Environmental and Social Management Framework (ESMF)

Draft

Pakistan Hydro-Meteorological and DRM Services Project

Pakistan Meteorological Department

National Disaster Management Authority

Executive Summary

Background

Climate change is expected to have an adverse impact on Pakistan, as it ranks 7th on the climate risk index. It continues to be one of the most flood-prone countries in the South Asia Region (SAR); suffering US$18 billion in losses between 2005 and 2014 (US$10.5 billion from the 2010 floods alone), equivalent to around 6% of the federal budget. Hydromet hazards have been coupled with rapid population growth and uncontrolled urbanization, leading to a disproportionate and growing impact on the poor.

To build on recent development gains, increase economic productivity, and improve climate resilience, it will be critical to improve the quality and accessibility of weather, water, and climate information services. Climate-resilient development requires stronger institutions and a higher level of observation, forecasting, and service delivery capacity; these could make a significant contribution to safety, security, and economic well-being. The Pakistan Hydro-Meteorological and DRM Services Project (PHDSP) expects to improve hydro-meteorological information and services, strengthen forecasting and early warning systems, and improve dissemination of meteorological and hydrological forecasts, warnings and advisory information to stakeholders and end-users and strengthen the existing disaster risk management (DRM) capacity and services of the National Disaster Management Authority (NDMA).

Project Description

The project has three main components and will be implemented over a period of five years.

Component 1: Hydro-Meteorological and Climate Services

The objective of this component is to improve the capability and thereby performance of the PMD to understand and make use of meteorological and hydrological information for decision making. This objective will be achieved, in line with international best practices, through investment in strengthening institutional setup and building capacity of human resources at the PMD. The Concept of Operations (CONOPS) is an important tool for PMD which will provide a conceptual overview of the proposed system and sub-systems.

Component 2: Disaster Risk Management

This project component will support implementation of the priorities identified in the National Disaster Management Plan, NDMP Road-Map 2016-2030 and the Sendai Framework for Disaster Risk Reduction. Under this component, capacity enhancement of NDMA will be prioritized. NDMA will be responsible for implementation of the project and coordination with the key stakeholders, for project initiation and implementation of activities. Key stakeholder will be involved from the initial phase. The main activities of this component will focus on strengthening capacity of NDMA through increased emergency response capacity, construction of DM complex that will house offices, NEOC, NIDM and the NDRF, reviewing the existing DRM system in the country and conducting hazard assessments in priority district.

Component 3: Contingency Emergency Response Component

This component will support preparedness and rapid response to a natural disaster, emergency, and/or catastrophic event as needed. The provisional zero cost for this component will allow for rapid reallocation of credit proceeds from other components under streamlined procurement and disbursement procedures. Following an adverse natural event that causes a

major natural disaster, the Government of Pakistan may request the Bank to re-allocate project funds to this component to support response and reconstruction. This component could also be used to channel additional funds should they become available as a result of the emergency.

Need for the Environmental and Social Management Framework (ESMF)

In line with the environmental legislation of Pakistan as well as World Bank (WB) Operational Policies, an Environmental and Social Management Framework (ESMF) for the project has been prepared. This ESMF assesses environmental and social impacts related to the physical interventions to expand facilities at PMD offices, build NDMA Headquarters, and install Automatic Weather Stations (AWS) across Pakistan. The ESMF outlines an Environmental and Social Management and Monitoring Plan (ESMMP) as well as a Resettlement Policy Framework (RPF) to address any adverse potential impacts as a result of this Project. The ESMF includes institutional arrangements required to implement environmental and social aspects and presents monitoring requirements for effective implementation of mitigation measures; describes training needs and specific reporting and documentation requirements; and proposes a third-party validation mechanism. The national regulatory laws and World Bank Operational Policies applicable to this project are detailed in this ESMF.

Assessment of Environmental and Social Baseline

Physical Location and Land Use

The project will be implemented in Islamabad Capital Territory, and Punjab, Sindh, Balochistan and KPK provinces of Pakistan. The project infrastructure development includes the establishment of a Monsoon Monitoring Center (MMC) in Islamabad as well as upgradation of PMD facilities in Lahore by constructing a Weather Surveillance Radar (WSR). 5 Regional Flood Forecasting Centers (RFFC) will also be established, as well as a Disaster Management Complex including construction of NDMA headquarters that will host National Institute of Disaster Management (NIDM), National Emergency Operations Center (NEOC) and NDRF Facility. The exact locations of these facilities as well locations of additional infrastructure development related to the installations of Automatic Weather Stations (AWS) and SWR will be finalized in the second phase of the project.

The MMC and WSR in Islamabad and Lahore will be built within the premises of the Pakistan Meteorological Department (PMD) office complexes. Environmental and Social Management Plans (ESMPs) for these have been prepared by PMD. ESMPs for the other sub-projects will be prepared when locations have been identified.

Surface and Ground Water Hydrology

Pakistan can be divided into three main units in terms of hydrology, Indus Basin, closed basin of Kharan desert and the Makran coastal basin. Groundwater availability is limited in Pakistan and poses a severe problem for water supply. Worst affected are the most arid regions of Balochistan and the southeast of Pakistan.

Natural Hazard Vulnerability

National Seismic Monitoring Centre of Pakistan issued the seismic zone map for Pakistan. Parts of KPK Province, Federally Administered Areas, Balochistan and Sindh fall in Zones 3 and 4 which indicate moderate to severe damage to infrastructure and topography from earthquakes.[1]

[1] National Seismic Monitoring Center, Pakistan Meteorological Department (PMD)

The entire country is prone to floods, particularly along the Indus River Basin, with major flooding experienced in 2010 and 2015. Sub-projects may be installed in areas that are prone to flooding.

Ecological Environment

Pakistan has a rich natural heritage of biodiversity due to diverse physiography, soil types, and climate. Terrestrial biomes of Pakistan range from deserts in the south to the mountain ranges of the Himalayas, Karakorum, and Hindu Kush in the north and west. Pakistan can be divided in to eleven ecological zones and nine main agro-ecological zones according to distribution of flora and fauna. More than 6,000 flowering species have been recorded in Flora of Pakistan, of which 465 are thought to be endemic and 50 species are on the verge of extinction.[2] There are 174 species of mammals, 668 species of birds, 177 species of reptiles, 22 amphibians, 198 freshwater fish species, 788 marine fist species found in Pakistan. [3] There are six endemic mammal species in Pakistan. Among them two — the little known woolly flying squirrel (*Eupetaurus cinereus*), found in the northern mountain areas, and the Indus dolphin — are endangered. In birds, two species of pheasants, the western tragopan (*Tragopan melanocephalus*), and the cheer pheasant (*Catreus wallichii*), together with the great Indian bustard (*Ardeostis nigriceps*) are listed as endangered. Of the 177 species of reptiles recorded in Pakistan, 18 are endemic. The IUCN Red List of threatened species lists 45 species of internationally threatened animals occurring in Pakistan. Of these, 4 are critically endangered, twelve are endangered and twenty nine vulnerable. Out of these 45 species, 18 are mammals, 17 birds 9 reptiles, and one fish.[4]

Pakistan has a total of 334 Protected Areas which include 28 National Parks, 102 Game Reserves and 99 Wildlife Sanctuaries, with the remaining falling into other categories such as Wildlife Parks and Wildlife Refuges and unclassified.

The Land Use Atlas of Pakistan puts the official estimates of forest cover in Pakistan at 5.4%.[5] The forests of Pakistan are grouped into five physiognomic classes, conifers (40%), scrub (28%), riverine (7%), mangroves (8%), and plantations (11%).[6]

Socioeconomic Profile

According to 2017 population census reports, the total population of Pakistan is approximately 207 million, with the province of Punjab having the highest population with 110 million, followed by Sindh 48 million, Khyber Pakhtunkhwa 30 million and Balochistan 12 million. Pakistan has one of the lowest literacy rates in the world, and stands 160th among world nations. Overall 55% population including 69% male and 45% female is literate. Agriculture is the main source of income and employment in Pakistan with 42% of the population working in the agriculture, fisheries and forestry sectors. This is followed by 35% employment in services (including government) and 22% in industry and associated jobs.

In Pakistan, the only recognized Indigenous Peoples are the Kailasha, residing in the valleys of Bamburet, Birir and Rambur)of the Ayun Union Council of Chitral district of the province of Khyber Pakhtunkhwa. The Project is anticipated to install an Automatic Weather Station (AWS) at Chitral Aiport, which is at a distance of 30-40km via jeepable road from the valleys of the Kailasha. Hence no impacts are anticipated on the Indigenous People of Kailasha.

[2] Flora of Pakistan; Missouri Botanical Garden and Karachi University
[3] Biodiversity in Pakistan: Key issues, 2011
[4] www.iucnredlist.org
[5] Government of Pakistan, 2009. Land use Atlas of Pakistan.
[6] Forestry Sector Master Plan (FSMP) Estimates of Land Use Based on Satellite Imagery Interpretation database

Stakeholder Consultations

Consultations were carried out at the national level with the Pakistan Meteorological Department. The general feedback from the stakeholders is positive, expressing support for the project. The ESMF also proposes a strategy for keeping the stakeholders' informed and receiving their feedback at various stages of the project through public consultations at the design, construction and operations stage. This will improve the acceptability of the Project by the local community and also ensure their participation in the process of project development. Site specific community level consultations will be carried out during the development of ESMPs for each sub-project.

Impacts Assessment and Mitigation

A detailed assessment has been carried out for potential impacts associated with the project, including those with environmental and social dimensions. The assessment has been done for design, construction and operation phase, and accordingly mitigation measures have been proposed. A detailed Environmental Management and Monitoring Plan (ESMMP) has been proposed which suggests mitigation measures, monitoring parameters and responsibilities.

Impacts associated with biodiversity, air quality, soil, solid waste, electromagnetic fields, labor health and safety, resource use and land acquisition were assessed for design, construction and operations phase. The impacts were found to be moderate to low in nature for Sub-Component 1.2 and Sub-Component 2.2. For these components, most of the impacts are expected during construction phase of the sub-projects. The anticipated impacts are mostly temporary, localized, and reversible in nature, and with the help of appropriate mitigation measures, these potential impacts can be adequately addressed.

The major potential adverse impacts associated with construction to expand PMD facilities and construct the NDMA Headquarters are temporary in nature and related to the soil, noise, air quality, solid waste, increased resource consumption, labor health and safety. Soil erosion and contamination by run-off from construction activities will be avoided through, proper storage of construction materials and proper disposal of contaminated soil. There may also be an impact on air quality from dust and exhaust emissions from soil excavation and movement of heavy vehicles, which will be mitigated by following an Emissions Monitoring Plan. Debris and waste from construction activities may increase the sediment loads into the drainage channels, while accidental leaks/spills of oil/fuel from storage tanks or maintenance vehicles can also pollute surface waters. A Debris Management Plan and proper storage and disposal of construction materials will manage these impacts. Improper waste disposal from the construction site as well as labor camps can lead to various public health concerns including worsened air quality due to waste burning, breeding grounds for vectors, and/or clogging of drains and pollution of subsurface water. A robust solid waste management plan will need to be put in place for construction material as well as for the domestic waste produced by labor camps. Workers' health and safety plan will be prepared for labor, in order to safeguard them from any adverse impacts while handling heavy machinery and toxic material (if any). Construction activities and increased traffic of heavy vehicles may impact public safety of surrounding communities. Proper signage for construction phase, training of construction staff and alternative routes are some of the mitigation measures. Increased consumption of energy and water during construction and operation phase will be managed by including resource efficient building designs and training construction staff on efficient use of water. The MMC and NDMA Headquarters in Islamabad are located in an earthquake prone area. Designs of these facilities will be made according to the Building Codes of Pakistan with Seismic provision and international best practices to avoid damage caused by earthquakes. The Environmental and Social Monitoring and Management Plan (ESMMP)

provides details on implementing mitigation measures, defines responsibilities and establishes monitoring mechanisms to ensure all environmental and social impacts are dealt with efficiently and in a timely manner.

Resettlement Planning Framework

Involuntary Resettlement may occur if private land acquisition is required or encroachments are to be removed for expansion of PMD facilities, construction of the NDMA Headquarters, and for the installation of Automatic Weather Stations (AWS) in various parts of the country (as a priority, these facilities will be constructed/installed on government owned land). To address the impacts of this, a Resettlement Planning Framework (RPF) has been prepared in accordance with the World Bank Operational Policy on Involuntary Resettlement (OP 4.12). The RPF guides the preparation of Resettlement Action Plans (RAP) in case land acquisition or resettlement may occur. RPF includes measures to inform, consult and provide prompt and effective compensation to all Project Affected Persons (PAPs) for losses of assets attributable directly to the project. The RPF includes details of entitlements as applicable for PAPs losing land, structures, other assets and incurring income/livelihood losses and support through the transition period, and development assistance. These affected persons are eligible for rehabilitation subsidies and for the compensation of lost land, structures and utilities along with loss of livelihood. There will also be special provisions for vulnerable displaced persons.

Institutional Arrangements

The implementation of the ESMF will fall under the overall supervision of the Project Directors of the Project Implementation Units (PIU), housed in the PMD and NDMA. The Project Directors will be responsible for the implementation, monitoring and reporting of the ESMMP through the Environment Safeguards Specialist. The Social Safeguards Specialist will ensure implementation of the RPF and any other social safeguards related measures. They will be assisted by Environment and Social Officers for sub-components and Database/MIS Officers. Detailed roles and responsibilities of the project team are provided in the ESMF.

Monitoring and Reporting

A robust system of internal and external monitoring of the ESMMP and RAP will be required throughout the life of the project. In addition to monitoring by the Environment and Social Safeguards Specialists, the Project Coordinator will play a pivotal role in monitoring implementation of the ESMF especially where technical designs and construction related impacts are involved. In addition, Monitoring and Evaluation Officer can also be requested to conduct random monitoring of construction sites in the project areas, both during construction and operation. Reports of these monitoring visits will be submitted to the Environment Specialist in the PIU.

External Monitoring will be used to ensure that both construction and the operation phase activities have been undertaken in line with the ESMF. Third Party Validation (TPV) exercises, conducted through an independent monitoring agency will be carried out on annual basis to evaluate the overall ESMMP compliance and implementation progress, and to ensure that the mitigation measures are implemented as per the mitigation plan. For the RAP (if required for any sub-project), external monitoring will be carried out twice a year, and its results will be communicated to all concerned PAPs, the PIUs and World Bank through semi-annual reports. Bi-Annual will be compiled by the Environment and Social Safeguards Specialists, and shared with the Project Directors and World Bank. These reports will provide progress on implementation of mitigation measures, safeguard monitoring, capacity building, and any other Environmental and Social Management and Monitoring Plan

(ESMMP) implementation activity carried out during the reporting period, and will propose mid-course correction actions. The Social Safeguards Specialist will prepare monthly reports on social aspects and RAP implementation activities and submit to the Project Director. Quarterly/bi-annual progress reports on RAP progress will be shared with the World Bank.

Capacity Development and Trainings

Capacity building and training of the staff associated with ESMF and RAP implementation will be required for effective environmental and social management. Specific trainings on environmental impacts and mitigation will be arranged for the relevant PIU staff to deliver their monitoring responsibilities in an organized and effective manner as per requirement of the monitoring plan. Trainings will also be held for contractors, sub-contractors, architects, supervision consultants and local authorities.

Budget for ESMF Implementation

A budget for implementation of the ESMF has been proposed. This includes human resources, capacity development and training costs over the course of the project, PPE and maintenance, consultants, environmental testing, preparation of additional environmental management instruments, and budget for External Monitoring/Third Party Validations. The total budget for these activities set in the ESMF is **PKR 139 Million** over the course of the project. The budget for resettlement and financing will be calculated when detailed RAPs are prepared in line with this ESMF.

Grievance Redress Mechanism

The Grievance Redress Mechanism spans the entire project implementation and will cater to both directly and indirectly affected population/beneficiaries. The GRM has been designed to address environmental and social problems identified during implementation, it will also cater to manage any disconnects that emerge from the field level and that has significant implications for effective implementation of the sub-project interventions. The Project Implementation Unit (PIU) office will serve as the secretariat for the Grievance Redress Committee (GRC-Project) that will be responsible for providing oversight on the entire GRM process at a strategic level and monitoring of complaints management. The overall objective of the GRM is therefore to provide a robust system of procedures and processes that provides for transparent and rapid resolution of concerns and complaints identified at the local level. The GRM will be accessible to diverse members of the community, including women, senior citizens and other vulnerable groups. Culturally appropriate communication mechanisms will be used at all sub- project sites both to spread awareness regarding the GRM process as well as complaints management.

Disclosure

The ESMF and RPF will be disclosed on the websites of PMD and NDMA, and on the World Bank Info Shop. Hard copies of this ESMF and RPF will also be shared with the Federal and Provincial Environmental Protection Agencies (EPA), project stakeholders, contractors, Civil Society Organizations etc. A copy of the ESMF and RPF will be placed in the Project Implementation Units, PMD and NDMA for public access. The Urdu translation of the Executive Summary of the ESMF will also be distributed to all relevant stakeholders, especially to the communities in the project areas.

خلاصہ

پس منظر

پاکستان میں ماحولیاتی تبدیلیوں کی وجہ سے شدید اثرات متوقع ہیں کیونکہ یہ ماحولیاتی خطرات کے اشارے میں ساتویں نمبر پر ہے۔ یہ اب بھی جنوبی ایشیائی خطے (SAR) میں سب سے زیادہ سیلاب کی زد میں ہونے والے ممالک میں سے ایک ہے جس نے 2005 سے 2014 کے درمیان 18 بلین امریکی ڈالر کا نقصان برداشت کیا (10.5 بلین ڈالر کا نقصان صرف 2010 کے سیلاب کے باعث ہوا) جو وفاقی بجٹ کے تقریباً 6 فیصد کے برابر ہے۔ آبی آفتیں، آبادی میں تیزتر اضافے اور دیہی آبادی کے شہری زندگی کی طرف بے قابو رجحان کے ساتھ مل کر غریب آبادی پر غیرمتناسب اور روزافزوں اثرات مرتب کر رہی ہیں۔ ترقی کے حالیہ اہداف کی تکمیل، معاشی پیداوار میں اضافے اور ماحولیاتی بحالی کے عمل کو بہتر بنانے کے لیے اشد ضروری ہے کہ موسم، پانی اور ماحولیات سے متعلق آگاہی کی فراہمی اور اس کے معیار کو بہتر بنایا جائے۔ ماحولیاتی بحالی پر پیش رفت کا تقاضا ہے کہ اس سے متعلقہ ادارے مضبوط بنائے جائیں اور مشاہدے، پیش گوئی اور معلومات کی فراہمی کی استعداد اعلیٰ سطح کی ہو۔ ایسا کرنے سے حفاظت ،سلامتی اور معاشی بہتری پیدا کرنے میں خاطرخواہ مدد مل سکتی ہے۔ پاکستان ہائیڈرو میٹرولوجیکل اینڈ ڈی آر ایم سروسز پراجیکٹ (PHDSP) توقع کرتا ہے کہ آبی و ماحولیاتی معلومات اور خدمات میں بہتری، پیش گوئی اور بروقت انتباہ کے نظام میں استحکام لایا جائے اور آبی و موسمیاتی پیش گوئیوں ،انتباہات اور ہدایات کی متعلقہ افراد اور اداروں تک رسائی میں بہتری آئے تاکہ نیشنل ڈیزاسٹر مینجمنٹ اتھارٹی (NDMA) کے قدرتی آفات سے نمٹنے کی موجودہ استعداد مزید مستحکم ہو سکے۔

پراجیکٹ کا تعارف

پراجیکٹ کے تین بنیادی حصے ہیں اور اس کا اطلاق پانچ سال کے عرصے میں ہو گا۔

پہلا حصہ:آبی ،موسمیاتی و ماحولیاتی خدمات:اس حصے کا ہدف پی ایم ڈی کی استعداد اور کارکردگی میں اضافہ کرنا ہے تاکہ موسمیاتی اور آبی معلومات کی تفہیم اور فیصلہ سازی میں ان کا استعمال کیا جا سکے۔ یہ ہدف اداروں کی انتظامی صلاحیت میں بہتری کے لیے سرمایہ کاری اور افرادی قوت کی استعداد کار میں اضافے کے بین الاقوامی معیار کے اعلیٰ ترین اقدامات ذریعے حاصل کیا جائے گا۔ کانسپٹ آف آپریشنز (CONOPS) پی ایم ڈی کے لیے ایک اہم ذریعہ ہے جس سے مجوزہ نظام اور اس کے ذیلی نظاموں کے بنیادی تصور کا جائزہ لیا جا سکے گا۔

دوسرا حصہ:قدرتی آفات سے نمٹنے کے اقدامات:پراجیکٹ کا یہ حصہ 'نیشنل ڈیزاسٹر مینجمنٹ پلان (NDMP) روڈمیپ 2016-2030' اور 'سینڈائی فریم ورک فار ڈیزاسٹر رسک ریڈکشن' میں متعین کی گئی ترجیحات کے اطلاق پر زور دے گا۔ اس حصے کے تحت NDMA کی استعدادِکار میں اضافے کو ترجیح دی جائے گا۔ پراجیکٹ پر عمل درآمد کرنا اور پراجیکٹ کی سرگرمیوں کے آغاز اور ان پر عمل درآمد کے لیے اہم متعلقہ افراد اور اداروں سے رابطہ کاری NDMA کی ذمہ داری ہو گی۔

اہم افراد اور اداروں کو پراجیکٹ کے آغاز ہی سے شامل کیا جائے گا۔ پراجیکٹ کے اس حصے کی بنیادی سرگرمیوں میں ہنگامی حالت میں فوری امداد ، NEOC، NIDM اور NDRF کے دفاتر قائم کرنے کے لیے ڈی ایم کمپلیکس کی تعمیر ، ملک میں اس وقت موجود DRM نظام پر نظرثانی اور ترجیحی اضلاع میں خطرات کے تخمینے کے ذریعے NDMAکی استعدادِ کار کو مضبوط بنانے پر توجہ مرکوز کی جائے گی۔

تیسراحصہ: ہنگامی حالت میں امداد کی فوری فراہمی: پراجیکٹ کا یہ حصہ قدرتی آفت یا ہنگامی حالت میں فوری امداد کی فراہمی کے لیے ضروری تیاری پر توجہ کرے گا۔ اس حصے کے لیے مختص کیے گئے اخراجات صفر ہیں، چنانچہ رقم فوری طور پر دیگر حصوں سے ادھر منتقل کی جائے گی جو منتقلی اور اخراجات کے باقاعدہ ایک نظام کے تحت ہو گا۔ کسی شدید قدرتی آفت آنے کی صورت میں جو بڑی قدرتی تباہی کا باعث بنی ہو، حکومت پاکستان متعلقہ بینک کو درخواست کر سکتی ہے کہ وہ پراجیکٹ کے فنڈ کا مطلوبہ حصہ امداد کی فراہمی اور بحالی کے کام کے لیے اس حصے کو منتقل کر دے۔ پراجیکٹ کا یہ حصہ دیگر ایسے اضافی فنڈزکو درست طور پر خرچ کرنے کے لیے بھی استعمال کیا جا سکتا ہے جو ہنگامی صورت حال میں دیگر ذرائع سے دستیاب ہوئے ہوں۔

ماحولیاتی و سماجی انتظامِ کار کے خاکے (ESMF)کی ضرور

پاکستان کی ماحولیاتی قانون سازی اور ورلڈ بینک (WB) کی پالیسیوں کے مطابق پراجیکٹ کے لیے ماحولیاتی و سماجی انتظامِ کار کا خاکہ (ESMF)تیار کیا گیا ہے۔ اس ESMF کی مدد سے PMD کے دفاتر کو مزید سہولیات کی فراہمی ، NDMA ہیڈکوارٹر کی تعمیر اور پاکستان بھر میں آٹومیٹک ویدر سٹیشنز (AWS) کی تنصیب کے عمل میں کیے جانے والے تعمیراتی اقدامات سے متعلق ماحولیاتی اور سماجی اثرات کا تخمینہ لگایا جائے گا۔ یہ ESMFماحولیاتی اور سماجی انتظامِ کار اور نگرانی کے ایک منصوبے (ESMMP)کا خاکہ اور ساتھ ہی ایک ری سیٹلمنٹ پالیسی فریم ورک (RPF)پیش کرتا ہے جس کے ذریعے اس پراجیکٹ کے نتیجے میں سامنے آنے والے کسی قسم کے ممکنہ مضر اثرات سے نمٹا جا سکے گا۔ اس ESMF میں ماحولیاتی اور سماجی پہلوؤں پر عمل درآمد سے متعلق ادارہ جاتی انتظامات شامل ہیں۔ اس کے علاوہ مضراثرات کو ممکن حد تک کم کرنے کے اقدامات کی نگرانی، تربیت کی ضروریات اور مختلف دستاویزات اور رپورٹوں کی تیاری کی وضاحت کے ساتھ ساتھ یہ ESMF کسی غیرجانبدار ادارے سے ان اقدامات کی توثیق سے متعلق تجاویز بھی پیش کرتا ہے۔ قواعدوضوابط کے ملکی قوانین اور ورلڈ بینک کی عملی پالیسیاں جن کا اطلاق اس پراجیکٹ پر ہوتا ہے، ان کی تفصیل بھی اس ESMF میں دی گئی ہے۔

ماحولیاتی اور سماجی معیار کا جائزہ

پراجیکٹ کا جغرافیائی مقام اور اراضی کا استعمال: یہ پراجیکٹ اسلام آباد کے وفاقی علاقے، پنجاب، سندھ، بلوچستان اور خیبرپختونخوا صوبوں میں رو بہ عمل لایا جائے گا۔ اس پراجیکٹ کے تحت ہونے والے تعمیراتی کام میں اسلام آباد میں ایک مون سون مانیٹرنگ سنٹر (MMC) کا قیام شامل ہے۔ اس کے ساتھ ساتھ لاہور میں موسمیاتی نگرانی کے ایک راڈار (WSR) کی تعمیر کے ذریعے PMD کی سہولیات کو بہتر بنانا بھی اس پراجیکٹ کا حصہ ہے۔ پانچ ریجنل فلڈ فورکاسٹنگ سنٹر (RFFC)

بھی قائم کیے جائیں گے۔ علاوہ ازیں ایک ڈیزاسٹر منیجمنٹ کمپلیکس بھی تعمیر کیا جائے گا جس میں NDMA ہیڈکوارٹر قائم ہونے کے ساتھ ساتھ نیشنل انسٹی ٹیوٹ آف ڈیزاسٹر منیجمنٹ (NIDM)، نیشنل ایمرجنسی آپریشنز سنٹر (NEOC) اور NDRF کی سہولت بھی فراہم کی جائے گی۔ ان سہولیات کے قیام کے صحیح حتمی مقام اور آٹومیٹک ویدر سٹیشنز(AWS) اور (SWR) سے متعلق دیگر تعمیرات کے مقامات کا تعین اس پراجیکٹ کے دوسرے مرحلے میں کیا جائے گا۔

اسلام آباد اور لاہور میں MMC اور WSR پاکستان میٹرولوجیکل ڈیپارٹمنٹ کے دفاتر کی موجودہ جگہ کے اندر ہی تعمیر کیے جائیں گے۔ PMD کی طرف سے ماحولیاتی اور سماجی انتظامِ کار کے منصوبے (ESMPs) تیار کر لیے گئے ہیں۔ دیگر ذیلی منصوبوں کے لیے ESMPs اس وقت تیار کیے جائیں گے جب ان کی حتمی جگہ کا تعین کر لیا جائے گا۔

زمین پر اور زیرزمین پانی کا سائنسی جائزہ: علمِ آب کی اصطلاحوں کے مطابق پاکستان کو تین بنیادی یونٹوں میں تقسیم کیا جا سکتا ہے، سندھ طاس، صحرائے خاران کا بند طاس اور مکران کا ساحلی طاس۔ پاکستان میں زیرزمین پانی کی دستیابی محدود ہے اور آب رسانی کے ضمن میں شدید مشکلات کا پیش خیمہ ہے۔ اس سلسلے میں سب سے زیادہ متاثرہ علاقے بلوچستان کے بارانی علاقے اور پاکستان کے جنوب مشرقی علاقے ہیں۔

قدرتی آفات کا خطرہ: نیشنل سیسمک مانیٹرنگ سنٹر آف پاکستان نے زلزلے کے امکان کے اعتبار سے علاقوں کی تقسیم پر مشتمل پاکستانی علاقوں کا ایک نقشہ جاری کیا ہے۔ خیبرپختونخوا کے کچھ حصے، وفاق کے زیرانتظام علاقے، بلوچستان اور سندھ زون 3 اور 4میں شامل ہیں جہاں زلزلوں کے باعث تعمیرات اور سطح زمین درمیانے سے شدید درجے کے نقصانات کی زد پر ہیں۔ سارا ملک ، خاص کر دریائے سندھ کے ساحلی علاقے سیلابوں کی زد پر ہیں جہاں 2010 اور 2015 میں بڑے پیمانے کے سیلاب آچکے ہیں۔ ذیلی پراجیکٹ ان علاقوں میں لگائے جا سکتے ہیں جہاں سیلاب کے خطرات زیادہ ہیں۔

ماحولیاتی کوائف: پاکستان میں متنوع ارضی خصوصیات، مٹی کی اقسام اور آب و ہوا کے تنوع کے باعث حیاتیاتی تنوع کا قدرتی ورثہ موجود ہے۔ پاکستان میں قدرتی حیات کے یہ خطے جنوب میں موجود صحراؤں سے لے کر شمال اور مغرب میں ہمالیہ، قراقرم اور ہندوکش کے پہاڑوں تک پھیلے ہوئے ہیں۔ ماحولیات کے حوالے نباتات اور جنگلی حیات کی تقسیم کی بنا پر پاکستانی علاقے کے گیارہ (11)ایکولوجیکل زون اور نو(9) ایگروایکولوجیکل زون بنائے گئے ہیں۔ پاکستان میں نباتات کے حوالے سے 6،000 سے زیادہ نسلیں پائی جاتی ہیں جن میں سے 465 کو مقامی سمجھا گیا ہے اور 50 کے قریب ایسی نسلیں ہیں جو نابود ہونے کے قریب ہیں۔ ممالیہ جانوروں کی 174 نسلیں، پرندوں کی 668 نسلیں، رینگنے والے جانوروں کی 177 نسلیں، جل تھلیوں کی 22 نسلیں، تازہ پانی کی مچھلیوں کی 198 اقسام، اور آبی حیات کی 788 اقسام پاکستان میں پائی جاتی ہیں۔ پاکستان میں مقامی ممالیہ جانوروں کی چھے نسلیں موجود ہیں۔ ان میں سے دو ، اُڑنے والی گلہری(*Eupetaurus cenereus*) شمالی پہاڑی علاقوں میں، اور دریائے سندھ کی ڈالفن، خطرے میں ہیں۔ پرندوں میں، طوطے کی دو اقسام *Tragopan melanocephalus*) اور (*Catreus wallichii*) اور انڈین شترمرغ (*Ardeostis nigriceps*) خطرے کی زد میں آئے ہوئے پرندوں کی فہرست میں شامل ہیں۔ رینگنے والے جانوروں کی پاکستان میں پائی جانے والی 177

نسلوں میں سے 18 مقامی ہیں۔ IUCN کی ریڈ لسٹ جو بین الاقوامی سطح پر جانوروں کی خطرے سے دوچار نسلوں کے حوالے سے بنائی گئی ہے، ان میں سے 45 پاکستان میں ہیں۔ ان میں سے 4 شدید خطرے سے دوچار ہیں، 12 خطرے کی زد میں ہیں اور 29 غیرمحفوظ ہیں۔ ان 45 نسلوں میں سے 18 ممالیا جانور ہیں، 17 پرندے ،9 رینگنے والے جانور اور ایک مچھلی کی قسم ہے۔پاکستان میں کل 334 محفوظ علاقے بنائے گئے ہیں جن میں 28 نیشنل پارک، 12 گیم ریزرو اور 99 جنگلی حیات کی حفاظت کے مخصوص مقامات ہیں۔ باقی علاقے دیگر زمروں میں آتے ہیں جیسے وائلڈ لائف پارک اور وائلڈ لائف پناہ گاہیں اور متفرق علاقے۔پاکستان کا ارضی استعمال کے حوالے سے بنایا گیا نقشہ بتاتا ہے کہ پاکستان میں جنگلات کا سرکاری تخمینہ 5.4 فیصد ہے۔ پاکستان کے جنگلات طبعی اعتبار سے پانچ طبقات میں تقسیم کیے گئے ہیں۔صنوبر (40فیصد)، جھاڑی (28فیصد)، دریائی (7فیصد)، ساحلی (8فیصد) اور سبزہ (11فیصد)۔

سماجی معاشی کوائف:2017 کی مردم شماری کی رپورٹ کے مطابق پاکستان کی آبادی 20 کروڑ 70 لاکھ ہے۔ اس میں سب سے زیادہ آبادی پنجاب کی10 کروڑ 10لاکھ ، اس کے بعد سندھ کی 4 کروڑ 80 لاکھ، خیبرپختونخوا کی 3 کروڑ اور بلوچستان کی 1 کروڑ 20 لاکھ ہے۔ پاکستان میں دنیا کے کم ترین شرح خواندگی رکھنے والے ملکوں میں شامل ہے اور دنیا میں اس کا نمبر 160 واں ہے۔ 55فیصد سے زیادہ لوگ جس میں 69 فیصد مرد اور 45فیصد عورتیں شامل ہیں، ناخواندہ ہیں۔پاکستان میں آمدنی اور روزگار کا سب سے بڑا ذریعہ زراعت ہے اور 42فیصد آبادی زراعت، ماہی گیری اور جنگلات کے شعبوں سے وابستہ ہے۔ اس کے بعد ملازمت (بشمول سرکاری ملازمت) کا شعبہ ہیں جس سے 35فیصد افراد وابستہ ہیں اور 22 فیصد صنعت اور اس کی متعلقہ ملازمتوں میں ہیں۔

پاکستان کے باقاعدہ 'مقامی لوگ' کیلاش ہیں جو صوبہ خیبرپختونخواہ کے ضلع چترال کی یونین کونسل ایون کی وادیوں بمبوریت، بریر اور رامبور میں رہائش پذیر ہیں۔ اس پراجیکٹ کے تحت آٹومیٹک ویدر سٹیشن (AWS) نصب کرنے کا ایک مجوزہ مقام چترال ایئرپورٹ بھی ہے جو کیلاش کی وادی سے جیپ کے راستے سے تقریباً 30 سے 40 کلومیٹر کے فاصلے پر واقع ہے۔ اس لیے چترال کے ان مقامی لوگوں کی بودوباش پر کسی قسم کے اثرات مرتب ہونے کا اندیشہ نہیں۔

متعلقہ افراد اور اداروں سے مشاورت

پاکستان میٹرولوجیکل ڈیپارٹمنٹ کے ساتھ ملکی سطح پر مشاورت کی گئی۔ متعلقہ افراد اور اداروں کی جانب سے مجموعی طور پر مثبت ردِعمل سامنے آیاہے جس میں پراجیکٹ کی تائید کی گئی ہے۔ ESMF میں ایک لائحہ عمل تجویز کیا گیا ہے جس کے ذریعے پراجیکٹ کے ڈیزائن، تعمیراتی کام اور اس کے چالوہونے کے مختلف مراحل کے دوران پراجیکٹ کے متعلقین کے ساتھ آگاہی اور مشاورت کا عمل جاری رکھا جائے گا۔ اس سے مقامی آبادی میں اس پراجیکٹ کی قبولیت میں اضافہ ہوگا اور پراجیکٹ میں پیش رفت کے کام میں ان کی شمولیت کو یقینی بنایا جا سکے گا۔ ہر ذیلی پراجیکٹ کے لیے ESMPs کی تیاری کے دوران پراجیکٹ کے مقام تنصیب پر مقامی آبادی سے مشاورت کا عمل جاری رکھا جائے گا۔

پراجیکٹ کے اثرات کا جائزہ اور انھیں کم کرنے کے اقدامات

پراجیکٹ کے ممکنہ اثرات کے تخمینے کے لیے ایک تفصیلی جائزہ تیار کیا گیا ہے جس میں ماحولیاتی اور سماجی اثرات کی جہات بھی شامل ہیں۔ یہ جائزہ ڈیزائن، تعمیر اور پراجیکٹ کے چالو ہونے کے مراحل پر مشتمل ہے اور اسی کے مطابق ہر مرحلے پر ان اثرات کو کم سے کم کرنے کے اقدامات بھی تجویز کیے گئے ہیں۔ ماحولیاتی انتظامِ کار اور نگرانی کا ایک تفصیلی منصوبہ (ESMMP) تجویز کیا گیا ہے جس میں ماحولیات اور سماجی زندگی کو متاثر کرنے والے عناصر کو کم سے کم کرنے کے اقدامات، نگرانی کے معیارات اور ذمہ داریوں کا تعین کیا گیاہے۔ پراجیکٹ کے ڈیزائن، تعمیر اور اس کے چالو ہونے کے مراحل پر حیاتیاتی تنوع، فضائی آلودگی، ارضی خصوصیات، فضلے کو ٹھکانے لگانا، برقی مقناطیسی لہریں، مزدوروں کی صحت و تحفظ، وسائل کے استعمال اور اراضی کے حصول جیسے معاملات کے لیے جائزے تیار کیے گئے ہیں۔ پراجیکٹ کے ذیلی جز1.2 اور ذیلی جز2.2 کے لیے نوعیت کے اعتبار سے درمیانے سے نچلے درجے کے اثرات پائے گئے ہیں۔ اندازہ ہے کہ زیادہ تر اثرات پراجیکٹ کے تعمیراتی کام کے دوران ہو سکتے ہیں۔ متوقع اثرات زیادہ تر عارضی، مقامی اور قابل بحالی ہوں گے جن کا موزوں اقدامات کے ذریعے مناسب طور پر ازالہ کیا جا سکے گا۔

PMD کی سہولیات میں اضافے اور NDMA ہیڈکوارٹر کی تعمیر کے کام سے وابستہ ممکنہ مضراثرات اپنی نوعیت میں عارضی ہیں اورمٹی، شور، فضائی آلودگی، فضلے کے بندوبست، وسائل کا زیادہ استعمال، مزدوروں کی صحت و تحفظ سے متعلق ہیں۔ تعمیراتی کام میں مٹی کے آلودہ ہونے کے خطرے کو تعمیراتی سامان کو مناسب طور پر ذخیرہ کرنے اور آلودہ مٹی کو مناسب طور پر ٹھکانے لگانے کے عمل سے کم کیا جا سکے گا۔ تعمیراتی عمل اور زمین کی کھدائی کے دوران فضا میں اُڑنے والی گرد اور گاڑیوں کی نقل و حمل اور بھاری مشینری کے چلنے سے نکلنے والے دھوئیں کے اثرات کو ایک ایمشنز مانیٹرنگ پلان کے تحت کم کرنے کے اقدامات کیے جائیں گے۔ تعمیراتی کام کے نتیجے میں پیدا ہونے والے کوڑا کرکٹ اور فضلے کی وجہ سے پانی کی نکاسی کا نظام متاثر ہو سکتا ہے، اس کے ساتھ ساتھ حادثاتی طور پر ایندھن کے تیل کی ٹینکیوں سے تیل رِسنے اور گاڑیوں کی مرمت کے دوران تیل بہنے سے بھی زمین پر موجود پانی کے ذخائر خراب ہو سکتے ہیں۔ اس کے تدارک کے لیے فضلے کو ٹھکانے لگانے اور تعمیراتی سامان کو بہتر طور پر ذخیرہ کرنے کا ایک باقاعدہ پلان تیار کیا گیا ہے۔ تعمیراتی سائٹ سے اور مزدوروں کی رہائشی جگہ سے کوڑا کرکٹ کے ناموزوں اخراج سے عوامی صحت کو خطرات لاحق ہو سکتے ہیں جس میں کوڑاکرکٹ کو جلانے کے نتیجے میں فضائی آلودگی، زمینی پانی کی آلودگی وغیرہ شامل ہیں۔ تعمیراتی مواد اور رہائشی کیمپ کے گھریلو کوڑاکرکٹ کومناسب طو رپر ٹھکانے لگانے کے لیے ایک باقاعدہ پلان پر عمل کرنے کی ضرورت ہو گی۔ مزدوروں کی صحت و تحفظ کا ایک پلان بنایا جائے گا تاکہ بھاری مشینری اور خطرناک سامان (اگر کوئی ہو) سے کسی طرح کے ممکنہ مضر اثرات کا تدارک کیا جا سکے۔ تعمیراتی کام اور بھاری مشینری کی نقل و حمل سے اردگرد کی مقامی آبادی کے تحفظ کے مسائل پیدا ہو سکتے ہیں۔ تعمیراتی جگہ پر مناسب طور پر نشانات لگا نا، تعمیراتی عملے کی مناسب تربیت اور متبادل راستوں کی فراہمی چند ایسے اقدامات ہیں جن سے ان مسائل کو حل کیا جا سکے گا۔ تعمیراتی کام کے دوران اور پراجیکٹ کے چالو ہو جانے کے بعد توانائی اور پانی کے زیادہ استعمال کے اثرات کو کم کرنے کے لیے موزوں تعمیراتی ڈیزائن بنائے جائیں گے اور تعمیراتی عملےکی پانی کے استعمال کے سلسلے میں مناسب تربیت کی

جائے گی۔اسلام آباد میں MMC اور NDMA ہیڈکوارٹر ایسے علاقوں میں ہیں جو زلزلے کے امکانی علاقے ہیں۔ان دفاتر کے ڈیزائن پاکستان کے تعمیراتی قوانین کے مطابق اور زلزلے میں نقصان سے بچاؤ کے بین الاقوامی طور پر تسلیم شدہ طریقوں کے مطابق تیار کیے جائیں گے۔ماحولیاتی اور سماجی نگرانی اور منیجمنٹ کا پلان (ESMMP) وہ تمام تفصیلات فراہم کرتا ہے جن میں ممکنہ مضر اثرات کا تدارک، ذمہ داریوں کا تعین اور نگرانی کا ایک نظام موجود ہے جس سے تمام ماحولیاتی اور سماجی اثرات سے مناسب طور پر اور بروقت عہدہ برآ ہونا یقینی بنایا جا سکے گا۔

ری سیٹلمنٹ پلاننگ فریم ورک

PMD سہولیات میں اضافے، NDMA ہیڈکوارٹر کی تعمیر اور آٹومیٹک ویدر سٹیشنز (AWS) کی تنصیب کے لیے ضرورت پڑ سکتی ہے کہ نجی اراضی کے حصول کے لیے کچھ گھرانوں کو غیررضاکارانہ نقل مکانی کرنی پڑے (اگرچہ ترجیح یہی ہے کہ تعمیرات اور تنصیب کا کام سرکاری ملکیت کی زمین پر ہی کیا جائے۔ اس مسئلے کے اثرات سے نمٹنے کے لیے ورلڈ بینک کی غیررضاکارانہ نقل مکانی کی پالیسی (OP 4.12) کے مطابق ایک ری سیٹلمنٹ پلاننگ فریم ورک (RPF) تیار کیا گیا ہے۔ اگر اراضی حاصل کرنا پڑتی ہے اور نقل مکانی درپیش ہوتی ہے تو یہ RPF اس ضمن میں رہنمائی کرتا ہے۔ اس RPF میں ان اقدامات کی تفصیل شامل ہے کہ پراجیکٹ سے متاثر ہونے والے تمام افراد (PAPs) کو براہِ راست پراجیکٹ کی وجہ سے پیش آنے والے نقصانات کے بارے میں آگاہی اور مشاورت کیسے فراہم کی جائے اور ان کا فوری اور موثر ازالہ کیسے کیا جائے گا۔ اس RPF میں یہ تفصیلات بھی شامل ہیں کہ اس پراجیکٹ سے متاثرہ لوگوں (PAP)کو، جن کی اراضی لے لی گئی ہو، ان کے دیگر اثاثوں کو نقصان پہنچا ہو، ان کی آمدنی اور روزگار متاثر ہوا ہو، تو عارضی اور عبوری طور پر ان کی امداد کیسے کی جائے گی اور ان کو مستقل بحالی کے لیے کیسے معاونت فراہم کی جائے گی۔

یہ متاثرہ لوگ بحالی کے لیے امداد کے مستحق ہیں اور اپنی کھوئی ہوئی اراضی، تعمیرات اور دیگر سہولیات اور ذرائع آمدنی کے نقصان کے بدلے میں معاونت کے مستحق ہیں۔ ایسے افراد کے لیے الگ سے بھی سہولیات رکھی گئی ہیں جو نقل مکانی کے نتیجے میں زیادہ غیرمحفوظ ہو گئے ہوں۔

ادارہ جاتی انتظامات

ESMF کا اطلاق کرنے کی ذمہ داری پراجیکٹ کی مجموعی نگرانی کرنے والے پراجیکٹ ڈائریکٹرز اور PMD اور NDMA میں واقع پراجیکٹ امپلی مینٹیشن یونٹ (PIU) کی ہو گی۔پراجیکٹ ڈائریکٹرز ، ماحولیاتی تحفظ کے ایک ماہر کے ذریعے ESMMP کے اطلاق، نگرانی اور رپورٹ نگاری کے ذمہ دار ہوں گے۔ سماجی تحفظ کے ماہر کی ذمہ داری ہو گی کہ RPF کا اطلاق یقینی بنائے اور سماجی تحفظ سے متعلق دیگر امور کی نگرانی کرے۔ ماحولیاتی اور سماجی تحفظ کے ماہرین کی معاونت کے لیے ماحولیاتی اور سماجی تحفظ کے افسران ذیلی امور کی نگرانی کریں گے اور ان کے ساتھ کمپیوٹر کے شعبے کے افسران بھی شامل ہوں گے۔پراجیکٹ کی ساری ٹیم کی تفصیلی ذمہ داریوں کا تذکرہ ESMF میں موجود ہے۔

نگرانی اور رپورٹ نگاری

ESMMP اور RAPکی نگرانی کا ایک فعال نظام پراجیکٹ کے آغاز سے اس کے فعال رہنے کے سارے عرصے تک درکار ہو گا۔ ماحولیاتی اور سماجی تحفظ کے ماہرین کے نگرانی کرنے کے ساتھ ساتھ ، پراجیکٹ کوآرڈینیٹر ESMF کے اطلاق کی نگرانی کرنے کے عمل میں بنیادی کردار ادا کرے گا، خاص طور پر ان معاملات میں جو تکنیکی ڈیزائن اور تعمیرات سے متعلق ہوں گے۔ مزید برآں مانیٹرنگ اینڈ اویلیوایشن آفیسر سے بھی درخواست کی جا سکتی ہے کہ وہ تعمیر کے دوران بھی اور جب پراجیکٹ کام کرنے لگے تو بھی وقتاً فوقتاً پراجیکٹ کی نگرانی کرتے رہیں۔ نگرانی کے ان دوروں کی رپورٹیں PIU میں ماحولیاتی ماہر کے پاس جمع کروائی جائیں گی۔نگرانی کے لیے بیرونی ماہرین کی خدمات بھی حاصل کی جائیں گی تاکہ اس امر کو یقینی بنایا جا سکے کہ پراجیکٹ کی تعمیراتی اور عملی سرگرمیاں ESMF کے مطابق سرانجام دی گئی ہیں۔ غیرجانبدارانہ توثیق (تھرڈ پارٹی ویلیڈیشن TPV) کا عمل بھی نگرانی کرنے والے کسی آزاد اور غیرجانبدار ادارے کے ذریعے سالانہ بنیاد پر کروایاجائے گا تاکہ جانچا جا سکے کہ ESMMP پر کس درجہ عمل درآمد اور پیش رفت ہوئی ہے اور یہ یقینی بنایا جا سکے کہ پراجیکٹ کے مضراثرات کی تخفیف کے اقدامات طے شدہ منصوبے کے مطابق ہوئے ہیں۔RAP کے لیے (اگر کسی ذیلی پراجیکٹ میں ضرورت ہوئی تو) بیرونی نگرانی سال میں دوبار بھی کرائی جا سکتی ہے اور شش ماہی رپورٹ کے ذریعے متعلقہ متاثرہ افراد، PIU اور ورلڈ بینک کو اس کے نتائج سے آگاہ کیا جائے گا۔شش ماہی رپورٹ ماحولیاتی اور سماجی تحفظ کے ماہرین کی طرف سے تیار کی جائے گی اور پراجیکٹ ڈائریکٹر اور ورلڈ بینک کو پیش کی جائے گی۔ ان رپورٹوں میں مضر اثرات کی تخفیف کے اقدامات، نگرانی ، استعدادِ کار میں اضافے اور ماحولیاتی اور سماجی انتظامِ کار اور نگرانی کے پلان (ESMMP) کی دیگر کوئی سرگرمی جو اس عرصے میں سرانجام دی گئی ہو، اس کی پیش رفت بیان کی جائے گی اور دورانِ کار اصلاح کی تجاویز پیش کی جائیں گی۔ سماجی تحفظ کے ماہرین پراجیکٹ کے سماجی پہلوؤں اور RAP پر عمل درآمد کے بارے میں ماہانہ رپورٹیں تیار کریں گے اور پراجیکٹ ڈائریکٹر کو پیش کریں گے۔ سہ ماہی /شش ماہی پیش رفت کی رپورٹ ورلڈ بینک کو پیش کی جائے گی۔

استعدادِکار میں اضافہ اور تربیتی سرگرمیاں

موثر ماحولیاتی اور سماجی انتظامِ کار کے لیے ESMF اور RAP کے اطلاق پر مامور سٹاف کی تربیت اور ان کی استعدادِ کار میں اضافہ کرنا ضروری ہے ۔ ماحولیاتی اثرات اور ان کی تخفیف کے اقدامات کے بارے میں متعلقہ PIU کے سٹاف کے لیے مخصوص تربیتی سرگرمیاں رکھی جائیں گی تاکہ وہ نگرانی سے متعلق اپنی ذمہ داریاں نگرانی کے منصوبے کے تقاضوں کے مطابق مرتب اور موثر طریقے سے ادا کر سکیں۔ ٹھیکیداروں، ذیلی ٹھیکیداروں، ماہرینِ تعمیرات، نگرانی کے ماہرین اور مقامی مجاز افسران کے لیے بھی پراجیکٹ سے متعلق تربیت کا انعقاد کیا جائے گا۔

ESMF کے اطلاق کے لیے بجٹ

ESMF کے اطلاق کے لیے ایک بجٹ تجویزکیا گیا ہے۔ اس بجٹ کے ذیل میں افرادی قوت کی فراہمی، ان کی استعدادِ کار میں اضافے اور ان کی تربیت کے اخراجات، PPE اور اس کی دیکھ بھال، ماہرین، ماحولیاتی ٹیسٹ، ماحولیاتی انتظامِ کار کے اضافی آلات کے اخراجات، اور بیرونی ماہرین سے نگرانی / غیرجانبدارانہ توثیق کے اخراجات شامل ہیں ۔کل بجٹ جو پراجیکٹ کے

تمام مراحل کے لیے ان سرگرمیوں کے لیےESMF میں رکھا گیا ہے، 139 ملین ہے۔ نقل مکانی اور آبادکاری کے بجٹ کا حساب اس وقت تیار کیا جائے گا جب ESMF کے مطابق تفصیلی RAP تیار کر لیے جائیں گے۔

شکایات کے ازالے کا نظام

شکایات کے ازالے کا ایک نظام پراجیکٹ پر عمل درآمد کی تمام مدت میں کام کرتا رہے گا اور اس پراجیکٹ سے بالواسطہ اور بلاواسطہ طور پر متاثر ہونے والے افراد، گروہوں یا اداروں کی دادرسی کرے گا۔ GRM اس طریقے پر بنایا گیا ہے کہ یہ پراجیکٹ پر عمل درآمد کے دوران سامنے آنے والے ماحولیاتی اور سماجی مسائل کا حل پیش کرے۔

یہ ان بے ربطیوں کو بھی درست کرے گاجو پراجیکٹ پر کام کے دوران سامنے آئیں گی اور جن کے مضمرات ذیلی منصوبوں پر موثر عمل درآمد کے لیے اہمیت رکھتے ہوں۔ پراجیکٹ امپلی منٹیشن یونٹ (PIU) کا دفتر شکایات کے ازالے کی کمیٹی (GRC-Project) کے سیکرٹیریٹ کے طور پر بھی کام کرے گا اور جوحکمتِ عملی کی سطح پر شکایات کے ازالے کے پورے عمل پر نظر رکھے گا اور دادرسی کی نگرانی کا ذمہ دار ہو گا۔

اس طرح GRM کا مجموعی مقصد اعمال و افعال کا ایک ایسا مضبوط وموثر نظام قائم کرنا ہے جو مقامی سطح پر پیش آنے والی شکایات اور مسائل کا شفاف اور فوری حل تلاش کر سکے۔اس GRMتک آبادی کے مختلف طبقوں کی رسائی ممکن ہو گی جن میں خواتین، بزرگ شہری اور دیگر حساس گروہ شامل ہوں گے۔ شکایات کے ازالے کے نظام سے آگاہی اور شکایات کے ازالے کے عمل ، دونوں کے لیے ہر ذیلی منصوبے پر رابطہ کاری کا ایسا طریقہ کار اختیار کیا جائے گا جو مقامی ثقافت ،روایات اور حالات کے مطابق موزوں ہو۔

اطلاع کاری

ESMF اور RPF کی معلومات کو PMD اور NDMA کی ویب سائٹ اور ورلڈ بینک کی معلوماتی رابطہ گاہ (Info Shop) پر فراہم کیا جائے گا۔ ESMF اور RPF کی دستاویزات ماحولیاتی تحفظ کے وفاقی اور صوبائی اداروں (EPA)، پراجیکٹ سے متعلقہ افراد اور اداروں، ٹھیکے داروں، سماجی تنظیموں وغیرہ کو پیش کی جائیں گی۔ESMF اور RPF کی ایک نقل پرجیکٹ امپلی منٹیشن یونٹ، PMD اور NDMA میں رکھی جائے گی جو عوامی رسائی میں ہو گی۔ ESMF کی اس تلخیص کا اردو ترجمہ بھی متعلقہ افراد اور اداروں، خاص طو رپر پراجیکٹ کے علاقے میں واقع متعلقہ آبادی میں تقسیم کیا جائے گا۔

List of Acronyms

AWS	Automatic Weather Station
CC	Construction Contractor
DRM	Disaster Risk Management
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EMF	Electromagnetic Field
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FFD	Flood Forecasting Division
GDP	Gross Domestic Product
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
IEE	Initial Environmental Assessment
IFC	International Finance Corporation
MHVRA	Multi Hazard Vulnerability Risk Assessment
MMC	Monsoon Monitoring Center
NCS	National Conservation Strategy
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Force
NEAP	National Environmental Action Plan
NEOC	National Emergency Operations Cell
NEP	National Environmental Policy
NEQS	National Environment Quality Standards
NGO	Non-Government Organization
NIDM	National Institute of Disaster Management
NIHL	Noise Induced Hearing Loss
NOC	No Objection Certificate
PDMAs	Provincial Disaster Management Authorities
PEPA 97	Pakistan Environmental Protection Act, 1997
PEPC	Pakistan Environmental Protection Council
PID	Provincial Irrigation Departments
PIU	Project Implementation Unit
PMD	Pakistan Meteorological Department
PNS	Pakistan National Committee
Pvt	Private
Radar	Radio Detection and Ranging
RAP	Resettlement Action Plan
RF	Radio Frequencies
SAR	Specific Absorption Rate
USAR	Urban Search & Rescue Teams
WAPDA	Water and Power Development Authority
WSR	Weather Surveillance Radar

List of Units

°C	Degree Celsius
cm	Centimetre
db	Decibels
Kg	Kilogram
Km	Kilometer
m	Meter
µg/m^3	Microgram per cubic meter
%	Percent
W/kg	watts per kilogram
mW/m^2	milliwatts per square metre

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Chapter 1. Introduction

1.1. Background

Over the last two decades Pakistan has made considerable progress in reducing absolute poverty and improving shared prosperity, but most of the population remains poor or vulnerable. Between 1991 and 2011 the number of people with an income below $1.25 per day was more than halved;[7] and between 2002 and 2011 the percentage of the population below the national poverty level fell from 34.7 to 13.6 percent.[8] Nonetheless, nearly three-quarters of the population remain poor or vulnerable.

A key dimension of social vulnerability in South Asia is exposure to hydrological and meteorological (hydromet) hazards including storms, floods, and droughts. Across South Asia, the number of disasters has quadrupled over the past four decades, causing over 800,000 deaths and US$80 billion in damages[9]—equivalent to an estimated 2–6 percent of GDP—and slowing economic growth and poverty reduction.[10] Climate change is expected to have an adverse impact on Pakistan, as it ranks 7th on the climate risk index[11]. It continues to be one of the most flood-prone countries in the South Asia Region (SAR); it suffered US$18 billion in losses between 2005 and 2014 (US$10.5 billion from the 2010 floods alone), equivalent to around 6 percent of the federal budget.[12] Hydromet hazards have been coupled with rapid population growth and uncontrolled urbanization, leading to a disproportionate and growing impact on the poor. The frequency and quantity of precipitation in Pakistan is becoming increasingly unpredictable. The severity of these hazards is likely to be exacerbated due to climate change. By 2030, annual average flood damages are projected to increase five-fold relative to 2010.[13] In addition, these extreme weather events create vulnerabilities in major natural asset-based sectors.

To build on recent development gains, increase economic productivity, and improve climate resilience, it will be critical to improve the quality and accessibility of weather, water, and climate information services. Climate-resilient development requires stronger institutions and a higher level of observation, forecasting, and service delivery capacity; these could make a significant contribution to safety, security, and economic well-being.[14]The Pakistan Hydro-Meteorological and DRM Services Project (PHDSP) expects to improve hydro-meteorological information and services, strengthen forecasting and early warning systems, and improve dissemination of meteorological and hydrological forecasts, warnings and advisory information to stakeholders and end-users and strengthen the existing disaster risk management (DRM) capacity and services of the National Disaster Management Authority

[7] http://documents.worldbank.org/curated/en/886791468083329310/Pakistan-Country-partnership-strategy-for-the-period-FY2015-19

[8] Ibid.

[9] Not including indirect losses.

