

Afghanistan rural energy market transformation initiative - Strengthening resilience of livelihoods through sustainable energy access

Environmental and Social Assessment Report

26 March 2020

CONTENTS

| | |
|--|-----------|
| Contents | 2 |
| Executive Summary | 9 |
| 1 Introduction | 11 |
| 2 Description of the Project..... | 13 |
| 2.1 Project Delivery and Administration | 13 |
| 2.1.1 Project Delivery | 13 |
| 2.1.2 Project Board and sub-committee..... | 13 |
| 2.1.3 National Project Management Unit | 14 |
| 2.1.4 Regulation, taxation and insurance..... | 15 |
| 2.1.5 Training | 15 |
| 2.2 Description of the Project Activities..... | 15 |
| 2.2.1 Background and Rationale..... | 15 |
| 2.2.2 Summary of Activities..... | 19 |
| 2.2.3 Technical details of Activity 3.1 – Construction of 3 RE mini-grids..... | 25 |
| 2.3 Project Alternatives | 36 |
| 2.3.1 Do Nothing Alternative | 36 |
| 2.3.2 Alternative Locations..... | 36 |
| 2.3.3 Alternative RE technologies | 37 |
| 3 Legal and Institutional Framework for Environmental and Social Matters | 38 |
| 3.1 Legislation, Policies and Regulations | 38 |
| 3.1.1 Constitution of the Islamic Republic of Afghanistan (2004) | 38 |
| 3.1.2 Environment Law (2007) | 38 |
| 3.1.3 Environmental Impact Assessment Regulations (2008; amended 2017)..... | 39 |
| 3.1.4 Law on Managing Land Affairs (2008)..... | 39 |
| 3.1.5 Land Expropriation Law (2001)..... | 40 |
| 3.1.6 Law on the Protection of Historical and Cultural Properties (2004)..... | 40 |
| 3.1.7 Access to Information Act (2014)..... | 40 |
| 3.2 Environmental Impact Assessment in Afghanistan..... | 40 |
| 3.2.1 Environmental Impact Assessment Process..... | 42 |
| 3.3 Multilateral Agreements and Biodiversity Protocols..... | 44 |
| 3.4 UNDP Social and Environmental Standards..... | 44 |
| 4 Description of Existing Environment..... | 45 |
| 4.1 Topography, Geology, Seismic Activity and Soils..... | 45 |
| 4.1.1 Topography | 45 |



4.1.2 Geology 46

4.1.3 Seismic Activity 47

4.1.4 Soils..... 49

4.2 Unexploded Ordnances 51

4.3 Climate 52

4.3.1 Precipitation..... 52

4.3.2 Temperature..... 54

4.3.3 Climate change predictions..... 57

4.3.4 Climate information on mini-grid sites..... 59

4.4 Air Quality..... 60

4.5 Ambient Light 61

4.6 Ambient Noise and Vibration..... 61

4.7 Visual Amenity..... 61

4.8 Surface Water and Hydrology 61

4.8.1 Overview 61

4.8.2 Water quality 63

4.9 Groundwater..... 64

4.10 Vegetation, Flora and Fauna..... 66

4.10.1 Background 66

4.10.2 Vegetation and Flora 66

4.10.3 Fauna 71

4.10.4 Protected Areas..... 74

4.11 Land Use 75

4.12 Land Ownership and Customary Tenure 77

4.13 Social Aspects..... 79

4.13.1 Population 79

4.13.2 Gender 79

4.13.3 Employment, Economic Aspects and Livelihoods 80

4.13.4 Health 81

4.13.5 Labour and Working Conditions..... 81

4.14 Waste Management 81

4.15 Religion 82

4.16 Indigenous Peoples and Ethnic Minorities 82

4.17 Archaeological and Cultural Heritage 82

5 Environmental and Social Risk Assessment 84



5.1 UNDP Social and Environmental Screening Policy Requirements..... 84

5.2 Impact Assessment Methodology 84

5.3 Assessment of Impacts by Activities 86

5.4 Specific Impacts on Environmental and Social Situation 95

 5.4.1 Topography, Geology and Soils..... 95

 5.4.2 Unexploded Ordnances 95

 5.4.3 Climate 95

 5.4.4 Air Quality 96

 5.4.5 Ambient Light 96

 5.4.6 Ambient Noise 96

 5.4.7 Visual Amenity..... 97

 5.4.8 Surface Water and Hydrology 97

 5.4.9 Groundwater..... 97

 5.4.10 Vegetation, Flora and Fauna..... 98

 5.4.11 Land Use 101

 5.4.12 Land Ownership and Customary Tenure 102

 5.4.13 Social aspects 103

 5.4.14 Waste 104

 5.4.15 Religion 105

 5.4.16 Indigenous Peoples and Ethnic Minorities 105

 5.4.17 Archaeological and Cultural Heritage..... 105

5.5 Indirect Impacts on Environmental and Social Situation..... 105

5.6 Cumulative Impacts..... 106

5.7 Conclusion..... 106

6 Environmental and Social Management Plan..... 108

 6.1 Overview and Objectives of the Environmental and Social Management Plan 108

 6.2 Overview of Institutional Arrangements for the Environmental and Social Management Plan 109

 6.2.1 Administration of Environmental and Social Management Plan 109

 6.2.2 Procedures, specific work plans/instructions, inspection checklists, incident reporting ... 109

 6.2.3 Review and auditing 110

 6.2.4 Capacity Building..... 110

 6.3 Stakeholder Engagement and Public Participation..... 111

 6.4 Complaints Register and Grievance Redress Mechanism 111

 6.5 Avoidance and Mitigation Measures 115

 6.5.1 Climate 115



| | | |
|--------|--|-----|
| 6.5.2 | Topography, Geology and Soils..... | 115 |
| 6.5.3 | Unexploded Ordinances..... | 119 |
| 6.5.4 | Air Quality..... | 121 |
| 6.5.5 | Ambient Light | 125 |
| 6.5.6 | Noise and Vibration..... | 125 |
| 6.5.7 | Surface Water | 128 |
| 6.5.8 | Groundwater..... | 130 |
| 6.5.9 | Vegetation, Flora and Fauna..... | 132 |
| 6.5.10 | Land Use, Ownership and Customary Tenure..... | 138 |
| 6.5.11 | Social Management | 141 |
| 6.5.12 | Gender | 143 |
| 6.5.13 | Employment, Labour and Working Conditions..... | 145 |
| 6.5.14 | Ethnic Minorities and Internally Displaced Persons | 147 |
| 6.5.15 | Archaeological and Cultural Heritage..... | 148 |
| 6.5.16 | Waste Management | 150 |
| 6.5.17 | Emergency Management Measures | 154 |
| 6.6 | Budget..... | 156 |
| 7 | References..... | 157 |
| | Annex 1: Guidance for Submitting a Request to the Social and Environmental Compliance Unit and/or the Stakeholder Response Mechanism | 158 |
| | Annex 2: Stakeholder Consultation and Stakeholder Engagement Plan | 162 |
| | General Communications..... | 162 |
| | Stakeholder Consultation and Information Disclosure | 162 |
| | Stakeholder engagement sequencing and iterative consultations..... | 162 |
| | Information disclosure | 164 |
| | Annex 3: Erosion, Drainage and Sediment Control Management Plan and Contaminated Soil Disposal Management Plan Outline..... | 165 |
| | Annex 4: Livelihood Action Plan Framework | |
| | Table 1 Overview of the RE mini-grids | 21 |
| | Table 2 Selected Locations for RE mini-grids..... | 22 |
| | Table 3 Main characteristics of RE mini-grids and areas served with electricity | 23 |
| | Table 4 Characteristics of proposed additional RE mini-grids | 23 |
| | Table 5 Powerlines and poles in the three solar mini-grids | 28 |
| | Table 6 Rating of Probability of Risk..... | 84 |
| | Table 7 Rating of Impact of Risk..... | 84 |

| | |
|---|-----|
| Table 8 UNDP Risk matrix | 85 |
| Table 9 Erosion, Drainage and Sediment Control Measures | 117 |
| Table 10 Unexploded Ordnances Measures | 120 |
| Table 11 Air Quality Management Measures..... | 122 |
| Table 12 Noise and Vibration Management Measures..... | 126 |
| Table 13 Surface Water Management Measures | 129 |
| Table 14 Groundwater management measures | 131 |
| Table 15 Flora and Fauna Management Measures..... | 137 |
| Table 16: Land Ownership Measures | 140 |
| Table 17: Social Management Measures | 142 |
| Table 18: Gender Measures | 144 |
| Table 19: Labour and Working Conditions Measures..... | 146 |
| Table 20: Archaeological and Cultural Heritage | 149 |
| Table 21 Waste Management Measures | 151 |
| Table 22 Emergency Management Measures | 155 |
| Table 23 Budget..... | 156 |
| | |
| Figure 1 Project organisation structure | 13 |
| Figure 2 Map of the provinces and districts with planned mini-grids | 19 |
| Figure 3 Example of overview of solar system with backup batteries (Source: Detailed Project Report: Solar Mini-Grid in Khost; Part 1 – Power Plant and Remote Monitoring Design, January 18, 2018) | 26 |
| Figure 4 Solar modules and inter-row spacing (Source: Detailed Project Report: Solar Mini-Grid in Khost; Part 1 – Power Plant and Remote Monitoring Design, January 18, 2018) | 27 |
| Figure 5 Structure M4 – Tension branch. | 29 |
| Figure 6 Structure M3 – Tension, large angle..... | 30 |
| Figure 7 Structure M2 – Alignment, small angle. | 31 |
| Figure 8 Structure M6 – Tension, shackle. | 31 |
| Figure 9 Structure MM1 – Alignment, double circuit. | 32 |
| Figure 10 Structure MM3 – Tension, large angle double circuit. | 33 |
| Figure 11 Structure MM6 – Tension, shackle double circuit. | 34 |
| Figure 12 Example of LV pole top design and cables. | 35 |
| Figure 13 Typical foundation plan..... | 35 |
| Figure 14 EIA Procedure..... | 43 |
| Figure 15 Relief with major rivers (map by Rafiqpoor). | 46 |
| Figure 16 Geology with tectonic lineaments (map by Rafiqpoor). | 47 |
| Figure 17 Map of Afghanistan showing the locations of modelled fault sources (heavy blue lines)..... | 48 |

| | |
|---|-----|
| Figure 18 Locations of earthquakes since 1964; Depths – red: 0–50 km, green: 50–100 km, and blue: 100–250 km. | 48 |
| Figure 19 Maps of modelled earthquake rates derived from smoothed seismicity showing the number of M6.0 earthquakes occurring per 10,000 km ² per 10,000 years for depths – (A) 0–50 km, (B) 50–100 km, (C) 100–250 km. | 49 |
| Figure 20 Soil regions after the classification of USDA (map by Rafiqpoor) | 50 |
| Figure 21 Soil profile showing high humus content, developed under mountain steppe vegetation in the Central Plateau of Bamyan (Photo Michel)..... | 51 |
| Figure 22 Mean annual rainfall in Afghanistan and adjacent areas (map by Rafiqpoor)..... | 53 |
| Figure 23 Percentage of rainy days with >5 mm precipitation (map by Rafiqpoor)..... | 53 |
| Figure 24 Percentage of summer rains in the annual precipitation (map by Rafiqpoor). | 54 |
| Figure 25 Mean annual temperatures (map by Rafiqpoor)..... | 55 |
| Figure 26 Mean July temperatures (map by Rafiqpoor). | 55 |
| Figure 27 Mean January temperatures (map by Rafiqpoor) with locations of mini-grid sites..... | 56 |
| Figure 28 Eco-climate classification (map by Rafiqpoor)..... | 57 |
| Figure 29 Change in temperature until 2100 under 3 emissions scenarios (0 = 1970-1999 average). | 58 |
| Figure 30 Spatial projections for temperature change under SRES A2 scenario..... | 58 |
| Figure 31 Change in precipitation until 2100 under 3 emissions scenarios (0 = 1970-1999 average). | 59 |
| Figure 32 Spatial projections of percent precipitation change under SRES A2 scenario..... | 59 |
| Figure 33 Climate diagrams of Kandahar (near S5 Panjawayee – left) and Khost (near S6 Sheikhamir - right). | 60 |
| Figure 34 Climate diagram of Bagram (Parvan, near S9 Qalandar khil). | 60 |
| Figure 35 Main drainage basins of Afghanistan with planned mini-grid locations | 63 |
| Figure 36 <i>Karez</i> landscape in a perspective GoogleEarth view; the lines of the irrigation tunnels leading from the foothills to the villages are well visible. | 65 |
| Figure 37 “Human footprint” (map by Rafiqpoor)..... | 66 |
| Figure 38 Map of the main vegetation categories of Afghanistan (map by Rafiqpoor) | 67 |
| Figure 39 Map of the tracks of marked steppe eagles during migration (map byRRRCN) | 72 |
| Figure 40 The planned protected areas system of Afghanistan. The Wakhan National Park and the Band-e Amir National Park are established, in other areas the designation of protected areas is in different stages of preparation. (Source WCS)..... | 74 |
| Figure 41 Main land-use types in Afghanistan with provincial boundaries and locations of planned mini-grids..... | 75 |
| Figure 42 Satellite image of mini-grid location in Kandahar – bare land and rangeland at the edge of the village. | 76 |
| Figure 43 Satellite image of mini-grid location (two possible sites) in Khost – bare land between arable fields. | 77 |
| Figure 44 Satellite image of mini-grid location in Parwan – arable lands. | 77 |
| Figure 45 Typical designs of poles causing high bird mortality by electrocution | 100 |

| | |
|---|-----|
| Figure 46 Prevention of phase-to-ground contact on the angle support by maintaining the minimum clearances | 133 |
| Figure 47 Prevention of phase-to-ground contact by maintaining the vertical minimum clearances at double circuit poles (conductors at several levels) | 133 |
| Figure 48 Cross-arm on grounded pole with suspension insulators, vertical distance between conductor and top side of cross-arm 600+ mm | 133 |
| Figure 49 Cross-arm on grounded pole with suspension insulators, conductors at several levels, vertical distance between conductor(s) and top side of cross-arm 600+ mm, vertical distance between the top side of the lower cross-arm and the conductor rope suspension of the upper cross-arm 1,600+ mm | 134 |
| Figure 50 Cross-arm on grounded pole with tension insulators, conductors in one or several levels, length of insulator 600+ mm, vertical distance between conductor rope bridge (jumper) and top side of cross-arm 600+ mm, route all conductor bridges below the cross-arm, in case of conductors arranged in several levels vertical distance between the top side of the lower cross-arm and the conductor rope bridge (jumper) of the upper cross-arm 1,600+ mm..... | 134 |
| Figure 51 Grounded junction pole with tension insulators, in one or several levels with single or double junction, as in Fig. 46, additionally minimum distance between conductor rope bridge (jumper) and grounded parts 600+mm, else insulated conductor rope bridges; vertical distance between the top side of the lower cross-arm and the upper conductors 1,600+ mm | 134 |
| Figure 52 Wooden pole - Distance from the pole top to the energized part 350+ mm; only bent insulator supports to be used(left); Insulated cross-arm with pin insulators (centre), distance between not insulated conductors has to be 2,400+ mm, with insulation of conductor in the centre distance can be reduced to 2,400+ mm between outer, not insulated conductors; cross-arm on an insulated top hamper in triangular arrangement, distance between grounded pole and insulator 1,000+ mm (right) | 135 |

EXECUTIVE SUMMARY

This Environmental and Social Assessment Report (ESAR) has been prepared in support of a project proposal entitled “Afghanistan rural energy market transformation initiative - Strengthening resilience of livelihoods through sustainable energy access” (the project) by the Government of the Islamic Republic of Afghanistan (GoIRA) to the Green Climate Fund (GCF). As this project is supported by the United Nations Development Programme (UNDP) in its role as a GCF Accredited Entity, the project has been screened against the UNDP’s Social and Environmental Standards Procedure and deemed a Moderate Risk (World Bank/International Finance Corporation Category B) project. As such, an ESAR has been prepared for the project. Chapter Eight (6) of the ESAR provides the Environmental and Social Management Plan (ESMP) for the project.

The Ministry of Rural Rehabilitation and Development (MRRD) as executing entity will lead the project. The MRRD will be supported by a Project Steering Committee (PSC) for the implementation of the project and compliance with this ESAR and ESMP.

The objective of the project is to prepare the ground-work for rural renewable energy market transformation in Afghanistan through a combination of targeted de-risking activities to address key mini-grid investment risks. These activities include: (1) policy and regulatory design, setting the basis for public and private sector financing, (2) capacity building and awareness raising of both the public, private sector and end-users, and (3) development of investment design reports, including green procurement procedures and safeguards, for 5 rural renewable energy mini-grids (3 solar, two hydro; total 3.8 MW) as well as implementation (installation) of three proof-of-concept solar mini-grid pilots (total capacity to be directly installed is 2.6 MW). This ESAR contains site-specific information, environmental and social impact assessment for these three mini-grids as far as available. These three projects are very similar and where differences in the design exist, these are explained in all relevant sections of this ESAR. The Detailed Project Reports for each of these projects contain sections on Environmental and Social Impact Assessments. During implementation, each Project will be re-screened with the UNDP SESP as needed in the course of required assessments or stand-alone management plan; when determined necessary by the Project Manager, Safeguards Officer, the Project Steering Committee, or UNDP; as outlined in the resulting management plan(s); and/or when project circumstances change in a substantive or relevant way.

This approach will create the basis for mainstreaming renewable energy mini-grid solutions and continued reduced GHG emission as compared to the alternative, diesel generated power. The project will result in 91,104 tCO₂eq reduction (direct mini-grid related savings) and can have indirect Technical Assistance (TA) related savings of 3,277,504 tCO₂eq reduction as a result of the de-risking package introduced in the project. The implementation of three proof-of-concept solar mini-grid pilots will thereby address enhanced resilience to climate change impact for 49,000 beneficiaries, of whom 23,500 are women.

The project with all mitigation measures in place has the potential to cause moderate environmental and social impacts. These include the acquisition of some agricultural land for the installation of PV systems and associated buildings, the safe disposal and/or recycling of batteries and solar panels (hazardous waste) after the end of their lifespan and the exhaustion emissions of back-up diesel generators. The electricity distribution lines (medium voltage) in the currently planned design would cause a high risk of electrocution of birds. This risk has to be mitigated to a large extent by constructing all distribution lines in a bird-safe design. Transformation of land cover for the construction of PV mini-grids is considered minimal by area and intensity of impact and will not cause significant permanent loss of vegetation.

The project does not require any resettlement. Land acquisition is required in only one location with privately used land available only, which will be fully compensated and livelihoods sustainably restored. No land acquisition is required in the other project sites since government owned land can be used for the PV construction works. Neither individual nor community livelihoods will be negatively altered by the project, but the access to electricity from alternative sources will improve the livelihoods of the target groups, while future expansion and replication will benefit more people. There are no indigenous peoples located within the project areas.

The project has developed a Grievance Redress Mechanism to deal with any complaints and issues that may arise as a result of the project. This Grievance Redress Mechanism complies with Afghanistan and UNDP Safeguard procedures.

Appropriate and relevant avoidance and mitigation options have been prescribed in the ESAR, which, if put in place, will significantly reduce the potential impacts of the project to an acceptable level. Moreover, the project will have significant environmental and social benefits that will be achieved more generally.

Budgeting for environmental and social interventions and the application of mitigation measures to enhance positive impacts for the project is an investment in the future. The end result of this budget will be that there will be avoided negative impacts on environment (in particular related to land acquisition, waste management and conservation of bird populations), stronger and improved resilience to the impacts of climate change, healthy ecosystems, more knowledgeable communities and overall improvement in the quality of life of the population as an investment in the future of the people of rural areas of Afghanistan. The project has a high replication potential and the avoidance and mitigation activities prescribed in this ESAR and ESMP can be implemented in similar situations. The required design changes for making medium voltage (MV) distribution lines bird-safe are to be used for the revision of the standards on such lines to mitigate this substantial threat to bird populations all over the country, including migratory bird populations and endangered species.

1 INTRODUCTION

1. This Environmental and Social Assessment Report (ESAR) has been prepared in support of a project proposal for “Afghanistan rural energy market transformation initiative - Strengthening resilience of livelihoods through sustainable energy access” by the Government of the Islamic Republic of Afghanistan (GoIRA) to the Green Climate Fund (GCF). As this project is supported by UNDP in its role as a GCF Accredited Entity, the project has been screened against UNDP’s Social and Environmental Standards Procedure and deemed a Moderate Risk (World Bank/International Finance Corporation Category B) project. As such, an ESAR has been prepared for the project. Chapter 6 of the ESAR provides the Environmental and Social Management Plan for the project.
2. The Ministry of Rural Rehabilitation and Development (MRRD) of the Government of the Islamic Republic of Afghanistan (GoIRA) with support from UNDP, is formulating a project on climate change mitigation and adaptation to climate change impacts, the “Afghanistan rural energy market transformation initiative - Strengthening resilience of livelihoods through sustainable energy access” for submission to the GCF.
3. Afghanistan is a landlocked, mountainous country in South-Central Asia that is recovering from decades of civil war. It occupies 652,000 square kilometres and borders Pakistan (East and South); Iran (West); Turkmenistan, Uzbekistan, and Tajikistan (West, North) and China (North-East). The population of Afghanistan was estimated to be 29.7 million in 2017-18¹ (though another source estimates it as 34.18 million in 2017²) and the Gross Domestic Product (GDP) is US\$19.469 billion (2016)³. The country is divided into 7 regions and 34 administrative provinces, with 73% of total population living in rural areas.
4. The climate in Afghanistan is characterized by semi-arid to arid continental type with hot dry summers and cold winters. Precipitation is generally small, of high variability and maybe concentrated to just few days in the rainy season. Most of the precipitation received is during the winter and spring, largely in the form of snowfall. Climate change scenarios for Afghanistan suggest⁴ temperature increases of 1.4-4.0°C by the 2060s, and 2.0-6.2°C by the 2090s (from 1970-1999 averages), and a corresponding decrease in rainfall and more irregular precipitation patterns. The biophysical effects of climate change are expected to be significant; droughts are likely to be the norm by 2030 leading to associated dynamics of desertification and land degradation; decreasing snow cover leading to depletion of water resources; dryer conditions and rising temperatures adversely affecting agricultural pattern and yields; aggravating the damage of forests and rangelands already caused by overgrazing of livestock and fuel wood needs.
5. Impacts of climate change on three major affected (and inter-related) sectors are described below:
 - i. **Agriculture:** There is evidence that the agriculture sector is highly vulnerable to increased temperatures and changes in rainfall/snowfall patterns and snow melt. Increased soil evaporation (resulting in moisture stress), reduced river flow and less frequent rain during peak cultivation seasons are already affecting agricultural productivity and crop choice options. Crop failure level is increasing due to insufficient rainfall in rain-fed areas (*lalmi*) and water shortages in irrigated areas. Furthermore, increasingly rangeland degradation, conversion into low-productivity *lalmi* fields and topsoil erosion caused by this reduces fertility and carbon storage capacity of land.
 - ii. **Socio-economic development of rural poor:** The poor are the most vulnerable to the effects of climate change in Afghanistan. Climate change is likely to compound existing chronic and acute food security issues. Direct effects of this will be more pronounced on populations who depend on agriculture for their livelihood and economic activities, but increases in food prices will also affect

¹ Central Statistics Organisation (CSO), Afghanistan Population Estimates 2017-18 <http://cso.gov.af/Content/files/نخمين نفوس/Final Population 1396.pdf>

² The World Bank <http://data.worldbank.org/country/afghanistan>

³ UNDP, Human Development Report 2016 http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/AFG.pdf

⁴ Landell Mills 2016. Feasibility Study for the Panj-Amu River Basin Project (DCI-ASIE/2015/361-001) Draft Final Report, Supplementary Document 13 Climate Risk Assessment and Management Report May 2016

other vulnerable groups. More specifically, the impact will be acute on women and children, on returning refugees and IDPs as well as on nomadic pastoralists (*Kochi*) and those involved in subsistence agriculture and/or transhumant pastoralism.

- iii. Water Resources: Water availability in some areas has already been drastically reduced both in terms of surface and ground water. Accelerated glacier melting has temporarily increased water availability, which is not sustainable. Changes in precipitation and flow patterns (coupled with inefficient water use) pose a serious threat to ecosystem productivity, and food production. The cumulative effects of disappearance of glaciers, more frequent and intense droughts on surface water and groundwater could threaten the water supply for entire communities (especially in arid regions), leading to a range of humanitarian crises, including disease, population displacement and conflict. Rises in winter and spring temperatures will lead to more rapid and earlier snow melt, increasing the risk of flash flooding. The impact of increasingly frequent flash floods is exacerbated by subsequent droughts.
6. Afghanistan has very low relative per capita GHG emissions. While 1990 emissions were at 0.2 metric tons CO₂ per capita, data indicates that per capita emissions were around 0.3 for 2010, making Afghanistan one of the lowest GHG emitters globally. However, the country is on a growth path, which is expected to strengthen over the coming years, meaning GHG emissions are likely to increase. Afghanistan's overall GHG emission figures demonstrate that the most important sources of CO₂ emissions are from the "Land-Use Change and Forestry" and "Energy" sectors.⁸ In terms of CH₄ and N₂O emissions, the agriculture sector is the major contributor. Afghanistan's Intended Nationally Determined Contributions (INDCs) seek a 13.6% reduction in GHG emissions by 2030 compared to a business as usual 2030 scenario, conditional on external support.⁵
7. The interrelationship of water, energy and food security is at the centre-stage of the poverty reduction and sustainable development agenda, and is central to the country's climate change response efforts spanning across mitigation and adaptation aspects. Unsustainable practices of energy extraction and use such as cutting of forests and collection of dwarf- and semi-shrubs from rangelands for fuelwood result in productivity loss, land degradation, erosion, floods and land-slides in addition to GHG emissions. The adverse impact of climate change on ecosystem services and thus on water, energy and food security creates an imbalance within this nexus and threatens the well-being and livelihoods of vulnerable communities.
8. Due to a long period of neglect and under-investment after decades of instability and war, the energy infrastructure in Afghanistan, in particular in rural areas, is now in a dire state, causing a situation in which the use of diesel and kerosene fuel is the current model for rural energy use with resulting high GHG emissions. On a binary basis, the national grid connected electrification rate is 30%⁶, which means that nearly 24.5 million people in Afghanistan⁷ are not connected to modern energy although a large part of the rural population may have some sort of electricity access, often through the use of diesel generators.
9. Access to modern forms of energy is closely linked to the ability of rural communities to enhance agricultural productivity, develop non-agricultural economic alternatives, and improve educational and health outcomes. The Afghanistan Rural Enterprise Development Programme (AREDP), which supports rural enterprises, has identified specific instances where the productivity and viability of rural industries such as agro and food processing, agriculture and apiculture have been constrained due to the lack of energy supply. Electric energy is also an important precondition for education and access to information in rural areas. Energy access for rural populations is hence, a top priority of the Government and forms the centre-piece of climate change strategies and overall national development plans.

⁵ Afghanistan's first Intended Nationally Determined Contribution or INDC, September 2015: http://www4.unfccc.int/ndcregistry/PublishedDocuments/Afghanistan%20First/INDC_AFG_20150927_FINAL.pdf

⁶ The World Bank Group, 2017. Afghanistan Country Snapshot, Washington, DC, USA

⁷ On the basis of estimated 35.5 mln population in 2017: <http://data.worldbank.org/country/afghanistan>

2 DESCRIPTION OF THE PROJECT

2.1 PROJECT DELIVERY AND ADMINISTRATION

2.1.1 Project Delivery

10. The project will be implemented following UNDP’s National Implementation Modality (NIM), according to the Standard Technical Assistance Agreement (STAA) between UNDP and the Government of Afghanistan and as per the policies and procedures outlined in the UNDP POPP.
11. The (national) Implementing Partner/Executing Entity for this project is the Ministry of Rural Rehabilitation and Development, which is accountable to UNDP for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of resources made available by UNDP. The management arrangements for this project are summarised below in Figure 1.

