoon 2022 Survey, whereas it was 0.5 and 1.1, respectively, in the Previous Post-Monsoon Surveys respectively. This shows that the average density of herpetofauna species was lower during the Post-Monsoon 2022 Survey when compared to Previous Post-Monsoon Surveys, whereas the average diversity is the same in the Post-Monsoon 2022 Survey as observed in the Previous Post-Monsoon Surveys. Lower density in the Post-Monsoon 2022 Survey can be attributed to a long drought period, which affected the overall fauna of the Terrestrial Ecological Study Area.

Average Diversity by Habitat: The highest average diversity was recorded in Sandy Plains (2.0), followed by Mountains/Hills (2.0), Dry Streambeds (0.7), and Gravel Plains (0.3) in the Post-Monsoon 2022 Survey, whereas in the Previous Post-Monsoon Surveys this pattern was different i.e., highest diversity was recorded in Dry Streambeds (0.7), followed by Gravel Plains (0.5) and Mountains/Hills (0.5). In Sandy Plains, no species was observed during the Previous Post-Monsoon Surveys, however, the highest diversity of herpetofauna species was observed in the Post-Monsoon 2022 Survey, which can be attributed to the installation of a fence across the borders of Pakistan with Iran and Afghanistan, which in turn reduced the anthropogenic disturbance of the site.

Average Density by Habitat: The highest average density was observed in Sandy Plains (3.0), followed by Mountains/Hills (1.3), Dry Streambeds (1.0), and Gravel Plains (0.3) in the Post-Monsoon 2022 Survey. Meanwhile, in Previous Post-Monsoon Surveys, the highest density was observed at Mountains/Hills (2.3), followed by Dry Streambeds (1.0), and Gravel Plains (0.5). No sighting or signs of herpetofauna were observed in Sandy Plains in the Previous Post-Monsoon Surveys.

Exhibit G.26 provides a comparison of the average diversity and density of herpetofauna species observed at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.27 provides a comparison of species abundance by sampling locations at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.28 provides a comparison of species richness by sampling locations at the Reko Diq Mine Site in the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys.

Exhibit G.26: Comparison of Average Diversity and Density of Herpetofauna at the Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Dry Streambeds	0.7	0.7	1.0	1.0
Gravel Plains	0.5	0.3	0.5	0.3
Mountains/Hills	0.5	0.7	2.3	1.3
Sandy Plains	0.0	2.0	0.0	3.0

Exhibit G.27: Comparison of Species Abundance Observed at Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys

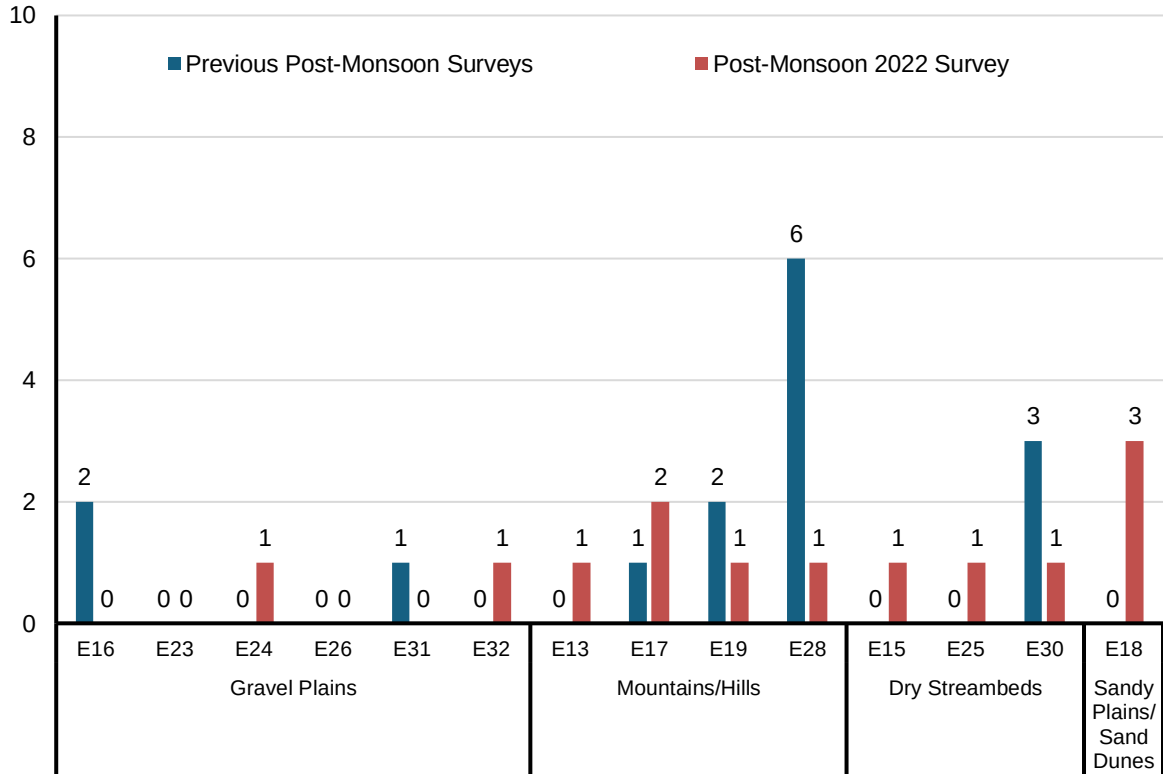
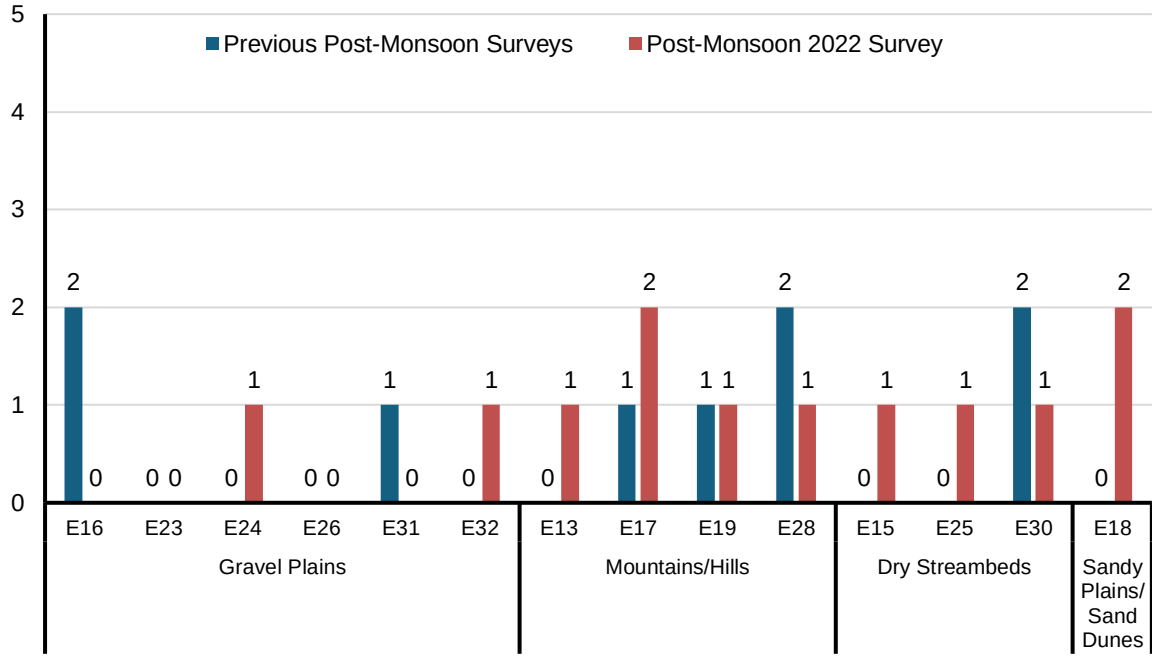


Exhibit G.28: Comparison of Species Richness Observed at Reko Diq Mine Site in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys



G.4.2 Northern Groundwater System

The compassion of abundance and diversity of herpetofauna species between the Post-Monsoon 2022 Survey, and November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) focused along the Northern Groundwater System, which is discussed here.