[10] World Bank Program Brief: South Asia Regional Program on Hydromet, Climate Services and Resilience (2017). http://www.worldbank.org/en/region/sar/brief/south-asia-hydrological-and-meteorological-hydromet-resilience-program

[11] Global Climate Risk Index 2017 https://germanwatch.org/en/download/16411.pdf

[12] World Bank (2015) *Fiscal Disaster Risk Assessment Options for Consideration: Pakistan*. Chapter 1, page 2. https://openknowledge.worldbank.org/handle/10986/21920

[13] http://floods.wri.org/#/country/170/Pakistan

[14] Upgrading all hydro-meteorological information and early-warning systems in developing countries has been estimated to have the potential to save 23,000 lives annually and provide US$3–30 billion per year in economic benefits—see Hallegatte (2012). "A Cost Effective Solution to Reduce Disaster Losses in Developing Countries: Hydro-meteorological Services, Early Warning, and Evacuation." Policy Research Working Paper 6058, World Bank, Washington, DC.

(NDMA). The project has three main components and will be implemented over a period of five years.

In support of climate change adaptation, the project will improve PMD's capacity to collect and analyze data and inform stakeholders so they can more efficiently use this information in planning and decision-making. While this project will focus its support on DRM, agriculture, and water as its main beneficiaries, many other sectors—including energy, transport, and health—can benefit from improved hydro-meteorological services to promote adaptation to climate change.

1.2. Need for the ESMF/RPF

The project focuses on the improvement of weather and hydrological forecasting processes and numerical prediction systems, and refurbishment of PMD and NDMA offices and facilities. Components 1 and 2 of the project (detailed in Chapter 2) envisage some physical low-scale interventions for the establishment and refurbishment of PMD in Punjab, Sindh, Balochistan and KPK province, establishment of a Disaster Management Complex, and installation of Automatic Weather Stations (AWS) across Pakistan.

The project is assigned as *Category B*, due to the limited environmental and social impacts that could be linked to temporary and localized environmental degradation and social disturbance during civil works. In line with the environmental legislation of Pakistan as well as the World Bank (WB) safeguard policies, an Environmental and Social Management Framework (ESMF) for the project including environmental and social impact studies is prepared for the project sites to mitigate any negative impact. This ESMF assesses environmental and social impacts related to the Project, and outlines an Environmental and Social Management and Monitoring Plan (ESMMP). The ESMF includes institutional arrangements required to implement the environmental actions and presents monitoring requirements for effective implementation of mitigation measures; describes training needs and specific reporting and documentation requirements; and proposes a third-party validation mechanism. The ESMF includes a Resettlement Policy Framework to address any land acquisition and involuntary resettlement that may occur due to the Project.

1.3. Structure of the ESMF

This Environmental and Social Management Framework consists of 12 chapters. Chapter introduces to the project and ESMF, including project background and need for the project. Chapter 2 provides a detailed description of the project, its sub components and analysis of project alternatives. Chapter 3 presents a review of national regulatory frameworks, World Bank Safeguard Policies, environmental codes of practice and international covenants and agreements. Chapter 4 is an assessment of national environmental and social baselines. Chapter 5 provides information on stakeholder consultations conducted for the project, and Stakeholders Consultation Framework. Chapter 6 presents an assessment of potential environmental and social impacts, proposed mitigation measures, and environmental and social management and monitoring plan. Environmental and social screening for sub-projects are included in Chapter 7. Chapter 8 is the Resettlement Policy Framework for possible land acquisition or involuntary resettlement caused by sub-project activities. Chapter 9 presents institutional arrangements including roles and responsibilities for ESMF implementation, monitoring of ESMF and capacity development and training of project team and contractors. Chapter 10 presents the ESMF implementation budget. Chapter 11 is the Grievance Redress Mechanism for stakeholders and general public and Chapter 12 presents Disclosure requirements.

Chapter 2. Project Description

This chapter provides a description of project components and location of the project.

2.1. Project Components

The Pakistan Hydro-Meteorological and DRM Services Project has three main components and will be implemented over a period of five years. The proposed investments are expected to improve the DRM system in Pakistan; enhance capacities of NDMA to respond to disasters and mainstream DRR; improve hydro-meteorological information and services; strengthen forecasting and early warning systems; and improve dissemination of meteorological and hydrological forecasts, warnings, and advisory information to stakeholders and end-users. In support of climate change adaptation, sub components 1.1, 1.2, and 1.3 below will improve PMD's capacity to collect and analyze data and inform stakeholders so they can more efficiently use this information in planning and decision-making. The project components and sub-components are detailed below:[15]

2.1.1. Component 1: Hydro-Meteorological and Climate Services

The objective of this component is to improve the capability and thereby performance of the PMD to understand and make use of meteorological and hydrological information for decision making. This objective will be achieved, in line with international best practices, through investment in strengthening institutional setup and building capacity of human resources at the PMD. The Concept of Operations (CONOPS) is an important tool for PMD which will provides a conceptual overview of the proposed system and sub-systems. The component will include following 3 sub-components:

Sub-Component 1.1: Institutional Strengthening, Capacity Building

1.1.A: Institutional strengthening and development of a legal and regulatory framework

1.1.B: Capacity building and training of PMD and main stakeholders

1.1.C: Outreach and public education, awareness raising, marketing

Sub-Component 1.2: Modernization of the Observation Infrastructure, Data Management and Forecasting Systems

This component aims to upgrade and expand the meteorological, agro-meteorological and hydrological observations networks and ensuring that these networks are well functioning and interoperable; modernize data management, communication and information and communication technology (ICT) systems; improve weather and hydrological forecasting processes and numerical prediction systems and refurbish PMD offices and facilities. The bulk of the activities in this component include procurement and installation of goods such as monitoring equipment and ICT. This component will include some physical works that may have environmental and social impacts. The component will include following 5 sub-components:

1.2.A: Technical modernization of the observation networks

1.2.B: Modernization of PMD data management, communication, and ICT system

[15] For additional details, please refer to the Project Document.

1.2.C: Improvement of the weather forecasting process, including numerical weather prediction system

1.2.D: Improvement of hydrological forecasting system, including flood modeling system

1.2.E: Expansion and refurbishment of PMD facilities and offices

Sub-component 1.2A will support the expansion and upgrade of the prioritized stations of the network, expansion of Doppler radar network, restoration of upper air observations, installation of wind profilers, improvement of hydrological stations and systems, and expansion and re-equipment of agro-meteorological network.

Sub-component 1.2E will establish the Monsoon Monitoring Centre in Islamabad, as well as up gradation of Flood Forecasting Division (FFD) to National Flood Forecasting Center (NFFC) and establishment of 5 Regional Flood Forecasting Centers (RFFC). The activities will also include the refurbishment of PMD offices including IMG and FFD. An engineering design and supervision firm will also be engaged through counterpart financing to support this sub-component.

Sub-Component 1.3: Enhancement of the PMD Service Delivery & Building Partnerships with the Private Sector

The objective of this component is to enhance the service delivery system of PMD by introducing public weather and hydrological services and enhancing end-to-end early warning systems and services, including impact forecast and warning services, development of agriculture and climate advisory services, creation of a National Framework for Climate Services, as well as strengthening services for aviation sector. This component will be essential in improving the credibility and penetration of PMD's services to the public and decision makers and potentially generate new sources of revenues in the future. In addition, improving information customization and dissemination to address the needs of consumers is expected to produce climate change adaptation co-benefits in terms of reducing vulnerability and improving preparedness to adverse hydro-meteorological events. Priority target end-users would initially include: (a) agro-meteorological information services, (b) food security; (c) emergency and disaster risk management; (d) water resource management; and (e) aviation. The component will include following 6 sub-components:

1.3.A: Introduction of Public Weather and Hydrological Services (water resources, disaster risk management (DRM), agriculture, irrigation, media, civil aviation, transport, health, energy, etc.)

1.3.B: Strengthening of end-to-end early warning system (EWS) including a regular post-event review process

1.3.C: Introduction of impact-based forecast and warning services in support of operations of DRM and other stakeholders

1.3.D: Development of Agriculture and Climate Advisory Service (ACAS), including drought monitoring

1.3.E: Creation of the National Framework of Climate Services (NFCS)

1.3.F: Strengthening Services for Aviation

Sub-Component 1.4: Project Management, Systems Integration, Monitoring and Implementation Support of PMD

The objective of this component is to develop detailed designs and integration of the modernization with other stakeholder systems—including donors, such as JICA, China and USAID as well as other government departments including PADs, NDMA, PIDs, WAPDA. In order to achieve this objective, the activities will comprise the hiring of a systems integrator to provide procurement and implementation support, guidance, technical advice and support to PMD operations and the overall modernization program, and support for project management, monitoring, reporting and evaluation of sub-components 1.1, 1.2 and 1.3 described above. There are three sub-components:

1.4.A: Assessment of existing systems and design of an optimum composite observation network, forecasting and service delivery processes (weather, climate, and hydrological)

1.4.B: Project management, monitoring, reporting and evaluation of components A, B, and C

1.4.C: Operations and maintenance (O&M) costs

2.1.2. Component 2: Disaster Risk Management

This project component will support implementation of the priorities identified in the National Disaster Management Plan, NDMP Road-Map 2016-2030 and the Sendai Framework for Disaster Risk Reduction. Under this component, capacity enhancement of NDMA will be prioritized. NDMA will be responsible for implementation of the project and coordination with the key stakeholders, for project initiation and implementation of activities. Key stakeholder will be involved from the initial phase. The main activities of this component will focus on strengthening capacity of NDMA through increased emergency response capacity, construction of DM complex that will house offices, NEOC, NIDM and the NDRF, reviewing the existing DRM system in the country and conducting hazard assessments in priority district. The component will consist of the following sub-components:

Sub-Component 2.1: Legal Policy and Institutional Strengthening

This component will primarily focus on strengthening the existing DRM system at the country level through a consultative process led review of the National Disaster Risk Management Framework and the National DRR Policy. This component aims to enhance the capacity of NDMA and the key stakeholders in improved availability of risk information based on quantitative and scientific evidence, DRM capacity building of government officials and increased capacity of NDMA in timely and efficient emergency response. It has seven sub-components:

2.1.A: Review the existing legal disaster risk management framework and policy

2.1.B: Institutional Strengthening for DRM

2.1.C: Strengthening of Disaster Risk Financing Mechanisms

2.1.D: National Disaster Response Force (NDRF)

2.1.E: Strengthening of Urban Search & Rescue Teams (USAR)

2.1.F: Multi Hazard-Vulnerability & Risk Assessment

2.1.G: Analytics and Research on Hazard Impacts

Sub-Component 2.2: Infrastructure for Resilience

This component has the following four sub-components.

2.2.A: Disaster Management Complex including NDMA HQs, NIDM, NEOC & NDRF Accommodation networks :

2.2.B: Establishment of DM Complex

2.2.C: Development of Disaster Management Information System (DMIS)

2.2.D: Investment Framework and pilot activities for resilience infrastructure in the Federal Capital

Sub-component 2.2A involves developing institutional set-up and operational capacity of NDMA through construction of NDMA headquarters that will host National Institute of Disaster Management (NIDM), National Emergency Operations Center (NEOC) and NDRF Facility. The NDMA HQs will be constructed to be disaster and climate resilient, meeting some of its energy needs by alternative energy sources. Consulting services will be involved in undertaking the review and finalization of complex design and supervision of construction. The component will support revamping, strengthening and establishment of Emergency Operations Centers (NEOCs) at federal level. The strengthening of National Emergency Operations Centre (NEOC) at NDMA will be line with the global best practices and lessons learnt tailoring them to fit into the Pakistan context. To ensure coordination and pooling of resources and capacities, the NEOC would be linked with the provinces and districts to provide real time data sharing capabilities. In order to determine and generate early warnings and alerts, the NEOC will be connected to the PMD's joint working desk (as provided under component 1). A training and capacity enhancement plan specifically designed for NEOC staff will also be part of this component. This will further focus on strengthening the capacity of the Government to manage disaster events through: a) an improved system for collecting and processing information related to disaster events for generation and dissemination of early warnings and instructions to communities at risk; and, b) better integrating SOPs and resources at emergency response agencies, fire services personnel, and District governments. Envisaged improvements to early warning systems include enhancing the capacity of NDMA to disseminate information efficiently and timely to the key stakeholders.

Sub-Component 2.3: Project Management

The sub component includes formulation and implementation of awareness and communications strategy which will be undertaken through consulting services. The project will be managed through a Project Implementation Unit (PIU) which will support the NDMA in implementing the project, encompassing: (i) incremental operating costs, including recruitment of additional short- term resources not readily available within the Department; (ii) consultancy costs – including engagement of Project Implementation Support and Supervision Consultant (PISSC); and (iii) expenditures on fiduciary systems, safeguards requirements, and GRM.

2.1.3. Component 3: Contingency Emergency Response Component

This component will support preparedness and rapid response to a natural disaster, emergency, and/or catastrophic event as needed. The provisional zero cost for this component will allow for rapid reallocation of credit proceeds from other components under streamlined procurement and disbursement procedures. Following an adverse natural event that causes a major natural disaster, the Government of Pakistan may request the Bank to re-allocate

project funds to this component (which presently carries a zero allocation of credit proceeds) to support response and reconstruction. The component would hence allow the GoP to request the Bank to re-categorize and reallocate financing from other project components (1 and 2) to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available as a result of the emergency.

2.1.4. Project Area

The project will be implemented in Islamabad Capital Territory, and Punjab, Sindh, Balochistan and KPK provinces of Pakistan. The map of the project area is provided as **Figure 2.1**. Initially the project infrastructure development includes the establishment of Monsoon Monitoring Center Islamabad and Weather Surveillance Radar (WSR) in Lahore, which will be built on existing PMD owned offices. Expansion of other PMD facilities and installation of AWS will most likely be at existing PMD stations and offices or government owned land in Pakistan. NDMA Headquarters in Islamabad will also be constructed, however, this is not anticipated to be in the first phase of the project. The locations of additional infrastructure development will be finalized in the second phase of the project.

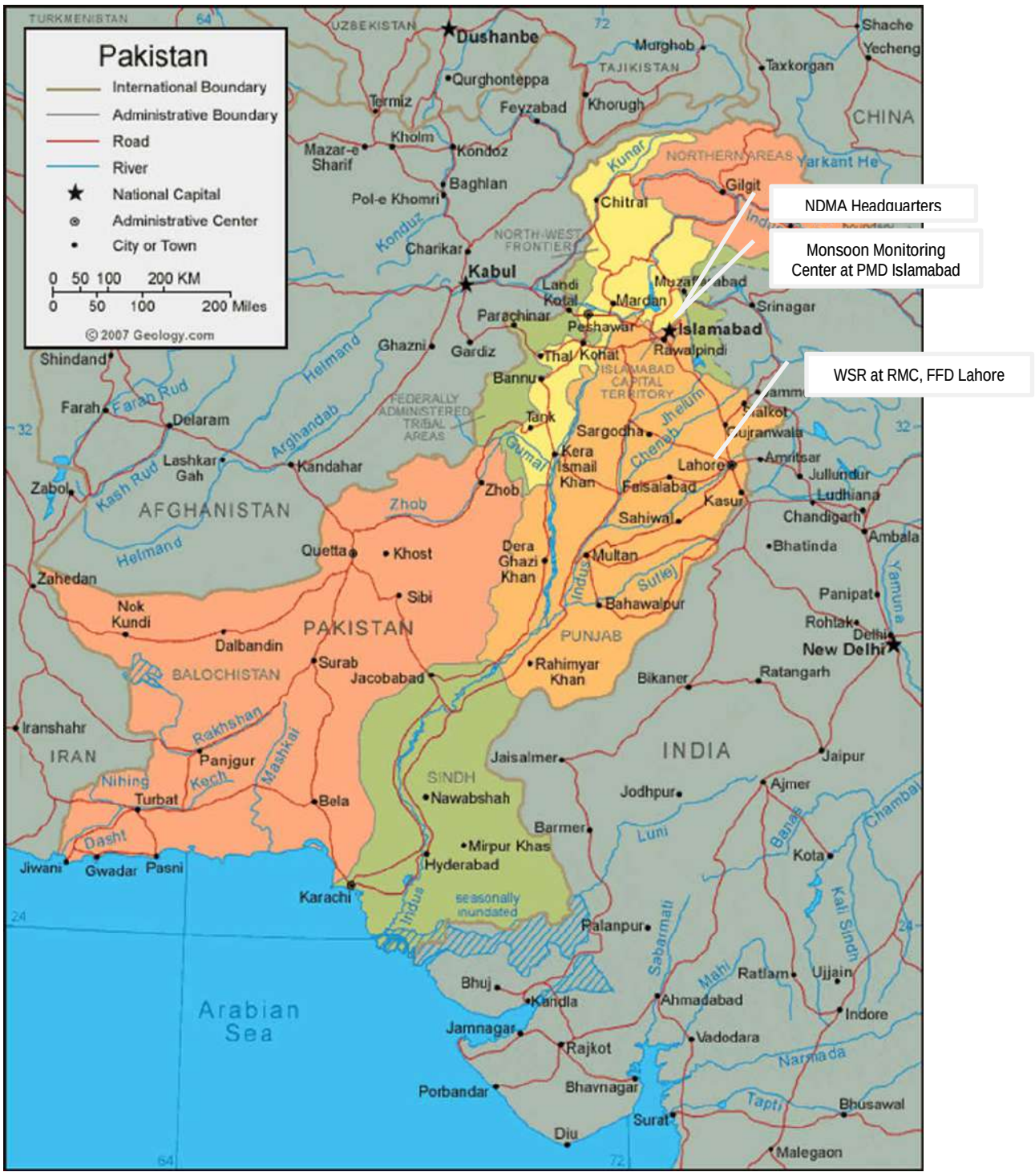

Figure 2.1: Project Area

2.2. Analysis of Project Alternatives

2.2.1. No Project Option

Pakistan continues to be one of the most flood-prone countries in the South Asia Region (SAR); having suffered US$18 billion in losses between 2005 and 2014 (US$10.5 billion from the 2010 floods alone), equivalent to around 6 percent of the federal budget.[16] Hydromet hazards have been coupled with rapid population growth and uncontrolled urbanization, leading to a disproportionate and growing impact on the poor. The frequency and quantity of precipitation in Pakistan is becoming increasingly unpredictable. The severity of these hazards is likely to be exacerbated due to climate change. By 2030, annual average flood damages are projected to increase five-fold relative to 2010.[17] In addition, these extreme weather events create vulnerabilities in major natural asset-based sectors.

In view of the vulnerability of the country to multiple disasters and climate-related risks, strengthening of Disaster Risk Management system in Pakistan is considered strategic in assisting the Government to achieve its national and global commitments, especially the Five-Year Development Plan of the Government of Pakistan (GoP), SDGs, Nationally Determined Contributions (NDCs) and the Sendai Framework for Disaster Risk Reduction (SFDRR) which among many other things, emphasize upon disaster-specific resilience in light of risk-informed development. The Project, by enhancing the capacity of PMD and NDMA is likely to contribute to a reduction in economic losses caused by floods and droughts, increase agricultural productivity, and increase efficiency of disaster risk management and food security interventions due to enhanced preparedness of targeted vulnerable communities. It will also provide an opportunity to substantially improve services to the following key sectors of the economy:

Disaster Management

National Disaster Management Authority and Provincial Disaster Management Authorities (PDMAs), the country's early warning system will be enhanced with reliable information. At present manual and rudimentary support is available that leaves enormous scope for diminishing the loss of lives, livelihoods and assets.

Agriculture

The Provincial Agriculture Departments (PADs) will benefit by improved information flow. Different forecast timescales from short-range to seasonal forecasts and agro-meteorological advisories are expected to enhance the productivity of farmers (more optimal planting and harvesting dates, reduced crop failure and post-harvest losses, more optimal use of inputs) leading to significant improvement in food security system;

Energy

Water and Power Development Authority (WAPDA)/Ministry of Water and Power and Provincial Irrigation Departments (PIDs) will gain benefits from installation of Hydrological models applied for data analysis result in more efficient use of hydropower potential.

[16] World Bank (2015) Fiscal Disaster Risk Assessment Options for Consideration: Pakistan. Chapter 1, page 2. https://openknowledge.worldbank.org/handle/10986/21920
[17] http://floods.wri.org/#/country/170/Pakistan

Aviation

Improved services will enhance safety and optimize use of fossil fuels for Aviation Division.

Given the project development objective, it should result in strengthening institutional capacity, contribute to a reduction in economic losses and decrease vulnerability through more efficient disaster risk management, increased food security and enhanced preparedness. In case there is no project, the objective of strengthening Disaster Risk Management system in Pakistan to assist the Government to achieve its national and global commitments will not be accelerated, which will result in continued vulnerability and economic losses for the country. Hence no project option sustains the status quo which is not beneficial for the economy, vulnerable communities, and the state.

2.2.2. Project Site Alternatives

Alternative project sites are considered when the project location is sensitive to environmental and/or social impacts associated either to the construction works or due to the operation of the facility constructed. This project currently suggests physical works to install new Weather Surveillance Radar (WSR) in Lahore and construct a Monsoon Monitoring Center and NDMA Headquarters in Islamabad; and proposes the installation of Automatic Weather Stations across the country, the locations of which are not confirmed yet. An analysis of alternative locations for sub-projects locations will be provided in the ESMPs prepared for each specific project site.

Chapter 3. Regulatory Framework

This chapter presents a review of national and provincial regulatory frameworks and the World Bank's safeguard policies. These legislations and safeguard policies, and their relevance to the proposed project, are briefly discussed below.

3.1. Constitutional Provision

Before 18th Amendment in the constitution of Pakistan, the legislative powers were with federal parliament and legislative assemblies of four provinces of Pakistan. If a particular legislation passed by the provincial assembly came into conflict with a law enacted by the national assembly, then according to constitution, the federal legislation will prevail over provincial legislation to extend the inconsistency. The subject of environmental pollution and ecology were in Concurrent Legislative List of the constitution thus allowing both federal and provincial government to enact laws on this subject. However only federal government has enacted laws on environment and the provincial environmental institutions derived their power from federal law.

After the 18th amendment in 2010, the concurrent list has been abolished and a limited number of subjects on the list have been included in the federal legislative list, whereas, the provincial governments have been given powers to legislate on the subjects transferred to provinces. The provision of the 18th Amendment which has a direct impact on the subject of 'Environment' is section 101(3), whereby the Concurrent Legislative List and the entries thereto from 1 to 47 (both inclusive) have been omitted from the Fourth Schedule. The power to legislate and decide on the subject of "environmental pollution and ecology" now lies with the provincial government, however, climate change remains under federal jurisdiction.

3.2. National and Provincial Laws

3.2.1. Environmental Protection Acts

The Pakistan Environmental Protection Act (PEPA) is the apex environmental law in the country, and provides for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and for promotion of sustainable development. Section 12 of the Act requires preparation of Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) before commencement of projects likely to cause adverse environmental effects. Immediately after 18th amendment the provinces adopted PEPA 1997 with amendments. Environmental protection acts relevant to the project include following:

1. Pakistan Environmental Protection Act (For Islamabad and Federally Administered Tribal Areas)
2. Punjab Environmental Punjab Environmental Protection Act (Amendment 2012) Sindh Environmental Protection Act 2014
3. Balochistan Environmental Protection Act 2013
4. KPK Environmental Protection Act 2014

The relevant sections of IEE and EIA in provincial acts is given in **Table 3.1.**

Table 3.1: Relevant sections covering IEE and EIA in provincial legislations

EPAs	IEE/EIA Section
Punjab Environmental Protection Act (Amendment 2012)	Section 12
Sindh Environmental Protection Act 2014	Section 17
Baluchistan Environmental Protection Act 2013	Section 15
KPK Environmental Protection Act 2014	Section 13
Pakistan Environmental Protection Act (For Islamabad and Federally Administered Tribal Areas)	Section 12

3.2.2. Environmental Protection Agency Review of IEE & EIA Regulations, 2000

These Regulations define procedures for preparation, review and approval of environmental assessments has been adopted by all the provinces. The projects falling under any of the categories listed in Schedule-I require preparation of Initial Environmental Examination (IEE) report, whereas those falling under categories listed in Schedule-II require preparation of detailed study, the Environmental Impact Assessment (EIA).

The sub-project in component 1.2 and 2.2 requires construction and refurbishment of office building in urban area therefore the project falls in urban development category I of IEE/EIA regulation thus requiring an IEE for Monsoon Research Center and NDMA Complex in Islamabad and Radar Station in Lahore. If an IEE is conducted and submitted to the EPAs, it is shared with public by virtue of law. Therefore, disclosure requirements of both bank and local regulatory requirement will be fulfilled. Apart from that information about different projects under progress are monitored by the M&E Directorate and they publish some data on their website. The IEE/EIA Regulation 2000 is attached as Annexure 1.

3.2.3. Environmental Quality Standards, 2000

The National Environmental Quality Standards (NEQS) have been adopted by all the provincial environmental protection departments/agencies; therefore, it will be followed for the project component 1.2 and 2.2. According to the World Bank policy compliance to all local statutory requirements is compulsory during project execution. NEQS first promulgated in 1993 and have been amended in 1995 and 2000. They have been revised and the latest NEQS were issued in 2010.These standards are also stringent with the International NEQs Regulation.

NEQS for Ambient Air – November, 2010 state the Maximum allowable concentration of pollutants (9 parameters) in gaseous emissions from vehicle exhaust.

NEQS for Drinking Water Quality – 2010 describe the drinking water properties by outlining the defined physical and chemical parameters.

NEQS for Noise – November 2010 states the maximum allowable limit of noise arising from vehicles in decibels (dB) separately for day and night times.

NEQS for Waste Effluents –2000 states the Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea.

These standards apply to the gaseous emissions and liquid effluents discharged by construction and post construction activities. The standards for vehicles will apply only

during the construction phase of the subproject. Standards for ambient air quality have also been prescribed. The detailed NEQS are included in Annexure 2.

3.2.4. Forest Protection Laws and Rules

Since the project interventions will be carried out in four provinces including capital territories, the laws and rules relevant for the protection and conservation of forest, fisheries and wildlife in the country are listed below. However at present project sites do not fall in designated forest zones. These regulations will only be applicable in circumstances pertaining to the requirement of the laws.

1. The Forest Act 1927 Amended 2016
2. Hazara Forest Act, 1936.
3. KPK Forest Ordinance 2002
4. Sindh forest Act 2012
5. Balochistan Forest and Wildlife Act 2014
6. Punjab Firewood and Charcoal (Restriction) Act 1964
7. Punjab Forest (Sale of Timber) Act 1913
8. Punjab Plantation and Maintenance of Trees Act 1974
9. Punjab Land Preservation Act

3.2.5. The Antiquities Act (1975)

It ensures the protection of Pakistan's cultural resources. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GOP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the project proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, GOP, any archaeological discovery made during the course of the project.

3.2.6. The Public Health (Emergency Provision) Act 1954 read with West Pakistan Epidemic Control Act 1958

These two laws cover the presentation and spread of human diseases, safeguarding the public health and providing and maintaining adequate medical services and other services essential to the health of the communities in the project area.

3.2.7. Explosives Act 1884

Under the Explosives Act 1884, the project contractors are bound by regulation on properly and securely handling, transporting and using explosive quarrying, blasting and other purposes.

3.2.8. Labour Law Constitutional Provision

The Constitution of Pakistan contains a range of provisions with regards to labour rights found in Part II: Fundamental Rights and Principles of Policy.

- Article 11 of the Constitution prohibits all forms of slavery, forced labour and child labour;
- Article 17 provides for a fundamental right to exercise the freedom of association and the right to form unions;
- Article 18 proscribes the right of its citizens to enter upon any lawful profession or occupation and to conduct any lawful trade or business;
- Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone;
- Article 37(e) makes provision for securing just and humane conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment.

The acts related to labour laws are Factories Act 1934, Employment of Child Act, 1991 are the most relevant to the project.

3.2.9. Employment of Child Act, 1991

Article 11(3) of the constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mine, or any other hazardous employment. In accordance with this article, the ECA 1991 disallows such child labor in the country. The ECA defines a child to mean a person who has not completed his/her fourteenth year of age. The ECA states that no child shall be employed or permitted to work in any of the occupations set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the act is carried out.

3.2.10. Islamabad Capital Territory Zoning Regulation 2005

The main administrative authority of the city is Islamabad Capital Territory Administration (ICT) with some help from Capital Development Authority (CDA) which oversees the planning, development, construction, and administration of the city. Islamabad Capital Territory is divided into eight zones: Administrative Zone, Commercial District, Educational Sector, Industrial Sector, Diplomatic Enclave, Residential Areas, Rural Areas and Green Area. Islamabad city is divided into five major zones: Zone I, Zone II, Zone III, Zone IV, and Zone V. Zone I consists mainly of all the developed residential sectors.

A. Un-acquired Sectoral Areas in these areas of Zone-1,

- land shall be acquired under a phased program and developed by the Authority in accordance with the land use pattern spelled out in the Master plan;
- no sale/ purchase of land which entails change in land use shall be allowed;
- no construction of houses or buildings shall be allowed. However, repair of old houses and expansion of existing houses may be allowed by the Authority to the native residents subject to the conditions that the site is located within the main body of the village. The covered area of such construction shall not exceed 1000 Square feet including expansion and such permission shall not in any way impede the right of the Authority to acquire the property whenever needed and

- no private scheme of any kind whatsoever shall be allowed, except in sector E-11, Schemes in E-11 will regulated according to the provisions applicable to schemes in Zone-2

This does not apply for the proposed project as the land is already under the ownership of PMD. Zone II consists of the under-developed residential sectors. Zone III consists primarily of the Margalla Hills National Park. Rawal Lake is in this zone. Zone IV and V consist of Islamabad Park, and rural areas of the city. The Soan River flows into the city through Zone V.

3.2.11. Motor Vehicles Ordinance, 1965, and Rules, 1969

The Motor Vehicles Ordinance, 1965, was extended in 1978, to the whole of Pakistan. The ordinance deals with the powers of motor vehicle licensing authorities and empowers the Road Transport Corporation to regulate traffic rules, vehicle speed and weight limits, and vehicle use; to erect traffic signs; and to identify the specific duties of drivers in the case of accidents. It also describes the powers of police officers to check and penalize traffic offenders at the provincial level. At the same time, the ordinance also empowers the Regional Transport Authority to operate as a quasi-judicial body at the district level to monitor road transport, licensing requirements, and compensations for death or injury to passengers on public carriers.

3.2.12. Pakistan Penal Code, 1860

The Pakistan Penal Code deals with offences where public or private property and/or human lives are affected due to the intentional or accidental misconduct of an individual or body of people. In the context of environment, the Penal Code empowers the local authorities to control noise, noxious emissions and disposal of effluents. Chapter XIV, Section 268 to 291 of PPC deals with the offences affecting the public health, safety, convenience, decency and morals. A Person may be guilty of public nuisance if his act or omission causes common injury, danger or annoyance to the public or results in spread of diseases dangerous to life. The section also deals with environmental pollution. Provisions under this Act relating to environment are no longer being enforced after promulgation of the Pakistan Environmental Protection Act, 1997. The NEQS enforced by the EPAs supersede the application of this legislation on industries and municipalities. The Penal Code, however, can provide a basis for the client to coordinate its activities with the local authorities to ensure that its construction activities do not become a cause of public nuisance or inconvenience. Pollution offences can still be tried under the relevant sections of Pakistan Penal Code, 1860, as they have not been specifically repealed by a subsequent legislation.

3.2.13. Building Code of Pakistan (Seismic Provisions-2007)

The Pakistan Engineering Council governs the application of Building Code of Pakistan (Seismic Provisions-2007). Prior to the start of construction the proposed sub project will take design approval from PEC. The obligates following;

- The provisions of the Building Code of Pakistan (Seismic Provisions-2007) shall apply for engineering design of buildings, like structures and related components.
- Construction of buildings in violation of the Building Code shall be considered as violation of professional engineering work as specified under clause (XXV) of section 2 of the Act.

The project will comply with the seismic provision during building design.

3.2.14. Provincial Local Government Ordinances, 2001

These ordinances, issued following the devolution process, establish regulations for land use, the conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety.

3.2.15. Factories Act, 1934

The clauses relevant to the project are those that concern the health, safety and welfare of workers, disposal of solid waste and effluent, and damage to private and public property. The Factories Act also provides regulations for handling and disposing of toxic and hazardous materials. Given that construction activity is classified as 'industry', these regulations will be applicable to the project contractors.

3.2.16. Land Acquisition Act 1894

The Land Acquisition Act (LAA) 1894 is a law for the acquisition of land and implemented to fulfil the needs of government and companies for land required by them for their projects, and secondly, to determine and pay compensation to those private persons or bodies whose land is to be acquired. The experience of the power of acquisition has been limited to a cash compensation policy purposes. The LAA is limited to a cash compensation policy for the acquisition of land and built-up property, and damage to other assets such as, crops, trees and infrastructure. The LAA does not take into account the rehabilitation and settlement of displaced population and restoration of their livelihoods. Presently, the requisite land for the proposed project is already owned by the project proponent, so that no additional private or government land will need to be acquired for the project. The LAA regulates the land acquisition process and enables the provincial governments to acquire private land for public purposes. Land acquisition is a provincial responsibility and provinces have also their own province specific implementation rules. The LAA and its Implementation Rules require that, following an impact identification and valuation exercise, land and crops are compensated in cash at the current market rate to titled landowners. The LAA mandates that land valuation is to be based on the last 3 to 5 years average registered land-sale rates. However, in several recent cases, the median rate over the past 1 year, or even the current rates, have been applied with an added 15% Compulsory Acquisition Surcharge according to the provision of the law. The project affected persons (PAPs), if not satisfied, can go to the Court of Law to contest the compensation award of the Land Acquisition Collector (LAC). The various sections relating to the land acquisition are briefly discussed.

Section 4 refers to the publication of preliminary notification and power for conducting survey. The Section 5 relates to the formal notification of land for a public purpose and 5 (a) covers the need for inquiry.

Section 6 refers to the Government makes a more formal declaration of intent to acquire land.

Section 7 indicates that the Land Commissioner shall direct the LAC to take order for the acquisition of land. The LAC has then to direct that the land required to be physically marked out measured and planned under Section 8.

Section 9 allows the LAC to give notice to all DPs that the Government intends to take possession of the land. If they have any claims for compensation then these claims are to be made to him at an appointed time, while the Section-10 delegates power to the LAC to record

statements of DPs in the land to be acquired or any part thereof as co-proprietor, sub-proprietor, mortgagee, and tenant or otherwise.

Section 11 enables the Collector to make inquiries into the measurements, value and claim and issue the final "award". The award includes the land's marked area and the valuation of compensation and the LAC has made an award under Section 11, LAC will then take possession and the land shall thereupon vest absolutely in the Government, free from all encumbrances. The section 18 reveals that in case of dissatisfaction with the award, DPs may request the LAC to refer the case onward to the court for a decision.

Section 23 refers to the award of compensation for the owners for acquired land is determined at its market value plus 15% in view of the compulsory nature of the acquisition for public purposes, while the Section-28 relates to the determination of compensation values and interest premium for land acquisition.

Section 31 provides that the LAC can, instead of awarding cash compensation in respect of any land, make any arrangement with a person having an interest in such land, including the grant of other lands in exchange.

Section 35 refers to the temporary occupation of arable or waste land subject to the provision of Part VII of the Act. The provincial government may direct the Collector to procure the occupation and use of the same for such term as it shall think fit, not exceeding three years from the commencement of such occupation.

Section 36 provides the information relating to the power to entre and take possession, and compensation on restoration. On the payment of such compensation, or on executing such agreement or on making a reference under Section 35, the Collector may entre upon and take possession of the land, and use or permit the use thereof in accordance with the terms of the said notice.

3.3. World Bank Safeguard Policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for the bank and borrowers in the identification, preparation, and implementation of programs and projects. Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations.

Table 3.2: Safeguard Policies Applicability

Subject	Policy Reference	Triggered	Remarks
Environmental Assessment	OP/BP 4.01	Yes	The project is categorized as Category B for its envisaged impacts. ESMF is prepared accordingly.
Natural Habitats	OP/BP 4.04	No	This OP is not triggered as project interventions are not likely to be carried out within or near sensitive habitats.
Pest Management	OP 4.09	No	This OP is not triggered as project interventions are not likely to be carried out that require pest management
Forestry	OP 4.36	No	This OP is not triggered since the sub-projects will not be located near or inside the protected forest.
Safety of Dams	OP 4.37	No	This OP is not relevant since the proposed project does not involve construction of dams.

Subject	Policy Reference	Triggered	Remarks
Physical and Cultural Resources	OP/BP 4.11	No	This OP is not triggered as there are no physical or cultural heritage sites within or near the project area. However a grave yard is present at a reasonable distance from the project site.
Involuntary Resettlement	OP/BP 4.12	Yes	This OP is triggered as project sites for PMD expansion, NDMA Headquarters and Automatic Weather Stations may require removal of encroachments or acquisition of land from public or private land holders.
Indigenous Peoples	OP 4.10	No	There are no known indigenous people in the project area.
Disputed Areas	OP 7.60	No	Project does not fall in disputed areas
International Waterways	OP 7.50	No	Project does not fall in cross boundary waters
Bank Disclosure Policy	BP 17.50	Yes	Under the policy, the Bank would provide access to more information about projects under preparation, projects under implementation, analytic and advisory activities and Board proceedings

3.3.1. OP /BP4.01 Environmental Assessment

WB requires environmental assessment (EA) of projects proposed for their financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision-making. The borrower is responsible for carrying out the EA. According to World Bank safeguards policies, projects shall be classified as one of the following three categories, depending on the nature and extent of potential environmental and social impacts:

Category A: Projects of this type would have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the physical works.

Category B: A proposed project may have some adverse environmental impacts, but less adverse than those of Category A projects. These impacts are typically site-specific, few if any have irreversible impacts, and in most cases mitigation measures can be readily designed.

Category C: Projects of this type are likely to have minimal or no adverse environmental impacts.

This project is classified as "Category B" as per the WB safeguards category. Under OP 4.01 this ESMF has been prepared which is defined in the OP as "An instrument that examines the issues and impacts associated when a project consists of a program and/or series of sub-projects, and the impacts cannot be determined until the program or sub-project details have been identified."

Component 2.1 and 2.3 deals with the improvement and construction of office facilities and radar installation, which may potentially cause negative environmental and social impacts. Most of these impacts are likely to be small scale, localized, and reversible in nature. This ESMF has been prepared in accordance with this policy. ESMPs for activities taking place in the first phase of the project have been prepared as separate documents. The World Bank Safeguard Policies are included as **Annexure 3** whereas project initial screening form is included in **Annexure 4**.

3.3.2. WB OP 4.12 (Involuntary Resettlement)

The WB's experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks. This policy includes safeguards to address and mitigate these risks. The overall objectives of the Policy include:

1. Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs;
2. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs; and
3. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

The OP has been triggered to guide any land acquisition within the project, as well as to assist in removal of encroachments using entitlements and eligibility. Major resettlement is not anticipated within the Project, however encroachments on public lands are a possibility.

3.3.3. BP 17.50 World Bank Disclosure Policy

The World Bank reaffirms its recognition and endorsement of the fundamental importance of transparency and accountability to the development process. Accordingly, it is the Bank's policy to be open about its activities and to welcome and seek out opportunities to explain its work to the widest possible audience. The WB Disclosure Policy will be applicable for this project. Under the policy, the Bank would provide access to more information about projects under preparation, projects under implementation, analytic and advisory activities and Board proceedings

3.4. Environmental Code of Practices

Environmental Code of Practices (ECoPs) is to address less significant environmental impacts and all general construction related impacts of the proposed project implementation. The ECoPs provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues. The list of ECoPs is provided below. Detailed ECoPs can be found in **Annexure 5**.

- ECP 1: Waste Management
- ECP 2: Fuels and Hazardous Substances Management
- ECP 3: Water Resources Management
- ECP 4: Drainage Management
- ECP 5: Soil Quality Management
- ECP 6: Erosion and Sediment Control
- ECP 7: Borrow Areas Development & Operation
- ECP 8: Air Quality Management
- ECP 9: Noise and Vibration Management
- ECP 10: Protection of Flora

- ECP 11: Protection of Fauna
- ECP 12: Protection of Fisheries
- ECP 13: Road Transport and Road Traffic Management
- ECP 14: Construction Camp Management
- ECP 15: Cultural and Religious Issues
- ECP 16: Workers Health and Safety

3.5. World Bank Guidelines

The principal World Bank publications that contain environmental and social guidelines are listed below.

- Environment, Health, and Safety (EHS) Guidelines prepared by International Finance Corporation and World Bank in 2007
- Pollution Prevention and Abatement Handbook 1998: Towards Cleaner Production
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross-Sectoral Issues.
- Social Analysis Sourcebook.

3.5.1. Environmental, Health, and Safety (EHS) IFC General Guidelines

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors. The proposed sub project does not fall in the category of sector specific guidelines, therefore; only EHS guidelines will be applicable to the pre-construction, construction and post construction activities. The construction contractor will follow the applicable guidelines.

3.6. International Conventions/Agreements

The following international conventions to which Pakistan is a signatory are relevant to project interventions:

Table 3.3: International Conventions

Category	Convention/convention	Came into force
Chemicals and hazardous wastes conventions	Stockholm Convention on Persistent Organic Pollutants	April 2008
	Rotterdam Convention on the Prior Informed Consent procedures for Certain Hazardous Chemicals and Pesticides in International Trade.	July 2005
	Basel Convention on the control of Trans-boundary Movement of Hazardous Wastes and their Disposal.	July 1994
Atmosphere conventions/protocols	United Nations Framework Convention on Climate Change (UNFCCC)	June 1994
	Kyoto Protocol to UNFCCC	Jan 2005
	Vienna Convention for the protection of the Ozone Layer.	Dec1992

Category	Convention/convention	Came into force
	Montreal Protocol on Substances that Deplete the Ozone Layer.	Dec 1992
Land / environmental cooperation conventions	United Nations Convention to Combat Desertification (UNCCD) in those Countries Experiencing Serious Drought and / or Desertification, Particularly in Africa.	Feb 1997
Cultural and natural heritage	Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention)	July 1976
Biodiversity related conventions/protocols	Convention on Biological Diversity (CBD).	July 1994
	Cartagena Protocol on Bio-safety to the Convention on Biological Diversity.	March 2009
	Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	Nov 1976
	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).	April 1976
	Convention on the Conservation of Migratory Species of Wild Animals (CMS)	Dec 1987

3.7. Gap Analysis of Land Acquisition Act & World Bank Policies

3.7.1. Comparison of LAA and WB Operational Policies

The LAA (1894) and the World Bank Involuntary Resettlement policy OP 4.12 principles specifically related to land acquisition and resettlement aspects compares as given in **Table 3.5** below. The objective of this exercise is to identify if and where the two sets of procedures are in conformity with each other and more importantly where there are differences and gaps. The key World Bank Involuntary Resettlement Policy Principles are:

- the need to screen the project early on in the planning stage,
- carry out meaningful consultation,
- at the minimum restore livelihood levels to what they were before the project,
- improve the livelihoods of affected vulnerable groups (iv) prompt compensation at full replacement cost and provide displaced people with adequate assistance,
- ensure that displaced people who have no statutory rights to the land that they are occupying are eligible for resettlement assistance and compensation for the loss of non-land assets and
- disclose of all reports.

Table 3.4: WB OP 4.12 Involuntary Resettlement & Pakistan Land Acquisition Act

World Bank Involuntary Resettlement Policy Principles	Pakistan's Land Acquisition Act	Approaches to Address the GAPs
Screen the project early on to identify past, present, and future involuntary resettlement impacts and risks. Determine the scope of resettlement planning through a survey and/or census of displaced persons, including a gender analysis, specifically related to resettlement	No equivalent requirements	Screened and categorized. Scope defined, social assessment and gender analysis

World Bank Involuntary Resettlement Policy Principles	**Pakistan's Land Acquisition Act**	**Approaches to Address the GAPs**
impacts and risks.		undertaken.
Carry out meaningful consultations with affected persons, host communities, and concerned nongovernment organizations. Inform all displaced persons of their entitlements and resettlement options. Ensure their participation in planning, implementation, and monitoring and evaluation of settlement programs. Pay particular attention to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, and Indigenous peoples, and those without legal title to land, and ensure their participation in consultations. Establish a grievance redress mechanism to receive and facilitate resolution of the affected persons‟ concerns. Support the social and cultural institutions of displaced persons and their host population. Where involuntary resettlement impacts and risks are highly complex and sensitive, compensation and resettlement decisions should be preceded by a social preparation phase.	LAC or District Judge (in Case of the Telegraph act) Are the final authorities to decide disputes and address complaints regarding quantification and assessment of compensation for the affected lands and other assets?	Complaints and grievances are resolved informally through project grievance redress mechanisms. Consultations conducted, vulnerable groups identified and supported as relevant.
Improve, or at least restore, the livelihoods of all displaced persons through (i) land-based resettlement strategies when affected livelihoods are land based where possible or cash compensation at replacement value for land when the loss of land does not undermine livelihoods,(ii) prompt replacement of assets with access to assets of equal or higher value, (iii) prompt compensation at full replacement cost for assets that cannot be restored, and (iv) additional revenues and services through benefit sharing schemes where possible.	No equivalent requirements.	Livelihoods restoration is required and allowances are provided. Provided as relevant.
Provide physically and economically displaced persons with needed support	No equivalent requirements.	Support provided to be commensurate with impacts

Chapter 4. Assessment of Environmental and Social Baseline

The chapter describes the baseline information related to the physical, biological and socio-economic environment of the project area of the proposed development.

4.1. Project Area

The project area in the document refers to the area where project interventions and components will be executed. The project area for Pakistan Hydro-Meteorological and DRM Services includes districts of Punjab, Sindh, Baluchistan and KPK province and Islamabad Capital Territory. Map showing the provinces and major cities of Pakistan is provided in **Figure 2.1**. Construction and rehabilitation work has been identified for component 1.2 and 2.2 of the project. As project activities will be across Pakistan, national level environmental and social baselines have been provided in this ESMF. Detailed site specific baselines will be included in Environmental and Social Management Plans (ESMPs) developed for each sub-project.

4.2. Physical Environment

The physical environment includes the abiotic component of the environment on which biological life is dependent to survive. The physical environment of the project area is explained below:

4.2.1. Climate

Pakistan's topographical features range from high mountains in the north to the coastal plains in the south. Climatic divisions of Pakistan include Zone A of highland climate prevailing over northern, north-western and western mountains, Zone B of lowland climate, which prevails over the whole of the Indus Plain, Zone C of coastal climate experienced by the Makran Coast, Karachi Coast and Indus Delta till the Rann of Kutch and Zone D of arid climate that prevails the south-eastern desert and south-western part of Balochistan.

4.2.2. Topography

Pakistan can be divided into three major Physiographic units:

1. northern mountains
2. the western highlands and
3. the Indus plain.

In addition to these three, a relatively small physiographic division comprises Potohar plateau and Salt Range in the Punjab occupying the north-western section of the Indus plain. The vast drainage area of the Indus corresponds roughly to the provinces of Punjab and Sindh. The plain in Punjab varies from about 150 to 300 meters and consists of fine alluvium deposited by the Indus, and its five tributaries, i.e. Jhelum, Chenab, Ravi, Sutlej and Beas. At lower altitude towards south in Sindh, the plain differs in characteristics and is formed by the deposit of only one river, i.e. the Indus and the alluvium here is of more recent character. The Indus plain is bounded on the west by highlands which are lower than northern mountain in

altitude and are also comparatively more arid. The aridity increases in these highlands from KPK Province in the north to the Baluchistan province in the south.

4.2.3. Surface Water Hydrology

Pakistan can be divided into three main units in terms of hydrology, Indus Basin, closed basin of Kharan desert and the Makran coastal basin. The Indus basin covering some 360,000 sq. miles is the largest. Besides its five main tributaries including Jhelum, Chenab, Ravi and Sutlej in the Punjab, the Indus River is also drained by Kabul and its main tributaries from Swat, Chitral and Panijkora as well as Kurrum and Gomal rivers of KPK. The rivers of the closed basin such as Mashkel and Zangi Nawar disappear into lakes such as Hamuni-Mashkel and Haimun-i-Lora. The Makran Coast Rivers, the two principal amongst which are Hingol and Dasht drain into the Arabian Sea east of Indus River.

4.2.4. Natural Hazard Vulnerability

Earthquake

National Seismic Monitoring Centre of Pakistan at the PMD issued the seismic zone map for Pakistan, as shown in **Figure 4.1**. Zone 1-minor to no damage, Zone 2-minor to moderate, Zone 3-moderate to severe and Zone 4 indicates severe damage to the infrastructure and topography. The geotectonic movement of the whole region is related to the collision of the Indian tectonic plate with Eurasian plate and subsequent formation process of the Himalayan Ranges. This tectonic process is the origin of the seismicity along the Himalayas and in particular where northern Pakistan and Kashmir are located.

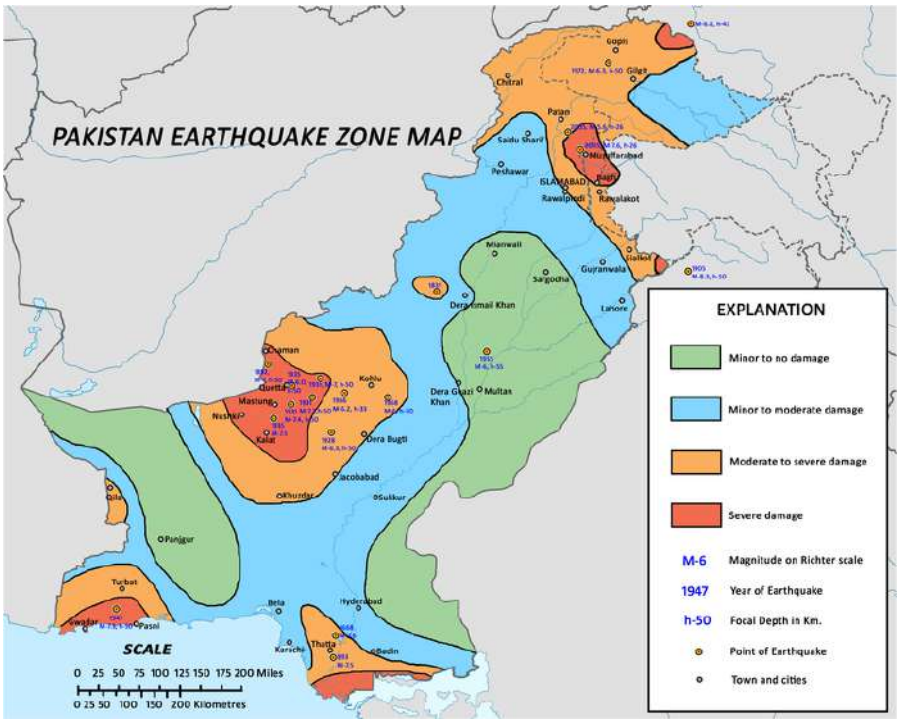

Figure 4.1: Seismic Zones of Pakistan[18]

[18] National Seismic Monitoring Center, Pakistan Meteorological Department (PMD)

Floods

The project locations for Automatic Weather Stations in various parts of Pakistan will be prone to floods. Floods of 2010 began in late July 2010, resulting from heavy monsoon rains in the KPK, Sindh, Punjab and Baluchistan regions of Pakistan and affected the Indus River basin. Approximately one-fifth of Pakistan's total land area was underwater; the floods directly affected about 20 million people, mostly by destruction of property, livelihood and infrastructure, with a death toll of close to 2,000. Again in 2015 starting from late July, heavy rains continued to fall in northern and eastern Pakistan causing floods. District Chitral in KPK was badly impacted. Over 800,000 people across 2,200 villages in the five affected provinces were displaced[19] . **Figure 4.2** is a map indicating the areas of the project most likely to be impacted in case of flood based on the 2010 flooding pattern**.**

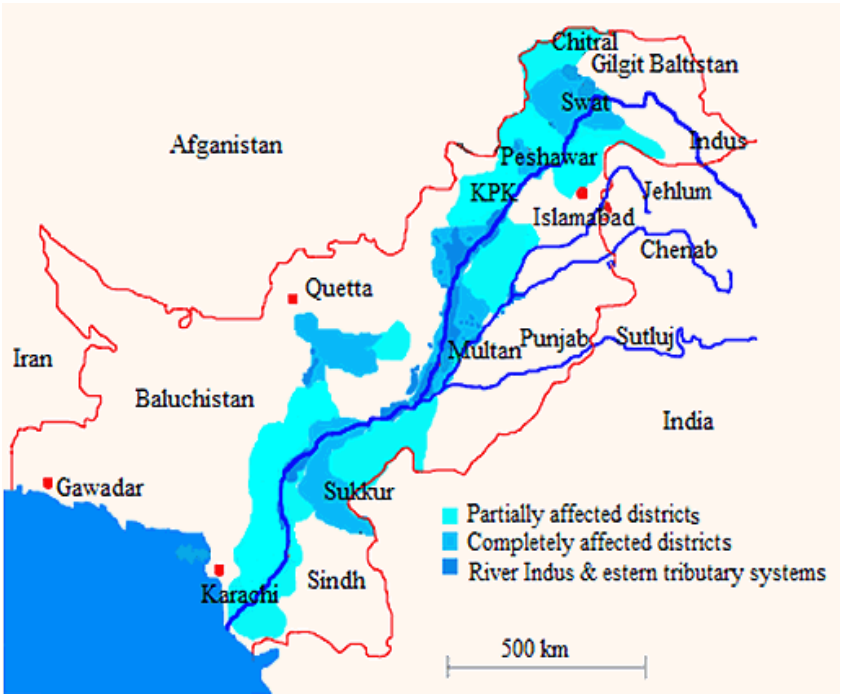

Figure 4.2: Impacted Area of Floods 2010[20]

4.2.5. Ground Water

Groundwater availability is limited in Pakistan and poses a severe problem for water supply. Worst affected are the most arid regions of Baluchistan and the southeast of Pakistan. Prior to the development of irrigation systems, groundwater tables in the Indus Plain were typically 20-30m below surface, which have now gone down to 30-300m in major cities. The problem is exacerbated by over abstraction of ground water, as quantity has traditionally been a priority over quality in Pakistan. A recent study to investigate groundwater quality and monitoring strategy has indicated a distinct paucity of chemical data[21] .From the limited data available, it appears that the most recognised water quality problem is poor microbial quality within distribution systems which can lead to severe health problems[22] . High salinity has led

[19] NDMA Annual Report 2010-www.ndma.gov.pk
[20] National Disaster Management Authority (NDMA)
[21] Chilton, P.J., Jamieson, D., Abid, M.S., Milne, CJ., Ince, M.E. and Aziz, J.A. 2001. Pakistan water quality mapping and management project. Scoping study. LSHTM/WEDC Report to DFID.
[22] Hina, S. 2000. Bacterial contamination major cause of groundwater pollution. http//lists.isb.sdnpk.org/pipermail/eco-list/2000/2000-September/000355.html.

to restrictions in resource availability. Excessive fluoride is an additional common problem. Recent well testing of sources within the Indus Plain has also identified some ground waters with unacceptably high concentrations of arsenic, however, the numbers of affected wells recognised is low.

4.2.6. Air Quality and Noise

Air pollution is considered to be a primarily urban problem in Pakistan as the rate of urbanization increases. In rural areas, air quality is considered to have been negatively affected in areas adjacent to industrial estates or isolated industrial plants set up outside city limits. Sufficient data Air Quality Monitoring at a national level is not available for the country, as such work has been done in isolation.[23]

4.3. Ecological Environment

Most of the covered area of Pakistan lies in arid and semi- arid region except for the southern slopes of the Himalayas and the sub-mountainous tract where the annual rainfall varies between 760 and 1270 mm. Depending on the topography, there is an extreme variation in the temperature of Pakistan. Within a relatively small area, the country has the equivalent of many of the world's most important climatic and vegetation zones or biomes[24]. Pakistan can be divided in to eleven ecological zones and nine main agro-ecological zones according to its distribution of flora and fauna[25]. About 80% of the country is arid and semi-arid, along with 12% sub-humid and 8% humid, having two distinct seasons (i.e. summer and winter). Monsoons bring the major portion of annual rainfall to most of the country in addition to winter rains, which are limited in quantity.

There are vast areas of arid and semi-arid habitat which host important biodiversity resources in the country. In addition, the Arabian Sea in south of the country is rich in phytoplankton and zooplankton[26]. The northern mountainous areas embracing the Himalayan, Karakorum and Hindukush Ranges are rich in fauna and flora, as compared to the south. These habitats support a variety of wild animals. The areas are difficult for human beings to access; hence, most wildlife is present in reasonable numbers. Some of the main wildlife species are the snow leopard, the black and the brown bears, otter, wolf, lynx, himalayan ibex, markhor, bharal, Marco Polo sheep, shapu, musk deer, marmots, tragopan and monal pheasants. The snow partridge and snow cock reside at higher elevations. The Rhesus monkey, common langur, red fox, black bear, common leopard, a variety of cats, musk deer (over a limited area), goral, several species of flying squirrels, chakor, partridge and pheasants (koklass, kaleej and cheer) live in the lower elevations. The main threats to the population of wild animals in the northern mountainous regions include, the competition with domestic livestock for existing natural forage, increasing human interference in the form of cultivation, the construction of roads, and hunting. The Himalayan foothills and the Potohar region, including the Salt Range and Kala Chitta Range, are covered with scrub forests, which have been reduced to scanty growth in most places. Medium-sized animals like the Punjab urial, barking

[23] State of the Environment Report, 2005; Pakistan Environmental Protection Agency
[24] National Biodiversity Strategy and Action Plan 2015, Government of Pakistan
[25] PARC 2009. Social Sciences Division & Crop Sciences Division, Pakistan Agricultural Research Council, Islamabad, Pakistan.
http://www.parc.gov.pk/agroeco.html.
[26] Parnetta, J.C. (Ed.) 1993. Marine Protected Areas needs in the South Asian Seas Region. Vol. 4 : Pakistan. In "A Marine Conservation and Development Report". Gland Switzerland: IUCN.
[26] *Biodiversity in Pakistan: Key issues (PDF Download Available)*. Available from: https://www.researchgate.net/publication/239936897_Biodiversity_in_Pakistan_Key_issues

deer, goral, chinkara, partridges (grey and black) and chakor are supported in these habitats. A variety of songbird fauna also occurs in these areas.

In the south, vast Indus flood plains have been cleared of natural vegetation to grow crops. This area does not have any endangered species. Only animals like the jackal, mongoose, jungle cat, civet cat, scaly anteater, desert cat and the wild hare occur in these areas. Hog deer is found in riverine tracts. The crop residues and wild growth support reasonable populations of black and grey partridges. Little vegetative cover, severity of climatic conditions and the great thrust of grazing animals on the deserts have left wild animals in a precarious position. Parts of Thall and Cholistan are now being irrigated, with the situation almost identical to that of the flood plains. Chinkara is the only animal, which can still be found in average numbers in Cholistan, but rarely in Thar. Grey partridge, species of sand grouse and the Indian courser are the main birds of the area. Peafowl occur in some areas in Cholistan.