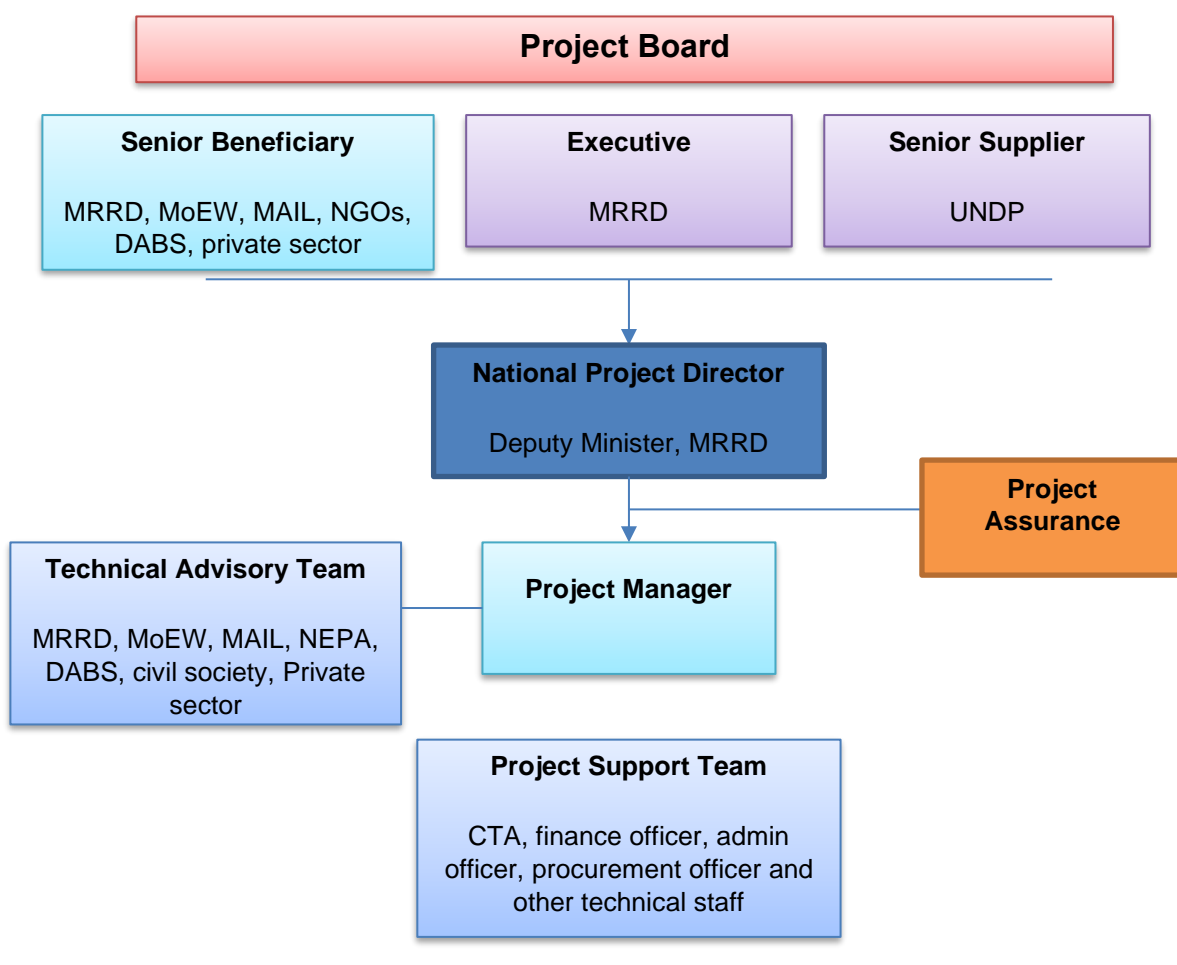


Figure 1 Project organisation structure

2.1.2 Project Board and sub-committee

12. The project will be governed by a Project Board for making consensus-based strategic and management decisions for the project. The Project Board is comprised of the National Implementing Partner and Responsible Parties:

- i. An Executive (role represented by National Implementing Partner MRRD) that holds the project ownership and chairs the Board.
 - ii. A Senior Supplier representative providing guidance regarding the technical feasibility of the project, compliance with donor requirements, and rules pertaining to use of project resources. This role will be fulfilled by UNDP in its capacity as GCF AE;
 - iii. Senior Beneficiary representatives who ensure the realisation of project benefits from the perspective of project beneficiaries; and
 - iv. the National Project Director, Deputy Minister of MRRD who is responsible for the overall direction, strategic guidance, and timely delivery of project outputs.
13. The Board will also include additional membership including representatives from relevant GoIRA ministries, Development Partners, Non-Government Organisations and the Afghanistan National Designated Authority to the Green Climate Fund. The Board will meet once every six months and/or upon a call by the National Project Director.
14. The Implementing Partner for this project is the MRRD. The MRRD is accountable to UNDP for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources.

2.1.3 National Project Management Unit

15. The PMU will be established under the MRRD to execute project activities, including day-to-day operations of the project, and the overall operational and financial management and reporting. The PMU will include the key roles identified in the organisation chart, in particular the National Project Director and the Project Manager.
16. Using established practice under NIM, the Government will designate a National Project Director (NPD) who will be the Deputy Minister of MRRD. The NPD will provide up to 50% of his/her time, and be responsible for the overall direction, strategic guidance, and timely delivery of project outputs. This position is not remunerated by GCF resources but is a Government financed position.
17. MRRD will recruit a Project Manager (PM), paid for by the project, who will be responsible for day-to-day operations and the management of a team of professionals and technical staff, including an international Chief Technical Advisor (who will also be recruited by UNDP to implement the project).
18. The Project Manager will run the project on a day-to-day basis on behalf of the MRRD within the constraints laid down by the Project Board. The Project Manager's function will end when the final project terminal evaluation report and other documentation required by the GCF and UNDP, has been completed and submitted to UNDP. The Project Manager is responsible for day-to-day management, decision-making for the project and the management of a team of professionals and technical staff (who will also be recruited by UNDP to implement the project). The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.
19. The PMU will include a designated safeguards officer. The project Safeguards Officer is responsible for overseeing implementation of the ESMP and required environmental and social risk management actions.
20. Roles and responsibilities of the Safeguards Officer in the Project Management Unit are specifically:
- Supervise and manage implementation of measures defined in this ESMP;
 - Carry out all specific responsibilities for implementation of this ESMP, including monitoring, and community consultations on the draft management plan(s);
 - Maintain relevant records associated with management of environmental and social risks, including updated SESP, impact assessments, evidence of consultations and FPIC, a log of grievances together with documentation of management measures implemented;

- Report to the Implementing Partner, the Project Board on the implementation of the ESMP;
 - Ensure that all service providers are informed of their responsibilities for the day to day compliance with the ESAR/ESMP.
21. UNDP will perform the project assurance role in line with the requirements outlined in the AMA. This includes management of funds, programme quality assurance, fiduciary risk management, timely delivery of financial and programme reports to GCF and other requirements as per the AMA. The MRRD will implement the project. UNDP will manage the funds from GCF, and will disburse based on the direct payment modality.
22. The Technical Advisory Team (TAT) consists of technical level staff from all Ministries and NGOs, represented on the Project Board. It will provide the platform for debate and contributions across the project outputs at a more technical and working level.

2.1.4 Regulation, taxation and insurance

23. The implementation of mini-grids and the investment design reports will comply with green procurement and safeguards standards in order to meet regulatory requirements once mini-grids will be implemented.
24. Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter alia, that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for utilities services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. Also, the goods and services procured directly by Government of Afghanistan implementing partners are exempt from customs duties and will be tax free. All the project procurement/inputs will be tax free.
25. There are no specific insurance policies relevant for the project activities.
26. An MoU between MRRD and MEW is in place which promotes a strong collaboration on energy development issues. No agreements are in place at this point with other stakeholders but where needed may be drafted during project implementation.

2.1.5 Training

27. Delivery organisations have the responsibility for ensuring systems are in place so that relevant employees, contractors and other workers are aware of the environmental and social requirements for construction, including the ESMP.
28. All project personnel will attend an induction that covers health, safety, environment and cultural requirements.
29. All workers engaged in any activity with the potential to cause serious environmental harm (e.g. handling of hazardous materials) will receive task specific environmental training.

2.2 DESCRIPTION OF THE PROJECT ACTIVITIES

2.2.1 Background and Rationale

30. Only around one-third of the Afghan population has access to modern and clean energy while in the rural areas most communities are not connected to the electricity grid. Afghanistan's 30% electrification rate makes it one of the lowest in Asia. Electricity use in Afghanistan for the year 2015 was 4,773.33 Million kWh. At a population of 29.7 million⁸, the per-capita annual usage is about 141 kWh⁹.

⁸ Central Statistics Organisation (CSO), Afghanistan Population Estimates 2017-18 <http://cso.gov.af/Content/files/تخمین نفوس/Final Population 1396.pdf>

⁹ <https://www.worlddata.info/asia/afghanistan/energy-consumption.php>

31. Over 97% of the rural population is estimated to use solid fuels (i.e. firewood, dwarf- and semi-shrubs, dung cakes, crop residues), often combusted in inefficient devices to meet space heating and cooking needs, leading to high costs and severe effects on health, particularly for women and children. As a result, Afghanistan is among the top 10 countries worst affected by indoor air pollution¹⁰ which is the biggest cause of premature deaths in the country (estimated at 54,000 per year according to the World Health Organisation-WHO)¹¹. The United Nations Environment Programme (UNEP) estimates that at the current rate of wood consumption and deforestation, Afghanistan's forests will disappear within 30 years. The collection of dwarf- and semi-shrubs from rangelands causes deterioration of forage for livestock, loss of ecosystem resilience, functions and services and leads to reduced ground water retention, increased soil erosion, floods and landslides.
32. Total installed generation capacity (domestic and imports) available to Afghanistan is approximately 1,504.6 MW, of which 60% consists of imports. Large rural areas will unlikely be connected to the grid during the next decades, due to remoteness, difficult terrain and resulting required high investment costs per client. Off-grid installed renewable capacity is close to 55 MW (52.9 MW micro-hydro power plants – MHPs and 2.1 MW of solar and others)¹². Out of the total 605 MW installed capacity, 56% is thermal (diesel and furnace oil) with a generation cost of USD0.25-0.35 per kWh, which is four times that of imported electricity. The remaining 44% (254 MW) is from hydropower, which is largely seasonal. The baseline option for meeting increased energy demand in rural areas, as their income levels grow, is likely to be the diesel generated power in the absence of clean alternatives. Among the alternative options for energy access, renewable energy (RE) systems offer the best opportunity to serve the rural communities by leveraging Afghanistan's abundant natural resource potential without cost-prohibitive grid extension or GHG-intensive diesel systems.
33. Afghanistan has plentiful renewable energy resource potential¹³. The hydropower potential in the country is estimated at 25,000 MW, of which the near-term potential of micro-hydro and mini-hydro is estimated to be 800 MW. Solar energy resources are also promising, with over 300 sunny days in a year with annual average insolation levels of 4.7 to 5.47 kWh/m². Afghanistan has good wind energy resources, with measured annual average wind speeds of 4.3 to 5.6 m/s at 10 m height. The country generates significant amounts of biomass resources which could be converted for thermal or electrical energy purposes. These biomass resources include 6.8 million tonnes/year of crop residues, 34 million tonnes/year of animal manure and 0.6 million tonnes/year of municipal solid waste.
34. Renewable energy (RE) development is a focus area for the country's developmental plans. Renewable energy development is a focus area for Country's National Appropriate Mitigation Actions (NAMA), Climate Change Strategy and Action Plan (CCSAP), and the Intended Nationally Determined Contribution (INDC). The foundation of the RE development is based upon the Afghanistan National Development Strategy (ANDS) which provides the overall vision and goals of the energy sector¹⁴, Power Sector Master Plan (PSMP) that provides the overall status and priorities of power sector network planning and expansion, including identification of regions where network expansion is not economically viable, and the National Energy Supply Program (NESP), which provides directions for strengthening energy institutions, private sector participation, capacity building and regulatory framework development. The Afghanistan Renewable Energy Policy (RENAP) is a comprehensive and overarching policy document to promote the RE sector in the country, setting a target of 5000 MW of additional generation capacity using RE. Mini-grids for rural electrification are considered as high priority sector in RENAP.
35. Liberalization is planned in energy generation (allowing privately-owned power plants to generate and sell electricity into the grid under a contract with the national electricity utility Da Afghanistan Breshna Sherkat (DABS)) followed by distribution (allowing privately sector operators to operate their own distribution in areas not served by the grid). Several Independent Power Producers (IPPs) are already

¹⁰ http://www.who.int/indoorair/health_impacts/burden_national/en/

¹¹ WHO, 2009: Country profile of Environmental Burden of Disease
http://www.who.int/quantifying_ehimpacts/national/countryprofile/afghanistan-rev.pdf

¹² <http://red-mew.gov.af/red/index.php/login> assessed August 2016 & Energy Sector Status Summary Report Q2 2016- MoEC/ICE

¹³ *ibid*⁴

¹⁴ Afghanistan National Development Strategy (ANDS) and National Energy Supply Programme (NESP)

in the planning phase of new energy project development, in both conventional and renewable energies. The regulatory framework for private sector involvement in energy generation has been largely established and applications for generation licenses are underway¹⁵. As per the RER2032¹⁶, business and investment models are being developed for RE projects, both utility scale and off-grids, including for mini-grids.

36. The barriers to realizing the full potential of RE for rural energy access in Afghanistan can be described under two broad but interrelated categories – lack of financing and institutional mechanisms to involve private sector both in the short term and long term; and inadequate technical and market knowledge to design and implement innovative projects. The GCF interventions are required for addressing these barriers in an effective and timely manner so that maximum GHG emissions reductions are realized now, and in future, rural renewable energy markets are transformed, adaptive capacity of rural poor is strengthened, and a low-carbon development strategy for Afghanistan is enabled.
37. The objective of the project is to prepare the ground-work for rural renewable energy market transformation in Afghanistan through a combination of targeted de-risking activities to address key mini-grid investment risks. The project will create the necessary conditions via policy and regulatory strengthening, as well as institution and capacity building of government, beneficiaries and the nascent domestic private sector RE mini-grid developers. The project will also develop investment design reports ready for implementation, including green procurement and environmental safeguards, for 5 mini-grids (3 solar, 2 hydro; total 3.8 MW), with the intent these then lead to either public or private investment, with private sector engagement encouraged. The project will further provide proof-of-concepts for future reference by means of the implementation of 3 solar mini-grids with a total installed capacity of 2.6 MW in the provinces of Kandahar, Parwan and Khost. Ultimately, the project aims to contribute, in a phased approach, to scaled-up deployment of mini-grids in Afghanistan, with the eventual, end-goal of large volumes of investment by the private sector on commercial terms.
38. De-risking is the central mechanism by which this project will act. Public de-risking measures can improve the risk-return profile of investment opportunities in three ways: policy de-risking instruments (that reduce risk), financial de-risking instruments (that transfer risk) and direct financial incentives (that compensate for risk). Policy de-risking measures, which address the underlying barriers that create investment risks, can be a cost-effective first step in creating an enabled investment environment. These instruments utilize policy and programmatic interventions to mitigate risks related to e.g. permits and approvals, generation licences, land rights and address overlapping institutional responsibilities, lack of staff capacities and knowledge. Given the nascent and early-stage of mini-grids in Afghanistan, the project will therefore primarily focus on a policy de-risking approach but will also prepare a framework for follow-up financial de-risking and financial incentives and pave the way for forthcoming investment.
39. In order that the project's design takes a systematic approach, the project utilizes the taxonomy of mini-grid investment risks developed under UNDP's DREI (De-risking Renewable Energy Investment) framework¹⁷. The project targets in particular the following investment risk categories, defined as follows:
 - i. *Energy Market Risk*: Risk arising from limitations and uncertainty in the energy market regarding market outlook, access (regulations), price (tariffs) and competition;
 - ii. *Social Acceptance Risk*: Risks arising from lack of awareness and resistance to renewable energy and mini-grids in end-users and communities;
 - iii. *Labour Risk*: Risks arising from the lack of skilled and qualified potential employees at mini-grid operators (including, engineering, customer acquisition, operations/maintenance);

¹⁵ Five-year Energy Sector Development Plan (2016-2020), 2016

¹⁶ Renewable Energy Roadmap 2032 (RER2032), ADB, March 2017

¹⁷ UNDP & ETH Zurich (2018). Derisking Renewable Energy Investment: Off-Grid Electrification. United Nations Development Programme, New York, NY and ETH Zurich, Energy Politics Group, Zurich, Switzerland

- iv. *Developer Risk*: Risks arising from limitations in the mini-grid operator's management capability (system sizing and design, business model selection), and its creditworthiness and cash flow.
40. The project is comprised of three Outputs which will occur in parallel. The **first Output**, addressing Energy Market Risk, focuses on strengthening the enabling institutional and regulatory framework for mainstreaming rural renewable energy markets by undertaking a set of 4 activities. These are i) Regulations for mini-grids and tariff mechanisms and structure developed and approved ii) Technical standards and guidelines developed for design and operation of mini-grids iii) Policy on fostering institutional reform and coordination mechanism among responsible institutions for mini grid development developed and iv) A framework for financial de-risking and financial incentives for RE mini-grids designed. The **second Output**, addressing Social Acceptance Risk and Labour Risk, comprises of capacity building of all relevant stakeholders as well as institutionalizing training for future sustainability. Specific activities include i) Capacity strengthening activities designed and delivered for government entities on technical, managerial, administrative and financing aspects of RE mini-grids ii) Capacity strengthening activities designed and delivered for non-energy institutions and beneficiaries on rural RE mini-grid systems iii) Capacity strengthening activities designed and delivered for private sector/RESOs on designing, operating and maintaining mini-grids and iv) Training institutionalized, and knowledge platform developed. The **third Output**, addressing Developer Risk, will prepare investment design reports ready for implementation for 5 mini-grid sites, and will develop accompanying green procurement and safeguards standards for mini-grids. The project will further provide proof-of-concepts for future reference by means of the implementation of 3 solar mini-grids with a total installed capacity of 2.6 MW in the provinces of Kandahar, Parwan and Khost. Activities are i) Green procurement policy for mini-grids developed and mainstreamed ii) Social and environmental safeguards policy for mini-grids developed and mainstreamed iii) Investment design reports for 5 mini-grids enabling direct government procurement or future private sector tendering iv) Implementation of 3 solar mini-grids with RESOs responsible for O&M.
41. The project is designed to be pan-Afghan, with an approach that overcomes the limitations of isolated and one-off efforts thus far. Target communities have been selected after a pan-Afghan survey of 54 sites across 32 of the country's 34 provinces¹⁸. Site selection for the implementation of 3 solar mini-grids and 5 investment design reports was based on analysis of demand and supply patterns, potential loads, ability to pay for energy services, the national grid extension plan from DABS¹⁹ and a security assessment on the basis of UN Security Map. The selected 8 sites implementation of 3 solar mini-grids and developing mini-grid investment design reports will provide an optimum contribution to the intended paradigm shift of the project as they are broadly spread throughout Afghanistan. Moreover, the 8 sites were selected on the basis of their potential for productive use and willingness to pay, thereby favouring successful deployment of RESCO services. Pre-feasibility studies conducted for all these 8 sites described the demographic and socio-cultural aspects as well as energy baseline scenarios of these communities. Accordingly, the total combined population of these sites is estimated to be 112,720 (around 19,708 households), representing 4.5% (2015) of the total population of selected provinces. Of the total, 47% is female population. All selected sites have good presence of enterprises (tailoring shops, vegetable oil extraction units) and agricultural applications. Each site has a primary health centre, school and mosques. Most sites have police stations present at their locations. The project will benefit all of these enterprises and institutions²⁰. Figure 2 details the selected locations.
42. (See Project Proposal and Feasibility Study for additional information on the main characteristics of the areas served with the mini-grids.)

¹⁸ A detailed description of the site selection process is presented in Chapter 7 of the Pre-Feasibility Study

¹⁹ Da Afghanistan Breshna Sherkat (DABS) is the national power utility in Afghanistan

²⁰ Feasibility Report- Strengthening resilience of livelihoods through sustainable energy access- Afghanistan Rural energy market transformation initiative- Annexure II

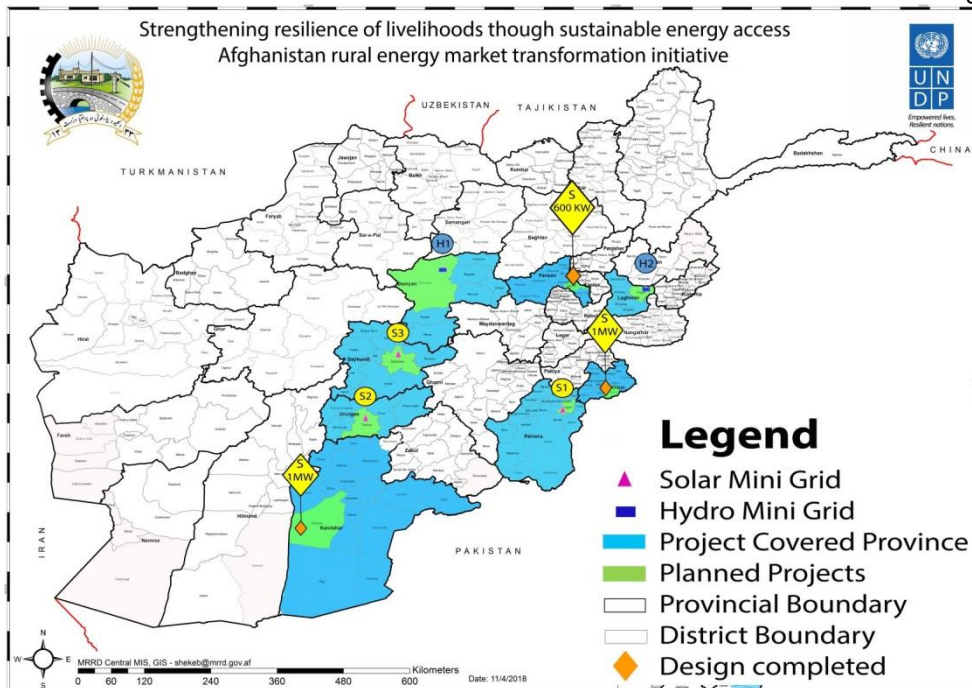


Figure 2 Map of the provinces and districts with planned mini-grids

2.2.2 Summary of Activities

43. The proposed project will have the following two outputs:

Output 1 – Energy Market Risk mitigated/removed through policy, regulatory and institutional development for improved renewable energy (RE) services in rural areas;

Output 2 – Capacity and engagement of the existing and potential mini-grid market actors and stakeholders strengthened on RE mini-grids;

Output 3 – Construction of 3 greenfield solar mini-grids and set-up of an “upscaling platform” to facilitate additional mini-grid investments.

44. For achieving Output 1 the project will implement the following activities:

Activity 1.1 – Regulations for mini-grids and tariff mechanisms and structure developed and approved;

The first activity under this output deals with developing a mini-grid policy that will institutionalize and support the development of RE mini-grids in the country for the purpose of rural electrification. The mini-grid policy will be developed through a consultative process by involving public sector players Ministry of Rural Rehabilitation and Development (MRRD), Ministry of Energy and Water (MEW), DABS, beneficiaries and private sector players of the Afghanistan Renewable Energy Union (AREU), and will address alignment with the National Energy Supply Program (NESP) and Renewable Energy Policy (RENAP), permits and approvals, generation licensing, land rights, rural electrification strategies and institutional arrangements. Close cooperation between MRRD and MEW to define clear roles and responsibilities as well as collaboration with Ministry of Health (MoH), the Ministry of Education (MoE) and the Ministry of Interior (MoI) is needed so that electricity delivery to health centres and posts, schools, police stations and outposts and street lights in rural areas are part of the policy development. The policy will signal the Government’s intent to encourage RE in rural energy markets and will provide a direction for private sector participation. This will set the foundation for rural renewable market transformation.

Activity 1.2 – Technical standards and guidelines developed for design and operation of mini-grids;

Energy market risks can also comprise of uncertain market regime with regard to standards required for certain technology implementation. Technical standards can create a common understanding and basis of expectations among developers, operators, regulators and consumers on the various levels of acceptable service delivery including technical, safety, cost and reliability issues. Under this output, a set of technical standards and guidelines for mini-grids will be developed in relation to material choice, system design and service level for generation equipment, distribution grid, and electricity service standards and purposefully designed for rural contexts in Afghanistan.

This project will undertake a review of existing technical standards and needs assessment for complementary standards for mini-grid development that will inform the development of the technical standards for mini-grids. The project will develop/update draft technical standards and guidelines for design and operation of mini-grids (generation equipment, distribution grid, and electricity service standards) purposefully designed for rural contexts. The draft technical standards for design and operation for mini-grids will be discussed by conducting workshops in all relevant regions in a consultation process involving MRRD, MEW, DABS, and market actors of AREU and beneficiaries. The finalized technical standards and guidelines will be approved by the government and be disseminated in workshops in all relevant regions as well as through regular government communication channels.

Activity 1.3 – Policy on fostering institutional reform and coordination mechanism among responsible institutions for mini grid development drafted;

Given that most of rural Afghanistan is not connected to the national grid, a dedicated rural electrification department shall provide greater focus on meeting the rural power shortage scenario. In order to supplement and compliment DABS (Da Afghanistan Breshna Sherkat), the national power utility in Afghanistan, the project will initiate the creation of a separate Rural Electrification Department (under DABS) (RED) that will be capacitated to design, plan and implement rural electrification projects mainly based on RE technologies. The RED will undertake all activities related to rural electrification including site identification, land acquisition, raising and managing finances and regulatory approvals, including support to local enterprises such as RESCOs.

In order to guarantee clear roles and responsibilities of the MEW and the MRRD in line with new responsibilities of the Rural Electrification Department (under DABS), the project will assist in the establishment of an effective coordination mechanism amongst these institutions as an important step to ensure synchronized development of the sector.

Activity 1.4 – Framework for financial de-risking RE mini-grids designed.

The project proposes to design a framework for financial de-risking and/or financial incentives for RE mini-grids, on the basis of detailed techno-economic analyses, including a DREI analysis simulation²¹. The framework will essentially be a viability gap funding mechanism, which will recommend the most cost-effective instruments and design, for example concessional financing and/or direct grants (capital subsidy, tax incentives), to achieve the requisite financial viability. This viability gap funding mechanism will be discussed in light of Afghanistan Government's discussions on setting up a Renewable Energy Fund. The most promising funding strategy for financial de-risking and financial incentives of RE mini-grid development will be further elaborated to explore potential government and climate finance.

45. For achieving Output 2 the project will implement the following activities:

Activity 2.1 – Capacity strengthening activities designed and delivered for government entities on technical, managerial, administrative and financing aspects of RE mini-grids;

The project will start the process of building and strengthening of institutions as a pre-requisite for developing the RE sector in Afghanistan. This involves strengthening of capacities across MEW, MRRD and other key ministries and provincial governments on technical, managerial, administrative and

²¹ More information on the DREI methodology for mini-grids can be found at www.undp.org/DREI

financing aspects of RE projects. Strengthening of monitoring capacities in the National Environment Protection Agency (NEPA) will allow for adequate monitoring of project results.

As there is no real standard method on how to estimate the contribution of off-grid electrification to greenhouse gas emission avoidance, its potential role as a mitigation option may be underestimated in official greenhouse gas reporting. The project will therefore develop a system for GHG monitoring, verification and reporting to UNFCCC and train the capacities of NEPA in order to be able to take up the responsibilities related to reporting off-grid GHG emission reduction contribution.

Activity 2.2 – Community commitment and local business interest activities designed and delivered for beneficiaries of 3 solar RE mini-grid systems;

For the 3 solar mini-grids that will be implemented in the project as well as for the five mini-grids to be designed under Activity 3.2, where community involvement is essential for successful operation and increasing the potential of productive use, the project will need to consult extensively with the local community regarding their interest in off-grid electrification solutions systems and their willingness to volunteer labour and land as needed. Local businesses play an important role in productive uses of energy and will need to be capacitated in understanding the economic potential that RE mini-grids can offer.

Activity 2.3 – Capacity strengthening activities designed and delivered for private sector/RESCOs on designing, operating and maintaining mini-grids;

In this project, Renewable Energy Service Companies (RESCOs), selected by the MRRD through a solicitation and due diligence process, will be supported and trained, in order to grow a nascent private sector mini-grid industry in Afghanistan. The services of a RESCO can vary from functioning as a mini-utility that combines both generation and distribution of electricity or it can have a more limited scope whereby one (government) entity is responsible for generation whereas the RESCO functions as the distributor, selling the electricity to consumers and servicing operation and maintenance costs. A full scale RESCO can also undertake pre-project activities such as site selection, load and enterprise development, feasibility study preparation and engineering design. Apart from the RESCO model, some other proven models such as pay-as-you-go, would also be explored for development in the Afghanistan market.

Capacity building of the private sector will focus on technical training for RE developers and RE service providers on various aspects of rural RE mini-grids such as system sizing, design and installation, business models and the critical role of productive uses. Training of local technicians for O&M of solar mini-grids as well as operators' and administrators' manuals in local languages will be part of this activity.

46. For achieving Output 3 the project will implement the following activities:

3 greenfield solar mini-grids in the Kandahar, Parwan and Khost regions, for a combined capacity of 2.6 MW, providing electricity to approx.7,800 households (49,000 people) and 1,050 small businesses (more technical details – see section 2.2.3):

Activity 3.1 – Construction of 3 greenfield solar mini-grids;

The project will implement 3 greenfield solar mini-grids for a total capacity of 2.6 MW, requiring a total capital investment (capex) of USD 12.4 million. The table 1 below provides an overview of the 3 mini-grids.

The 3 solar mini-grids will be located in 3 districts of 3 provinces. The specific locations (village or site name, coordinates – latitude and longitude in decimal degrees), estimated technical potential capacity as presented in the design are presented in table 2.