The herpetofauna's abundance and richness at 13 common sampling locations along Northern Groundwater System are compared for Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys, which include E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12 and MH1. Among the 13 common sampling locations, four were in the Gravel Plains habitat, three in Dry Streambeds, two each in Sandy Plains/Sand Dunes and Clayey Plains, and one each in the Mountains/Hills and Agricultural Areas/Date Palms habitat.

A total of 23 specimens of nine species were observed in the Post-Monsoon 2022 Survey from the Northern Groundwater System, whereas, in Previous Post-Monsoon Surveys, a total of 44 specimens belonging to 14 species were observed. This shows a significant change in the overall abundance and diversity of the herpetofauna species in Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys. This change can be attributed to the anthropogenic activities disrupting the habitat for the herpetofauna species.

Average Diversity and Density in the Overall Survey: The average diversity (diversity per sampling location for each survey) (0.7) and density (1.8) of herpetofauna species observed in the Post-Monsoon 2022 Survey was lower compared to the average diversity (0.9) and density (3.4) in the Previous Post-Monsoon Surveys. The dry conditions due to the lack of rain have affected the fauna along the Northern Groundwater System.

Average Diversity by Habitat: In the Previous Post-Monsoon Surveys, the highest diversity was observed in Clayey Plains (3.0), followed by Dry Streambeds (1.5); however, in the Post-Monsoon 2022 Survey, the highest average diversity was observed in Sandy Plains/Sand Dunes (3.0) followed by Agricultural Areas/Date Palms (1.0). No specimen was observed in the Mountains/Hills habitat in any of these surveys.

Average Density by Habitat: The highest average density for herpetofauna in the Previous Post-Monsoon Surveys was observed in Dry Streambeds (6.8), followed by Clayey Plains (4.0), and Gravel Plains (1.3), however during the Post-Monsoon 2022 Survey, the highest average density was observed in Sandy Plains/Sand Dunes (6.0) followed by Gravel Plains (1.8), Agricultural Areas/Date Palms (1.0), Clayey Plains (1.0) and Dry Streambeds (0.3). No specimens were observed in Mountains/Hills during either the Previous Post-Monsoon Surveys or the Post-Monsoon 2022 Survey.

Exhibit G.29 provides a comparison of the average diversity and average density of herpetofauna observed along the Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit D.30 provides a comparison of herpetofauna species abundance observed along the Northern Groundwater System in Previous Post-Monsoon Surveys and the Post-Monsoon 2022 Survey.

Exhibit G.31 provides a comparison of herpetofauna species richness observed along the Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.29: Comparison of Average Diversity and Density of Herpetofauna Species Observed along Northern Groundwater System in Previous Post-Monsoon and Post-Monsoon 2022 Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Agricultural Areas/ Date Palms	0.0	1.0	0.0	1.0
Dry Streambeds	1.5	0.3	6.8	0.3
Clayey Plains	3.0	0.5	4.0	1.0
Dry Streambeds	1.5	0.3	6.8	0.3
Gravel Plains	0.8	0.5	1.3	1.9
Mountains/Hills	0.0	0.0	0.0	0.0
Sandy Plains/Sand Dunes	0.5	3.0	4.0	6.0

Exhibit G.30 Comparison of Herpetofauna Abundance Observed along Northern Groundwater System in Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