4.3.1. Biodiversity

Pakistan is rich in biodiversity, particularly in the arid and semi-arid regions which cover almost 80% of the total land area. Similarly, the junction of three Zoogeographical regions in Pakistan; Ethiopian Region, Palearctic Region and Oriental region, also a major factor of a diverse fauna in the country[27]. With its dramatic ecology, broad latitudinal spread and immense altitudinal range, Pakistan spans a remarkable number of the world's ecological regions. These range from the mangrove forests fringing the Arabian Sea to the spectacular mountaintops where the Western Himalayas, Hindukush and Karakorums meet. Terrestrial biomes of Pakistan range from deserts in the south to the mountain ranges of the Himalayas, Karakorum, and Hindu Kush in the north and west. Of the total national land area, 62.7% constitutes wilderness, regions that are neither suitable for agriculture or for commercial forestry. Majority of these areas comprising of deserts, arid lands and mountains are either communally owned or state lands with undefined tenure and usufruct rights. Approximately 5.9 million hectares of these lands are designated as rangelands.[28]

4.3.2. Fauna

The ecological habitats OF Pakistan support a rich variety of species (plants, mammals, birds, reptiles, amphibians, fishes, invertebrates) that contribute to the overall biodiversity of Pakistan.There has been widespread conversion of tropical thorn forests in the Indus plains to agriculture. This has caused habitat loss for many species. At least ten ecosystems of special value for their species-richness and/or unique communities of flora and fauna are threatened with habitat loss and degradation. A number of the world's rarest animals like Indus River dolphin, Snow leopard, Western Tragopan, Markhor. Animal diversity of Pakistan is given in **Table 4.1**.

Table 4.1: Animal diversity of Pakistan[29]

Category	Total No. of Species	Endemic
Mammals	195	3
Birds	662	0
Reptiles	174	15
Fish	525	36
Amphibians	16	3
Invertebrates	2000+	unknown

[28] Government of Pakistan, 2005. Forests & Biodiversity Information/Data Report. Ministry of Environment, Government of Pakistan, Islamabad.
[29] Sources (Various): IUCN-WCMC (1991) Roberts (1991), GAA (2004), Sheikh & Akhtar (2005)
*Note: Includes thirteen sub-species.

4.3.2.1. Mammals

Order Mammalia is represented by about 195 species and subspecies in Pakistan. For many of these species, Pakistan contains the majority of the global population. List of mammals of Pakistan in included in **Annexure 6**. There are six endemic mammal species in Pakistan. Among two, the little known woolly flying squirrel (*Eupetaurus cinereus*), found in the northern mountain areas, and the Indus dolphin are endangered. Other threatened species include the Balochistan black bear, (*Ursus thibetanus gedrosianus*), the snow leopard and four ungulates: markhor (*Capra falconeri*), Marco Polo sheep (*Ovis ammon polii*), goitred gazelle (*Gazella subgutturosa*), and urial (*Ovis orientalis*).[30]

Mammals are the most threatened group of vertebrates around the global. Out of eighteen orders of the world's mammals (4,763 species), Pakistan has representative species of ten orders that are among the most threatened in the world. As in the world total 1137 species of mammals are threatened, among approximately 1026 species belong to the orders whose representative species are also found in Pakistan. Mammals of Pakistan include the world's smallest surviving mammal, the Mediterranean pigmy shrewas well as the largest mammal in existence today, the blue whale. Six endemic mammalian species reported include yellow desert bat (*Nyticeius pallidus*), wooly flying squirrel (*Eupetaurus cinereus*), pygmy gerboa (*Salpingotus michaelis*), Hotson's long-tailed hamster (*Calomyscus hotsoni*), Murree vole (*Hyperacrius wynnei*) and Indus river dolphin (*Platanista minor).* There are a number of other endemic or near-endemic subspecies like Chiltan markhor (*Capra falconeri chialtanensis*), Suleman markhor (*Capra falconeri jerdoni*), Pakistan sand cat (*Felis margarita scheffeli*), Balochistan bear (*Ursus thibetanus gedrosianus*), Punjab urial (*Ovis vignei punjabiensis*). The status of these species is disputed by taxonomists. Tiger (*Panthera tigris*) and swamp deer (*Cervus duvauceli*) have been reported to be extinct during this century, lion (*Panthera leo*) during the last century, and the Indian one-horned rhinoceros (*Rhinoceros unicornis*) about four hundred years ago[24]. Several species have been described as extremely rare or occurring in very small population on the borders of Pakistan, and of these, the cheetah (*Acinonyx jubatus*), Indian wild ass (*Equus hemionus khur*) and hangul (*Cervus elaphus hanglu*) are already regarded as being extinct in Pakistan (NCCW, 1978). Many other species like Indus dolphin, grey wolf, snow leopard, brown bear, Suleman markhor, lynx, Marcopolo sheep are among some of the threatened mammals in Pakistan. Most of species have declined in numbers due to a combination of threats such as habitat loss and overuse of natural resources.

4.3.2.2. Birds

A high percentage of Pakistan's birds are migratory; over 30% of recorded species are Palaeartic winter visitors. The Sulaiman Range, the Hindu-Kush and the Himalayas in KPK and federally administered areas comprise part of the Western Himalayan Endemic Bird Area.[31] Pakistan has 668 bird species of which one third are water birds. Majority of these are migratory species, including geese, ducks, swans, waders, and other water birds. Species that require urgent conservation attention include the Siberian Crane (*Grus leucogeranus*), the Sarus Crane (*Grus Antigone*), the Dalmatian Pelican (*Pelicanuscrispus*), the Sociable Plover (*Vanellusgregarious*), the Lesser White-fronted Goose (Ansererythropus), Pallas‟s Fish Eagle (*Heliaeetusleucoryphus)*, and White-backed and Indian vultures.[27] Two species of pheasants, the western tragopan (*Tragopan melanocephalus*), and the cheer pheasant (*Catreus wallichii*), together with the great Indian bustard (*Ardeostis nigriceps*) are listed as

[30] National Biodiversity Strategy and Action Plan 2015, Government of Pakistan
[31] Biodiversity of Pakistan, TJ Roberts,1997

endangered. Two significant populations of the western tragopan are found in the Pallas Valley of Kohistan and the Neelum Valley. Pakistan is the second most important wintering ground for the white-headed duck (*Oxyura leucocephala*).Complete list of birds is included as **Annexure 7.**

4.3.2.3. Reptiles

Over 195 species of reptiles are known in Pakistan. The list of reptiles of Pakistan 2016 is include in **Annexure 8.** Of these, 13 species are believed to be endemic. As with other groups, these are a blend of Palaearctic, Indo-Malayan and Ethiopian forms. The most distinctive heptrofauna is found in the Chaghai desert where 6 endemic species occur(including five lizards and one snake) are endemic to Pakistan and a further six species found only here and in bordering parts of Iran. Important populations of marine turtles nest on Pakistan's southern beaches. The coastal areas of Pakistan are nesting grounds of the green turtle (*Cheloniamydas*) and the olive ridley turtle (*Lepidochelysolivacea*).

Of the 72 snake species found in Pakistan, only 14 marine and 12 terrestrial snake species are poisonous; most well-known are the Indian cobra, common krait, saw-scaled viper and Russel's viper.

Green turtle (*Chelonia mydas*), the olive ridley turtle, (*Lepidochelys olivacea*), the gharial (*Gavialis gangeticus*), and the Central Asian cobra (*Naja oxiana*), mugger (*Crocodylus palustris*), central Asian monitor lizard (*Varanus flavescens*), Indian python (*Python molurus*) are among the internationally threatened species of reptiles in Pakistan (IUCN 1990).[32] The mugger (marsh crocodile) is in danger partially due to over hunting. The species is now nearly extinct and only occur in small numbers in Sindh and a few areas in Balochistan (Groombridge, 1988). The gharial is in a precarious situation, or maybe already extinct and has only been seen in small numbers between the Sukkur and Guddu barrages. In addition monitor species are heavily hunted for their skins.

4.3.2.4. Amphibians

As Pakistan is predominantly an arid and semi-arid country, it is not surprising that only 26 species of amphibians have been recorded. Amphibian fauna is scarce in Pakistan as not a single species of two vital amphibian orders, Caudata and Gymnophiona, exists here. These species fall in twelve genera of four major families viz., Bufonidae, Megophryidae, Microhylidae and Dicroglossidae[33]. The distribution of amphibian fauna in Pakistan elevates from sea level reaching up to 4000 meters in the Himalayas and Karakoram, stretching across the latitude from Indian boundary to its western borders [34]. Genus Duttaphrynus and Bufotes, family Bufonidae are the two widely distributed genera of toads in Pakistan. *Duttaphrynus himalayanus* is widely distributed throughout the Himalayan Mountains and has been reported in the neighboring countries including China and India whereas *Duttaphrynus melanostictus* is found mainly in Hazara division in Khyber Pakhtunkhwa province [35]. Olive toad, *Duttaphrynus olivaceus*, inhabits lowland areas of the North Western Balochistan whereas *Duttaphrynus stomaticus* is one of the most widely distributed and well adapted

[32] Biological Diversity in Pakistan, IUCN, 1997
[33] Frost DR. (2016). Amphibian Species of the World: an Online Reference. Version 5.2. Electronic Database. American Museum of Natural History, New York, USA.
[34] MS Khan. (2014). Conservation Biology of Amphibians of Asia. Amphibians of Pakistan and their conservation status. Heatwole H, Das I. (Eds.). Natural History Publications. Borneo. Kota Kinabalu
[34]Biodiversity in Pakistan: Key issues 2005
[35] Khan MS. (2001). Notes on cranial-ridged toads of Pakistan and description of a new subspecies (Amphibia: Bufonidae). Pakistan Journal of Zoology 33: 293-298.

anuran specie that thrives in most areas of Pakistan including both highlands and lowlands [36]. Most members of genus Bufotes including the *Bufotes psedudoraddei* (endemic), *Bufotes surdus*, *Bufotes zugmayeri* are distributed mainly in the western areas of Pakistan including Balochistan [37]while *Bufotes latastii* (Laddakh toad) is distributed on the Himalayan highlands (Skardu) [7][38]. The only member of family Megophryidae, Scutiger nyingchiensis, commonly known as Tibetian toad, is restricted to highlands of Deosai in the northern highlands [26]. List of Amphibians of Pakistan is included in **Annexure 9**. Members of family Microhylidae, Uperodon systoma, localized in the capital territory (North Punjab) and Murree hills are a secretive subterranean frog whereas *Microhyla oronata* shares same habitat [8] [39]as U. systoma [40]. Western, central, and eastern Himalayas (Kashmir, Hazara) houses the frogs of genus Allopaa (*Allopa hazarensis* and *Allopa barmoachensis*). Balochistan Karez frog, *Chrysopaa sternosignata*, extends throughout Balochistan province and Kashmir valley. It has been reported inhabiting the irrigating channels, karez in the Balochistan highlands. Grass fields of northwestern mountains of Pakistan and areas of Kashmir valley provide an ideal habitat to the altitude adapted *Scutiger nyingchiensis*[41]. Two species of genus Euphlyctis, wide ranging anuran members prefer plain areas especially in Punjab. Other species with high populations in plain areas include *Hoplobatrachus tigrinus*, *Fejervarya syhadrensis* and members of genus Sphaerotheca (*Sphaerotheca breviceps* and *Sphaerotheca strachani*). Genus Sphaerotheca is distributed mainly along the river channels and expands its habitat to thecoastal areas in Sindh [42]. North-central Pakistan and Kashmir valley is inhabited by the Murree frog, *Nanorana vicina* [43].

4.3.2.5. Fish

The National Biodiversity Strategy and Action Plan of 2015 identified 198 species of freshwater fish fauna in Pakistan. It is predominantly south Asian, with some west Asian and high Asian elements. The fish fauna of the northern areas of Pakistan comprises 20 restricted species. About 140 species of fish fauna, especially warm water fish is restricted to the Indus plain. Of these, the genus *Schistura* is restricted to sub-mountain areas while the genus *Triplophysaisis* mainly confined to high altitude regions. Snow trout are found in the Himalayas, Hindukush, and Karakoram mountain ranges and are not represented in the Indus plain.

4.3.2.6. Insects/Invertebrates

Geopolitically, Pakistan is considered as an important region, as have variable habitats and water resources in different forms like streams, snow, rivers and springs[44]. According to estimations of taxonomists, 14 million species present in world [45], among them only 2 million

[36] Auffenberg W, Rehman H (1977) Geographic variations in Bufo stomaticus, with remarks on Bufo olivaceus: biogeographical and systematic implications. Biodiversity of Pakistan. Mufti SA, Woods CA, and Hasan SA. Eds., eds., Mus. Nat.Hist. Islamabad, Pakistan. 351- 372.
37 MS Khan. (2014). Conservation Biology of Amphibians of Asia. Amphibians of Pakistan and their conservation status. Heatwole H, Das I. (Eds.). Natural History Publications. Borneo. Kota Kinabalu
[38] Khan MS (1997) A new toad of genus Bufo from the foot of Siachin Glacier, Baltistan, northeastern Pakistan. Pakistan Journal of Zoology 29: 43-48
[39] Rais M, Baloch S, Rehman J, et al. (2012). Diversity and conservation of amphibians and reptiles in North Punjab, Pakistan. Herpetological Bulletin 122: 16-25.
[40] Masroor R. (2011). An Annotated Checklist of Amphibians and Reptiles of Margalla Hills National Park, Pakistan. Pakistan J Zool 43: 1041-1048.
[41] Khan MS. (2006). Amphibians and Reptiles of Pakistan. Malabar, Florida: Krieger Publishing Company.
[42] Begum A, Ghalib SA, Khan MZ, et al. (2014). An overview of the current status and distribution of amphibians in Sindh. African Journal of Science and Research 3:21-23.
[43] Rais M, Abbassi S, Batool T, et al. (2014). A note on recapture of Nanorana vicina (Anura: Amphibia) from Murree, Pakistan. Journal of Animal and Plant Sciences Lahore 24: 455-458. [13] Khan MS. (1990). The impact of human activities on the status and distribution of amphibians in Pakistan. Hamdryad 15: 21-24.
[44] Zia A, Naeem M, Rafi MA, Naz F, Afsheen S, Ilyas M. Damselflies (Zygoptera: Odonata) of Pakistan: Part 1. Journal of Insect Science. 2011(11):102-110.
[45] Cherian PT. Getting the Measure of India's Insect Diversity: Perspectives on Biosystematics and Biodiversity. 2004, 1-666.

scientifically identified and named that indicate lack of information[46]. For Pakistan data is primary not vaialable. Eighty species of butterflies have been recorded in the northern mountains, many of which are endemic. Almost 80% of Pakistan's endemic flowering plants are confined to the northern and western mountains where the insectivore diversity is high[47].

4.3.3. Endangered Species

The number of endemic species and those considered as threatened with extinction are provided in IUCN red list. The IUCN Red List of threatened species lists 45 species of internationally threatened animals occurring in Pakistan. Of these, 4 are critically endangered, twelve are endangered and twenty nine are vulnerable. Out of these 45 species, 18 mammals, 17 birds, 9 reptiles, and one is fish. List of endangered species from IUCN Red List is included in **Annexure 10**.

4.3.4. Wildlife Protected Areas

The project interventions are not likely to be carried out in protected areas/ sanctuaries and national parks of Pakistan. Types of Protected Areas in Pakistan include:

10. National Parks: 27
11. Wildlife Sanctuaries: 99
12. Game Reserves: 102

The details of national parks are included in **Table 4.2** whereas area coverage in **Table 4.3** and map is included as **Figure 4.3**. [48]

Table 4.2: National Parks of Pakistan

#	National Park	Established	District(s)	Province
1.	Deva Vatala	2009	Bhimber	Federally Administered Areas
2.	Ghamot	2004	Neelum	
3.	Gurez	2009	Neelum	
4.	Machiara	1996	Muzaffarabad	
5.	Pir Lasura	2005	Kotli	
6.	Poonch River Mahaseer	2010	Kotli, Mirpur and Poonch	
7.	Toli Pir	2005	Poonch	
8.	Panjal Mastan	2005	Bagh District	
9.	Hazarganji-Chiltan	1980	Quetta	Balochistan
10.	Hingol	1988	Awaran, Gwadar and Lasbela	
11.	Ziarat National Park	2018	Ziarat	

[46] Narendran TC. An Introduction to Taxonomy. Zoological Survey of India publ. (ed. Director Zoological Survey of India) Kokatta, 2006, 1-80.
[47] *Biodiversity in Pakistan: Key issues 2005*
https://www.researchgate.net/publication/239936897_Biodiversity_in_Pakistan_Key_issues
[48] The detailed list of game reserves and wildlife sanctuaries is available at World Database on Protected Areas

#	National Park	Established	District(s)	Province
12.	Shandure-Phander National Park	2012	Ghizer	Gilgit Baltistan
13.	Central Karakoram National Park	1993	Gilgit and Skardu	
14.	Deosai	1993	Skardu	
15.	Khunjerab	1975	Gilgit	
16.	Qurumber	2011	Ghizer	
17.	Broghil Valley	2010	Chitral	KPK
18.	Chitral Gol	1984	Chitral	
19.	Lulusar-Dudipatsar	2003	Mansehra	
20.	Saiful Muluk	2003	Mansehra	
21.	Sheikh Buddin	1993	Dera Ismail Khan	
22.	Chinji	1987	Chakwal	Punjab
23.	Kala Chitta	2009	Attock	
24.	Lal Suhanra	1972	Bahawalpur	
25.	Margalla Hills	1980	Islamabad, Rawalpindi	
26.	Murree-Kotli Sattian-Kahuta	2009	Rawalpindi	
27.	Kirthar	1974	Dadu	Sindh

Table 4.3: Protected Areas of Pakistan by Province/Territory

Region/ Province	National Parks	Wildlife Sanctuary	Game Reserves	Un Classified	Total PAs	Total Area Conserved (ha)	% of Total Land Area Protected
Federally Administered Areas	01	00	08	00	09	51,998	3.91
Balochistan	02	15	07	07	31	1,837,704	5.29
Punjab	02	37	19	00	58	3,315,803	5.29
NWFP	03	06	38	05	52	470,675	6.30
Sindh	01	35	14	04	54	1,307,575	9.27
Federal Territory	01	01	01	00	03	94,186	100
Northern Areas	04	05*	09	00	18	2,092,180	2.97
Totals	14	99	96	16	225	9,170,121	10.40

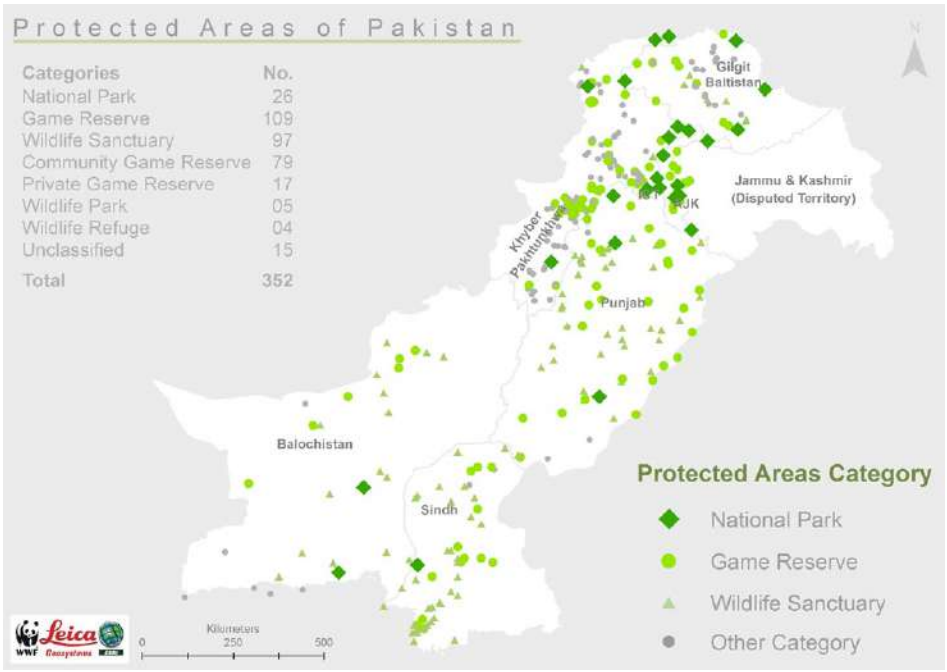

Figure 4.3: Map of Protected Areas of Pakistan

4.3.5. Flora

Pakistan's native flora reflects its varied climatic zones, which range from arid and semi-arid to temperate and tropical. The diversity of the landscape and climate in Pakistan allows a wide variety of trees and plants to flourish. There are 6000 species of flora in Pakistan with more than 430 tree species are distributed over 82 families and 226 genera. Out of these 22 species from 5 families and 11 genera belong to softwood trees of gymnosperms.The forests range from coniferous alpine and subalpine trees such as spruce, pine, and deodar cedar in the extreme northern mountains to deciduous trees in most of the country (for example, the mulberry-like shisham found in the Sulaiman Mountains), to palms such as coconut and date in the southern Punjab, southern Balochistan, and all of Sindh. The western hills are home to juniper, tamarisk, coarse grasses, and scrub plants. Mangrove forests form much of the coastal wetlands along the coast in the south. Differences of latitude, elevation, soil type, and climate have favoured a variety of plant growth. Drought-resistant vegetation in the desert consists of stunted thorny scrub, mostly acacia. The plains present a parkland view of scattered trees. Dry scrub forests, called *rakh*s, grow in parts of the arid plain. In the northern and northwestern foothills and plains, shrub forests, principally acacia, and wild olive are found. In the wetter parts of the northern and northwestern mountains, evergreen coniferous softwood forests, with some broad-leaved species, grow. Fir, deodar, blue pine (*Pinus wallichiana*), and spruce are the principal coniferous trees. At lower elevations, below 3,000 feet (900 metres), broad-leaved oaks, maples, birches, walnuts, and chestnuts predominate. Conifers are an important source of commercial timber. In the arid landscape of the Potwar Plateau, some hills are only thinly wooded. In the northern ranges of the Balochistan plateau are some groves of pine and olive. The babul tree (*Acacia arabica*) is common in the Indus River valley, as are many species of fruit trees. The country's forest cover is naturally sparse, but it has been diminished further by excessive timber cutting and overgrazing[49]. The floral biodiversity of Pakistan can be divided in to three zones:

[49] https://www.britannica.com/place/Pakistan/Plant-and-animal-life

4.3.5.1. Northern Highlands and Valleys

The northern highlands include lower elevation areas of Potohar and Kashmir regions and higher elevation areas embracing the foothills of Himalayan, Karakorum and Hindukush mountain ranges. These areas provide an excellent habitat for wildlife in the form of alpine grazing lands, sub-alpine scrub and temperate forests. At inaccessible areas, most wildlife is present in high numbers. The northern and north-western highlands of are covered with conifer and scrub forests, which have been reduced to scanty growth in most places. These occur from 1,000 to 4,000 m altitudes. Swat, Upper Dir, Lower Dir, Malakand, Mansehra and Abbottabad districts of Khyber Pakhtunkhwa (formerly North-West Frontier Province) are the main areas covered with coniferous forests. Pindrow fir (*Abies pindrow*) and Morinda spruce (*Picea smithiana*) occupy the highest altitudes, deodar (*Cedrus deodara*) and blue pine (*Pinus wallichiana*), the intermediate heights, and chir pine (*Pinus roxburghii*), occupy the lower areas. The biome is defined as north-western Himalayan alpine shrub and meadows[50].

4.3.5.2. Eastern Plains and Deserts

In most of Punjab and Sindh, the Indus plains have many fluvial landforms that support various natural biomes including tropical and subtropical dry and moist broadleaf forestry as well as tropical and xeric shrublands (deserts of Thal in Punjab, Tharparkar in Sindh) and kair (*Capparis aphylla*) which provide firewood. The riparain woodlands grow in narrow belts along the banks of River Indus and its tributaries. Main tree varieties are of sheesham and babul and main shrub varieties are reed beds and tamarisk (*Tamarax dioica*) bushes. The southern part across River Indus and its numerous eastern tributaries of Chenab, Ravi, Sutlej, Jhelum, Beas are spread across most of Punjab. The plain of river Indus continues towards and occupies most of western Sindh. The plains have many fluvial landforms (including bars, flood plains, levees, meanders and ox-bows) that support various natural biomes including tropical and subtropical dry and moist broadleaf forestry as well as tropical and xeric shrub lands (deserts of Thal in Punjab and of Cholistan, Nara and Tharparkar in Sindh). The banks and stream beds of the river system also support riparian woodlands that exhibit the tree species of kikar, mulberry and sheesham. The reed beds and tamarisk bushes along the rivers are also present. Such geographical landform accompanied by monsoon provides an excellent ground for diversity of flora and fauna species. However, the plains are equally appealing to humans for agricultural goals and development of civilization. Vast Indus flood plains have been cleared of natural vegetation to grow crops.

4.3.5.3. Wetlands and Coastal Region

The Sindh coastal region is located in the southeastern part of the country between the Indus border along the Sir Creek on the east, and the Hub River along the Balochistan coast on the west. This coastal region is about 350 km long and can be divided into the Indus Delta/Creek and Karachi coast. Indus River Delta which is the largest saltwater wetland in Pakistan Unlike many other river deltas, it consists of clay soil with swamps. The Great Rann of Kutch below the Thar Desert is not as swampy and exhibits shrubland vegetation of rather dry thorny shrubs as well as marsh grasses of Apluda and Cenchrus. Other saltwater wetlands are located on the coast of Balochistan such as at Sonmiani and Jiwani. The main vegetation found around the coastal areas are mangrove forests. Mangroves provide breeding ground for variety of fish, shrimps, crabs and other invertebrates and also are of great significance as a

[50] http://www.efloras.org/flora_page.aspx?flora_id=5

source of nutrients for fisheries. Since majority of the people residing near or around the coastal areas are engaged in fishing and related activities, mangroves make an important contribution to the local and national economy. The most commonly distributed specie is Avicennia marina (Grey mangrove or Timar) that comprises 99% of the total vegetation. The coastal wetlands attract a number of migratory birds, particularly waterfowl.

4.3.6. Protected Wetlands

More than 239 significant natural wetlands in Pakistan covering an area of 11% of the country[51]. Wetlands in Pakistan can be classified as following:

i Inland wetlands
ii Marine or coastal wetlands
iii Human-made wetlands

Wetlands are under the status of protection through Ramsar Convention. Pakistan is signatory to the convention with nineteen Ramsar protected sites covering an area of 1,343,627 hectares (3,320,170 acres) given as **Table 4.4.** According to the convention, protection and preservation of wetlands shall be considered in country's development planning.

[50]The wetlands around the world are depleting at a high rate. [52]In a study conducted on Japan revealed that increasing water demand has resulted in the construction of several dams and lakes on almost every river system of the country, but a decline of 70% to 80% in water volume, caused by siltation was noted within a span of 20 to 30 years. Growing population and associated developments are also causing augmentation in the release of domestic, industrial, agricultural and other pollutants to the wetlands are major threats to wetlands of Pakistan. A major threat to the coastal biodiversity of Sindh is pollution. Untreated industrial effluents and agricultural run-off are the major sources of coastal and marine pollution.

Table 4.4: Protected Wetlands of Pakistan

Wetland	Date	Province	Area	District	Coordinates	Iucn Protection Status
Astola Island	10/05/2001	Balochistan	5,000 ha	Gwader	25°07'N 063°52'E	None
Jiwani Coastal Wetland	10/05/2001	Balochistan	4,600 ha	Gwader	25°05'N 061°48'E	None
Miani Hor	10/05/2001	Balochistan	55,000 ha	Lasbella	25°24'N 066°06'E	None
Ormara Turtle Beaches	10/05/2001	Balochistan	2,400 ha	Gwader	25°13'N 064°28'E	None
Tanda Dam	23/07/1976	Khyber Pakhtunkhwa	405 ha	Kohat	33°35'N 071°22'E	None
Thanedar Wala Game Reserve	23/07/1976	Khyber Pakhtunkhwa	4,047 ha	Lakki Marwat	32°37'N 071°05'E	Game Reserve
Chashma Barrage	22/03/1996	Punjab	34,099 ha	Mianwali	32°25'N 071°22'E	Wildlife
Taunsa Barrage	22/03/1996	Punjab	6,756 ha	Muzzaffargarh	30°42'N 070°50'E	Wildlife Sanctuary

[51] WWF Pakistan Wetlands Programme and Ramsar Convention 1971

[52] Taub F. B., 1984, Ecosystems of the World 23: Lakes and Reservoirs. Elsevier, Netherlands. Thorsell, J., Ferster Levy, R., and Sigaty, T, 1997, A Global Overview of Wetland and Marine Protected Areas on the World Heritage List, World Conservation Monitoring Centre, Cambridge, UK.

Uchhali Complex	22/03/1996	Punjab	1,243 ha	Khushab	32°37'N 072°00'E	Wildlife Sanctuary
Deh Akro-II Desert Wetland Complex	05/11/2002	Sindh	20,500 ha	Nawabshah	26°50'N 068°20'E	Wildlife Sanctuary
Drigh Lake	23/07/1976	Sindh	164 ha	Larkana	27°34'N 068°06'E	Wildlife Sanctuary
Haleji Lake	23/07/1976	Sindh	1,704 ha	Thatta	24°47'N 067°46'E	Wildlife Sanctuary
Indus Delta	05/11/2002	Sindh	472,800 ha	Thatta	24°06'N 067°42'E	Wildlife Sanctuary
Indus Dolphin Reserve	10/05/2001	Sindh	125,000 ha	Ghotki	28°01'N 069°15'E	Game Reserve
Jubho Lagoon	10/05/2001	Sindh	706 ha	Thatta	24°20'N 068°40'E	None
Kinjhar Lake	23/07/1976	Sindh	13,468 ha	Thatta	24°56'N 068°03'E	Wildlife Sanctuary
Nurri Lagoon	10/05/2001	Sindh	2,540 ha	Thatta	24°30'N 068°47'E	None
Runn of Kutch	05/11/2002	Sindh	566,375 ha	Tharparker	24°23'N 070°05'E	Wildlife Sanctuary
Hub Dam	10/05/2001	Sindh, Balochistan	27,000 ha	Lasbella/Karachi	25°15'N 067°07'E	Wildlife Sanctuary

4.3.7. Forest

The type of forests that exist in Pakistan with relative share are moist and dry temperate: coniferous 40%, scrub 28%, tropical thorn 3.5%, manmade irrigated 5%, riverine 7%, mangrove 8% and farm forests 11%. Juniper forests of north-central Balochistan are the most extensive remnants of this forest-type in the world. Some trees are over 2500 years old. The total area of forests in Pakistan is 4.224 million ha which is 4.8% of the total land area (**Table 4.5**). [53]However, it may be mentioned here that the farmland trees and linear planting along road, canal and railway sides covering an estimated area of 466,000 ha and 16,000 ha respectively do not constitute forests within the context of legal, ecological or silvicultural/management definition of forests. The situation is also similar, but to a lesser extent, in the case of miscellaneous plantations over an area of 155,000 ha. If the area of these three categories of plantations is excluded from total forest area of 4.224 million ha, then the latter is reduced to 3.587 million ha which is approximately 4.1 % of the total area. Forest of Pakistan is illustrated in **Figure 4.4**.[54] Types of forest present in Pakistan are given below:

[53] Forest Cover, Forest types, Breakdown of forest types, Change in Forest Cover, Primary forests, Forest designation, Disturbances affecting forest land, Value of forests, Production, trade and consumption of forest products -- The FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS's Global Forest Resources Assessment (2005) and the State of the World's Forests (2005, 2003, 2001)

[54] Environment, Land use / Resources, Economy, Population / Demographics, Infrastructure, Health -- CIA World Factbook, 2005
Forest Cover, Forest types, Breakdown of forest types, Change in Forest Cover, Primary forests, Forest designation, Disturbances affecting forest land, Value of forests, Production, trade and consumption of forest products -- The FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS's Global Forest Resources Assessment (2005) and the State of the World's Forests (2005, 2003, 2001)

Table 4.5: Percentag forest covers for each province/territory of Pakistan[55]

Province/territory	Percentage geographic area covered by forest	Percentage of total forest area
Federally Administered Areas	20.7	6.5
Balochistan	1.7	14.0
Northern Areas	9.5	15.7
N.W.F.P.	16.6	40.0
Punjab	2.9	14.4
Sindh	2.8	9.4

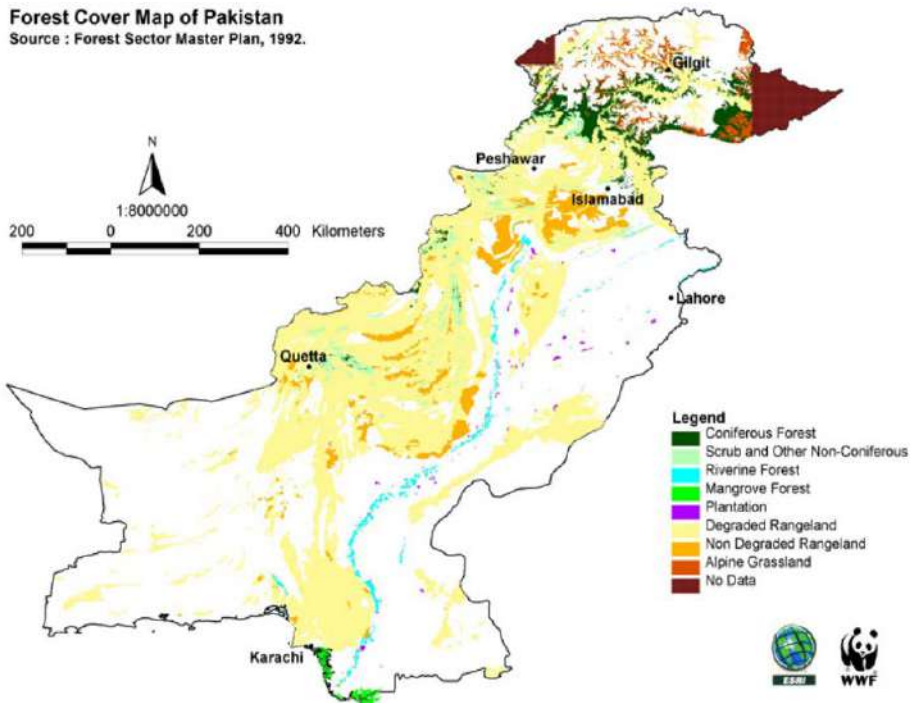

Figure 4.4: Forests of Pakistan

4.3.7.1. Coniferous Forest

The coniferous forests occur from 1,000 to 4,000 m altitudes. Chitral, Swat, Upper Dir, Lower Dir, Malakand, Mansehra and Abbottabad districts of Khyber Pakhtunkhwa, Azad Kashmir and Rawalpindi district of the Punjab are the main areas covered with coniferous forests. Pindrow Fir(*Abies pindrow*), Morinda spruce (*Picea smithiana*), deodar (*Cedrus deodara*), blue pine (*Pinus wallichiana*), chir pine (Pinus roxburghii) are the most common varieties. The Coniferous forests also occur in Balochistan hills. Chilghoza pine (*Pinus gerardiana)* and juniper (*Juniperous macropoda*) are the two most common species of Balochistan.

[55] Forestry Sector Master Plan (FSMP) Estimates of Land Use Based on Satellite Imagery Interpretation database

4.3.7.2. Sub-tropical dry Forests

The sub-tropical dry forests are found in the Attock, Rawalpindi, Islamabad, Jhelum and Gujrat districts of the Punjab, and in the Mansehra, Abbottabad, Mardan, Peshawar and Kohat districts of Khyber Pakhtunkhwa up to a height of 1,000 m. In Balochistan, they are confined to the Sulaiman Mountains and other hilly areas. Dominant tree species are phulai (*Acacia modesta),* kau (*Olea cuspidata*) and hopbush (*Dodonaea viscosa*).

4.3.7.3. Tropical thorn Forests

The tropical thorn forests are dominated by xerophytic scrubs. They are most widespread in the Punjab plains but also occupy small areas in southern Sindh and western Balochistan. They are mainly used for grazing purposes, watershed protection and fuelwood. Common species are vann (*Salvadora oleoides*), khejri (*Prosopis cineraria*), kair (*Capparis aphylla*), etc.

4.3.7.4. Irrigated Plantations

The irrigated plantations were first developed in 1866 at Changa Manga in Lahore. Today they occupy about 226,000 ha. Sheesham (*Dalbergia sissoo*), mulberry/Shahtoot (*Morus alba*), babul (*Acacia nilotica*) and species of Eucalyptus and Populus are the common tree species grown in the irrigated plantations.

4.3.7.5. Rivarian Forests

The rivarian forests grow in narrow belts along the banks of River Indus and its tributaries. They are more commonly found in Sindh and to some extent in the Punjab. Babul (*Acacia nilotica*), Shisham (*Dalbergia sissoo*) and Tamarax dioica are the most common species. Khejri (*Prosopis cineraria*) and Populus euphratica are some other species. They are mainly used for lumber.

4.3.7.6. Mangrove Forest

The coastline of Pakistan spans a total area of 990 km, of which 241 km is in the province of Sindh and 660 km in the province of Balochistan. Mangrove ecosystems lie between 24° 10’ and 25° 37’ latitude N and 61° 38’ and 68° 10’ longitude E. They are concentrated mainly in the Indus Deltaic swamps in Sindh, along the Arabian Sea coastline. Mangrove forest is an integral part of inter-tidal zone of the coastal environment extending throughout the tropics and subtropics of the world. In Sindh, mangroves are mainly found at Indus Delta and in Balochistan they are found at three different patches, Miani Hor, Kalmat Khor and Gwadar bay [56]. The total area covered by mangrove on the coast is approximately 102,267 hactres [57]. The map of mangroves in Pakistan is given as **Figure 4.5** wheras status of mangroves is given as **Table 4.6.**

[57] Mangroves of Pakistan, WWF Pakistan and
A preliminary survey of mangroves of Balochistan. WWF-Pakistan Project Report Rasool F, Saifullah SM (2005) Mangrove nurseries at Sonmiani Balochistan.

Table 4.6: Area of Mangrove Forests in Pakistan (Ha)[58]

Location	Province	Area (hac) 2017
Indus delta region	Sindh	96,801
Sandspit	Sindh	1,274
Miani hor	Balochistan	3,506
Kalamat hor	Balochistan	446
Jiwani	Balochistan	240
Total		102,267

Source: WWF Pakistan 2017

Early records show eight species of mangroves exist along the delta. Presently only four are found i.e. *Avicennia marina, Rhizophora mucronata, Aegiceras corniculatum and Ceriops tagal. Avicennia marina* (Forssk.) Vierh, locally called as timmar, is the most dominant species of the area whereas *Rhizophora mucronata* Lam., locally known as Kumri and *Ceriops tagal* (Perr.), locally called Kain and *Aegiceras corniculatum* are also present small percentage. In addition, salt bushes are found in the area, the most common of which are *Arthocnemum indicum,* locally called lana, and *Suaeda monica* locally known as garor. *Avicennia marina* is found all over the Miani Hor while a pure stand of *R. mucronata* is present in the north-east of the lagoon. *C. tagal* grows mixed with the other two species. At the high water mark salt bushes are also present within and adjacent to the mangrove stand. It has been observed that the area occupied by these bushes limits the establishment of mangrove saplings reported *Bruguiera gymnorrhiza* in the area but there is no other record of its presence. There is a possibility that it was confused with *C. tagal*. The area is one of the sources of the seed bank for different reforestation projects in the Indus Delta. There is an overall increase in mangroves due to the efforts various non-profit organisations including the Sindh forest department. [59]

Figure 4.5: Map of Coastal Area with Mangroves

[58] WWf Pakistan, 2017
[59] IUCN Pakistan, 2018

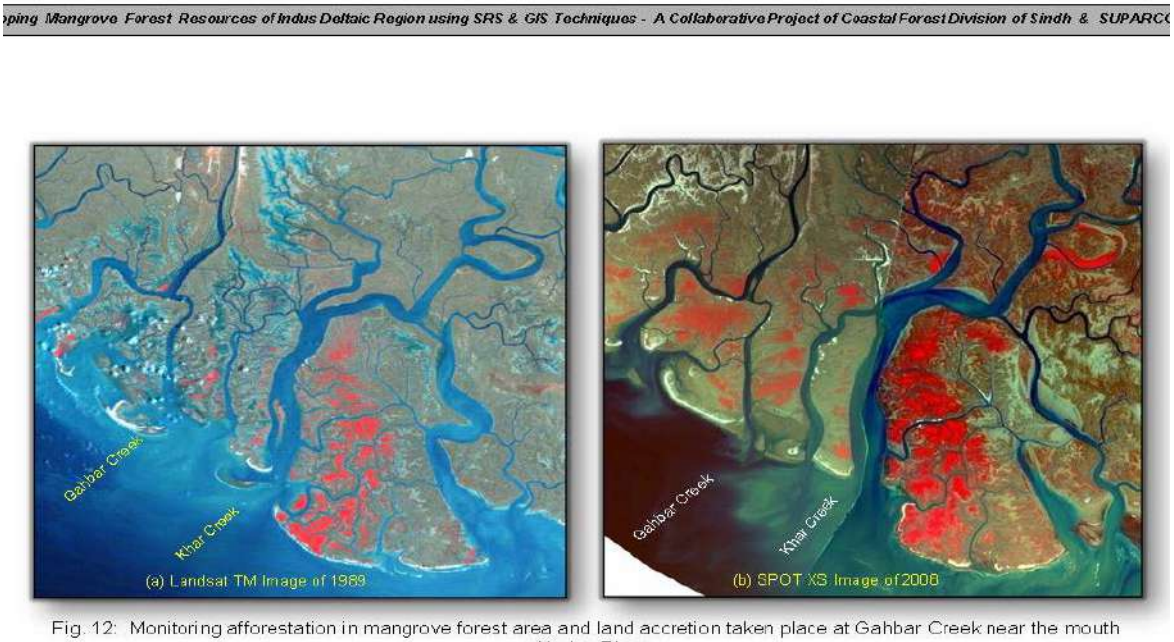

Figure 4.6:Satelite images indicating increase in Mangroves[60]

4.3.8. Protected Forest and Sensitive Ecosystems

There are a number of protected and reserve forests under the law, however, the project interventions are not likely to be carried out in Government or State reserved or protected forest. However NOC will be attained from forest department (if required). Critically threatened ecosystems of Pakistan are given **Table 4.7**. Major protected forest include following:

- Birir Valley Coniferous Forestin Chitral District (also called 'Deodar Chilghoza Oak Forest')
- Jhangar Scrub Forest in Chakwal District
- Sulaiman Coniferous Forestin Khyber Pukhtunkhwa (also called 'Sulaiman Chilgoza Pine Forest')
- Ziarat Juniper Forestin Ziarat District
- Artificial resource managed forests
- Changa Manga Forest in Lahore District
- Chichawatni Plantation in Sahiwal District
- Khipro Reserve Forest in Sanghar District
- Mangrove Forrest in Sindh and Balochistan

[60] Sindh Forest Department

Table 4.7: Critically Threatened Ecosystems of Pakistan[61]

Ecosystem	Characteristics	Significance	Threats
Indus delta and coastal wetlands	Extensive mangroves and mudflats. Inadequate protected area coverage	Rich avian and marine fauna. Diverse mangrove habitat Marine turtle habitat	Reduced freshwater flow from diversions upstream. Cutting mangroves for fuel wood Drainage of coastal wetlands.
Indus River and wetlands	Extensive wetlands	Migratory flyway of global importance. Habitat for Indus River dolphin.	Water diversion/ drainage. Agricultural – intensification. Toxic pollutants.
Chagai desert	A desert of great antiquity	Many endemic and unique species	Proposed mining. Hunting parties from the Gulf
Balochistan juniper forest	Huge and ancient junipers	World's largest extant juniper forest Unique flora and fauna.	Fuelwood cutting and overgrazing. Habitat fragmentation.
Chilghoza forest (Suleiman Range)	Rock outcrops with shallow mountain soils	Important wildlife habitat for several species at risk.	Fuelwood cutting and overgrazing. Illegal hunting.
Balochistan subtropical forests	Mid-altitude forests with sparse canopy but rich associated flora	Very few areas remain. Important wildlife habitat.	Fuelwood cutting and overgrazing.
Balochistan rivers	Not connected with Indus River System	Unique aquatic fauna and flora with high levels of endemism.	Water diversion/ drainage. Over fishing.
Tropical deciduous forests (Himalayan foothills)	Extend from the Margalla Hills NP east to Azad Kashmir.	Perhaps the most floristically rich ecosystems of Pakistan.	Fuel wood cutting and overgrazing
Moist and dry temperate Himalayan forests	Important forest tracts now increasingly fragmented.	Global hot spot for avian diversity. Important wildlife habitat.	Commercial logging. Fuel wood cutting and overgrazing.
Trans-Himalayan alps and plateaus	Spectacular mountain scenery.	Unique flora and fauna; center of endemism.	Fuel wood cutting and overgrazing. Illegal hunting. Unregulated tourism. Habitat fragmentation.

4.4. Socioeconomic Profile

4.4.1. Demography

According to 2017 population census reports, the total population of the Pakistan is 207,774,520 approximately 207 million[62]. The most heavily populated province is Punjab with a population of 110 million, followed by Sindh with 48 million Khyber Pakhtunkhwa with 30 million and Balochistan with a population of 12 million. The population Islamabad Capital Territory is 2 million, while that of FATA is 5 million. The population density is 250 persons per square km of the major part of the project area. **[63]** The urban centers are densely

[61] Biodiversity in Pakistan: Key issues Mirza B. Baig and Faisal Sultan Al-Subaiee 2014
[62] Pakistan Bureau of Statistics, provincial census result 2017
[63] Pakistan Population Census Organization

populated with an average of 1000 person per square kilometer. Districts located close to the city centers are thickly populated, whereas, the districts lying in the southern and northern boundaries are relatively thinly populated. The province wise distribution of population of Pakistan is given in **Table 4.8**.

Table 4.8: Provincial Results of Census 2017

ADMINISTRATIVE UNITS	POPULATION 2017	POPULATION 1998
PAKISTAN	**207,774,520**	**132,352,279**
KHYBER PAKHTUNKHWA	30,523,371	17,743,645
FATA	5,001,676	3,176,331
PUNJAB	110,012,442	73,621,290
SINDH	47,886,051	30,439,893
BALOCHISTAN	12,344,408	6,565,885
ISLAMABAD	2,006,572	805,235

Note:-

1. Total Population includes all persons residing in the country including Afghans & other Aliens residing with the local population
2. Population does not include Afghan Refugees living in Refugee villages

4.4.2. Literacy and Education

Literacy is defined as percentage of population that can read and write at the age of 10 or above. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), Pakistan has one of the lowest literacy rates in the world, and stands 160th among world nations. Overall 55 % population including 69% male and 45% female is literate[64]. Literacy ratio of Pakistan is provided in **Figure 4.7**.

Education in Pakistan is overseen by the Federal Ministry of Education and the provincial governments, whereas the federal government mostly assists in curriculum development, accreditation and in the financing of research and development. Article 25-A of Constitution of Pakistan obligates the state to provide free and compulsory quality education to children from age 5 to 16 years. The country governed type of education institutes present in the project areas of intervention are include Primary schools, Secondary Schools, Higher Secondary Colleges, Degree College, Graduate Colleges, Medical Colleges, Universities and Technical and vocational institutions.

[64] Boissiere, M., 2004. Determinants of Primary Education Outcomes in Developing Countries. World Bank, Independent Evaluation Group (IEG), Washington, DC.
Chaudhry, I.S., Rahman, S., 2009. The impact of gender inequality in education on rural poverty in Pakistan: an empirical analysis. Eur. J. Econ. Financ. Adm. Sci.

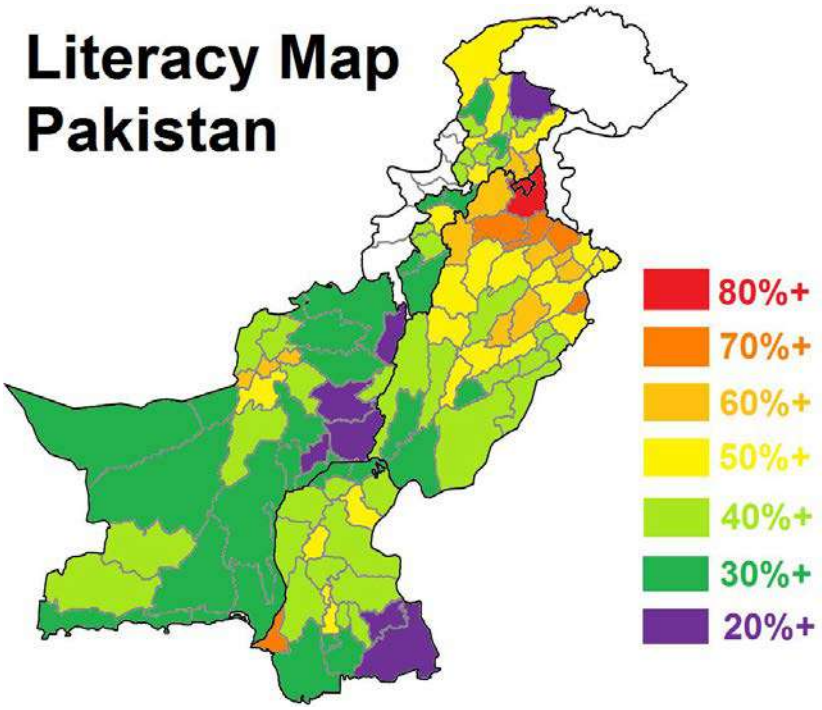

Figure 4.7: Literacy Ratio Map of Pakistan[65]

4.4.3. Health

The government is active in the health care sector in all districts of the project area. The provinces in line with federal ministry of health are making efforts to provide quality health care services to the general public. A network of government hospitals and basic health units is operational but limited services are available due lack of resources. Other than government hospitals, private hospitals and clinics are present to fulfill the needs of the public.

4.4.4. Occupation

Agriculture is the main source of employment in Pakistan. 42% of the population works in the agriculture, fisheries and forestry sectors, followed by 35% in services (including government) and 22% in industry and associated jobs.[66]

4.4.5. Gender

The social and cultural context of Pakistani society is predominantly patriarchal. However, women in mainly urban areas have improved access to education, face fewer problems in mobility and often seek employment. Men and women are conceptually divided into two separate worlds. Home is defined as a woman's legitimate ideological and physical space, while a man dominates the outside world. In the given social context, 70-80% of Pakistani women lack social value and status because of negation of their roles as producers and providers in all social roles. The preference for sons due to their productive role dictates the allocation of household resources in their favour. Male members of the family are

[65] UNESCO
[66] Pakistan Labour Force Survey, 2014-2015

given better education and are equipped with skills to compete for resources in the public arena, while female members are imparted domestic skills to be good mothers and wives.[67]

Lack of skills, limited opportunities in the job market, and social and cultural restrictions limit women's chances to compete for resources in the public arena. This situation has led to the social and economic dependency of women that becomes the basis for male power over women in all social relationships. The nature and degree of women's subordination vary across classes, regions, and the rural/urban divide. Patriarchal structures are relatively stronger in the rural and tribal setting where local customs establish male authority and power over women's lives. On the other hand, women belonging to the upper and middle classes have increasingly greater access to education and employment opportunities and can assume greater control over their lives.

4.4.6. Indigenous Peoples

The World Bank Operational Policy OP 4.10 provides guidelines to ensure that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. All Bank financed projects are designed to ensure that Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive. The policy lays down requirements for the projects to be financed by the Bank that affects Indigenous Peoples that include:

- Screening by the Bank to identify whether Indigenous Peoples are present in, or have collective attachment to, the project area;
- A social assessment by the borrower;
- A process of free, prior, and informed consultation with the affected Indigenous Peoples' communities at each stage of the project, and particularly during project preparation, to fully identify their views and ascertain their broad community support for the project;
- The preparation of an Indigenous Peoples Plan or an Indigenous Peoples Planning Framework; and
- Disclosure of the draft Indigenous Peoples Plan or draft Indigenous Peoples Planning Framework.

In Pakistan, the only recognized Indigenous Peoples are the Kailasha[68], residing in 15 villages in three valleys (Bamburet, Birir and Rambur) of the Ayun Union Council of Chitral district of the province of Khyber Pakhtunkhwa. They form the smallest minority community in the Islamic Republic of Pakistan. They are identified as indigenous peoples due to their distinct language, folklore, and polytheistic religion; differentiating them from the other communities in the area who migrated to Chitral at a later time. The community still relies mainly on their indigenous sources of livelihood including livestock, small-scale cultivation and wage labour. However, the community does not have a unique source of livelihood as these traditional occupations are shared with other ethnicities and tribes in the region. The Kalash people have only recently begun to move towards a cash economy, triggered by the influx of tourists in the area.

[67] ADB Gender Analysis, 2000
[68] Pakistan Poverty Alleviation Fund, Indigenous Peoples Planning Framework, 2014

The extrapolated population of Kailasha people in 2015[69] was 3,628 (with 1,729 women). The Kailasha constitute about 15% of the total population of Ayun Union Council and around 20% of the total extrapolated population of the 15 villages in which they reside. There are 556 Kailash people settled in rest of the Chitral District, making the total estimated Kailash population as 4,184. No other accurate estimates of Kailash population are available as different sources vary in their estimates. Looking at the available demographic statistics, Kailash are in majority in the villages of Kalashandeh (Anish) and Rambur, 85% and 75%, respectively. Kailash population ranges from 7% to 44% in the villages of Burun, Birir, Batrik, Karakar and Pehlawanandeh. In the remaining 8 villages, their population is negligible (less than 1%).

The Project is anticipated to install an Automatic Weather Station (AWS) in Chitral District. As these weather stations require low scale physical constructions on less than 500 sq feet of land and will be built on secure government owned land, the most likely location for the AWS is the Chitral Aiport. Bamburet, the largest valley where the Kailasha live is approximately 40km, Birir is 34km and Rambur is 32km from Chitral Airport, connected to the main town of Chitral by a jeepable road. **Figure 4.8** shows the location of Chitral Aiport and the three Kailash valleys. It can be observed from the satellite image that the Kailash Valleys are remotely located with limited road access. Given the small scale of the AWS, remoteness, and the distance of the Kailasha villages from Chitral Aiport, there is no anticipated negative impact of this Project on the Kailsha.

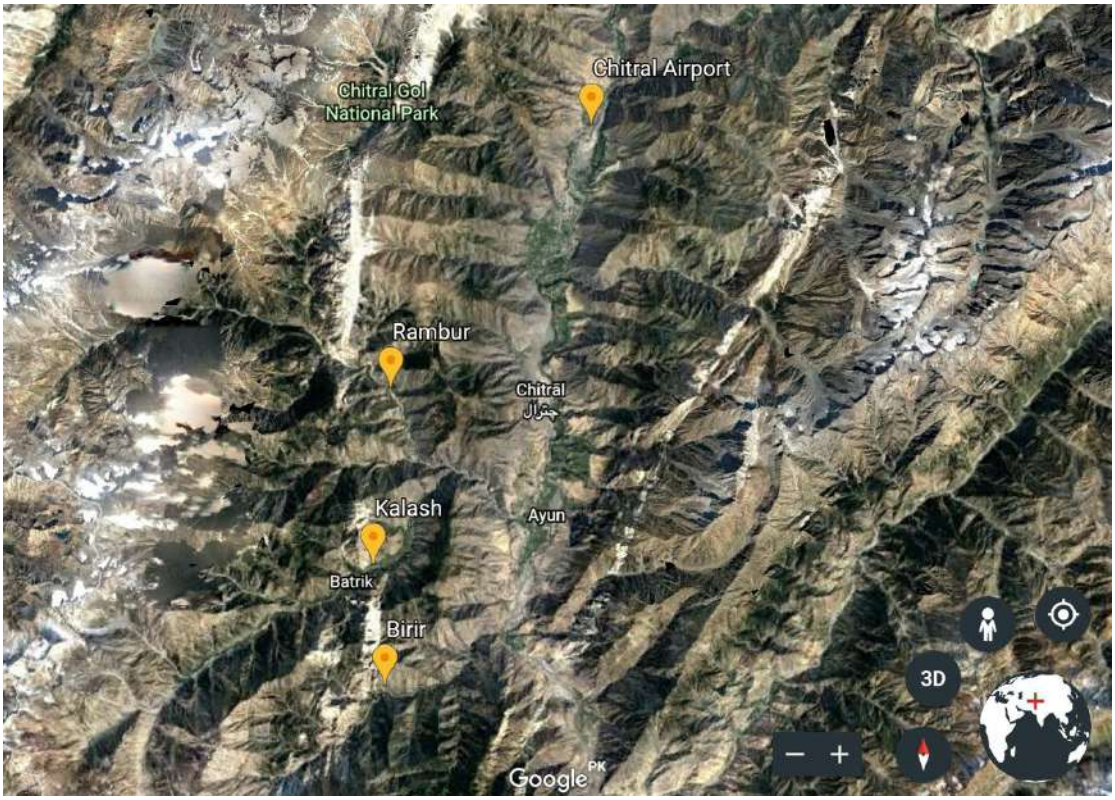

Figure 4.8: Location of Kailasha Valleys

[69] Extrapolated from the 1998 Population Census. Source: PPAF Indigenous Peoples Planning Framework.

Chapter 5. Stakeholders Consultations and Information Disclosure

This section of the report outlines the stakeholder consultation approach adopted for this project, identifies the concerned groups of stakeholders, and proposes the consultation framework for the project.

5.1. Introduction

The participation of project stakeholders in project planning, design and implementation is now universally recognized as an integral part of environmental impact assessment. The World Bank guidelines on disclosure of information and stakeholder participation lay emphasis on enforcement the mechanism in every stage of project execution. The Pakistan Environmental Protection Act 1997 Section 12(3) highlights that "every review of an environmental impact assessment shall be carried out with public participation." United Nations Conference on Environment and Development (UNCED) in 1992 endorsed the process of stakeholder participation and consultation as one of the key documents of the conference Agenda 21. It emphasizes the role of public participation in environmental decision-making for the achievement of sustainable development.