Table 1 Overview of the RE mini-grids

| Mini-grid location (province): | Kandahar | Parwan | Khost |
|--------------------------------|----------|--------|-------|
|--------------------------------|----------|--------|-------|



| Capacity | 1.0 MW | 0.6 MW | 1.0 MW |
|--|---|---|---|
| Number of beneficiaries | 2,081 households (14,500 people) and 516 commercial users | 2,000 households (12,000 people) and 142 commercial users | 3,725 households (22,500 people) and 400 commercial users |
| Capex (years 1-2) | \$4.4m | \$3.5m | \$4.5m |
| Battery replacement cost (year 16) | \$1.75m | \$1.25m | \$0.9m |
| Affordable tariff – residential (\$/kWh) | \$0.10 | \$0.10 | \$0.10 |
| Affordable tariff – commercial (\$/kWh) | \$0.20 | \$0.20 | \$0.20 |
| Annual revenues at full capacity | \$230,000 | \$125,000 | \$220,000 |
| Annual O&M fees paid to operator | \$77,000 | \$60,000 | \$77,000 |
| IRR without concessionality (25-year) | -6.4% | -13.3% | -4.6% |
| GCF grant required for >20% IRR | \$3.8m | \$3.2m | \$3.9m |
| Grant as % of capex | 86% | 92% | 87% |

The mini-grids will be owned by the Ministry for Rural Development (MRRD) and operated by private sector companies under simple outsourcing contracts. The construction of the mini-grids will be outsourced to separate construction contractor(s). Both the operator(s) and construction contractor(s) will be selected based on competitive tenders designed by the project.

Table 2 Selected Locations for RE mini-grids

| Running number | Province | District | Location (village or site name) | Latitude/Longitude of electricity generating facility (Lat./Long) | Technical potential capacity ¹ (kW _p) | Capacity of backup and supportive diesel generators (kW) |
|----------------|--------------|------------|---------------------------------|---|--|--|
| S5 | Kandahar | Panjawayee | Panjawayee | N 31.538342° E 65.477868° | 1000 | 425 + 75 |
| S6 | Khost | Gurboz | Sheikhamir | N 33.277°, E 69.931° or N 33.294326° E 69.919498° | 1000 | 330 |
| S9 | Parwan | Bagram | Turkman Qalandar khil | N 34.99°, E 69.28° or N 34.98589° E 69.26669° | 600 | 300 + 75 |
| | Total | | | | 2,600 | 1,205 |

Note: Coordinates of sites refer to approx. locations of PV systems and accessory buildings.

The locations of the mini-grids are such that connections to the DABS grid and, therefore, any purchase power agreement with DABS, are not foreseen in the near or medium future. Electricity will be sold directly to customers, with MRRD – as mini-grid owner – bearing revenue risk. The mini-grid tariff levels have been determined through affordability surveys already conducted in the target communities. Specifically, the tariff would result in monthly electricity bills (based on reasonable estimates of consumption for lighting and basic appliances) that are comparable to the cost currently incurred to household energy use on the basis of kerosene. The residential tariff is also higher than the highly-

subsidized USD 0.07/kWh tariff currently applied by DABS to households connected to the grid elsewhere in Afghanistan. Users will also pay a connection fee to MRRD to cover the cost of meters and their installation.

Table 3 presents the beneficiaries – households and individuals, number of public facilities like schools, health centres, mosques and public centres, number of small and medium enterprises, including retail shops, oil extraction mills, flour mills, carpentry and tailor workshops as well as mobile telephone towers and existing water pumps with diesel generators, which are used for irrigation purposes. Most pumps at sites with planned PV are used for abstracting ground water for irrigation and other needs, while few pumps in these areas might also be used for lifting surface water from rivers and canals.

This ESAR contains site-specific information, environmental and social impact assessment for these three mini-grids as far as available. These three projects are very similar and where differences in the design exist, these are explained in all relevant sections of this ESAR. The Detailed Project Reports for each of these projects contain sections on Environmental and Social Impact Assessments. During implementation, each Project will be re-screened with the UNDP SESP as needed in the course of required assessments or stand-alone management plan; when determined necessary by the Project Manager, Safeguards Officer, the Project Steering Committee, or UNDP; as outlined in the resulting management plan(s); and/or when project circumstances change in a substantive or relevant way.

Table 3 Main characteristics of RE mini-grids and areas served with electricity

| Running number | Province | House Holds | Population | Schools | Health centers | Mosques | Police stations | Public Centers/Gov't | SMEs | | | | | Telephone towers | Existing Diesel Water Pumps |
|----------------|--------------|--------------|---------------|-----------|----------------|------------|-----------------|----------------------|-------------------------------------|----------------------|-------------|-----------------|-----------|------------------|-----------------------------|
| | | | | | | | | | Retail shops and similar businesses | Oil Extraction mills | Flour mills | Carpentry/Metal | Tailor | | |
| S5 | Kandahar | 2,081 | 14,500 | 2 | 2 | 69 | 11 | 2 | 304 | 1 | 4 | 58 | 45 | 4 | 300 |
| S6 | Khost | 3,725 | 22,500 | 7 | 3 | 82 | 2 | 5 | 284 | 0 | 3 | 0 | 10 | 5 | 590 |
| S9 | Parwan | 2,000 | 12,000 | 3 | 1 | 44 | 3 | 2 | 91 | 0 | 34 | 12 | 17 | 2 | 46 |
| | Total | 7,805 | 49,000 | 12 | 6 | 195 | 16 | 9 | 670 | 1 | 41 | 70 | 72 | 11 | 936 |

Note: Data from Detailed Design Reports, figures in italics are from the pre-feasibility study.

Activity 3.2 – Set-up of knowledge platform;

The project aims to create the conditions for scalability in the form of additional solar mini-grid implementations. Evidence of success and lessons learnt from the 3 mini-grids implemented by the project should also facilitate fund-raising from a wider range of donors and, subject to the macroeconomic and security developments in the country, possibly also commercial or impact investors. Scalability will be facilitated by: (i) the production of step-by-step guidelines on solar mini-grid implementation, for MRRD use; (ii) the set-up of an online platform to share KPIs and lessons learnt on solar mini-grid development specifically tailored to Afghanistan, based on data collected from the 3 initial mini-grids; and (iii) the development of an additional 5 hydro and solar mini-grids designs in pre-identified areas of Afghanistan, for ready implementation by MRRD and to facilitate fund-raising from other donors or investors.

Table 4 Characteristics of proposed additional RE mini-grids

| Running number | Province | Solar | Latitude /L | House | Population | SC | Health | M | Pu | Retail | Technical pote | Annu |
|----------------|----------|-------|-------------|-------|------------|----|--------|---|----|--------|----------------|------|
|----------------|----------|-------|-------------|-------|------------|----|--------|---|----|--------|----------------|------|

| | | | | | | | | | | | | |
|----|----------|-------|------------------------|---------------|---------------|-----------|-----------|-----------|----------|------------|---|---------------------|
| | | | | | | | | | | | | |
| H1 | Bamian | Hydro | 34.980203 66.579163 | 1,600 | 10,050 | 2 | 1 | 12 | 0 | 67 | 400 | 1,401 |
| H2 | Laghman | Hydro | 34.790762 70.102027 | 2,700 | 15,700 | 4 | 1 | 10 | 3 | 79 | 900 | 3,153 |
| S1 | Paktika | Solar | 33.22199 68.77170 | 2,272 | 9,890 | 4 | 2 | 35 | 4 | 148 | 750 | 1,182 |
| S2 | Urozgan | Solar | 32.656752 65.912076 | 3,800 | 23,300 | 3 | 0 | 29 | 1 | 63 | 1,000 | 1,577 |
| S3 | Daikundi | Solar | 33.7844 66.71814 | 1,530 | 4,780 | 6 | 8 | 2 | 0 | 77 | 750 | 1,183 |
| | | | | 11,902 | 63,720 | 19 | 12 | 88 | 8 | 434 | Hydro: 1300 kW Solar: 2500 kW <u>3800 kW</u> | <u>8,497</u> |

Activity 3.3 – Green procurement policy for mini-grids developed and mainstreamed;

The project will therefore develop a green procurement policy for mini-grids procurement, using guidance from ISO 20400²², to facilitate the use and purchase of most environmentally-friendly services and products for mini-grids. In addition, this policy will be aligned to NEPA's policies and national environmental standards related to the establishment of mini-grids in the country. The capacities of the relevant ministries involved in mini-grid procurement processes, especially MEW, MRRD and DABS in light of the establishment of the RED (under DABS) will be strengthened to be able to apply the green procurement guidelines.

Activity 3.4 – Social and environmental safeguards policy for mini-grids developed and mainstreamed;

In general, solar mini-grids have the potential to cause moderate environmental and social impacts. Land clearing for the construction of mini-grids is considered minimal by area and intensity of impact and will not cause significant permanent loss of vegetation. However, there can be a potential for hazardous waste during the operation of the mini-grid from used batteries of photovoltaic systems. The reticulation networks, in particular MV distribution lines, depending on design specifics, can cause substantial losses of birds, including globally threatened species, due to electrocution.

In order to mitigate any potential environmental and social impact of mini-grid development, the project foresees in the development of standards related to social safeguards and environmental sustainability of mini-grids, using UNDP's Social and Environmental Standards as guidance and specific Environmental and Social Safeguards assessment tools for mini-grid development, such as developed

²² ISO 20400:2017 provides guidance to organizations, independent of their activity or size, on integrating sustainability within procurement

by the World Bank, as input for safeguard policy development. They shall also be in line with the Convention on Migratory Species' (CMS) "Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region"²³. Such regulatory instruments should also provide safeguards and balance the interests of the village energy users and the rural energy service provider and lay out the principles which encourage long term service delivery and specify mechanisms to resolve and redress conflicts.

2.2.3 Technical details of Activity 3.1 – Construction of 3 RE mini-grids

47. The solar PV based mini-grids will basically consist of:

1. the photovoltaic panels, the total size of their modules is determined by the capacity and the insolation intensity, with about 7-10 m²/kW_p (Note: DC to AC conversion causes losses of about 20% of capacity);
2. support structures, which place the panels in the optimum angle towards the sunlight;
3. solar charge controllers, backup batteries, DC/AC converters and substation;
4. Diesel backup and support generators and associated fuel tanks; and
5. Reticulation network consisting of medium (MV) and low voltage distribution lines and transformers (see below para 61 ff.).

48. The area of the PV system will be fenced with chain-link fence to avoid unauthorized persons and livestock from entering the site and potentially causing damage or experiencing accidents. The totally fenced area depends on the number and size of modules and their placement. A 1,000 kW_p system will need 7,000-10,000 m² solar panel size; the panels are on supporting structures and will require a total size of the fenced area of about twice the panel size, i.e. about 1.5 to 2 ha/MW_p. The fenced area can be used for haymaking if the vegetation cover is suitable.

49. The PV systems will be guarded and served 24/7. For the service of the PV system, including control of the electrical systems and regular cleaning of panels from dust, a single-story service building of up to 50 m² has to be erected at each site, which contains at least one technical room, one or more rooms for service personnel and guards, facilities for cooking and eating and a simple outhouse (dry toilette).

50. The project site for the PV system in Kandahar is located in Panjawayee district at N 31.538342°, E 65.477868°, altitude is 957 m. The size of land areas that will be used for the PV system in Kandahar is approx. 21,500m².

²³ UNEP/CMS/Conf.10.30/Rev.2 1 November 2011

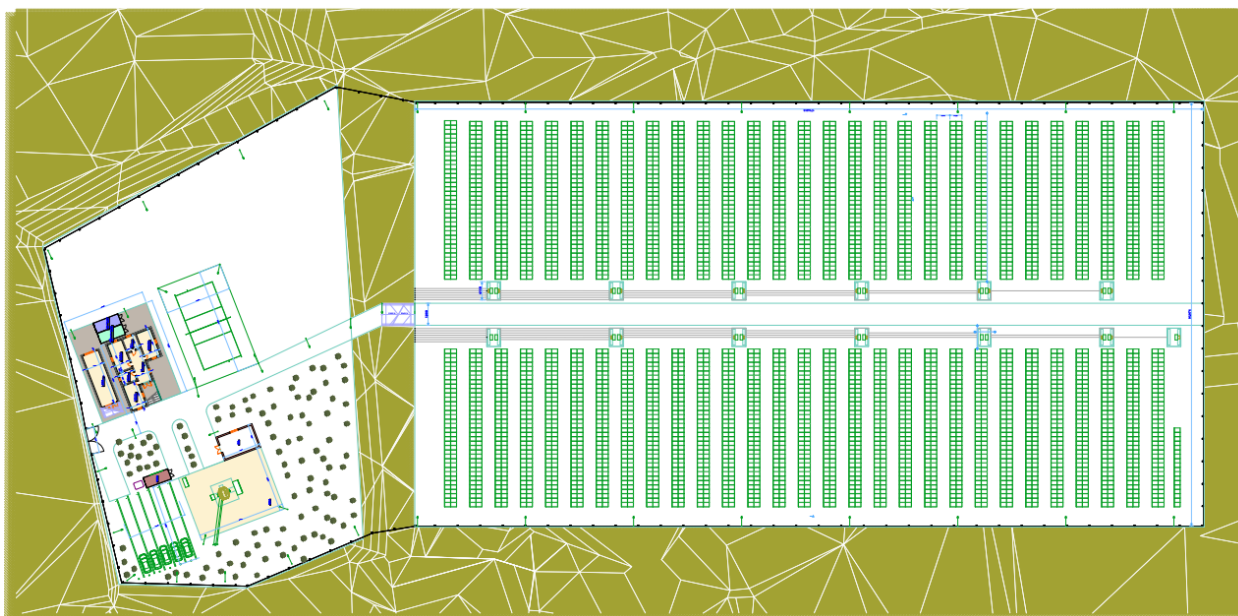


Figure 3 Example of overview of solar system with backup batteries (Source: Detailed Project Report: Solar Mini-Grid in Khost; Part 1 – Power Plant and Remote Monitoring Design, January 18, 2018)

51. The project site for the solar power plant in Khost province has been identified in Mangal Borikhel village of Gurbuz district, 1.8 km (0.4 km asphalt road plus 1.4 km dirt road) away from the district centre. The geographical coordinates of the site are N 33.277°, E 69.931° and altitude is 1,206 m. In Khost the area needed for the entire PV system will be around 18,000 m² (17,000 m² solar panels and remaining for auxiliary structures). Previous project descriptions indicated another site near Sheikhamir village (N 33.294326, E69.919498), about 2 km to the north.
52. The project site for the PV system in Parwan is located between six villages at N 34.99°, E 69.28°, altitude 1,460 m. The coordinates indicated in the design report might actually not indicate the actual location of the PV installations, but rather the centre of the entire mini-grid. In previous reports a site near village Turkman at N 34.98589°, E 69.26669°, altitude 1,488 m, had been indicated. For the PV system in Parwan an area of 16,000 m² has been indicated.

53. The designs of the three PV systems differ only marginally and therefore here one typical design is explained in more detail.
54. The planned design for Khost²⁴ includes some auxiliary elements (in the left part of fig. 2): parking lot (252 m²), generator room (13 m²), substation (300 m²), well house (50 m²), warehouse (47 m²), service building (110 m²) with hall, control room, bath room, personnel room, kitchen and equipment room, two 40 ft-containers (each 13-4 m²) for bidirectional inverter system and battery storage and a volleyball field (360 m²). The system includes 4,050 polycrystalline PV modules of 250 W designed in 225 strings of 18 modules connected in series with an intercepting surface of 7,249.5 m² (tilt angle 34°), inter-row spacing between modules of 2.67 m, and spacing of 4.33 m between module centres. The total project site of the PV system with all auxiliary elements is about 12,000 m².

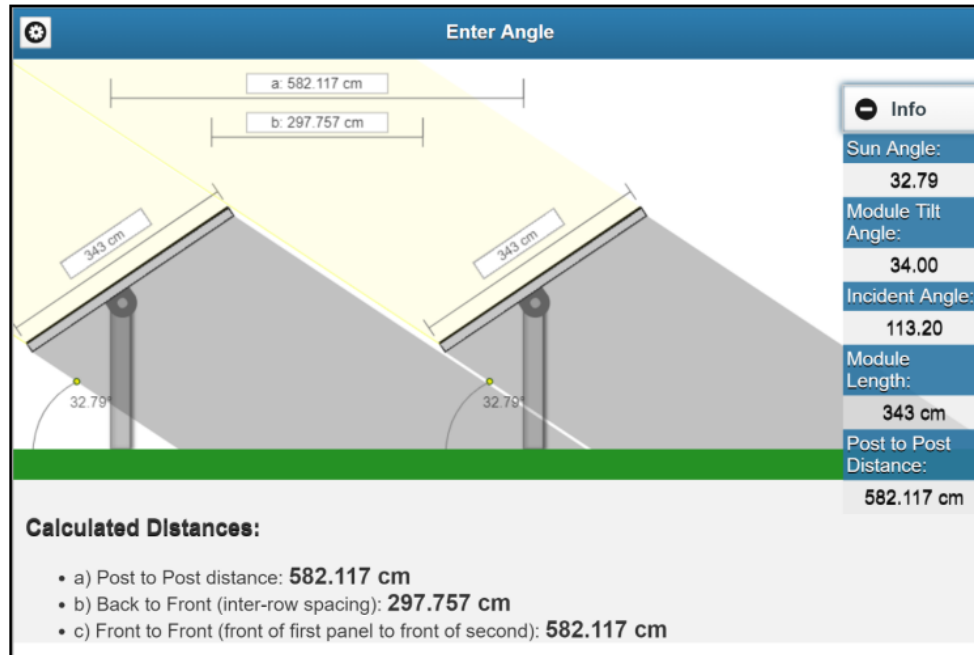


Figure 4 Solar modules and inter-row spacing (Source: Detailed Project Report: Solar Mini-Grid in Khost; Part 1 – Power Plant and Remote Monitoring Design, January 18, 2018)

55. The proposed design for Khost suggests a hybrid system configuration of 1 MW solar PV, 330 kW diesel generator and 4,032 kWh battery backup (total capacity of battery storage is 5,040 kWh, but maximum 80% depth of discharge).
56. In Kandahar the PV system is backed up by 3,500 kWh battery backup with Li-Ion batteries and two diesel generators of 425 kW and 75 kW.
57. In Parwan the PV system is backed up by 2,500 kWh battery backup with Li-Ion batteries and two diesel generators of 300 kW and 75 kW.
58. Batteries should best be kept at stable ambient temperature, avoiding heat or freezing. The draft design for Khost suggests storing the 6,300 pieces of 2V/400Ah lead-carbon batteries in a 40 ft. container with cooling and ventilation. Also the systems in Kandahar and Parwan are proposed to be supplied by the manufacturers as factory assembled and tested units (Containerized Battery Energy Storage Systems) complete with sub systems for thermal management, cooling, battery management, fire protection etc. Hence many of the manufacturers supply these preassembled units as building blocks (e.g. units of 500kWh) fully assembled, wired and tested in e-houses or containers. A big advantage with this arrangement is the ability to procure fully assembled and tested units with manufacturer's warranty for the assembled unit.

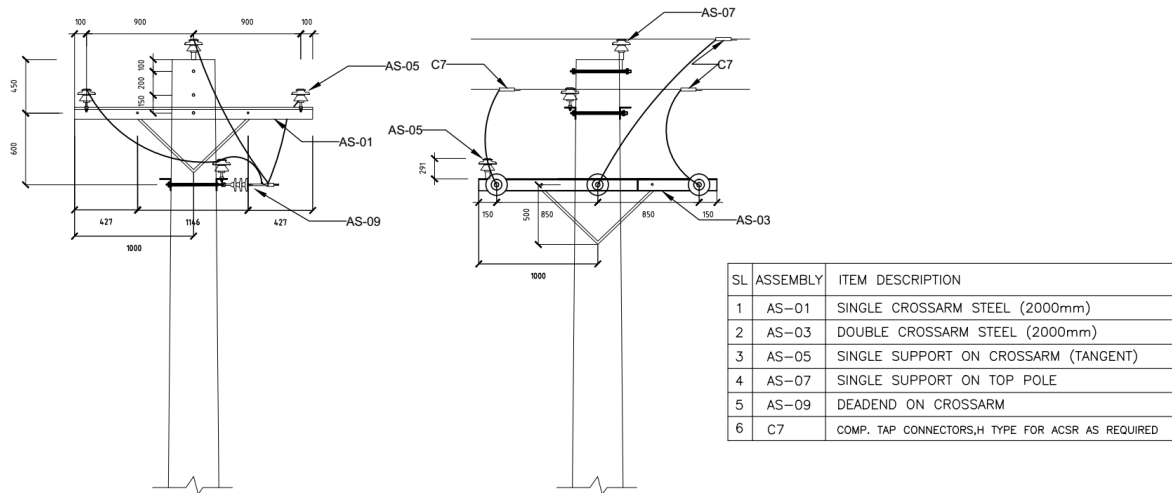
²⁴ Detailed Project Report: Solar Mini-Grid in Khost; Part 1 – Power Plant and Remote Monitoring Design, January 18, 2018

59. An alternative to be considered allowing for stable ambient temperature while requiring much lower additional energy needs than a container, especially in colder sites than Khost, might be a separate cellar, similar to potato storage cellars, partly underground for using the insulation of earth and with proper ventilation to hydrogen release gases, which can be emitted by the batteries. The cellars, in which the batteries will be placed, should be a separate structure, not the basement of the service building. The battery cellar for a 1 MW solar system might have a ground area of about 20 to 50 m², depending on the spatial placement of the batteries.
60. Distribution lines between the powerhouse and the villages and within the villages will include:
1. Medium voltage (MV) lines of 20 kV (cables: Kandahar 9,043 m, Khost, Parwan 8,253 m);
 2. Low voltage (LV) lines of 400 V in form of ABC aluminium cables (length of cables: Kandahar 19,078 m, Khost, Parwan 13,817);
 3. Poles and auxiliary elements for MV and LV distribution lines are currently planned to be built in accordance to DABS standards. The figures 5-13 provide examples of the currently planned typical design of these standard poles of MV and LV lines;
 4. Transformers.

Table 5 Powerlines and poles in the three solar mini-grids

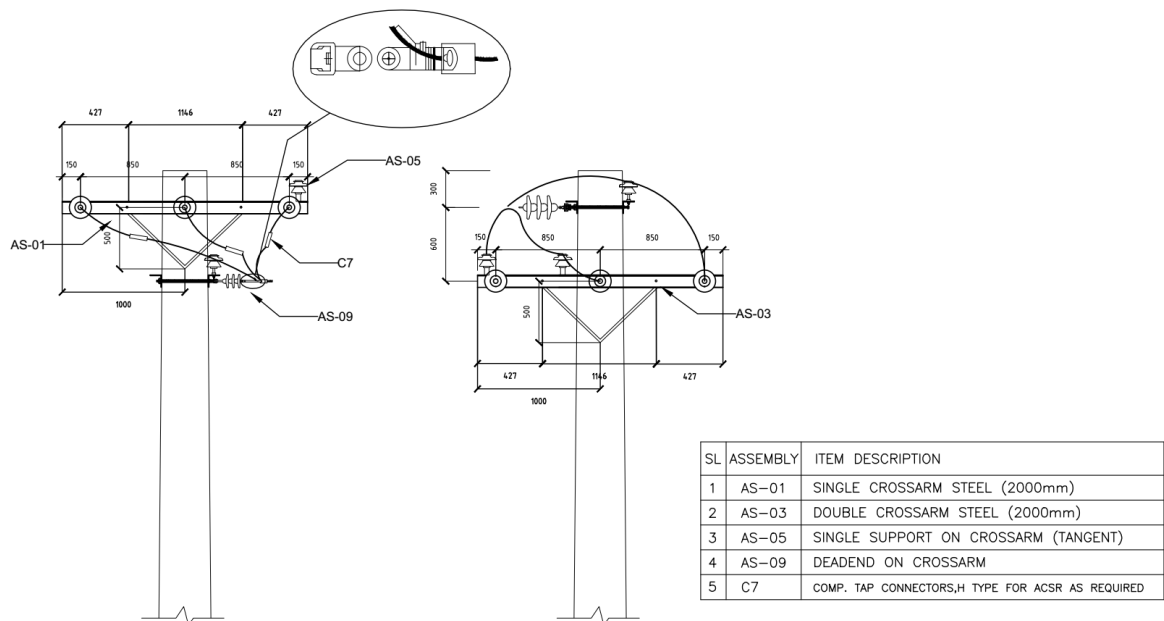
| Project | MV Line, Km | LV Line, Km | No. of Poles |
|----------|-------------|-------------|--------------|
| Kandahar | 3.01 | 17.56 | 401 |
| Parwan | 2.74 | 13.48 | 322 |
| Khost | 20 | 20 | 1,050 |

61. Due to the identified adverse environmental impact (section 5.5.10) the draft ESAR for the previous Funding Proposal to GCF as of October 2017-February 2018 had called for substantial changes the design of the MV distribution lines must undergo to become bird-safe and thus acceptable by the applicable environmental standards (see section 6.5.9). Direct advice on critical design elements and alternative bird-safe solutions had been provided to DABS, NEPA and UNDP Afghanistan. Further advice was provided to UNDP and NEPA in May 2019. So far the design of MV distribution lines and in particular of pole top structures has not been changed and due to the inherent high risk of electrocution remains highly dangerous for birds and not acceptable from an environmental safeguards perspective in terms of biodiversity conservation requirements.



NOTE:--
1.ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED

Figure 5 Structure M4 – Tension branch.



NOTE:–
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED

Figure 6 Structure M3 – Tension, large angle.

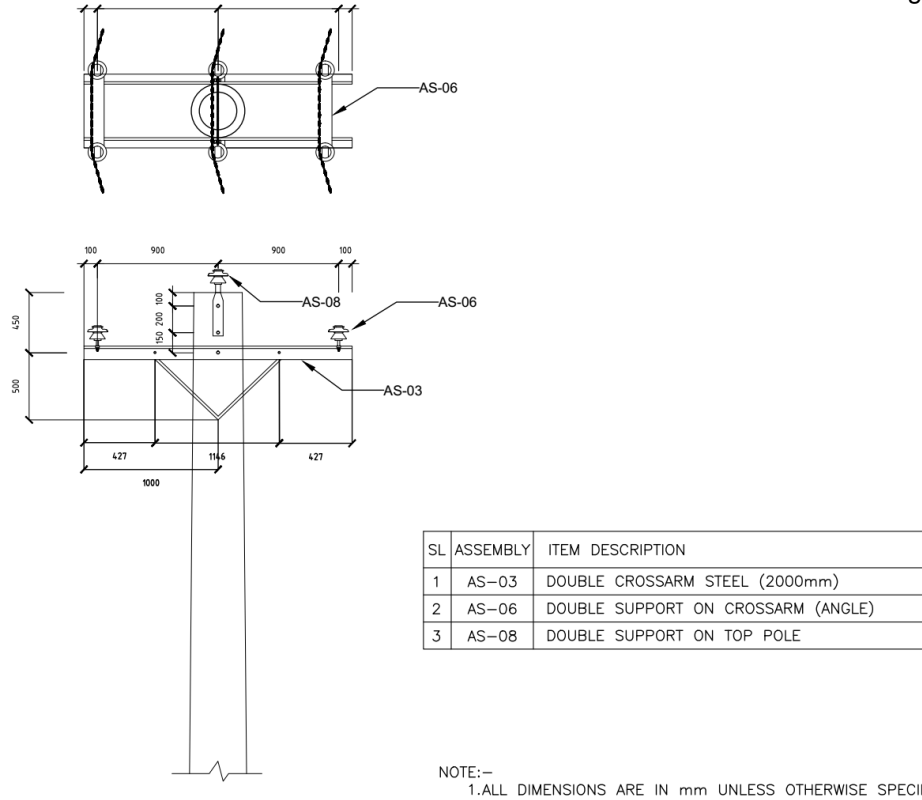


Figure 7 Structure M2 – Alignment, small angle.