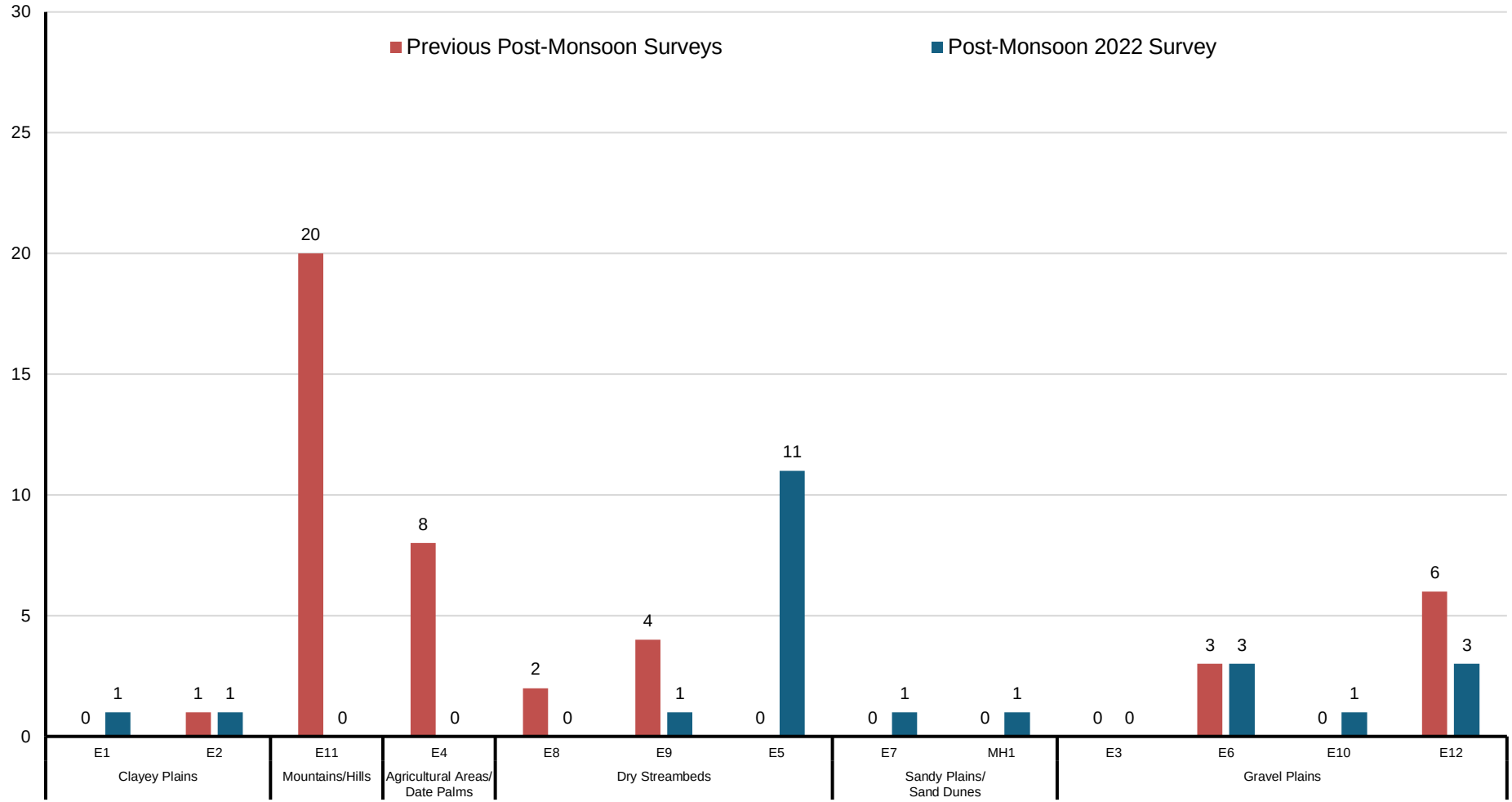
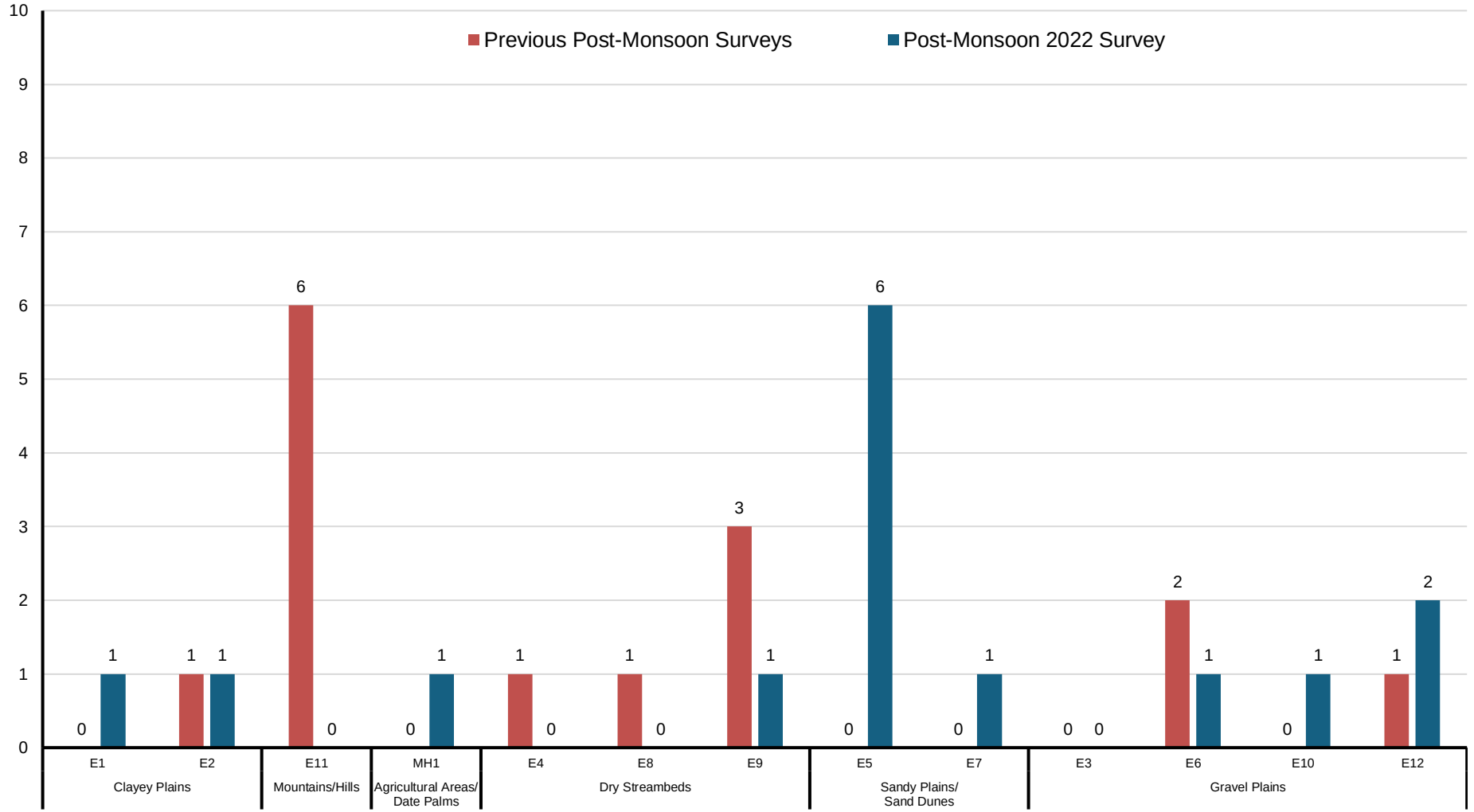


Exhibit G.31: Comparison of Herpetofauna Species Richness Observed along Northern Groundwater System in Previous Post-Monsoon and Post-Monsoon 2022 Surveys



G.4.3 Access Route to Reko Diq Mine Site

The compassion of abundance and diversity of herpetofauna species between the Post-Monsoon 2022 Survey, November 2008 Survey, September 2009 and August 2020 Survey (referred to as the Previous Post-Monsoon Surveys) along the Access Route to Reko Diq Mine Site, which is discussed here.

The herpetofauna's abundance and richness at eight common sampling locations along Access Route to Reko Diq Mine Site are compared for the Post-Monsoon 2022 Survey and Previous Post-Monsoon Surveys which includes E41, E42, E43, E44, E45, E46, E47, and E48. Among these common sampling locations, four were in the Gravel Plains habitat, three in Dry Streambeds, two each in Sandy Plains/Sand Dunes and Clayey Plains, and one in the Mountains/Hills habitat.

A total of five specimens of three species were observed in Post-Monsoon 2022 Survey as compared to 10 specimens of five species in the Previous Post-Monsoon Surveys from the eight common sampling locations along the Access Route to Reko Diq Mine Site. The abundance and richness of herpetofauna species is lower in Post-Monsoon 2022 Survey as compared to Previous Post-Monsoon Surveys.

Average Diversity and Density in the Overall Survey: Average diversity (diversity per sampling location for each survey) and density of 0.4 and 0.6 were recorded in the Post-Monsoon 2022 Survey along the Access Route to the Reko Diq Mine Site whereas, in the Previous Post-Monsoon Surveys, it was recorded as 0.6 and 0.4 respectively. This shows that the diversity of herpetofauna species is lower in the Post-Monsoon 2022 Survey in comparison with Previous Post-Monsoon Surveys, however, the density is comparatively higher than in Previous Post-Monsoon Surveys. A slight decline in the herpetofauna abundance and diversity was observed in the Post-Monsoon 2022 Survey compared to the Previous Post-Monsoon Surveys.