5.2. Objectives of Stakeholder Consultation

In accordance with World Bank Guidelines, public consultations are essential to fulfill the following objectives:

1. Exchange of information related to the Project and its possible utilization in the Project designing/planning and implementation;
2. Identification of likely impacts on land, resettlement, loss of livelihood, etc.
3. Ascertaining the most acceptable solutions and mitigation measures for possible issues which could arise during implementation of the project activities;
4. Eliciting community comments and feedback on the proposed Project;
5. Facilitate and maintain dialogue with the stakeholders to gain consent on carrying out project activities in the area;
6. Encourage transparency and inculcate trust among various stakeholders to gain cooperation and partnership from the communities, local leadership, and NGOs.
7. Record concerns regarding the various aspects of the project, including the existing situation, project area/area of influence, construction works and the potential impacts of the construction-related activities and operation of the project.
8. Incorporate mitigations measures to address concerns with project design and implementation.

5.3. Consultation Process

The consultation process followed for the project is detailed below:

5.3.1. Identification and Classification of Stakeholders

The identification of stakeholders is important for the sustainability of a development project and helps to evaluate and envisage the role of stakeholders. The Stakeholders Analysis refers to the Project Affected Personal (PAPs)/ local community, associated departments/agencies, Non-Governmental Organizations (NGOs) and others, whose assets/land, business, structures, installations, interests may be impacted due to the project activities. The influence or impact of stakeholders on the project is elaborated in the form of a matrix and the mitigation measures are proposed accordingly. The stakeholders that are likely to be influenced by the project activities or would like to participate in the project will include:

- Government Organizations;
- Inhabitants of the sub project surrounding areas;
- Project beneficiaries

5.3.2. Classification of Stakeholders

Project Stakeholders are classified as primary and secondary stakeholders depending on the influence of the project activities:

- Primary Stakeholders: People, groups or institutions directly effected by the project and can influence the project outcome.
- Secondary Stakeholders: People, groups, or institutions that are indirectly affected by the project and can influence project delivery process.

The list of primary and secondary stakeholders for this project is provided in **Table 5.1** .

Table 5.1: **List of Stakeholders**

Stakeholders	
Primary	Pakistan Meteorological Department (PMD)
	National Disaster Management Authority
	Communities within 1 km radius of sub project sites
Secondary	Civil Aviation Authority
	WAPDA
	Provincial Irrigation Department
	Federal Flood Commission
	Provincial Agriculture Department
	Ministry of Climate Change
	Global Change Impact Study Center
	Agriculture Research Council
	Provincial Agriculture Departments
	Indus River System Authority

5.3.3. Methodology

One to one meetings were conducted with the primary stakeholders, barring the communities, which would be done subsequently in sub-projects' design phase. Sessions were informal to encourage friendly environment, comfortable enough for participants to express their concerns, questions and opinions about the project activities in addition to seeking clarification regarding the project. Survey team highlighted the potential benefits of project implementation and documented any aspects, which need to be covered in detail during the execution stage. The meetings progressed in the following manner:

- A brief project description was provided to the stakeholders.
- Stakeholders were given the opportunity to raise queries or concerns regarding the Project.
- Queries were responded to and concerns were documented.

5.3.4. Consultation Findings/ Concerns

Concerns raised by stakeholders during consultation processes are detailed in **Table 5.2** below.

Table 5.2: Stakeholder Concerns

Stakeholders Consulted	Concerns	Response
Location: Islamabad Pakistan Meteorological Department Respondents: Hazrat Mir, Deputy Director General/ Chief Meteorologist Mr Jan Muhammad Khan, Director Planning Mr Aleem ul Hassan, Deputy Director	Pakistan Hydro-Meteorological and DRM Project has several components managed by various partners. There is high risk that incompletion or non-performance at one component will impact the other components. Thus, affecting the sustainability of the project. It is suggested to provide PMD autonomy for completion of project components. No separate funds should be allocated for equipment training; the provision should be made in the contractual requirement of manufacturer installing the equipment for the whole project. Required experts for various components of the project should be hired locally. If international consultant is needed, there should be open competition among local and international experts. The project budget has more than 40% budget for experts needed from the World Bank. The budget estimation should take in to account The provision of climate specific data needed for climate change assessments should be included in the project. Height of the radar should be taken	Project to respond to these concerns at the sub-project phase

	into consideration in the presence of population nearby. NOC from CDA, LDA, CAA, NDMA and local authorities should be taken prior to construction work. The AWS should be installed in government owned land in a guarded locality to avoid damage to the equipment. Cost of land acquisition (if required) should be made part of the project.	
Location: Lahore Respondents: Muhammad Riaz (Chief Meteorologist) Fayaz Nazir (Senior Electronic Engineer) Sahibzad Khan (Director) Organization: Regional Meteorological Center, FFD Lahore	Currently, there is no space available at the FFD center for new radar installation; however, a possible solution is to shift the Pilot Balloon Observatory (PBO) building to the Regional Meteorological Center building which is right across the road and has ample space to house PBO. This scenario would have the following benefits: The new radar building would be located right next to the existing one. It would not hamper the efficiency of the observation instruments in the front yard as it would be built behind the existing radar. Height of the tower should be elevated above 100 ft to increase efficiency. Latest and most sustainable building standards should be followed to increase the life of the infrastructure for long term benefits. Power backup system should be up to the mark keeping in view the current load shedding scenario in the city. New radar technology uses less power, so a possibility of hybrid systems should be considered Auto Calibration rain gauges should be installed at different ranges i.e. 50, 100, 200, 240 and 480 kilometers. This would increase the efficiency of current and proposed systems. The maintenance arrangement after the project implementation must be chalked out. The provision of spares must be guaranteed for at least 10 years. Additional staff must be hired for the new system, which should include at least 5 meteorologists and 4 sub-engineers. Vehicles should be provided for remote sensing.	Project to respond to these concerns at the sub-project phase

	The staff should all be given trainings on radar meteorology. Coordination for the project implementation should be improved with timely information dissemination. High resolution output systems should be used.	

5.4. Stakeholders Consultation Framework

A continuous process of keeping the stakeholders informed and receiving their feedback at various stages of Project implementation will be carried out to improve the acceptability of the Project by the stakeholders and ensuring their participation in the process of sub project preparation and development. A strategy for public consultation during the implementation of the Project is delineated, for different stages of the project, i.e. design, construction and operation. The consultations framework at each stage is explained in **Table 5.3** below.

Table 5.3: Public Consultation/ Participation Framework

Objective	Target Stakeholders	Implementation Stage	Responsibility
Meetings/scoping sessions/ survey/interviews etc. to inform stakeholders about project and obtain feedback about the project design.	Potential stakeholders in the sub-project area, general public, and line departments/ agencies especially PMD, CAA and RMC	Design Stage of sub-projects	PMD/ NDMA PIUs
Public awareness sessions to share the ESMP/RAP with the project affected persons/communities; and other stakeholders.	Potential stakeholders in the sub-project area, general public; and line departments/ agencies.	Design/ Implementation Stage	PMD/ NDMA PIUs
Consultations during formation of PAP Committees (PAPCs)	PAPs in the sub-project area(if any)	Construction Stage	PMD/ NDMA PIUs
Setting of Grievance Redress and Community Complaint Register	Stakeholders in the sub-project area.	Construction Stage	PMD/ NDMA PIUs
Consultations during internal monitoring	Stakeholders in the sub-project area	Construction Stage	PMD/ NDMA PIUs
Fortnightly meetings at project sites	PMD and NDMA	Construction Stage	PMD/ NDMA PIUs
Consultations with the Stakeholders	PAPs/communities in the	Construction Stage	PMD/ NDMA

Objective	Target Stakeholders	Implementation Stage	Responsibility
during the Independent Monitoring	sub-project area		PIUs / Independent monitoring consultant
Consultations with the Stakeholders relating to the leftover tasks	PAPs/communities in the sub-project area	Operation Stage	PMD/ NDMA PIUs
Consultations with the Stakeholders during the site visits by the World Bank Review Missions	PMD AND NDMA/PIU/contractors as well as sub-project PAPs/ Communities	Construction/ Operation Stage	PMD/ NDMA PIUs

Chapter 6. Environmental and Social Impact Assessment and MitigationFramework

6.1. Pakistan Hydro-meteorological and DRM Services Project (PHDSP)

The Pakistan Hydro-meteorological and DRM Services Project has three main components through which it will seek to improve hydro-meteorological information and services, strengthen forecasting and early warning systems, and improve dissemination of meteorological and hydrological forecasts, warnings and advisory information to stakeholders and end-users through the Pakistan Meteorological Department. It will also strengthen the existing disaster risk management (DRM) capacity and services of the National Disaster Management Authority (NDMA). Environmental and social impacts of this project are expected from construction and expansion of NDMA and PMD offices and facilities, and installation of Weather Surveillance Radar and Automatic Weather Stations across the country under Components 1 and 2. An analysis of each project component and associated environmental and social impacts are discussed in this section.

6.1.1. Component 1: Hydro-meteorological and Climate Services

The objective of this component is to improve the capability and thereby performance of the PMD to understand and make use of meteorological and hydrological information for decision making..

Sub-Component 1.2A: Technical Modernization of Observation Networks

The sub-component will support the expansion and upgrade of the prioritized stations of the network, expansion of doppler radar network, restoration of upper air observations, installation of wind profilers, improvement of hydrological stations and systems, and expansion and re-equipment of agro-meteorological network.

Sub-Component 1.2E: Expansion and Refurbishment of PMD Facilities in Pakistan

The sub-component will establish the Monsoon Monitoring Centre in Islamabad, as well as up gradation of Flood Forecasting Division (FFD) to National Flood Forecasting Center (NFFC) and establishment of 5 Regional Flood Forecasting Centers (RFFC).

Sub-components 1.2A and 1.2E will involve civil works during construction and refurbishment of PMD offices and installation of WSR and AWS at various locations in Pakistan. The project interventions under 1.2 E may result in limited and reversible environmental impacts during construction due to their location at existing PMD office facilities in commercial settings, however, social impacts during construction may rate higher due to presence of sensitive social receptors near MMC and AWS intervention. The project locations for the AWS are not yet known. This section will detail the potential environmental and social impacts for each of the planned interventions during first phase specifically Monsoon Monitoring Centre, WSR and AWS and propose required mitigation measures.

6.1.2. Component 2: Disaster Risk Management

This component will focus on strengthening capacity of NDMA through increased emergency response capacity, construction of DM complex that will house offices,

NEOC, NIDM and the NDRF, reviewing the existing DRM system in the country and conducting hazard assessments in priority district.

Sub-Component 2.2A: Establishment of Disaster Management Complex

This component mainly involves developing institutional set-up and operational capacity of NDMA through construction of NDMA headquarters that will host National Institute of Disaster Management (NIDM), National Emergency Operations Center (NEOC) and NDRF Facility.

Sub-components 2.2A will involve civil works during construction of the Disaster Management Complex. The project interventions may result in limited and reversible environmental and social impacts since the location of the project is in an area designated for commercial and government offices. This section will detail the potential environmental and social impacts for each of the planned interventions during first phase

6.1.3. Component 3: Contingent Emergency Response Component

This component will support preparedness and rapid response to climate and natural disasters, emergency, and/or catastrophic events as needed. The component and associated sub-components do not involve physical works to be undertaken at present. There are no potential environmental and social impacts associated at this stage, however, in case of a national disaster, entire infrastructure development/reconstruction projects will be screened for environmental and social impacts.

6.2. Impact Assessment Matrix

To screen, identify and evaluate the impacts, the nature, extent, duration, scale and other parameters of the sub project activities are to be studied along with conditions of the environmental and social receptors (secondary baseline). Mitigation measures are based on the magnitude of the impact, sensitivity and behaviour of the environmental and social receptors at the sub-project sites and, regulatory requirements using best management practices. The detailed impact assessment matrix of design, construction and operations/post construction phase is given **Table 6.1.**

Table 6.1: Potential Environmental and Social Impacts (Prior Mitigation)

Project Activities		Impacts on Physical Environmental									Impacts on Ecological Environment			Impacts on Social Environment								
	Soil Erosion	Land use	Ambient Air Quality	Surface Water Quality	Groundwater Quality	Water/ Electricity /Gas / Fuel Consumption	Solid Waste	Ambient Noise level	Electromagnetic Field	Climate	Flora	Fauna	Biodiversity /Ecology	Resettlement	Traffic	Public Health, Safety and security	Health and Safety of Workers	Economy	Employment	Drinking Water	Loss of land holdings and livelihood	Cultural/religious and Archaeological resources
Component 1: Technical Modernization of Observation Networks; Expansion and Refurbishment of PMD Facilities																						
Design Phase	M-	M-	M-	M-	M-	H+	M-	M-	M-	M-			M-	M-H-				M-H-			M-H-	
Construction Phase	H-	L-	H-	M-	L-	M-	H-	H-	H-	M-	M-	M-	L-	L-	H-	H-	H-	H+	H+		L-	L-
Operation Phase			M-	M-		M-	M-		H-	M-					M-		M-	H+	H+			
Component 2: Establishment of Disaster Management Complex																						
Design Phase	M-	M-	M-	M-	M-	H+	M-	M-		M-			M-	M H-				M-H-			M- H-	
Construction Phase	H-	L-	H-	M-	L-	M-	H-	H-		M-	M-	M-	L-	L-	H-	H-	H-	H+	H+		L-	L-
Operation Phase			M-	M-		M-	M-			M-						M-	M-	H+	H+			
Component 3: Contingent Emergency Response Component																						
Design Phase																						
Construction Phase																						
Operation Phase																						

H- = High Negative Impact; Blank =None M- = Moderate Negative Impact; L- = Low Negative Impact; H+ = High Positive Impact; M+ = Moderate Positive Impact; L+ = Low Positive Impact.

6.3. Potential Environmental and Social Impacts during Design and Mitigation

The design phase activities of the sub projects include the infrastructure design, site selection and preparation for civil works. The associated impact of activities under Components 1 and 2 of the project on ecological, physical and human environment are presented in this section. These activities include expansion of facilities at PMD offices, installation of Weather Surveillance Radar and Automatic Weather Stations, and construction of a Disaster Management Complex.

6.3.1. Biodiversity and Natural Resource

None of the sub-project activities will be carried out within the sensitive areas as per Environmental Protection Act, Forest and Wildlife Protection Act of each province. The project sites for expansion of PMD facilities, WSR and Disaster Management Complex are expected to be at existing locations of PMD stations/offices or on land owned by the government, thus at a reasonable distance from critical and sensitive receptors including reserve forests, national parks, wetlands, marine protected areas and wildlife sanctuaries. The AWS will be across the country and exact locations are not known. Similarly, there are no sensitive habitats present within the project sites that support endangered mammal or bird species. Hence impact on flora and fauna is negligible. Project sites may require tree cutting and vegetative clearing therefore mitigations are proposed in the design phase to avoid maximum damage. The following mitigation measures are proposed.

Mitigation Measures

- Incorporate technical design measures to minimize unnecessary removal of trees and vegetative cover;
- Plan for compensatory planting of eight trees against each fallen tree of similar floral function;
- Disallow introduction of invasive/ exotic species; and recommend native species for plantation.
- Locations for AWS will be selected outside/at a reasonable distance from the environmentally sensitive areas and archeological/cultural and religious sites of importance.

6.3.2. Land Acquisition, Resettlement, Loss of Livelihoods

Construction activities are expected to be on government owned land and may require temporary acquisition of land or removal of encroachments. The land for AWS installation may require acquisition from government and private land owners. This will be small areas as AWS require approximately 500 square feet for installation.

Mitigation Measures

If land acquisition/resettlement will be required or loss of livelihood will occur, impacts will be mitigated by preparing a RAP in accordance with the Resettlement Policy Framework (RPF), provided in this ESMF and WB OP 4.12. Details are provided in ***Chapter 8*** on Resettlement Policy Framework.

6.3.3. Natural Disasters

The project sites are prone to natural disasters including earthquakes and floods. The earthquake of 2005 caused damage to a number of engineering structures in Pakistan. Similarly, the flood of 2010 was devastating for various regions of country. The impact is likely to be high in case of a natural disaster.

Mitigation Measure

- The building design will be earthquake resistant according to Building Codes of Pakistan with Seismic provision and international best practices to avoid damage caused by earthquake;
- Variety of structural engineering measures or structural components like shear walls, braced frames, moment resisting frames, and diaphragms, base isolation, energy dissipating devices and bracing of non-structural components are proposed. Simpler techniques include avoiding soft stories and bolting the sill plate of houses to the foundation;
- Primary focus of earthquake design is initial life safety and getting people out of the building safely, not necessarily the ability of a building to withstand the effects of an earthquake, or to ensure occupancy or functionality following an event. Therefore building design will include emergency exits and alarm system;
- Planning, designing and constructing the building to minimize any potential flood damages using guidelines of **Annexure 11**. Following are proposed:
  - elevating as much of the building as possible above the design flood level,
  - designing the building foundation and any portions subject to flooding to withstand design flood conditions and loads,
  - using flood-damage-resistant materials for any portions of the building below the design flood level
  - where flood proofing is permitted, employing appropriate methods and materials to either dry-flood proof or wet-flood proof those portions of the building below the design flood level

6.3.4. Water /Electricity/ Natural Gas/ Fuel Consumption

There will be an increase in resource consumption due construction work and subsequently project operations due to increase in staff. It will pose a pressure on water and energy resources of the project area of interventions. The impact is likely to be high as the sub-project buildings and tower will host more than 200-1000 officials.

Mitigation Measures

- Green building council and international best practice will be engaged for design provisions to be followed for water, electricity and natural gas conservation;
- Water meters will be made part of the design in each building to monitor the consumption;
- Design of buildings will include installation of Solar Panels;
- Provision of Low Voltage electrical appliances will be made in procurement procedures;

- Prepare Energy and water conservation plan for construction.

6.3.5. Air Quality and Noise Levels

Project activities associated with construction may increase the ambient air quality and noise levels of the at the sub-project sites. The noise and air pollution sources include site clearing, construction machinery, generators, civil and mechanical work. The impacts are likely to be high.

Mitigation Measures

- Air quality and noise level baselines will be conducted to enable monitoring during construction phase;
- Provision of compliance to NEQS of vehicular emission will be made in the contract of construction contractor;
- Traffic management plan for construction will be formulated during design phase that enable continuous traffic flow and avoid congestions which result in increased vehicle smoke density at a given area;
- Plan to neutralize dust emissions from construction activity, such as regular watering of sub-project sites to settle dust.
- Hazardous material list not to be used in construction will be made part of the contract.

6.3.6. Solid Waste Management

Improper solid waste disposal can result in increased air pollution through burning of waste, vector borne diseases, contamination of water sources and ambient aesthetics for surrounding communities.

Mitigation Measures

- Prepare a detailed Solid Waste Management Plan for the construction sites and labor camps;
- Identify current municipal systems of waste management
- Plan for placement of waste collection containers throughout the project area;
- Disallow the burning of any of type of waste;
- Prepare plans for the safe handling, storage and disposal of harmful materials;
- Prepare Solid Waste Management Plans for project sites for the operational phase (including adequate placement of waste bins, requirements of sanitary staff, transportation of waste, and identification of landfill sites).

6.3.7. Workers Health and Safety

Use of heavy machinery and handling of chemicals by workers can result in health impacts and accidents.

Mitigation Measures

Prepare a Worker Health and Safety Plan for the construction phase.

6.4. Potential Environmental and Social Impacts during Construction and Mitigation

The potential impacts associated with the construction and rehabilitation of PMD centers, research centers, field offices, installations of weather equipment and radars, and establishment of a Disaster Management Complex across the country are elaborated below:

6.4.1. Landscape/Soil

Expansion of PMD offices and research centers is expected to be on existing sites in use by PMD having urban and semi urban set up surrounded by commercial and residential areas. Hence there will be no drastic change in the landscape during construction. The location for the Disaster Management Complex and AWS may have trees, shrubs and water streams, however, the locations will not in an environmentally sensitive area with endangered vegetation. Construction and civil works are likely to carry out site clearance, vehicular, labour and machinery movement causing soil erosion and compaction. There is also a potential for contamination of soil via runoff from construction activities including oil spills, construction material, dredged / spoil materials and construction waste. The impact is likely to be high, however, the duration be will be confined to construction phase.

Mitigation Measures

- Removal of vegetation and trees will be avoided to the extent possible
- Water will be sprinkled during building of foundation to avoid erosion.
- Construction materials will be stored in proper stores on impervious sheets to avoid any soil contamination.
- Machinery and vehicles will be operated at designated routes to avoid erosion and compaction of un-impacted soils.
- Visual Inspection will be carried out for land contamination and dust emissions.
- The soil contaminated from minor and moderate spills will be removed and will be handed over to waste contractor for treatment at nearest incineration facility to the sub-project sites.
- Major spills may require specialized treatment such as incineration, bioremediation and biodegradation. The biological agents will be introduced to the spill to hasten biodegradation. Most of the components of oil will be broken down by bacteria and other microorganisms into harmless substances such as fatty acids and carbon dioxide. To stimulate the growth of the microorganisms, fertilizing nutrients like nitrogen and phosphorous will be places near the oil tanks.

6.4.2. Ambient Air Quality and Climate

The construction activities at sub-project sites will cause impact on air quality. Cement mixers (Batch Plant), movement of the machinery and soil excavation may release particulate matter 2.5/10 and fugitive dust which will deteriorate ambient air quality in the vicinity of the sub-project sites. Construction vehicles, generator is likely to generate dust and exhaust emissions such as oxides of Carbon (COx) Oxides of Sulphur (SOx), Oxides of Nitrogen (NOx). Impact on local air quality is high as a result of gaseous emissions and particulate matter. The construction work is not likely to impact the climate of the area, however, there will be minimal increase in GHG emission from above mentioned sources.

Mitigation Measures

- Following of NEQS as performance indicators;
- Contractor shall provide an Emissions Monitoring Plan to ensure constant checking of emissions by construction machinery and vehicles; Contractor should provide an operations and maintenance plan for the same;
- Water will be sprinkled twice a day to avoid fugitive dust emissions;
- Construction machinery and vehicles will be kept in good conditions to avoid vehicular emissions. Vehicular and generator exhaust emissions will be monitored to ensure compliance;
- Unnecessary movement of vehicles will be avoided at the construction location;
- Open burning of solid waste from the Contractor's camps should be strictly banned;
- Wind breaks /barriers (either natural or constructed) will be deployed to reduce the possibility of suspended particles in air;
- Raw materials such as cement, gravels and sand will be kept under sheet covers to prevent air flow;
- In order to further reduce the environmental impact Cement Works (Concrete Batching Plant), the concrete batching plant will incorporate the following design and practices:
  - Cement will be transferred directly from barges to the plant.
  - All mixing will be in the enclosed electric motor driven plant mixer, NOT in trucks.
  - Truck loaded with concrete will be in wet form.
  - All washing water used by the batch plant and storm water will be collected and stored and recycled for re-use.
  - No water will be discharged outside the plant boundary.
  - Concrete recycling machine be used to recycle waste material to slurry water and aggregates for reuse.

6.4.3. Surface/Ground Water Resources

Drainage channels may be located at the location for the Disaster Management Complex. Construction activities may encourage soil erosion and increase the sediment loads into the city drainage, while accidental leaks/spills of oil/fuel from storage tanks or maintenance vehicles can also pollute surface waters. Construction waste and oil spills, if left unattended will result in forming leachate that will percolate through the soil strata and may contaminate the groundwater table. The sources of contamination and wastewater may likely to generate from the following sources:

- Disposal of construction waste and solid waste from worker camps into the water channel;
- Possible oil spills from fuel storage area;
- Surface runoff due to rainfall causing blockage of drainage;
- Used oil, paints, cleaning solvents and other chemicals may generate liquid hazardous wastes.

- Wastewater from temporary sanitation facilities for the workers may also result in contamination of subsoil water.

The impact is likely to be high for infrastructure developments for the Disaster Management Complex.

Mitigation Measures

- **Debris Management Plan**; the contractor will ensure that construction debris does not find its way into the drainage or water channels which may get clogged;
- Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond;
- Construction work close to streams or other water bodies will be avoided, especially during monsoon period;
- All fuel storage will be properly marked to highlight their contents with a concrete pad underneath to prevent water contamination in case of leaks or spills. Daily monitoring will be carried out for leaks. Shovels, plastic bags, and absorbent material will be placed near fuel and oil storage or handling areas to attend spills and leaks;
- Used oil and vehicle related waste will be transported to local contractors for recycling or reuse;
- Diverting work area runoff into properly designed and constructed sediment traps or drainage collection system to ensure that exposed soils are not eroded. Runoff velocities in ditches or other drainage routes, or along slopes, to be kept low to minimize erosion potential. Runoff outfall locations to be protected with erosion resistant material, if required.
- Proper disposal of solid and sewage waste from workers camps to ensure it is not disposed in the drainage channel.

6.4.4. Water /Electricity/ Natural Gas and Fuel Consumption

The estimated water consumption calculated by Water and Sanitation Authority (WASA) is 72 gallon per person per day. There will be an increase in water, electricity, natural gas and fuel consumption from the baseline during construction causing increase in total GHG emissions form the project sites . Preparation of sand, cement mortar, curing of walls before and after plastering require a large amount of water that may reduce the availability of water in residing area. The impact is likely to be high.

Mitigation Measures

- Water meters will be installed at sub-project sites to monitor water consumption;
- Construction staff will be trained on water conservation practices to avoid excessive loss;
- Water required for construction should be obtained in a way so that water availability and supply to residing area remains unaffected;
- Approval will be attained from relevant departments prior to construction work.

- Prepare **Energy and water conservation plan** for construction**.**

6.4.5. Solid Waste Generation

During construction phase, solid waste can be generated from discarded equipment parts, scrap metals, equipment boxes, wood parts, empty bags, and leftover construction debris. The excavated material may also be considered as solid waste as it would require disposal. Solid waste will also be generated from workers camps at the construction sites. Waste collection and disposal mechanism is in place will be used for the maximum allowable waste. The construction material and waste may contain hazardous/toxic chemical materials banned as per international best practices. They may include:

- Asbestos (pipe covers flooring and building material)
- Lead (Roofing material and pipes)
- Cadmium (used as corrosion resistant agent in steel)
- Polyvinyl Chloride (pipes)
- VOCs (formaldehyde in form solvents, paints, synthetic coating cause)
- Silica (in various building material-exposure causes lung cancer)
- Wood preservatives (Creosotes and Arsenic)
- Halogenated flame Retardants (mixed in concrete construction material)

Mitigation Measures

- **Solid Waste Management Plan** will be prepared for all sub-project sites to be used by Construction Contractor. In case of the occurrence of toxic/hazardous chemical materials, it will be handled according to hazardous waste management best international practices. The **Waste Management Plan** will be prepared with following provision:
  - Solid waste collection, segregation, storage and disposal will be carried out for waste generated. For at source segregation separate waste bins will be placed at sub-project sites. Recyclable material will be segregated whereas non-hazardous waste will be disposed-off properly at approved disposal site;
  - Labeling of containers will be carried out including the identification and quantity of the contents, hazard information;
  - Marking of Hazardous/toxic waste 'if generated' separately and disposal using international best practices through registered contractor;
- Used oil will be collected in separate containers stored on impervious platform with restricted access and must be sold to licensed contractor;
- Burning of solid and waste oil should be strictly prohibited
- Training of workers will be carried out in the storage and handling of materials and chemicals that can potentially cause soil contamination;
- **Emergency Response Plan** will be prepared to address the accidental spillage of fuels and hazardous/toxic material, fire, vandalism and natural hazards;
- On completion of the construction phase of the project, the contractor will be required to rehabilitate the site. Rehabilitation will include removal of all construction materials and wastes, and the grading and landscaping of all exposed sites that may be prone to erosion. Where natural erosion protection measures may not be possible

or practical, suitable physical erosion protection methods will be used. The purposes of site rehabilitation will be to minimize the potential for soil erosion, enhance the aesthetic appearance of the site and restore safe public access to the surrounding area.

6.4.6. Noise Levels

Noise is one of the aspects which may cause hearing impacts on workers and communities in immediate vicinity especially during morning office/school hours and night time. The construction activities are likely to generate high noise levels. The sources of noise in construction are provided as follows:

- Asphalt Plant
- Construction and excavation work such as heavy earth moving equipment/ machinery, pilling work, welding, cuttings, drilling, grinding.
- Material loading/offloading vehicles and other transport used by construction contractor.
- Use of pressure horns.

In case of the sub-projects construction activities are restricted to a confined area within the site. Impact of noise is likely to be high from baseline noise levels (60-70dB). Noise impact will be high to the workers and moderate to the residents not causing hearing loss. **Table 6.2** details the impact of noise at various levels. Construction workers may suffer from Noise Induced Hearing Loss (NIHL) due to civil and mechanical work that may generate higher levels of noise.

Table 6.2: Noise Impact[70]

Noise level dB	Impact
60	Hearing damage in 8 hours
80	Hearing damage in 8 hours
85	Hearing damage in 2 hours
100	Hearing damage in 2 hours
110	Hearing damage in 30 min
120	Hearing damage in 7.5 min
130	Pain threshold
150	Hearing damage in 30 sec
300	Complete hearing loss

Mitigation Measures

- The location for stationary sources of noise such as concrete mixers and pumps will be selected at a reasonable distance from residing population. The cement tankers will be working inside enclosure with cladding to reduce noise;

[70]Source: Urbanization and Sustainable Cities 100: Environmental Science, International Science, 5th edition (1991) Cunningham Saigo

- The construction material loaders will only operate during night time as per rules of traffic police in the sub project areas. Working hours will be allocated for the use of batch plant, equipment and other machinery;
- School time and late night construction activities will be avoided;
- Use of noise barriers in locations next to schools;
- Blowing of horn will be strictly prohibited;
- Noise monitoring will be carried out at various locations using noise meters. Site labour working in high noise area where noise level exceeds 85 dB (A), will wear earplugs and ear muffs;
- Noise level of 55 dB at day and 45 dB at night time will be maintained.

6.4.7. Flora and Fauna

Since the sub-project locations are expected to be on existing sites in use by PMD or government owned land having urban and semi urban set up, there are no potential impacts on local flora and fauna. However, construction activities may require cutting of trees and clearing of vegetation. The ecological impacts of the project are not likely to be beyond the immediate footprint of the construction site.

Mitigation

- Planting of eight trees for every tree cut during construction;
- Do not introduce invasive or exotic species through plantation.

6.4.8. Public Health and Safety

Construction activities and movement of heavy vehicles at construction sites and access service roads may result in road side accidents, particularly with the residents who may not be familiar with the presence of heavy equipment. Roads and streets, particularly in urban areas may also be blocked during construction. For example, the MMC is Islamabad is located near schools. There will be a movement of school children in the vicinity during certain hours of the day.

Mitigation Measures

- Train drivers operating heavy vehicles in road and pedestrian safety;
- Set appropriate speed limits to avoid accidents;
- Use of heavy vehicles on public roads will be avoided during hours when students are coming to school or leaving school;
- Placement of construction and diversion signage, particularly at urban areas and at sensitive/accident-prone spots, in accordance to a **Public Safety Plan**;
- Provision of alternate routes for use by the public.

6.4.9. Workers Health and Safety

Use of heavy machinery and handling of hazardous waste and chemicals may result in health impacts for workers on the construction site. Presence of asbestos in old and new building material is hazardous to health.

Mitigation Measures

In accordance to the **Workers Health and Safety Plan**, ensure:

- The project locations have full access to health facilities and emergency response centers (fire, earthquake and floods) and police station. In case of emergency, the injured will be taken to the nearest medical facility.
- Provision of clean drinking water will be ensured for the construction crew;
- Hygiene inspections will be carried out to avoid disease epidemic;
- In case of unlikely incidents (fire, vandalism) the workers will be evacuated and emergency response and law enforcement agencies will be engaged;
- Fire safety alarms will be installed at various locations;
- Fire extinguishers will be placed at various locations including a water hose installation at ground level;
- Fire safety and emergency response trainings will be conducted;
- Hazards indicator signs and firefighting equipment will be installed;
- The construction crew will be trained on important aspects of workplace safety;
- Construction machinery operators and drivers will be trained to avoid associated accidents using machines and vehicles;
- Flammables and other toxic materials will be marked and stored at secured sites;
- Onsite first aid kits will be kept at construction sites and randomly moving vehicles\machinery.
- Do not allow workers with inadequate training to operate heavy machinery;
- Provision of appropriate and high quality Personal Protective Equipment (PPE) to workers such as gloves, vests, hard-hats, masks etc.;
- Train workers in the use of PPE and safety measures while using heavy machinery and handling chemicals.
- Follow guidelines for Asbestos and Asbestos based product use in construction **(Annexure 12)**

6.4.10. Physical /Cultural/ Archeological Resources

The sub-project locations may have religiously and culturally important sites at a reasonable distance. Excavation work during construction may result in the uncovering of ancient sites or artifacts. Impact is likely to be low for example the only known sensitive site close to sub project MMC is a grave yard which will not have any direct and indirect impacts.

Mitigation Measures

- Construction staff will be trained and informed on identifying the evidence of archaeological/historic remains;
- In case evidence of archaeological remains is found during construction activities, the actions listed below will be undertaken.
- Excavation work in the vicinity of the find will be stopped;
- Assistance will be sought from the nearest office of the Department of Archaeology and Museums to identify the remains;
- If the department decides to salvage the find, PMD will provide assistance.
- Detailed procedure for Archaeological Chance Finds included in **Annexure 13**.

6.4.11. Traffic Management

The sub-project sites in urban areas may be close to socioeconomic sensitive receptors like schools, colleges, offices and hospitals. The construction work may likely impact the traffic flow. Increase the traffic flow will occur as a result of:

- Use of trucks for movement of construction material to project site;
- Mobilization and use heavy equipment for construction;
- Use of pressure horns.

This slight increase in traffic may also cause accidental injuries, deteriorate ambient air quality and generate noise. It may also cause restrictions to access, traffic congestion and nuisance to the general public.

Mitigation Measures

- Vehicles will be inspected prior to start of construction work.
- Alternate routes will be created to avoid disturbance to school and hospital;
- Construction site will be barricaded to minimize accidental injuries and visual nuisance to the general public;
- Movement of construction equipment will be limited to specific duration when there is least disturbance to the residing offices e.g after school timings;
- Adequate road signs will be erected to warn general public;
- The contractor will be advised to follow vehicular maintenance to reduce engine noise;
- Drivers will be trained to follow the designated routes and avoid honking;
- The construction trucks will be adequately covered with tarpaulin covers to avoid flow into air.

6.5. Potential Environmental and Social Impacts during Operations and Mitigation

This section describes the impacts of subprojects during operations/ post construction.

6.5.1. Electromagnetic Field Generated

There may be radiation impacts of EMF related to radars at various selected sites which will be proposed by the PMD at implementation stage. People who live or routinely work around radars have expressed concerns about long-term adverse effects of these systems on health, including cancer, reproductive malfunction, cataracts and changes in behaviour or development of children. Radars usually operate at radio frequencies (RF) between 300 MHz and 15 GHz. They generate EMFs that are called RF fields. RF fields within this part of the electromagnetic spectrum are known to interact differently with human body. RF fields below 10 GHz (to 1 MHz) penetrate exposed tissues and produce heating due to energy absorption. The depth of penetration depends on the frequency of the field and is greater for lower frequencies. Absorption of RF fields in tissues is measured as a Specific Absorption Rate (SAR) within a given tissue mass. The unit of SAR is watts per kilogram (W/kg). SAR is the quantity used to measure the "dose" of RF fields between about 1 MHz and 10 GHz. An SAR of at least 4 W/kg is needed to produce known adverse health effects in people exposed to RF fields in this frequency range.

RF fields above 10 GHz are absorbed at the skin surface, with very little of the energy penetrating into the underlying tissues. The basic dosimetric quantity for RF fields above 10 GHz is the intensity of the field measured as power density in watts per square metre (W/m2) or for weak fields in milliwatts per square metre (mW/m^2) or microwatts per square metre ($\mu W/m^2$).

However studies have shown that weather radars operate at higher frequencies but generally have lower average and peak powers. Under normal conditions, if radar is installed at a higher elevation, they pose no hazard to the general public however impact on workers exposed is likely to be high.

Mitigation Measures

- Engineering controls for EMF include interlocks, electronic means to exclude the radar pointing within office complex in the tower building, and shielding.
- Administrative controls include audible and visible alarms, warning signs, and restriction of access through barriers, locked doors, or limiting access time to radar.
- Workers will use personal protective equipment to ensure compliance with exposure standards. Conductive suits, gloves, safety shoes and other types of personal protective equipment for RF fields are now commercially available. PPEs should be used with great care, since the attenuation properties of the material used to make this protective equipment can vary dramatically with frequency.
- RF safety glasses will be used near the radar operating area. Special care will be taken in buying the glasses since any metal may enhance local fields by acting as a receiving antenna.
- There are no exposure situations where members of the general public need to use protective equipment for RF fields from weather radars. An extensive program of measurement surveys, hazard communication, coupled with effective protective measures, is required around all radar installations for safety of workers.

6.5.2. Air Quality and Climate

The subprojects are likely to hire additional staff subsequently there will be an increase in number of vehicles entering the project area. This will lead to increased vehicular emissions during project operation that may pose potentially negative impacts on the air quality of the area if not mitigated properly. Similarly, in absence of solar panel backup generators may cause emissions. Emissions may carry over long distances, depending on wind speed and direction, the temperature of the surrounding air, and atmospheric stability. If no mitigation measures adopted, the impact is likely to be moderate.

Mitigation Measures

- The project staff will be advised to car pool and use and local transport;
- Provision of pick and drop for staff to avoid additional load on air quality;
- Vehicles with excessive smoke emissions should not be allowed to enter the sub-project locations.

6.5.3. Surface/ Ground Water

The type of sub projects proposed are not likely to cause direct contamination of water bodies and groundwater, siltation of surface water resources and alterations in drainage pattern. Relevant district authorities are responsible for the drainage and sewerage system. The sewerage water from the existing buildings enters the city sewerage drains. The sewerage lead to the surface water Nullah and surface water drains that are heavily polluted. The sub-projects are not likely to impact ground water, however, the impact on surface water through sewerage is likely to be moderate. The subproject sites may have drainage channels that might be used for sewage disposal.

Mitigation Measures

- Ensure sewage is directed into municipal drains leading to sewerage treatment Plant.
- Restoration and protection if monsoon led water channels at the sub-project sites

6.5.4. Solid Waste

There will be an increase in solid waste generation due to additional building maintenance and staff employed for the sub-projects. Sub-project sites are located in areas where solid waste collection is provided by the municipality. However, these systems have been known to be unreliable resulting in open dumping of waste in nearby channels and green areas.

Mitigation Measures

The mitigation measures include:

- Decrease solid waste going to landfills by segregating at source with labeled dust bins for biodegradable, non- biodegradable and recyclable products;
- Disposal of biodegradable to the municipality for treatment;
- Clearance of reusable and recyclable waste to certified recycling companies.

6.5.5. Electricity/ Water /Natural Gas /Fuel Consumption

The estimated water consumption calculated by Water and Sanitation Authority (WASA) is 72 gallon per person per day. There will be an increase in electricity, water, natural gas and fuel consumption as the sub-projects likely to hire staff. In absence of solar panels the electricity consumption will have high impact; if the proposed design recommendation for Solar panel is included then the building will be self-sustainable.

Mitigation Measures

- Water meters will be installed to assess the water consumption and water sensors at taps to avoid the wastage in case of leakages;
- Plumping system will be checked and maintained on monthly basis;
- Installation of Korean technology toilets that enable the reuse of sink water in WC. Similarly in Korea most building have waste water treatment plants installed in the basement for water conservation;
- The staff of PMD and NDMA will be trained on water conservation;

6.5.6. Ecological Impacts (Flora and Fauna)

Scientific literature was screened for articles on ecological effects of RF-EMF. According to a review of the ecological effects of radiofrequency electromagnetic fields [71] , RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms and plants in 70% of the studies. Development and reproduction of birds and insects are the most strongly affected endpoints. An uncertainty exists on the effects of EMR exposure on birds due to lack of studies. Most studies indicate the possibilities of the changes in the behaviour, physiology, breeding success and mortality. The effects of EMF exposure may be examined in light of multiple intensities are not conducted. The possible biological effects of electromagnetic fields on avian biology are inconclusive and uncertain. Since the EMF will not be directed towards ground, therefore, it is unlikely to impact vegetation including trees, grass, and shrubs and ground animals. Moreover the influence of EMF with other environmental factors on birds is not available that may provide important information for conservation of birds.

6.6. Environmental and Social Monitoring and Management Plan

6.6.1. Mitigation and Monitoring of Environmental and Social Impacts

Table 6.3 describes the implementation of mitigation measures for potential environmental and social impacts and their monitoring plan.

[71] S.Cucurachietal W.L.M.Tamis, M.G.Vijver, W.J.G.M.Peijnenburg, and G.R.de Snoo

Table 6.3: Environmental and Social Mitigation Implementation and Monitoring Plan

Phase	**Implementation Plan**			**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
Design Phase							
Biodiversity and Natural Resources	The sub-project sites may require tree cutting for site clearing.	1. Incorporate technical design measures to minimize unnecessary removal of trees and vegetative cover; 2. Plan for compensatory planting of eight trees against each fallen tree of similar floral function; 3. Disallow introduction of invasive/ exotic species; and recommend native species for plantation. 4. Locations for AWS will be selected outside/at a reasonable distance from the environmentally sensitive areas and archeological/cultural and religious sites of importance.	Project Implementation Units (PIUs) Design Contractors/Engineers	Construction designs and maps Project plans Tree count Compensatory Tree Plantation Plans Tree Species	At the time of design preparation At the time of design finalization	Environmental Safeguards Specialist – PIU, Contractor, Project Directors PMD and NDMA	Site specific ESMP
Land Acquisition, Resettlement, Loss of Livelihoods	The sub-project sites may require land acquisition and removal of encroachments	If land acquisition/resettlement will be required or loss of livelihood will occur, impacts will be mitigated by preparing a RAP in accordance with the Resettlement Policy Framework (RPF), provided in this ESMF and WB OP 4.12. Details are provided in ***Chapter 8*** on Resettlement Policy Framework.	Social Safeguards Specialist– PIUs	Site selection maps Preparation of RAP	At the time of design	Social Safeguards Specialists Project Directors	RPF and WB OP 4.12
Natural Disasters	The project sites are prone to natural disasters including earthquakes and floods.	1. The building design will be earthquake resistant according to Building Codes of Pakistan with Seismic provision and international best practices to avoid damage caused by earthquake; 2. Variety of structural engineering measures or structural components like shear walls, braced frames, moment resisting frames, and diaphragms, base isolation, energy dissipating devices and bracing of non-structural components are proposed. Simpler techniques include avoiding soft stories and bolting the sill plate of houses to the foundation; 3. Primary focus of earthquake design is initial life safety and getting people out of the building safely, not necessarily the ability of a building to withstand the effects of an earthquake, or to ensure occupancy or functionality following an event. Therefore building design will include emergency exits and alarm system; 4. Planning, designing and constructing the building to minimize any potential flood damages using guidelines of Annexure 11. Following are proposed: 5. elevating as much of the building as possible above the design flood level, 6. designing the building foundation and any portions subject to flooding to withstand design flood conditions and loads,	Project Implementation Units (PIUs)	Sub-project design maps with incorporation of building code for relevant Zones Construction contractor ToRs	At the time of design	Environmental Safeguards Specialist – PIU, Contractor, Project Directors PMD and NDMA	Building Codes of Pakistan with Seismic Provision using earthquake Zone standards for identified project sites

Phase	**Implementation Plan**			**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
		7. using flood-damage-resistant materials for any portions of the building below the design flood level 8. where flood proofing is permitted, employing appropriate methods and materials to either dry-flood proof or wet-flood proof those portions of the building below the design flood level					
Water /Electricity/ Natural Gas/ Fuel Consumption	There will be an increase in resource consumption due to construction work and subsequently project operations due to increase in staff.	1. Green building council and international best practice will be engaged for design provisions to be followed for water, electricity and natural gas conservation; 2. Water meters will be made part of the design in each building to monitor the consumption; 3. Design of buildings will include installation of Solar Panels; 4. Provision of Low Voltage electrical appliances will be made in procurement procedures; 5. Provision of pick and drop will be made part of sub-project design to manage the resource consumption including fuel and reduction in GHG emissions. 6. Prepare Energy and water conservation plan for construction	Project Implementation Units (PIUs)	Design provision for water, electricity, natural gas and fuel conservation	At the time of design	Environmental Safeguards Specialist – PIU, Contractor, Project Directors PMD and NDMA	Green Building Council guidelines
Air Quality and Noise Levels	Project activities associated with construction may increase the ambient air quality and noise levels of the at the sub-project sites. The impacts are likely to be high.	1. Air quality and noise level baselines will be conducted to enable monitoring during construction phase; 2. Provision of compliance to NEQS of vehicular emission will be made in the contract of construction contractor; 3. Traffic management plan for construction will be formulated during design phase that enable continuous traffic flow and avoid congestions which result in increased vehicle smoke density at a given area; Plan to neutralize dust emissions from construction activity, such as regular watering of sub-project sites to settle dust.	Project Implementation Units (PIUs)	Monthly monitoring of Ambient Air Quality and Noise for baseline.	At the time of design	Environmental Safeguards Specialist – PIU, Contractor, Project Directors PMD and NDMA	IFC/World bank OHS, ECP and NEQS for Ambient Air Quality and Noise.
Solid Waste Management	Improper solid waste disposal can result in increased air pollution through burning of waste, vector borne diseases, contamination of water sources and ambient aesthetics for surrounding communities. The impacts are likely to be high.	1. Prepare a detailed **Solid Waste Management Plan** for the construction sites and labor camps; 2. Identify current municipal systems of waste management 3. Plan for placement of waste collection containers throughout the project area; 4. Disallow the burning of any of type of waste; 5. Prepare plans for the safe handling, storage and disposal of harmful materials; 6. Prepare Solid Waste Management Plans for project sites for the operational phase (including adequate placement of waste bins, requirements of sanitary staff, transportation of waste, and identification of landfill sites) 7. Hazardous material list not to be used in construction will be made part of the contract.	Contractor Project Implementation Units (PIUs)	Solid Waste Management Plan Contractual binding on prohibited use of Hazardous Material for construction contractor (CC)	At award of construction Contract	Environmental Safeguards Specialist – PIU, Contractor, Project Directors PMD and NDMA	Hazardous Substance Rules 2003 ToRs

Phase	**Implementation Plan**			**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
Workers Health and Safety	Use of heavy machinery and handling of chemicals by workers can result in health impacts and accidents. The impacts are likely to be high.	Prepare a **Worker Health and Safety Plan** for the construction phase	Contractor Project Implementation Units (PIUs)	Worker Health and Safety Plan	At award of Construction Contract	Social Safeguards Specialist – PIU, Contractor, Project Directors PMD and NDMA	World Bank OHS Guidelines
Construction Phase							
Landscape/Soil	Construction at sites is likely to carry out site clearance, vehicular, labour and machinery movement causing soil erosion and compaction. There is also a potential for contamination of soil via runoff from construction activities including oil spills, construction material, dredged / spoil materials and construction waste.	1. Removal of vegetation and trees will be avoided to the extent possible 2. Water will be sprinkled during building of foundation to avoid erosion. 3. Construction materials will be stored in proper stores on impervious sheets to avoid any soil contamination. 4. Machinery and vehicles will be operated at designated routes to avoid erosion and compaction of un-impacted soils. 5. Visual Inspection will be carried out for land contamination and dust emissions. 6. The soil contaminated from minor and moderate spills will be removed and will be handed over to waste contractor for treatment at nearest incineration facility to the sub-project sites. 7. Major spills may require specialized treatment such as incineration, bioremediation and biodegradation. The biological agents will be introduced to the spill to hasten biodegradation. Most of the components of oil will be broken down by bacteria and other microorganisms into harmless substances such as fatty acids and carbon dioxide. To stimulate the growth of the microorganisms, fertilizing nutrients like nitrogen and phosphorous will be places near the oil tanks. 8. Training of staff on oil spills.	Contractor Project Implementation Units (PIUs)	Visual inspections and photographic record of site clearing and oil spills. Water sprinkling	Daily	Environmental Safeguards Specialist – PIUs Construction Contractor	World Bank OHS for Ambient
Ambient Air Quality and Climate	The construction activities at sub-project sites will cause impact on air quality, cement mixers (Batch Plant), movement of the machinery, generators soil excavation, construction vehicles, is likely to generate dust and exhaust emissions. Impact on local air	1. Contractor shall provide an Emissions Monitoring Plan to ensure constant checking of emissions by construction machinery and vehicles; Contractor should provide an operations and maintenance plan for the same; 2. Water will be sprinkled twice a day to avoid fugitive dust emissions; 3. Construction machinery and vehicles will be kept in good conditions to avoid vehicular emissions. Vehicular and generator exhaust emissions will be monitored to ensure compliance; 4. Unnecessary movement of vehicles will be avoided at the construction location; 5. Open burning of solid waste from the Contractor's camps should	Contractor Project Implementation Units (PIUs)	Ambient Air Quality monitoring for SOx, NOx and Particulate Matter PM2.5/10	Monthly	Environmental Safeguards Specialist -PMD and NDMA/ Construction Contractor	NEQS and World Bank OHS

Phase	Implementation Plan			Monitoring Plan			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
	quality is high	be strictly banned; 6. Wind breaks /barriers (either natural or constructed) will be deployed to reduce the possibility of suspended particles in air; 7. Raw materials such as cement, gravels and sand will be kept under sheet covers to prevent air flow; 8. In order to further reduce the environmental impact Cement Works (Concrete Batching Plant), the concrete batching plant will incorporate the following design and practices: 9. Cement will be transferred directly from barges to the plant. 10. All mixing will be in the enclosed electric motor driven plant mixer, NOT in trucks. 11. Truck loaded with concrete will be in wet form. 12. All washing water used by the batch plant and storm water will be collected and stored and recycled for re-use. 13. No water will be discharged outside the plant boundary. 14. Concrete recycling machine be used to recycle waste material to slurry water and aggregates for reuse.					
Surface/Ground Water Resources	Drainage channel is located at sub- project site for NDMA complex and drainage channel are in close vicinity of MMC and WSR sites. Construction activities may encourage soil erosion and waste may increase the sediment loads into the city drainage, while accidental leaks/spills of oil/fuel from storage tanks or maintenance vehicles can also pollute surface waters. The impact is likely to be high in sub- project site for NDMA complex	1. **Debris Management Plan**; the contractor will ensure that construction debris does not find its way into the drainage or water channels which may get clogged; 2. Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond; 3. Construction work close to streams or other water bodies will be avoided, especially during monsoon period; 4. All fuel storage will be properly marked to highlight their contents with a concrete pad underneath to prevent water contamination in case of leaks or spills. Daily monitoring will be carried out for leaks. Shovels, plastic bags, and absorbent material will be placed near fuel and oil storage or handling areas to attend spills and leaks; 5. Used oil and vehicle related waste will be transported to local contractors for recycling or reuse; 6. Diverting work area runoff into properly designed and constructed sediment traps or drainage collection system to ensure that exposed soils are not eroded. Runoff velocities in ditches or other drainage routes, or along slopes, to be kept low to minimize erosion potential. Runoff outfall locations to be protected with erosion resistant material, if required. 7. Proper disposal of solid and sewage waste from workers camps to ensure it is not disposed in the drainage channel.	Contractor Project Implementation Units (PIUs)	Surface Water	Monthly Quarterly	Environmental Safeguards Specialist -PMD and NDMA Construction Contractor	NEQS and World Bank OHS
Water /Electricity/	Construction activities require a large amount of	1. Water meters will be installed at sub-project sites to monitor water consumption;	Contractor	Water, Electricity and	Monthly/	Environmental Safeguards	World Bank Environmental

Phase		**Implementation Plan**		**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
Natural Gas and Fuel Consumption	water that may reduce the availability of water in residing area. It will add load to the electricity natural gas fuel consumption increasing GHG emissions. The impact is likely to be high.	2. Construction staff will be trained on water conservation practices to avoid excessive loss; 3. Water required for construction should be obtained in a way so that water availability and supply to residing area remains unaffected; 4. Approval will be attained from relevant development authority at district level/CDA prior to construction work. 5. Construction workers and supervisor will be trained on energy and water conservation practices.	Project Implementation Units (PIUs)	Natural Gas Consumption Energy Conservation Plan Trainings	Quarterly	Specialist -PMD and NDMA Construction Contractor	Code of Practice
Solid Waste Generation	During construction phase, solid waste can be generated from discarded equipment parts, scrap metals, equipment boxes, wood parts, empty bags, and leftover construction debris. The construction material and waste may include toxic/hazardous chemical materials.	1. **Solid Waste Management Plan** will be prepared for all sub-project sites to be used by Construction Contractor. The Waste Management Plan will be prepared with following provision of hazardous chemical handling plan: ▪ Solid waste collection, segregation, storage and disposal will be carried out for waste generated. For at source segregation separate waste bins will be placed at sub-project sites. Recyclable material will be segregated whereas non-hazardous waste will be disposed-off properly at approved disposal site; ▪ Labeling of containers will be carried out including the identification and quantity of the contents, hazard information; ▪ Marking of Hazardous/toxic waste 'if generated' separately and disposal using international best practices through registered contractor; ▪ Used oil will be collected in separate containers stored on impervious platform with restricted access and must be sold to licensed contractor; ▪ Burning of solid and waste oil should be strictly prohibited 2. Training of workers will be carried out in the storage and handling of materials and chemicals that can potentially cause soil contamination; 3. Emergency Response Plan will be prepared to address the accidental spillage of fuels and hazardous/toxic material, fire, vandalism and natural hazards; 4. On completion of the construction phase of the project, the contractor will be required to rehabilitate the site. Rehabilitation will include removal of all construction materials and wastes, and the grading and landscaping of all exposed sites that may be prone to erosion. Where natural erosion protection measures may not be possible or practical, suitable physical erosion protection methods will be used. The purposes of site rehabilitation will be to minimize the potential for soil erosion, enhance the aesthetic appearance of the site and restore safe public access to the surrounding area.	Contractor Project Implementation Units (PIUs)	Solid waste Management Plan trainings Amount and type of solid waste generated from sub-project sites; List of hazardous chemical used for construction	Monthly	Environmental Safeguards Specialist -PMD and NDMA Construction Contractor	Hazardous Chemicals Rules, 2003

Phase	**Implementation Plan**			**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
Noise Levels	The construction activities are likely to generate high noise levels. The sources of noise in construction include Asphalt Plant excavation work, heavy earth moving equipment/ machinery, pilling work, welding, cuttings, drilling, grinding and material loading/offloading vehicles. Impact is likely to be high.	1. The location for stationary sources of noise such as concrete mixers and pumps will be selected at a reasonable distance from residing population. The cement tankers will be working inside enclosure with cladding to reduce noise; 2. The construction material loaders will only operate during night time as per rules of traffic police. Working hours will be allocated for the use of batch plant, equipment and other machinery; 3. School time and late night construction activities will be avoided; 4. Use of noise barriers in locations next to schools; 5. Blowing of horn will be strictly prohibited; 6. Noise monitoring will be carried out at various locations using noise meters. Site labour working in high noise area where noise level exceeds 85 dB (A), will wear earplugs and ear muffs; 7. Noise level of 55 dB at day and 45 dB at night time will be maintained.	Contractor Project Implementation Units (PIUs)	Noise Monitoring Residing Areas and Construction Site	Monthly	Environmental Safeguards Specialist -PMD and NDMA Construction Contractor	NEQS, World Bank OHS
Flora and Fauna	The construction may require cutting of trees and clearing of vegetation.	1. Planting of eight trees for every tree cut during construction by the contractor and managed by Project staff; 2. Do not introduce invasive or exotic species through plantation.	Contractor Project Implementation Units (PIUs)	Tree count Tree Plantation in designated area (count eight for one cut)	Prior /Start/Post construction	Environmental Safeguards Specialist -PMD and NDMA Construction Contractor	Site specific ESMP
Public Health and Safety	Construction activities and movement of heavy vehicles may impact public safety. Similarly emissions and noise from the site may impact the health of residing communities	1. Train drivers operating heavy vehicles in road and pedestrian safety; 2. Set appropriate speed limits to avoid accidents; 3. Use of heavy vehicles on public roads will be avoided during hours when students are coming to school or leaving school; 4. Placement of construction and diversion signage, particularly at urban areas and at sensitive/accident-prone spots, in accordance to a **Public Safety Plan**; 5. Provision of alternate routes for use by the public. Mitigation associated with public health including noise and air quality is included in earlier sections.	PIUs	Complaint/ Accident Register	Prior /Start/Post construction	Social Safeguards Specialist -PMD and NDMA Construction Contractor	World Bank OHS Guidelines and ECP
Workers Health and Safety	Use of heavy machinery and handling of hazardous waste and chemicals may result in health impacts for workers on the construction site.	In accordance to the **Solid Waste Management** and **Workers Health and Safety Plan**, ensure: 1. The project locations have full access to health facilities and emergency response centers (fire, earthquake and floods) and police station. In case of emergency, the injured will be taken to the nearest medical facility. 2. Provision of clean drinking water will be ensured for the	Contractor Project Implementation Units (PIUs)	Health and Safety Management Plan and trainings Medical record of	Monthly	Social Safeguards Specialist -PMD and NDMA Construction Contractor	World Bank OHS Guidelines and ECP , Health and Safety Management

Phase		**Implementation Plan**		**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
		construction crew; 3. Hygiene inspections will be carried out to avoid disease epidemic; 4. In case of unlikely incidents (fire, vandalism) the workers will be evacuated and emergency response and law enforcement agencies will be engaged; 5. Fire safety alarms will be installed at various locations; 6. Fire extinguishers will be placed at various locations including a water hose installation at ground level; 7. Fire safety and emergency response trainings will be conducted; 8. Hazards indicator signs and firefighting equipment will be installed; 9. The construction crew will be trained on important aspects of workplace safety; 10. Construction machinery operators and drivers will be trained to avoid associated accidents using machines and vehicles; 11. Flammables and other toxic materials will be marked and stored at secured sites; 12. Onsite first aid kits will be kept at construction sites and randomly moving vehicles\machinery. 13. Do not allow workers with inadequate training to operate heavy machinery; 14. Provision of appropriate and high quality Personal Protective Equipment (PPE) to workers such as gloves, vests, hard-hats, masks etc.; 15. Train workers in the use of PPE and safety measures while using heavy machinery and handling chemicals. 16. Follow guidelines for Asbestos and Asbestos based product use in construction **(Annexure 12)**		workers Prior /Start/Post construction			Plan
Physical /Cultural/ Archeological Resources	The sub-projects may include religiously and culturally important sites at a reasonable distance. Excavation work during construction may result in the uncovering of ancient sites or artifacts. Impact is likely to be low as the only identified sensitive site close to sub project MMC is a grave yard.	1. The construction work will be stopped at the time of the funeral and burial at the grave yard. 2. Construction staff will be trained and informed on identifying the evidence of archaeological/historic remains; 3. In case evidence of archaeological remains is found during construction activities, the actions listed below will be undertaken. ▪ Excavation work in the vicinity of the find will be stopped; ▪ Assistance will be sought from the nearest office of the Department of Archaeology and Museums to identify the remains; ▪ If the department decides to salvage the find, PMD will provide assistance. 4. Detailed procedure for Archaeological Chance Finds included in **Annexure 13**.	Contractor Project Implementation Units (PIUs)	Consultation with the relevant departments Preparation of PCR Plan, if needed.	At the start of construction	Social Safeguards Specialist -PMD and NDMA Construction Contractor	RPF and WB OP 4.12

Phase	**Implementation Plan**			**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
Traffic Management	The sub-project sites are in urban area close to social sensitive receptors like schools, colleges, offices and residents. The construction work may likely impact the traffic flow.	1. Vehicles will be inspected prior to start of construction work. 2. Alternate routes will be created to avoid disturbance to school and hospital; 3. Construction site will be barricaded to minimize accidental injuries and visual nuisance to the general public; 4. Movement of construction equipment will be limited to specific duration when there is least disturbance to the residing offices e.g after school timings; 5. Adequate road signs will be erected to warn general public; 6. The contractor will be advised to follow vehicular maintenance to reduce engine noise; 7. Drivers will be trained to follow the designated routes and avoid honking; 8. The construction trucks will be adequately covered with tarpaulin covers to avoid flow into air.	Contractor Project Implementation Units (PIUs)	Construction vehicles trimmings Accident register	Continuous	Social Safeguards Specialist -PMD and NDMA Construction Contractor	Compliance Traffic management plan
Land Acquisition and Resettlement	Sub-projects may require some small scale private land acquisition and removal of encroachments	1. A Resettlement Action Plan (RAP) will be prepared for the sub-project based on guidance from the Resettlement Planning Framework (RPF)	Contractor Project Implementation Units (PIUs)	RAP	Monthly	Social Safeguards Specialist – PMD/NDMA Resettlement Specialist	RPF and RAP
Operations Phase							
EMF	The sub-project operations at MMC and WSR sites may have radiation impacts of EMF related to radars	1. Engineering controls for EMF include interlocks, electronic means to exclude the radar pointing within office complex in the tower building, and shielding. 2. Administrative controls include audible and visible alarms, warning signs, and restriction of access through barriers, locked doors, or limiting access time to radar. 3. Workers will use personal protective equipment to ensure compliance with exposure standards. Conductive suits, gloves, safety shoes and other types of personal protective equipment for RF fields are now commercially available. PPEs should be used with great care, since the attenuation properties of the material used to make this protective equipment can vary dramatically with frequency. 4. RF safety glasses will be used near the radar operating area. Special care will be taken in buying the glasses since any metal may enhance local fields by acting as a receiving antenna. 5. There are no exposure situations where members of the general public need to use protective equipment for RF fields from weather radars. An extensive program of measurement surveys, hazard communication, coupled with effective protective measures, is	Project Management NDMA and PMD	Monitoring should be performed to quantify RF field levels in the area. While extremely high RF field levels can be measured directly in front of radar to assess the levels of EMF.	Quarterly	Environment and Social Safeguards Specialist -PMD and NDMA	World Health Organisation Standards

Phase		**Implementation Plan**		**Monitoring Plan**			
Impacts	**Environmental and Social Impacts**	**Proposed Mitigation Measures**	**Responsibility**	**Monitoring Parameter(s)**	**Frequency**	**Responsibility**	**Compliance Criteria**
		required around all radar installations for safety of workers.					
Land Acquisition and Resettlement	Sub-projects may require some small scale private land acquisition and removal of encroachments	1. A Resettlement Action Plan (RAP) must be completed	Project Implementation Units (PIUs)	RAP	Project Completion	Social Safeguards Specialist – PMD/NDMA Resettlement Specialist	RPF and RAP
Air Quality and Climate	An increase in number of vehicles entering the offices may pose potentially negative impacts on the air quality of the area if not mitigated properly	2. The project staff will be advised to car pool and use and local transport; 3. Provision of pick and drop for staff to avoid additional load on air quality; 4. Vehicles with excessive smoke emissions should not be allowed to enter the sub-project locations.	Project Management NDMA and PMD	Vehicular Emissions	Quarterly	Environment and Social Safeguards Specialist -PMD and NDMA	NEQs Permissible limits of vehicular exhaust
Surface and Ground water	The sub- projects are not likely to impact ground water, however, the impact on surface water through sewerage is likely to be moderate. The NDMA Complex has a drainage channel that might be used for sewage disposal.	1. Ensure sewage is directed into municipal drains leading to sewerage treatment Plant. 2. Restoration and protection monsoon led water channel at the site of NDMA complex	Project Management NDMA and PMD	Ground water /drinking quality	Biannual	Environment and Social Safeguards Specialist -PMD and NDMA	NEQs liquid Effluent
Solid Waste	There will be an increase in solid waste generation due to additional building maintenance and staff employed for the sub-projects.	1. Monitor and ensure that solid waste collection is provided by the municipality. 2. Decrease solid waste going to landfills by segregating at source with labeled dust bins for biodegradable, non- biodegradable and recyclable products; 3. Disposal of biodegradable to the municipality for treatment; 4. Clearance of reusable and recyclable waste to certified recycling companies.	Project Management NDMA and PMD			Environment and Social Safeguards Specialist -PMD and NDMA	Solid Waste Management Plan
Electricity/ Water /Natural Gas /Fuel Consumption		1. Water meters will be installed to assess the water consumption and water sensors at taps to avoid the wastage in case of leakages; 2. Plumping system will be checked and maintained on monthly basis; 3. Installation of Korean technology toilets that enable the reuse of sink water in WC. Similarly in Korea most building have waste water treatment plants installed in the basement for water conservation; 4. The staff of PMD and NDMA will be trained on water conservation; 5. Use of solar panels to generate electricity	Project Management NDMA and PMD	Electricity/ Water /Natural Gas /Fuel Consumption	Monthly	Environment and Social Safeguards Specialist -PMD and NDMA	N/A

Chapter 7. Environmental and Social Screening

7.1. Sub-Project Screening and Impact Assessment Process

While preparing any sub-projects, the ESMF will be followed to screen sub-projects and to determine the appropriate safeguards instruments which will be required in line with the World Bank Operational Policies. The following guidelines, codes of practice and requirements will be followed in the screening, selection, design and implementation of any sub-project.