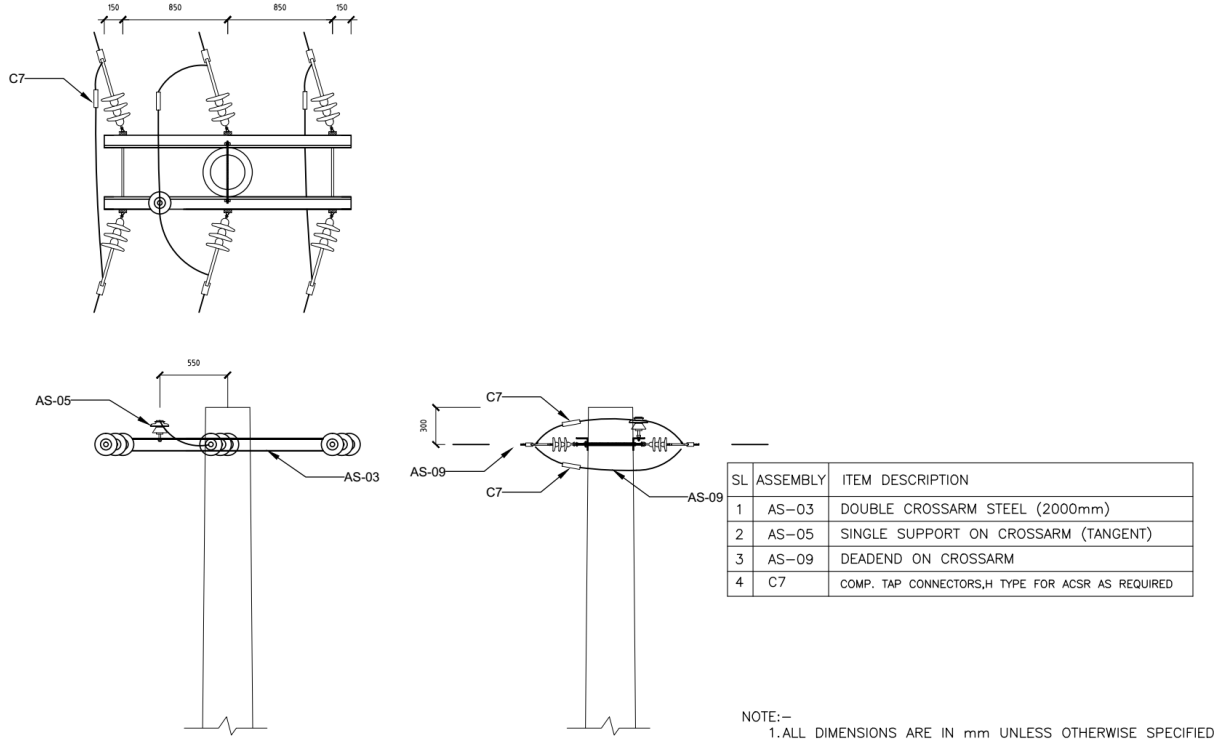
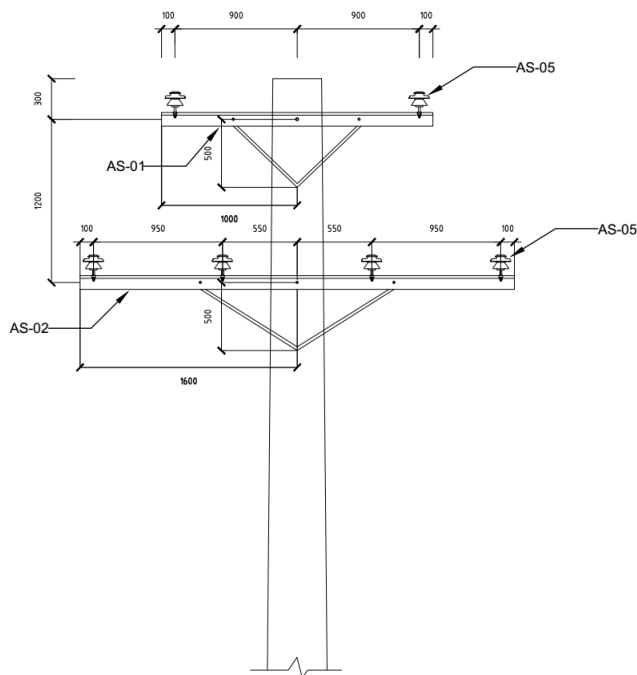


Figure 8 Structure M6 – Tension, shackle.



| SL | ASSEMBLY | ITEM DESCRIPTION |
|----|----------|--------------------------------------|
| 1 | AS-01 | SINGLE CROSSARM STEEL (2000mm) |
| 2 | AS-02 | SINGLE CROSSARM STEEL (3200mm) |
| 3 | AS-05 | SINGLE SUPPORT ON CROSSARM (TANGENT) |

NOTE:--
1.ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED

Figure 9 Structure MM1 – Alignment, double circuit.

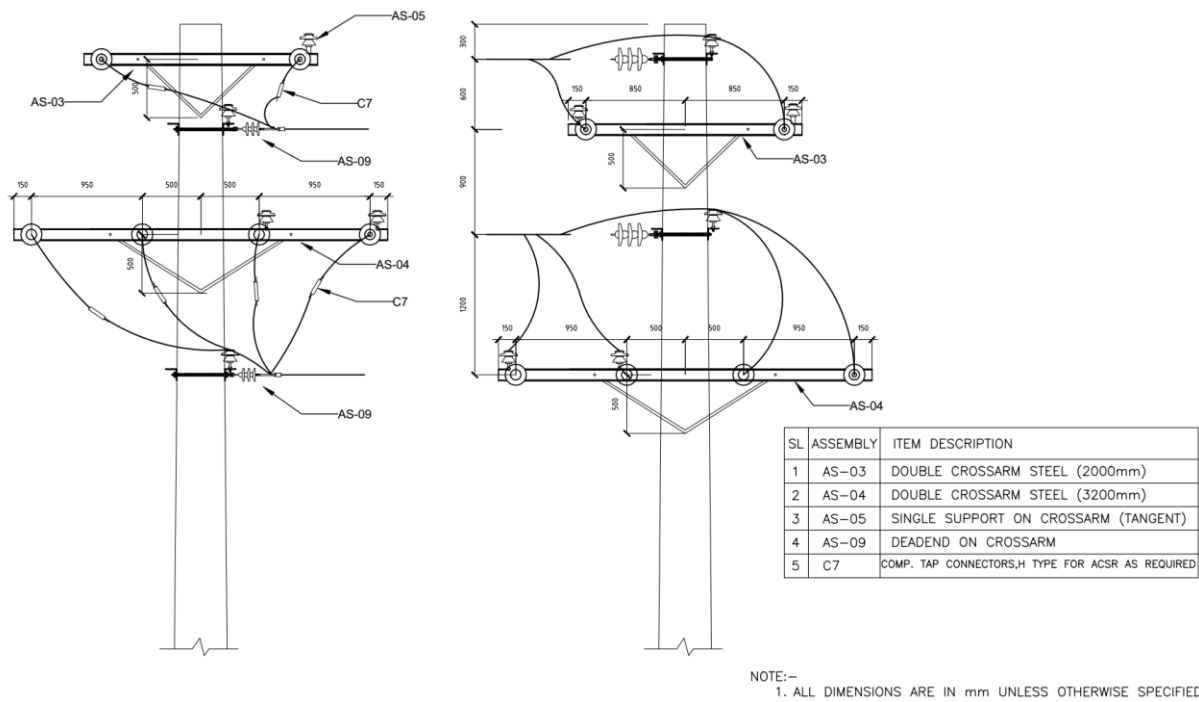


Figure 10 Structure MM3 – Tension, large angle double circuit.

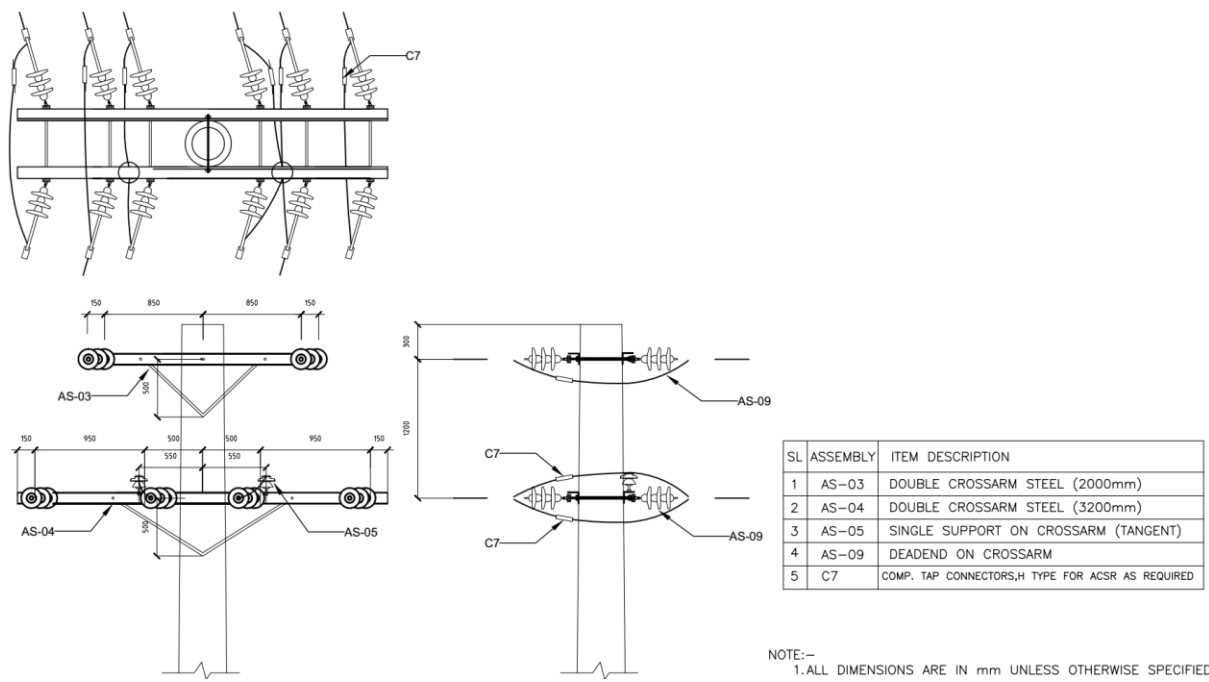


Figure 11 Structure MM6 – Tension, shackle double circuit.

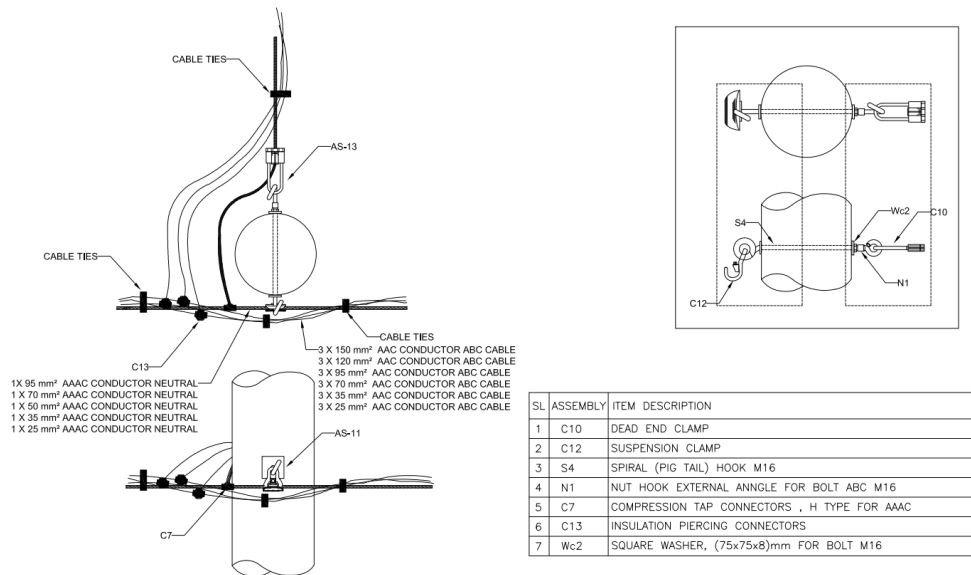
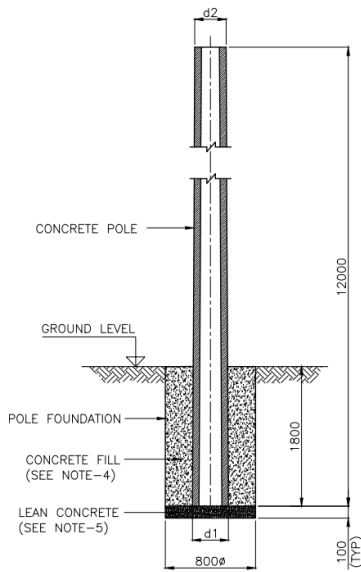


Figure 12 Example of LV pole top design and cables.



**TYPICAL SECTION OF
TENSION / ANGLE / DEAD END POLE**

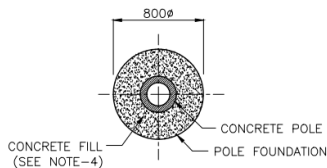


Figure 13 Typical foundation plan.

Foundation Application Schedule

| Sr. No. | Foundation Type | Soil Description |
|---------|-------------------------------------|--|
| 1. | Foundation Type-I Spread Footing | Soil having bearing capacity 1.5kg/cm ² & assume cone earth 30'. Cohesive material-Very stiff clay requiring pickaxe for removal. Afresh sample which can't be molded by finger pressure & intended by thumb. Blow count over 10. Granular material-Very dense cemented gravel. Difficult to excavate by shovel alone. Relative density over 75%. Blow count over 20. |

Foundation Schedule - 12m/400KG TIP LOAD POLE

| FOUNDATION TYPE | TENSION/ANGLE/DEAD END POLE | |
|-----------------|-----------------------------|-----------------------------------|
| | FOUNDATION SIZE WIDTH (mm) | CONCRETE VOLUME (M ³) |
| TYPE - I | 800 | 0.68 |

NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DO NOT SCALE.
3. IN SITU SOIL TYPES TO BE VERIFIED BY EMPLOYER/ENGINEER.
4. CONCRETE FILL SHALL BE PLAIN CEMENT CONCRETE OF GRADE 25Mpa.
5. PLAIN CEMENT LEAN CONCRETE 100MM THICK OF GRADE 10Mpa IN BOTTOM OF EXCAVATION.
6. MOD-MAXIMUM ALLOWABLE DEVIATION ANGLE.
7. SELECTED FILL MATERIAL SHALL BE WELL COMPACTED, AND SHALL BE FREE FROM ORGANIC MATERIAL.

62. For the PV systems, which are close to villages and the parts of which could even be transported by donkey, no substantial road construction or modification of existing roads is expected.

2.3 PROJECT ALTERNATIVES

63. As part of the project development, a range of alternatives were considered:

2.3.1 Do Nothing Alternative

64. Without this project people, social facilities and businesses in the targeted rural areas will not have access to electricity from renewable sources. In the rural areas, selected for the development of the RE mini-grids for any foreseeable future connection to the central electricity grid is not likely because of too large distances to the nearest grid, low ratio of potential customers to costs of central grid extension and generally insufficient capacity of the national grid. In the absence of RE mini-grids or central grid local people, social facilities and businesses would not have access to electricity, install self-made unreliable devices of low capacity or rely on diesel generators for generating electricity leading to high GHG emissions. Lack of reliable electricity supply negatively affects social and economic development in the rural areas of Afghanistan.
65. For these reasons the do-nothing-alternative has much higher negative impacts on an environment and GHG emissions than the project alternative, which has a substantial net benefit, justifying the proposed funding.

2.3.2 Alternative Locations

66. Target communities have been selected after a Pan-Afghan survey of 56 sites across 32 of the country's 34 provinces. The proposed activities could be undertaken in a number of different locations. However the proposed locations, particularly RE mini-grid locations have been identified in the frame of the Pre-feasibility Study by the GoIRA, especially by MRRD, as those sites that provide the greatest economic, environmental, and social benefit and replication potential. The process of site selection is presented in the Feasibility Study, section 5.1.
67. When considering alternative sites during the development of this project, the Pre-feasibility Studies and the Feasibility Study also considered the likelihood of connection to the central grid, potential of larger interventions by the Ministry of Energy and Water (MEW) and the potential for the specifically proposed RE mini-grid technologies.
68. Furthermore, the selection of sites is based on consultations with sub-national government bodies, Community Development Councils (CDCs) and community representatives. The Community Development Councils (CDCs)²⁵ were first established under the National Solidarity Programme (NSP). They are tasked with planning, negotiating, and managing development investments. The Councils are trained in financial management and bookkeeping, and in basic principles of transparency, participation, and accountability. Under the Citizens Charter National Priority Programme the existing Shuras, such as health, education, and agriculture committees are to be integrated as subcommittees to the CDCs. They will carry out technical functions and coordinate with line ministries, while providing CDCs with their full financial and planning information, allowing rural and urban communities to manage and implement a single and transparent budget and development plan.
69. The project held six consultation workshops in the regions during October 2015 till April 2016. In these meetings participated members of the District Development Assemblies, locally active NGOs, of the regional technical teams of the Ministry of Energy and Water (MoEW), Ministry of Agriculture, Irrigation and Livestock (MAIL) and Ministry of Rehabilitation and Rural Development (MRRD) as well as of the Afghanistan Renewable Energy Union (AREU). During these meetings the objectives of the project and the approaches to achieve these objectives were discussed – electricity from renewable sources and clean cooking and heating options, also reducing indoor air pollution.
70. During three Technical Working Group meetings in the premises of the MRRD the technical scope and geographic focus (1st meeting), site selection and feasibility study preparation (2nd meeting) and proposed outputs and activities were discussed and revised by participants from the MRRD; MAIL,

²⁵ Government of Islamic Republic of Afghanistan Citizens' Charter National Priority Programme December 2016

National Environmental Protection Agency (NEPA), MoEW, Inter-Ministerial Committee on Energy, UNDP, international organizations and representatives of civil society and private sector.

71. Alternative locations for the implemented mini-grids would be possible and indicate the replication potential of the applied approach, but at any alternative location the ratio of environmental and social risks and impact and of benefits would be similar to the situation in the selected areas.

2.3.3 Alternative RE technologies

72. The sites selection are the result of an elaborate process that assessed different renewable energy sources for each location and selected the renewable energy source with the best potential for the particular site. From a larger number of available project sites, including sites where hydro power mini-grids are considered the best solution, 3 sites for solar mini-grids were selected for this project.

3 LEGAL AND INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL AND SOCIAL MATTERS

3.1 LEGISLATION, POLICIES AND REGULATIONS

73. No specific gaps assessment of national policies and regulations with regard to requirements of the GCF and/or UNDP's environmental and social safeguards policies was possible in the context of this ESAR. The national policies and legal frameworks of IROA have been developed with international assistance, are applied in the context of multiple internationally funded programs and projects and fully comply with international standards and practice. and standards and the measures to fill any gaps. The ESAR assesses all potential impacts with regard to GCF and UNDP policies and safeguards. The following legislation is relevant to the project:

3.1.1 Constitution of the Islamic Republic of Afghanistan (2004)

74. **The Constitution of the Islamic Republic of Afghanistan (2004)** – including foundations of legislation on social and environmental issues, such as, for instance:

- “Mines and other subterranean resources as well as historical relics shall be the property of the state. Protection, management and proper utilization of public properties as well as natural resources shall be regulated by law” (Article Nine);
- “The state, within its financial means, shall design and implement effective programs to develop agriculture and animal husbandry, improve economic, social and living conditions of farmers, herders and settlers as well as the nomads' livelihood.” (Article Fourteen);
- “The state shall be obligated to adopt necessary measures to protect and improve forests as well as the living environment.” (Article Fifteen).

3.1.2 Environment Law (2007)

75. This law has been developed under consideration of international best practices. It sets forth national administrative roles and coordination with provincial authorities; establishes management frameworks for natural resource conservation, biodiversity, drinking water, pollution control, and environmental education; and defines enforcement tools²⁶.

76. The law defines the National Environmental Protection Agency “as an independent institutional entity, responsible for coordinating and monitoring conservation and rehabilitation of the environment, and for implementing this Act.”

77. Key elements of the law are:

78. Fundamental principles (Article 5), including:

- Value and respect of nature as whole;
- Regulation of all elements of the environment;
- Interdependence of peace, sustainable development, environmental protection, conservation and respect for human rights and fundamental freedoms;
- Preservation of health, diversity and productivity of the environment for future generations;
- Sustainability to meet development and environmental needs of present and future generations;
- Prevention and minimizing of adverse effects through long-term cross-sectoral planning and coordination;
- Priority of prevention over remedy or compensation;

²⁶ Taylor, D. A. (2006). Policy: new environment law for Afghanistan. *Environmental Health Perspectives*, 114(3). Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1392251/>

- Precautionary principle;
 - Persons causing adverse effects must bear the costs of their avoidance, mitigation or remedy;
 - community involvement in decision making;
 - transboundary collaboration;
79. Functions and power of NEPA (in Article 9); Committee for Environmental Coordination (Article 10); National (Article 11) and Subnational (Article 12) Environmental Advisory Councils;
80. Management of Activities Affecting the Environment, regulating among others:
- Prohibited activities (Article 12);
 - Preliminary assessment (Article 13);
 - Comprehensive mitigation plans (Article 14);
 - Approval (Article 15) and Appeal (Article 16) procedures;
 - Detailed provisions on public participation (Article 19) and on the EIA board of experts (Article 20);
 - Economic incentives and disincentives (Article 24) and Valuation of natural resources (Article 25);
 - Pollution control (Articles 27-33);
 - “Environmental considerations relevant to water resources conservation and management” (Articles 34-35), which contain general requirements, like “protecting aquatic and associated ecosystems and their biological diversity” and fundamental requirements regarding prevention and remedy of water pollution;
 - Biodiversity and natural resources conservation and management (Articles 36-63), including, e.g.,
 - provisions for establishment and management of protected areas (Articles 38-43);
 - the management of vegetation (Articles 44) and rangeland (Article 45) outside protected areas;
 - Sustainable use and conservation of species, aiming at achieving “favourable conservation status” and preventing the dispersal of alien invasive species (Articles 46-53);
 - Access to genetic resources (Articles 58-63).
81. Environmental information, education and training, and research (Articles 64-66);
82. Compliance and enforcement (Article 67), which among others specifies the appointment and powers of inspectors (Article 67), Abatement order (Article 68), Compliance order (Article 69), punishment, liability and appeal.
83. The law is executed through a set of regulations, which specify the provisions of the law.

3.1.3 Environmental Impact Assessment Regulations (2008; amended 2017)

84. Schedule I lists project types likely to have significant impacts (Category 1) or potentially adverse impacts (Category 2); and the industries likely to cause pollution. Schedule II provides the application form; Schedule III provides the Technical Guideline for the Screening Process; and Schedule IV the record of decision.
85. **Administrative Guidelines for the Preparation of Environmental Impact Assessments (2008)** – accompany these Regulations to guide proponents on interacting with the National Environmental Protection Agency, on public consultation, and roles and responsibilities of stakeholders.

3.1.4 Law on Managing Land Affairs (2008)

86. This law lays out principles of land classification and documentation, and the principles governing allocations of state land, land leasing, land expropriation, settlement of land rights, and restoration of lands. The law encourages commercial investment in state-owned agricultural land with opportunities for long leases. The objectives of the law are²⁷:
- Creation of a unitary and reliable land management order across the country;

²⁷ ADB (2014). Country Assessment on Land Acquisition and Resettlement. Regional Technical Assistance (RETA) – 7433: Mainstreaming Land Acquisition and Resettlement Safeguards in Central and West Asia Region Retrieved from <https://www.adb.org/sites/default/files/project-document/149538/43288-012-tacr-08.pdf>

- Management of property books and land registration based on the credible documents of relevant offices;
- Collection of authentic figures and statistics of lands for the purpose of using them in the future economic and development plans of government;
- Solving the problems resulting from performance of land related reforms of former regimes;
- Segregation of government, individual, virgin and arid and pasture (grazing) and endowed lands;
- Distribution of government lands as well as virgin and arid lands;
- Restoration of lands distributed illegally;
- Provision of adequate opportunities for active and broad private sector participation in landholding sphere;
- Prevention of government land confiscation;
- Providing the opportunity for the people to access land.

3.1.5 Land Expropriation Law (2001)

87. The law recognizes private property and provides that acquisition of private land for public purposes should be done with great care and by the competent authorities and compensation for all other assets, e.g., structures, crops, trees etc., on the land should be paid based on market rate. But the law does not specifically provide for resettlement and rehabilitation i.e., provision of additional assistances to the eligible vulnerable affected families, restoration of business/income loss to be compensated and other assistance/rehabilitation measures.²⁸

88. Issues that are not covered by the Law on Managing Land Affairs and the Land Expropriation Law are governed by the country's Civil Code, which in large measure reflects the Hanafi School of Islamic law (*Shari'a*). Islamic law governs when the Civil Code is silent on an issue. Customary law dominates in Afghanistan, and the Civil Code recognizes the application of customary law with regard to land rights. The Constitution is silent on the authority of customary law but prohibits the adoption of laws that are inconsistent with the tenets of Islam. Customary law is in large measure consistent with *Shari'a*, and *Shari'a* permits the practice of customary law so long as it does not interfere with tenets of Islam. Customary law systems vary but share the following characteristics: (i) use of customary village councils (known in Dari as *shura*, or *jirga* in Pashtu) that use mediation and arbitration techniques of dispute resolution; (ii) the application of principles of apology and forgiveness; and (iii) the concept of restorative justice.²⁹

3.1.6 Law on the Protection of Historical and Cultural Properties (2004)

89. The law defines the objects falling within its scope, sets forth the State's interest and rights in such objects, specifies prohibited and regulated activities involving such objects, and establishes enforcement measures.

3.1.7 Access to Information Act (2014)

90. This law ensures the right of access to information for all citizens from the government and non-government institutions; the transparency and accountability in the conduct of governmental and nongovernment institutions; and establishes the processing of information requests and provision of information.

3.2 ENVIRONMENTAL IMPACT ASSESSMENT IN AFGHANISTAN

91. Environmental Impact Assessment is implemented under the authority of the National Environmental Agency (NEPA) in accordance with Article 22 of the Environmental Law and follows the Environmental

²⁸ Ibid.

²⁹ Ibid.

Impact Assessment Regulations (2008). NEPA is the authorized agency to issue a Certificate of Compliance.

92. The Environmental Impact Assessment Regulations distinguish Category 1 and Category 2 activities, but apply as well to any other activity that is likely to have a significant adverse effect on the environment and which is determined by NEPA to be a prohibited activity.
93. NEPA's Division of Environmental Impact Assessment and Sustainable Developments screens all projects and decides about approval or further requirements for finalizing the screening, makes the decision about the requirement of an Environmental and Social Impact Assessment. A board of main stakeholders makes final decision of approval or rejection. So far this board rejected about 800 applications and approved more than 2,500³⁰.
94. Depending on character and expected impact of a project NEPA requires Environmental Management Plans, Emergency Response Plans and/or Reclamation Plans (mining projects).
95. Inspection and monitoring of implementation are carried out by NEPA's provincial or main departments, depending on size and impact of the project.
96. **Category 1** activities are activities likely to have adverse impacts: means those activities likely to have significant adverse effects that are sensitive, diverse or unprecedented, and affect an area broader than the sites of facilities subject to the physical works of the activity. These activities among others include:

A. Energy

The construction, installation or upgrading of:

- i. Hydroelectric power generation facilities over 50 MW;
- ii. Thermal power generation facilities over 200 MW;
- iii. Distribution lines (11³¹ kV or more) and grid stations;
- iv. Nuclear power plants; or
- v. Petroleum refineries.

E. Water management, dams, irrigation and flood protection

The construction or upgrading of:

- i. Dams and reservoirs with a storage volume of 50 million cubic meters or more, or a surface area of 8 square kilometres or more; or
- ii. Irrigation and drainage projects serving 15,000 hectares or more.

I. Environmentally Sensitive Areas

All activities situated in environmentally sensitive areas as determined by regulation:

97. **Category 2** activities are activities with potentially adverse impacts: means those activities that have potentially significant adverse on human environment or on environmentally sensitive areas that less adverse than those in Category 1 and are site specific and in most instances not irreversible. These activities among others include:

B. Energy

The construction, upgrading, installation or development of:

- i. Hydroelectric power generation facilities less than 50 MW;
- ii. Thermal power generation facilities less than 200 MW;

³⁰ Personal information by Deputy Head of NEPA, Mr. Gh.M.Malikyar, 2017.

³¹ Given the non-existence of 11 kV lines in the country, the small impact of local medium-voltage distribution systems in comparison to other Category 1 activities and the more usual application of 110 kV as smallest high-voltage transmission, we assume that the figure of 11 kV might be a technical error. The 11 kV is clearly indicated as threshold and has to be followed.

- iii. Distribution lines less than 11³² kV, and large distribution projects;
 - iv. Oil and gas transmission systems;
 - v. Oil and gas extraction projects including exploration, production gathering systems, separation and storage; or
 - vi. Waste-to-energy generation projects.
98. So, based on A.iii the project is a Category 1 project under the national Environmental Impact Assessment regulations. The findings of this ESAR indicate that the MV distribution lines (20 kV) due to current pole top design, which due to the high risk of electrocution poses a substantial threat to birds, including globally threatened species, would have a severe environmental impact.

3.2.1 Environmental Impact Assessment Process

99. The planned mini-grid developments under the proposed project, including all related works, except the MV distribution lines, fall into Category II. The MV distribution lines fall into Category I. The Regulations, however, do not prescribe procedural differences for activities of one or the other category. All other activities do not fall into any category under these regulations. Thus in the frame of the implementation planning of each mini-grid the project will have undergo the process as described in the Regulations.
100. NEPA accepts for initial review documents in English but all formal applications for approval have to be submitted in official language (either Dari or Pashtu). So far the project has not yet been submitted to NEPA for obtaining a permit. In the absence of funding for the solar mini-grid designs, requesting permits has not yet been relevant. A permit request will be filed once funding for constructing mini-grids is secured.
101. The following process will take place in the frame or Consideration of applications after screening:
- The project applicant has to submit to NEPA an application form in the format provided in Schedule II of the Regulations.
 - The applicant shall conduct a screening process and submit a screening report to determine, whether or not there is a likelihood of significant adverse effects.
 - The NEPA than within 14 days of receiving an application shall distribute a notice of public disclosure to land owners, land-users, and the elders of local communities likely to be affected by the activity.
102. NEPA within 21 days of distributing the notice of public disclosure shall
- Decide whether the information contained in the screening report is sufficient to issue a Certificate of Compliance, with or without conditions;
 - Request required additional information from the applicant; or
 - Instruct the applicant to require an Environmental impact assessment.
103. The content of the Environmental Impact Statement is described in Regulation 7 of the Environmental Impact Assessment Regulations.
104. Within 45 days of the Environmental Impact Statement being lodged with NEPA the Agency shall
- issue a Certificate of Compliance, with or without conditions; or
 - advise the applicant in writing to revise the submitted reports and add required information.
105. Within 30 days of submission of the revised documents NEP shall issue the Certificate of Compliance, with or without conditions or refuse to issue the Certificate and provide written reasons for the refusal to the applicant.