Average Diversity by Habitat: Among different habitat types, the highest average diversity in the Post-Monsoon 2022 Survey was recorded in Dry Streambeds (0.7) followed by Gravel Plains (0.5), and no specimen was observed in Mountains/Hills, whereas, in the Previous Post-Monsoon Surveys, this distribution pattern was slightly different i.e., the highest diversity at Mountains/Hills (3.0) followed by Gravel Plains (0.8) and Dry Streambeds (0.3).

Average Density by Habitat: During the Post-Monsoon 2022 Survey, the highest average density was recorded in Dry Streambeds (1.0) followed by Gravel Plains (0.5), whereas, during the Previous Post-Monsoon Surveys, this pattern was recorded as the highest density in Mountains/Hills (4.0) followed by Gravel Plains (1.3), and Dry Streambeds (0.3). No sighting of herpetofauna in Mountains/Hills was recorded during the Post-Monsoon 2022 Survey.

Exhibit G.32 provides a comparison of the average diversity and density of herpetofauna species observed during the Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey along the Access Route to the Reko Diq Mine Site.

Exhibit G.33 provides the graph for comparisons of herpetofauna abundance observed by sampling locations along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.34 provides the graph for comparisons of herpetofauna species richness observed by sampling locations along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey.

Exhibit G.32: Comparison of Average Diversity and Density of Herpetofauna Species Observed along the Access Route to the Reko Diq Mine Site in Previous Post-Monsoon and Post-Monsoon 2022 Surveys

Habitat	*Average Diversity*		*Average Density*	
	Previous Post-Monsoon Surveys	*Post-Monsoon 2022 Survey*	*Previous Post-Monsoon Surveys*	*Post-Monsoon 2022 Survey*
Dry Streambeds	0.3	0.7	0.3	1.0
Gravel Plains	0.8	0.5	1.3	0.5
Mountains/Hills	3.0	0.0	4.0	0.0

Exhibit G.33: Comparison of Herpetofauna Abundance by Sampling Location Observed along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey

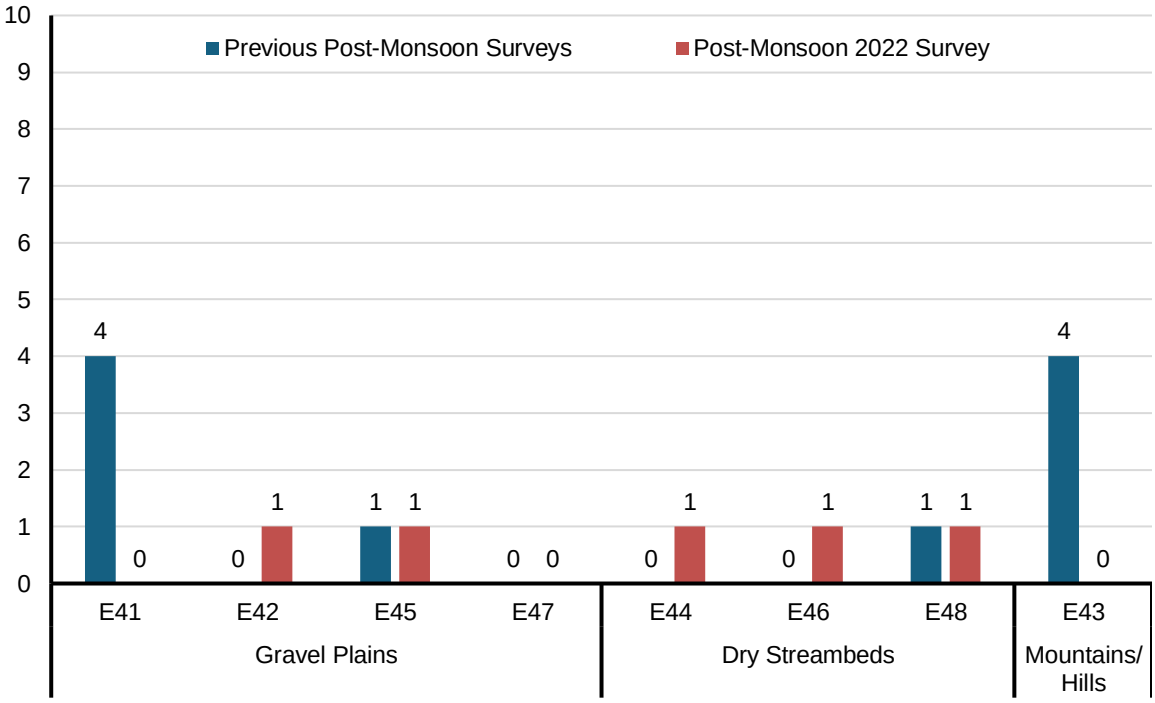
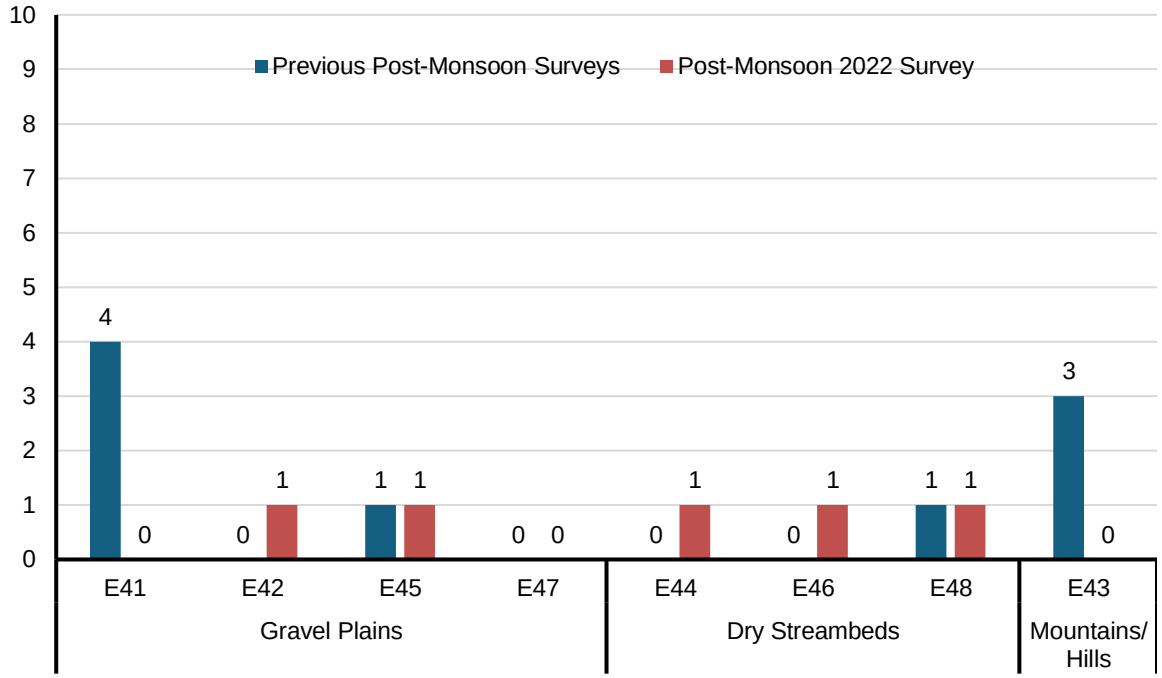


Exhibit G.34: Comparison of Herpetofauna Species Richness by Sampling Location Observed along the Access Route to the Reko Diq Mine Site for Previous Post-Monsoon Surveys and Post-Monsoon 2022 Survey



G.5 Invertebrates

No sampling was conducted at the Reko Diq Mine Site and Associated Infrastructure in the Previous Post-Monsoon Surveys. Therefore, no comparison is provided for invertebrates.