Criteria for the type of assessment to be conducted for sub-projects are provided in **Table 7.1**. The sub-projects will be screened for social, environmental and archaeological impacts using screening given in **Annexure 14.** Category-A sub-projects will not be financed under this project. If Category-A sub-project is identified, sub-project will be either dropped or replaced with a Category B or C sub-project. Environmental and Social Management Plans (ESMPs) will need to be prepared and clearance obtained from the Bank prior to initiating environmental category 'B' sub-projects; For sub-projects categorized as Category C, no further activity beyond screening would be required.

Table 7.1: Subproject Category Classification System

Category	Description	Requirement
A	Proposed subproject is classified significant adverse social and/or environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.	Full ESIA Category A subproject examines the project's potential negative and positive environmental and social impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental and social performance.
B	Proposed subproject is classified as Category B, if it's potential adverse social impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. These impacts are site- specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Category A projects.	Narrower scope of ESIA for a Category B subproject than that of ESIA for Category A. But, like ESIA for Category A, it examines the subproject's potential negative and positive environmental and social impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental and social performance.
C	Proposed subproject is classified as Category C if it is likely to have minimal or no adverse social and/or environmental impacts.	Beyond screening, no further ESIA action is required for a Category C subproject.

Note: Any proposed subproject under the project which results in a Category An assignment will only be considered for financing if the individual subproject activity resulting in the Category A assignment is appropriately mitigated from the subproject and/or replaced with an element that presents a less significant environmental risk (Category B or C).

The guidelines for preparation of ESMPs are given below. The assessments will also be submitted to the relevant EPA for obtaining No Objection Certificate (NOC) before

commencing the sub-projects implementation, in line with the provincial regulatory requirements.

ESMP Guidelines for Sub-Projects

When a subproject includes distinct mitigation measures (physical works or management activities), an Environmental and Social Management Plan (ESMP) needs to be included with the subproject application.

Site Specific ESMP General Format/ Contents:

An ESMP usually includes the following components:

Description of adverse effects: The anticipated effects are identified and summarized.

Description of mitigation measures: Each measure is described with reference to the effect(s) it is intended to deal with. As needed, detailed plans, designs, equipment descriptions, and operating procedures are described.

Description of monitoring program: Monitoring provides information on the occurrence of environmental and social effects. It helps identify how well mitigation measures are working, and where better mitigation may be needed. The monitoring program should identify what information will be collected, how, where and how often. It should also indicate at what level of effect there will be a need for further mitigation. How environmental and social effects are monitored is discussed below.

Responsibilities: The people, groups, or organizations that will carry out the mitigation and monitoring activities are defined, as well as to whom they report and are responsible. There may be a need to train people to carry out these responsibilities, and to provide them with equipment and supplies.

Implementation schedule: The timing, frequency and duration of mitigation measures and monitoring are specified in an implementation schedule, and linked to the overall subproject schedule.

Cost estimates and sources of funds: This are specified for the initial subproject investment and for the mitigation and monitoring activities as a subproject is implemented. Funds to implement the EMP may come from the subproject grant, from the community, or both. Government agencies and NGOs may be able to assist with monitoring.

Monitoring Methods:

Methods for monitoring the implementation of mitigation measures or environmental effects should be as simple as possible, consistent with collecting useful information, so that community members can apply them themselves.

If social impacts related to land, resettlement, livelihood, infrastructure damage are identified during screening process, the sub-projects will also be screened for need of land acquisition and resettlement using Involuntary Resettlement Screening Checklist Attached as **Annexure 15**. If confirmed, necessary planning efforts will be carried out to develop mitigation measures in accordance with RPF presented in Chapter-8 of this ESMF.

All projects/subprojects will be screened for impacts on physical cultural resources and necessary mitigation measures. An outline of Physical Cultural Resource Management Framework providing a roadmap for preparing a Management Plan for the protection of cultural property and chance discovery of archaeological artifacts, unrecorded graveyards and burial sites are outlined in **Annexure 13.**

The following will be applicable for all sub-projects:

1. ESMPs of sub-projects should be made part of all construction contracts to ensure effective implementation.
2. The Environment, Health and Safety Guidelines developed by the International Finance Corporation (IFC) and the World Bank will also be applicable to the activities under the emergency projects/subprojects.

3. Subject to the needs as determined by the Bank's safeguards' team, the implementing agency will engage independent technical resources to conduct an annual environmental and social audit as third party validation, of the subprojects undertaken during each year of the Project implementation.

7.2. Planning Review and Approval

PIU will be responsible for the screening and preparation of any safeguards instrument required in line with this Framework. The PIU will submit the initial ESMPs documents to World Bank prior to implementation of sub projects to maintain the quality control and consistency. The implementation agencies will not approve the proposed operations until the required environmental and social safeguard action plans are cleared for compliance with the Framework by the World Bank.

The implementing agency will implement the projects in close coordination with the relevant line departments, local governments, and political agents. The implementing agency will be responsible for applying the safeguard screening and mitigation requirements to its own sub-projects. It should also be ensured that other necessary NOCs should also be obtained from all other departments before commencing works of any sub-project.

Chapter 8. Resettlement Policy Framework

8.1. Involuntary Resettlement under the Project

The Project activities may have some small scale land acquisition requirements. Planned and anticipated sub-projects and their land requirements are:

Expansion and refurbishment of PMD facilities and offices

This sub-component will establish the Monsoon Monitoring Centre in Islamabad, as well as up gradation of Flood Forecasting Division (FFD) to National Flood Forecasting Center (NFFC) in Lahore. Both facilities will be built on the existing offices of PMD in Islamabad and Lahore, hence not requiring any acquisition of land.

Construction of NDMA Headquarters in Islamabad

This component mainly involves developing institutional set-up and operational capacity of NDMA through construction of NDMA headquarters that will host National Institute of Disaster Management (NIDM), National Emergency Operations Center (NEOC) and NDRF Facility. The NDMA Headquarters are most likely going to be built on government owned land allocated for this purpose. Screening will be required to ensure that there are no squatters or encroachments on this land. A Resettlement Action Plan (RAP) will be prepared and implemented if encroachments are ascertained and Project Affected Persons (PAPs) are identified during screening.

Installation of Automatic Weather Stations (AWS)

Automatic Weather Stations will be installed at undisclosed locations across Pakistan. Land requirements for each station are small, approximately 500 square feet. These stations will be installed on:

- Government owned land where possible
- If government owned land is not available, the project will explore voluntary land donations
- If government owned or voluntary land is not available, the project will as a last option, consider acquisition of private land. In case of land acquisition, a Resettlement Action Plan (RAP) will be prepared.

8.2. Objectives of the Resettlement Planning Framework (RPF)

The Resettlement Planning Framework has been developed under guidance of World Bank Policy OP4.12 on Involuntary Resettlement to respond to possible resettlement due to project activities. The RPF provides guidelines on preparation of a Resettlement Action Plan (RAP) in case land acquisition is ascertained or Project Affected Person (PAPs) are identified during screening of sub-projects. Screening tools are provided in Chapter 7 and **Annexure 15**of this ESMF.

OP 4.12 on Involuntary Resettlement covers direct economic and social impacts that are caused by:

- The involuntary taking of land resulting in i) relocation or loss of shelter; ii) loss of assets or access to assets; or iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or
- The involuntary restriction of access to legally designated parts and protected areas resulting in adverse impacts on the livelihoods of displaced persons.

Implementation of any sub-project requiring involuntary resettlement will not commence before a RAP has been prepared and implemented. The RAP will lay out provisions for land and other compensation, assistance required for relocation of PAPs, prior to displacement, as well as livelihood restoration measures. In particular, the taking of land and related assets can happen only after compensation has been paid and other allowances and entitlements have been provided to displaced persons and measures have been taken to ensure livelihood restoration. The selection of sub-projects will be based on the following principles:

- Involuntary resettlement and land acquisition should be avoided where feasible, or minimized, exploring all viable alternative sub projects design;
- Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to give the persons displaced by the project the opportunity to share in project benefits. Displaced and compensated persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs; and
- Displaced and compensated persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

8.3. Eligibility and Cut-off-Date

In accordance with the World Bank OP 4.12, census will be required to identify the person/persons who will be affected by the project to determine the eligibility for compensation and other resettlement assistance[72].

The project affected persons eligible for compensation or rehabilitation/resettlement assistance are discussed below:

- All land owning affected persons losing land or non-land assets, whether covered by legal title or customary land rights, whether for temporary or permanent acquisition;
- Tenants and sharecroppers, whether registered or not; for all non-land assets, based on prevailing tenancy arrangements;
- Persons losing the use of structures and utilities, including titled and non-titled owners, registered, unregistered, tenants and lease holders plus encroachers and squatters;
- Persons losing business, income and salaries of workers, or a person or business suffering temporary effects, such as disturbance to land, crops, and business operations both permanently and also temporarily during construction;
- Loss of communal property, lands and public infrastructure;

[72] Resettlement assistance may consist of land, other assets, cash, employment, and so on, as appropriate.

- Vulnerable persons identified through the census/impact assessment survey/analysis; and
- In case of relocation, all affected persons will receive transitional and other support to re-establish their livelihoods.

The compensation eligibility will be limited by a 'cut-off date' for the proposed project on the day of the start of the "census" survey for the impact assessment in order to avoid an influx of outsiders. The cut-off date[73] will be announced through mass media (like pamphlets/leaflets, newspaper). The project affected persons who settle within the alignment after the cut-off date will not be eligible for compensation.

8.4. Entitlement for Compensation

The following entitlements are applicable for the project affected persons losing land, structures, and other assets and incurring income losses. These displaced persons are eligible for rehabilitation subsidies and for the compensation of lost land, structures and utilities along with loss of livelihood. There will also be special provisions for vulnerable displaced persons.

8.4.1. Agricultural Land Impacts

Permanent Losses:

- Legal/legalizable landowners (including who may have customary rights) are compensated either in cash at replacement cost plus a 15% compulsory acquisition surcharge (CAS) free of taxes and transfer costs;
- Leaseholders of public land will receive rehabilitation in cash equivalent to the market value of the gross yield of lost land for the remaining lease years (up to a maximum of three years); and
- Encroachers will not receive payment for land – they will be rehabilitated for land use loss through a special self-relocation allowance equivalent to one year of agricultural income or through the provision of a free or leased replacement.

Temporary Land Loss

Legal/legalizable owners and tenants or encroachers will receive cash compensation equal to the average market value of rental of land. For agriculture land, compensation will be paid for each lost harvest for the duration of the loss, and by the restoration of both, cultivable and uncultivable land, to pre-construction conditions. Through specification in the contract agreements, contractors will be required to carry out restoration works before handing over land back to the original occupiers, or PAPs will be provided with cash to rehabilitate the land.

Severely Project Affected Persons

- Vulnerable households, legal/legalizable owners, tenants or encroachers will be entitled to one vulnerable impact allowance equal to the market value of the harvest of the lost land for one year (summer and winter), in addition to the standard crop compensation.

[73] Normally, this cut-off date is the date the census begins. The cut-off date could also be the date the project area was delineated, prior to the census, provided that there has been an effective public dissemination of information on the area delineated, and systematic and continuous dissemination subsequent to the delineation to prevent further population influx.

- The aim of this payment is to assist severely displaced persons to overcome the short term adverse impacts of land and asset loss, and help them to readjust to their changed circumstances while they are making replacement earning arrangements. There will be a need to closely monitor such severely displaced persons. The one-time payment should, at the absolute minimum be adequate to provide them with equivalent level of livelihood.
- Other options can be considered, including non-cash based livelihood support and employment, both temporary and permanent. Other additional income restoration measures can be considered during preparation of RAP, if required for any sub-project.

8.4.2. Residential and Commercial Land

- Residential and commercial land will be compensated at replacement value for each category of the PAPs.
- Residential and commercial land owners will be entitled to the following:
- Legal/legalizable owners will be compensated by means of either cash compensation for lost land at replacement cost based on the market value of the lost land plus a 15% CAS, free of taxes and transfer costs; or in the form of replacement land of comparable value and location as the lost asset;
- Renters are compensated by means of cash compensation equivalent to three months of rent or a value proportionate to the duration of the remaining lease, including any deposits they may lose; and
- Squatters/Encroachers are compensated through either a self-relocation allowance covering six months of income or the provision of a leased replacement plot in a public owned land area. They will be compensated for the loss of immovable assets, but not for the land that they occupy.

8.4.3. All Other Assets and Incomes

- Structures will be compensated for in cash at replacement cost plus 15% CAS. Material that can be salvaged is allowed to be taken by the owner, even if compensation has been paid for it;
- Renters or leaseholders of a house or structure are entitled to cash compensation equivalent to three months rent or a value proportionate to the duration of the remaining lease period;
- Crop compensation will be paid to owners, tenants and sharecroppers based on their agreed shares. The compensation will be the full market rate for one year of harvest including both winter and summer seasons;
- Fruit and other productive trees will be compensated for based on rates sufficient to cover income replacement for the time needed to re-grow a tree to the productivity of the one lost. Trees used as sources of timber will be compensated for based on the market value of the wood production, having taken due consideration of the future potential value;
- Businesses will be compensated for with cash compensation equal to one year of income for permanent business losses. For temporary losses, cash compensation equal

to the period of the interruption of business will be paid up to a maximum of six months or covering the period of income loss based on construction activity;

- Workers and employees will be compensated with cash for lost wages during the period of business interruption, up to a maximum of three months or for the period of disruption;
- Relocation assistance is to be paid for PAPs who will be required to vacate their property. The level of assistance should be adequate to cover transport costs and also special livelihood expenses for at least 1 month or based on the severity of impact;
- Community structures and public utilities, including mosques and other religious sites, graveyards, schools, health centers, hospitals, roads, water supply and sewerage lines, will be fully replaced or rehabilitated to ensure their level of provision is, at a minimum, to the pre-project situation; and
- Particular attention will be paid to vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples, ethnic minorities, or other displaced persons who may not be protected through national land compensation legislation.

8.5. Entitlement Matrix

The compensation and resettlement & rehabilitation entitlements are summarized in the Entitlement Matrix presented as **Table 8.1** below:

Table 8.1: Entitlement Matrix

Asset	Specification	Project Affected Persons	Compensation Entitlements[74]
Temporary impacts on arable land	Access is not restricted and existing or current land use will remain unchanged	Farmers/ Titleholders	No compensation for land acquisition provided that the land is rehabilitated/restored to its former quality following completion of works; Rental for land will be provided in cash based on the use of land and in accordance with market value. Compensation, in cash, for all damaged crops and trees.
		Leaseholders *(registered or not)*	No compensation for land provided that the land is rehabilitated/restored to its former quality following completion of works; Land rental will be provided in accordance with market value. Compensation, in cash, for all damaged crops and trees.
		Sharecroppers *(registered or not)*	Compensation, in cash, for all damaged crops and trees. Land rental will be provided in accordance with market value.
		Agricultural workers	Compensation, in cash, for all damaged crops and trees.
		Squatters	Compensation, in cash, for all damaged crops

[74] Compensation for all assets will be to the owner of the asset.

Asset	Specification	Project Affected Persons	Compensation Entitlements[74]
			and trees, where these are owned by the squatters.
Permanent impacts on Arable land where access is restricted and/or land use will be affected	All adverse effects on land use independent of severity of impact	Farmers/ Titleholders	Land for land compensation with plots of equal value and productivity to the plots lost; or; Cash compensation plus 15% CAS for affected land at replacement cost based on market value free of taxes, registration, and transfer costs.
		Leaseholders *(registered or not)*	Renewal of lease contract in other plots of equal value/productivity of plots lost, or Cash equivalent to market value of gross yield of affected land for the remaining lease years (up to a maximum of 3 years).
		Sharecroppers *(registered or not)*	Cash equivalent to market value of the lost harvest share once (temporary impact) or twice (permanent impact).
		Agricultural workers losing their contract	Cash indemnity corresponding to their salary (including portions in kind) for the remaining part of the agricultural year.
		Squatters	1 rehabilitation allowance equal to market value of 1 gross harvest (in addition to crop compensation) for land use loss.
	Additional provisions for severe impacts (More than 10% of land loss)	Farmers/ Titleholders Leaseholders	1 severe impact allowance equal to market value of gross harvest of the affected land for 1 year (inclusive of winter and summer crop and additional to standard crop compensation).
		Sharecroppers *(registered or not)*	1 severe impact allowance equal to market value of share of harvest lost (additional to standard crop compensation)
		Squatters	1 severe impact allowance equal to market value of gross harvest of the affected land for 1 year (inclusive of winter and summer crops and additional to standard crop compensation)
Residential/ Commercial Land		Titleholders	Land for land compensation through provision of a plots comparable in value/ location to plot lost or Cash compensation plus 15% CAS for affected land at full replacement cost free of taxes, registration, and transfer costs.
		Renters/ Leaseholders	3 months rent or a value proportionate to the duration of the remaining lease, including any deposits they may lose.
		Squatters	Accommodation in available alternate land/ or a self-relocation allowance
Houses/ Structures		All relevant PAPs (including squatters)	Cash compensation plus 10% electrification allowance at replacement rates for affected structure and other fixed assets free of salvageable materials, depreciation and transaction costs. Affected tenants will receive cash compensation of a value proportionate to the duration of the

Asset	Specification	Project Affected Persons	Compensation Entitlements[74]
			remaining lease period, or three months, whichever is higher. In case of partial permanent impacts full cash assistance to restore remaining structure, in addition to compensation at replacement cost for the affected part of the structure.
Crops	Crops affected	All PAPs owning crops (including squatters)	All crop losses will be compensated at market rates based on actual losses.
Trees	Trees affected	All PAPs owning trees (including squatters)	For timber/ wood trees, the compensation will be at market value of tree's wood content. Fruit trees: Cash compensation based on lost production for the entire period needed to re-establish a tree of equal productivity.
Business/ Employment	Temporary or permanent loss of business or employment	All PAPs (including squatters, agriculture workers)	Business owner: (i) Cash compensation equal to one year income, if loss is permanent; ii) In case of temporary loss, cash compensation equal to the period of the interruption of business up to a maximum of six months or covering the period of income loss based on construction activity. Workers/ employees: Indemnity for lost wages for the period of business interruption up to a maximum of 3 months
Relocation	Transport and transitional livelihood costs	All PAPs affected by relocation	Provision of sufficient allowance to cover transport expenses and livelihood expenses for one month
Community assets	Mosques, foot bridges, roads,	Affected community	Rehabilitation/substitution of affected structures/ utilities (i.e. mosques, footbridges, roads).
Vulnerable PAPs livelihood	Households' below poverty line, female headed households, disable persons etc.	All vulnerable PAPs	Lump sum one time livelihood assistance allowance on account of livelihood restoration support. OPL should be per household member Or Minimum Wage per earning member per month. Temporary or permanent employment during construction or operation, where ever feasible.
Unidentified Losses	Unanticipated impacts	All PAPs	Deal appropriately during project implementation according to the World Bank Operational Policies.

8.6. Calculation for Compensation Payments

Individual and household compensation will be made in kind and/or in cash (refer to **Table 8.2**). Although the type of compensation may be an individual's choice, compensation in kind will be preferred, if available, when the loss amounts to more than 20 % of the total loss of assets. Compensations for land and other assets (buildings and structures) are determined as follows:

Table 8.2: Forms of Compensation

Compensation	Notes
Cash Payments	Compensation will be calculated and paid in the national currency. Rates will be based on the market value of land and/or assets when known, or estimated when not known, plus compensation for the value of standing crops.
In-Kind	Compensation may include items such as land, houses, and other buildings, building materials, seedlings, agricultural inputs and financial credits for equipment.
Assistance	Assistance may include moving allowance, transportation and labour.

8.6.1. Land Valuation and Compensation

There is a minimal chance of permanent land acquisition under this project. Should there be any land acquisition for installation of AWS and therefore RAP preparation, the following procedure will be adopted, as per the Land Acquisition Act 1894 (LAA):

- PMD will write to the relevant provincial revenue department for permanent land acquisition in the interest of welfare of the country;
- Revenue Mukhtiarkar will give a notice to land owner to produce the documents that prove land ownership;
- The land owner will provide the copy of the ownership document to Mukhtiarkar to prove ownership;
- Revenue Department will notify that the particular area is required for state welfare works permanently and hence section 4 and 6 of the LAA will be applied to that area;
- Following application of section 4 and 6 of the LAA, the price will be decided District Collector will pay the cheque to land owner in lieu of the required land.

Land will be valued following a valuation process consistent with LAA 1894 and the provisions of RPF. For land valuation, Land Valuation Committees (LVC) will be formed comprising members from PMD/PIU, local administration, PAPs and NGOs (if any) with a mandate to fix the rates based on market survey and negotiation with the communities. Compensation will be based on the market rates on the cut-off date along with 15 % over and above the cost of the land and other requirements of Sections 23 and 24 of LAA and RPF.

8.6.2. Buildings and Structures

Building, houses and structures will be compensated at replacement cost. Buildings/houses and structure valuation survey will be conducted by a joint team comprising members from PMD/PIU and Consultants to assess the value of the houses and other infrastructural facilities. In this regard meetings will also be held with local people as well as local administration. The schedule rates for the compensation of different types of losses, such as residential and, commercial structures, community owned and religious structures and other such assets will be used as a base which will be escalated with the help of market survey. These unit rates will be discussed and agreed upon with local communities and the affected persons. The following procedures/methods will be used for the proper assessment of unit compensation values of different items/assets located as standard for valuation of assets.

- Houses are valued at replacement value/cost based on cost of materials, type of construction, labour, transport and other construction costs;
- Hand pumps and other utilities are valued at current installation cost; and
- The relocation cost is the amount needed to displace and relocate temporary assets at prevailing market prices without adding costs for transaction.

8.7. Preparing Resettlement Action Plan

Should the screening process identify any involuntary resettlement, OP 4.12 calls for the preparation of individual RAPs that must be consistent with this RPF.

To address the impacts under this policy, the RAP must include measures to ensure that the displaced persons are;

- Informed about their options and rights pertaining to resettlement;
- Consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and
- Provided prompt and effective compensation at full replacement cost for losses of assets and access attributable to the sub project.

Following are the major steps to be adopted for preparation of the RAP:

8.7.1. Baseline, Socioeconomic Data, and Resettlement Surveys

An important aspect of preparing a RAP is to establish appropriate and accurate baseline socioeconomic data and census to identify the persons who will be affected by the project, to determine who will be eligible for compensation and assistance, and to discourage inflow of people who are ineligible for these benefits.

To identify the affected population and the possible adverse impacts, primary information will be collected through detailed resettlement assessment survey. This data will include:

- Inventory of houses, population and other assets will be developed by an inventory performa and will be filled through resettlement assessment survey by the team;
- Focus Census to enumerate the affected people and to register them according to location including the land holdings;
- Household Income and Living Standard Survey for assessment of lost and affected household, enterprises and community's living standard level;
- Village Level Survey for all affected people, with a focus on vulnerable groups, as necessary covering the factual position regarding the social amenities, electricity, telephone, water supply, education facilities etc. and other community resources;
- Buildings/Houses Valuation Survey to assess the value of the houses and other infrastructural facilities. In this regard meetings will be held with locals as well as local administration;
- Women Status Survey to establish the baseline data for ascertaining the women status; and
- Consultation with affected population for effective mitigation measures and planning.

8.7.2. Resettlement Entitlement and Policy Matrix

An entitlement matrix consistent with the RPF will be developed. For the restoration of the living standards of the PAP, provision will be made so that people should be provided proper compensation and assistance to restore their livelihoods.

8.7.3. Implementation Arrangements

For effective implementation, RAP will describe the implementation arrangements. Identification of critical path actions, preparation of RAP implementation arrangements, compensation procedures and resettlement process will be described for an efficient and smooth implementation of RAP.

8.7.4. Preparation of Monitoring, Evaluation and Reporting Plan

The mitigation measures are effective only if properly monitored. For this purpose, proper Monitoring, Evaluation and Reporting plan will be prepared.

8.7.5. Grievance Redressal Mechanism (GRM)

Under the GRM, RAP will describe the options available to affected persons for grievance redressal they may have about the entire process, the identification of eligible people for compensation, the valuation and compensation and any other complaints they may have against the entire process. The GRM will be consistent with the provisions of RPF.

8.7.6. Cost Estimates

The RAP preparation and implementation costs, including cost of compensation, various eligible allowances, monitoring & evaluation, grievances redress and LAR administration, as well as contingencies, will be estimated and included in the RAP and will be considered an integral part of Project cost.

Cost estimation will be made during preparation of RAP. The RAP (s) will include a budget section indicating (i) unit compensation rates for all affected items and allowances, (ii) methodology followed for the computation of unit compensation rates, and (iii) a cost table for all compensation expenses including administrative costs and contingencies.

8.7.7. Public Consultation and Participation

Public consultation and participation will afford the PAPs an opportunity to contribute to both the design and implementation of the program activities. In so doing, the likelihood for conflicts between and among the affected and with the management committees will be reduced.

In recognition of this, particular attention will be paid to public consultation with PAPs, households, homesteads (including host communities) as well as NGOs when resettlement and compensation concerns are involved. During RAP preparation, there must be adequate consultation and involvement of the local communities and the affected persons. Specifically, the affected persons must be informed about the intentions to use the earmarked sites for the project activities, facilities and structures. The affected persons must be made aware of:

- Their options and rights pertaining to resettlement and compensation;

- Specific technically and economically feasible options and alternatives for resettlement sites;
- Process of, and proposed dates for, resettlement and compensation;
- Effective compensation rates at full replacement cost for loss of assets and services; and
- Proposed measures to maintain or improve their living standards.

As a matter of strategy, public consultation will be an on-going activity taking place throughout the entire project cycle. Hence, public consultation will take place during the:

- Preparation of project designs
- Resettlement and compensation planning
- Drafting and reading/signing of the compensation contracts.
- Payment of compensations
- Resettlement activities

Public consultation and participation shall take place through local meetings, request for written proposals/comments, completion of questionnaires/application forms, public readings and explanations of the project interventions and requirements. Public documents shall be made available in appropriate languages at the local levels. RAPs should be translated to local languages and made freely available at a public place accessible to the PAPs to which it is relevant. Public consultation measures shall take into account the low literacy levels prevalent in the rural communities, by allowing enough time for discussions, consultations, questions, and feedback.

8.7.8. Resettlement Action Plan

The indicative outline of RAP is given below and it will include the following components:

iv Description of the project
v Potential Impacts
vi Project Objectives
vii Relevant findings of the socioeconomic study
viii Legal framework
ix Institutional framework
x Eligibility
xi Valuation of and compensation of losses
xii Resettlement Entitlement and Policy Matrix
xiii Site selection, site preparation, and relocation
xiv Housing, infrastructure and social service
xv Environmental protection and management
xvi Summary of Consultations
xvii Integration with host populations
xviii Grievance procedures
xix Implementation Arrangements
xx Monitoring and Evaluation (M&E)
xxi Implementation schedule
xxii Costs and budget

8.7.9. RAP Submission and Approval

The RAP(s), once prepared, will be submitted to the World Bank for review and approval.

8.8. Resettlement Budget, Flow of Funds and Payment of Compensation

Finances for RAP cost, including compensation, allowances, and administration of RAP preparation and implementation, will be provided by the Government as counterpart funds. Costs for external monitoring tasks can be allocated under the loan. In order to ensure that sufficient funds are available for RAP implementation, the Government will allocate 100% of the cost of compensation at replacement cost and expected allowances estimated in the RAP plus 15% of contingencies before RAP implementation. Funds will be transferred by the Govt. to the PIU. The District Collector will receive funds from the PIU and payment will be made directly to the affected persons without any delay, by way of crossed cheques, following issuance of notices as required by LAA 1894.

8.9. Institutional Arrangements for Implementing RAPs

For implementation of RAP, a Resettlement Unit (RU) will be instituted within the PIU by deploying the requisite staff. The composition of RU will include:

i Resettlement Officer (Head of Unit)
ii Land Acquisition and Collector (Member-assisted by Tehsil Dar and Patwari)
iii Assistant Resettlement Officer (Focal Member)
iv Gender Specialist,
v Communication Officer (Member)
vi Construction Supervision Consultant (Member)
vii APs Representative (Member)

RU staff will work in close coordination with the Social Safeguards Officer and other staff already appointed at PIU. They will assist RU in all matters related to the land acquisition and resettlement.The overall scope of work of RU will include:

i Updating, implementation and monitoring of RAP with the coordination of District administration, Revenue Department and other line Departments.
ii Updating the census of PAPs linked with project impacts by type, category and severance and prepare compensation packages for each PAP on the basis of agreed unit rates and entitlements criterion;
iii Disbursement of compensation, and community complaints etc.
iv Have regular monthly meetings to review the progress regarding RAP implementation as per the schedule given in this resettlement plan.
v Organize, conduct and record meaningful/informed consultations participation with PAPs.
vi Disclose project/LAR related information to PAPs and Development of database of PAPs

Chapter 9. Institutional Arrangements

This section defines the organizational roles and responsibilities of the key players in the proposed project and grievance redress mechanism.

9.1. Project and ESMF Implementation

The activities and investments under the Project will be implemented through two federal entities. The project envisages the use of existing government structures for implementation. Component 1 focusing on hydro meteorological and climate services will be implemented by the Pakistan Meteorological Department, while National Disaster Management Authority will be responsible for implementing Component 2 focusing on disaster risk management in the country. These federal entities would establish dedicated Project Implementation Units (PIUs) to assist in the implementation of the project activities. Both Implementing Agencies (IAs) will be responsible for appointing a Project Director (PD) and hiring of key staff and consultants for respective PIUs as per project requirements.

The IAs through their respective PIUs would have responsibility for project implementation including, but not limited to, reporting, monitoring and evaluation, social and environmental management, procurement, financial management, audit and disbursements, as well as coordination with the line agencies and the Bank. The PIU will be adequately resourced with skillsets and competencies required for project implementation and monitoring. The PIUs would be created and adequately staffed within one month of project effectiveness. The implementation of Component 1 will require close coordination between different government stakeholder agencies as well as within IA. To ensure overall guidance and coordination for project implementation, a dedicated Project Coordination Committee (PCC), comprising senior representatives from concerned federal and provincial departments, would be established as the apex forum.

The ESMF will be implemented by PIUs at PMD and NDMA and will be supported by one environmental and social specialist/ officer at each PIUs. The design engineer will also have staffed with environmental engineer to ensure the engineering design will integrate the appropriate environmental and social policies and provisions describe in ESMF in each infrastructure design at implementation level. Similarly, the Contractor when undertaking the constructional activities will be supported by environmental and social technical staff to implement the ESMF and ESMPs.

9.2. Implementing Partners

Key public-sector partner institutions would act as implementing partners for Component 1, including the Aviation Division, the National Disaster Management Authority and Provincial Disaster Management Authorities (PDMAs), WAPDA/Ministry of Water and Power, Provincial Irrigation Departments (PIDs), and the Provincial Agriculture Departments (PADs). This joint-implementation arrangement will enable stakeholders to closely oversee improvements of products and services funded by the project within their respective sectors. To facilitate this objective, a Joint Technical Stakeholder Group (JTSG) has already been established during project preparation; this consists of both implementation partners and other stakeholders who will benefit from improved hydromel services. The project will be implemented according to the guidelines and procedures outlined in the Operations Manual (OM), which should be adopted by project effectiveness and reviewed periodically. The

documents will lay out roles and responsibilities of different stakeholders and provide details of project processes and project cycle.

The Project will support the Implementing Agencies in developing and implementing an internal and external communications strategy during project implementation. The communication functions for the project will be housed at PMD and NDMA.

9.3. ESMMP Institutional Arrangement

The ESMMP will be implemented under the overall supervision of the Project Directors, PIUs. The designated project directors (PD) and Director Implementation will be the overall in-charge of the Project. They will engage, hire and delegate the supervisory responsibilities to the staff. The Project Directors will be responsible for the implementation, monitoring and reporting of the ESMMP through the Environment and Social Safeguards Specialists to be appointed by the project. The Social Safeguards Specialist will ensure implementation of the Resettlement Policy Framework and other social safeguards related measures defined in ESMMP along with implementation of Grievance Redress Mechanism (GRM) provided in following section. PIUs will be responsible for hiring of Construction Contractor and supervision of contractors work on the sites in accordance with ESMMP.

9.3.1. Roles and Responsibilities of Design Engineers

Design engineers for each sub-project will be required to ensure integration of ESMF/ESMP requirements in all civil and engineering designs. They will also be involved in the preparation of EOIs for contractors and ensure that ESMF/ESMP requirements are integrated in EOI and BOQ documents.

9.3.2. Roles and Responsibilities of Contractors

Contractors for each sub-project will be required to prepare all relevant plans for mitigating environmental and social impacts and ensure that ESMF/ESMP requirements are part of the engineering design and implemented at the field level. A list of plans to be prepared by contractors is given below:

1. Debris Management Plan
2. Energy and Water Conservation Plans
3. Solid Waste Management Plan
4. Emergency Response Plan
5. Public Safety Plan
6. Workers Health & Safety Plan
7. Emissions Monitoring Plan

9.3.3. Roles and Responsibilities of Project Team

Roles and responsibilities of the designated Specialists and project team have been detailed in **Table 9.1** below. In cases of overlapping roles by more than one Specialist, the higher officer will have the authority to re-designate the roles and responsibilities of those officers in the best interest of the project and to ensure clarity of responsibilities for EMP implementation.

Table 9.1: Roles and Responsibilities

Organization	Position	Responsibility
Project Implementation Unit (PIU)	Project Director	Ensure ESMMP implementation
Project Implementation Unit (PIU)	Environment Safeguards Specialist	▪ Ensure implementation of the ESMMP during various stages of design and construction; ▪ Ensure that timely and robust environmental monitoring is carried out in the field; ▪ Ensure that the construction contracts include clauses for ESMMP implementation; ▪ Ensure that environmental trainings are planned and implemented; ▪ Overall monitoring and reporting of ESMMP; ▪ Conduct financial management of the ESMMP; ▪ Coordinate and ensure development of awareness material; ▪ Commission annual third party validations of the project; ▪ Prepare Environmental Bi-Annual Progress Reports for the project.
Project Implementation Unit (PIU)	Social Safeguards Specialist	▪ To carry out the screening of the sub-projects with respect to the social aspects as defined in the ESMF; ▪ Monitor and check the proper implementation of all social mitigation measures as suggested in ESMF/ESMP; ▪ Monitoring and evaluation of social related matters of the project and maintain a social complaint register to document social issues; ▪ Top supervise the Contractor's activities and make sure that all the contractual obligations related to the social compliance are met; ▪ Review of periodic social reports being prepared by the contractor ▪ Ensure inclusion of ESMMP guidelines in project designs. ▪ Screen sub-projects for Involuntary Resettlement, gender focus and citizen engagement ▪ Ensure Resettlement Policy Framework (RPF) is implemented and RAP is prepared if required ▪ Remain the focal point for managing the project GRM, and maintain analysis and reports on types of complaints received, resolved, time taken to action, etc.

Project Implementation Unit (PIU)	Environment and Social Safeguard officer / Database/MIS Specialist	▪ Ensure that ESMMP and RPF are being implemented by contractors at the site level; ▪ Monitor implementation of ESMMP through regular site visits and report to PIU; ▪ To facilitate the implementation of the GRM; ▪ To receive and record complaints and issue acknowledgment; ▪ To maintain the record of all grievances and their status; ▪ Maintain a record of all documentation produced; ▪ Responsible for Grievance Redress at each site.
Project Implementation Unit (PIU)	Third Party Monitoring consultants	Environmental Monitoring and Testing Supervision of ESMMP implementation during construction on sites Ensure Compliance with EMMP guidelines.

Sample TORs for Environmental and Social Specialists at PIUs are given in **Annexure 16.**

9.4. Monitoring Plan

9.4.1. Internal Monitoring– ESMMP

In addition to monitoring by the Environment and Social Safeguards Specialists, Project Coordinators will play a pivotal role in monitoring implementation of ESMMP especially where technical designs and construction related impacts are involved. Project Directors will ensure that mitigation measures which require administrative approval remain under his/her direct reporting. In addition, Monitoring and Evaluation Officer can also be requested to conduct random monitoring of construction sites in the project areas, both during construction and operation. Monitoring reports will be submitted to the Environment and Social Safeguard Specialists in the PIU for necessary corrective action.

9.4.2. Internal Monitoring - RAP

If RAPs are prepared for sub-projects, internal monitoring will be carried out routinely by the PIUs assisted by the RU and their results will be communicated to concerned Project Affected Persons and to World Bank through the quarterly project implementation reports. Indicators for the internal monitoring will be those related to process and immediate outputs and results. This information will be collected directly from the field by the RU and reported monthly to the PRMP to assess the progress and results of RAP implementation, and to adjust the work Program accordingly (if necessary). The monthly progress reports will be consolidated on quarterly basis and will be submitted to World Bank. Specific monitoring indicators will be as follows:

1. Information campaign and consultation with PAPs;
2. Status of land acquisition and payments on land compensation;
3. Compensation for affected structures and other assets;
4. Relocation of PAPs;

5. Payments for loss of income/ livelihood;
6. Selection and distribution of replacement land areas; and
7. Income restoration activities
8. Gender segregated analysis of RAP implementation
9. Progress on the gender sensitive grievance redress mechanism

The above information will be collected by PMD/NDMA with the assistance of RU and field office which are responsible for monitoring the day-to-day social and resettlement activities of the project through the following instruments:

1. Review of census information for all PAPs;
2. Consultation and informal interviews with PAPs;
3. In-depth case studies;
4. Sample survey of PAPs;
5. Key informant interviews; and
6. Community/ public meetings/ consultations

9.4.3. External Monitoring/Third Party Validation – ESMMP

External Monitoring will be used to ensure that both construction and the operation phase activities have been undertaken in line with the ESMMP. Third Party Validation (TPV) exercises, conducted through an independent monitoring agency will be carried out on annual basis to evaluate the overall ESMMP compliance and implementation progress, and to ensure that the mitigation measures are implemented as per the mitigation plan. In case of any deviation, corrective actions will be taken where necessary. For the TPV, environmental consultants with relevant expertise and previous experience will be engaged. The PIUs may hire the services of an environment expert (consultant), if required, to address issues related to environmental impact mitigation or non- conformity that emerge from monitoring activities.

9.4.4. External Monitoring/Third Party Validation – RAP

If RAPs are prepared for the sub-projects, external monitoring will be carried out twice a year, and its results will be communicated to all concerned PAPs, the PIUs and World Bank through quarterly and semi-annual reports. Sub-projects whose implementation time-frame will be under 6 months will be monitored on quarterly basis. The indicators for External Monitoring will include:

1. Review and verify internal monitoring reports prepared by the PIUs assisted by social safeguard specialist and its field offices;
2. Review of the socio-economic baseline census information of pre-project affected persons;
3. Identification and selection of impact indicators;
4. Impact assessment through formal and informal surveys/interview with the project affected persons;
5. Consultation with PAPs, officials, community leaders for preparing external monitoring report; and

6. Assess the resettlement efficiency, effectiveness, impact and sustainability, drawing lessons for future resettlement policy formulation and planning.

The external monitoring agency/consultant will also assess the status of project affected vulnerable groups such as female-headed households, disabled/elderly and families below the poverty line. The following will be considered as the basis for monitoring and evaluation of the project:

1. Socio-economic conditions of the PAPs in the post-resettlement period;
2. Communications and reactions from PAPs on entitlements, compensation, options, alternative developments and relocation timetables etc.;
3. Changes in housing and income levels;
4. Rehabilitation of squatters;
5. Valuation of property;
6. Grievance procedures/ mechanism;
7. Disbursement of compensation; and
8. Level of satisfaction of the PAPs in the post resettlement period.

The external monitoring agency/consultant will carry out a post-implementation evaluation of the RAP implementation about a year after completion of its implementation. The compelling reason for this study is to find out if the objectives of the RAP have been attained or not. The benchmark data of socioeconomic survey of severe impacts/severely affected PAPs conducted during the preparation of the RAP will be used to compare the pre and post project conditions. The external monitoring agency/consultant will recommend appropriate supplemental assistance/ or corrective action plan for the PAPs to ensure the accomplishment of objectives of the RAP.

9.4.5. Reporting

Environmental and Social Mitigation and Monitoring Report

The Environment and Social Safeguards Specialist will compile and evaluate monitoring reports from environmental social safeguard officer and third party monitoring. The compiled reports and mid-course correction actions will be shared with the Project Director and World Bank. The Environment and Social Safeguards Specialist will be responsible to prepare and circulate ESMMP progress reports on a bi-annual basis. These bi-annual Progress Reports will provide progress on implementation of mitigation measures, safeguard monitoring, capacity building, and any other ESMP implementation activity carried out during the reporting quarter. These reports will be shared with, among others, the World Bank within one month of the completion of six month for the World Bank. The report will include sub-sections including air quality monitoring, monitoring of emissions.

Resettlement Monitoring Reports

If RAPs are prepared for the sub-projects, the RU will prepare monthly progress reports on RAP implementation activities with assistance of social safeguards officer and will submit to the Project Director – PIU and based on the monthly progress report, quarterly progress reports will be prepared and submitted to World Bank.

The Independent External Monitoring Consultants (IEMC) will submit quarterly external monitoring report and submit to the PMD/NDMA and the PMD/NDMA will further submit to World Bank for the review in order to assist in ascertaining whether resettlement goals have been achieved, and more importantly, whether livelihoods and living standards have been restored/enhanced. The reports will include suitable recommendations for improvement. Monitoring reports will be submitted on regular intervals as specified (i.e. MPR and QPR). The M&E documents and other social reports will also be publicly available, including posting in project website.

9.5. Capacity Development and Trainings

9.5.1. Environmental and Social Mitigation and Monitoring Plan

Capacity building and training of the staff associated with EMP implementation will be required for effective environmental management. Specific trainings on environmental impacts and mitigation will be arranged for the Project Directors, Environment and Social Safeguards Specialists, Project Coordinators and other members of the Project Implementation Units to deliver their monitoring responsibilities in an organized and effective manner as per requirement of the monitoring plan. The main objective of the trainings is to enhance the technical capacity of staff associated with ESMMP implementation and to keep the PIU Teams, aware of the emerging environmental and social issues, and enable them to resolve those issues through proposed mitigation measures. **Table 9.2** gives a tentative program for capacity building and trainings. 20 workshops are to be held throughout the course 5 years project. This includes annual refresher trainings. The workshops will focus on environmental issues arising during ESMMP implementation, mitigation measures, and health & safety. They will also focus on sensitizing the participants about environmental responsibility, managing the on-ground problems, and assuring implementation of the ESMMP. Each workshop will have no more than thirty participants. In case of extra participants, extra workshops will be conducted.

Table 9.2: Capacity Building and Training Plan

Description of Training	Training Module	Location	Frequency	Participation
Two-day Training Workshop	Objectives, need and use of ESMMF; Legal requirements of the EMP (Legislations and World Bank Operational Policies) ; Management of environmental issues and mitigation strategies as per EMP; Monitoring Mechanism Documentation and reporting procedures.	PIUs, Islamabad Lahore	Annually workshop at the start of the project	PIU Staff including Project Director, Project Coordinator, Environment and Social Safeguards Specialists , Infrastructure Specialists, Engineers, M&E Officer etc.
One Day Training Workshop	ESMMP with special focus on mitigation measures during design stage	PIUs Islamabad Lahore	One training workshop at design stage of project	All architects, contractors, sub-contractors, and supervision consultants

Description of Training	Training Module	Location	Frequency	Participation
One Day Training Workshop	ESMMP with special focus on mitigation measures during construction stage	PIUs Islamabad Lahore	One workshop every year during construction period of the project	All contractors, sub-contractors, and supervision consultants
One Day Training Workshop	ESMMP with special focus on mitigation measures during operational phase	PIUs Islamabad Lahore	One workshop every year during operational phase of the project	PMD and NDMA staff
One Day Refresher Trainings	ESMMP Implementation and Reporting	PIUs Islamabad Lahore	One workshop every year	PIU Staff

9.5.2. Resettlement Planning Framework (RPF)

Table 9.3 summarizes the training requirements of all the relevant staff to be involved in the implementation of Resettlement Policy Framework and Resettlement Action Plans if required.

Table 9.3: Capacity Building and Training Plan for RAP

Description of Training	Training Module	Location	Frequency	Participation
One Day Training Workshop on RPF and RAP	Application and use of RPF Social Assessment process LA process Necessity for RAP and its preparation process Implementation and Monitoring Institutional Mechanism Grievance Mechanism	PIU	Annually	RU, PIU, Consultants, relevant government officials, Local Community Reps., and other stakeholders

Chapter 10. ESMF implementation Budget

Approximate implementation cost of ESMF is given below:

Table 10.1:ESMF Implementation Budget

#	Description	Unit	Quantity	Unit Rate PKR	Total PKR	Total USD
1.	Trainings (including materials, logistics, venue)	Quarters	20	2,000,000	40,000,000	360,360
2.	Environment Specialist	Months	60	300,000	18,000,000	162,162
3.	Environment Assistant	Months	60	500,000	3,000,000	27,027
4.	Social Safeguard Specialist	Months	60	200,000	12,000,000	108,108
5.	External Monitors (5 annual reports, 1 inception and end project evaluation report)	Reports	7	2,000,000	14,000,000	126,126
6.	Environmental Testing				4,000,000	36,036
7.	Consultants (ESMP, RAP, RPF)	Reports	4	500,000	2,000,000	18,018
8.	Contingency @ 20 %				19,400,000	174,775
9.	Total				139,400,000	1,255,856

Budget for mitigation measures for each sub-project will be identified in site specific ESMPs.

Finances for RAP cost, including compensation, allowances, and administration of RAP preparation and implementation, will be provided by the Government as counterpart funds. Costs for external monitoring tasks can be allocated under the loan. In order to ensure that sufficient funds are available for RAP implementation, the Governments will have to allocate 100% of the cost of compensation at replacement cost and expected allowances estimated in the RAP plus 15% of contingencies before RAP Implementation.

Chapter 11. Grievance Redress Mechanism

11.1. Overview and scope

The Grievance Redress Mechanism proposed here spans the entire project implementation and will cater to both the directly and indirectly affected population/beneficiaries. Though the GRM proposed here has been designed to address environmental and social problems identified during implementation, it will also cater to manage any disconnects that emerge from the field level and that has significant implications for effective implementation of the sub-project interventions.

The Project Implementation Units (PIU) office will serve as the secretariat for the Grievance Redress Committee (GRC-Project) that will be responsible for providing oversight on the entire GRM process at a strategic level and monitoring of complaints management.

11.2. Objectives of the Grievance Redress Mechanism

The grievance redress mechanism (GRM) will be consistent with the requirements of the World Bank safeguard policies to ensure mitigation of community concerns, risk management, and maximization of environmental and social benefits. The overall objective of the GRM is therefore to provide a robust system of procedures and processes that provides for transparent and rapid resolution of concerns and complaints identified at the local level.

The GRM will be accessible to diverse members of the community, including women, senior citizens and other vulnerable groups. Culturally appropriate communication mechanisms will be used at all sub- project sites both to spread awareness regarding the GRM process as well as complaints management.

11.3. Communication & Awareness on GRM

The final processes and procedures for the GRM will be translated in to local language, if needed and disseminated at all sub-project locations. These shall be made available (in both leaflet and poster format) to all sub-project locations.

11.4. Proposed Mechanisms

A grievance redress mechanism (GRM) will be operational at each subproject level to facilitate amicable and timely resolution of complaints and grievances of the stakeholders including communities and project affected personnel (PAPs) (male and female) regarding all environmental and social issues. Under the GRM, Grievance Redress Committees (GRCs) will be formed comprising of PIU's general manager (GM), PIU's Environment and Social Specialists, representative of ESMP/ESIA consultants, Resettlement Specialist, representative of RAP Consultants, member of PAP Committee (male and female). Owing to the nature of the project, a GRC will be formed at each subproject level.

Under the GRM, Complaint Register (CR) will be maintained by the PIU at each subproject level. All complaints and grievances will be logged in the register along with details including date of complaint, name and address of complainant, location, and description of complaint. The GRC will then fill additional details in the Register including the corrective action needed, timeframe for corrective action to be taken, and person/project entity responsible for corrective action. Once the corrective action is implemented, the GRC will

document the associated details in the Register including the description of action take, date of action completion, views of the complainant regarding the corrective action, and any residual grievance. GRM procedures will be disseminated particularly among the local communities and PAPs. GRM will be gender responsive, culturally appropriate, and readily accessible to the PAPs at no cost and without retribution. A multi-tier GRM has been proposed for the project is described below.

1. Tier 1 (Community level): When a grievance arises, the PAP (male or female) may contact directly with the PAPC (male or female) Field implementation Unit (FIU) or PIU. PAPC may resolve the concern at field level. If the issue is successfully resolved, no further follow-up is required.
2. Tier 2 (GRC level): If no solution can be found at Tier 1, the PAP (male or female) may convey concern/grievance to the GRC, either verbally or in writing. The GRC will log the complaint along with relevant details in the complaint register (CR). For each complaint, the GRC will investigate and prepare a fact-finding report to assess its eligibility, and identify an appropriate solution. The GRC will, as appropriate, instruct the responsible entity to take corrective actions. The complaint will be redressed/appropriately responded within fifteen days. The GRC will review the responsible entity's response and undertake additional monitoring as needed. During the complaint investigation, the GRC will work in close consultation with the Contractors, Environment Specialist, the RAP Consultants, FIU, and PIU.
3. Tier 3 (PIU level): If the complainant is not satisfied/issue not resolved at the Tier 2, then GRC will forward the complaint to PIU for remedial measures and decisions accordingly. The committee at PIU level will consist of GM, Environment specialist, Resettlement Specialist of PIU, and ESMP/ESIA and RAP Consultants. The complaint at the Tier 3 will be resolved within three weeks.
4. Tier 4: If the PAPs are still not satisfied with the decision of PIU, then the complainant(s) may enter the reference in the Court of law.

11.5. Procedures

1. Any grievance in written, verbal or digital form shall be recorded by the receiving office in CR which will be maintained at PIU and FIU;
2. A serial number will be assigned to it together with the date of receipt;
3. A written acknowledgement to a complainant shall be sent promptly and in any case within three working days;
4. The acknowledgement shall contain the name and designation of the officer who will deal with the grievance; information that necessary action will be taken within the specified working days from the date of receipt of the grievance by the officer concerned; name, address, email address and phone number of the authority which the complainant could approach if the matter is not redressed within the specified timeframe or if s/he is not satisfied with the action taken;
5. If the office receiving the grievance/complaint is not the one designated to consider and dispose it, the receiving office shall forward it to the designated office, but after having complied with the requirements at 1 to 3 above;

6. The office designated to consider the matter shall make every effort to ensure that grievances/appeals are considered and disposed-off within the stipulated period of fifteen days in case of Tier 2 and three weeks in case of Tier 3.
7. If the grievance redress mechanism fails to satisfy the aggrieved affected person at all levels, s/he can submit the case to the appropriate court of law.

11.6. Grievance Closure

The complaint shall be considered as disposed-off and closed when:

1. The designated officer/authority has acceded to the request of the complainant fully;
2. Where the complainant has indicated acceptance of the response in writing;
3. Where the complainant has not responded to the concerned officer FIU/PIU within one month of being intimated about the final decision of the grievance officer on his grievance/complaint;
4. Where the complainant fails to attend the proceedings of the concerned officer at FIU/PIU within the stipulated period of the disposal of the complaint; and
5. Where the complainant withdraws his/her complaint.

Chapter 12. Disclosure

This ESMF and the RPF will be disclosed on the websites of PMD and NDMA, and on the World Bank Info Shop. Hard copies of this ESMF will also be shared with the Federal and Provincial EPAs, project stakeholders, contractors, Civil Society Organizations etc. A copy of the ESMF will be placed in the Project Implementation Units, PMD and NDMA for public access. The Urdu translation of the Executive Summary of the ESMF will also be distributed to all relevant stakeholders, especially to the communities in the project areas. The purpose will be to inform them about the project activities, negative environmental and social impacts expected from the project and proposed mitigation measures.

The executive summary of the RAP (if prepared for any sub-project) will be translated in local language *(Urdu)*, which is understandable to all project affected persons and local community and will be provided to all PAPs as well.

This information brochure will also be disclosed in local language to the PAPs and some other local key persons resided in the vicinity of the project area, so that each PAP could be able to understand the project activities, i.e. the project, cut-off date, eligibility for entitlement of compensation, methods of measurement, price assessment & valuation of losses, payment of compensation, GRM, cost & budget and monitoring & evaluation.