³² Same as previous.

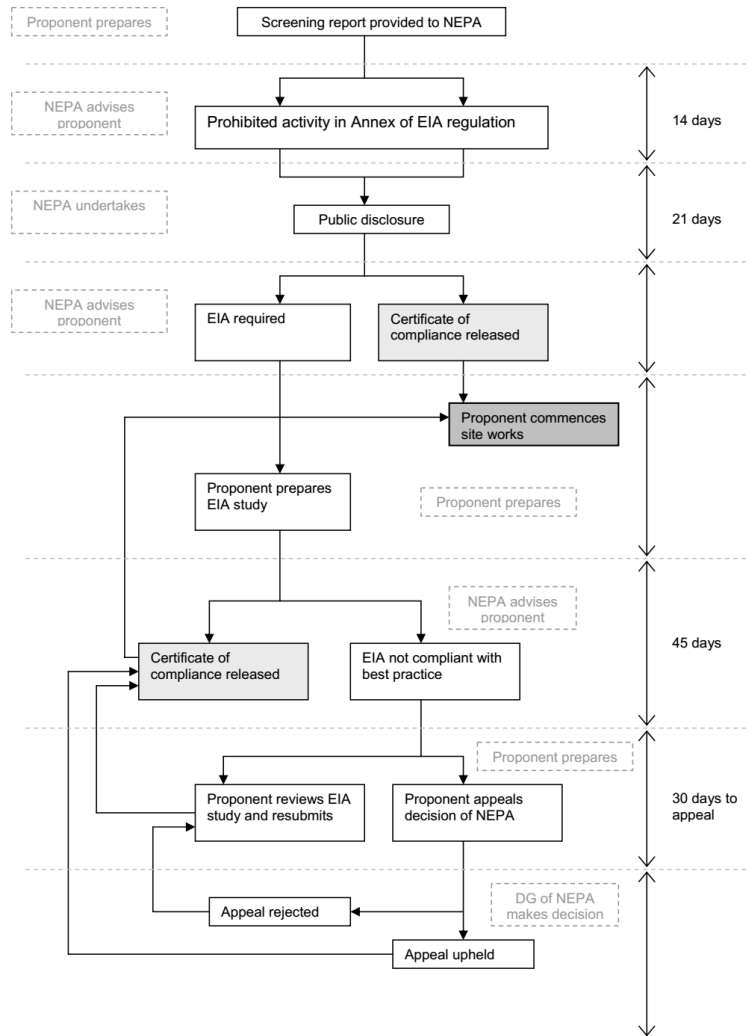


Figure 14 EIA Procedure³³.

106. The Environment Law, Article 19 “Public participation”, provides a legal framework for public consultation during environmental assessment:

107. Affected persons may express their opinion on a proposed project, plan, policy or activity, preliminary assessment, environmental impact statement, final record of opinion and comprehensive mitigation plan, before the approval of the project, plan, policy or activity, and the proponent must demonstrate to the National Environmental Protection Agency that affected persons have had meaningful opportunities, through independent consultation and participation in public hearings, to express their opinions on these matters on a timely basis.

108. The National Environmental Protection Agency shall not reach a decision on any application for a permit until such time that the proponent has demonstrated to the satisfaction of the National Environmental Protection Agency that the proponent has distributed copies of the document to affected persons, informed the public that the document is being made available for public review by advertising the document and displaying a copy of it for inspection, and convened and recorded the proceedings of a public hearing.

³³ National Environmental Impact Policy, November 2007

109. After the National Environmental Protection Agency has reviewed the conditions set forth in item 3 above, the National Environmental Protection Agency shall reach a decision and inform the public of that decision and make available any relevant documentation or information for public review.

3.3 MULTILATERAL AGREEMENTS AND BIODIVERSITY PROTOCOLS

110. The Islamic Republic of Afghanistan is a signatory to a number of international and regional agreements and conventions, which are related to the environment. They include:
- UN Framework Convention on Climate Change (UNFCCC or “Framework Convention”), ratified in September 2002, and the Kyoto Protocol to the Framework Convention signed in June 2013.
 - UN Convention on Biological Diversity (1993), since December 2002;
 - UN Convention to Combat Desertification (1996), since November 1995;
 - Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1975), since October 1985;
 - Convention on the Conservation of Migratory Species of Wild Animals (CMS, 1983), since August 2015;
 - Convention Concerning the Protection of the World Cultural and Natural Heritage, since March 1979;
 - Vienna Convention for the Protection of the Ozone Layer Vienna (1985), since September 1988.
111. In addition, Afghanistan has signed but not ratified³⁴:
- UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970);
 - Ramsar Convention on Wetlands (1975);
 - Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1992);
 - Memorandum of Understanding Concerning Conservation Measures for the Siberian Crane (1993) under the CMS;
 - UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995);
 - UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2006).
112. Afghanistan is not a signatory to the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention; 1998).
113. Of particular relevance with regard to this ESAR are the Convention on Biological Diversity (CBD) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS). It its current design the project would contradict the document of CMS adopted at the 10th Conference of the Parties in 2011 “Guidelines for Mitigating Conflict between Migratory Birds and Electricity Power Grids”³⁵.

3.4 UNDP SOCIAL AND ENVIRONMENTAL STANDARDS

114. UNDP Social and Environmental Standards³⁶ approved by UNDP’s Organizational Performance Group in June 2014 and the related project-level Social and Environmental Procedure³⁷ are mandatory elements of the legal and institutional framework of this project.
115. Generally national law is less specific than the applicable UNDP standards. The UNDP Social and Environmental Standards integrate the compliance with national law while being more specific on

³⁴ Panj-Amu River Basin Sector Project (RRP AFG 48042), Initial Environmental Examination; July 2016, DRAFT

³⁵ UNEP/CMS/Conf.10.30/Rev.2 1 November 2011

³⁶ <https://www.undp.org/content/undp/en/home/librarypage/operations1/undp-social-and-environmental-standards.html>

³⁷ <https://www.undp.org/content/undp/en/home/librarypage/operations1/undp-social-and-environmental-screening-procedure.html>

several aspects. So the assessments in this ESAR are based on the UNDP and GCF standards and by this also address and meet the national requirements.

4 DESCRIPTION OF EXISTING ENVIRONMENT

116. This section identifies the existing environmental and social baseline conditions of the country and its regions in general and of project intervention sites in particular. Most baseline information has been obtained before and during project design in 2017. No substantial changes are expected to have happened since then in the areas of the planned mini-grids. During the preparation of this ESAR we also referred to Google Earth imagery, which is regularly updated and where some scenes can be older or more recent. The potential impact of the project interventions on the existing environmental and social conditions will be assessed in section 5 and avoidance and mitigation measures are presented in the ESMP (section 6).

4.1 TOPOGRAPHY, GEOLOGY, SEISMIC ACTIVITY AND SOILS

4.1.1 Topography³⁸

117. The topography of Afghanistan is presented on the map in figure 15. The country is very mountainous. The Hindukush with about 7,000 m high snowy peaks, other high mountains, the high central plateau, deeply eroded gorges and valleys, inter-montane basins and wide pediments characterize the topography of Afghanistan. About half of the country is located at altitudes above 2,000 m while altitudes below 500 m account for less than 10% of the country's total area.

118. The country can be divided into five major natural topographic units:

1. The high mountains of Hindukush (over 4,500 m);
2. The mountainous region of central Afghanistan, including the Koh-e Baba, Feroz Koh and Tirband-e Turkestan (1,250 - 4,500 m);
3. The semi-desert and steppe hill lands of the Southwest and of the North of Afghanistan (<500 - 1,250 m);
4. The desert lowlands of the Southwest (<500 - 1,000 m); and
5. A narrow strip of mountains and valleys (500 – 4,000 m) in the eastern part, which is under the influence of the Indian summer monsoon.

³⁸ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

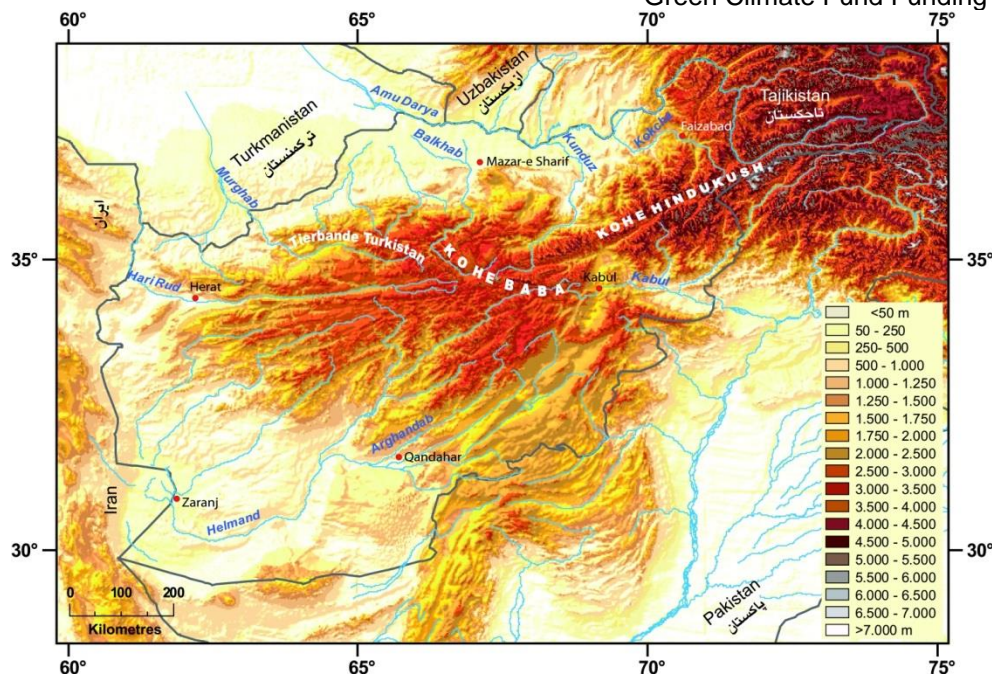


Figure 15 Relief with major rivers (map by Rafiqpoor³⁹).

119. The mini-grid sites of the proposed program are located in all topographic regions of the country. The PV-based mini-grids are located in the southern and western hill lands and in the eastern valleys. The HP mini-grids are located in the central and eastern mountains; one site is located in the northern hill lands, supplied with water from the Hindukush.

4.1.2 Geology⁴⁰

120. Afghanistan's geology (figure 16) is very complex. The major geological and tectonical units recognized in Afghanistan are:

1. The crystalline basement of the mountainous region of central Afghanistan and the Hindukush, as well as the metamorphites of eastern Afghanistan;
2. The Mesozoic block between the Kabul-Herat- and Chaman-Moqor tectonical lineaments;
3. The Upper Cretaceous-Tertiary block in the North;
4. The Tertiary of the Baluchistan geosyncline at the South;
5. The sedimentary basins of the early Quarternary in the South-West;
6. The loess and sand covered areas of late Quarternary in the North and South of the country.

³⁹ Ibid.

⁴⁰ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

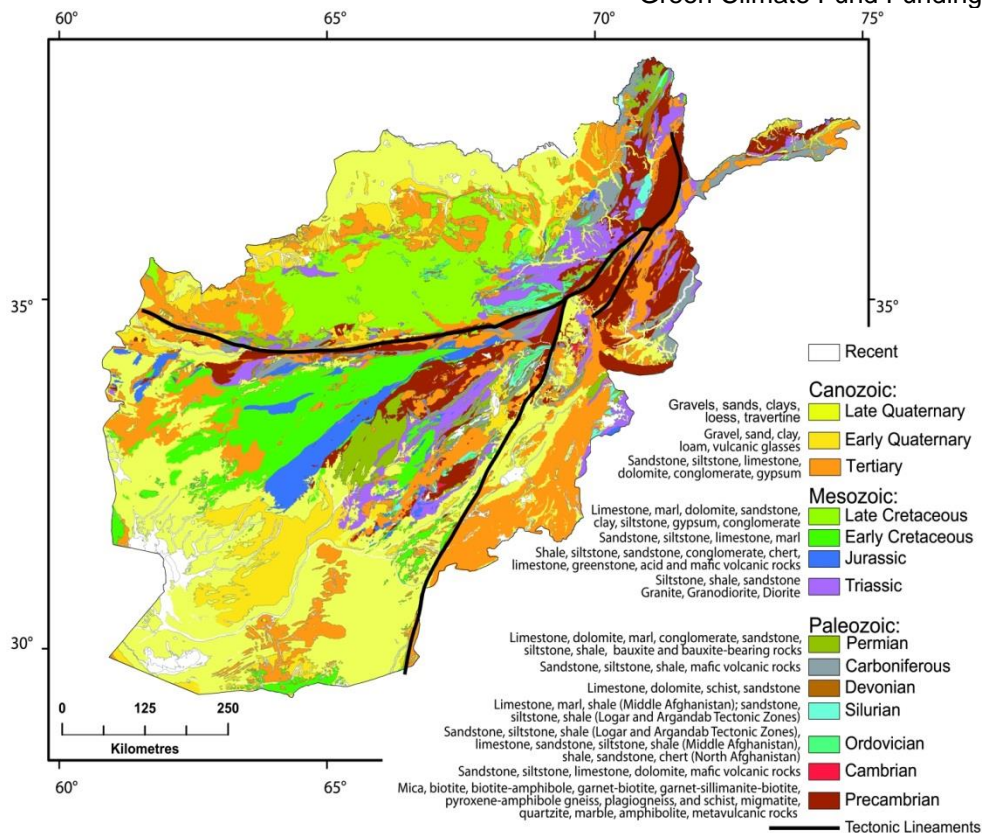


Figure 16 Geology with tectonic lineaments (map by Rafiqpoor⁴¹).

4.1.3 Seismic Activity⁴²

121. Afghanistan is located in a seismic active zone, where the Eurasian and Indian tectonic plates collide. As shown in section 4.1.2 several larger tectonic lineaments are found in the geology of the country.
122. Parts of Afghanistan lie within a relatively stable, southward-projecting promontory of the Eurasian tectonic plate, but the country is surrounded on the east, south, and west by active plate boundaries that are associated with deformation, faults, and earthquakes. The greatest hazard is in the east, where the Indian plate moves northward with respect to Eurasia at a rate of about 4 cm/yr. A broad zone of deformation along the plate boundary lies partly within eastern Afghanistan, trending south-westward from the Hindu Kush in northeast Afghanistan, through Kabul, and along the Afghanistan-Pakistan border. This zone is characterized by abundant earthquakes and major faults (figures 17, 18 and 19).
123. West of Afghanistan, the Arabian plate moves northward relative to Eurasia at about 3 cm/yr. The main plate boundary trends north-westward through the Zagros region of southwestern Iran. Although Iran is laced with major faults, and earthquakes are common, the deformation for the most part does not cross the border, leaving western Afghanistan relatively quiescent seismically.

⁴¹ Ibid.

⁴² Based on Boyd, O.S., Mueller, Ch.S., Rukstales, K.S. (2007). Preliminary Earthquake Map of Afghanistan. Open-File Report 2007-1137. U.S. Department of the Interior. U.S. Geological Survey.

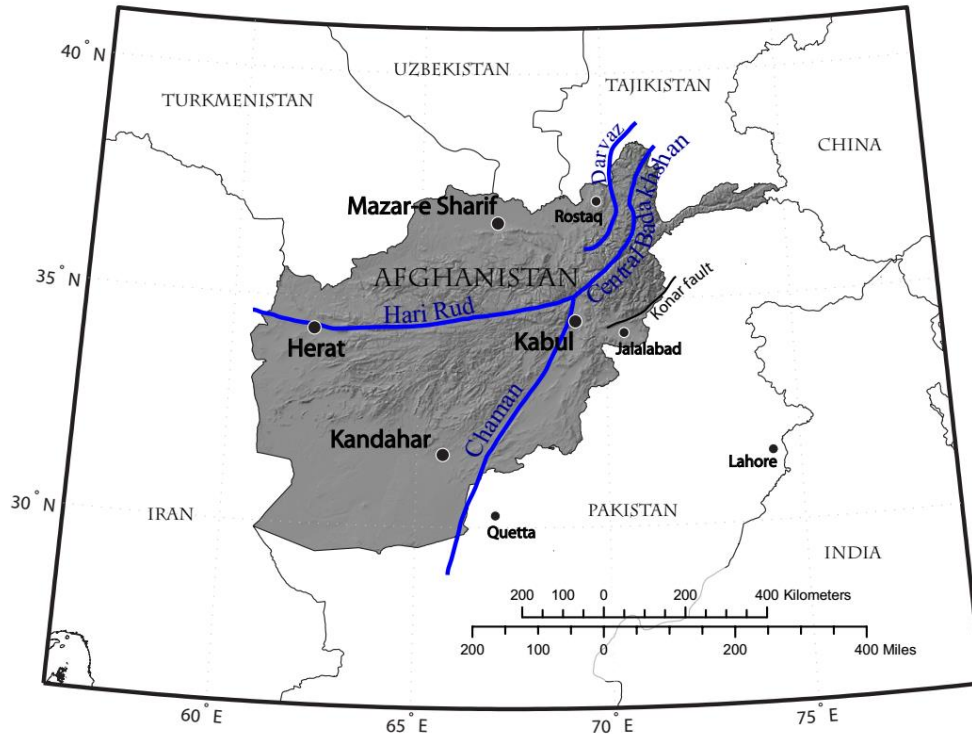


Figure 17 Map of Afghanistan showing the locations of modelled fault sources (heavy blue lines).

124. Accordingly, the history of destructive earthquakes in Afghanistan spans more than four thousand years. Earthquakes have killed more than 7,000 Afghans in the 10 years before 2007, including the Nahrin earthquake in May 1998 that killed an estimated 4,000 people. Future large earthquakes, driven by ongoing active geologic processes in the region, will occur close to population centres and lifelines, with a consequent risk for greater casualties and damage. The seismic hazard must be considered in the siting, construction, and restoration of communities and facilities in Afghanistan.

Seismic hazard is high in north-eastern Afghanistan and much lower in the western half of the country. Hazard increases north-east of Kabul through the Hindu Kush, due in part to the increased seismicity there, and near the traces of the Central Badakhshan and Darvaz faults.

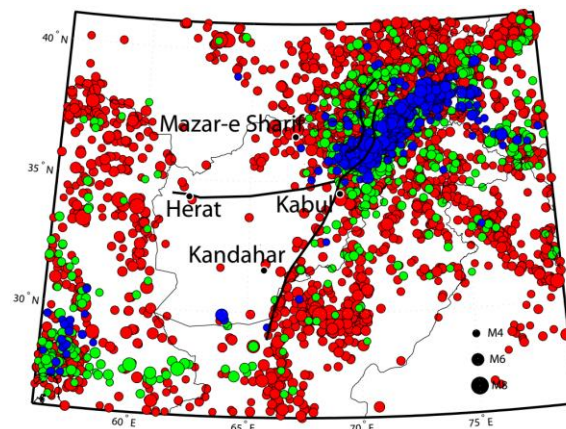


Figure 18 Locations of earthquakes since 1964; Depths – red: 0–50 km, green: 50–100 km, and blue: 100–250 km.

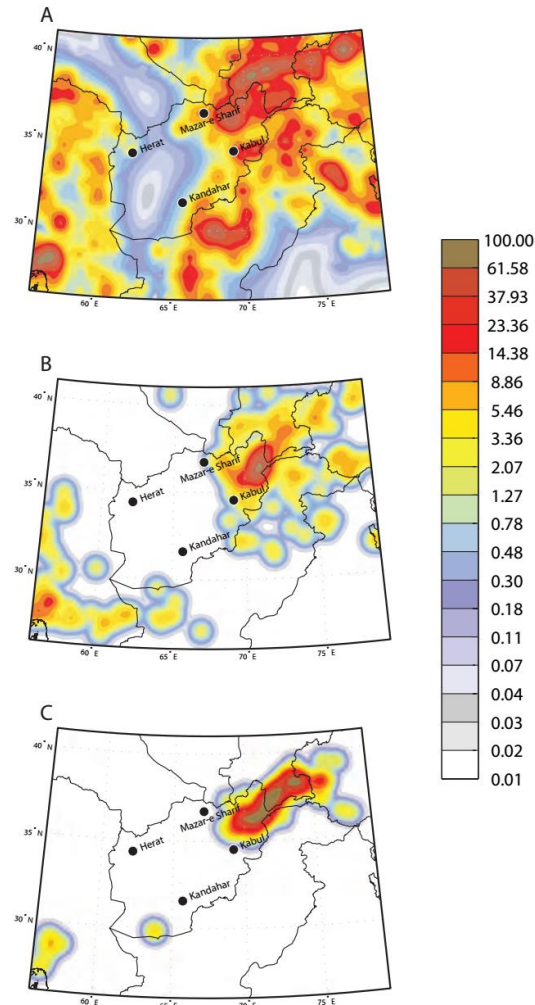


Figure 19 Maps of modelled earthquake rates derived from smoothed seismicity showing the number of M6.0 earthquakes occurring per 10,000 km² per 10,000 years for depths – (A) 0–50 km, (B) 50–100 km, (C) 100–250 km.

4.1.4 Soils⁴³

125. Figure 20 provides a map of soil regions across Afghanistan. The soils are a result of the varied topography, the petrological basis (bedrock), the climatic differentiation and the vegetation cover. Four major soil regions with dominating types of soils can be identified:

1. High altitudes of the Hindukush and mountainous regions of central Afghanistan with weak soil formation – the *Cryorthents* on rocks or *Aridisols* of high mountain desert and semi-desert: very young soils without clear differentiation in the soil profile;
2. Hot rolling country and lowlands of the northern Afghanistan – the *Xeropsamments* or *Arenosols* with *xeric* moisture regimes: mineral-rich soils on loess and in a strip along the Amu Darya river mobile sands;
3. Deserts and semi-deserts of the Southwest – soils of the *Torrripsamments* group or *Arenosols* with *aridic* (or *torric*) moisture regimes, but also moving sands, saline soils and clays and other types;
4. Major valleys – *Torrifluents* or *Fluvisols*, mainly on alluvial deposits: fertile soils with an *aridic* (or *torric*) moisture regime; the most intensively cultivated artificially irrigated lands.

⁴³ Ibd.

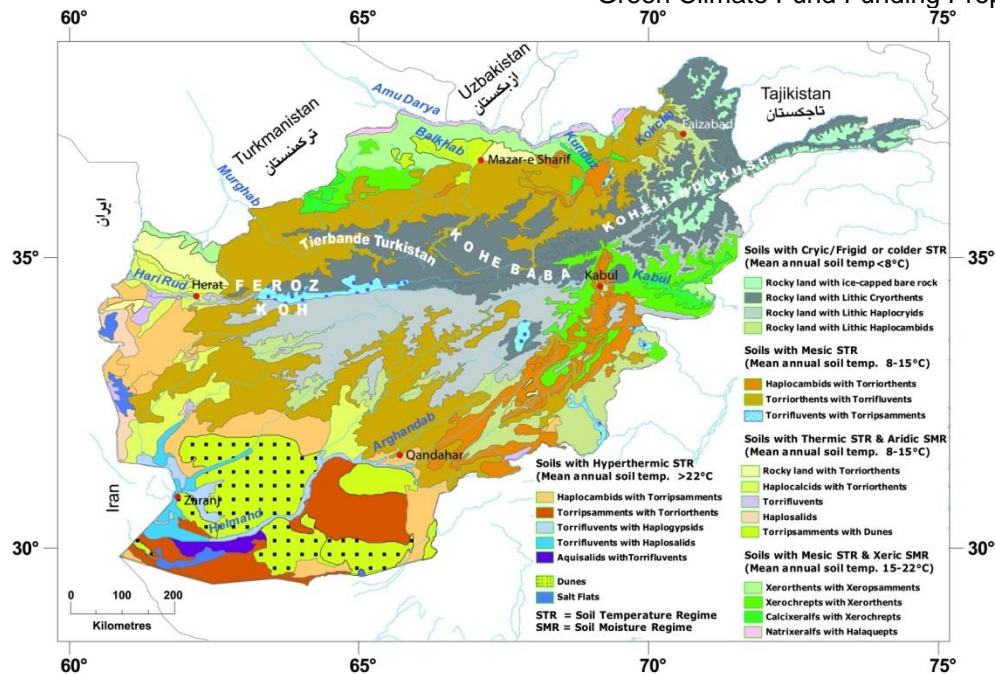


Figure 20 Soil regions after the classification of USDA (map by Rafiqpoor⁴⁴)

126. Many soils in Afghanistan due to their young age, arid climate, historical and current erosion and low vegetation productivity are poorly developed and have low humus content. Outside of intensively cultivated areas, the highest humus content and thus carbon storage is found at higher elevation, under mountain steppe vegetation without overly intensive grazing (figure 21). These soils are very sensitive to erosion following the destruction of the vegetation cover by overgrazing or rain-fed cultivation (*Ialm*).

⁴⁴ Ibid.



Figure 21 Soil profile showing high humus content, developed under mountain steppe vegetation in the Central Plateau of Bamyan (Photo Michel).

127. Soil erosion depends on several parameters, such as type of soil, slope, vegetation, topography and rainfall and wind intensity. The loss of soil stability and soil erosion can take place due to the removal of vegetation cover, and numerous construction activities. The major reasons for soil erosion all over Afghanistan are overgrazing, removal of trees, shrubs and subshrubs for fuel and cultivation of sloping lands. It can cause the loss of soil fertility and induce slope instability. Wind erosion removes fertile topsoil and causes dust storms, which negatively affect air quality and human health.
128. As discussed in Section 4.3 Climate (4.3.1 Precipitation and 4.3.4 Climate information on mini-grid sites) rainfall is concentrated in the wet season, which in most areas runs from November to April, with an additional rainy period during summer in the East of the country. As rainfall is often concentrated in single large events it can have a significant impact on unprotected soils, where sudden high surface run-off causes sheet and gully erosion, sedimentation and sometimes massive flash flood events.
129. The river flow dynamics caused by the precipitation and snowmelt patterns as described in Section 4.8 determine the vertical and lateral erosion of the river courses, the transportation of material by the river and its sedimentation.

4.2 UNEXPLODED ORDNANCES

130. After decades of war, civil war and civil unrest, unexploded ordnances are a risk factor in most areas of Afghanistan. Land mines have been widely used during the Soviet-Afghan war 1979-1989 and during the civil war between the Mujahedeen factions and with the Taliban (1989-2001). During several years, e.g. in the early 2000s, Afghanistan had the highest number of casualties due to landmines and unexploded ordnance in the world⁴⁵.

The project preparation did not include a detailed analysis of presence of unexploded ordnances in the areas of the planned mini-grids. However, all planned sites are located in areas which are secure and

⁴⁵ International Campaign to Ban Landmines. Landmine monitor report 2003. New York: Human Rights Watch, 2002.

stable since many years, and these areas have either been cleaned up or are known to local communities.

4.3 CLIMATE

131. The climate of Afghanistan is mainly arid and continental. Major climatic differences in the country are determined by altitude, mountain ranges acting as barrier to aerial circulation and by the influence of different patterns of atmospheric circulation. These factors all together determine the patterns of precipitation and temperature in the country.
132. Detailed data on the climate patterns in Afghanistan are difficult to obtain. During the years of conflict, recording of meteorological data was interrupted at most stations. Data therefore often have a gap between 1980 and the mid or late 2000s. Furthermore data recorded at stations in the mountain valley do not properly represent the temperature and precipitation higher up in the mountains. These differences can be highly significant and influence heavily on ecosystems and land-use in mountainous areas.
133. The temporal climate patterns are best presented by climate diagrams. These graphs combine average monthly values of temperature (left y-axis) with precipitation (right y-axis). Temperature is plotted against precipitation with a scale unit of 1°C against a scale unit of 2 mm precipitation. Months during which the rainfall bars are below the temperature scale are considered as relative arid (drought) period.
134. The climate diagrams and characteristics of the program's mini-grid sites will be presented in section 4.3.4.

4.3.1 Precipitation⁴⁶

135. Most of Afghanistan receives little precipitation. Total annual rainfall varies over the country as can be seen on the map of mean annual rainfall (figure 22). Highest rainfall amounts of up to 1000+ mm per annum are received in the highest mountain regions of Hindukush and Safed Koh in the Northeast and East of the country. The Central plateau and mountains of Koh-e Baba, Tierband-e Turkestan and Feroz Koh receive low to moderate precipitation of 300-500 mm p.a. The lowlands in the North and in the South-east have rainfall of only 100-200 mm or in the country's southwestern Nimroz, Helmand and Farah provinces even less than 50 mm per annum.
136. Precipitation is of very high variability and may be concentrated to just a few days in the rainy season, which may last several months. Rainstorms can yield the whole rainfall of a month within few hours, often causing flash floods, erosion and landslides. So called "*sel-ab*", floods with large amounts of mud, gravel and larger stones can be highly destructive and devastate entire valleys. On the other hand, only daily rainfall of more than 5 mm is considered ecologically relevant, because smaller amounts of rain tend to evaporate immediately. Figure 23 shows the percentage of days with >5 mm rain among all rainy days in one year during the period 1972-1974. This map clearly explains one factor influencing water availability and agricultural productivities in different parts of the country.