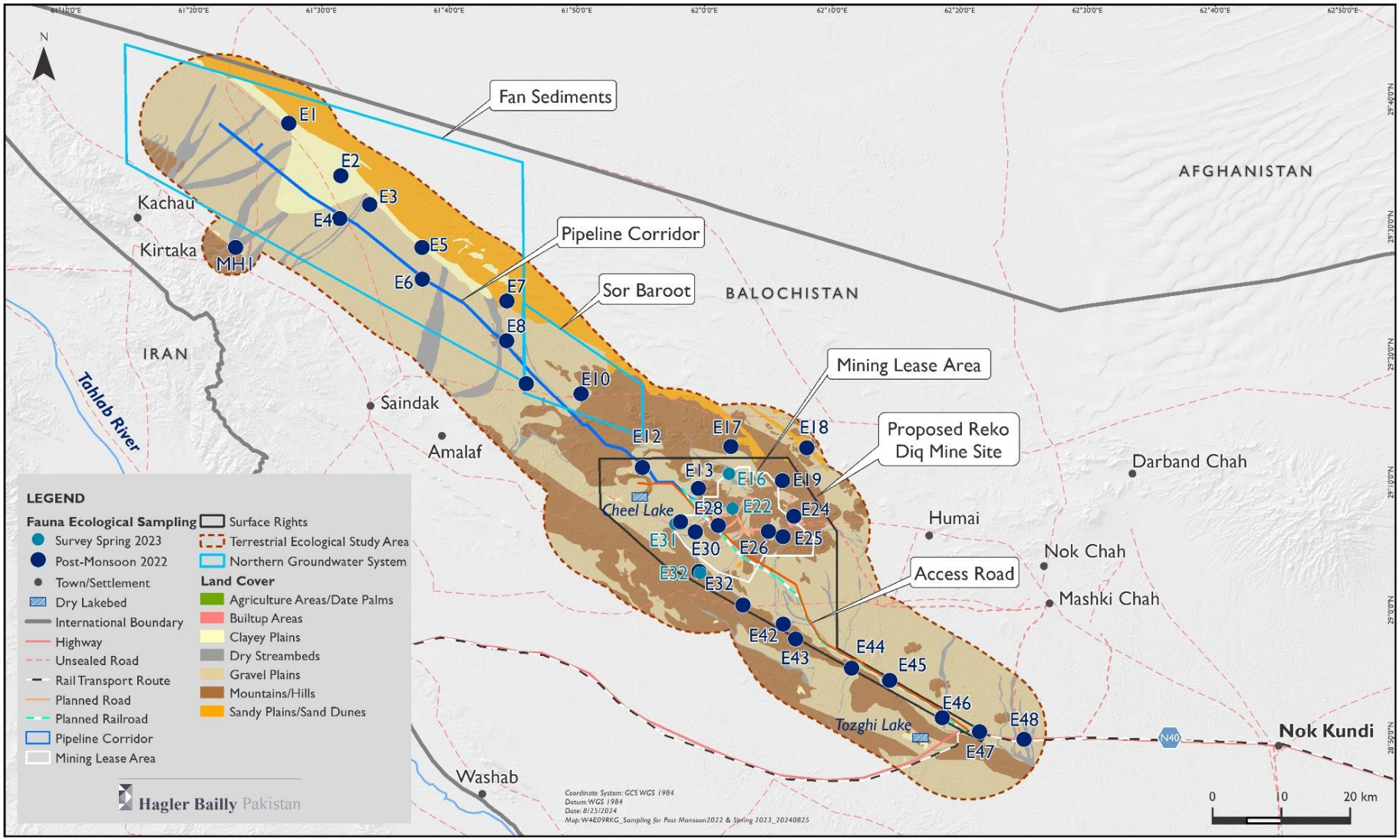
Appendix H: Results and Comparison of Spring 2023 Survey with Previous Spring Survey

This appendix presents the comparisons of the results of the Spring 2023 Survey with the Previous Spring Survey conducted in May 2008 for terrestrial fauna.

The results of the Spring 2023 Survey (conducted in April-May 2023) for common sampling locations are compared with the Previous Spring Survey which was carried out in similar season i.e., May 2008. The weather conditions were almost comparable with the current survey season, therefore, the results for common sampling locations using common sampling method were used for the comparison of these surveys. The comparison is made for only four common sampling locations (E16, E22, E31, and E32) at the proposed Reko Diq Mine Site. Among the four common sampling locations, three were in Gravel Plains and one in Mountains/Hills. No sampling was conducted along the Northern Groundwater System and Access Route to the Reko Diq Mine Site in the Previous Spring Survey, so the comparison is not provided for these two Project Infrastructures. The comparison is based on the line transect sampling method for birds, mammals, and herpetofauna.

Exhibit H.1 provides a map of common sampling locations.

Exhibit H.1: Common Sampling Locations Sampled in Previous Spring Survey and Spring 2023 Survey



H.1 Avifauna

H.1.1 Reko Diq Mine Site

Overall, four bird species have been observed at the Reko Diq Mine Site and all of these were birds in the Previous Spring Survey. A total of 10 bird specimens belonging to four species were observed in the Previous Spring Survey, whereas no specimen of any bird species was observed in the Spring 2023 Survey from common sampling locations. This shows that both bird abundance and species richness were higher in the Previous Spring Survey at the common sampling locations. This decline in bird abundance and diversity can be attributed to the prolonged drought and dry season, due to which there was a shortage of food and other conducive conditions for birds. Higher bird activity was only observed at campsites (Project camp and security forces camps) where they find food and to some extent, shelter for survival.

Exhibit H.2 provides a comparison of avifauna species observed in the Previous Spring Survey and the Spring 2023 Survey.

Exhibit H.2: Avifauna Species Observed in Previous Spring Survey and Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Previous Spring Survey*	*Spring 2023 Survey*
1	*Ammomanes deserti*	Desert Lark	✓	-
2	*Emberiza sahari*	House Bunting	✓	-
3	*Oenanthe deserti*	Desert Wheatear	✓	-
4	*Passer domesticus*	House Sparrow	✓	-

Average Diversity and Density in the Overall Survey: The average diversity and density of bird species observed in the Previous Spring Survey were 1.0 and 3.0, respectively, while no specimen of bird species was observed in the Spring 2023 Survey from the common sampling locations.

Average Diversity by Habitat: In the Previous Spring Survey, the highest average diversity was observed in Gravel Plains (1.3), followed by Mountains/Hills (1.0).

Average Density by Habitat: In the Previous Spring Survey, the highest density was observed in Gravel Plains (3.3), followed by Mountains/Hills (2.0).