The Project office (PIU) and social safeguards specialist will keep the PAPs informed about the impacts and entitlement of compensation and facilitate in addressing grievance (s). The ESMF study team has made an endeavor to hold consultative and scoping sessions with these stakeholders to evince their views on the proposed Project, *inter-alia*, their opinions, suggestions, understanding on various issues and concerns.

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Annexure 1: IEE/EIA Regulations and ESMP Format

EE/EIA Regulation 2000

SCHEDULE I

(See Regulation 3)

List of projects requiring an IEE

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms with total cost more than Rs.10 million
2. Projects involving repacking, formulation or warehousing of agricultural products

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 200 KW
3. Transmission lines less than 11 KV, and large distribution projects
4. Oil and gas transmission systems
5. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
6. Waste-to-energy generation projects

C. Manufacturing and processing

1. Ceramics and glass units with total cost more than Rs.50 million
2. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost less than Rs.100 million
3. Man-made fibers and resin projects with total cost less than Rs.100 million
4. Manufacturing of apparel, including dyeing and printing, with total cost more than Rs.25 million
5. Wood products with total cost more than Rs.25 million

D. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, Sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million
2. Crushing, grinding and separation processes 9
3. Smelting plants with total cost less than Rs.50 million

E. Transport

1. Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metaled roads) with total cost less than Rs.50 million
2. Ports and harbor development for ships less than 500 gross tons

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area less than 8 square kilometers
2. Irrigation and drainage projects serving less than 15,000 hectares
3. Small-scale irrigation systems with total cost less than Rs.50 million

E. Water supply and treatment

Water supply schemes and treatment plants with total cost less than Rs.25 million

F. Waste disposal

Waste disposal facility for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters

G. Urban development and tourism

1. Housing schemes
2. Public facilities with significant off-site impacts (e.g. hospital wastes)
3. Urban development projects

H. Other projects

Any other project for which filing of an IEE is required by the Federal Agency under sub-regulation (2) of Regulation 5

SCHEDULE II

(See Regulation 4) List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 200 MW
3. Transmission lines (11 KV and above) and grid stations
4. Nuclear power plans
5. Petroleum refineries

B. Manufacturing and processing

6. Cement plants
7. Chemicals projects
8. Fertilizer plants
9. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost of Rs.100 million and above
10. Industrial estates (including export processing zones)
11. Man-made fibers and resin projects with total cost of Rs.100 M and above
12. Pesticides (manufacture or formulation)
13. Petrochemicals complex
14. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel),printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.10 million
15. Tanning and leather finishing projects

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Smelting plants with total cost of Rs.50 million and above

D. Transport

1. Airports
2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction of existing roads) with total cost of Rs.50 million and above
3. Ports and harbor development for ships of 500 gross tons and above
4. Railway works

E. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 50 million cubic meters and above or surface area of 8 square kilometers and above
2. Irrigation and drainage projects serving 15,000 hectares and above
3. Water supply and treatment Water supply schemes and treatment plants with total cost of Rs.25 million and above

F. Waste Disposal

1. Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
2. Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

G. Urban development and tourism

1. Land use studies and urban plans (large cities)
2. Large-scale tourism development projects with total cost more than Rs.50 million

H. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

I. Other projects

1. Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect

ESMP Format

The ESMP for each sub-project will include the following:

1. Introduction
2. Project Description
3. Legal and Policy Framework
4. Environmental and Social Baselines
5. Social Impact Assessment (in case of Involuntary Resettlement or Indigenous Peoples)
6. Stakeholder Consultations
7. Environmental and Social Screening
8. Environmental and Social Impact Assessment and Mitigation
9. Environmental and Social Management and Monitoring Plan
10. Institutional Arrangements
11. Grievance Redress Mechanism
12. Budget for ESMP Implementation

Annexure 2: NEQS

Table 1: Effluent Discharge Standards NEQS 2000) Applicable to the Works

#.	PARAMETRS	NEQS
1	Temperature	40 ^{O}C =≤3 deg.
2	pH	6 – 9
3	BOD5	80 mg/l
4	Chemical Oxygen Demand (COD)	150 mg/l
5	Total Suspended Solid (TSS)	200 mg/l
6	Total Dissolved Solids	3500 mg/l
7	Grease and Oil	10 mg/l
8	Phenolic compounds (as phenol)	0.1 mg/l
9	Ammonia	40 mg/l
10	Chlorine	1.0 mg/l
11	Chloride	1000.0 mg/l
12	Sulphate	600 mg/l
13	Manganese	1.5 mg/l
14	Fluoride	10 mg/l
15	Cyanide (as CN') total	1.0 mg/l
16	An-ionic detergents (as MB As)	20 mg/l
17	Sulphide (S-2)	1.0 mg/l
18	Pesticides	0.15 mg/l
19	Cadmium	0.1 mg/l
20	Chromium trivalent and hexavalent	1.0 mg/l
21	Copper	1.0 mg/l
22	Lead	0.5 mg/l
23	Mercury	0.01 mg/l
24	Selenium	0.5 mg/l
25	Nickel	1.0 mg/l
26	Silver	1.0 mg/l
27	Total Toxic metals	2.0 mg/l
28	Zinc	5.0 mg/l
29	Arsenic	1.0 mg/l
30	Barium	1.5 mg/l
31	Iron	8.0 mg/l
32	Boron	6.0 mg/l

Table 2: National Environmental Quality Standards (NEQS) for Gaseous Emission (mg/Nm^3, Unless Otherwise Defined)

#	Parameter	Source of Emission	Existing Standards	Revised Standards
1.	Smoke	Smoke Opacity not to exceed	40% or 2 Ringlemann Scale	40% or 2 Ringlemann Scale or equivalent smoke number
2.	Particulate Matter (I)	(a) Boilers and Furnaces (i) Oilfired	300	300
		(ii) Coalfired	500	500
		(iii) CementKilns	200	200
		(b) Grinding, crushing, clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	500	500
3.	Hydrogen Chloride	Any	400	400
4.	Chlorine	Any	150	150
5.	Hydrogen Fluoride	Any	150	150
6.	Hydrogen Sulphide	Any	10	10
7.	Sulphur Oxide (2) (3)	Sulfuric acid/ Sulphonic acid plants		
		Other plants except power plants operating on oil and coal	400	1700
8.	Carbon Monoxide	Any	800	800
9.	Lead	Any	50	50
10.	Mercury	Any	10	10
11.	Cadmium	Any	20	20
12.	Arsenic	Any	20	20
13.	Copper	Any	50	50
14.	Antimony	Any	20	20
15.	Zinc	Any	200	200

#	Parameter	Source of Emission	Existing Standards	Revised Standards
16.	Oxides of Nitrogen (3)	Nitric acid manufacturing unit. Other plants except power plants operating on oil or coal: Gas fired Oil fired Coal fired	400 - -	400 600 1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent sulphur content in fuel. Higher content of Sulphur will case standards to bepro-rated.
3. In respect of emissions of sulphur dioxide Nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards.

Table 3: National Environmental Quality Standards (NEQS, 2009) for Vehicular Emission

#	Parameter	Standard (Maximum permissible Limit)	Measuring Method	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode.	To be compared with Ringlemann Chart at a distance of 6 meters or more	Immediate effect
2	Carbon Monoxide (CO)	6%	Under idling condition: Non-dispersive infrared detection through gas analyzer.	
3	Noise	85 dB(A)	Sound Meter at 7.5 meters from the source	

Table 4: National Environmental Quality Standards (NEQS, 2010) for Noise

#	Category of Area / Zone	Effective from 1st July, 2010		Effective from 1st July, 2013	
		Limit in dB (A) Leq*			
		Daytime	Night-time	Daytime	Night-time
1	Residential Area (A)	65	50	55	45
2	Commercial Area (B)	70	60	65	55
3	Industrial Area (C)	80	75	75	65
4	Silence Zone (D)	55	45	50	45

Note:

1. Daytime hours: 6:00 a.m. to 10:00p.m.
2. Night-time hours: 10:00 p.m. to 6:00a.m.
3. Silence Zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters round hospitals, educational institutions and courts.
4. Mixedcategoriesofareasmaybedecidedasoneofthefourabovementionedcategoriesbythecompetentauthority.

**dB (A) Leq: Time weighted average of the level of sound in scale "A" which is relatable to human hearing.*

Table 5: National Environmental Quality Standards (NEQS, 2010) for Drinking Water

#	Properties/Parameters	Standard Values for Pakistan	WHO Standards	Remarks
BACTERIAL				
1	All water is intended for drinking (E.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian Countries also follow WHO Standards
2	Treated water entering the distribution system (E.Coli or Thermotolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian Countries also follow WHO Standards
3	Treated water entering the distribution system (E.Coli or Thermo tolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12- month period.	Most Asian Countries also follow WHO Standards
PHYSICAL				
4	Colour	≤15 TCU	≤15 TCU	
5	Taste	Non Objectionable/ Acceptable	Non Objectionable/ Acceptable	
6	dour	Non Objectionable/ Acceptable	Non Objectionable/ Acceptable	
7	Turbidity	<5 NTU	<5 NTU	
8	Total hardness as $CaCO_3$	<500mg/l	---	

#	Properties/Parameters	Standard Values for Pakistan	WHO Standards	Remarks
9	TDS	<1000	<1000	
10	pH	6.5-8.5	6.5-8.5	
RADIOACTIVE				
11	Alpha Emitters bq/L or pCi	0.1	0.1	
12	Beta Emitters	01	01	
CHEMICAL				
Essential Inorganics		**mg/litre**	**mg/litre**	
13	Aluminum (Al) mg/l	≤0.2	0.02	
14	Antimony (Sb)	≤0.005	0.02	
15	Arsenic (As)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing Countries
16	Barium (Ba)	0.7	0.7	
17	Boron (B)	0.3	0.3	
18	Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing Countries
19	Chloride (Cl)	<250	250	
20	Chromium (Cr)	≤0.05	0.05	
21	Copper (Cu)	2	2	
Toxic Inorganics		**mg/litre**	**mg/litre**	
22	Cyanide (CN)	≤0.05	0.07	Standard for Pakistan similar to most Asian developing Countries
23	Fluoride (F)	≤1.5	1.5	
24	Lead (Pb)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing Countries
25	Manganese (Mn)	≤0.5	0.5	
26	Mercury (Hg)	≤0.001	0.001	
27	Nickel (Ni)	≤0.02	0.02	
28	Nitrate (NO_3)	≤50	50	
29	Nitrite (NO_2)	≤3	3	
30	Selenium (Se)	0.01	0.01	
31	Residual Chlorine	0.2-0.5 at consumer end	---	

#	Properties/Parameters	Standard Values for Pakistan	WHO Standards	Remarks
		0.5-1.5 at source		
32	Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing Countries
Organics				
33	Pesticides mg/L	---	PSQCA No. 4629-2004, Page No.4, Table No. 3, Serial No. 20-58 may be consulted	Annex-II
34	Phenolic Compounds (as Phenols) mg/L	---	≤0.002	
35	Poly nuclear aromatic hydrocarbons (as PAH) g/L		0.01 (By GC/MS method)	

****PSQCA: Pakistan Standards Quality Control Authority*

Table 6: National Environmental Quality Standards (NEQS, 2010) for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st July 2010	Effective from 1st January 2013	
Sulphur Dioxide (SO_2)	Annual Average*	80µg/m³	80µg/ m³	Ultraviolet Fluorescence Method
	24 hours**	120µg/m³	120µg/m³	
Oxides of Nitrogen as (NO)	Annual Average*	40µg/m³	40µg/m³	Gas Phase Chemiluminescence
	24 hours**	40µg/m³	40µg/m³	
Oxides of Nitrogen as (NO_2)	Annual Average*	40µg/m³	40µg/m³	Gas Phase Chemiluminescence
	24 hours**	80µg/m³	80µg/m³	
Ozone (O_3)	1 hour	180µg/m³	130µg/m³	Non disperse UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400µg/m³	360µg/m³	High Volume Sampling, (Average flow rate not less than 1.1m³/minute)

Annexure 3: World Bank Environmental and Social Safeguard Policies

#	*Subject*	*Policy Reference*	*Triggered*	*Source Web*
1.	Environmental Assessment	OP/BP 4.01	Yes	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=3900&ver=current
2.	Natural Habitats	OP/BP 4.04	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1581&ver=current
3.	Pest Management	OP 4.09	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1637&ver=current
4.	Forestry	OP 4.36	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1585&ver=current
5.	Safety of Dams	OP 4.37	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1576&ver=current
6.	Physical and Cultural Resources	OP/BP 4.11	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1583&ver=current
7.	Involuntary Resettlement	OP/BP 4.12	Yes	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1584&ver=current
8.	Indigenous Peoples	OP 4.10	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1582&ver=current
9.	Disputed Areas	OP 7.60	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=1841&ver=current
10.	International Waterways	OP 7.50	No	https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=2660
11.	Bank Disclosure Policy	BP 17.50	Applicable	http://siteresources.worldbank.org/OPSMANUAL/Resources/DisclosurePolicy.pdf

Annexure 4: Screening Checklist

a. Brief Description of the Project:

_____

_____

b. Location: _____

c. Name of Proponent: _____

#	Questions to be Considered	Briefly Describe Yes/No?	Is this likely to result in a Significant effect? Yes/No- why
Environmental and cumulative Impacts			
1	Will construction or operation of the project use natural resources? Such as land, water, materials or energy, especially any resources which are non-renewable or in short supply**?**		
2	Will the project involve use, storage, transport, handling or production of substance or materials, which could be harmful to human health or the environment or concerns about actual or perceived risks to human health**?**		
3	Will the Project produce solid waste during construction, operation, or decommissioning**?**		
4	Will the Project release pollutants or any hazardous, toxic or noxious substances to air**?**		
5	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation**?**		
6	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters and groundwater**?**		

7	Will there is any risk of accidents during construction or operation of the project, which could affect human health or the environment**?**		
8	Are there any other factors, which should be considered such as consequential development that could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality**?**		
9	Are there any areas on or around the locations, which, are protected under international, national, or local legislation for their ecological, landscape, cultural, or other value, which could be affected by the project**?**		
10	Are there any other areas on or around the location, which are important or sensitive for reasons of their ecology e, g. wetlands, watercourses or other water bodies, mountains, forests or woodlands, which could be affected by the project**?**		
11	Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, over wintering, migration, which could be affected by the project**?**		
12	Are there any in land or underground water sonor around the location that could be affected by the project**?**		
13	Are there any areas or features of high landscape or scenic value on or around the location, which could be affected by the project**?**		
14	What kind of effluents can be discharged during operation of this project/ units**?**		
15	Is this project likely to affect the soil, water and air of the surrounding environment**?**		
16	Are there any transport routes passing through or around the		
	location which are susceptible to congestion or which cause environmental problem, which could be effected by the project**?**		
17	Is the project located in a previously undeveloped area where there is a loss of Greenfield land**?**		
18	Are there any areas on or around the locations which are occupied by the sensitive land-use e.g. hospitals, schools, worship places, community facilities which could be affected by the project**?**		
19	Are there any areas on or around the locations which contain important high quality or scarce resources e.g. ground & surface water forestry, agriculture, fisheries tourism, minerals which could be affected by the project**?**		

20	Are there any areas on or around the locations which that are already subject to pollution or environmental damage e.g. where existing legal environmental standers are exceeded which could be affected by the project**?**		
21	Is the project location is susceptible to earthquake, subsistence, landslide erosions flooding or extreme adverse climate conditions e.g. temperature inversion, fogs, severe winds, which could cause the project to present environmental problem**?**		
22	What would be the source of energy supply for this project**?**		
23	What would be the mechanism of solid waste disposal/management when this project would become functional?		
24	What would be the mechanism of waste water drainage/disposal / treatment when this project would become functional**?**		
25	What kind of effluents are expected /discharged when this project would become functional**?**		
Social and land use impacts			
1	Will the Project result in social changes, for example, in demography, traditional lifestyles, employment**?**		
2	Are there any routes or facilities on or around the locations, which are used by the public for access to recreation, or other facilities, which could be affected by the project**?**		
3	Are there any areas or features of historic or cultural importance on or around the location which could be effected by the project**?**		
4	Are there existing land uses on or around the location e.g. homes, gardens or other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be effected by the project**?**		
5	Are there any plans for future land uses on or around the location which could be effected by the project?		
6	Are there any areas on or around the location which are densely populated or built up, which could be affected by the project**?**		

Observations/Recommendation:-

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Survey Conducted by

Name and Designation

Signatures

Verified by

Name and designation

Signatures

Annexure-5: Environmental Code of Practices

Introduction

The objective of preparation of the Environmental Code of Practices (ECP) is to address less significant environmental impacts and all general construction related impacts of the proposed project implementation. The ECPs will provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues.

ECP 1: Waste Management

ECP 2: Fuels and Hazardous Substances Management

ECP 3: Water Resources Management

ECP 4: Drainage Management

ECP 5: Soil Quality Management

ECP 6: Erosion and Sediment Control

ECP 7: Borrow Areas Development & Operation

ECP 8: Air Quality Management

ECP 9: Noise and Vibration Management

ECP 10: Protection of Flora

ECP 11: Protection of Fauna

ECP 12: Protection of Fisheries

ECP 13: Road Transport and Road Traffic Management

ECP 14: Construction Camp Management

ECP 15: Cultural and Religious Issues

ECP 16: Workers Health and Safety

The Contractor can also prepare a 'Construction Environmental Action Plan' (CEAP) demonstrating the manner in which the Contractor will comply with the requirements of ECPs and the mitigation measures proposed in the ESMMP of the ESA Report. The CEAP will form the part of the contract documents and will be used as monitoring tool for compliance. Violation of the compliance requirements will be treated as non-compliance leading to the corrections or otherwise imposing penalty on the contractors.

ECP 1: Waste Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	The Contractor shall: - Develop waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to WAPDA for approval. - Organize disposal of all wastes generated during construction in an environmentally acceptable manner. This will include consideration of the nature and location of disposal site, so as to cause less environmental impact. - Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. - Segregate and reuse or recycle all the wastes, wherever practical. - Collect and transport non-hazardous wastes to all the approved disposal sites. - Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. - Provide refuse containers at each worksite. - Request suppliers to minimize packaging where practicable. - Place a high emphasis on good housekeeping practices. - Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	The Contractor shall: - Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot. - Store, transport and handle all chemicals avoiding potential environmental pollution. - Store all hazardous wastes appropriately in bunded areas away from water courses. - Make available Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction. - Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. - Construct concrete or other impermeable flooring to prevent seepage in case of spills

ECP 2: Fuels and Hazardous Substance Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	The Contractor shall: - Prepare spill control procedures and submit the plan for WAPDA approval. - Train the relevant construction personnel in handling of fuels and spill control procedures. - Store dangerous goods in bunded areas on a top of a sealed plastic sheet away from watercourses. - Refueling should occur only within bunded areas. - Make available MSDS for chemicals and dangerous goods on-site. - Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site approved by EPA. - Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored and personnel trained in the correct use. - Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. - Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. - Store hazardous materials above flood plain level. - Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area should preferably slope or drain to a safe collection area in the event of a spill. - Put containers and drums in permanent storage areas on an impermeable floor that slopes to a safe collection area in the event of a spill or leak. - Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. - Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.

ECP 3: Water Resources Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous Material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	The Contractor shall: - Follow the management guidelines proposed in ECPs 1 and 2. - Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables
Discharge from construction sites	During construction both surface and groundwater quality may be deteriorated due to construction activities in the river, sewerages from construction sites and work camps. The construction works will modify groundcover and topography changing the surface water drainage patterns, including infiltration and storage of storm water. The change in hydrological regime leads to increased rate of runoff and in sediment and contaminant loading, increased flooding, groundwater contamination, and effect habitat of fish and other aquatic biology.	The Contractor shall: - Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials - Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site - Divert runoff from undisturbed areas around the construction site - Stockpile materials away from drainage lines - Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to a approved waste disposal site or recycling depot - Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil Erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall: - Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion - Ensure that roads used by construction vehicles are swept regularly to remove sediment. - Water the material stockpiles, access roads and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds)
Construction activities in water bodies	Construction works in the water bodies will increase sediment and contaminant loading, and effect habitat of fish and other aquatic biology.	The Contractor shall: - Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site - Monitor the water quality in the runoff from the site or areas affected by dredge plumes, and improve work practices as necessary - Protect water bodies from sediment loads by silt screen or bubble curtains or other barriers - Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables. - Use environment friendly and non-toxic slurry during construction of piles to discharge into the river. - Reduce infiltration of contaminated drainage through storm water management design - Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets.
Drinking water	Groundwater at shallow depths might be contaminated and hence not suitable for drinking purposes.	The Contractor shall: - Control the quality of groundwater to be used for drinking water on the bases of NEQS and World Bank standards for drinking water. Safe and sustainable discharges are to be ascertained prior to selection of pumps. - Tube wells will be installed with due regard for the surface environment, protection of groundwater from surface contaminants, and protection of aquifer cross contamination - All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned
	Depletion and pollution of groundwater resources	- Install monitoring wells both upstream and downstream areas near construction yards and construction camps to regularly monitor and report on the water quality and water levels. - Protect groundwater supplies of adjacent lands

ECP 4: Drainage Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	- The Contractor shall: - Prepare a program for prevent/avoid standing waters, which EMSU will verify in advance and confirm during implementation - Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line - Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there. - Rehabilitate road drainage structures immediately if damaged by contractors' road transports. - Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to the relevant standards provided by EPA, before it being discharged into recipient water bodies. - Ensure the internal roads/hard surfaces in the construction yards/construction camps that generate has storm water drainage to accommodate high runoff during downpour and that there is no stagnant water in the area at the end of the downpour. - Construct wide drains instead of deep drains to avoid sand deposition in the drains that require frequent cleaning. - Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion - Protect natural slopes of drainage channels to ensure adequate storm water drains. - Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem. - Reduce infiltration of contaminated drainage through storm water management design
Ponding of water	Health hazards due to mosquito breeding	- Do not allow ponding of water especially near the waste storage areas and construction camps - Discard all the storage containers that are capable of storing of water, after use or store them in inverted position

ECP 5: Soil Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	The Contractor shall: - Strictly manage the wastes management plans proposed in ECP1 and storage of materials in ECP2 - Construct appropriate spill contaminant facilities for all fuel storage areas - Establish and maintain a hazardous materials register detailing the location and quantities of hazardous substances including the storage, use of disposals - Train personnel and implement safe work practices for minimizing the risk of spillage - Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site - Remediate the contaminated land using the most appropriate available method to achieve required commercial/industrial guideline validation results
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	The Contractor shall: - Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds

ECP 6: Erosion and Sediment Control

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils that affects the growth of vegetation which causes ecological imbalance.	The Contractor shall: - Reinstate and protect cleared areas as soon as possible. - Mulch to protect batter slopes before planting - Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turfings/tree plantations
Construction activities and material stockpiles	The impact of soil erosion are: (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, (ii) destruction of aquatic environment in nearby lakes, streams, and reservoirs caused by erosion and/or deposition of sediment damaging the spawning grounds of fish, and (iii) destruction of vegetation by burying or gullying.	The Contractor shall: - Locate stockpiles away from drainage lines - Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds - Remove debris from drainage paths and sediment control structures - Cover the loose sediments and water them if required - Divert natural runoff around construction areas prior to any site disturbance - Install protective measures on site prior to construction, for example, sediment traps - Control drainage through a site in protected channels or slope drains - Install ‘cut off drains’ on large cut/fill batter slopes to control water runoff speed and hence erosion - Observe the performance of drainage structures and erosion controls during rain and modify as required.

ECP 7: Borrow Areas Development & Operation

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development and operation of borrow areas	In case, the borrow pits developed by the Contractor, there will be impacts on local topography, landscaping and natural drainage.	The Contractor shall: - Reuse excavated or disposed material available in the project area to the maximum extent possible - Identify borrow pits in consultation with the local governments and WAPDA. - Obtain the borrow material from: - barren land or land without tree cover outside the road reserve; - Do not dug the borrow pits within 5m of the toe of the final section of the road embankment. - Dig the borrow pits continuously. Ridges of not less than 8 m widths shall be left at intervals not exceeding 300 m and small drains should be cut through the ridges to facilitate drainage - Slope the bed level of the borrow pits, as far as possible, down progressively towards the nearest cross drain, if any, and do not lower it than the bed of the cross-drain, to ensure efficient drainage. - Follow the below for restoration of borrow areas are: - Return stockpiled topsoil to the borrow pit if is used for agriculture; - return stockpiled topsoil to the borrow pit and all worked areas to be stabilized through re-vegetation using local plants. - Control at each site by ensuring that base of the borrow pit drains into a sediment trap prior to discharging from the site.

ECP 8: Air Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	The Contractor shall: - Fit vehicles with appropriate exhaust systems and emission control devices, in compliance with the NEQS. Maintain these devices in good working condition. - Operate the vehicles in a fuel efficient manner - Cover haul vehicles carrying dusty materials moving outside the construction site - Impose speed limits on all vehicle movement at the worksite to reduce dust emissions - Control the movement of construction traffic - Water construction materials prior to loading and transport - Service all vehicles regularly to minimize emissions - Limit the idling time of vehicles not more than 2 minutes
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	The Contractor shall: - Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. - Focus special attention on containing the emissions from generators - Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites - Service all equipment regularly to minimize emissions
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard.	- Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds) - Minimize the extent and period of exposure of the bare surfaces - Reschedule earthwork activities or vegetation clearing activities, where practical, if necessary to avoid during periods of high wind and if visible dust is blowing off-site - Restore disturbed areas as soon as practicable by vegetation/grass-turfing - Store the cement in silos and minimize the emissions from silos by equipping them with filters.

ECP 9: Noise and Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	The Contractor shall: - Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures - Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall: - Appropriately site all noise generating activities to avoid noise pollution to local residents - Use the quietest available plant and equipment - Modify equipment to reduce noise (for example, noise control kits, lining of truck trays or pipelines) - Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures - Install acoustic enclosures around generators to reduce noise levels. - Fit high efficiency mufflers to appropriate construction equipment
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall: - Notify adjacent residents prior to any typical noise event outside of daylight hours - Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions - Employ best available work practices on-site to minimize occupational noise levels - Install temporary noise control barriers where appropriate - Notify affected people if noisy activities will be undertaken, e.g. blasting - Plan activities on site and deliveries to and from site to minimize impact - Monitor and analyze noise and vibration results and adjust construction practices as required. - Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas

ECP 10: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall: - Reduce disturbance to surrounding vegetation - Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetations. - Get approval from supervision consultant for clearance of vegetation. - Make selective and careful pruning of trees where possible to reduce need of tree removal. - Control noxious weeds by disposing of at designated dump site or burn on site. - Clear only the vegetation that needs to be cleared in accordance with the plans. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill and construction of diversion roads, etc. - Do not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. - Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from. - Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. - Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. - Ensure excavation works occur progressively and re-vegetation done at the earliest - Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction - Supply appropriate fuel in the work caps to prevent fuel wood collection

ECP 11: Protection of Fauna

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality,	The Contractor shall: - Limit the construction works within the designated sites allocated to the contractors - check the site for animals trapped in, or in danger from site works and use a qualified person to relocate the animal
	Impact on migratory birds, its habitat and its active nests	The Contractor shall: - Not be permitted to destruct active nests or eggs of migratory birds - Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and located active nests - Minimize the release of oil, oil wastes or any other substances harmful to migratory birds to any waters or any areas frequented by migratory birds.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	- The Contractor shall: - Restrict the tree removal to the minimum required. - Retain tree hollows on site, or relocate hollows, where appropriate - Leave dead trees where possible as habitat for fauna - Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition.
Construction camps	Illegal poaching	- Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching.

ECP 12: Protection of Fisheries

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The main potential impacts to fisheries are hydrocarbon spills and leaks from boats and disposal of wastes into the river	- The Contractor shall: - Ensure that boats used in the project are well maintained and do not have oil leakage to contaminate river water. - Contain accidental spillage and make an emergency oil spill containment plan to be supported with enough equipments, materials and human resources - Do not dump wastes, be it hazardous or non-hazardous into the nearby water bodies or in the river
Construction activities on the land	The main potential impacts to aquatic flora and fauna River are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	- The Contractor shall: - follow mitigation measures proposed in ECP 3 : Water Resources Management and EC4: Drainage Management -

ECP 13: Road Transport and Road Traffic Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall: - Prepare and submit a traffic management plan to WAPDA for their approval at least 30 days before commencing work on any project component involved in traffic diversion and management. - Include in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary diversions, necessary barricades, warning signs/lights, road signs, etc. - Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Pakistani Traffic Regulations. - Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Urdu: - Location: chainage and village name - Duration of construction period - Period of proposed detour/alternative route - Suggested detour route map - Name and contact address/telephone number of the concerned personnel - Name and contact address/telephone number of the Contractor - Inconvenience is sincerely regretted.
	Accidents and spillage of fuels and chemicals	- Restrict truck deliveries, where practicable, to day time working hours. - Restrict the transport of oversize loads. - Operate road traffics/transport vehicles, if possible, to non-peak periods to minimize traffic disruptions. - Enforce on-site speed limit

ECP 14: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall: - Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view. - Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. - Submit to the PMU for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. - Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites: - Adequate housing for all workers - Safe and reliable water supply. Water supply from tube wells that meets the national standards - Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. Female toilets should be clearly marked in language understood by the persons using them to avoid miscommunication. The minimum number of toilet facilities required is one toilet for every ten persons. - Treatment facilities for sewerage of toilet and domestic wastes - Storm water drainage facilities. Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the silt retention pond to natural drainage via a grassed

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		swale at least 20 meters in length with suitable longitudinal gradient. - Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon. - Provide child crèches for women working on the construction site. The crèche should have facilities for dormitory, kitchen, indoor/outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers - Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall: - Ensure proper collection and disposal of solid wastes within the construction camps - Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level. - Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipments/vehicles needed. - Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition. Cover the bed of the pit with impervious layer of materials (clayey, thin concrete) to protect groundwater from contamination. - Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		with. - Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall: - Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. - Make available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. - Conduct awareness campaigns to educate workers on preserving the protecting of biodiversity in the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall: - Provide adequate health care facilities within construction sites. - Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. - Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. - Initial health screening of the laborers coming from outside areas - Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work - Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis - Complement educational interventions with easy access to condoms at campsites as well as voluntary 140counseling and testing - Provide adequate drainage facilities throughout camps to ensure that disease vectors habitats (stagnant water bodies, puddles) do not form. Regular mosquito repellant sprays in monsoon. - Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices
Safety	In adequate safety facilities to the construction camps may	The Contractor shall: - Provide appropriate security personnel (police / home guard or private security guards) and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	create security problems and fire hazards	enclosures to prevent unauthorized entry in to the camp area. - Maintain register to keep track on a head count of persons present in the camp at any given time. - Encourage use of flameproof material for the construction of labor housing/site office. Ensure that these houses/rooms are of sound construction and capable of withstanding storms/cyclones. - Provide appropriate type of firefighting equipment suitable for the construction camps - Display emergency contact numbers clearly and prominently at strategic places in camps. - Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	The Contractor shall: - Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. - Dismantle camps in phases as the work decreases (do not wait for completion of the entire work. - Give prior notice to the laborers before demolishing their camps/units - Maintain the noise levels within the national standards during demolition activities - Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. - Reuse the demolition debris to a maximum extent. - Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. - Restore the site to its original condition or to an agreed condition with the landowner defined prior to the commencement of the works (in writing). - Not make false promises to the laborers for future employment in O&M of the project.

ECP 15: Cultural and Religious Issues

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall: - Communicate to the public through community consultation and newspaper announcements regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. - Do not block access to cultural and religious sites, wherever possible - Restrict all construction activities within the foot prints of the construction sites. - Stop construction works that produce noise (particularly during prayer time) should there be any mosque/religious/educational institutions close to the construction sites and users make objections. - Take special care and use appropriate equipment when working next to a cultural/religious institution. - Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given by the PMU - Provide separate prayer facilities to the construction workers. - Show appropriate behavior with all construction workers especially women and elderly people - Allow the workers to participate in praying during construction time - Resolve cultural issues in consultation with local leaders and supervision consultants - Establish a mechanism that allows local people to raise grievances arising from the construction process. - Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters

ECP 16: Worker Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc) and (iii) road accidents from construction traffic.	The Contractor shall: - Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with the national acts and rules of the Government of Pakistan - Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas, - Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. - Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job - Appoint an environment, health and safety manager to look after the health and safety of the workers - Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters
	Child and pregnant labor	- The Contractor shall: - not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977).
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	- Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work - Document and report occupational accidents, diseases, and incidents.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		- Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice. - Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. - Provide awareness to the construction drivers to strictly follow the driving rules - Provide adequate lighting in the construction area and along the roads
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECP 14 Construction Camp Management: - Adequate ventilation facilities - Safe and reliable water supply. Water supply from deep tube wells that meets the national standards - Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. - Treatment facilities for sewerage of toilet and domestic wastes - Storm water drainage facilities. - Recreational and social facilities - Safe storage facilities for petroleum and other chemicals in accordance with ECP 2 - Solid waste collection and disposal system in accordance with ECP1. - Arrangement for trainings - Paved internal roads. - Security fence at least two m height. - Sick bay and first aid facilities
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	- The contractor shall provide portable toilets at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities should be at least six m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment. - Contractor should provide bottled drinking water facilities to the construction workers at all the construction sites.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Other ECPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community: - ECP 2: Fuels and Hazardous Goods Management - ECP 4: Drainage Management - ECP 8: Air Quality Management - ECP 9: Noise and Vibration Management - ECP 13: Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall: - Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS. - Train all construction workers in general health and safety matters, and on the specific hazards of their work Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. - Commence the malaria, HIV/AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counseling and testing. - Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.

Annexure 6: Mammals of Pakistan

INSECTIVORA
1. *Crocidura attenuata* – Grey Shrew
2. *Crocidura gmelini* – Steppie Pygmy Shrew
3. *Crocidura pergrisea* – Pale Grey Shrew
4. *Crocidura pullata* (Syn: *gueldenstaedtii)* Asiatic White-toothed Shrew
5. *Crocidura zarudnyi* – Zarudny's Shrew
6. *Hemiechinus auritus* - Long-eared Steppe or Afghan hedgehog
7. *Hemiechinus collaris* - Long-eared Desert Hedgehog
8. *Hemiechinus hypomelas* - Brandt's Hedgehog
9. *Hemiechinus micropus* - Indian Hedgehog
10. *Sorex thibetanus* - Asiatic Pygmy Shrew
11. *Suncus etruscus* - Savi's Pygmy Shrew
12. *Suncus murinus* - House Shrew or Musk Shrew
13. *Suncus stoliczkanus* - Anderson's Shrew or Yellow-throated Shrew

CHIROPTERA
14. *Barbastella leucomelas* – Asian or Eastern Barbastelle
15. *Cynopterus sphinx* – Short-nosed Fruit Bat
16. *Eptesicus bottae* – Botta's Serotine
17. *Eptesicus nasutus* – Sindh Bat, Sindh Serotine or Persian Serotine
18. *Eptesicus nilssoni* – Northern Serotine
19. *Eptesicus serotinus* – Common Serotine
20. *Hipposideros cineraceus* – Least Leaf-nosed Bat
21. *Hipposideros fulvus* – Fulvous Leaf-nosed Bat or Bicolour Round-leaf Horseshoe Bat
22. *Megaderma lyra* – Indian False Vampire
23. *Miniopterus schreibersii* – Schreiber's Long-fingered or Bent-winged Bat
24. *Murina tubinaris* – Gilgit Tube-nosed Bat
25. *Myotis blythii* – Lesser Mouse-eared Bat (extra-limital)
26. *Myotis emarginatus* - Geoffroy's Bat or Notch-eared Bat (extra-limital)
27. *Myotis longipes* – Long-fingered Bat (extra-limital)
28. *Myotis muricola* - Dark Whiskered Bat
29. *Myotis mystacinus* - Whiskered Bat (extra-limital)
30. *Nyctalus leisleri* – Leisler's Noctule or Hairy-armed Bat
31. *Nyctalus montanus* – Mountain Noctule
32. *Nyctalus noctula* – Common Noctule
33. *Otonycteris hemprichii* – Hemprich's Long-eared Bat or Desert Long-eared Bat
34. *Pipistrellus ceylonicus* – Kelaart's Pipistrelle
35. *Pipistrellus coromandra* – Indian Pipistrelle
36. Pipistrellus dormeri – Dormer's Bat
37. *Pipistrellus javanicus babu* – Himalayan Pipistrelle
38. *Pipistrellus kuhlii* – Kuhl's Pipistrelle
39. *Pipistrellus paterculus* – Thomas's Pipistrelle
40. *Pipistrellus pipistrellus* – Common Pipistrelle
41. *Pipistrellus savii* – Savi's Pipistrelle
42. *Pipistrellus tenuis mimus* – Least Pipistrelle
43. *Plecotus auritus* – Brown Long-eared Bat
44. *Plecotus austriacus* – Grey Long-eared Bat
45. *Pteropus giganteus* – Indian Flying Fox
46. *Rhinolophus blasii* – Blasius' or Peters' Horseshoe Bat
47. *Rhinolophus ferrumequinum* – Greater Horseshoe Bat
48. *Rhinolophus hipposideros* – Lesser Horseshoe Bat
49. *Rhinolophus lepidus* – Blyth's Horseshoe Bat
50. *Rhinolophus macrotis* – Big-eared Horseshoe bat
51. *Rhinopoma hardwickei* – Lesser Rate-tailed Bat or Small Mouse-taled Bat
52. *Rhinopoma microphyllum* – Larger Rat-railed Bat or Mouse-tailed Bat
53. *Rhinopoma muscatellum* – Least Mouse-tailed Bat

54. *Rousettus egyptiacus arabicus* – Egyptian Fruit Bat
55. *Rousettus leschenaultia* – Fulvous Fruit Bat
56. *Scotoecus pallidus* – Yellow Desert Bat
57. *Scotophilus heathii* – Common Yellow-bellied Bat or Desert Scotophil Bat
58. *Scotophilus kuhlii* – Temminck's House Bat or Lesser House Bat
59. *Tadarida aegyptiaca* - Egyptian Free-tailed Bat or Wrinkle-lipped Bat
60. *Taphozous nudiventris* – Naked Rumped Tomb Bat or Kutch Sheath-tailed Bat
61. *Taphozous perforatus* – Tomb Bat or Egyptian Tomb Bat
62. *Triaenops persicus* – Persian Trident Bat

PRIMATES

63. *Macaca mulatta mulatta* – Rhesus Macque
64. *Semnopithecus entellus*– Grey Langur or Hanuman Langur

PHOLIDOTA

65. *Manis crassicaudata* – Indian Pangolin or Scaly Anteater

CARNIVORA

66. *Acinonyx jubatus* – Cheetah (extinct in Pakistan)
67. *Canis alpinus* – Indian Wild Dog or Dhole
68. *Canis aureus* – Asiatic Jackal
69. *Canis lupus* – Wolf
70. *Caracal caracal* – Caracal or Red Lynx
71. *Felis chaus* – Jungle Cat
72. *Felis margarita* – Sand Cat or Dune Cat
73. *Felis silvestris*– Indian Desert Wild Cat or Asiatic Steppe Wild Cat
74. *Herpestes edwardsii* – India Grey Mongoose or Common India Mongoose
75. *Herpestes javanicus* – Small Indian or Small Asian Mongoose
76. *Hyaena hyaena* – Striped Hyaena
77. *Lutra lutra* – Common Otter
78. *Lutrogale perspicillata* – Smooth-coated Otter or Indian Otter
79. *Lynx lynx isabellina* – Himalayan Lynx
80. *Martes flavigula* - Yellow throated Marten
81. Martes foina – Stone Marten
82. *Mellivora capensis* – Ratel or Honey Badger
83. *Mustela altaica* – Alpine Weasel or Pale Weasel
84. *Mustela erminea* – Stoat or Ermine
85. *Otocolobus manul* – Pallas' Cat or Steppe Cat
86. *Paguma larvata* – Masked Palm Civet
87. *Panthera leo* – Lion (extinct in Pakistan)
88. *Panthera pardus* – Panther or Leopard
89. *Panthera tigris* – Tiger (extinct in Pakistan)
90. *Paradoxurus hermaphroditus* –Toddy Cat or Common Palm Civet
91. *Prionailurus bengalensis* – Leopard Cat
92. *Prionailurus viverrinus* – Fishing Cat
93. *Uncia uncia* – Snow Leopard or Ounce
94. Ursus arctos isabellinus – Brown Bear
95. *Ursus thibetanus* – Asiatic Black Bear or Himalayan Black Bear
96. *Ursus thibetanus gedrosianus* – Balochistan Black Bear
97. *Viverricula indica* – Small Indian Civet or Rasse
98. *Vormela peregusna* – Marbled Polecat
99. *Vulpes bengalensis* – Indian or Bengal Fox
100. *Vulpes cana* – Blanford's Fox or King Fox
101. *Vulpes rueppellii* – Rueppell's Fox or Sand Fox
102. *Vulpes vulpes* – Common Red Fox
103. *Vulpes vulpes montana* – Tibetian Red Fox

PERISSODACTYLA

104. *Equus hemionus khur* – Indian Wild Ass or Onager
105. *Rhinoceros unicornis* – Great One-horned Rhinoceros or Indian One-horned Rhinoceros (extinct in Pakistan)

ARTIODACTYLA

106. *Antilope cervicapra* – Blackbuck (Extinct in the wild)
107. *Axis porcinus* – Hog Deer or Para
108. *Boselaphus tragocamelus* – Nilgai or Blue Bull

109. *Capra aegagrus blythi* – Wild Goat or Persian Pasang
110. *Capra aegagrus chialtanensis* – Chiltan Wild Goat
111. *Capra falconeri falconeri* – Flare-horned Markhor
112. *Capra falconeri megaceros* – Straight horned Markhor
113. *Capra Ibex sibirica* – Himalayan Ibex
114. *Cervus duvaucelii* – Swamp Deer or Barasingha
115. *Cervus elaphus* – Red Deer or Kashmir Hangul
116. *Gazella bennettii* – Chinkara or India Gazelle
117. *Gazella subgutturosa* – Goitred Gazelle or Persian Gazelle
118. *Hemitragus jemlahicus* – Himalayan Tahr (extra-limital)
119. *Moschus chrysogaster* – Himalayan Musk Deer
120. *Muntiacus muntjak* – Indian Muntjac or Barking Deer
121. *Naemorhedus goral* – Himalayan Goral or Grey Goral
122. *Ovis ammon polii* – Marco Polo Sheep
123. *Ovis vignei cycloceros* – Afghan Urial
124. *Ovis vignei punjabensis* – Punjab Urial
125. *Ovis vignei vignei* – Ladakh Urial
126. *Pseudois nayaur* – Bharal or Blue Sheep
127. *Sus scrofa* – Wild Pig or Indian Wild Boar

LAGOMORPHA

128. *Lepus capensis* – Cape Hare
129. *Lepus nigricollis* – Indian Hare or Black-naped Hare
130. *Ochotona roylei* – Royle's Pika or Indian Pika
131. *Ochotona rufescens* – Afghan Pika or Collared Pika

RODENTIA

132. *Acomys cahirinus* – Cairo Spiny Mouse
133. *Allactaga elater* – Small Five-toed Jerboa
134. *Allactaga euphratica* – Long-eared Jerboa
135. *Allactaga hotsoni* – Hotson's Five-toed Jerboa
136. *Alticola roylei (Syn: argentatus)* – Royle's High Mountain Vole
137. *Alticola stoliczkanus* – Stoliczka's High Mountain Vole (extra-limital)
138. *Apodemus flavicollis* – Yellow-necked Field Mouse (extra-limital)
139. *Apodemus rusiges (syn: sylvaticus)* – Himalayan Wood Mouse or Field Mouse
140. *Bandicota bengalensis* – Lesser Bandicoot Rat or Sindh Rice Rat
141. *Calomyscus bailwardi* – Mouse-like Hamster
142. *Cremnomys cutchicus* – Cutch Rock Rat
143. *Cricetulus migratorius* - Migratory Hamster or Grey Hamster
144. *Dryomys nitedula* – Forest Dormouse
145. *Ellobius fuscocapillus* – Quetta or Afghan Mole Vole
146. *Eupetaurus cinereus* – Woolly Flying Squirrel
147. *Funambulus pennantii* – Northern Palm Squirrel or Five-striped Palm Squirrel
148. *Gerbillus cheesmani* – Cheesman's Gerbil
149. *Gerbillus gleadowi* – Indian Hairy-footed Gerbil
150. *Gerbillus nanus* – Balochistan Gerbil
151. *Golunda ellioti* – Indian Bush Rat
152. *Hylopetes fimbriatus* – Small Kashmir Flying Squirrel
153. *Hyperacrius fertilis* – True's Vole or Burrowing Vole
154. *Hyperacrius wynnei* – Miurree Vole
155. *Hystrix indica* – Indian Crested Porcupine
156. *Jaculus blanfordi* – Blanford's Jerboa or Greater Three-toed Jerboa
157. *Marmota caudata* – Long-tailed Marmot or Kashmir Marmot
158. *Marmota himalayana* – Himalayan Marmot
159. *Meriones crassus* – Sundevall's Jird
160. *Meriones hurrianae* – Indian Desert Jird or Desert Gerbil
161. *Meriones libycus* – Liybyan Jird
162. *Meriones persicus* – Persian Jird
163. *Microtus juldaschi* – Pamir Vole or Juldaschi's Vole
164. *Millardia gleadowi* – Sand-coloured rate
165. *Millardia meltada* – Soft-furred Field Rat or Metad
166. *Mus booduga* – Little Indian Field Mouse

167. *Mus cervicolor* – Fawn-coloured Mouse (extra-limital)
168. *Mus musculus* –House Mouse
169. *Mus platythrix* – Indian Brown Spiny Mouse (extra-limital)
170. *Mus saxicola* – Grey Spiny Mouse
171. *Nesokia indica* – Short-tailed Mole Rat
172. *Petaurista petaurista* – Giant Red Flying Squirrel Or Indian Giant Flying Squirrel
173. *Rattus nitidus* – Himalayan Rat (extra-limital)
174. *Rattus norvegicus* – Norway or Brwon Rat
175. *Rattus rattus* – Roof Rat or House Rat
176. *Rattus turkestanicus* – Turkestan Rat
177. *Rhombomys opimus* – Great Gerbil or Giant Day Jird
178. *Salpingotus michaelis* – Balochistan Pygmy Jerboa
179. *Sicista concolor* – Chinese Birch Mouse
180. *Tatera indica* – Indian Gerbil or Antelope Rat

CETACEA

181. *Balaenoptera edeni* – Bryde's Whale
182. *Balaenoptera musculus* – Great Blue Whale or Sulphur-bottomed Whale
183. *Balaenoptera physalus* – Common Rorqual or Common Finback
184. *Delphinus delphis*– Long-beaked Dolphin
185. *Dugong dugon* – Dugong (extra-limital)
186. *Kogia simus* – Dwarf Sperm Whale
187. *Megaptera novaeangliae* – Humpback Whale
188. *Neophocaena phocaenoides* – Little Indian Porpoise or Black Finless Porpoise
189. *Peponocephala electra* – Melon-headed Whale or Electra Dolphin
190. *Platanista minor* – Indus Dolphin or Bhulan
191. *Pseudorca crassidens* – False Killer Whales
192. *Sousa chinensis*– Indian Humpback Dolphin
193. *Steno bredanensis* – Rough-toothed Dolphin
194. *Tursiops truncatus* – Eastern Bottle-nosed Dolphin
195. *Ziphius cavirostris* – Goosebeak Whale or Cuvier's Beaked Whale

Source IUCN Pakistan
Note: For Caprinae categorization, Schaller (1975); Schaller & Khan (1975) and Shackleton (1996) are followed.

Annexure 7: Birds of Pakistan

#	COMMON NAME	SPECIES	SUBSPECIES	STATUS
1.	Great Crested Grebe	*P. cristatus*	*P.cristatus cristatus*	Migratory Winter visitor
2.	Blacknecked Grebe	*P. nigricollis*	*P.nigricollis nigricollis*	Migratory Winter visitor
3.	Little Grebe or Dabchick	*P. ruficollis*	*P. ruficollis capensus*	Resident
4.	Rednecked Grebe	*P. grisegena*	*nil*	Rare winter visitor
5.	Spotted or Gray Pelican	*P.philippensis*	*P.philippensis philippensis*	Resident
6.	Dalmation Pelican	*P.philippensis*	*P.philippensis crispus*	Winter visitor
7.	Masked Booby	*Sula dactylatra*	*S. dactylatra melanops*	
8.	Large Cormorant	*P.carbo*	*P.carbo sinesis*	
9.	Indian Shag	*P.fuscicollis*	*nil*	Resident
10.	Little Cormorant	*P.niger*	*nil*	Resident
11.	Darter or Snake Bird	*A.rufa*	*A. rufa melanogaster*	Resident
12.	Giant Heron	*A.goliath,*	*nil*	Rare vagarant
13.	European Great Heron	*A.cinerea*	*A.c. cinerea*	Migratory, Winter visitor
14.	Eastern Grey Heron	*A.cinerea*	*A.c. rectirostris*	Resident
15.	Eastern Purple Heron	*A.purpurea*	*A.purpurea manilensis*	Resident
16.	Little Green Heron	*B. striatus*	*B.striatus chloriceps*	Resident
17.	Indian Pond Heron or Paddy Bird	*A. grayii*	*A.grayii grayii*	Resident
18.	Cattle Egret	*B. ibis*	*Bubulcus ibis cormandus*	Resident
19.	Large Egret or Great White Heron	*E.alba*	*Egretta alba alba*	Rare Winter Straggler
20.	Eastern Large Egret	*E.alba*	*Egretta alba modesta*	Resident
21.	Smaller or Medium Egret	*E. intermedia*	*Egretta intermedia intermedia*	Resident
22.	Little Egret	*E. garzetta*	*Egretta garzetta garzetta*	Resident
23.	Indian Reef Heron	*E. gularis*	*E. gularis schistacea*	Resident
24.	Night Heron	*N. nycticorax*	*Nycticorax nycticorax nycticorax*	Resident
25.	Black Bittern	*D. flavicollis*	*Dupetor flavicollis flavicollis*	Resident
26.	Bittern	*B. stellaris*	*Botaurus stellaris stellaris*	Migratory, Winter visitor
27.	Little Bittern	*Ixobrychus minutus*	*I. minutus minutus*	Resident
28.	Chestnut Bittern	*I. cinnamomenus*	*nil*	Resident
29.	Yellow Bittern	*I. sinensis*	*nil*	Resident
30.	Painted Stork	*I. leucocephalus*	*nil*	Resident
31.	Openbill Stork	*A. oscitans*	*nil*	Resident
32.	Whitenecked Stork	*C. episcopus*	*Ciconia episcopus episcopus*	Resident
33.	White Stork	*C. ciconia*	*C. ciconia ciconia*	Migratory, Winter visitor
34.	Black Stork	*C. nigra*	*nil*	Migratory, Winter visitor
35.	Blacknecked Stork	*X. asiaticus*	*X. asiaticus asiaticus*	Resident
36.	Adjutant Stork	*L. dubius*	*nil*	Uncertain
37.		*threskiornithidae*		
38.	White Ibis	*T. melanocephala*	*nil*	Resident
39.	Indian Black Ibis	*P. papillosa*	*P.papillosa papillosa*	Resident
40.	Glossy Ibis	*P. falcinellus*	*P. falcinellus falcinellus*	Partly Resident, Partly Winter visitor
41.	Spoonbill	*P. leucorodia*	*P. leucorodia major*	Partly Resident, Partly Winter visitor
42.	Greater Flamingo	*P.roseus*	*nil*	Resident
43.	Lesser Flamingo	*P.minor*	*nil*	Resident
44.	White fronted Goose	*A. albifrons*	*A. albifrons albifrons*	Migratory Winter visitor
45.	Lesser White fronted Goose	*A.erythropus*	*nil*	Migratory Winter visitor
46.	Eastern Greyleg Goose	*A. anser*	*A. anser rubrirostris*	Migratory Winter visitor
47.	Barheaded Goose	*A. indicus*	*nil*	Migratory Winter visitor
48.	Whooper Swan	*C. cygnus*	*C. c. cygnus*	Rare Winter Straggler
49.	Mute Swan	*C. olor*	*nil*	Rare Winter Straggler
50.	Western Whistling Swan	*C. columbianus*	*C. columbianus bewickii*	Rare Winter Straggler
51.	Lesser Whistling Teal or Tree Duck	*D.javanica*	*nil*	Partly Migratory
52.	Large Whistling Teal	*D. bicolor*	*nil*	Resident
53.	Rudy Shelduck	*T.ferruginea*	*nil*	Migratory Winter visitor
54.	Common Shelduck	*T. tadorna*	*nil*	Rare Winter visitor
55.	Marbled Teal	*A. angustirostris*	*nil*	Resident
56.	Pintail	*A. acuta*	*nil*	Migratory Winter visitor
57.	Common Teal	*A. crecca*	*A. c. crecca*	Migratory Winter visitor
58.	Baikal Clucking or Formosa Teal	*A. formosa*	*nil*	Rare Winter visitor
59.	Spotbill Duck	*A. poecilorhyncha*	*A. p. poecilorhyncha*	Partly Migratory
60.	Mallard	*A. platyrhynchos*	*nil*	Migratory Winter visitor
61.	Gadwall	*A. strepera*	*A. s. strepera*	Migratory Winter visitor
62.	Falcated Teal	*A. falcata*	*nil*	Rare Straggler

63.	Wigeon	*A. penelope*	*nil*	Migratory Winter visitor
64.	Bluewinged Teal	*A. querquedula*	*nil*	Migratory Winter visitor
65.	Shoveller	*A. clypeata*	*nil*	Migratory Winter visitor
66.	Redcrested Pochard	*N. rufina*	*nil*	Winter visitor
67.	Common Pochard	*A. ferina*	*nil*	Migratory Winter visitor
68.	White-eyed Pochard	*A. nyroca*	*nil*	Migratory Winter visitor
69.	Tufted Duck	*A. fuligula*	*nil*	Migratory Winter visitor
70.	Cotton Teal	*N. coromandelianus*	*N. c. coromandelianus*	Resident
71.	Nakta or Comb Duck	*S. melanotos*	*S. m. melanotos*	Resident
72.	Longtail Duck	*C. hyemalis*	*nil*	Rare Winter Straggler
73.	Goldeneye Duck	*B. clangula*	*B. c. clangula*	Winter visitor
74.	Smew	*M. albellus*	*nil*	Winter visitor
75.	Common Merganser	*M. merganser*	*M. m. merganser*	Winter visitor
76.	Redbreasted Merganser	*M. serrator*	*M. s. serrator*	Winter visitor
77.	Whiteheaded Stifftailed Duck	*O. leucocephala*	*nil*	Winter visitor
78.	Blackwinged kite	*E. caeruleus*	*E. c. vociferus*	Resident
79.	Crested Honey Buzzard	*P. ptilorhynchus*	*P. p. ruficollis*	Partly Migratory
80.	Black Kite	*M. migrans*	*M. m. migrans*	Partly Migratory
81.	Pariah Kite	*M. migrans*	*M. m. govida*	Resident
82.	Blackeared Kite	*M. migrans*	*M. m. lineatus*	Migratory Winter visitor
83.	Brahminy Kite	*H. indus*	*H. i. Indus*	Resident
84.	Eastern Goshawk	*A. gentilis*	*A. g. schvedowi*	Winter Vagarant
85.	Central Asian Shikra	*A. badius*	*A. b. cenchroides*	Resident
86.	Indian Shikra	*A. badius*	*A. b. dussmieri*	Resident
87.	Asiatic Sparrow - Hawk	*A. nisus*	*A. n. nisosimilis*	Winter visitor
88.	Indian Sparrow - Hawk	*A. nisus*	*A. n. melachistos*	Resident
89.	Longlegged Buzzard	*B. rufinus*	*B. r. rufinus*	Resident
90.	White-eyed Buzzard Eagle	*B. tessa*	*nil*	Resident
91.	Hodgson's or Feather toed Hawk - Eagle	*S. nipalensis*	*S.n.nipalensis*	Resident
92.	Bonelli's or Feather toed Hawk - Eagle	*H. fasciatus*	*H. f. fasciatus*	Resident
93.	Booted Hawk - Eagle	*H. pennatus*	*nil*	Partly Resident Partly Winter visitor
94.	Himalyn Golden Eagle	*A. chrysaetos daphanea*	*nil*	Resident
95.	Imperial Eagle	*A. heliaca*	*A. h. heliaca*	Winter visitor
96.	Tawny Eagle	*A. rapax*	*A. r. vindhiana*	Resident
97.	Eastern Steppe Eagle	*A. nipalensis*	*A. n. nipalensis*	Winter visitor
98.	Greater Spotted Eagle	*A. clanga*	*nil*	Resident
99.	Lesser Spotted Eagle	*A. pomarina hastata*	*nil*	Resident
100.	Black Eagle	*I. malayensis*	*I. m. perniger*	Resident
101.	Whitetailed Sea Eagle	*H. albicilla*	*nil*	Rare Winter visitor
102.	Ringtailed Fishing Eagle	*H. leucoryphus*	*nil*	Partly Migratory
103.	Black or King Vulture	*T. calvus*	*nil*	Resident
104.	Cinereous Vulture	*A. monachus*	*nil*	Partly Resident Partly Winter visitor
105.	Indian Griffon Vulture	*G. fulvus*	*G. f. fulvescens*	Resident
106.	Himalyn Griffon Vulture	*G. himalayensis*	*nil*	Resident
107.	West Pakistan Long-billed Vulture	*G. indicus*	*G. i. jonesi*	Resident
108.	Indian Whitebacked Vulture	*G. bengalensis*	*nil*	Resident
109.	Egyptian Vulture	*N. percnopterus*	*N. p. percnopterus*	Resident
110.	Himalayan bearded Vulture	*G. barbatus*	*G. b. aureus*	Resident
111.	Hen Harrier	*C. cyaneus*	*C. c. cyaneus*	Winter Visitor Passage Migrants
112.	Pale Harrier	*C. macrourus*	*nil*	Winter visitor
113.	Motagu's Harrier	*C. pygargus*	*nil*	Winter visitor
114.	Marsh Harrier	*C. aeruginosus*	*C. a. aeruginosus*	Winter visitor
115.	Short-toed Eagle	*C. gallicus*	*C. g. gallicus*	Resident
116.	Crested Serpent Eagle	*S. cheela*	*S. c. cheela*	Resident
117.	Osprey	*P. haliaetus*	*P. h. haliaetus*	Winter visitor
118.	Snake or Cherrug Falcon	*F. biarmicus*	*F. b. cherrug*	Winter visitor
119.	Shanghar Lion	*F. biarmicus*	*F. b. milvipes*	Rare Winter visitor
120. s	Laggar Falcon	*F. biarmicus*	*F. b. jugger*	Resident
121.	Eastren Pregrene Falcon	*F. peregrinus*	*F. p. japonesis*	Winter visitor
122.	Redcapped or Barbarry Falcon	*F. peregrinus*	*F. p. babylonicus*	Partly Resident Partly migratory
123.	Shaheen Falcon	*F. peregrinus*	*F. p. peregrenator*	Resident
124.	Hobby	*F. subbuteo*	*F. s. subbuteo*	Winter visitor
125.	Central Asian Hobby	*F. subbuteo*	*F. s. central asiae*	Partly Resident mainly winter visitor
126.	North Asiatic Merlin	*F. columbarius*	*F. c. insignis*	Rare Winter visitor