⁴⁶ Summarized based on Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

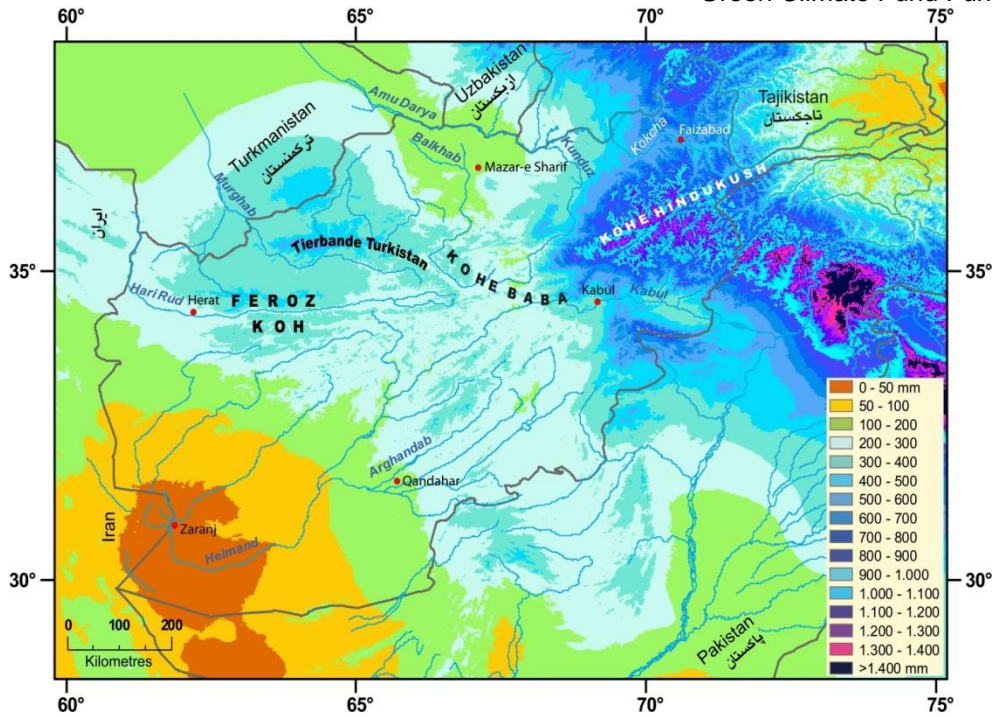


Figure 22 Mean annual rainfall in Afghanistan and adjacent areas (map by Rafiqpoor⁴⁷).

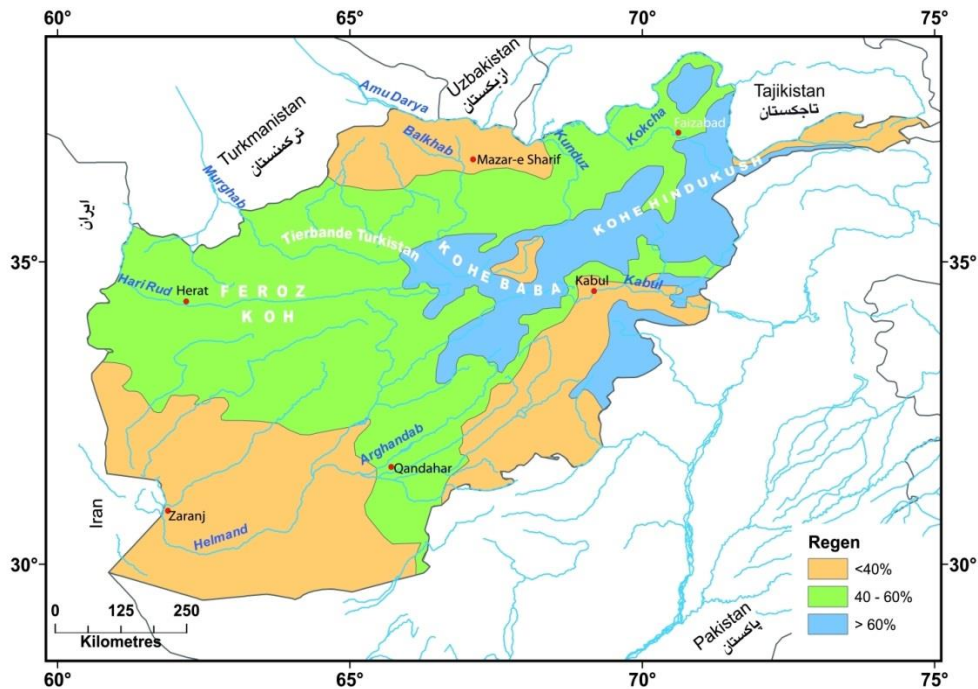


Figure 23 Percentage of rainy days with >5 mm precipitation (map by Rafiqpoor⁴⁸).

137. In most parts of the country precipitation is concentrated during the winter and spring months. Depending on the mainly by altitude determined temperature, snow is stored until the summer season

⁴⁷ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁴⁸ Ibid.

and provides melt water to the lowlands on which irrigated agriculture as well as run-of-the river hydropower heavily depend. In the north of the country a substantial portion of the annual rainfall occurs during the spring months; and rain-fed agriculture is highly dependent on this rainfall pattern and yields are heavily affected by droughts during this season. Small areas in the east of the country, e.g. the basin of Khost, are under the influence of the Indian summer monsoon and therefore have a second rainfall peak during the summer months June till August. Figure 24 shows these areas according to the percentage of summer rains in in annual rainfall.

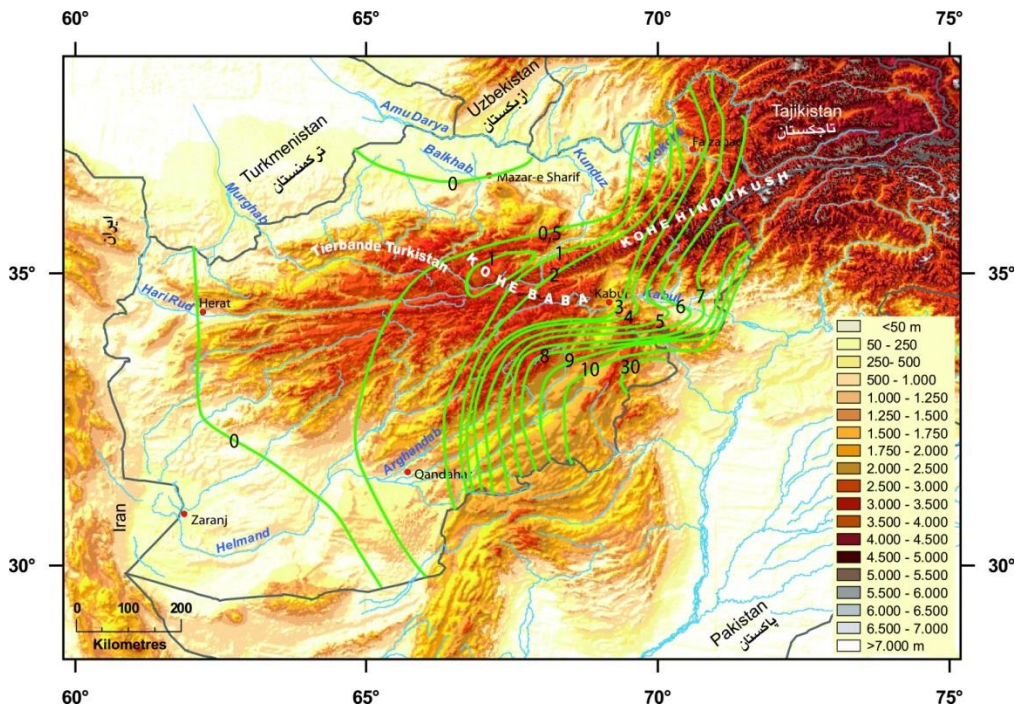


Figure 24 Percentage of summer rains in the annual precipitation (map by Rafiqpoor⁴⁹).

138. Precipitation patterns influence on the discharge of the rivers. Precipitation in form of snow is stored until the temperatures raise. For this reason rivers with their catchment receiving much precipitation as snow, like the Panj and its tributaries, have the lowest flow in winter. As larger snow packs at high altitudes last until mid-summer flow peak in such rivers is in summer at the height of snow melt. Discharge in rivers where precipitation in the catchment is mainly as rain is closer related to the seasonal patterns of precipitation, but flow is more or less buffered by a part of the rainfall being infiltrated into the ground water and after some time released by springs. The Central Plateau in Yakawlang district of Bamyan thus has almost no surface water, but most of its rainfall is infiltrated in aquifers and released by springs, some of which contribute to the lakes of Band-e Amir.

4.3.2 Temperature⁵⁰

139. Temperature patterns in Afghanistan are subject to altitudinal gradients. While there are generally lower temperatures higher in the mountains, the lowest temperatures have been recorded in the continental inter-montane basins.

140. The spatial patterns of temperatures of Afghanistan are best presented by maps of the mean annual temperature (figure 25), of the warmest (figure 26) and of the coldest (figure 27) months. Heat and cold can impact the functioning of PV systems and battery energy storage systems.

⁴⁹ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁵⁰ Summarized based on Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

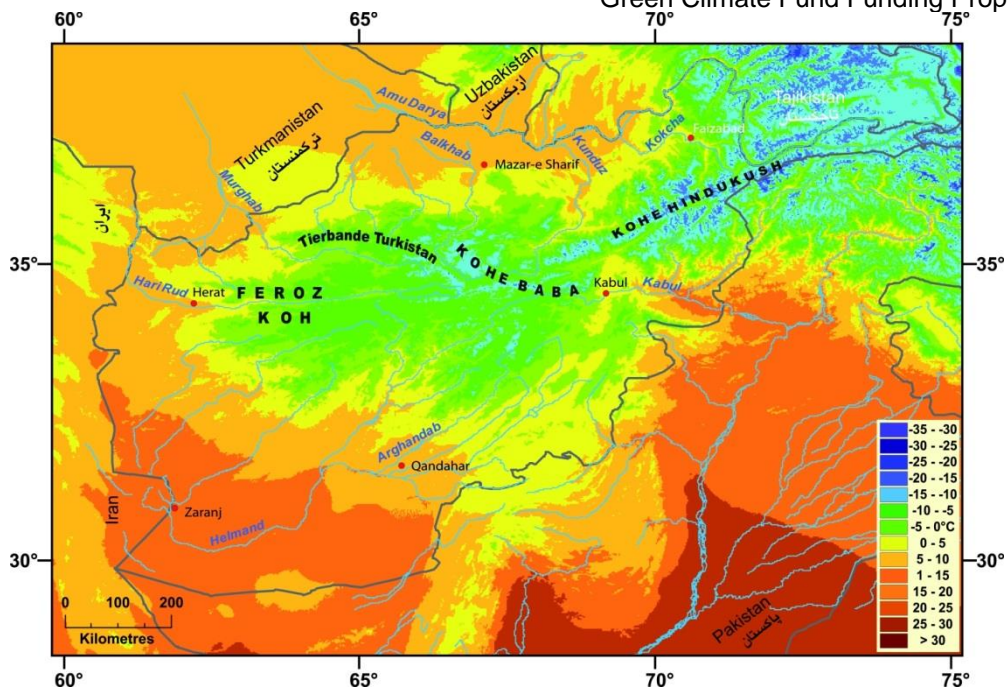


Figure 25 Mean annual temperatures (map by Rafiqpoor⁵¹).

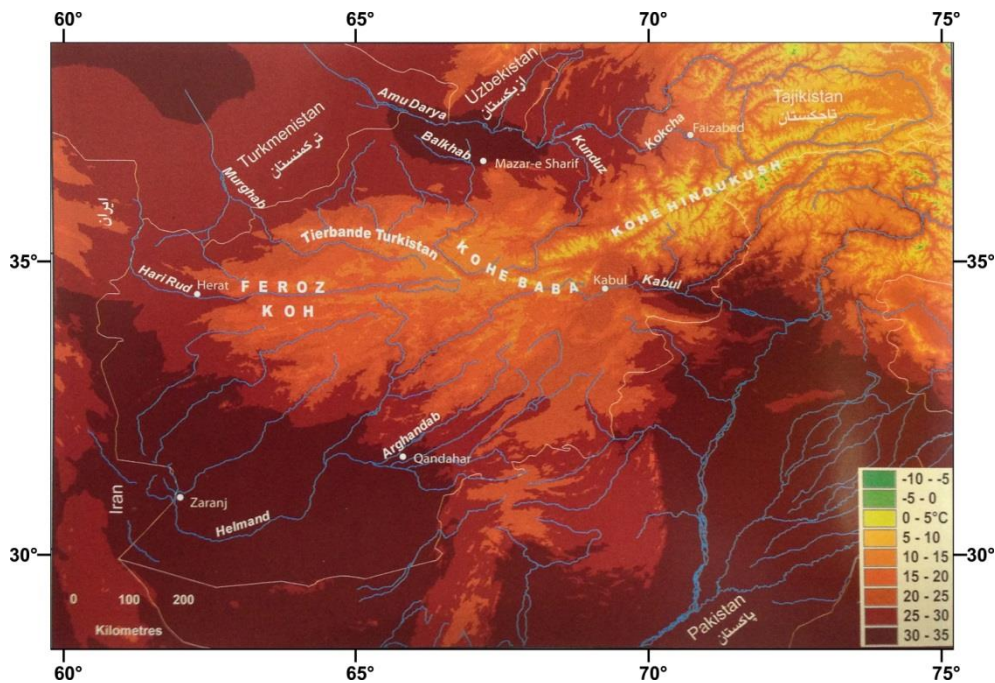


Figure 26 Mean July temperatures (map by Rafiqpoor⁵²).

⁵¹ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.
⁵² Ibd.

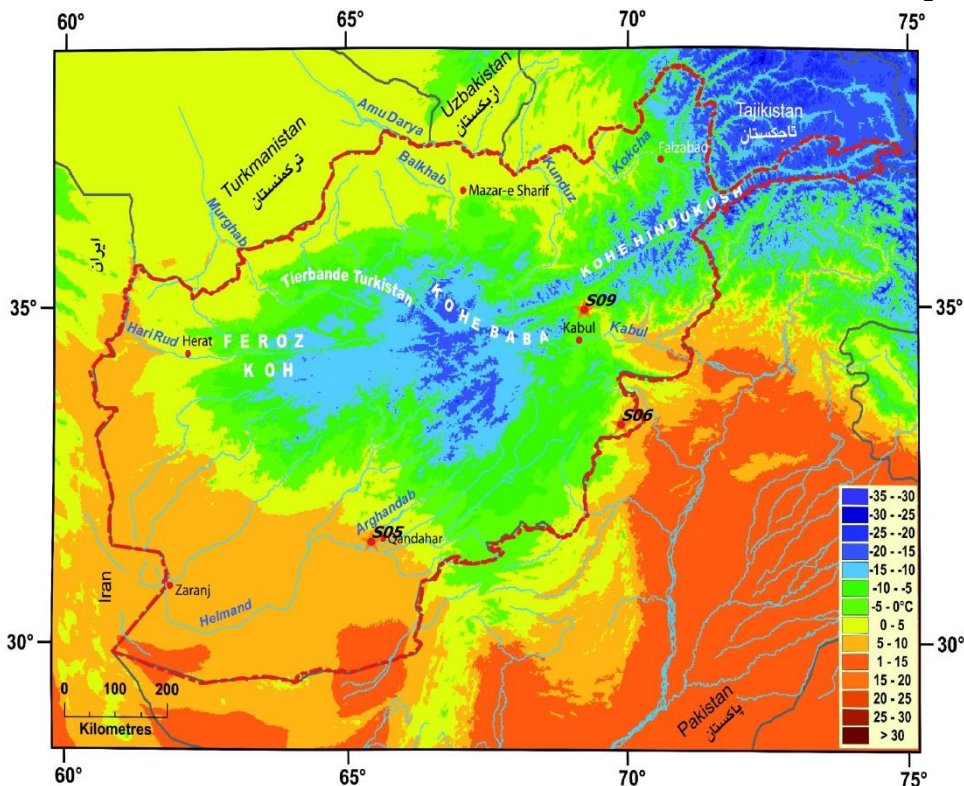


Figure 27 Mean January temperatures (map by Rafiqpoor⁵³) with locations of mini-grid sites.

141. The seasonal variations of temperature show the highly continental character of the climate of Afghanistan. Based on the winter temperatures, traditionally Afghans distinguish the “*garmsir*” (warm land) and “*sardsir*” (cold land). The “*garmsir*” with mid-Winter mean temperatures of 5-10°C are the basins of Laghman and Jalalabad and the south-west provinces Qandahar, Helmand and Farah. These spatial and seasonal variations of temperature influence not only agriculture and livestock herding, especially the nomadic pastoralism, but also other economic activities and the lifestyle of people, for instance teaching breaks in universities and schools.
142. The mini-grid sites S06 and S09 are located in the regions with mean temperatures in January of 0-5°C, while S05 in Panjwayee near Kandahar has 5-10°C (figure 27). The electricity generation capacity of the mini-grids will, however, will not be sufficient for space heating.
143. The combination of precipitation and thermal patterns describe the ecological climate conditions for vegetation growth and thus for land-use. In most mountainous areas with sufficient humidity for the growth of plants is the thermal growing season extremely short, sometimes one month or less. In areas with a longer thermal growing season aridity limits plant growth. The map in figure 28 shows this eco-climate classification.
144. The regions with most favourable conditions for natural vegetation and agriculture are those with warm (9-10 thermal vegetation months) and humid (7-9 hygric vegetation months). Such regions are concentrated on the slopes around Safed Koh in the East and at the northern slopes of Hindukush in Takhar and Baghlan. The areas north of the Feroz Koh, Tirband-e Turkistan and Koh-e Baba have warm subhumid to semiarid climate and are important agricultural areas. In these areas yield of non-irrigated agriculture heavily depends on the seasonal rainfall in spring and if precipitation in May and June is insufficient there the result will be crop failure, which makes the region especially prone to climate change impact, with predicted more irregular rainfall patterns and higher degree of aridity. The southwest, mainly the provinces of Farah, Nimroz, Helmand and Kandahar is warm and semiarid to hot

⁵³ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

and periarid. Here agriculture is possible only with irrigation from rivers, originating in the central mountains.

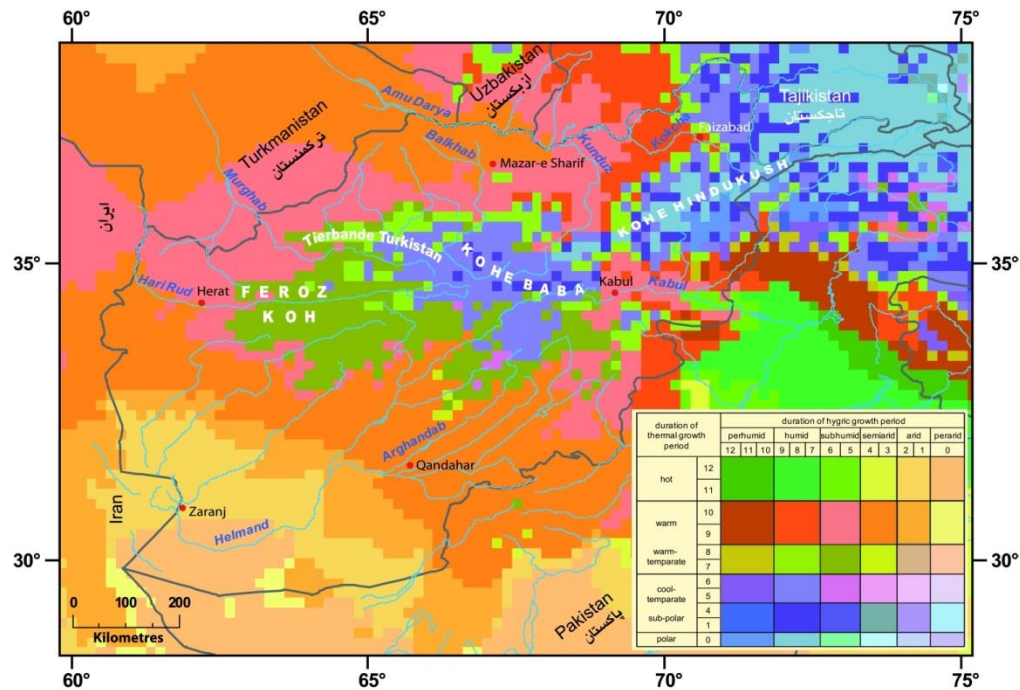


Figure 28 Eco-climate classification (map by Rafiqpoor⁵⁴).

4.3.3 Climate change predictions⁵⁵

145. Ongoing trends in climate change are difficult to determine with accuracy due to the lack of long-term precise meteorological records in the country. Available data and trends from neighbouring countries indicate that mean annual temperature has increased by 0.6°C since 1960, at an average rate of around 0.13°C per decade. Increases have been most pronounced during the autumn (September, October, November), with increases at an average rate of 0.29°C per decade and a significant increase in the number of exceptionally hot days and nights. Changes in precipitation regimes tend to vary more between regions than temperature. Mean rainfall over Afghanistan has decreased slightly (at an average rate of 0.5 mm per month (or 2% per decade) since 1960. This is mainly due to decreases of around 2.7 mm per month (6.6% per decade) in spring (March, April, May) rainfall. The proportion of rainfall that occurs in heavy events has not changed with any consistent trend since 1960.

146. Current models indicate significant warming across all regions of Afghanistan with average predicted increases in temperature of between 2°C and 6.2°C by 2090s dependent on global emissions scenarios. Warming is most rapid in spring/summer with this trend being marked in the north and the central plains of Afghanistan. All projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in current climate, especially during summer months.

⁵⁴ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁵⁵ Savage, M., Dougherty, B., Hamza, M., Butterfield, R., Bharwani, S. (2009). Socio-Economic Impacts of Climate Change in Afghanistan. A Report to the Department for International Development. Stockholm Environment Institute, Project Report – 2009.

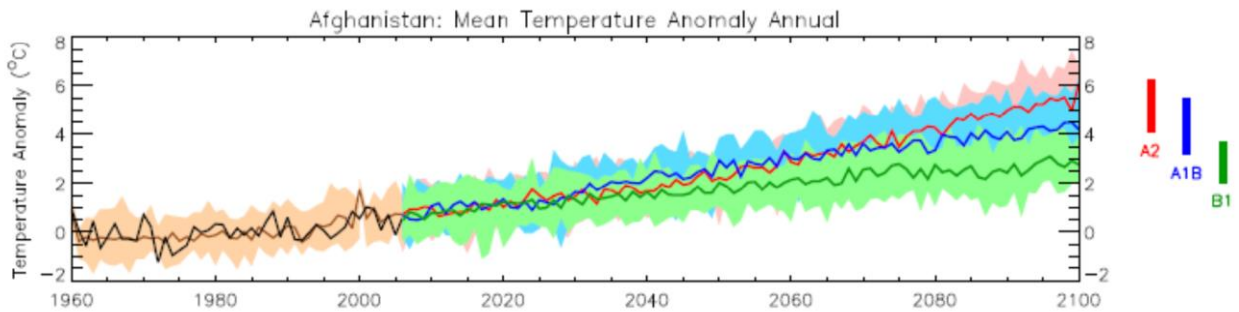


Figure 29 Change in temperature until 2100 under 3 emissions scenarios (0 = 1970-1999 average).

147. Across all emission scenarios the mean annual temperature is projected to increase by 1.4 to 4.0°C by the 2060s, compared to 1970-1999 averages. Dependent on the emission scenario, the range of projections by the 2090s is around 1.5 to 2.5°C.



Figure 30 Spatial projections for temperature change under SRES A2 scenario.

148. In the short term, average annual rainfall is projected to show a small increase by about 10-20 mm. Mean annual rainfall changes in the 2090s show conditions are generally drier (by 10-40 mm) over much of Afghanistan. Much of the drying is due to decreases in spring rainfall (March, April, May). Winters are expected to be significantly drier in the South further increasing the aridity there. Drought is likely to be regarded as the norm by 2030, rather than as a temporary or cyclical event. Floods due to untimely rainfall and a general increase in temperature are of secondary importance. Their impacts may be amplified due to more rapid spring snow melt as a result of higher temperatures, combined with the downstream effects of land degradation, loss of vegetative cover and land mismanagement.

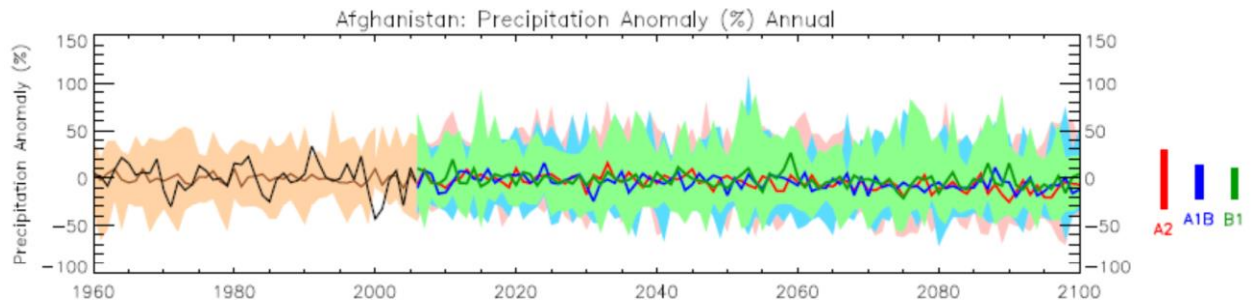


Figure 31 Change in precipitation until 2100 under 3 emissions scenarios (0 = 1970-1999 average).

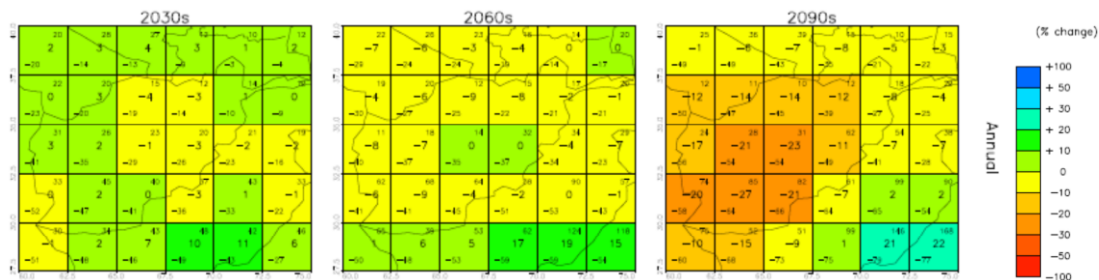


Figure 32 Spatial projections of percent precipitation change under SRES A2 scenario⁵⁶.

4.3.4 Climate information on mini-grid sites⁵⁷

149. Local climate varies between the planned mini-grid sites of the project. As these sites are not necessarily located in the vicinity of weather stations, here climate diagrams from stations are presented, which are located sufficiently close to the selected sites to be representative for these. For some sites no nearby weather station data could be identified.

150. Noticeable is the similarity of rainfall and temperature patterns, with however, large differences between the stations in terms of annual and monthly precipitation and temperatures. Rainfall patterns at the station Khost (fig. 33) are influenced by the Indian summer monsoon resulting in rainfall during the months June-September, which are without substantial precipitation at all other sites.

151. Note the different scales of the graphs in fig. 33 and 34!

⁵⁶ Ibid. Savage et al. (2009).

⁵⁷ Climate diagrams retrieved from <https://en.climate-data.org>

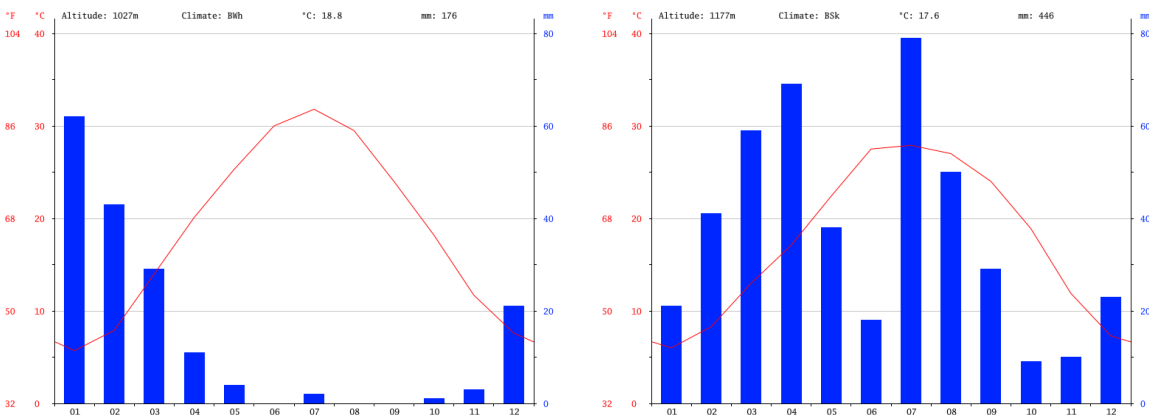


Figure 33 Climate diagrams of Kandahar⁵⁸ (near S5 Panjawayee – left) and Khost⁵⁹ (near S6 Sheikhamir - right).