Exhibit H.3 provides a comparison of the average diversity and density of bird species observed at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.4 provides a comparison of species abundance for common sampling locations at Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.5 provides a comparison of species richness for common sampling locations at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.3: Comparison of Average Diversity and Density of Birds by Habitat Type at the Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey

Habitat	*Average Diversity*		*Average Density*	
	Previous Spring Survey	*Spring 2023 Survey*	*Previous Spring Survey*	*Spring 2023 Survey*
Gravel Plains	1.3	0.0	3.3	0.0
Mountains/Hills	1.0	0.0	2.0	0.0

Exhibit H.4: Comparison of Bird's Abundance by Sampling Location at the Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey

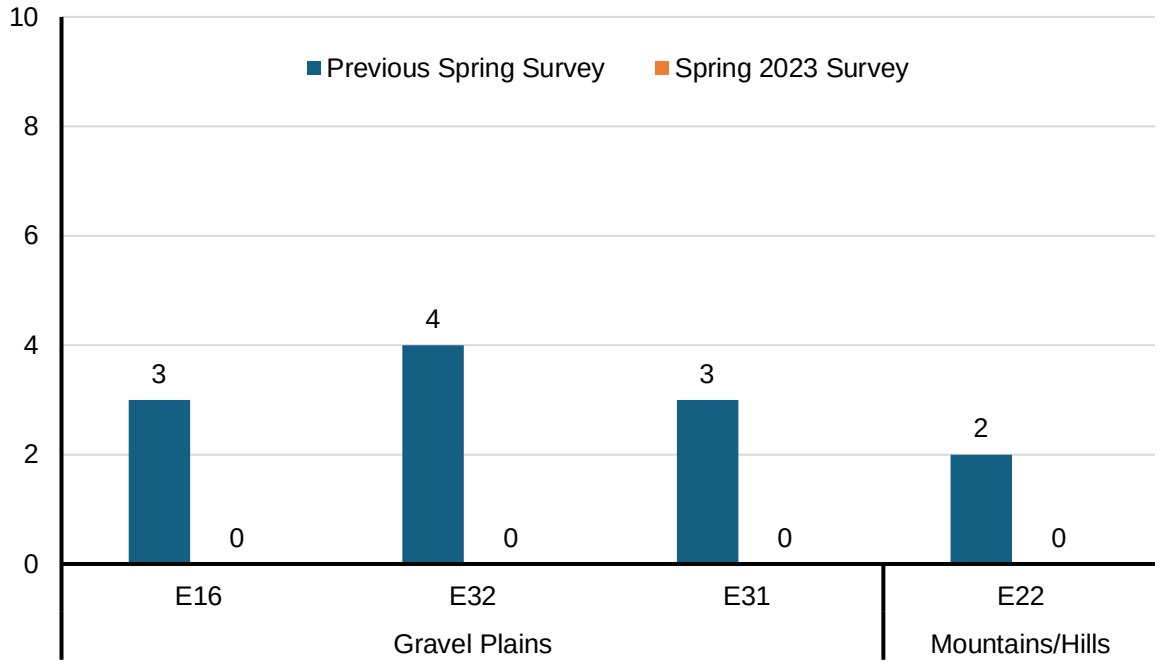
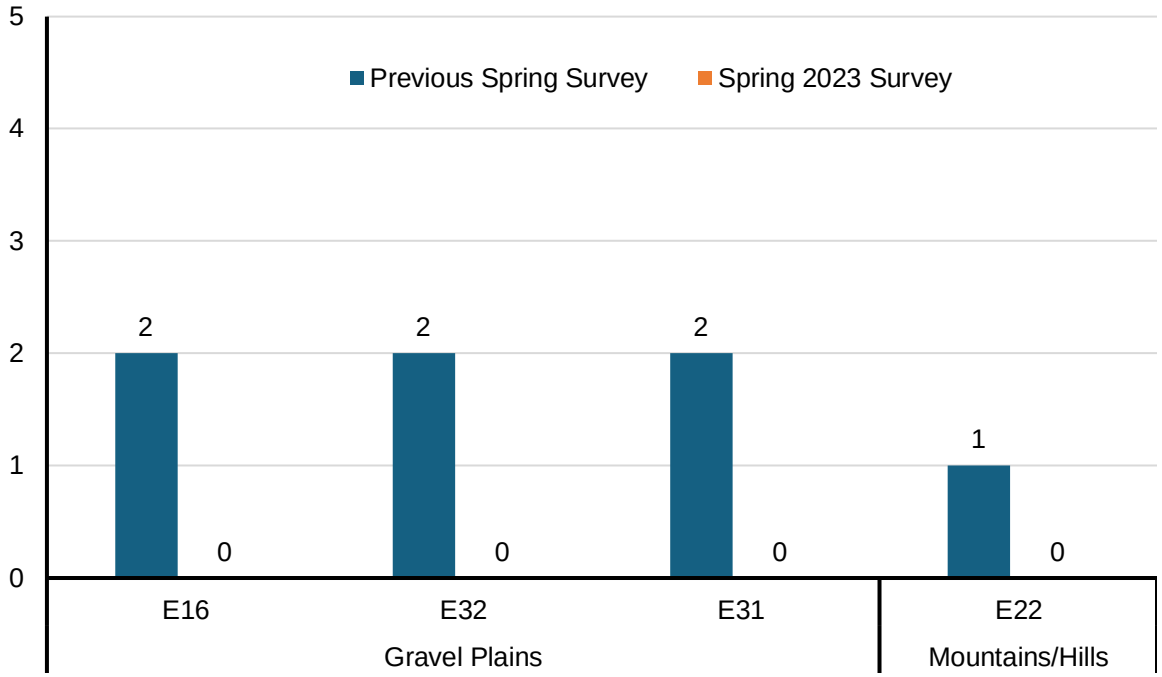


Exhibit H.5: Comparison of Bird's Richness by Sampling Location at the Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey



H.1.2 Northern Groundwater System

No sampling was conducted along the Northern Groundwater System in the Previous Spring Survey. Therefore, no comparison is provided.

H.1.3 Access Route to Reko Diq Mine Site

No sampling was conducted along the Access Route to the Reko Diq Mine Site in the Previous Spring Survey. Therefore, no comparison is provided.

H.2 Mammals

H.2.1 Reko Diq Mine Site

Overall, three mammalian species have been observed at the Reko Diq Mine Site. Of these, two species were observed in the Previous Spring Survey, and only one species was observed in the Spring 2023 Survey. The mammalian species observed at Reko Diq Mine in the Previous Spring Survey, including Asiatic Jackal and Ruppel's Fox. However, in the Spring 2023 Survey, only one species i.e., Cape Hare (*Lepus capensis)* was observed.

Exhibit H.6 provides a comparison of mammalian species observed in the Previous Spring Survey and Spring 2023 Survey.

Exhibit H.6: Mammalian Species Observed in Previous Spring Survey and Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Previous Spring Survey*	*Spring 2023 Survey*
1	*Canis aureus*	Asiatic Jackal	✓	-
2	*Vulpes rueppellii*	Ruppple's Fox	✓	-
3	*Lepus capensis*	Cape Hare	-	✓

Average Diversity and Density in the Overall Survey: The average diversity of mammalian species observed in the Spring 2023 Survey was 0.3 compared to 0.5 observed in the Previous Spring Survey. Similarly, the average density observed in the Spring 2023 Survey was 0.2 compared to 0.7 in the Previous Spring Survey. This comparison shows that the diversity and density of mammalian species in the Previous Spring Survey were higher than in the Spring 2023 Survey.