127.	Pallid Merlin	*F. columbarius*	*F. c. christianiludovici*	Winter Vagarant
128.	Redheaded Merlin	*F. chicquerra*	*F. c. chicquerra*	Resident
129.	European Kestral	*F. tinnunculus*	*F. t. tinnunculus*	Partly Resident Partly Winter visitor
130.	Snow Patridge	*L. lerwa*	*nil*	Resident
131.	Seesee Patridge	*A. griseogularis*	*A. g. griseogularis*	Resident
132.	Himalyan Snowcock	*T. himalayensis*	*T. h. himalayensis*	Resident
133.	Persian Chukor	*A. chukar*	*A. c. koroviakovi*	Resident
134.	Northern Chukor	*A. chukar*	*A. c. pallescens*	Resident
135.	Chukor Partridge	*A. chukar*	*A. c. chukar*	Resident
136.	South Persian Black Partridge	*F. francolinus*	*F. f. henrici*	Resident
137.	Baluchistan Grey Partridge	*F. pondicerianus*	*F. p. mecranesis*	Resident
138.	North Indian Grey Patridge	*F. pondicerianus*	*F. p. interpositus*	Resident
139.	Grey Quail	*C. coturnix*	*C. c. coturnix*	Resident
140.	Blackbreasted or Rain Quail	*C. coromandelica*	*nil*	Partly Migratory
141.	Punjab Jungle Bush Quail	*P. asiatica*	*P. a. punjaubi*	Resident
142.	Westerned Horn Pheasant	*T. melanocephalus*	*nil*	Resident
143.	Impeyan or Himalayan Monal Pheasant	*L. impejanus*	*nil*	Resident
144.	Whitecrested Kaleej Pheasant	*L. leucomelana*	*L. l. hamiltonii*	Resident
145.	Indian Red Jungle Fowl	*G. gallus*	*G. g. murgi*	Resident
146.	Chestnut-mantled Koklas Pheasant	*P. macrolopha*	*P. m. castanea*	Resident
147.	Chir Pheasant	*C. wallichii*	*nil*	Resident
148.	Indian Peafowl	*Pavo cristatus*	*nil*	Resident
149.	Little Bustard Quail	*T. sylvatica*	*T. s.dussumier*	Rains visitor
150.	Indian Yellowlegged Button Quail	*T. tanki*	*T. t. tainki*	Uncertain
151.	Indian Bustard Quail	*T. suscitator*	*T. s. taigoor*	Resident
152.	Eastern Common Crane	*G. grus*	*G. g. lilfordi*	Wintor visitor
153.	Indian Sarus Crane	*G. antigone*	*G. a. antigone*	Resident
154.	Siberian or Great White Crane	*G. leucogeranus*	*nil*	Wintor visitor
155.	Demoiselle Crane	*A. virgo*	*nil*	Autumn passage migrant
156.	Indian or Slaty-legged Banded Crake	*R. eurizonoides*	*R. e. amauroptera*	Partly Migratory
157.	Little Crake	*P. parva*	*nil*	Winter visitor
158.	Spotted Crake	*P. porzana*	*nil*	Winter visitor
159.	Northern Ruddy Crake	*A. fuscus*	*bakeri*	Resident
160.	Chinese White-breasted Waterhen	*A. phoenicurus*	*A. p. chinensis*	Resident
161.	Kora or Watercock	*G. cinerea*	*G. c. cinerea*	Resident
162.	Purple Moorhen	*G. chloropus*	*G. c. indica*	Resident
163.	Indian Purple Moorhen	*P. porphyrio*	*P. p. seistanicus*	Partly Migratory
164.	Coot	*F. atra*	*F. a. atra*	Resident
165.	Great Bustard	*O. tarda*	*O. t. dybowskii*	Rare Winter vagarant
166.	Eastern Little Bustard	*O. tetrax*	*O. t. orientalis*	Winter visitor
167.	Great Indian Bustard	*C. nigriceps*	*nil*	Winter visitor
168.	Houbara Bustard	*C. undulata*	*C. u. macqueenii*	Partly Resident Partly Winter visitor
169.	Leekh or Lesser Florican	*S. indica*	*nil*	Resident
170.	Pheasant-tailed Jacana	*H. chirurgus*	*nil*	Resident
171.	Bronzewinged Jacana	*M. indicus*	*nil*	Resident
172.	Oyestercatcher or Sea-Pie	*H. ostralegus*	*H. o. ostralegus*	Winter visitor
173.	Whitetailed Lapwing	*V. leucurus*	*nil*	Winter visitor
174.	Sociable Lapwing	*V. gregarius*	*nil*	Winter visitor
175.	Peewit, Lapwing or Green Plover	*V. vanellus*	*nil*	Winter visitor
176.	Redwattled Lapwing	*V. indicus*	*V. i. Indicus*	Resident
177.	Yellow-wattled Lapwing	*V. malabaricus*	*nil*	Resident
178.	Blackbellied or Grey Plover	*P. squatarola*	*nil*	Winter visitor
179.	Golden Plover	*P. apricaria*	*P. a. apricaria*	Winter Vagarant
180.	Eastern Golden Plover	*P. dominica*	*P. d. fulva*	Winter visitor
181.	Large Sand Plover	*C. leschenaultii*	*nil*	Winter visitor
182.	Eastern Ringed Plover	*C. hiaticula*	*C. h. tundrae*	Rare Winter visitor
183.	European Little Ringed Plover	*C. dubius*	*C. d. coronicus*	Partly Resident Partly Winter visitor
184.	Indian Little Ringed Plover	*C. dubius*	*C. d. jerdoni*	Resident
185.	Kentish Plover	*C. alexandrinus*	*C. a. alexandrinus*	Resident
186.	Pamirs Lesser Sand Plover	*C. mongolus*	*C. m. artifrons*	Winter visitor
187.	Whimbrel	*N. phaeopus*	*N. p. phaeopus*	Winter visitor
188.	Curlew	*N. arquata*	*N. a. arquata*	Winter visitor
189.	Eastern Curlew	*N. arquata*	*N. a. orientalis*	Winter visitor
190.	Blacktailed Godwit	*L. limosa*	*L. l. limosa*	Winter visitor
191.	Bartailed Godwit	*L. lapponica*	*L. l. lapponica*	Winter visitor
192.	Spotted or Dusky Redshank	*T. erythropus*	*nil*	Winter visitor
193.	Common Redshank	*T. totanus*	*T. t. totanus*	Winter visitor
194.	Eastern Redshank	*T. totanus*	*T. t. eurhinus*	Winter visitor

195.	Marsh Sandpiper or Little Greenshank	*T. stagnatilis*	*nil*	Winter visitor
196.	Greenshank	*T. nebularia*	*nil*	Winter visitor
197.	Green Sandpiper	*T. ochropus*	*nil*	Winter visitor
198.	Wood or Spotted Sandpiper	*T. glareola*	*nil*	Winter visitor
199.	Terel Sandpiper	*T. terek*	*nil*	Winter visitor
200.	Common Sandpiper	*T. hypoleucos*	*nil*	Winter visitor
201.	Turnstone	*A. interpres*	*A. i. interpres*	Winter visitor
202.	Eastern Solitory Snipe	*C. solitaria*	*C. s. solitaria*	Uncertain
203.	Pintail Snipe	*C. stenura*	*nil*	Winter visitor
204.	Common or Fantail Snipe	*C. gallinago*	*C. g. gallinago*	Winter visitor
205.	Jack Snipe	*C. minima*	*nil*	Winter visitor
206.	Wood Snipe	*C. nemoricola*	*nil*	Resident
207.	Woodcock	*S. rusticola*	*S. r. rusticola*	Resident
208.	Eastern Knot	*C. tenuirostris*	*nil*	Winter visitor
209.	Sanderling	*C. albus*	*nil*	Winter visitor
210.	Little stint	*C. minutus*	*nil*	Winter visitor
211.	Temminck's Stint	*C. temminckii*	*nil*	Winter visitor
212.	Dunlin	*C. alolnus*	*alpinus*	Winter visitor
213.	Culew-Sandpiper	*C. testaceus*	*nil*	Winter visitor
214.	Knot	*C. canatus*	*C. c. canatus*	Rare Winter Visitor
215.	Broadbilled Sandpiper	*L. falcinellus*	*L. f. falcinellus*	Winter visitor
216.	Ruff	*P. pugnax*	*nil*	Winter visitor
217.	Rednecked Phalarope	*P. lobatus*	*nil*	Winter visitor
218.	Painted Snipe	*R. benghalensis*	*R. b. benghalensis*	Winter visitor
219.	Indian Blackwinged Stint	*H. himantopus*	*H. h. himantopus*	
220.	Avocet	*R. avosetta*	*nil*	Winter visitor
221.	Ibisbill	*I. Struthersii*	*nil*	Resident
222.	Crab Plover	*D. ardeola*	*nil*	Winter visitor
223.	Persian Stone Curlew	*B. oedicnemus*	*B. o. saharae*	Resident
224.	Indian Stone Curlew	*B. oedicnemus*	*B. o. indicus*	Resident
225.	Great Stone Plover	*E. magnirostris*	*E. m. recurvirostris*	Resident
226.	Creamcolor or Desert Courser	*C. cursor*	*C. c. cursor*	Winter visitor
227.	Indian Courser	*C. cormandelicus*	*nil*	Partly Migratory
228.	Collared Pratincole	*G. pratincola*	*G. p. pratincola*	Resident
229.	Large Indian Pratincole	*G. pratincola*	*G. p. maldivarum*	Resident
230.	Small Indian Pratincole	*G. lactea*	*nil*	Resident
231.	Sooty Gull	*L. hemprichii*	*nil*	Winter visitor
232.	Yellowlegged Herring Gull	*L. argentatus*	*L. a. heuglini*	Winter visitor
233.	Herring Gull		*L. a. mongolicus*	Winter visitor
234.	Lesser Blackbacked Gull	*L. fuscus*	*F. f. fuscus*	Winter visitor
235.	Great Blackheaded Gull	*L. ichthyaetus*	*nil*	Winter visitor
236.	Brownheaded Gull	*L. brunnicephalus*	*nil*	Winter visitor
237.	Blackheaded Gull	*L. ridibundus*	*L. r. ridibundus*	Winter visitor
238.	Slenderbilled Gull	*L. genei*	*nil*	Partly Resident Partly Winter visitor
239.	Indian Whiskered Tern	*C. hybrida*	*C. h. indica*	Winter visitor Passage migrant
240.	Gullbilled Tern	*G. nilotica*	*G. nilotica*	Resident
241.	Caspian Tern	*H. caspia*	*H. c. caspia*	Resident
242.	Indian River Tern	*S. aurantia*	*nil*	Resident
243.	European Common Tern	*S. hirundo*	*S. h. hirundo*	Winter visitor
244.	Whitecheeked Tern	*S. repressa*	*nil*	Winter visitor
245.	Blackbellied Tern	*S. acuticauda*	*nil*	Resident
246.	Red Sea Brown-winged Tern	*S. anethetus*	*S. a. fuligula*	
247.	Little Tern or Ternlet	*S. albifrons*	*S. a. albifrons*	Resident
248.	Blackshafted Ternlet		*S. a. saundersi*	Resident
249.	Red Sea or Large Crested Tern	*S. bergii*	*S. b. velox*	Resident
250.	Indian Lesser Crested Tern	*S. bengalensis*	*S. b. bengalensis*	Resident
251.	Sandwich Tern	*S. sandvicensis*	*S. s. sandvicensis*	Winter visitor
252.	Indian Skimmer or Scissorbill	*R. albicollis*	*nil*	Partly Migratory
253.	Noddy Tern	*A. stolidus*	*A. s. pileatus*	Straggler
254.	Large Pintail Sandgrouse	*P. alchata*	*P. a. caudacutus*	Wintor visitor Passage migrants
255.	Indian Sandgrouse	*P. exustus*	*P. e. erlangeri*	Resident
256.	Spotted Sandgrouse	*P. senegullus*	*nil*	Winter visitor
257.	Imperial Blackbellied Sandgrouse	*P. senegullus*	*P. o. orientalis*	Partly Resident Partly Winter visitor
258.	Coronetted Sandgrouse	*P. coronatus*	*P. c. atratus*	Resident
259.	Closebarred Sandgrouse	*P. indicus*	*P. i. arabicus*	Resident
260.	Painted Sandgrouse	*P. indicus*	*P. i. Indicus*	Partly Migratory
261.	Bengal green Pigeon	*T. phoenicoptera*	*T. p. phoenicoptera*	Resident

262.	West Himalayan Snow Pigeon	*C. leuconota*	*C. l. leuconota*	
263.	Turkestan Hill Pigeon	*C. rupestris*	*C. r. turkestanica*	Resident
264.	Blue Rock Pigeon	*C. livia*	*C. l. neglecta*	Resident
265.	Eastern Stock Pigeon	*C. eversmanni*	*nil*	Winter visitor Passage migrant
266.	Eastern Wood Pigeon or Cushat	*C. palumbus*	*C. p. casiotis*	Erratic Wanderer
267.	Speckled Wood Pigeon	*C. hodgsonii*	*nil*	Resident
268.	Persian Turtle-Dove	*S. turtur*	*S. t. arenicola*	Winter Vagarant
269.	Western Turtle-Dove	*S. orientalis*	*S. o. meena*	Resident
270.	Indian Ring Dove	*S. decaocto*	*S. d. decaocto*	Resident
271.	Indian Red Turtle-Dove	*S. tranquebarica*	*S. t. tranquebarica*	Resident
272.	Indian Spotted Dove	*S. chinesis*	*S. c. suratensis*	Resident
273.	Indian little Brown or Senegal Dove	*S. senegalensis*	*S. s. cambayensis*	Resident
274.	Large Indian Parakeet	*P. eupatria*	*P. e. nipalensis*	Resident
275.	Northern Rose-ringed Parakeet	*P. krameri*	*P. k. borealis*	Resident
276.	Northern Bossom headed Parakeet	*P. haimalayana*	*nil*	Resident
277.	Pied Crested Cuckoo	*C. jacobinus*	*C. j. serratus*	Summer (breeding) visitor
278.	Large Hawk-Cuckoo	*C. sparverioides*	*C. s. sparverioides*	Resident
279.	Common Hawk-Cuckoo or Brain-fever Bird	*C. various*	*C. v. various*	Resident
280.	Indian Cuckoo	*C. micropterus*	*C. micropterus*	Resident
281.	Asiatic Cuckoo	*C. canorous*	*C. c. subtelephonus*	Uncertain
282.	Cuckoo	*C. canorous*	*C. c. canorus*	
283.	Himalayan Cuckoo	*C. saturatus*	*S. s. saturatus*	Resident
284.	Small Cuckoo	*C. poliocepholus*	*C. p. poliocepholus*	Resident
285.	Indian Plaintive Cuckoo	*C. merulinus*	*C. m. passerinus*	
286.	Indian Koel	*E. scolopacea*	*E. s. scolopacea*	Resident
287.	Western Sirkeet Cuckoo	*T. leschenaultii*	*T. l. sirkee*	Resident
288.	Common Crow Pheasant or Coucal	*C. sinensis*	*C. s. sinensis*	Resident
289.	Indian Barn Owl	*T. alba*	*T. a. stertens*	Resident
290.	Western Spotted Scops Owl	*O. spilocephatus*	*O. s. huttoni*	Resident
291.	Straited or Pallid Scops Owl	*O. brucei*	*nil*	
292.	Eastern Scops Owl	*O. scops*	*O. s. pulchellus*	Winter Straggler Summer Visitor
293.	North Indian Scops Owl	*O. scops*	*O. s. sunia*	
294.	Punjab Collared Scops Owl	*O. bakkamoena*	*O. b. plumipes*	Resident
295.	West Pakistan Collared Scops Owl	*O. bakkamoena*	*O. b. deserticotor*	Resident
296.	Turkestan Honrned or Eagle Owl	*B. bubo*	*B. b. turcomanus*	Resident
297.	Himalayan Horned or Eagle Owl	*B. bubo*	*B. b. hemachalana*	Uncertain
298.	Indian Great Horned or Eagle Owl	*B. bubo*	*B. b. bengalensis*	Resident
299.	Dusky Honrned Owl	*B. coromandus*	*B. c. coromandus*	Resident
300.	Brown Fish Owl	*B. zeylonensis*	*B. z. leschenault*	Resident
301.	Snowy Owl	*N. scandiaca*	*nil*	
302.	Collared Pygmy Owlet	*C. brodiei*	*C. b. brodiei*	
303.	West Himalayan Barred Owlet	*C. cucoloides*	*C. c. cucoloides*	
304.	Indian Brown Hawk -Owl	*N. scutulata*	*N. s. lugabris*	Resident
305.	Hutton's Owlet	*A. noctua*	*A. n. bactiana*	Resident
306.	Northern Spotted Owlet	*A. brama*	*A. b. indica*	Resident
307.	Hume's Wood Owl	*S. butleri*	*nil*	Resident
308.	Himalayan Brown Wood Owl	*S. lepotogrammica*	*S. l. newarensis*	Resident
309.	Scully's Wood Owl	*S. aluco*	*S. a. biddulphi*	
310.	Himalayan Wood Owl	*S. aluco*	*S. a. nivicola*	Resident
311.	Longeared Owl	*A. otus*	*A. o. otus*	
312.	Shorteared Owl	*A. flammeus*	*A. f. flammeus*	Passage Migrants
313.	Himalayan Jungle Nightjar	*C. indicus*	*C. i. hazarae*	Resident
314.	Hume's European Nightjar	*C. europaeus*	*C. e. unwini*	Passage Migrant visitor
315.	Sykes's or Sind Nightjar	*C. mahrattensis*	*nil*	Resident
316.	Indian Little Nightjar	*C. asiaticus*	*C. a. asiaticus*	Resident
317.	Franklin's or Allied Nightjar	*C. affinis*	*C. a. monticola*	Not Given in the book
318.	Egyptian Nightjar	*C. aegyptius*	*nil*	Not Given in the book
319.	Whitethroated Spinetail Swift	*C. caudacuta*	*C. c. nudipes*	Not Given in the book
320.	Alpine Swift	*A. melba*	*A. m. melba*	Summar visitor and Passage migrant
321.	Indian Alpine Swift	*A. melba*	*A. m. nubifuga*	
322.	Eastern Swift	*A. apus*	*A. a. pekinensis*	Breeding visitor
323.	Pale Brown Swift	*A. pallidus*	*nil*	Winter visitor
324.	Palestine House Swift	*A. affinis*	*A. a. gallilejensis*	Resident
325.	Indian Pied King-fisher	*C. rudis*	*C. r. leucomelanura*	Resident
326.	Central Asian Small Blue Kingfisher	*A. atthis*	*A. a. pallasii*	Partly Migratory
327.	Indian Small Blue Kingfisher	*A. atthis*	*A. a. benalensis*	Resident
328.	Whitebreasted Kingfisher	*H. smyrnensis*	*H. s. smyrnensis*	Resident
329.	European Bee-eater	*M. apiaster*	*nil*	Resident

330.	Bluecheeked Bee-eater	*M. supercilious*	*M. s. persicus*	Breeding visitor
331.	Bluetailed Bee-eater	*M. philippinus*	*M. p. philipinus*	Resident
332.	Sind-tailed Bee-eater	*M. orientalis*	*M. o. beludschicus*	Resident
333.	Kashmir Roller	*C. garrulus*	*C. g. semenowi*	Resident
334.	Northern Roller or Blue Jay	*C. benghalensis*	*C. b. benghalensis*	Resident
335.	European Hoope	*U. epops*	*U. e. epops*	Summer Breeding visitor & Partly Resident
336.	Grey Hornbill	*T. birostris*	*nil*	Resident
337.	Himalayan Great Barbet	*M. virens*	*M. v. marshallorum*	Resident
338.	Bluethreated Barbet	*M. asiatica*	*M. a. asiatica*	Resident
339.	Crimsonbreasted Barbet or Coppersmith	*M. haemacephala*	*M. h. indica*	Resident
340.	West Pakistan Orangerumped Honeyguide	*I. xanthonotus*	*I. x. radcliffi*	Resident
341.	European Wryneck	*J. torquilla*	*J. t. torquilla*	Winter visitor
342.	Kashmir Wryneck	*J. torquilla*	*J. t. himalayana*	Resident
343.	Northern Speckled Piculet	*P. innominatus*	*P. i. Innominatus*	Resident
344.	Transcaspian Scalybellied Green Woodpecker	*P. squamatus*	*P. s. flavirostris*	
345.	Himalayan Scalybellied Green Woodpecker	*P. squamatus*	*P. s. squamtus*	Resident
346.	Indian Blacknaped Green Woodpecker	*P. canus*	*P. c. sanguiniceps*	Resident
347.	Sind Goldenbacked Woodpecker	*D. benghalense*	*D. b. dilutum*	Resident
348.	Sind Pied Woodpecker	*P. assimilis*	*nil*	Resident
349.	Kashmir Pied Woodpecker	*P. himalayensis*	*P. h. alescens*	Resident
350.	West Himalayan Brownfronted Pied Woodpecker	*P. auriceps*	*P. a. auriceps*	Resident
351.	Indian Fulvous-breasted Pied Woodpecker	*P. macei*	*P. m. macei*	Resident
352.	Yellowfronted Pied or Mahratta Woodpecker	*P. mahrattensis*	*P. m. mahrattensis*	Resident
353.	West Himalayan Greycrowned Pygmy Woodpecker	*P. canicapillus*	*P. c. mitchellii*	Resident
354.	Northern Browncrowned Pygmy Woodpecker	*P. nanus*	*P. n. nanus*	Resident
355.	Singing Bush Lark	*M. javanica*	*M. j. cantillans*	Resident
356.	Sind Redwinged Bush Lark	*M. erythroptera*	*M. e. sindiana*	Resident
357.	Ashycrowned Finch-Lark	*E. grisea*	*nil*	Resident
358.	Blackcrowned Finch-Lark	*E. nigriceps*	*E. n. affinis*	Partly Migratory
359.	Indian Desert Finch-Lark	*A. deserti*	*A. d. phoenicuroides*	Said to be resident
360.	Persian Roufus-tailed Finch Lark	*A. phoenicurus*	*A. p. zarudnyi*	Uncertain
361.	Indian Roufus-tailed Finch Lark	*A. phoenicurus*	*A. p. phoenicurus*	Resident
362.	Large Desert Lark	*A. alaudipes*	*A. a. doriae*	Resident
363.	Yarkand Short-toed Lark	*C. cinerea*	*C. c. longipennis*	Winter visitor
364.	Karakoram or Hume's Short-toed Lark	*C. acutirostris*	*C. a. acutirostris*	Rare Winter visitor
365.	Tibet Short-toed Lark	*C. acutirostris*	*C. a. tibetana*	
366.	Persian Short-toed Lark	*C. rufescens*	*C. r. persica*	Winter visitor
367.	Indus Sand Lark	*C. rayatal*	*C. r. adamsi*	Resident
368.	Eastern Calandra Lark	*M. bimaculata*	*M. b. torquata*	Winter visitor
369.	Pamir Horned Lark	*E. alpestris*	*E. a. albigula*	Resident
370.	Longbilled Horned Lark	*E. alpestris*	*E. a. longirostris*	Resident
371.	Baluchistan Crested Lark	*G. cristata*	*G. c. magna*	Resident
372.	Indian Crested Lark	*G. cristata*	*G. c. chendoola*	Resident
373.	Gilgit Crested Lark	*G. cristata*	*G. c. lynesi*	Resident
374.	West Siberian Skylark	*A. arvensis*	*A. a. dulcivox*	Winter visitor
375.	Caucasian Skylark	*A. arvensis*	*A. a. cantarella*	Winter visitor
376.	Turkestan Small Skylark	*A. gulgula*	*A. g. inconspicua*	Resident
377.	Kashmir Small Skylark	*A. gulgula*	*A. g. lhamarum*	Resident
378.	Siberian Collared Sand Martin	*R. riparia*	*R. r. diluta*	Partly Migratory
379.	Indian Greythroated Martin	*R. paludicola*	*R. p. chinensis*	Resident
380.	Crag Martin	*H. rupestris*	*nil*	Resident
381.	Pale Crag Martin	*H. obsoleta*	*H. o. pallida*	Resident
382.	Western Swallow	*H. rustica*	*H. r. rustica*	Resident
383.	Indian Wiretailed Swallow	*H. smithii*	*H. s. filifera*	Summer Breeding visitor
384.	Indian Cliff Swallow	*H. fluvicola*	*nil*	Uncertain
385.	European Striated or Redrumped Swallow	*H. daurica*	*H. d. rufula*	Resident or Summer visitor
386.	Indian Striated or Redrumped Swallow	*H. daurica*	*H. d. erythropygia*	Resident
387.	European House Martin	*D. urbica*	*D. u. urbica*	Uncertain

388.	Kashmir House Martin	*D. urbica*	*D. u. cashmeriensis*	Partly Migratory
389.	Indian Grey Shrike	*L. excubator*	*L. e. lahtora*	Resident
390.	Baluchistan Grey Shrike	*L. excubator*	*L. e. pallidirostris*	Summer Breeding visitor
391.	Persian Grey Shrike	*L. excubator*	*L. e. aucheri*	Rare Winter visitor
392.	Turkestan Grey Shrike	*L. excubator*	*L. e. hemeyeri*	Vagrant
393.	Lesser Grey Shrike	*L. excubator*	*L. minor*	Uncertain
394.	Baluchistan Baybacked Shrike	*L. vittatus*	*L. v. nargianus*	Resident
395.	Indian Baybacked Shrike	*L. vittatus*	*L. v. vittatus*	Resident
396.	Rufousbacked Shrike	*L. schach*	*L. s. erythronotus*	Resident
397.	Redbacked Shrike	*L. collurio*	*L. c. collurio*	Autumn Passage migrant
398.	Rufous Shrike	*L. collurio*	*L. c. phoenicuroides*	Partly Autumn passage migrant ?
399.	Pale Brown Shrike	*L. collurio*	*L. c. isabellinus*	Winter visitor or passage migrant
400.	European Golden Oriole	*O. oriolus*	*O. o. oriolus*	Passage vagarant
401.	Indian Golden Oriole	*O. oriolus*	*O. o. kundoo*	Summer breeding visitor
402.	North Indian Black Drongo or King Crow	*D. adsimilis*	*D. a. adsimilis*	Resident
403.	Indian Grey Drongo	*D. leucophaeus*	*D. l. longicaudatus*	Resident
404.	Blackheaded or Brahminy Myna	*S. pagodarum*	*nil*	Resident
405.	Rosy Starling or Rosy Pastor	*S. roseus*	*nil*	Winter visitor
406.	Daurian Myna	*S. strunius*	*nil*	Straggler
407.	Finsch's or Common Indian Starling	*S. vulgaris*	*S. v. poltaratskyi*	Winter visitor Partly migrant
408.	Hume's or Afghan Starling	*S. vulgaris*	*S. v. nobilior*	Winter visitor
409.	Central Asian Starling	*S. vulgaris*	*S. v. porphyonotus*	Winter visitor
410.	Sind Starling	*S. vulgaris*	*S. v. minor*	Resident
411.	Kashmir Starling	*S. vulgaris*	*S. v. indicus*	Winter visitor
412.	Indian Myna	*A. tristis*	*A. t. tristis*	Resident
413.	Bank Myna	*A. ginginianus*	*nil*	Resident
414.	Northern Jungle Myna	*A. fuscus*	*A. f. fuscus*	Resident
415.	West Himalayan Redcrowned Jay	*G. glandarius*	*G. g. bispecularis*	Resident
416.	Black throated Jay	*G. lanceolatus*	*nil*	Resident
417.	Western Yellow-billed Blue Magpie	*C. flavirostris*	*C. c. cucullata*	Resident
418.	Kashmir or White-rumped Magpie	*P. pica*	*P. p. bactriana*	Resident
419.	Northwestern Tree Pie	*D. vagabunda*	*D. v. bristoli*	Resident
420.	West Himalayan Tree Pie	*D. formosae*	*D. f. occidentalis*	Resident
421.	Larger-Spotted Nut-cracker	*N. caryocatactes*	*N. c. multipunctata*	Resident
422.	Himalayan Yellow-billed or Alpine Chough	*P. graculus*	*P. g. digitatus*	Partly Migratory
423.	West Himalayan Red-billed Chough	*P. pyrrhocorax*	*P. p. centralis*	Resident
424.	Sind House Crow	*C. splendens*	*C. s. zugmayeri*	Resident
425.	Rook	*C. frugilegus*	*C. f. frugilegus*	Winter visitor Partly Migratory
426.	Jackdaw	*C. mondeula*	*C. m. mondeula*	Winter visitor Partly Migratory
427.	Himalayan Jungle Crow	*C. macrorhynchos*	*C. m. intermedius*	Resident
428.	Eastern Carrion Crow	*C. corone*	*C. c. orientalis*	Partly Winter visitor
429.	Eastern Hooded Crow	*C. corone*	*C. c. sharpii*	Winter visitor
430.	Punjab Raven	*C. corax*	*C. c. subcorax*	Winter visitor
431.	Brown-necked Raven	*C. corax*	*C. c.ruficollis*	Partly Winter visitor
432.	Waxwing	*B. garrulus*	*B. g. garrulus*	Erratic Winter Vagrant
433.	Grey Shrike-Bulbul	*H. ampelinus*	*nil*	Rare Vagrant
434.	Sind Wood Shrike	*T. pondicerianus*	*T. p. pallidus*	Resident
435.	Himalayan Large Cuckoo-Shrike	*C. novaehollandiae*	*C. n. nippalensis*	Resident
436.	Dark Grey Cuckoo-Shrike	*C. melaschistos*	*C. m. melachistos*	Partial Migrant
437.	Himalayan Blackheaded Cuckoo-Shrike	*C. melanoptera*	*C. m. melanoptera*	Resident
438.	North Indian Scarlet Minivet	*P. flammeus*	*P. f. speciosus*	Resident
439.	West Himalayan Longtailed Minivet	*P. ethologus*	*P. e. favillaceus*	Summer visitor ?
440.	Rosy Minivet	*P. roseus*	*P. r. roseus*	Partial Migrant
441.	Sind Small Minivet	*P. cinnamomenus*	*P. c. pallidus*	Resident
442.	Northwestern Iora	*A. tiphia*	*A. t. septentrionalis*	
443.	Marshall's Iora	*A. nigrolutea*	*nil*	Resident
444.	White-eared Bulbul	*P. leucogenys*	*P. l. leucot?s*	Resident
445.	Hume's White-eared Bulbul	*P. leucogenys*	*P. l. humii*	Resident
446.	Whitecheeked Bulbul	*P. leucogenys*	*P. l. leucogenys*	Resident
447.	Punjab Redvented Bulbul	*P. cafer*	*P. c. intermedius*	Resident
448.	Central Indian Redvented Bulbul	*P. cafer*	*P. c. humayuni*	Resident
449.	Himalayan Black Bulbul	*H. madagascariensis*	*H. m. psaroides*	Resident
450.	West Himalayan Rusty Cheeked Seimitar Babblar	*P. erythrogenys*	*P. e. erythrogenys*	Resident
451.	Blackchinned Babbler	*S. pyrrhos*	*nil*	Resident

452.	Western Yellow-eyed Babbler	*C. sinese*	*C. s. hypoleucum*	Resident
453.	Sind Babbler	*C. altirostre*	*C. a. scindicum*	Resident
454.	Bearded Tit-Babbler or Reeding	*P. biamicus*	*P. b. russicus*	Accidental Winter visitor
455.	Afghan Babbler	*T. caudatus*	*T. c. huttoni*	Resident
456.	Common Babbler	*T. caudatus*	*T. c. caudatus*	Resident
457.	Western Straited Babbler	*T. earlei*	*T. e. sonivius*	Resident
458.	Sind Jungle Babbler	*T. striatus*	*T. s. sindianus*	Resident
459.	Western Whitethroated Laughing Thrush	*G. albogularis*	*G. a. whistleri*	Resident
460.	Western Variegated Laughing Thrush	*G. variegatus*	*G. v. similis*	Resident
461.	Western Rofouschinned Laughing Thrush	*G. rufogularis*	*G. r. occidentalis*	Resident
462.	Baluchistan Streaked Laughing Thrush	*G. lineatus*	*G. l. bilkevitchi*	Resident
463.	Gilgit Streaked Laughing Thrush	*G. lineatus*	*G. l. gilgit*	Resident
464.	Simla Streaked Laughing Thrush	*G. lineatus*	*G. l. lineatus*	Resident
465.	Redheaded Laughing Thrush	*G. erythrocephalus*	*G. e. erythrocephalus*	Resident
466.	Redwinged Shrike Babbler	*P. flaviscapis*	*P. f. validirostris*	Resident
467.	Western Green Shrike Babbler	*P. xanthochlorus*	*P. x. occidentalis*	Resident
468.	Western Blackcapped Sibia	*H. capistrata*	*H. c. capistrata*	Resident
469.	Spotted Flycatcher	*M. straita*	*M. s. sarudnyi*	Mirgrant, summer visitor
470.	Kashmir Sooty Flycatcher	*M. sibirica*	*M. s. gulmergi*	Partial Migrant
471.	Rofoustailed Flycatcher	*M. ruficauda*	*nil*	Mirgrant, summer visitor
472.	Western Redbreasted Flycatcher	*M. parva*	*M. p. parva*	Migratory Winter visitor
473.	Whitebrowed Blue Flycatcher	*M. superciliaris*	*M. s. superciliaris*	Mirgrant, summer visitor
474.	Western Slaty Blue Flycatcher	*M. leucomelanura*	*M. l. leucomelanura*	Partial Migrant
475.	Western Roufousbellied Niltava	*M. sundara*	*M. s. whistleri*	Resident
476.	Verditor Flycatcher	*M. thalassina*	*M. t. thalassina*	Mirgrant, summer visitor
477.	Northern Greyheaded Flycatcher	*C. ceylonensis*	*C. c. calochrysea*	Resident or summer visitor
478.	Northern Whitethroated Fantail Flycatcher	*R. aureola*	*R. a. aureola*	Resident
479.	Western Whitethroated Fantail Flycatcher	*R. albicollis*	*R. a. canescens*	Resident
480.	West Himalayn Paradise Flycatcher	*T. paradisi*	*T. p. leucogaster*	Mirgrant, summer visitor
481.	Pale Strongfooted Bush Warbler	*C. fortipes*	*C. f. pallidus*	Migratory Winter visitor
482.	Cetti's Warbler	*C. cetti*	*C. c. albiventris*	Migratory Winter visitor
483.	Largebilled Warbler	*B. m.*	*B. m. major*	Migratory Winter visitor
484.	Mousetached Sedge Warbler	*L. melanopogan*	*L. m. mimica*	Party resident partly winter visitor
485.	Streaked Fantail Warbler	*C. juncidis*	*C. j. cursitans*	Partly Migratory
486.	Norhern Ashy-grey Wren Warbler	*P. hodgsonii*	*P. h. rufula*	Partly Migratory
487.	Rofousfronted Wren-Warbler	*P. buchanani*	*nil*	Resident
488.	Indian Streaked Wren-Warbler	*P. gracilis*	*P. g. lepida*	Resident
489.	Northwestern Plain-Wren-Warbler	*P. subflava*	*P. s. terricolor*	
490.	Sind Yellowbellied Wren-Warbler	*P. flaviventris*	*P. f. sindiana*	Resident
491.	Western Longtailed Grass Warbler	*P. burnesii*	*P. b. burnesii*	Resident
492.	Sind Brown Hill Warbler	*P. criniger*	*P. c. striatula*	Resident
493.	Himalayan Brown Hill Warbler	*P. criniger*	*P. c. criniger*	Resident
494.	Streaked Scrub Warbler	*S. inquieta*	*S. i. striata*	Resident
495.	Indian Tailor Bird	*O. sutorius*	*O. s. guzuratus*	
496.	Eastern Grasshopper Warbler	*L. naevia*	*L. n. straminea*	Migratory Winter visitor
497.	Bristled Grass Warbler	*C. striatus*	*nil*	Resident
498.	Straited Marsh Warbler	*M. palustris*	*M. p. toklao*	Resident
499.	Indian Great Reed Warbler	*A. stentoreus*	*A. s. brunnescens*	Winter visitor/Passage Migrant/Resident
500.	Asian Reed Warbler	*A. scirpaceus*	*fuscus*	Partly resident, partly winter visitor
501.	Blyth's Reed Warbler	*A. dumetorum*	*nil*	Winter visitor, passage migrant
502.	Indian Paddyfield Warbler	*A. agricola*	*A. a. agricola*	Winter visitor
503.	Northern Paddyfield Warbler	*A. agricola*	*A. a. capistrata*	Winter visitor
504.	Kashmir Bluntwinged Paddyfield Warbler	*A. concinens*	*A. c. haringtoni*	Summer (breeding) visitor
505.	Great Reed Warbler	*A. arundinaceus*	*A. a. zarudnyi*	Accidental
506.	Siberian Booted Tree Warbler	*H. caligata*	*H. c. caligata*	Winter visitor/Passage migrant
507.	Upcher's Tree Warbler	*H. languida*	*H. languida*	Summer (breeding) visitor
508.	Eastern Orphean Warbler	*S. hortensis*	*S. h. jerdoni*	Summer (breeding) visitor
509.	Indian Whitethroat	*S. communis*	*S. c. icterops*	Summer visitor
510.	Desert Warbler	*S. nana*	*S. n. nana*	Summer (breeding) visitor
511.	Siberian Lesser Whitethroat	*S. curruca*	*S. c. blythi*	Winter visitor
512.	Kirghiz Lesser Whitethroat	*S. curruca*	*S. c. halimodendri*	Winter visitor

513.	Small Whitethroat	*S. curruca*	*S. c. minula*	Winter visitor
514.	Hume's Lesser Whitethroat	*S. curruca*	*S. c. althaea*	Summer (breeding) visitor
515.	Barred Warbler	*S. nisoria*	*nil*	Rare Passage migrant
516.	Brown Chiffchaff	*P. collybita*	*P. c. tristis*	Winter visitor
517.	European Chiffchaff	*P. collybita*	*P. c. collybita*	Vagrant
518.	Sind Chiffchaff	*P. collybita*	*P. c. sindianus*	Summer (breeding) visitor
519.	Plain Leaf Warbler	*P. neglectus*	*nil*	Summer (breeding) visitor
520.	Tickell's Leaf Warbler	*P. affinis*	*P. a. affinis*	Summer (breeding) visitor
521.	Tytler's Leaf Warbler	*P. tytleri*	*nil*	Summer (breeding) visitor
522.	Olivaceous Leaf Warbler	*P. griseolus*	*nil*	Summer (breeding) visitor
523.	Hume's Yellowbrowed? Leaf Warbler	*P. inornatus*	*P. i. humei*	Summer (breeding) visitor
524.	Brook's Leaf Warbler	*P. subviridis*	*nil*	Summer (breeding) visitor
525.	Western Pallas's Leaf Warbler	*P. proregulus*	*P. p. simlaensis*	Migratory, Winter visitor
526.	Largebilled Leaf Warbler	*P. magnirostris*	*nil*	Summer (breeding) visitor
527.	Western Greenish Leaf Warbler	*P. trochiloides*	*P. t. viridanus*	Summer (breeding) visitor
528.	Baltistan Green Leaf Warbler	*P. trochiloides*	*P. t. ludlowi*	Summer (breeding) visitor
529.	Bright Green Leaf Warbler	*P. trochiloides*	*P. t. nitidus*	Winter visitor, passage migrant
530.	Large Crowned Leaf Warbler	*P. occipitalis*	*P. o. occipitalis*	Summer (breeding) visitor
531.	Small Crowned Leaf Warbler	*P. reguloides*	*P. r. kashmiriensis*	Resident
532.	Western Greyheaded Fly-catcher-Warbler	*S. xanthoschistos*	*S. x. albosuperciliaris*	Resident
533.	Himalayan Goldcrest	*R. regulus*	*R. r. himalayensis*	Resident
534.	Turkestan Tit-Warbler	*L. sophiae*	*L. s. sophiae*	Resident
535.	Roufous Chat	*E. galactotes*	*E. g. familiaris*	
536.	Persian Nightingle	*E. megahynchos*	*E. m. hafizi*	Rare visitor
537.	Northern Bluethroat	*E. svecicus*	*E. s. svecicus*	Winter visitor
538.	Turkestan Bluethroat	*E. svecicus*	*E. s. pallidogularis*	Winter visitor
539.	Ladakh Bluethroat	*E. svecicus*	*E. s. abbotti*	Summer (breeding) visitor
540.	West Himalayan Ruby-throat	*E. pectoralis*	*E. p. pectoralis*	Summer (breeding) visitor
541.	Indian Blue Chat	*E. brunneus*	*nil*	Summer (breeding) visitor
542.	Kashmir Redflanked Bush Robin	*E. cyanurus*	*E. c. pallidior*	Mirgratory, Winter visitor
543.	Western Golden Bush Robin	*E. chrysaeus*	*E. c. whistleri*	Mirgratory, Winter visitor
544.	Indian Magpie-Robin	*C. sualaris*	*C. s. saularis*	Resident
545.	Eversmann's Redstart	*P. erythronotus*	*nil*	Winter visitor
546.	Blueheaded Redstart	*P. caeruleocephalus*	*nil*	Winter visitor
547.	Kashmir Black Redstart	*P. ochruros*	*P. o. phoenicuroides*	Summer (breeding) visitor
548.	Whitefronted Redstart	*P. phoenicurus*	*P. p. phoenicurus*	Passage Migrant
549.	Bluefronted Redstart	*P. frontalis*	*nil*	Winter visitor
550.	Guldenstadt's Redstart	*P. erythrogaster*	*P. e. grandis*	Resident
551.	Plumbeous Redstart	*R. fuliginosus*	*R. f. fuliginosus*	Resident
552.	Hodgson's Shortwing or White Bellied Redstart	*H. phoencicuroides*	*H. p. phoenicuroides*	Summer (breeding) visitor
553.	Little Forktail	*E. scouleri*	*E. s. scouleri*	Resident
554.	Western Spotted Forktail	*E. maculatus*	*E. m. maculatus*	Resident
555.	Brown Rock Chat	*C. fusca*	*nil*	Resident
556.	Stoliczka's Bush Chat	*S. macrorhyncha*	*nil*	Resident
557.	West Siberian Collared Bush Chat	*S. torquata*	*S. t. maura*	Partly resident, partly winter visitor
558.	Indian Collared Bush Chat	*S. torquata*	*S. t. indica*	Summer (breeding) visitor
559.	Whitetailed Bush Chat	*S. leucura*	*nil*	Resident
560.	Northern Pied Bush Chat	*S. caprata*	*S. c. bicolor*	Summer (breeding) visitor
561.	Dark-grey Bush Chat	*S. ferrea*	*nil*	Resident
562.	Isabelline Chat	*O. isabellina*	*nil*	Partly resident, partly winter visitor
563.	Redtailed Chat	*O. xanthoprymna*	*O. x. kingki*	Winter visitor
564.	Wheatear	*O. oenanthe*	*O. o. oenanthe*	Straggler
565.	Barnes's Chat	*O. finschii*	*O. f. barnesi*	Partly resident, partly winter visitor
566.	Pied Chat	*O. picata*	*nil*	Partly resident, partly winter visitor
567.	Tibetan Desert Wheatear	*O. deserti*	*O. d. oreophilla*	Summer visitor / Winter visitor
568.	Central Asian Desert Wheatear	*O. deserti*	*O. d. deserti*	Winter visitor
569.	Hooded Chat	*O. monacha*	*nil*	Winter visitor
570.	Hume's Chat	*O. alboniger*	*nil*	Resident
571.	Pleschanka's Chat	*O. pleschanka*	*O. p. pleschanka*	Summer (breeding) visitor
572.	Whitecapped Redstart or River Chat	*C. leucocephalus*	*nil*	Partial Migrant
573.	Brownbacked Indian Robin	*S. fulicata*	*S. f. cambaiensis*	Resident
574.	Rock Thrush	*M. saxatilis*	*nil*	Autumn passage migrant
575.	Blueheaded Rock Thrush	*M. cinclorhynchus*	*nil*	Summer (breeding) visitor
576.	Chestnutbellied Rock Thrush	*M. rufiventris*	*nil*	Resident

577.	Iranian Blue Rock Thrush	*M. solitarius*	*M. s. longirostris*	Winter visitor
578.	Indian Blue Rock Thrush	*M. solitarius*	*M. s. pandoo*	Summer (breeding) visitor
579.	Himalayan Whistling Thrush	*M. caeruleus*	*M. c. temminckii*	Resident
580.	Orangeheaded Ground Thrush	*Z. citrina*	*Z. c. citrina*	Partial Migrant
581.	Western Plainbacked Mountain Thrush	*Z. mollissima*	*Z. m. whiteheadi*	Partial Migrant
582.	Smallbilled Mountain Thrush	*Z. dauma*	*Z. d. dauma*	Partial Migrant
583.	Tickell's Thrush	*T. unicolor*	*nil*	Summer (breeding) visitor
584.	Greywinged Blackbird	*T. boulboul*	*nil*	Resident
585.	Turkestan Blackbird	*T. merula*	*T. m. intermedius*	Rare winter visitor
586.	Tibetan Blackbird	*T. merula*	*T. m. maximus*	Partly migratory
587.	Western Greyheaded Thrush	*T. rubrocanus*	*T. r. rubrocanus*	Resident
588.	Dusky Thrush	*T. naumanni*	*T. n. eunomus*	Winter visitor
589.	Redwing	*T. iliacus*	*nil*	Winter visitor
590.	Missel Thrush	*T. viscivorus*	*T. v. bonapartei*	Resident
591.	Blackthroated Thrush	*T. ruficollis*	*T. r. atrogularis*	Partly resident, partly winter visitor
592.	Redthroated Thrush	*T. ruficollis*	*T. r. ruficollis*	Winter visitor
593.	Kashmir Wren	*T. troglodytes*	*T. t. neglectus*	Resident
594.	Magrath's Wren		*T. t. magrathi*	Resident
595.	Whitebreasted Dipper	*C. cinclus*	*C. c. cashmeriensis*	Resident
596.	Whitebellied Dipper	*C. cinclus*	*C. c. leucogaster*	Straggler
597.	West Himalayan Brown Dipper	*C. pallasii*	*C. p. tenuirostris*	Resident
598.		*PRUNELLIDAE*		
599.	Turkestan Alpine Accentor	*P. collaris*	*P. c. rufilata*	Resident
600.	Robin Accentor	*P. rubeculoides*	*nil*	Resident
601.	Altai Accentor	*P. himalayana*	*nil*	Winter visitor
602.	Western Rofousbreasted Accentor	*P. strophiata*	*P. s. jerdoni*	Resident
603.	Turkestan Alpine Accentor	*P. fulvescens*	*P. f. fulvescens*	
604.	Radde's Accentor	*P. fulvescens*	*P. f. ocularis*	Accidental
605.	Turkestan Blackthroated Accentor	*P. atrogularis*	*P. a. huttoni*	Winter visitor
606.	Ural Blackthroated Accentor	*P. atrogularis*	*P. a. atrogularis*	Rare winter visitor
607.	Baluchistan Grey Tit	*P. major*	*P. m. ziaratensis*	Resident
608.	Afghanistan Grey Tit	*P. major*	*P. m. decolorans*	Resident
609.	Kashmir Grey Tit	*P. major*	*P. m. cashmirensis*	Resident
610.	Greenbacked Tit	*P. monticolus*	*P. m. monticolus*	Resident
611.	Yellowbreasted Blue Tit	*P. cyanus*	*P. c. flavipectus*	Straggler
612.	Tien Shan Blue Tit	*P. cyanus*	*P. c. Tianchanicus*	Vagrant
613.	Crested Black Tit	*P. cyanus*	*P. melanolophus*	Resident
614.	Simla Black Tit	*P. rubidiventris*	*P. r. rufonuchalis*	Resident
615.	Northern Yellow-cheeked Tit	*P. xanthogenys*	*P. x. xanthogenys*	Resident
616.	Western firecapped Tit	*C. flammiceps*	*C. f. flammiceps*	Summer (breeding) visitor
617.	Penduline Tit	*R. pendulinus*	*R. p. coronatus*	Winter visitor
618.	Whitecheeked Tit	*A. leucogenys*	*nil*	Resident
619.	Whitethroated Tit	*A. niveogularis*	*nil*	Resident
620.	Kashmir Nuthatch	*S. europaea*	*S. e. cashmirensis*	Resident
621.	Western White-cheeked Nuthatch	*S. leucopsis*	*S. l. leucopsis*	Resident
622.	Eastern Rock Nuthatch	*S. tephronota*	*S. t. tephronota*	Resident
623.	Wall creeper	*T. muraria*	*T. m. nepalensis*	Resident
624.	Kashmir Tree Creeper	*C. familiaris*	*C. f. hodgsoni*	Resident
625.	West Himalayan Tree Creeper	*C. himalayana*	*C. h. limes*	Partial migrant
626.	European Tree Pipit	*A. trivialis*	*A. t. trivialis*	Winter visitor
627.	Witherby's Tree Pipit	*A. trivialis*	*A. t. haringtoni*	Summer (breeding) visitor
628.	Meadow Pipit	*A. pratensis*	*nil*	Rare winter visitor
629.	Richard's Pipit	*A. novaeseelandiae*	*A. n. richardi*	Erratic winter vagrant
630.	Nothwestern Paddyfield Pipit	*A. novaeseelandiae*	*A. n. waiti*	Resident
631.	Tawny Pipit	*A. campestris*	*A. c. campestris*	Winter visitor
632.	Redthroated Pipit	*A. cervinus*	*nil*	Rare passage migrant
633.	Vinaceous breasted Pipit	*A. roseatus*	*nil*	Summer (breeding) visitor
634.	Persian Rock Pipit	*A. similis*	*A. s. decaptus*	Summer (breeding) visitor
635.	Brown Rock Pipit	*A. similis*	*A. s. jerdoni*	Summer (breeding) visitor & Partly resident
636.	Central Asian Water Pipit	*A. spinoletta*	*A. s. coutellii*	Winter visitor
637.	Japanese Water Pipit	*A. spinoletta*	*A. s. japonicus*	Winter visitor
638.	Upland Pipit	*A. sylvanus*	*nil*	Resident
639.	Greyheaded Yellow Wagtail	*M. flava*	*M. f. thumbergi*	Winter visitor
640.	Blueheaded Yellow Wagtail	*M. flava*	*M. f. beema*	Winter visitor
641.	Turkestan Blackheaded Wagtail	*M. flava*	*M. f. melanogrisea*	Winter visitor
642.	Whiteheaded Yellow Wagtail	*M. flava*	*M. f. leucocephala*	Winter visitor and Partly Passage migrant
643.	Northern Yellowheaded Wagtail	*M. citreola*	*M. c. citreola*	Winter vistor
644.	Western Yellowheaded Wagtail	*M. citreola*	*M. c. werae*	Winter visitor

645.	Blackbacked Yellowheaded Wagtail	*M. citreola*	*M. c. calcarata*	Summer (breeding) visitor
646.	Grey Wagtail	*M. caspica*	*M. c. caspica*	Summer (breeding) visitor
647.	Indian White Wagtail	*M. caspica*	*M. a. dukhunensis*	Winter visitor
648.	Masked Wagtail	*M. caspica*	*M. a. personata*	Summer (breeding) visitor partial migrant
649.	Hodgeson's Pied Wagtail	*M. caspica*	*M. a. alboides*	Summer (breeding) visitor
650.	Large Pied Wagtail	*M. maderaspatensis*	*nil*	Resident
651.	Indian Thickbilled Flower-pecker	*D. agile*	*D. a. agile*	Resident
652.	Sind Purple Sunbird	*N. asiatica*	*N. a. asiatica*	Partial migrant
653.	Indian White-eyes	*Z. palpebrosa*	*Z. p. palpebrosa*	Resident
654.	Indian House Sparrow	*P. domesticus*	*P. d. indicus*	Resident
655.	Kashmir House Sparrow	*P. domesticus*	*P. d. parkini*	Partly migratory
656.	Turkestan House Sparrow	*P. domesticus*	*P. d. bactrianus*	Winter visitor
657.	Spanish Sparrow	*P. hispaniolensis*	*P. h. transcaspicus*	Winter visitor passage migrant
658.	Afghan Tree Sparrow	*P. montanus*	*P. m. dilutus*	Resident
659.	Sind Jungle Sparrow	*P. pyrrhontus*	*nil*	Resident
660.	Himalayan Cinnamon Tree Sparrow	*P. rutilans*	*P. r. cinnamomeus*	Resident
661.	Afghan Scrub Sparrow	*P. moabiticus*	*P. m. yatii*	Winter visitor
662.	Sind Yellow Throated Sparrow	*P. xanthocollis*	*P. x. transfuga*	Resident
663.	Rock Sparrow	*P. petronia*	*P. p. intermedia*	Winter visitor
664.	Indian Baya	*P. philippinus*	*P. p. philippinus*	Resident
665.	Blackthroated Weaver Bird	*P. benghalensis*	*nil*	Resident
666.	Indian Streaked Weaver Bird	*P. mayor*	*P. m. flaviceps*	Resident
667.	Red Munia or Avadavat	*E. amandava*	*E. a. amandava*	Resident
668.	Whitethroated Munia	*L. malabarica*	*L. m. malabarica*	Resident
669.	Hawfinch	*C. coccothraustes*	*C. c. humii*	Winter visitor
670.	Black and Yellow Grosbeak	*M. icteriodes*	*nil*	Residnet
671.	Allied Grosbeak	*M. affinis*	*nil*	Residnet
672.	Persian Whitewinged Grosbeak	*M. carnipes*	*M. c. speculigerus*	Residnet
673.	Himalayan Whitewinged Grosbeak	*M. carnipes*	*M. c. carnipes*	Residnet
674.	Spotted Grosbeak	*M. melanozanthos*	*nil*	Resident
675.	Siberian Goldfinch	*C. cardeulis*	*C. c. major*	Rare winter visitor
676.	Central Asian Goldfinch	*C. cardeulis*	*C. c. subulata*	Rare visitor
677.	Greyhaeded Goldfinch	*C. cardeulis*	*C. c. caniceps*	Resident
678.	Himalayan Greenfinch	*C. spinoides*	*C. s. spinoides*	Summer breeding visitor
679.	Eastern Linnet	*A. cannabina*	*A. c. bella*	Winter visitor
680.	Stoliczka's Twite	*A. flavirostris*	*A. f. montanella*	Resident
681.	Redbrowed Finch	*C. burtoni*	*nil*	Resident
682.	Goldfronted Finch	*S. pusillua*	*nil*	Resident
683.	Western Plaincoloured Mountain Finch	*L. nemoricola*	*L. n. altaica*	Resident
684.	Brandt's Mountain Finch	*L. brandti*	*L. b. brandti*	Straggler
685.	Pamirs Mountain Finch	*L. brandti*	*L. b. pamerensis*	Winter visitor
686.	Himalayan Mountain Finch	*L. brandti*	*L. b. haematopygia*	Resident
687.	Trumpeter Bullfinch	*R. githaginea*	*R. g. crassirostris*	Resident
688.	Monolian Desert Finch	*R. mongolica*	*nil*	Winter visitor
689.	Lichtenstein's Desert Finch	*R. obsoleta*	*nil*	Resident
690.	Crimsonwinged Desert Finch	*R. sanguinea*	*R. s. sanguinea*	Uncertain
691.	Turkestan Rosefinch	*C. erythrinus*	*C. e. ferghanensis*	Summer breeding visitor
692.	Pinkbrowed Rosefinch	*C. rhodochorus*	*nil*	Resident
693.	Redmantled Rosefinch	*C. rhodochlyms*	*C. r. grandis*	Resident
694.	Kashmir Whitebrowed Rasefinch	*C. thura*	*C. t. blythi*	Resident
695.	Great Rosefinch	*C. rubicillasevertzovi*	*nil*	Resident
696.	Western Redbreasted Rosefinch	*C. puniceus*	*C. p. humii*	Resident
697.	Orange Bullfinch	*P. aurantiaca*	*nil*	Resident
698.	Chaffinch	*F. coelebs*	*F. c. coelebs*	Rare winter visitor
699.	Brambling	*F. montifringilla*	*nil*	Winter visitor, passage migrant
700.	Corn Bunting	*E. calandra*	*nil*	Winter vagrant
701.	Pine Bunting	*E. leucocephala*	*E. l. leucocephala*	Winter visitor
702.	Blackheaded Bunting	*E. melanocephala*	*nil*	Winter visitor
703.	Redheaded Bunting	*E. bruniceps*	*nil*	Partly resident, partly winter visitor
704.	Chestnut Bunting	*E. rutila*	*nil*	Rare winter visitor
705.	Whitecapped Bunting	*E. stewarti*	*nil*	Summer breeding visitor
706.	Ortolan Bunting	*E. hortulana*	*nil*	Vagrant
707.	Greynecked Bunting	*E. buchanani*	*E. b. buchanani*	Rare summer breeding visitor
708.	Transcaspian Rock Bunting	*E. cia par*	*nil*	Summer breeding visitor
709.	Himalayan Rock Bunting	*E. cia par*	*E. c. stracheyi*	Resident
710.	Indian Greyheaded Bunting	*E. fucata*	*E. f. arcuata*	Resident

711.	Striolated Bunting	*E. striolata*	*E. s. striolata*	Resident
712.	Central Asian Reed Bunting	*E. schoeniclus*	*E. s. pallidior*	Winter visitor
713.	Yellowbreasted Bunting	*E. aureola*	*E. a. aureola*	Rare winter visitor
714.	Crested Bunting	*M. lathami*	*nil*	Resident