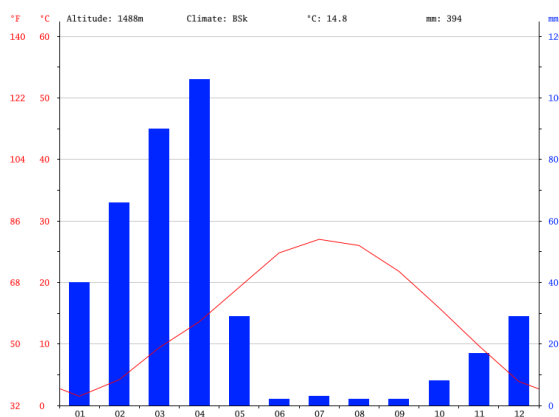


Figure 34 Climate diagram of Bagram⁶⁰ (Parvan, near S9 Qalandar khil).

4.4 AIR QUALITY

152. The project areas are predominantly village or rural in character. Existing air quality reflects those environments. Even if no data from air quality measurements are available for any of the mini-grid sites the existing knowledge about the sites supports the assumption that there is very little air pollution in these areas due to the absence of any industrial pollution sources.
153. Electricity generation in rural areas relies on generators burning diesel, gasoline or kerosene, which causes localized air pollution.
154. Dust pollution originates from dry arable lands and degraded rangelands, both not covered by protective vegetation. This dust pollution is common all over Afghanistan during the dry season.
155. During all seasons use of biomass and dung for cooking causes year-round localized air pollution in villages, with indoor air pollution causing substantial health problems, especially for women and children.

⁵⁸ <https://en.climate-data.org/location/1255/>

⁵⁹ <https://en.climate-data.org/location/31380/#climate-graph>

⁶⁰ <https://en.climate-data.org/location/31380/#climate-graph>

156. The cold season in different provinces and depending on altitude lasts up to eight months. Most common fuel for heating are biomass, dung and in lesser extent coal, all burned in primitive heating devices. This causes substantial air pollution in villages and towns.

4.5 AMBIENT LIGHT

157. Ambient light in the project areas is entirely determined by the daylight and weather. The mini-grid sites lack street lights and substantial outdoor lighting by households, social facilities or businesses. Industrial facilities do not exist in the mini-grid areas. Artificial light sources are small and have only local influence – candles and petroleum lamps, electric bulbs supplied by small PV and HP systems.

4.6 AMBIENT NOISE AND VIBRATION

158. No noise data has been collected for the preparation of the ESAR. Due to the limited urban development and heavy industry, environmental noise is very low. At the mini-grid sites relief will prevent that noise is readily transmitted across large distances. Sources of noise include: motor vehicles and generators. As electricity generation in rural areas relies on generators burning diesel, gasoline or kerosene and individually run by households, businesses and public institutions local noise can be substantial and negatively impacts overall comfort.

4.7 VISUAL AMENITY

159. The visual amenity of the mini-grid sites varies and its assessment would be subject to highly subjective judgement. All sites are located in typical for Afghanistan landscapes with their characteristic aesthetic values, but no site is of extraordinary visual amenity in national or international terms.

4.8 SURFACE WATER AND HYDROLOGY

4.8.1 Overview

160. Afghanistan can be divided into three major drainage basins and some non-drainage areas:

A. The endorheic Amu Darya basin, draining previously into the Aral Sea with some of the historic tributaries now isolated and considered as forming two separate basins: Harirod-Murghab and Northern, including the sub-basins:

- i. Panj (Amu Darya);
- ii. Kokcha (Amu Darya);
- iii. Ab-e Rustaq (Amu Darya);
- iv. Khanabad (Amu Darya);
- v. Kunduz (Amu Darya);
- vi. Khulm (Northern);
- vii. Balkhab (Northern);
- viii. Sar-e Pul (Northern);
- ix. Shirin Tagab (Northern);
- x. Bala Murghab (Harirod-Murghab);
- xi. Kushk wa Kashan Rod (Harirod-Murghab);
- xii. Upper Hari Rod (Harirod-Murghab);
- xiii. Lower Hari Rod (Harirod-Murghab);

B. The endorheic Helmand River basin draining to the Sistan terminal lakes on the Iranian border, including:

- i. Upper Helmand;
- ii. Middle Helmand;



- iii. Lower Helmand;
- iv. Sistan-Helmand;
- v. Kash Rod;
- vi. Khuspas Rod;
- vii. Farah Rod;
- viii. Adraskan Rod;
- ix. Chagay;
- x. Daht-e Nawur;
- xi. Upper Arghandab;
- xii. Lower Arghandab;
- xiii. Sardi wa Ghazni Rod;
- xiv. Tarnak Rod;
- xv. Arghistan; and the

C. Kabul-Indus River basin draining now or in the past into the Indus and finally into the Arabian sea, including the basins of:

- i. Kabul;
- ii. Ghorband wa Panjshir (Kabul tributaries);
- iii. Alingar (Kabul tributaries);
- iv. Kunar (Kabul tributaries);
- v. Chak wa Logar Rod (Kabul tributaries)
- vi. Shamal;
- vii. Gomal; and

D. the non-drainage areas of.

- i. Dasht-e Naomid in the west;
- ii. Dasht-e Margo (considered part of Helmand); and
- iii. Registan (considered part of Helmand).

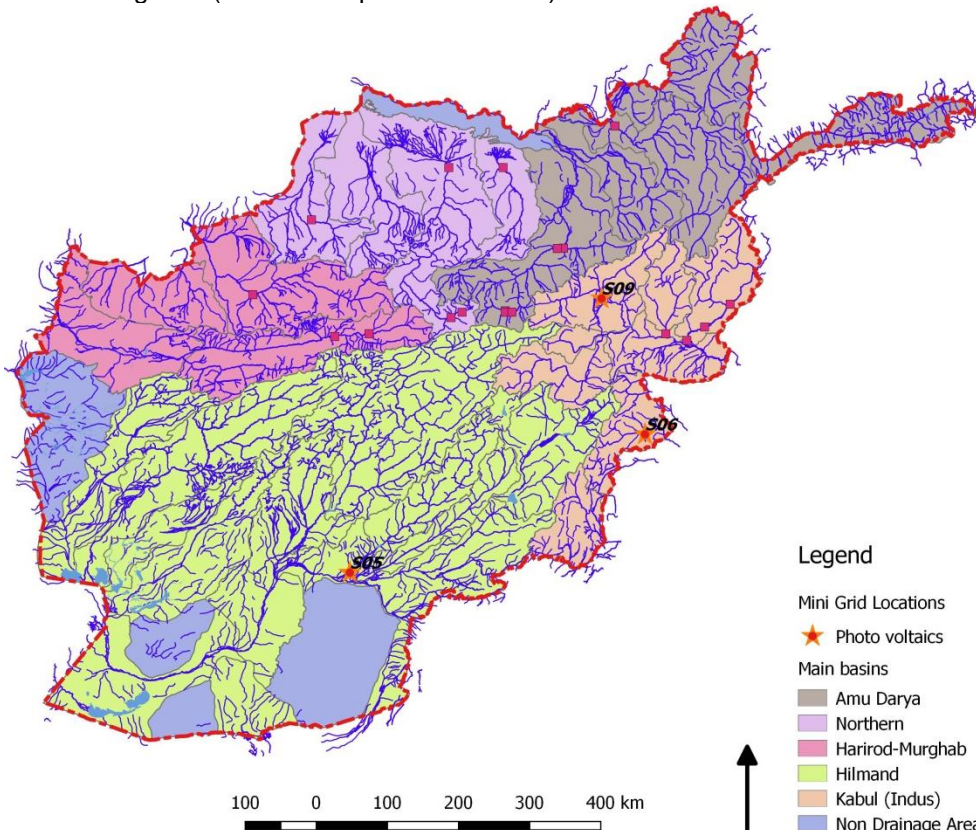


Figure 35 Main drainage basins of Afghanistan with planned mini-grid locations

161. The discharge in all rivers varies much between seasons, but also between years. Because of these great fluctuations in streamflow, from flood to drought, knowledge of the magnitude and time distribution of streamflow is essential for all aspects of water management and environmental planning. To provide the Afghan managers with necessary streamflow information, the U.S. Geological Survey, in cooperation with the U.S. Task Force for Business and Stability Operations, computed streamflow statistics for data collected at historical gauges in Afghanistan, in the Kabul, Amu Darya, Northern, Hari Rud and Murghab Basins⁶¹. These data in most locations cover ten and more years prior September 1978.
162. The basins represented in the USGS report⁶² are in arid and mountainous environments, often fed by melting snow from the high mountains and infrequent storms. Seasonal fluctuations of discharge are thus caused by a combination of precipitation patterns, snow accumulation and snowmelt. Precipitation is highest at higher altitudes, where low temperature cause that a large portion of precipitation is stored as snow. Thus the increase of precipitation in late fall and winter after the summer drought is not reflected in an increase of river discharge. Also spring precipitation is partly retained as snow. For this reason the peaks of river discharge are not synchronous with precipitation patterns.
163. Depending on the amount of snow accumulation in the catchment areas and the timing of snowmelt, discharge peaks are typically from (April) May to July (August). In some areas, where snowmelt is accelerated and rainfall seasonally concentrated, high discharge can be restricted to three months only, while the remaining of the year the river can have almost no water. In such catchments mean monthly discharges can vary by factor 30 between the months with lowest and months with highest discharges. Other rivers have a more balanced discharge, e.g. the Kokcha river with a large catchment in the Hindukush mountains, but still mean discharge varies by factor 10 between the months with highest and lowest discharge.
164. The seasonal variations in discharge are advantageous for irrigated agriculture, because precipitation outside the vegetation season is naturally stored and during the growth season provided as river discharge. The predicted climate change will likely affect this seasonal water availability if precipitation patterns become more irregular and temperature increase reduces snow packs.
165. The concurrence of peak discharge with the need for irrigation water and with the vegetation period has the advantage that diversion of a part of the flow for hydropower generation in most cases does not cause water allocation conflicts in wet and average years.
166. Inter-annual variation of mean discharge is also high for specific seasons as well as for annual mean discharges. Variations by factor 5-10 and more of the discharge during the months with highest flow can be observed between driest and wettest years. During the months with lowest discharge even higher inter-annual variation is possible.

4.8.2 Water quality

167. The rivers of the mini-grid sites have no known load of pollutants from industrial or agricultural sources. Due to the absence of any industrial polluters and the lack of large scale intensively used irrigated lands with high amounts of applied fertilizer such pollution is highly unlikely. As livestock dung is usually collected as fuel or fertilizer no substantial pollution from livestock can be expected.
168. In rural and urban settlements pollution of rivers by domestic waste can locally be substantial. Lack of sewage and waste water treatment cause localized pollution of surface water by human excrements and waste water.

⁶¹ Olson, S.A., and Williams-Sether, T., 2010, Streamflow characteristics at streamgages in northern Afghanistan and selected locations. U.S. Geological Survey Data Series 529, 512 p., retrieved at <http://pubs.usgs.gov/ds/529/>

⁶² Ibd.

169. Generally there is very little organic matter in the rivers and streams. In most watercourses low water temperature, insufficient availability of nutrients, fluctuations of discharge and seasonally high sediment load limit the growth of aquatic vegetation, including phytoplankton.

4.9 GROUNDWATER

170. Water is infiltrated into the ground and replenishes the ground water, where during a sufficient time of the year precipitation exceeds evapotranspiration and where porous substrate allows for the water to sink in deep enough and to reach an aquifer, i.e. a geological layer which is permeable for water, subordinated an impermeable stratum. Under the climate conditions of Afghanistan infiltration takes place during the wet season in areas with enough rainfall. Most precipitation is in the mountains and, as far as snow is not sublimated without melting, snowmelt contributes to the groundwater replenishment of the aquifers. In contrast, in the arid lowlands little if any precipitation reaches the groundwater as most water is either immediately evaporated or stored in the upper soil horizons and then transpired by plants or evaporated from the soil surface. The groundwater supply in the arid lowlands thus depends on the replenishment in the mountain areas. From there the ground water is led over the impermeable layer far into the dry forelands of the mountains.⁶³

171. Only close to the mountains is the aquiferous layer not too deep below ground to be reached by a well or a shaft. Further away from the mountains the ground water is often located too deep and cannot be lifted with traditional means. For this reason since centuries in Afghanistan, as in adjacent regions, underground irrigation canal(s) *karez* or *qana* are used. In such a *karez* the groundwater is first captured at the bottom of the mountains by digging a vertical shaft, from where it will be led to the irrigation areas through long tunnels. Along this tunnel during the construction of the underground channel a series of vertical shafts is excavated to remove the material from the tunnel and to allow for its future maintenance. This creates a chain of ring-shaped small hills in the landscape (fig. 36).⁶⁴

172. The total ground water recharge in entire Afghanistan is estimated with 16.4 km³ or 10% of the average total precipitation amount. This would be a high percentage by international standards but can be realistic due to the concentration of rainfall in form of snow, which can often find ready access to ground water when it melts. Groundwater extraction is estimated at about 2.8 km³, of which 99% is used for agriculture. Of this 1.2 km³ comes from *karez* systems, 1.0 km³ from springs and the remaining from shallow and deep wells.⁶⁵

173. In densely populated areas of Afghanistan, like the Kabul basin with the capital of the country and a population of 4.6 million people (2015) or Mazar-e Sharif, ground water is pumped with diesel pumps. This leads to an over intensive abstraction of ground water and depletion of ground water tables, e.g. by 2-8 more in Kabul. Pollution is also an issue for water supplies, with often inadequate protection of groundwater from surface water pollution due to inadequate sanitation facilities. Groundwater is often the preferred source for village water supply systems, since it can be of high quality and less seasonal than surface supplies. However, salinity is a problem in some areas.⁶⁶

⁶³ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁶⁴ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁶⁵ ADB (2015). Preparation of the Afghanistan Water Resource Sector Development Strategy. Volume 2 Annexes. TA-7994 AFG.

⁶⁶ Ibid. ADB (2015)

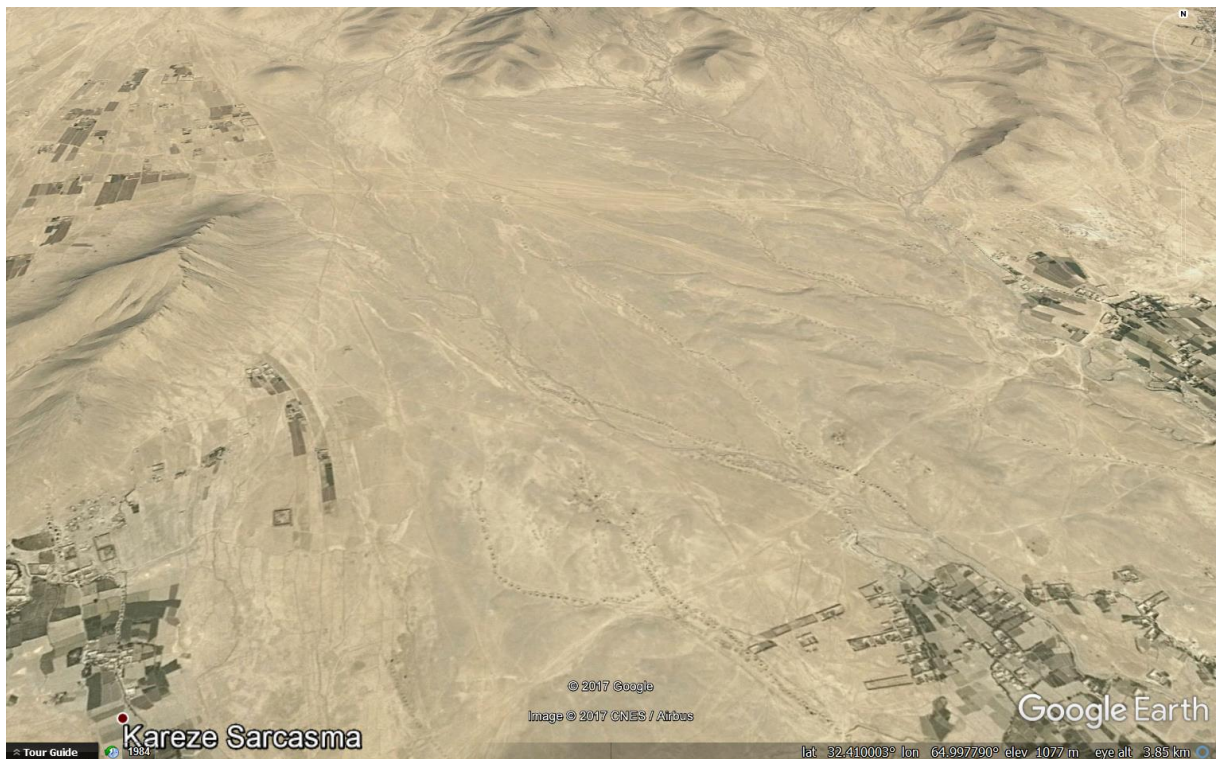


Figure 36 Karez landscape in a perspective GoogleEarth view; the lines of the irrigation tunnels leading from the foothills to the villages are well visible.

174. At the sites of planned mini-grids no groundwater studies have been undertaken, because the project is neither designed for pumping of groundwater nor expected to cause additional groundwater abstraction.

4.10 VEGETATION, FLORA AND FAUNA

4.10.1 Background

175. Siegmar-W. Breckle and M. Daud Rafiqpoor in 2010 presented the most recent comprehensive overview of flora and vegetation of Afghanistan⁶⁷. This book as well explains in detail the topographic (see section 4.1.1 of this ESAR), geological (see section 4.1.2), soil (see section 4.1.3) and climate (see section 4.3) characteristics, which determine the vegetation and consequently the ecosystems and much of the historical and current land use in the country.

176. The map of the “human footprint” (figure 37), i.e. the change of ecosystems reflected in human population density, land transformation, human access, infrastructure and settlements, shows that throughout the country the valleys, oasis and alluvial fans are the main settlement and economic regions.

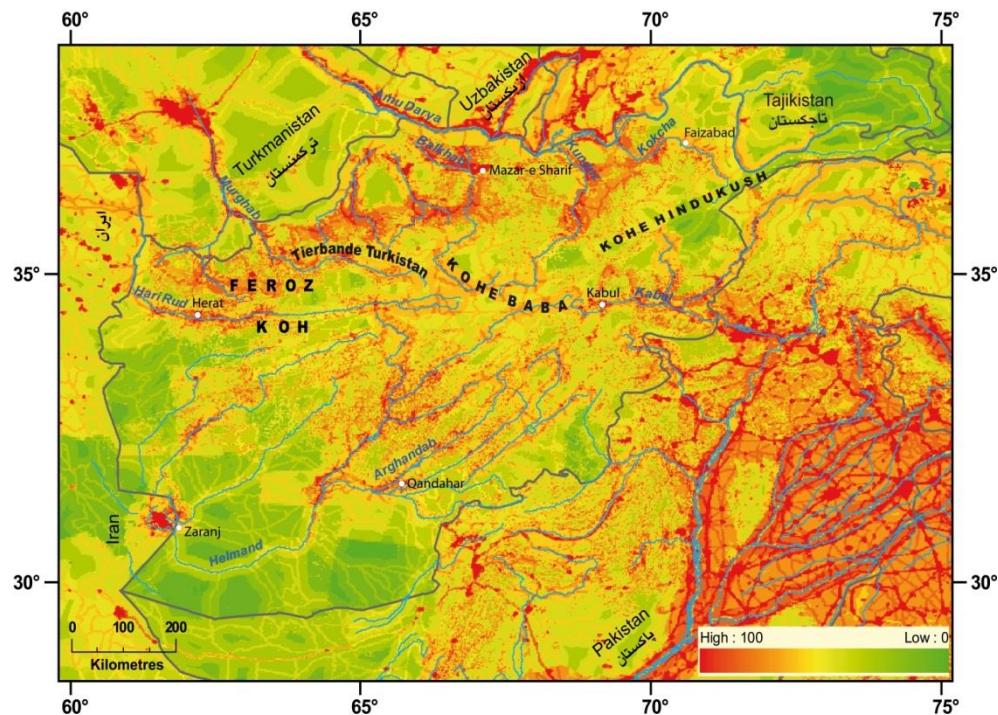


Figure 37 “Human footprint” (map by Rafiqpoor⁶⁸)

4.10.2 Vegetation and Flora⁶⁹

4.10.2.1 Vegetation:

177. The vegetation of Afghanistan, except of the small forest areas in the East and the irrigated lands, which cover about 5% of the country’s surface, appears over large areas rather monotonous and for most of the time plants appear to be almost absent. This impression is caused by the strongly seasonal and predominantly semiarid climate (see section 3.3) in combination with the past and ongoing excessive impact of grazing, cutting of vegetation for forage and fuel and expanding *la’lmi* cultivation of drylands.

⁶⁷ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁶⁸ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

⁶⁹ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.

178. The vegetation of Afghanistan (figure 38) can be characterized by the main zonal vegetation categories on normal ecological sites (No.1-8). Vegetation formed under predominant influence of one ecological factor like additional water or high salinity is called azonal vegetation (No. 9). Due to the limitations of scale not all major vegetation types are indicated and differentiated on the map.

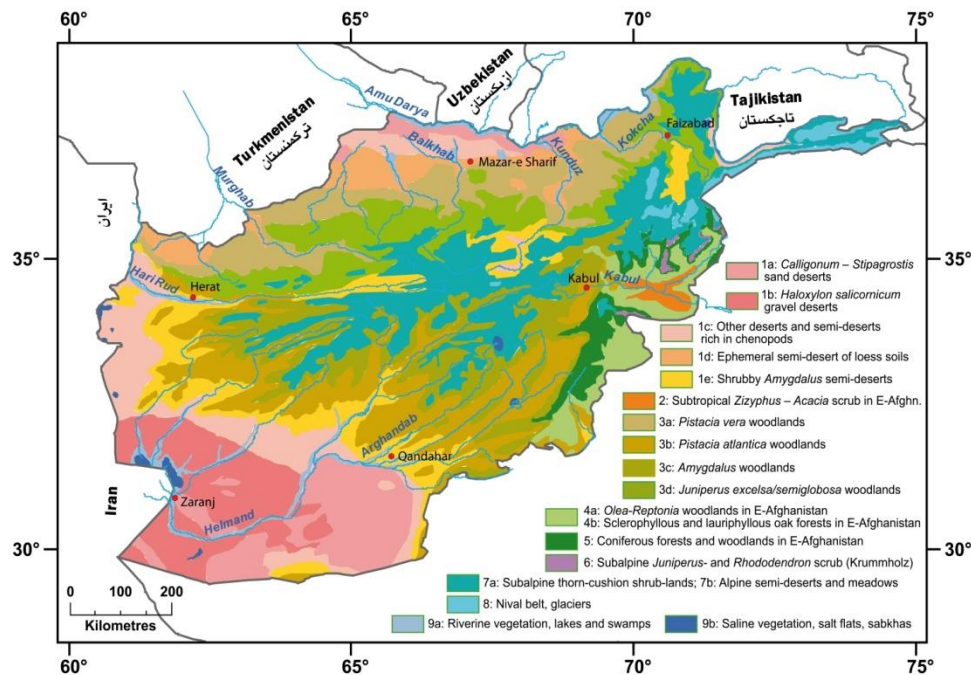


Figure 38 Map of the main vegetation categories of Afghanistan (map by Rafiqpoor⁷⁰)

179. The following main vegetation types are of importance (numbers refer to map in figure 37):

A. Deserts and semi-deserts:

a. *Calligonum-Stipagrostis* communities of sand deserts (No. 1a)

This vegetation is characterized by the shrubs of *Haloxylon persicum*, *Salsola richteri* and different *Calligonum* species as well as tall perennial grasses *Stipagrostis karelinii* and *S. pennata*, which cover and fixate the sand dunes in the driest parts in N- and S-Afghanistan, where average annual rainfall is less than 150 mm.

b. *Haloxylon salicornicum* communities of gravel deserts (No. 1b)

Communities of *Haloxylon salicornicum* with other sub-shrubs and a number of xero-halophytic annuals, among them Chenopodiaceae species *Halarchon vesiculosus*, *Halocharis violacea*, *H. sulphurea* and the endemic Brassicaceae species *Pyramidium griffithianum* are restricted to the excessively dry and hot gravelly plains of SW- and S-Afghanistan.

c. Other shrubby or sub-shrubby chenopod deserts and semi-deserts (No. 1c)

At the lower altitudes of S-, W- and N-Afghanistan, where annual rainfall rarely exceeds 150-200 mm, a variety of rather different plant communities exists. Important plants are shrubby and sub-shrubby Chenopodiaceae, several *Artemisia* species and the shrubs *Zygophyllum atriplicoides*, *Z. eurypterum*, *Ephedra strobilacea*, *E. sarcocapra* and the thistle *Cousinia deserti*, on sands combined with the tall Apiaceae *Ferula assa-foetida* and

⁷⁰ Breckle, S.-W. and Rafiqpoor, M.D. (2010). Field Guide Afghanistan – Flora and Vegetation, Bonn, Scientia Bonnensis.



Dorema aitchinsonii. Most of these areas are heavily degraded due to overgrazing, fuel collection and overly excessive harvesting of *Ferula*.

d. Ephemeral semi-deserts of loess soils (No. 1d)

In the lower parts of N-Afghanistan with annual rainfall of 150-300 mm typical Central Asian ephemeral semi-deserts are found. In spring they are green from grasses like *Poa bulbosa* and the sedges *Carex pachystylis* and *C. stenophyllus* and coloured by multiple flowers like the Brassicaceae *Malcolmia* and *Turularia*, annual legumes like *Trigonella grandiflora* and geophytes from the genera *Tulipa*, *Gagea*, *Iris*, *Ixiolirion* and *Allium*. Later the vegetation completely dries up with very few species remaining green into the summer. These ecosystems are important winter and spring grazing areas, but are often degraded by overgrazing.

e. Shrubby *Amygdalus* semi-deserts (No. 1e)

In foothill areas of N-, S- and W-Afghanistan and in interior basins with rainfall between 150 and 250 mm per annum vegetation is dominated by different spiny species of almond *Amygdalus*, accompanied by a variety of other low shrubs like *Ephedra intermedia*, dwarf-shrubs of *Acanthophyllum*, *Acantholimon*, *Cousinia* and *Artemisia*, perennial grasses like *Stipa hohenackeriana* and numerous annuals and geophytes.

The PV mini-grid S5 is located in this vegetation type.

f. Subtropical *Zizyphus* and *Acacia* scrub (No. 2)

The thorny, savannah-like vegetation of *Zizyphus nummularia* and *Acacia modesta*, combined with evergreen unpalatable shrubs as *Periploca aphylla*, *Rhazya stricta*, *Calotropis procera* and *Withania coagulans* in the dry and hot Jalalabad basin shows subtropical influence.

B. Deciduous and juniper woodlands

a. *Pistacia vera* communities (No. 3a)

Pistacia vera woodlands are found in the hills of lower and medium altitude in the North of Afghanistan, where annual rainfall fluctuates between 300 and 500 mm. Depending on soil and altitude the pistachio occur together with other trees and shrubs as *Amygdalus bucharica*, *Celtis caucasica*, *Cercis griffithii*, *Acer semenowii*, *Fraxinus xanthoxyloides*, the woody liana *Ephedra foliata* and tall herbs as *Codonocephalum grande*, *Cousinia umbrosa*, *Phlomis bucharica* and *Salvia pterocalyx* as well as geophytes *Eranthis longestipitata*, *Corydalis aitchinsonii* and several *Eremurus species*. Large areas of these woodlands have been cleared by overharvesting of wood combined with excessive grazing, which prevents the regeneration of shrubs and trees and transforms the herbal layer. In higher altitudes large areas have been cleared of the natural vegetation and became transformed into rain-fed arable lands *la'Imi*.

b. *Pistacia atlantica* communities (No. 3b)

In W-, S- and E-Afghanistan at altitudes between 1,000 and 2,000 m with annual rainfall of 250-400 mm woodlands of *Pistacia atlantica* trees are the typical vegetation. Additional tree species include *Cercis griffithii*, *Fraxinus xanthoxyloides* and *Ficus johannis*, at predominantly skeletal soils with shrubs of *Amygdalus spinosissima*, *Cerasus bifrons*, *Astragalus* spp. and subs-shrubs of *Artemisia* spp. together with a variety of perennial herbs. These woodlands are often degraded by wood cutting and overgrazing, leading to a dominance of unpalatable spiny *Astragalus* and small annuals.

c. *Amygdalus* woodlands (No. 3 c)



Almond woodlands of *Amygdalus kuramica* and *A. browiczii* gradually replace the Pistachio woodlands at higher elevations of 2,000 to 2,800 m with more annual rainfall, longer lasting snow and more moderate summer temperatures. The almond trees are accompanied by shrubs of the genera *Rosa*, *Colutea*, *Cerasus*, *Rhamnus*, *Sageretia thea* and many perennial herbs as *Salvia bucharica* and *S. rhytidea*, *Eremurus aitchinsonii*, *E. korshinskyi*, *Rheum ribes* and *Cousinia* spp. Removal of shrubs and trees combined with overgrazing often led to the transformation into thorny cushion subshrub and *Leucopoa karatavica* grassland.