Average Diversity by Habitat: The highest average mammalian diversity was observed in Mountains/Hills (1.0), and no species was observed in Gravel Plains in the Spring 2023 Survey. At the same time, the highest mammal diversity in the Previous Spring Survey was observed in Mountains/Hills (1.0), followed by Gravel Plains (0.3).

Average Density by Habitat: The highest mammalian density in the Spring 2023 Survey was observed in Mountains/Hills (1.0), and no specimen of any species was observed in Gravel Plains. Whereas, the highest mammalian density in the Previous Spring Survey was observed in Mountains/Hills (2.0), followed by Gravel Plains (0.3).

The decrease in mammal diversity and density in the Spring 2023 Survey is likely due to a decline in plant cover, as noted in the vegetation survey. Plant cover is essential for providing food and shelter to a variety of mammal species within the Ecological Study Area.

Exhibit H.7 provides a comparison of the average diversity and density of mammalian species by habitat type observed at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.8 provides a comparison of species abundance for common sampling locations at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.9 provides a comparison of species richness for common sampling locations at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.7: Comparison of Average Diversity and Average Density by Habitat Type at Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey

Habitat	*Average Diversity*		*Average Density*	
	Previous Spring Survey	*Spring 2023 Survey*	*Previous Spring Survey*	*Spring 2023 Survey*
Gravel Plains	0.3	0.0	0.3	0.0
Mountains/Hills	1.0	1.0	2.0	1.0

Exhibit H.8: Comparison of Mammals Abundance by Sampling Location at Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey

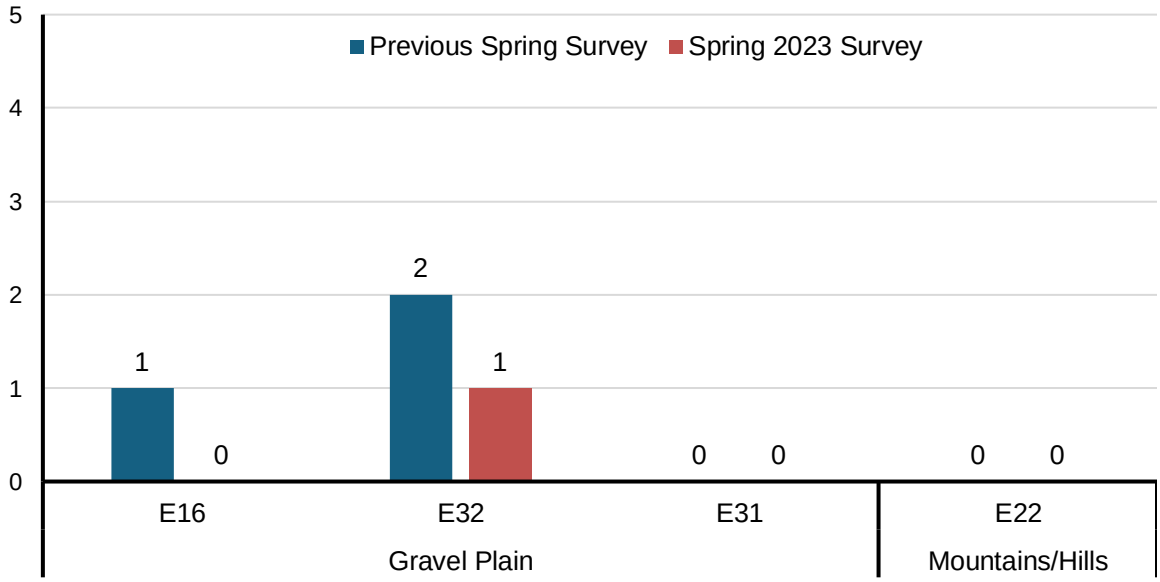
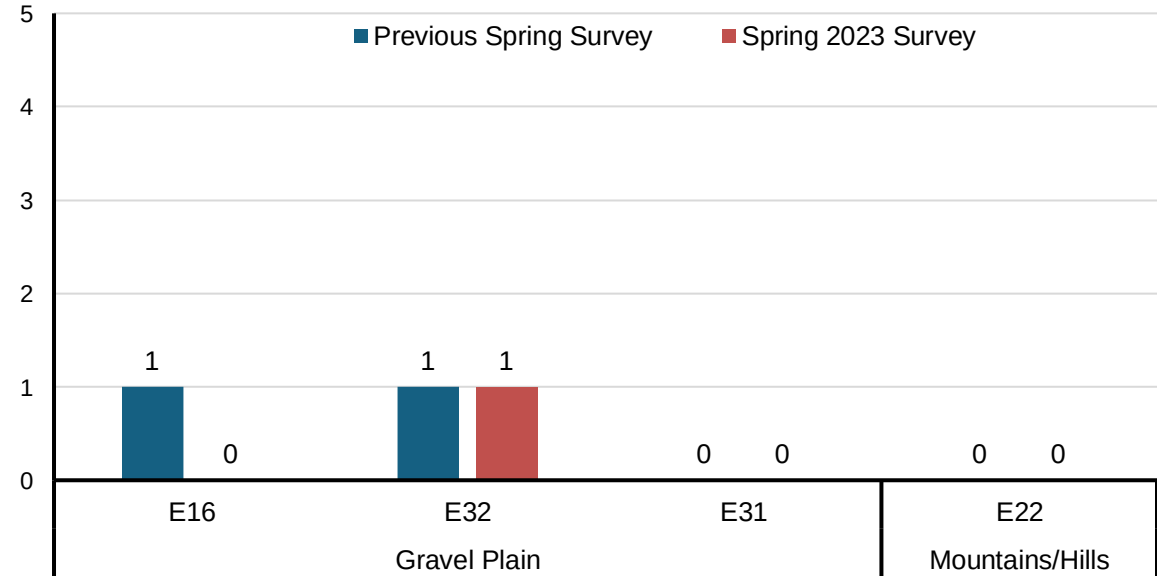


Exhibit H.9: Comparison of Mammals Richness by Sampling Location at Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey



H.2.2 Northern Groundwater System

No sampling was conducted along the Northern Groundwater System in the Previous Spring Survey. Therefore, no comparison is provided.

H.2.3 Access Route to Reko Diq Mine Site

No sampling was conducted along the Access Route to the Reko Diq Mine Site in the Previous Spring Survey. Therefore, no comparison is provided.

H.3 Small Mammals

H.3.1 Reko Diq Mine Site

No sampling was conducted at the Reko Diq Mine Site in the Previous Spring Survey. Therefore, no comparison is provided.

H.3.2 Northern Groundwater System

No sampling was conducted along the Northern Groundwater System in the Previous Spring Survey. Therefore, no comparison is provided.

H.3.3 Access Route to Reko Diq Mine Site

No sampling was conducted along the Access Route to the Reko Diq Mine Site in the Previous Spring Survey. Therefore, no comparison is provided.