Annexure-8: Reptiles of Pakistan

#	Common name	Scientific name	Conservation Status
	Pond and River Turtles		
1.	Spotted Mud Turtle	*Geoclemys hamiltonii*	Vulnerable
2.	Crowned River Turtle	*Hardella thurjii*	Vulnerable
3.	Brown River turtle	*Kachuga smithii*	Low risk
4.	Sawback Turtle	*Kachuga tecta tecta*	Not evaluated
	Tortoise		
5	Afghan Tortoise	*Testudo horsfieldii*	Vulnerable
6	Sindh Star Tortoise	*Geochelone elegans*	Not evaluated
	Marine Turtle		
7.	Green turtle	*Chelonia mydas japonica*	Endangered
8	Hawksbill	*Eretmochelys imbricate bissa*	Critically endangered
9	Olive Ridley turtle	*Lepidochelys olivacea olivacea*	Endangered
10	Loggerhead turtle	*Caretta caretta gigas*	Endangered
11	Leatherback	*Dermochelys coriascea*	Critically endangered
	Softshell Turtles		
12	Narrow-headed Softshell	*Chitra indica*	Endangered
13	Indian Soft-shell	*Aspideretes gangeticus*	Vulnerable
14	Peacock softshell	*Aspideretes hurum*	Vulnerable
15	Indian Flapshell	*Lissemys punctata andersoni*	Not evaluated
	Crocodile		
16	Mugger	*Crocodylus palustris palustris*	Vulnerable
	Eyelid and lidless Geckos		
17	Nikolsky Spider Gecko	*Cyrtopodium agomuroides*	Not evaluated
18	Sharp-tailed Spider Gecko	*Rhinogecko femoralis*	Not evaluated
19.	Blunt-tailed Spider gecko	*Agamura persica*	Not evaluated
20.	Baloch Rock Gecko	*Alsophylax tuberculatus*	Not evaluated
21.	Fat-tailed Gecko	*Eublepharis macularis*	Not evaluated
22.	Swat Stone Gecko	*Cyrtodactylus walli*	Not evaluated
23	Warty Rock Gecko	*Cyrtodactylus kachhensis kachhensis*	Not evaluated
24.	Quetta Rock Gecko	*Cyrtodactylus kachhensis watsoni*	Not evaluated
25.	Ingoldby's Stone Gecko	*Cyrtodactylus kachhensis ingoldbyi*	Not evaluated
26.	Salt Range Rock Gecko	*Cyrtodactylus montiumsalsorum*	Not evaluated
27.	Keeled Rock Gecko	*Cyrtodactylus scaber*	Not evaluated
28.	Minton's Gecko	*Cyrtodactylus mintoni*	Not evaluated
29.	Hazara Gecko	*Cyrtodactylus dattanensis*	Not evaluated
30.	Persian pygmy Gecko	*Tropiocolotes persica*	Not evaluated
31.	Pygmy Flat Gecko	*Tropiocolotes depressus*	Not evaluated
32	Spotted Indian house Gecko	*Hemidactylus brookii brookii*	Not evaluated
33	Yellow-nellied House Gecko	*Hemidactylus flavivirdis*	Not evaluated
34	South Asian Waif Gecko	*Hemidactylus frenatus*	Not evaluated
35	Bark Gecko	*Hemidactylus leschenaultia*	Not evaluated
36	Persian Gecko	*Hemidactylus persicus*	Not evaluated
37	Bloched Gecko	*Hemidactylus triedrus triedrus*	Not evaluated
38	Mediterranean Gecko	*Hemidactylus turcicus turcicus*	Not evaluated
39.	Fan Toe-tip Gecko	*Ptyodactylus homolepis*	Not evaluated
40.	Balochistan Sand Gecko	*Crossobamon lumsdenii*	Not evaluated
41.	Whip-tailed Sand Gecko	*Crossobamon maynardi*	Not evaluated
42.	Sindh Sand Gecko	*Crossobamon orientalis*	Not evaluated
43.	Batura thin-toed Gecko	*Tenuidactylus baturensis*	Not evaluated
44.	Fort Munro Gecko	*Tenuidactylus fortmunroi*	Not evaluated
45.	Soan Sakaser Gecko	*Tenuidactylus indusoani*	Not evaluated
46.	Red tailed Gecko	*Tenuidactylus rhodocaudus*	Not evaluated
47.	Rohtas Fort Gecko	*Tenuidactylus rohtasfortai*	Not evaluated
48.	Sindh Ground Gecko	*Teratolepis fasciata*	Not evaluated
49.	Baluch Plate-tailed Gecko	*Teratoscincus microlepis*	Not evaluated
50.	Turkestan Plate-tailed Gecko	*Teratoscincus scincus*	Not evaluated
	Agama		
53.	Kumaon Agama	*Japalura kumaonensis*	Not evaluated
54.	Agror Valley Agama	*Laudakia agrorensis*	Not evaluated

#	Common name	Scientific name	Conservation Status
55.	Caucasian Rock Agama	*Laudakia caucasicus*	Not evaluated
56.	Badkshan Agama	*Laudakia badakhshana*	Not evaluated
57.	Himalayan Rock Agama	*Laudakia himalayanus himalyanus*	Not evaluated
58.	Black Rock Agama	*Laudakia melanurus*	Not evaluated
59.	Yellow-headed Black	*Laudakia nuptus liratus*	Not evaluated
60.		*Laudakia melanurus melanurus*	Not evaluated
61.	Large scaled Agama	*Laudakia nuptus nuptus*	Not evaluated
62.	Yellow headed Agama	*Laudakia nuptus fusca*	Not evaluated
63.	Kashmir Rock Agama	*Laudakia tuberculatus*	Not evaluated
64.	Briliant Agama	*Trapelus agilus agilus*	Not evaluated
65.	Spotted Ground Agama	*Trapelus ruderatua*	Not evaluated
66.	Red throated Ground	*Trapelus rubrigularis*	Not evaluated
67.	Common Ground Agama	*Trapelus ruderata baluchiana*	Not evaluated
68.	Small tail Ground Agama	*Brachysaura minor*	Not evaluated
69.	Changeable Lizard	*Calotes versicolor*	Not evaluated
70.	Northern Forest Lizard	*Calotes versicolor farooqi*	Not evaluated
71.	Clark's Toad-headed Agama	*Phrynocephalus clarkorum*	Not evaluated
72.	Beautiful Toad-head Agama	*Phrynocephalus euptilopus*	Not evaluated
73.	Speckled Toad-headed Agama	*Phrynocephalus luteoguttatus*	Not evaluated
74.	Black-tailed Toad Agama	*Phrynocephalus maculates maculatus*	Not evaluated
75.	Ornate Toaded-headed Agma	*Phrynocephalus ornatus*	Not evaluated
76.	Grey Toad-headed Agama	*Phrynocephalus scutellatus*	Not evaluated
	Spinytail Lizard		
77.	Baloch Spiny-tailed Lizard	*Urommastyx asmusi*	Not evaluated
78.	Common Spiny-tailed	*Urommastyx hardwickii*	Not evaluated
	Chameleons		
79.	Ceylon Chameleon	*Chamaeleo chamaeleo zeylanicus*	Not evaluated
	Sand Lizards		
80.	Indian Fringe-toed sand Lizard	*Acenthodactylus cantoris cantoris*	Not evaluated
81.	Mekran Fringe-toed Sand Lizard	*Acenthodactylus cantoris blanfordi*	Not evaluated
82.	Yellow-tailed Sand Lizard	*Acenthodactylus micropholis*	Not evaluated
	Lacerta		
83.	Recticulate Desert Lacerta	*Eremias acutirostris*	Not evaluated
84.	Chagai Desert Lacerta	*Eremias aporosceles*	Not evaluated
85.	Short-nosed Desert Lacerta	*Eremias brevirostris*	Not evaluated
86.	Yellow-headed desert	*Eremias faciata*	Not evaluated
87.	Long-tailed Desert Lacerta	*Eremias guttulata watsonana*	Not evaluated
88.	Caspian desert Lacerta	*Eremias scripta*	Not evaluated
89.	Persian Steppe Lacerta	*Eremias velox persica*	Not evaluated
90.	Elegant Snake-eyed Lacerta	*Ophisops elegans elegans*	Not evaluated
91.	Punjab Snake-eyed Lacerta	*Ophisops jerdonii*	Not evaluated
92.	Blanford Snake-eyed Lacerta	*Ophisops blanfordi*	Not evaluated
93.	Indian Snake-eyed Lacerta	*Ophisops microlepis*	Not evaluated
	Skinks		
94.	Earless Dwarf Skink	*Ablepharus grayanus*	Not evaluated
95.	Easterm Dwarf Snake	*Ablepharus pannonianus*	Not evaluated
96.	Oceelated Skink	*Chalcides ocellatus ocellatus*	Not evaluated
97.	Orange-tailed Skink	*Eumeces schneiderii blythianus*	Not evaluated
98.	Zarudny's Skink	*Eumeces schneiderii zarudnyi*	Not evaluated
99.	Yellow-bellied mole skink	*Eumeces taeniolatus*	Not evaluated
100.	Thal Skink	*Eumeces indothalensis*	Not evaluated
101.	Himalayan Ground Skink	*Leiolopisma himalayana*	Not evaluated
102.	Glacier Skink	*Leiolopisma ladacensis*	Not evaluated
103.	Striped Grass Skink	*Mabuya dissimilis*	Not evaluated
104.	Bronze Grass Skink	*Mabuya macularia*	Not evaluated
105.	Many Keeled Grass Skink	*Mabuya carinata*	Not evaluated

#	Common name	Scientific name	Conservation Status
106.	Mekran sand Swimmer	*Ophiomorus blanfordi*	Not evaluated
107.	Short-toed Sand Swimmer	*Ophiomorus blanfordi*	Not evaluated
108.	Indus Sand Swimmer	*Ophiomorus raithmai*	Not evaluated
109.	Afghan sand Swimmer	*Ophiomorus tridactylus*	Not evaluated
110.	Dotted garden Skink	*Riopa punctata*	Not evaluated
	Monitor Lizards		
111.	Yellow Monitor	*Varanus flavescens*	Not evaluated
112.	Indian Monitor	*Varanus bengalensis*	Not evaluated
113.	Transcaspian Desert Monitor	*Varanus griseus caspius*	Not evaluated
114.	Pakistan Desert Monitor	*Varanus griseus konieczsyi*	Not evaluated
	Blind Snakes		
115.	Brahminy Blind snake	*Typhlops braminus*	Not evaluated
116	Ahsan's Blind Snake	*Typhlops ahsanai*	Not evaluated
117.	Thick Blind Snake	*Typhlops diardi platyventris*	Not evaluated
118	Slender Pakistani Blind Snake	*Typhlops ductuliformes*	Not evaluated
119.	Madge's Blind Snake	*Typhlops m. madgemintonai*	Not evaluated
120.	Sherman's Blind Snake	*Typhlops m. shermanai*	Not evaluated
	Thread Snakes		
121	Sindh Thread Snake	*Leptotyphlops blandfordii*	Not evaluated
122	Beaked Thread Snake	*Leptotyphlops macrorhynchus*	Not evaluated
	Boas		
123	Russell's Sand Boa	*Eryx conicus*	Not evaluated
124	Indian Sand Boa	*Eryx johnii johnii*	Not evaluated
125	Tartary Sand Boa	*Eryx tataricus speciosus*	Not evaluated
	Pythons		
126	Indian Python	*Python molurus molurus*	Near threatened
	Colubrids		
127	Indian Gamma Snake	*Boiga trigonata trigonata*	Not evaluated
128	Dark-headed Gamma	*Boiga trigonata melanocephala*	Not evaluated
	Snake		
129	Banded Racer	*Coluber faciolatus*	Not evaluated
130	Spotted Desert Racer	*Coluber karelini karelini*	Not evaluated
131	Minton's Snake	*Coluber karelini mintonorum*	Not evaluated
132	Mountain Racer	*Coluber ravergeiri ravergeiri*	Not evaluated
133	Cliff Racer	*Coluber rhodorachis rhodorachis*	Not evaluated
134.	Red Cliff Racer	*Coluber rhodorachis ladacensis*	Not evaluated
135	Kashmir Cliff Racer	*Coluber rhodorachis* kasmirensis	Not evaluated
136	Plain's Racer	Coluber v. ventromaculatus	Not evaluated
137.	Bengal Plain's Racer	Coluber ventromaculatus bengalensis	Not evaluated
138	Indus Plain's Racer	Coluber ventromaculatus indusai	Not evaluated
139	Dark-neck Dwarf Racer	Pseudocyclophis persica	Not evaluated
140	Sindh lake Snake	Enhydris pakistanica	Not evaluated
141	Common Wolf Snake	Lycodon aulicus aulicus	Not evaluated
142	Northern Wolf Snake	Lycodon striatus striatus	Not evaluated
143	Golden Spotted Wolf	Lycodon striatus	Not evaluated
144	Travancore Wolf Snake	Lycodon travancore	Not evaluated
145	Maynard's Awl-headed	Lytorhynchus maynardi	Not evaluated
146	Sindh Awl-headed Snake	Lytorhynchus maynardi	Not evaluated
147	Afghan Awl-headed Snake	Lytorhynchus ridgewayi	Not evaluated
148.	Flat-headed Keelback	Amphiesma platyceps	Not evaluated
149	Siebold's Snake	Amphiesma sielboldii	Not evaluated
150	Striped Keelback	Amphiesma stolata stolata	Not evaluated
151	Tessellated Water Snake	Natrix tessellata tessellata	Not evaluated
152.	Dark-bellied marsh snake	Xenochrophis cerasogaster	Not evaluated
153.	Johan's water snake	Xenochrophis sanctijohannis	Not evaluated
154	Checkered Keelback	Xenochrophis piscator piscator	Not evaluated
155.	Russet Kukri Snake	Oligodon arnensis	Not evaluated

#	Common name	Scientific name	Conservation Status
156	Streaked Kukri Snake	*Oligodon taeniolatus*	Not evaluated
157	Indian Sand Snake	*Psammophis condanarus*	Not evaluated
157	Indian Sand Snake	*Psammophis condanarus condanarus*	Not evaluated
158	Pakistan Ribbon Snake	*Psammophis leithii*	Not evaluated
159	Steppe Ribbon Snake	*Psammophis lineolatus*	Not evaluated
160	Afro-asian Sand Snake	*Psammophis schokari*	Not evaluated
161	Dhaman	*Ptyas mucosus*	Not evaluated
162	Golden head Snake	*Sibynophis sagittarius*	Not evaluated
163	Red-spotted Diadem Snake	*Spalerosophis arenarius*	Not evaluated
164	Eastern Diadem Snake	*Spalerosophis diadema diadema*	Not evaluated
165	Persian Diadem Snake	*Spalerosophis diadema schirazianus*	Not evaluated
166	Indian Desert Cat Snake	*Telescopus rhinopoma*	Not evaluated
	Kraits and Cobras		
167	Krait	*Bungarus caeruleus*	Not evaluated
168	Sindh Krait	*Bungarus s. sindanus*	Not evaluated
169	Northern Punjab Krait	*Bungarus sindanus razai*	Not evaluated
170	Indian Cobra	*Naja naja naja*	Not evaluated
171	Oxus Cobra	*Naja naja oxiana*	Not evaluated
	Sea Snakes		
172	Stoke's Sea Snake	*Astrotia stokesii*	Not evaluated
173	Beaked Sea snake	*Enhydrina schistose*	Not evaluated
174	Many-toothed Sea Snake	*Hydrophis caerulescens caerulescens*	Not evaluated
175	Annulated Sea Snake	*Hydrophis cyanocinctus*	Not evaluated
176	Spotted Sea Snake	*Hydrophis fasciatus fasciatus*	Not evaluated
177	Persian Gulf Sea Snake	*Hydrophis lapemoides*	Not evaluated
178	Bombay Sea Snake	*Hydrophis mamillaris*	Not evaluated
179	Ornate Sea Snake	*Hydrophis ornatus ornatus*	Not evaluated
180	Yellow Sea Snake	*Hydrophis spiralis*	Not evaluated
181	Short Sea Snake	*Lapemis curtus*	Not evaluated
182	Cantor's Small-headed Sea Snake	*Microcephalophis cantoris*	Not evaluated
183	Common Small-headed	*Microcephalophis gracilis*	Not evaluated
184	Pelagic Sea Snake	*Pelamis platurus*	Not evaluated
185	Viperine Sea Snake	*Praescutata viperina*	Not evaluated
	Vipers and Pit Vipers		
186	Saw-scaled Viper	*Echis carinatus pyramidum*	Not evaluated
187	Eastern Saw-scaled Viper	*Echis carinatus sochureki*	Not evaluated
188	Transcaspian Saw-scaled Viper	*Echis carinatus multisquamatus*	Not evaluated
189	Astola Saw-scaled Viper	*Echis carinatus astolae*	Not evaluated
190	Leaf-nosed Viper	*Eristicophis macmahonii*	Not evaluated
191	Persian Horned Viper	*Pseudocerastes persicus persicus*	Not evaluated
192	Levantine Viper	*Macrovipera labetina obtuse*	Not evaluated
193	Russell's Viper	*Daboia russelii russelii*	Not evaluated
194	Himalayan Pit Viper	*Gloydius himalayanus*	Not evaluated

Annexure 9: Amphibians of Pakistan

#	Common name	Scientific name
Family : BUFONIDAE (Toads)		
1.	Himalayan Toad	*Bufo himalayanus*
2.	Ladakh Toad	*Bufo latastii*
3.	Southeast Asian Toad	*Bufo melanostictus*
4.	Hazara Toad	*Bufo melanostictus hazarensis*
5	Olive Toad	*Bufo olivaceus*
6	Swat Green Toad	*Bufo pseudoraddei pseudoraddei*
7.	Batura glacier Toad	*Bufo pseudoraddei baturae*
8	Siachin Toad	*Bufo siacheninsis*
9	Indus Valley Toad	*Bufo stomaticus*
10	Iranian Toad	*Bufo surdus*
11	Baluch Green Toad	*Bufo viridis zugmayeriss*
FAMILY: MICROHYLIDAE (Narrow-Mouthed Frogs)		
12	Ornate Narrow-Mouthed Frog or Ant frog	*Microhyla ornata*
13	Marbled Balloon Frog	*Uperodon systoma*
FAMILY: RANIDAE (Broad-Mouthed Frogs)		
14	Common Skittering Frog	*Euphlyctis cyanophlyctis cyanophlyctis*
15	Spiny skittering frog	*Euphlyctis cyanophlyctis microspinulata*
16	Seistan Skittering Frog	*Euphlyctis cyanophlyctis seistanica*
17	Indus Valley Bullfrog	*Holobatrachus tigerinus*
18	Alpine Cricket Frog	*Fejervarya limnocharis*
19	Southern Cricket Frog	*Fejervarya syhadrensis*
20	Tibetan Frog	*Nanorana pleskei*
21	Kashmir Torrent Frog	*Paa barmoachensis*
22	Hazara Torrent Frog	*Paa hazarensis*
23	Karez Frog	*Paa sternosignata*
24	Murree Hills Frog	*Paa vicina*
25	Burrowing frog	*Sphaerotheca breviceps*
26	Pakistan Bullfrog	*Sphaerotheca strachani*

Annexure 10: Endangered Species of Pakistan (IUCN Redlist)

Mammals

No	Species Name	*Scientific Name*	Range
1.	Altai Weasel	*Nustela altaica*	Bhutan, China, India Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan
2.	Argali	*Ovis ammon*	Afghanistan, China, India Kazakhstan, Nepal, Pakistan, Russia, Uzbekistan
3.	Asiatic Black Bear	*Urus thibetanus*	Afghanistan, Bangladesh, Bhutan, Cambodia, China, India, Iran, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Russia, Taiwan, Thailand, Vietnam
4.	Baluchistan Forest Dormouse	*Dryomys neithammeri*	Pakistan
5.	Black Finless Porpoise	*Neophocaena phocaenoides*	Asia, Middle East
6.	Burrowing Vole	*Hyperacrious fertilis*	India, Pakistan
7.	Central Kashmir Vole	*Alticola montosa*	India, Pakistan
8.	Cyprian Wild Sheep	*Ovis orientalis*	Afghanistan, America, Azerbaijan, India, Iran, Kazakhstan, Oman, Pakistan, Tajikistan, Turkey, Turkmenistan, Uzbekistan
9.	Eurasian Otter	*Lutra lutra*	Africa, Asia, Europe, Middle East
10.	European Marbled Polecat	*Vormela peregusna*	Asia, Europe, Middle East
11.	Fishing Cat	*Prionailurus veverrinus*	Asia, Middle East
12.	Ganges River Dolphin	*Platanista gangetica*	Bangladesh, India, Nepal, Pakistan
13.	Goitered Gazelle	*Gazella subgutturosa*	Asia, Europe, Middle East
14.	Goral	*Naemorhedus goral*	East Asia, Middle East
15.	Gray Langur	*Semnopithecus entellus*	Bangladesh, China (Tibet), India, Kashmir, Pakistan, Sikkim, Sri Lanka
16.	Himalayan Musk Deer	*Moschus leucogaster*	China (Tibet), Southern slopes of the Himalayas
17.	Indian Pangolin	*Manis crassicaudata*	Bangladesh, India, Pakistan, Sri Lanka
18.	Indo-pacific Hump-backed Dolphin	*Souse chinensis*	Africa, Asia, Austria, Middle East, Oceanic, South America
19.	Kashmir Musk Deer	*Moschus cupreus*	Afghanistan, India, Pakistan
20.	Little Hairy-footed Gerbil	*Gerbillus gleadowi*	India, Pakistan
21.	Markhor	*Capra falconeri*	Afghanistan, Pakistan
22.	Pallas's Cat	*Otocolobus manul*	Afghanistan, Armenia, Azerbaijan, China, India, Iran, Kazakhstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan
23.	Red Deer	*Cervus elephus*	Afghanistan, Algeria, Bhutan, China, France, India, Morocco, Pakistan, Tunisia
24.	Sand Cat	*Felis margarita*	Africa, Asia, Europe, Middle East
25.	Smooth-coated Otter	*Lutrogale perspicillata*	Bangladesh, Brunei Darussalam, Cambodia, China, India, Indonesia, Iraq, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam
26.	Wild Goat	*Capra aegagrus*	Armenia, Azerbaijan, Georgia (Eurasia) Iran, Pakistan, Russian, Turkey, Turkmenistan

Birds

No	Species Name	Scientific Name	Range
1.	Baer's Pochard	*Aythya baeri*	Asia, vagrant population in Pakistan and the Philippines
2.	Black-billed Tern	*Sterna acuticauda*	Bangladesh, China, India, Laos, Myanmar, Nepal, Pakistan, Thailand
3.	Black-headed Ibis	*Threskiornis lemanocephalus*	Asia, Middle East
4.	Black-talied Godwit	*Limosa limosa*	Africa, Asia, Australia, Central America, Europe, Middle East, North America (including United States Territory), Oceanic
5.	Rristled Grassbird	*Chaetornis striata*	India, Pakistan, Pakistan
6.	Cheer Pheasant	*Catreus wallichii*	India, Pakistan, Pakistan
7.	Cinnereous Vulture	*Aegypious monachus*	Africa, Asia, Europe, Middle East
8.	Dalmatian Pelican	*Pelecanus cripus*	Africa, Asia, Europe, Middle East
9.	Egyptian Vulture	*Neophron percnopterus*	Europe, Africa, Asia, and the Middle East
10.	Eurasian Curlew	*Numenius arquata*	Africa, Asia, Australia, Central America, Europe, Middle East, North America (including United States Territory), Oceanic
11.	Eurasian peregrine Falcon	*Falco peregrinus peregrinus*	Eurasia South to Africa and Mideeast

12.	European Roller	*Coracias garrulous*	Asia, Europe, Middle East
13.	Ferruginous Duck	*Aythya nyroca*	Africa, Europe, Middle East
14.	Great Indian Bustard	*Ardeotis nigriceps*	India, Pakistan
15.	Greater Spotted Eagle	*Aquila clanga*	Africa, Asia, Europe, Middle East
16.	Houbara Bustard	*Chlamydotis undulate*	Africa, Asia, Europe, Middle East
17.	Indian Skimmer	*Rynchops albicollis*	Bangladesh, India, Nepal, Pakistan
18.	Indian Spotted Eagle	*Aquila hastate*	Bangladesh, India, Nepal, Pakistan
19.	Indian Vulture	*Gyps indicus*	Afghanistan, India, Malaysia, Pakistan
20.	Jerdon's Babbler	*Chrysomma altirostre*	India, Nepal, Pakistan
21.	Kashmir Flycatcher	*Ficedula subrubra*	India, Pakistan, Sri Lanka
22.	Laggar Falcon	*Falco jugger*	Afghanistan, Bangladesh, India, Iran, Myanmar, Nepal, Pakistan
23.	Lesser Flamingo	*Phoeniconaias minor*	Africa, Asia, Europe, Middle East, Oceanic
24.	Lesser Kestrel	*Falco naumanni*	Africa, Asia, Europe, Middle East
25.	Lesser White-fronted Goose	*Anser erythropus*	Africa, Europe, Middle East, North America (United States Territory)
26.	Little Bustard	*Tetrax tetrax*	Africa, Asia, Europe, Middle East
27.	Long-billed Bush-warbler	*Bradypterus major*	China, India, Pakistan, Tajikistan
28.	Marbled Teal	*Marmaronetta angustirostris*	Africa, Asia, Europe, Middle East
29.	Oriental Darter	*Anhinga melanogaster*	Bangladesh, Brunei Darussalam, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Vietnam
30.	Painted Stork	*Mycteria leucocephala*	Bangladesh, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam
31.	Pale-backed Pigeon	*Columba eversmanni*	Afghanistan, China, India, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan
32.	Pallas[s Fish-eagle	*Haliaeetus leucoryphus*	Bangladesh, Bhutan, Cambodia, China, India, Iran, Iraq, Israel, Kazakhstan, Mongolia, Myanmar, Nepal, Oman, Pakistan, Saudi Arabia, Tajikistan, Uzbekistan
33.	Pallied Harrier	*Circus macrourus*	Africa, Asia, Europe, Middle East
34.	Red-headed Vulture	*Sarcogyps calvus*	Asia, Middle East
35.	Rufuos-vented Prinia	*Prinia burnesii*	Bangladesh, India, Pakistan
36.	Sakar Falcon	*Falco cherrug*	Africa, Asia, Europe
37.	Sarus Crane	*Grus Antigone*	Australia, Bangladesh, Cambodia, India, Laos, Myanmar, Nepal, Pakistan, Vietnam
38.	Siberian White Crane	*Grus leucogeranus*	C.I.S (Siberia) to India, including Iran and China
39.	Sociable Lapwing	*Vanellus gregarious*	Africa, Asia, Europe, Middle East
40.	Tytler's Leaf-warbler	*Phylloscopus tytleri*	Afghanistan, India, Nepal, Pakistan
41.	Western Tragopan Pheasant	*Tragopan melanocephalus*	India, Pakistan
42.	White-headed Duck	*Oxyura leucocephala*	Africa to Asia
43.	White-rumped Vulture	*Gyps bengalensis*	Asia, Europe, Middle East
44.	Yellow-rumped Honeyguide	*Indicator xanthonotus*	Bhutan, China, India, Myanmar, Nepal, Pakistan

Reptiles

No	Species Name	Scientific Name	Range
1.	Afghan Tortoise	*Testudo horsfieldii*	Afghanistan, Armenia, Azerbaijan, China, Iran, Kazakhstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan
2.	Crowned River Turtle	*Hardella thurjii*	Bangladesh, India, Nepal, Pakistan
3.	Desert Monitor	*Varanus griseus*	Asia, Africa and the Middle East
4.	Ganges Soft-shelled Turtle	*Aspideretes gangeticus*	Bangladesh, India, Pakistan
5.	Gavial	*Gavialis gangeticus*	Bangladesh, Burma, India, Nepal, Pakistan
6.	India Softshell Turtle	*Trionyx gangeticus*	India, Pakistan
7.	Mugger Crocodile	*Crocodylus palustris*	Bangladesh, Burma, India, Nepal, Pakistan
8.	Narrow-headed Softshell Turtle	*Chitra indica*	Bangladesh, India, Myanmmar, Pakistan
9.	Peacock Softshell Turtle	*Nilssonia hurum*	Bangladesh, India, Nepal, Pakistan
10.	Spotted Pond Turtle	*Geoclemys hamiltonii*	North India, Pakistan
11.	Yellow Monitor	*Varanus flavescens*	West Pakistan through India to Bangladesh

Fish

No	Species Name	Scientific Name	Range
1.	Banded Eagle Ray	*Aetomylaeus nichofii*	Asia, Australia
2.	Bigeye Tuna	*Thunnus obesus*	Africa, America, Samoa, Asia, Australia, Central America, Europe, Middle East, North America-including United States (Hawaii), Oceanic, South America

No	Species Name	Scientific Name	Range
3.	Black-blotched Stingray	*Taeniura meyeni*	Africa, Asia, Australia, Middle East, Oceanic, South America
4.	Bowmouth Guitarfish	*Rhina ancylostoma*	Africa, Asia, Australia, Middle East
5.	Brown-marbled Grouper	*Epinephelus fiscoguttatus*	Africa, America, Samoa, Asia, Australia, Europe, Middle East, North America (United States Territory), Oceanic
6.	Clubnose Guitarfish	*Rhinobatos thouin*	Africa, Asia, Australia, Middle East
7.	Common Seahorse	*Hippocampus kuda*	Asia, Australia, Hawaii, Middle East, Oceanic
8.	Corel Catshark	*Atelomycterus marmoratus*	Bangladesh, Cambodia, China, India, Indonesia, Japan, Malaysia, Pakistan, Papua New Guinea, Philippines, Singapore, Taiwan, Thailand, Vietnam
9.	Estuary Cod	*Epinephelus coioides*	Africa, Asia, Australia, Middle East, Oceanic
10.	Flapnose Ray	*Rhinoptera javanica*	Africa, Asia, Middle East
11.	Fossil Shark	*Hemipristic elongates*	Africa, Asia, Australia, Middle East
12.	Grey Bamboo Shark	*Chiloscyllium griseum*	China, India, Indonesia, Japan, Malaysia, Pakistan, Papua New Guinea, Philippines, , Thailand
13.	Hammerhead Shark	*Sphyma mokarran*	Africa, Asia, Australia, Central and South America, Middle East, , Oceanic , United States
14.	Hardnose Shark	*Carcharhinus macloti*	Australia, Bangladesh, China, India, Indonesia, Kenya, Myanmar, Pakistan, Papua New Guinea, Sri Lanka, Taiwan, Tanzania, Vietnam
15.	Japanese Devilray	*Mobula japonica*	Africa, Asia, Australia, Central America Hawaii, Middle East, North America, Oceanic, South America
16.	Knifetooth Swafish	*Anoxypristis cuspidate*	Australia, Bangladesh, China, India (Andaman Is.), Indonesia, Japan, Korea, Malaysia, Myanmar, Oman, Pakistan, Papua New Guinea, Philippines, Singapore, Somalia, Sri Lanka, Taiwan, Thailand, Vietnam
17.	Longheaded Eagle Ray	*Aetobatus flagellum*	China, India, Indonesia (Jawa), Pakistan
18.	Longtail Butterfly Ray	*Gymnura poecilura*	Africa, Asia, Middle East, Oceanic
19.	Luciobarbus brachycephalus	*Luciobarbus brachycephalus*	Afghanistan, Armenia, Azerbaijan, China, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan
20.	Malabar Grouper	*Epinephelus malabaricus*	Africa, America, Samoa, Asia, Australia, Middle East, Oceanic
21.	Narrowsnout sawfish	*Pristis zijsron*	Africa, Asia, Australia (new South Wales, Queensland), Middle East,
22.	Oceanic Whitetip Shark	*Carcharhinus longimanus*	Africa, America, Samoa, Asia, Australia, Central America, Europe, Middle East, North America (including United States and Hawaii), Oceanic, South America
23.	Pondicherry Shark	*Carcharhimus hemiodon*	China, India, Indonesia (Kalimantan), Malaysia, Oman, Pakistan
24.	Porcupine Ray	*Urogymnus asperrimus*	Africa, Asia, Australia, Middle East, Oceanic
25.	Sharponse Guitarfish	*Rhinobatos granulatus*	Australia, India, Indonesia, Kuwait, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam
26.	Slender Hammerhead	*Eusphyra blochii*	Asia, Australia, Middle East
27.	Smallscaled Grouper	*Epinephelus polylepis*	Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, United Arab Emirates, Yemen
28.	Smoothnose Wedgefish	*Rhynchobatus laevis*	Australia, Bangladesh, China, India, Japan, Oman, Pakistan, Sri Lanka, Tanzania
29.	Spinycheek Grouper	*Epinephelus diacanthus*	Djibouti, India, Iran, Oman, Pakistan, Sri Lanka, United Arab Emirates, Yemen
30.	Spotted Eagle Ray	*Aetobatus narinari*	Africa, Asia, Australia, Central America, Middle East, North America (including United States and US Island Territory and Hawaii), Oceanic, South America
31.	Whale Shark	*Rhincodon typus*	Africa, America, Samoa, Asia, Australia, Central America, Middle East, Oceanic, South America
32.	Whitecheek Shark	*Carcharhinus dussumieri*	Asia, Australia, Middle East
33.	Widenose guitarfish	*Rhnobatos obtusus*	Bangladesh, India, Indonesia, Malaysia, Myanmar, Pakistan, Sri Lanka, Thailand
34.	Wild Common Carp	*Cyprinus carpio*	Asia, Europe, Middle East
35.	Yellowfin Hind	*Cephalopholis hemistiktos*	Asia, Africa, and the Middle East
36.	Zebra Shark	*Stegostoma faciatum*	Africa, Asia, Australia, Middle East, Oceanic

Annexure 11: Flood Resistant Design Guideline

Any proposed development in the regulated floodplain must be consistent with the need to minimize flood damage. This can be accomplished, in part, by using materials, equipment, and construction techniques that are resistant to flood damage in locations that would be wet during a 100-year flood.

- New construction and substantially improved structures (including accessory structures): It is required that materials and equipment located below the flood protection level (and outside of dry flood proofed areas) be resistant to flood damage. This may apply to foundations, floor beams, joists, enclosures, and equipment servicing the building (electrical, plumbing, mechanical, ducts, etc.).
- Non-substantial improvements to existing (pre-FIRM) buildings and non-building development: New and replacement electrical, plumbing, and mechanical equipment must be located or designed to resist flood damage. The entire project should utilize flood resistant design, materials, and practices to the greatest extent practical.

What Does "Flood Resistant" Mean?

Floodplain areas can be subjected to hydrostatic (standing water) and hydrodynamic (flowing water) pressures during floods. These pressures can result in displaced foundation walls, collapsed structures, floating fuel tanks, scouring, and other damage. Flood resistance thus requires that structural and non-structural components be durable, resistant to flood forces (including buoyancy), and resistant to deterioration caused by inundation with floodwater. Options that require emergency operation (such as shutting off electricity or removing vulnerable components) should be avoided if possible, particularly in areas subject to flash flooding. "Flood resistant" is not "dry floodproofing" of non-residential structures.

Flood Damage-Resistant Building Materials

It is important that all parts of a building or other project that are susceptible to flooding (including fasteners and connectors) be made of materials that are resistant to flood damage. "Flood-resistant materials" include any building product capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage. "Prolonged contact" means at least 72 hours, and "significant damage" is any damage requiring more than cleaning or low-cost cosmetic repair (such as painting). The need to replace flood damaged drywall or other material is considered "significant damage" and is thus not acceptable. Components that are not inundated should be resistant to excessive humidity.

Flood damage-resistant materials include:

- Glazed brick, concrete, concrete block, glass block or stone (with waterproof mortar or grout);
- Steel trusses, headers, beams, panels, or hardware;
- Naturally decay resistant lumber, recycled plastic lumber, or marine grade plywood;
- Clay, concrete, rubber, or steel tiles (with chemical-set or waterproof adhesives);
- Cement board;
- Metal doors, cabinets, and window frames;
- Mastic, silicone, or polyurethane formed-in-place flooring;
- Sprayed polyurethane foam or closed-cell plastic foam insulation;
- Water-resistant glue; and
- Polyester epoxy paint (mildew-resistant paint contains toxic ingredients and should not be used indoors).

Anchoring
Foundations, equipment, accessory structures, and other components located below the flood protection level must be firmly anchored to resist flotation, collapse, and lateral movement.

Mechanical, Plumbing, and Electrical Systems
Location above the flood protection level is generally the best way to protect service equipment, such as heating, ventilating, air conditioning, plumbing appliances, plumbing fixtures, duct systems, and electrical equipment (service panels, meters, switches, and outlets). If these components are at a lower level, they must be designed to prevent damage from flooding. This may involve waterproof enclosures, barriers, protective coatings, or other techniques to protect vulnerable components. The municipality may require certification from a licensed professional that the standards for resistance to flood damage are met.

Backflow and Automatic Shut-Off Valves
Flooding can cause sewage from sanitary sewer lines to back up into buildings through drain pipes, causing both damage and health hazards. Backflow valves are designed to temporarily block pipes and prevent flow into the building and should be installed on any pipes that leave the building or are connected to equipment located below the flood protection level. In addition to sanitary sewer and septic connections, this may include water lines, washing machine drain lines, laundry sinks, downspouts, and sump pumps. Fuel supply lines must be equipped with float operated automatic shut-off valves.

Storage Tanks
Unanchored fuel tanks can be easily moved by flood waters, posing a serious threat of contamination and other damage. Even a buried tank can be pushed to the surface by buoyant effects. A tank can be anchored by attaching it to a concrete slab that is heavy enough to resist the force of flood waters or by running straps over it and attaching them to ground anchors. Tanks and other containers should have watertight fill caps, vents that extend above the flood protection level, and accurate labeling of contents (so that emergency personnel know what it contains if the tank breaks loose and floats away).

Additional Resources
- *Wet Flood proofing Requirements for Structures Located in Special Flood Hazard Areas*, Technical Bulletin 7-93, FEMA FIA-TB-7 (1993), available at http://www.fema.gov/library/viewRecord.do?id=1720, includes planning, safety, and engineering considerations for wet flood proofing.
- *Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, Technical Bulletin 2, FEMA FIA-TB-2 (2008), available at http://www.fema.gov/library/viewRecord.do?id=1580, includes lists of acceptable materials for flood-resistant construction.
- *Protecting Building Utilities from Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems*, FEMA 348 (1998), available at http://www.fema.gov/hazard/flood/pubs/pbuffd.shtm. This publication provides technical guidance for the design and construction of flood-resistant utility systems, including HVAC systems, fuel systems, electrical systems, sewage management systems, and potable water systems.
- *Elevator Installation for Buildings Located in Special Flood Hazard Areas*, Technical Bulletin 4-93, FEMA FIA-TB-4 (1993), available at http://www.fema.gov/library/viewRecord.do?id=1717. Provides guidance concerning the installation of elevators below the Base Flood Elevation.
- *Flood-Resistant Design and Construction*, American Society of Civil Engineers (ASCE) 24-05, purchase at www.asce.org, highlights available at http://www.fema.gov/library/viewRecord.do?id=3515. ASCE 24 is a referenced standard in the NYS Building Code and the NYS Residential Code. Buildings designed according to ASCE 24 are better able to resist flood loads and flood damage

Annexure 12: Asbestos Handling Guidelines

Guidelines Asbestos and Asbestos Based Product use during Construction

Asbestos is a group of naturally occurring fibrous silicate minerals. It was used widely in the production of many industrial and household products because of its useful properties, including fire retardation, electrical and thermal insulation, chemical and thermal stability, and high tensile strength[4].

Asbestos based products include Asbestos –Cement (A-C) construction materials such as A-C flat and corrugated sheets, A-C pipe, and A-C water storage tanks. Over 90% of the asbestos fiber produced today is chrysotile which is found in these products. Vehicle brake, clutch pads, roofing and gaskets are some other products that are still being manufactured with asbestos content. Due to international laws banning the use of asbestos, it is hardly used in construction materials other than asbestos –cement products. However, it is still found in older buildings in the form of friable surfacing materials, thermal system insulations, non-friable flooring materials, and other applications. In Sri Lanka, asbestos roofing sheets are widely used as it is the most cost effective and durable material given climate, environment and other factors. Other alternatives to asbestos roofing sheets in Sri Lanka are clay tile, zinc-aluminum, cadjan (matted coconut/Palmyra/palm leaves) and concrete. These alternatives have disadvantages such as:

- Clay tiles are easy to remove, and in areas where there are monkeys it poses a practical problem. Monkeys tend to travel over roofs and either deliberately or accidentally break tiles, thus expenses for replacing is high.
- Zinc-Aluminum – While durable and long lasting, given the tropical climate and monsoon rains, such roofing heats up during the day and during rainy periods the noise makes it impractical especially to use in classrooms.
- Cement – due to the climate in Sri Lanka if not properly treated can result in leaks and damage to the structure. Furthermore, in high temperatures the heat absorption is high thus increasing the temperature in the buildings. In classrooms, it would make it difficult for students and teachers to work. Furthermore, concrete roofs are costly, and will not be affordable, given the large number of school infrastructure requirements that will need to be met through the project.
- Cadjan roofs while environmentally friendly, need to be replaced frequently, causes leaks and will not be acceptable on school buildings.

Ban on Asbestos Use:

As health risks related to exposure to asbestos is widely known, many countries have banned the commercial use of asbestos. The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the "prevention and control of, and protection of workers against, health hazards due to

occupational exposure to asbestos". As of March 4, 2008, 31 countries had ratified the Convention, 17 of them have banned asbestos use. ILO asbestos convention requirements include:

- Work clothing to be provided by employers,
- Double changing rooms and wash facilities to prevent dust from going home on street clothes, Training of workers about the health hazards to themselves and their families,
- Periodic medical examinations of workers,
- Periodic air monitoring of the work environment, with records retained for 30 years,
- Development of a work plan for demolition work, to protect workers and provide for proper waste disposal, and
- Protection from retaliatory and disciplinary measures of workers who remove themselves from work that they are justified in believing presents a serious danger to health.

Health Risks:

Health hazards from breathing asbestos dust include:

- Asbestosis – a lung scarring disease
- Form of cancer such as mesothelioma.

The main risks of exposure from asbestos is where fibers are easily made air borne under little pressure, such as cutting of A-C products that can release fibers. Risks are from construction materials that need to be altered, repaired and disposed of that may release particles into the air, and increase the risk of inhalation. Renovations, repairs and decommission of buildings containing A-C products such as roof sheets can pose a risk. However, in the case of Asbestos –Cement (AC) corrugated sheets, the fiber is present in the non- friable form which means that fiber is embedded in cement and cannot be easily air-borne. Such materials are known to have little health risk once (a) the roof has been completed and (b) given that material is in good condition and not disturbed[8]. Although IDA Group's Good Practice Note on Asbestos , and its Health and Safety Guidelines do not encourage the use of asbestos products in construction, in light of the practical uses for construction of school infrastructure, the costs, its availability in local markets and lack of feasible alternatives, the use of asbestos is the most feasible option. However, to minimize the health risks that asbestos products do pose, the following guidelines adapted from the World Bank's Health and Safety Guidelines and other sources are recommended to be followed. As Sri Lanka has no regulations regarding the use of Asbestos, the use of ILO convention guidelines as stated above are recommended as well.

Construction phase:

- To minimize the risk of damage of A-C sheets for roofing, transportation of material must be done with care. Where possible, sheets should be transported in airtight containers or with dust covers.

- During installation of sheets, ensure that damage is minimized. Use of power tools to drill holes that may release particles needs to be kept to the minimum.
- Use a protective sheet (i.e. insulation foil) between the A-C sheets and the classrooms to reduce the risk of minute particles entering the rooms.
- Workers who are involved in handling and installing A-C sheets should take precautions to minimize exposure by wearing protective masks and showering to minimize spread of dust. Work clothes used during the installation of sheets should be washed and workers change to clean clothes before leaving construction site.
- Workers should be made aware of the risks of A-C sheets, and how to minimize these risks.

Post Construction/De-Commissioning:

- Contractors should dispose of waste containing asbestos in a manner that does not pose a health risk to the workers concerned or the population in the vicinity. Disposal at approved landfills and prompt burial under various levels of material apply to friable asbestos waste. Contractors should consult the Local Authority and Central Environmental Authority to obtain guidance on proper disposal of material.
- Contractor should be encouraged to develop an asbestos management plan that identifies the content (whether it is in friable form and has potential to release fibers), and proper removal procedures.
- During the removal of A-C sheets, workers should wear proper protective gear such as masks and shower to prevent the spread of dust. Clothes worn during this process should be washed and workers should change into clean clothes prior to leaving construction site.
- Workers who are, or have been, exposed to asbestos in their occupational activities should be provided, in accordance with national laws and practices, with such medical examinations as are necessary to supervise their health in relation to the occupational hazard, and to diagnose occupational diseases caused by exposure to asbestos. For the prevention of disease and functional impairment related to exposure to asbestos, all workers assigned to work involving asbestos exposure should be provided with:

- a pre-assignment medical examination;
- periodic medical examinations at appropriate intervals (at least every 3 years);
- other tests and investigations, in particular chest radiographs and lung function test, which may be necessary to supervise their state of health in relation to the occupational hazard and to identify early indicators of disease caused by asbestos;
- a copy of their medical record.
- The above requirements will be based on the type of construction and its magnitude.

Annexure 13: Physical Cultural Resource (PCR) Management Framework and Chance Find procedures

A. The PCR Management Framework

The PCR Management Plan can constitute a section of the Environmental Management Plan, if one is required. The Management Plan should clearly:

- Schedule the implementation of the proposed PCR mitigating measures and PCR monitoring, if any, taking into account the weather pattern, and identify roles and responsibilities for such implementation;
- Identify procedures for handling chance finds, including the role and responsibilities of the cultural authorities and the contractor; and
- Identify procedures for addressing PCR impacts which may occur during implementation but were not predicted in the impact assessment.

The following are the main considerations guiding the preparation of the PCR Management Plan.

1. Policy, Legal and Regulatory Framework

This section should contain reference to the following, including identification of any implications for the PCR component of the ESMP, such as special standards or requirements:

- The World Bank‘s EA policy OP/BP 4.01 and the PCR policy OP/BP 4.11;
- Sections of national EIA laws, regulations and guidelines relating to PCR;
- Sections of the national environmental conservation strategy, if any, relating to PCR;
- Legislation and regulations relating to:
    - Antiquities, including sale and export;
    - Procedures for addressing chance finds, in terms of ownership and requirements by the contractor and cultural authorities;
    - Archaeology, including the issue of permits.
- Relevant authorities charged with PCR identification, protection and management, their powers, the legal basis for their authority, and their actual capacity;
- PCR-related conventions and treaties to which the borrower country is signatory;
- Sites in the borrower country currently listed by other international agency in the field of PCR such as the World Monuments Fund, or ICOMOS, as being of national or international importance;

- Any national or provincial registers of PCR maintained by accredited authorities in the borrower country.

2. Project Description

The project description should detail construction and operation phases, including maps, diagrams and plans of planned activities. The description should take into consideration any potential impacts on PCR of planned activities, construction/rehabilitation processes, transport arrangements, etc.

3. Analysis of Alternatives

In cases where there are major PCR issues, the analysis of alternatives should consider alternative project sites or technologies that could specifically avoid or minimize those impacts on PCR.

4. Baseline Data

The baseline data should begin with an investigation and inventory of PCRs likely to be affected by the project. The data should consider all types of PCR that might be impacted, covering:

- Living-culture PCR, as well as historical, archaeological and paleontological PCR;
- Natural and human-made PCR;
- Movable and immovable PCR;
- Unknown or invisible PCR.

The data collection activity should involve consultations with concerned parties and potentially affected communities. Potential data sources might include cultural authorities, national or provincial PCR registers, universities and colleges, public and private PCR-related institutions, religious bodies and local PCR NGOs. Sources at the community level typically include, for example, community leaders and individuals, schools, religious leaders, scholars, PCR specialists, and local historians.

The baseline data section should include maps showing PCR baseline data within the potential impact areas. In addition, data should detail the cultural significance or value attributed by the concerned or affected parties to the PCR identified in the baseline. Consultation is a particularly important means of identifying PCR and documenting their presence and significance. This will normally not be expressed in monetary terms, but rather should explain the nature of the cultural significance, for example whether it is religious, ethnographic, historic, or archaeological. In the case of PCR of archaeological, architectural, paleontological or other scholarly or scientific value, the PCR Management Plan should provide an assessment of the relative importance of the PCR in this regard locally, nationally and/or internationally.

5. Impact Assessment

PCR should be included in the impact matrix and PCR impacts for each project stage – construction/rehabilitation, operation, etc. – should be detailed. The PCR Management Plan should specifically describe the nature and extent of the potential impacts and state precisely why they are considered to be significant or insignificant. The impact assessment should also

consider the possibility of accidents during construction/rehabilitation and operations which might affect PCR, especially in urban settings, which might call for special precautionary measures.

6. Mitigation Measures

It is particularly important that consultations with concerned and affected parties are conducted on the proposed mitigation measures relating to PCR impacts. Agreements must be reached and evidence of such agreements should be included in PCR Management Plan. It should be checked whether the recommended mitigation measures might themselves have environmental impacts (e.g. archaeological excavations). PCR Management Plan should detail the cost of implementing and the timing of the recommended PCR mitigation measures.

B. Chance Find Procedures

Chance find procedures which will be used during this Project are as follows:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the Ministry in charge of Department of Archaeology take over;
- Notify the supervisory Engineer who in turn will notify the responsible local authorities and the Ministry immediately (within 24 hours or less);
- Responsible local authorities and the Ministry in charge of Department of Archaeology would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists of the Department of Archaeology and Museums (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
- Decisions on how to handle the finding shall be taken by the responsible authorities and the Ministry in charge of Department of Archaeology. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;
- Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the Ministry in charge of Department of Archaeology; and
- Construction work could resume only after permission is given from the responsible local authorities and the Ministry in charge of Department of Archaeology concerning safeguard of the heritage.

These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered or observed.

Annexure 14: Sub-project Social and Environmental Screening Form

Pakistan Hydro-Meteorological and DRM Services Project

Subproject Title:

Subproject location (area/district/site):

Subproject scope of work:

Implementing Agency:

Date of screening:

Responsible agency:

#	Screening Criteria	Assessment of category	Explanation
ENVIRONMENT			
1	Is the subproject in an eco-sensitive area or adjoining an eco-sensitive area or monument? (Yes/No) If Yes, which is the area? Elaborate impact accordingly.		
2	Will the subproject create significant/limited/no environmental impacts during the construction stage? ▪ Clearance of vegetation/ tree-cover/other ▪ Direct discharge of construction run-off, improper storage and disposal of excavation spoils, wastes and other construction materials adversely affecting water quality and flow regimes. ▪ Flooding of adjacent areas. ▪ Improper storage and handling of substances leading to contamination of soil and water. ▪ Elevated noise and dust emission. ▪ Disruption to traffic and visitor's movements. ▪ Damage to existing infrastructure, public utilities, and amenities. ▪ Failure to restore temporary construction sites. ▪ Possible conflicts with and/or disruption to local community and/or visitors. ▪ Health risks due to unhygienic conditions at workers 'camps. ▪ Safety hazards during construction. ▪ Other, specify.		

3	Will the subproject create significant/limited/no environmental impacts during the operational stage? (Significant / limited / no impacts) ▪ Flooding of adjacent areas ▪ Impacts to water quality due to effluent discharge ▪ Gas emissions ▪ Safety hazards ▪ Other, specify.		
4	Does the subproject involve any prior clearance from the State Forest Department for either the conversion of forest land or for tree-cutting? (Yes/ No). If yes, which?		
CULTURAL HERITAGE			
5	Will the subproject create significant/limited/no cultural properties impacts? ▪ Involve significant excavations, demolition, movement of earth, flooding or other major environmental damages. ▪ Is located within or in the vicinity of a recognized cultural property conservation area or heritage site. ▪ Is designed to support the management or conservation of a cultural property. ▪ Other, specify.		
6	Does the subproject involve any prior clearance from the Archeology Department for either the conservation or management of heritage sites or vicinities? (Yes/ No). If yes, which?		
SOCIAL			
7	Will the subproject create significant/limited/no social impacts? ▪ Land acquisition resulting in loss of income from agricultural land, plantation or other existing land. ▪ Impact on livelihood and economic activity. ▪ Land acquisition resulting in relocation of households. ▪ Any reduction of access to traditional dependent communities (to areas where they earn for their primary or substantial livelihood). ▪ Any displacement or adverse impact on tribal settlement(s). ▪ Adverse impacts to women, including economic and safety concerns. ▪ Impact on infrastructure (roads, water supply, any other type of infrastructure) Other, specify.		

Overall Assessment			
	▪ Subproject is declined ▪ Subproject is accepted ▪ Subproject is classified as environmental Category A and requires an in-depth Environmental and Social Impact Assessment and an Environmental Management Plan. ▪ Subproject is classified as environmental Category B and requires an Environmental Management Plan. ▪ Subproject is classified as environmental Category C and does not require an Environmental Management Plan.		

Annexure 15: Involuntary Resettlement Screening Checklist

Potential Impacts	Yes	No	Expected	Remarks
Does the sub-project involve any physical construction work, i.e. rehabilitation, reconstruction or new construction? Specify in "remarks" column.				
Does the sub-project involve impacts on land, assets and people, if "Yes" try to quantify the impacts and check following items? If "No" impacts, explain the situation in "remarks" and move to section 2.				
Potential impacts				
Land (quantify and describe types of land in "remarks column".				
Government or state owned land free of occupation (agriculture or settlement)				
Private land				
▪ Residential				
▪ Commercial				
▪ Agriculture				
▪ Communal				
▪ Others (specify in "remarks").				
Land-based assets:				
▪ Residential structures				
▪ Commercial structures (specify in "remarks")				
▪ Community structures (specify in "remarks")				
▪ Agriculture structures (specify in "remarks")				
▪ Public utilities (specify in "remarks")				
▪ Others (specify in "remarks")				
Agriculture related impacts				
▪ Crops and vegetables (specify types and cropping area in "remarks).				
▪ Trees (specify number and types in "remarks").				
▪ Others (specify in "remarks").				
Affected Persons (DPs)				
▪ Number of DPs				
▪ Males				

Potential Impacts	**Yes**	**No**	**Expected**	**Remarks**
▪ Females				
▪ Titled land owners				
▪ Tenants and sharecroppers				
▪ Leaseholders				
▪ Agriculture wage laborers				
▪ Encroachers and squatters (specify in remarks column).				
▪ Vulnerable DPs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".				
▪ Others (specify in "remarks")				
Section 2				
Others (specify in "remarks".				
Are there any other minority groups affected by land acquisition or project activities? If "Yes" check the following items				
▪ Minority groups (specify in "remarks"). Describe nature of impacts				

Annexure 16: Sample Terms of Reference

Environmental Safeguards Specialist

One Environmental Safeguards Specialist will be based in Project Implementation Unit (PIU) PMD Islamabad.

One Environmental Safeguards Specialist will be based in Project Implementation Unit (PIU) NDMA Islamabad.

Tasks: Environmental Safeguards Specialist will be responsible for the following duties and responsibilities relevant to project environmental safeguards compliances and mitigation measures

Objective:

Provide expert support to executing agencies in the office and field, provide support to implement activities related to the project components for compliance to environmental safeguards and mitigation measures.

Main responsibilities are:

- Deal with environmental aspects of the project and provide feedback to the Project Director on implementation of environmental action plan under the activities of the project.
- Support in compliance of the credit conditions and covenants pertaining to Environmental Safeguards.
- Update in Implementation of Environmental aspects of the project.
- Oversee environmental monitoring of the ESMF and site specific ESMPs
- Provide technical support to works consultants in the development of site specific ESMPs
- Coordinate with implementing agencies and works contractors for onsite implementation of ESMPs.
- Organize and conduct the trainings on ESMF and ESMP compliances as proposed in mitigation plan.
- Prepare monthly, quarterly progress reports of Environment and Social Management Framework (ESMF).
- Prepare final progress report of the ESMF and submit to the World Bank.
- Ensure the HSE compliance onsite by the civil works consultants / contractor at project sites.
- Coordinate and conduct Environmental Field Monitoring visits of Project Areas.
- Review and revision of documents and ensuring timely delivery of outputs as agreed between The World Bank and PIU, PMD.
- As and when required contribute to the ongoing activities of the safeguard unit.
- Assist the Project Director in routine office matter when require.
- Work as the focal point for World Bank to provide necessary requirements of environmental compliances within the project.

Academic Qualification:

Post Graduate degree in Environmental Sciences with 5-8 years of relevant work experience in dealing with Environmental management and implementation in development projects.

Salary and Benefits:

PMD and NDMA will decide as per their rules and regulations for the project

Duration: Till project duration

Social Safeguards Specialist

One Social Safeguards Specialist will be based in Project Implementation Unit (PIU) PMD Islamabad.

One Social Safeguards Specialist will be based in Project Implementation Unit (PIU) NDMA Islamabad.

Tasks: Social Safeguards Specialist will be responsible for the following duties and responsibilities relevant to project social safeguards compliances and mitigation measures

Objective:

Provide expert support to executing agencies in the office and field, provide support to implement activities related to the project components for compliance to social safeguards and mitigation measures.

Main responsibilities are:

- Deal with social aspects of the project and provide feedback to the Project Director on implementation of RPF, GRM and social safeguards under the activities of the project.
- Support in compliance of the conditions and covenants pertaining to Social Safeguards.
- Oversee social monitoring of the ESMF and site specific ESMPs
- Provide technical support to works consultants in the development of site specific ESMPs
- Coordinate with implementing agencies and works contractors for onsite implementation of ESMPs.
- Organize and conduct the trainings on ESMF and ESMP compliances as proposed in mitigation plan.
- Prepare monthly, quarterly progress reports of Environment and Social Management Framework (ESMF) and RPF
- Coordinate and conduct Social Field Monitoring visits of Project Areas.
- Review and revision of documents and ensuring timely delivery of outputs as agreed between The World Bank and PIU, PMD.
- As and when required contribute to the ongoing activities of the safeguard unit.
- To carry out the screening of the sub-projects with respect to the social aspects as defined in the ESMF;
- Monitor and check the proper implementation of all social mitigation measures as suggested in ESMF/ESMP;
- Monitoring and evaluation of social related matters of the project and maintain a social complaint register to document social issues;
- Top supervise the Contractor's activities and make sure that all the contractual obligations related to the social compliance are met;
- Review of periodic environmental and social reports being prepared by the investor/contractor
- Ensure inclusion of ESMMP guidelines in project designs.
- Screen sub-projects for Involuntary Resettlement
- Ensure Resettlement Policy Framework (RPF) is implemented and RAP is prepared if required

Academic Qualification:

Post Graduate degree in Social Sciences with 5-8 years of relevant work experience in dealing with Environmental management and implementation in development projects.

Salary and Benefits:

PMD and NDMA will decide as per their rules and regulations for the project

Duration: Till project duration