H.4 Herpetofauna

H.4.1 Reko Diq Mine Site

Overall, three herpetofauna species have been observed at the Reko Diq Mine Site. Of these, two species were observed in the Previous Spring Survey, and only one species was observed in the Spring 2023 Survey. The herpetofauna species observed at Reko Diq Mine in the Previous Spring Survey include Fringe-fingered Lizard (*Acanthodactylus micropholis)* and Indian Fringe-toed Lizard (*Acanthodactylus cantoris)*. However, in the Spring 2023 Survey, only one species i.e., Clark's Toad-headed Agama (*Phrynocephalus clarkorum)* was observed. A decline in both the diversity and abundance of the herpetofauna was observed in the Spring 2023 Survey compared to the Previous Spring Survey.

Exhibit H.10 provides a comparison of herpetofauna species observed in the Previous Spring Survey and Spring 2023 Survey.

Exhibit H.10: Herpetofauna Species Observed in Previous Spring Survey and Spring 2023 Survey

No.	*Scientific Name*	*Common Name*	*Previous Spring Survey*	*Spring 2023 Survey*
1	*Acanthodactylus micropholis*	Fringe-fingered Lizard	✓	-
2	*Acanthodactylus cantoris*	Indian Fringe-toed Lizard	✓	-
3	*Phrynocephalus clarkorum*	Clark's Toad-headed Agama	-	✓

Average Diversity and Density in the Overall Survey: The average diversity of herpetofauna species observed in the Spring 2023 Survey was 0.2 compared to 0.5 observed in the Previous Spring Survey. Similarly, the average density observed in the Spring 2023 Survey was 0.2 compared to 1.5 observed in the Previous Spring Survey. This comparison shows that the diversity and density of herpetofauna species in the Previous Spring Survey were higher when compared to the Spring 2023 Survey. Lower density during the Spring 2023 Survey can be attributed to a long drought period, which affected the overall fauna of the Terrestrial Ecological Study Area.

Average Diversity by Habitat: The highest diversity was recorded in Mountains/Hills (1.0), and no specimen of herpetofauna was observed in Gravel Plains in the Spring 2023 Survey. Whereas the highest average diversity was recorded in Gravel Plains (0.7), and no specimen of herpetofauna was observed in Mountains/Hills in the Previous Spring Survey.

Average Density by Habitat: The highest average density was recorded in Mountains/Hills (1.0), and no specimen of herpetofauna was observed in Gravel Plains in the Spring 2023 Survey. Whereas the highest average density was recorded in Gravel Plains (2.0) and in Mountains/Hills, no specimen of herpetofauna was observed in the Previous Spring Survey. This shows that the density of herpetofauna species is lower in the Gravel Plains habitat in the Spring 2023 Survey as compared to the Previous Spring Survey and vice versa for the Mountains/Hills habitat. This decline in herpetofauna abundance can be attributed to a decrease in plant cover over a decade, as evident in the comparison of plant data between the Spring 2023 and the Previous Spring Survey.

Exhibit H.11 provides the average diversity and density of herpetofauna species observed at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.12 provides a comparison of species abundance for common sampling locations at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

Exhibit H.13 provides a comparison of species richness for common sampling locations at the Reko Diq Mine Site in the Spring 2023 Survey and the Previous Spring Survey.

H.4.2 Northern Groundwater System

No sampling was conducted along the Northern Groundwater System in the Previous Spring Survey. Therefore, no comparison is provided.

H.4.3 Access Route to Reko Diq Mine Site

No sampling was conducted along the Access Route to the Reko Diq Mine Site in the Previous Spring Survey. Therefore, no comparison is provided.

H.5 Invertebrates

No sampling was conducted at the Reko Diq Mine Site and Associated Infrastructure in the Previous Spring Survey for invertebrates, therefore, no comparison is provided.

Exhibit H.11: Comparison of Average Diversity and Density of Herpetofauna by Habitat at Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey

Habitat	*Average Diversity*		*Average Density*	
	Previous Spring Survey	*Spring 2023 Survey*	*Previous Spring Survey*	*Spring 2023 Survey*
Gravel Plains	0.7	0.0	2.0	0.0
Mountains/Hills	0.0	1.0	0.0	1.0

Exhibit H.12: Comparison of Species Abundance by Sampling Location at Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey

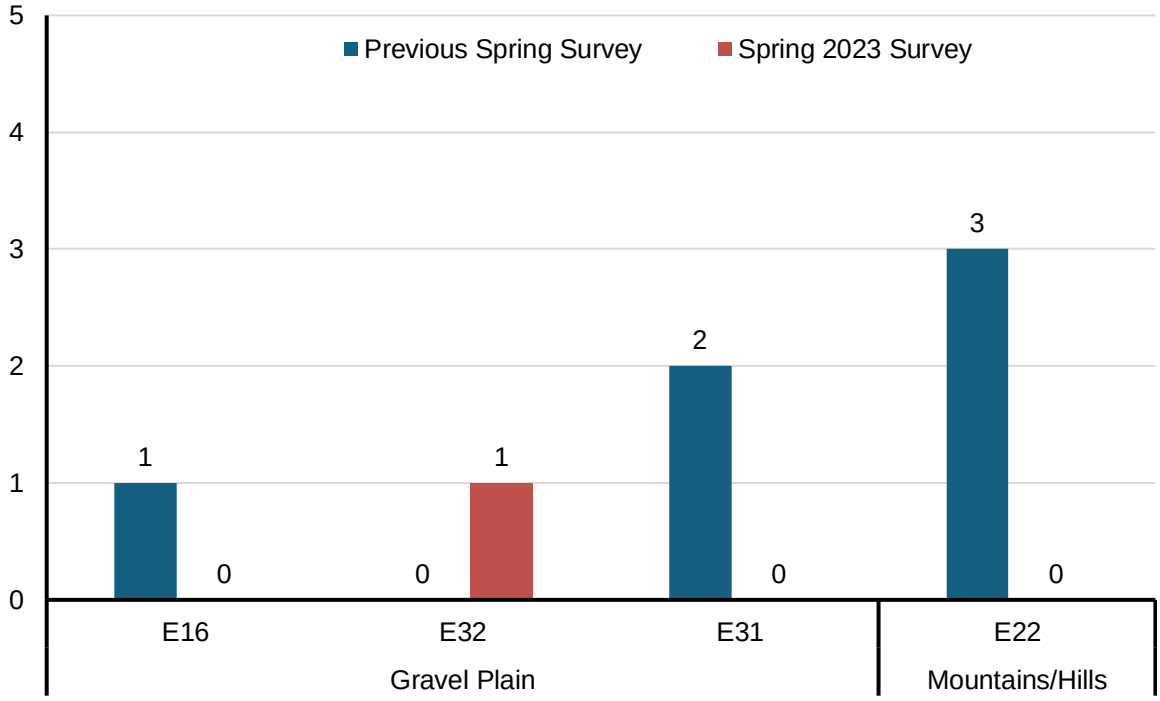


Exhibit H.13: Comparison of Species Richness by Sampling Location at Reko Diq Mine Site in Spring 2023 Survey and Previous Spring Survey