The PV mini-grid S9 is located in the zone of this vegetation type, although the actual grid site is close to villages and therefore the natural vegetation cover does not exist anymore.

d. *Juniperus excelsa/semiglobosa* woodlands (No. 3d)

In N-Afghanistan the Pistachio woodlands above 1,400 m grade into evergreen juniper communities that reach up to the tree line at 2,900 to 3,200 m. The rainfall of 450-1,000 mm, most in form of snow, allows a rich vegetation to develop, which consists of a variety of trees (*Celtis caucasica*, *Fraxinus xanthoxyloides*, *Acer turkestanicum*, *Amygdalus kuramica*), shrubs (*Lonicera nummulariifolia*, *Ephedra equisetina*, *Rosa*, *Berberis*, *Prunus* and *Cotoneaster*), herbaceous (*Impatiens parviflora*, *Lepirodyclis holsteoides*, *Geranium rotundifolium*, *Parietaria lusitanica*, *Prangos pabularia*, *Codonoccephalum grande*, *Rheum ribes* and *Ferula* spp.) and geophyte (*Eremurus furseorum*, *E. spectabilis*, *Allium rosenbachianum*) species. After destruction of the trees this vegetation is largely transformed into thorn-cushion and *Artemisia glanduligera* types.

C. Evergreen broad-leaved woodlands and forests in E-Afghanistan:

a. Dry *Reptonia/Olea* woodlands (No. 4a)

b. Sclerophyllous and lauriphyllous oak forests (No. 4b)

These two vegetation types occur close to each other and are indicated by the same colour in the vegetation map (Figure 38). The dry woodlands of *Reptonia buxifolia* and *Olea ferruginea* with other xerophytic trees and shrubs and a high coverage of tall tussock grasses occur around the basins of Khost and Jalalabad at altitudes of 800 to 1,300 m with rainfall of 300-500 mm. The *Quercus baloot* communities grow adjacent to the former at altitudes from 1,300 to 2,100 m with annual precipitation of 35-600 mm. The oaks can form forests with trees of up to 15 m height and are accompanied by woody species as *Amygdalus kuramica*, *Pistacia khinjuk* and many others, but these forest have disappeared from large areas and been replaced by sub-shrub communities of *Perovskia* and *Artemisia* species. In the sub-humid to humid areas of Nuristan *Quercus baloot* is replaced by *Qu. dilatata* and *Qu. semecarpifolia*, which are like Himalayan forests accompanied by a number of other tree and shrub species, including walnut *Juglans regia*.

D. Temperate coniferous forests and woodlands in E-Afghanistan (No. 5)

Forests and woodlands of Himalayan coniferous species (e.g. pine *Pinus gerardiana*, *P. wallichiana*, cedar *Cedrus deodora* in drier areas, fir *Abies pindrow*, *A. spectabilis* and spruce *Picea smithiana* in more humid areas of Nuristan and Safed Koh) replace the broad-leaved evergreen forests where mean precipitation is too low or vegetation period due to altitude too short. These forests have the most valuable timber in Afghanistan, especially cedar, and are heavily illegally exploited and are thus in a large scale severely degraded or already destroyed and replaced by *Artemisia* subshrub communities.

The mini-grid S6 (Khost) is located in the zone of this vegetation type, although the actual grid site is close to villages and therefore the natural vegetation cover does not exist anymore.

E. Subalpine, alpine and nival vegetation:



- a. Subalpine *Juniperus* and *Rhododendron* scrub (No. 6);
- b. Sub-alpine thorn-cushion shrub-lands (No. 7a);
- c. Alpine semi-deserts, steppes and meadows (No. 7b);
- d. Nival belt (No 8)

Subalpine *Juniperus* and *Rhododendron* scrub is restricted to the wettest parts of Nuristan from the treeline at 3,200 up to 4,000 m. Subalpine thorn-cushion shrub-lands and alpine semi-deserts, steppes and meadows are widely distributed all over the Hindukush, Koh-e Baba and the higher parts of the Central Plateau, where summer rain is absent and precipitation mainly stored as snow in the winter, supplying vegetation after melting. Spiny species of the genera *Cousinia*, *Astragalus*, *Onobrychis*, *Acantholimon*, *Acanthophyllum* and *Cicer* together with subshrubs and dwarf shrubs of *Artemisia*, *Ephedra gerardiana*, *Rhamnus prostrata* and *Krascheninnikovia ceratoides* dominate this type. Palatable grasses, as *Piptaterum lateriale*, *Poa araratica*, *Koeleria* spp., *Festuca* spp. and many legumes, such as species of the genera *Trigonella*, *Astragalus* and *Oxytropis* make these areas important summer pastures, used during the short summer by local transhumant agro-pastoralists and nomadic pastoralists (*Kochi*). Human population growth and increased livestock numbers cause a large scale overgrazing and resulting vegetation degradation and loss of vegetation productivity in these areas.

F. Azonal vegetation:

- a. Riverine vegetation (No. 9a);
- b. Lakes and swamps (No. 9a)
- c. Alkaline lakes, saline flats (No. 9b)

Naturally the lower terraces of the major river valleys underwent periodical flooding, causing specific growth conditions for the vegetation. Typical types are thermophilous riverine forests of *Populus pruinosa* along the Amu Darya and its tributaries, of *Populus euphratica* in the valleys of SW-Afghanistan (Hari Rud, Khash Rud, Helmand and Arghandab), *Dalbergia sissoo* communities with *Nerium indicum* and *Ficus palmata* along the lower Kabul river and its tributaries from Nuristan and montane riverine forests of *Populus afghanica*, various willow *Salix* species and different other shrubs. The majority of these former forests have been transformed into agricultural lands with remnants often restricted to gravelly riversides, which are heavily affected by cutting and livestock grazing.

The river vegetation is usually poor and contains only few species of the genera *Potamogeton* and *Batrachium* as well as *Zannichelia palustris*. There are only few lakes in Afghanistan. Most of former larger endorheic lakes during the last decades transformed into huge salt-swamps due to reduced inflow caused by water abstraction for irrigation and drought. The lakes of Band-e Amir and nearby areas are made by natural travertine dams and have a stable water level. Due to their altitude at 2,800-2,900 m and the steep relief there is limited aquatic vegetation of submerse *Potamogeton*, *Utricularia* as well as *Juncus*, *Phragmites* and other reed plants.

Alkaline lakes have sparse vegetation, heavily influenced by overgrazing at the shore areas and episodic flooding, composed of halotolerant plants e.g. *Juncus gerardi*, *Crypsis aculeata*, *Glaux maritima*. Saline flats are only episodically flooded and dominated by salt tolerant subshrubs and annuals of Chenopodiaceae (*Halocnemum strobilaceum*, *Halostachy belangeriana*, *Salsola* spp.) and grasses (*Aeluropus littoralis*, *Hordeum leporinum*, *Eremopoa persica*), but also various species of *Limonium*, *Nitraria*, *Tamarix* and other genera.

4.10.2.2 Native flora and invasive species:

180. Though Afghanistan is a rather arid country with extensive deserts and semi-deserts and a high level of degradation of the vegetation cover, the number of vascular plant species is with estimated 4,100 species, distinctively higher than in more humid temperate areas, like central Europe, which might be attributed to the lack of large-scale glaciation and high diversity of habitats. The number of plant species is however below those of Mediterranean countries like Italy (5,600) and Greece (5,700). 30% of the species are thought to be endemic.
181. Major plant families in Afghanistan are:
- Fabaceae (630 species, with 380 of these belonging to *Astragalus* alone, which has an evolutionary centre in this region);
 - Asteraceae (500, with *Cousinia* alone including 144, among them 93 endemics, and *Artemisia* with 43 species, also indicating and evolutionary centre here);
 - Brassicaceae (225), the dominant plant family at the highest altitudes above 4,500 m;
 - Lamiaceae (205);
 - Caryophyllaceae (180);
 - Apiaceae (180);
 - Poaceae (170-180) or gramineae including important cultivated and fodder plants;
 - Liliaceae (156);
 - Chenopodiaceae (138);
 - Boraginaceae (125);
 - Ranunculaceae (120).
182. In all these families except the grasses (Poaceae) the percentage of species endemic to Afghanistan is high and many of these endemics are at least morphologically isolated from their closest relatives. This may indicate the importance of Afghanistan and the region as a very old centre of evolutionary development in flowering plants at all levels – family, genus and species.
183. The flora of Afghanistan belongs to the Irano-Turanian (to which 93% of the country belong) and Sino-Japanese (7%) plant-geographical regions, but also consists of elements of adjacent Saharo-Sindian and Central Asian High Mountain floristic regions.
184. There is no known substantial problem with invasive non-native plant species. Deforestation and degradation of woodlands, overgrazing and cultivation of marginal areas cause the loss of plant diversity and the dominance of few species, usually plants, which are spiny or due to other features not or less palatable to livestock.

4.10.3 Fauna

185. Analyses of recorded animal species in Afghanistan list wide ranges of numbers of native flora and fauna because of taxonomic confusion and questionable record-keeping. The highest numbers of species recorded are as follows: 150 mammal species, 515 bird species, 112 reptiles, eight amphibians, 139 fish (according to other sources only 85 species of 10 families⁷¹) and 245 butterflies. Only seven vertebrate species are endemic to Afghanistan, including the one endemic amphibian – the Paghman salamander *Paradactylodon mustersi*.⁷²
186. The mammal fauna of Afghanistan although extremely depleted in abundance still includes a number of remarkable species. Six carnivore families have representatives in Afghanistan, among them nine species of wild cats (plus the most likely extinct cheetah), including snow leopard *Panthera uncia* and Persian leopard *Panthera pardus saxicolor*, several canine and weasel species, Asian palm civet *Paradoxurus hermaphroditus*, striped hyena *Hyaena hyaena* as well as Asian black *Ursus thibetanus* and brown bear *U. arctos*. Ungulates include three species of wild goat (Asiatic ibex *Capra sibirica*, bezoar goat *C. aegagrus* and markhor *C. falconeri*), two species of wild sheep (urial *Ovis vignei* and

⁷¹ Coad, B. (2015): Native fish biodiversity in Afghanistan. Iran. J. Ichthyol. 2(4): 227-234.

⁷² Kanderian, N., Lawson, D., Zahler, P. (2011): Current status of wildlife and conservation in Afghanistan, International Journal of Environmental Studies, 68:3, 281-298. <http://dx.doi.org/10.1080/00207233.2011.573960>

argali *O. ammon*), Bukhara deer *Cervus hanglu bactrianus* and musk deer *Moschus cupreus*, and goitered gazelle *Gazella subgutturosa*. There are as well representatives of other mammal families – rodents, bats and insectivores, which so far all are poorly studied.

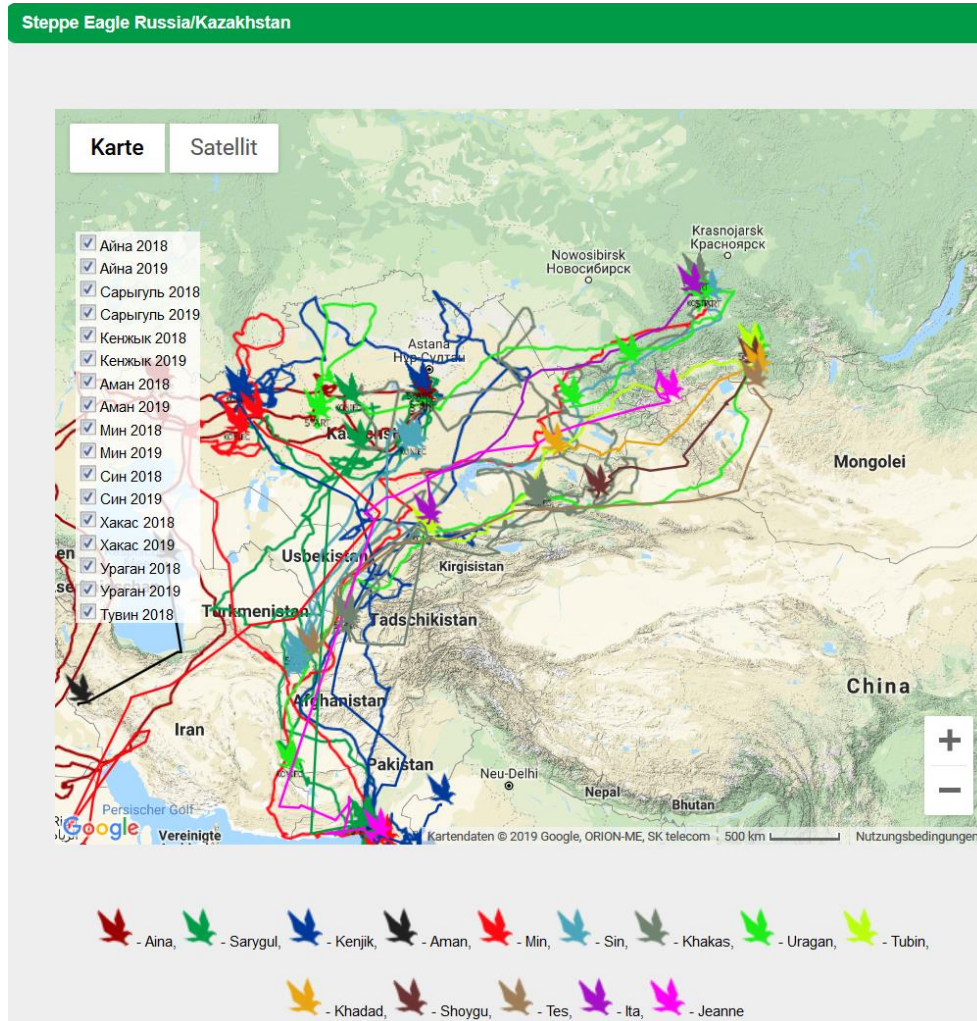


Figure 39 Map of the tracks of marked steppe eagles during migration (map byRRRCN⁷³)

187. The avifauna of Afghanistan is diverse and so far includes 492 species, one of which is endemic and 23 are considered as globally threatened⁷⁴. Remarkable are the occurrences of several threatened raptor species like the endangered saker falcon *Falco cherrug*, near threatened Laggar falcon *F. jugger*, endangered Egyptian vulture *Neophron percnopterus*, endangered steppe eagle *Aquila nipalensis*, vulnerable greater spotted eagle *Aquila clanga*, near-threatened bearded vulture *Gypaetus barbatus* and others. The largest bird order is the Passeriformes (249 species). Threats to birds are poaching, habitat destruction and degradation; and for large and medium sized birds power lines, especially medium voltage distribution lines, increasingly become sources of mortality. The speckled wood-pigeon *Columba hodgsonii* and the Indian vulture *Gyps indicus* are extirpated.
188. Afghanistan is located at an important migration route of migratory birds from Siberia and Central Asia, which is especially important for several large birds, among these a number of birds of prey, including globally threatened species like the steppe eagle. Satellite tracking of this species illustrates the importance of Afghanistan as it allows for this and other species to bypass the high mountains of

⁷³ <http://rrrcn.ru/ru/migration/se2018>

⁷⁴ <https://avibase.bsc-eoc.org/checklist.jsp?region=AF&list=clements>

Central Asia (see fig. 39). Powerlines also threaten bird populations migrating through the country. They are, e.g., substantial threats for steppe eagle⁷⁵ and other larger birds as the pole tops often provide attractive resting sites, where the constructive design causes electrocution and is reason for substantial losses. This refers to the entire country Afghanistan and as all project sites are located in this country they are certainly located in the migration routes of those birds. It has to be noticed that these birds do not use narrow migration routes, as, e.g. white storks at the Bosphorus and raptors at some coast lines, but cross the country in a broad front.

189. 121 reptile species have been found in Afghanistan⁷⁶, including geckos, agamas, anguid lizards, skinks, true lizards, monitor lizards, slender blind snake, blind snake, boas, colubrids, cobra and vipers. Five reptile species are endemic⁷⁷.
190. The Paghman salamander is known from just three tributaries of the Paghman stream drainage in the Central Highlands area of Kabul Province. The stream that forms their entire habitat is only 4 km in length and is fed by melting glaciers higher up in the Hindukush. Their environmental requirements are very specific, with adults requiring fast flowing water, and larvae living in deeper calmer pools under mats of vegetation.
191. The ichthyofauna is relatively diverse for a country isolated from the sea with large portions of its land mass being desert. The fish fauna of Afghanistan^{78,79} is dominated Cyprinidae (56.9%), Cobitidae (24.5%) and to a lesser extent by Siluriformes (11.8%). The highest variety is found among the cyprinid snow trout (Schizothoracini) and cobitids, in particular a high number of hillstream loaches *Noemacheilus* spp. Many of these taxa are restricted to certain drainages. *Noemacheilus stoliczkae* and *Schizothorax intermedius* are found in all three major drainages. Some fish species are adapted to cold, fast-flowing mountain streams. There are three principal drainage basins: the endorheic Amu Darya draining to the Aral Sea with 29 species, the endorheic Helmand River basin draining to the Sistan terminal lakes on the Iranian border is the largest of the three major drainage basins with the least diverse ichthyofauna of 22 species, and the Kabul River basin draining to the Indus River with 44 species. Certain species found in the upper Amu Darya are also found in the upper reaches of adjacent drainages. Eight fish species are endemics to Afghanistan within its political boundaries.
192. No invasive animal species are currently known to pose any substantial risk to ecosystems, biodiversity, economy and human health in Afghanistan, except the cosmopolitan rodents *Mus musculus* and *Rattus norvegicus*. Three non-native bird species red avadavat *Amandava amandava*, nutmeg manikin *Lonchura punctulata* and rose-ringed parakeet *Psittacula krameri* are introduced to the country but are not considered invasive. The native fish fauna could in the future be possibly affected if rainbow trout *Salmo gairdnerii* and other non-native fish species are bred and released into natural waterbodies. Currently intensive trout farming is developed in some areas, e.g. in Kahmard (Bamyan).

⁷⁵ <https://www.bbc.com/news/world-europe-50180781>

⁷⁶ <http://reptile-database.reptarium.cz/search?search=Afghanistan&submit=Search>

⁷⁷ <http://Intreasures.com/afghanr.html>

⁷⁸ Petr, T. Coldwater fish and fisheries in Afghanistan. Retrieved from <http://www.fao.org/docrep/003/x2614e/x2614e08.htm>

⁷⁹ Coad, B. (2015): Native fish biodiversity in Afghanistan. Iran. J. Ichthyol. 2(4): 227-234.



4.10.4 Protected Areas



Figure 40 The planned protected areas system of Afghanistan. The Wakhan National Park and the Band-e Amir National Park are established, in other areas the designation of protected areas is in different stages of preparation. (Source WCS)

193. The Protected Areas System of Afghanistan is still in an early stage of development. A National Protected Area System Plan of Afghanistan has been developed with international assistance by GEF, USAID and Wildlife Conservation Society and approved by NEPA in 2010. This plan suggested a timeline for protected areas development until 2015 and 2030. So far, however, the 2015 targets have been met only partly. The map in Figure 40 provides an overview of existing, planned and considered protected areas in Afghanistan.

194. Band-e Amir National Park was gazetted in 2009. The originally proposed protected areas Big Pamir, Tegermansu and Waghjir are now integrated in the larger Wakhan National Park established in 2014. These national parks do not comply with the IUCN Protected Areas Category II “National Park”, but are rather comparable with Category V “Protected Landscape” with some integrated zones of stricter formal protection, which so far are hardly enforced. With the support of a GEF/UNDP project, implemented by the Wildlife Conservation Society, the management of these two protected areas is developed and involvement of local communities in management and sustainable use of the protected areas and their natural resources are fostered.

195. Other protected areas are currently not functional. Some existed before the Soviet-Afghan war, like the Ajar Valley Wildlife Reserve established originally in 1977, which had been gazetted for three years in 2009 by NEPA Executive Order, or Dasht-e Nawar and Ab-e Estada, also established 1977, without recent formal redesignation.

196. Further areas have been considered, but so far neither formal designation nor substantial activities towards their establishment have been implemented: e.g. Northwest Afghanistan Game Reserve, Ragistan Desert or Nuristan Protected Area.

197. None of the planned sites for solar power implementation is located in or near an existing or planned protected area, but one site (H3 in Bamyan) proposed for design planning under this project is located at the edges of a planned protected area (Northern Plateau).

4.11 LAND USE

198. Land-use in Afghanistan is largely determined by the climate conditions (see 3.3) and the availability of surface and ground water (see 4.8 and 4.9).

199. The dominant land-use type in Afghanistan is rangeland used for extensive livestock grazing. Grazing takes place in different forms, distinguished by the level of mobility of the herds. Sedentary grazing is restricted to the surroundings of the villages. Given the seasonal variations of forage availability, this type is rarely possible and often causes overgrazing. Transhumant pastoralism makes use of varying forage availability in different altitudinal or otherwise determined ecological zones. Typically the herds are seasonally moved between summer and winter pastures, which can be dozens of kilometres apart. Traditionally at least at the summer pastures local pasture rotation ensured that forage resources are evenly and sustainably used and can recover. With growing human population and livestock numbers in many areas this local pasture rotation is no longer possible and in the result overgrazing and pasture degradation are common problems. Nomadic pastoralism takes place over larger distances. Most nomadic pastoralists (*Kochi*) use defined seasonal grazing areas, usually with specific camp locations and pastures used by specific family groups. Growing human population and livestock numbers have contributed to increasing conflict between transhumant and nomadic pastoralists about access to pastures.

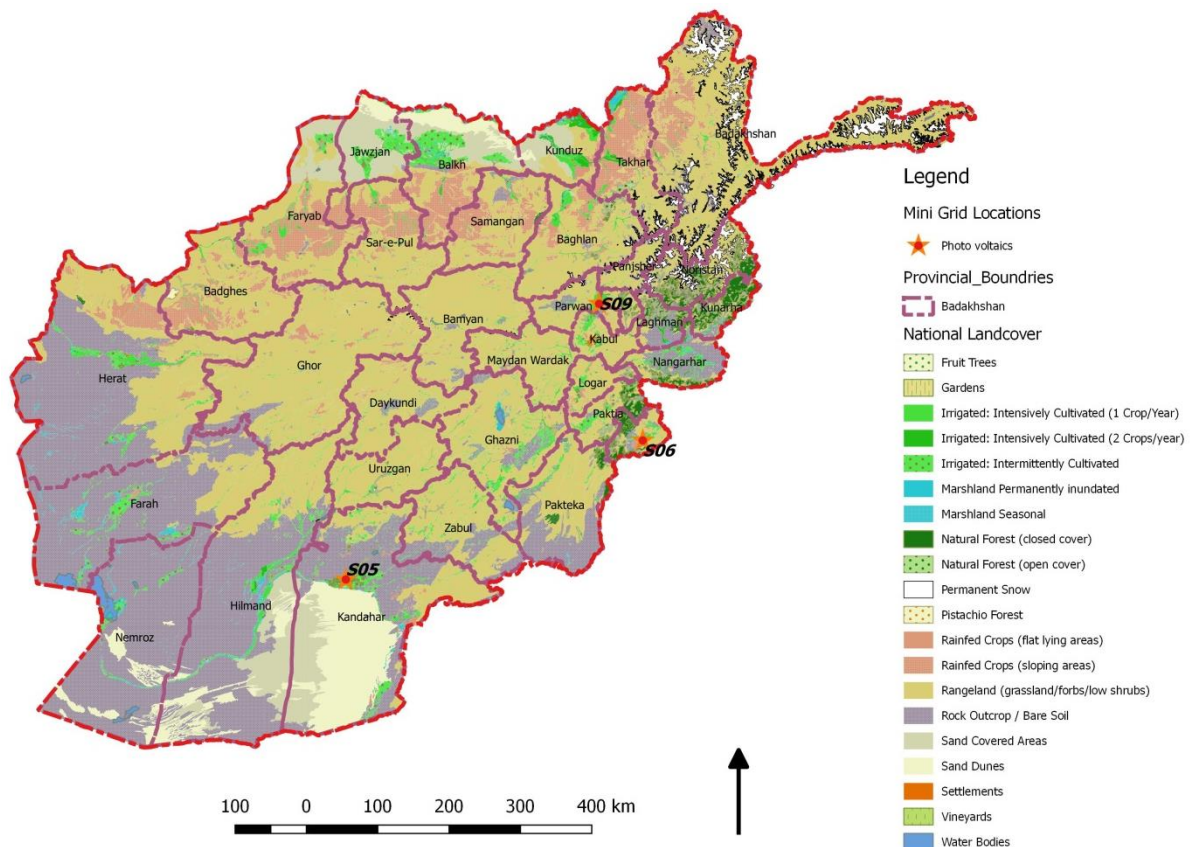


Figure 41 Main land-use types in Afghanistan with provincial boundaries and locations of planned mini-grids⁸⁰.

⁸⁰ Map by Stefan Michel, GIS data by Afghanistan Information Management Service 1997 and UNDP.

200. The second largest land-use category is rain-fed arable land. Rain-fed farming (*la'imi*) depends on sufficient precipitation during the winter and spring season and is accordingly concentrated in the north of the country, where climate is most suitable. The dominant crop is wheat. Rain-fed farming is affected by large scale soil erosion and loss of fertility. Climate change, with increasingly unreliable rainfall patterns, more frequent drought and increasing summer temperatures, makes this type of land-use more and more risky and contributes to declining yield.
201. Parts of the non-irrigated lands are covered by pistachio woodlands, used for grazing, local rain-fed farming and harvest of pistachio nuts. The extend of these woodlands and their density rapidly declined during the last decades, caused by unsustainable wood cutting, livestock grazing preventing rejuvenation and transformation into arable lands. Several initiatives for rehabilitation of pistachio stands are underway, but have so far not led to a substantial recovery.
202. Irrigated agriculture is restricted to river valley and alluvial fans at the bottom of mountain ranges. Important crops include rice, other cereals and fruit trees. In some provinces (especially Helmand, but also Farah, Kandahar, Urazgan and Nimroz) opium poppy is an important (illegal) cash crop, covering in these provinces in 2008 about 150,000 ha.
203. Forests and woodlands make up only about 867,000 ha or 1.33% of the country's land area. Between 1990 and 2005 Afghanistan lost about one third of its forest cover⁸¹. Larger forest areas are restricted to the east of the country, mainly in the provinces Nurestan, Kunar, Khowst and Paktia.
204. Commercial fisheries are spatially and economically marginal as land-use type. Fishing of natural stocks is restricted to some larger rivers but fish farming is more important. In some areas with sufficient surface water supply trout farms have been established during the last years.
205. Figure 41 shows the main land-use types of Afghanistan with the locations of planned mini-grids. Two of the solar mini-grid installations are placed on rangelands or barren lands, at the edges of irrigated lands and close to settlements (figures 42 and 43). One solar power installation in Parwan will be in irrigated arable lands (figure 44).



Figure 42 Satellite image of mini-grid location in Kandahar – bare land and rangeland at the edge of the village.

⁸¹ <https://rainforests.mongabay.com/deforestation/archive/Afghanistan.htm>

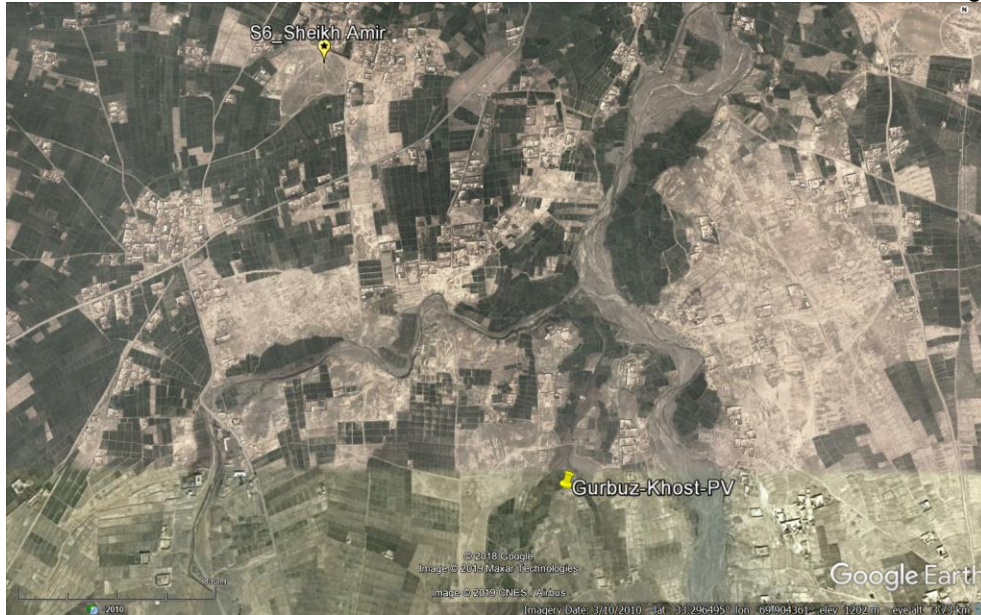


Figure 43 Satellite image of mini-grid location (two possible sites) in Khost – bare land between arable fields.

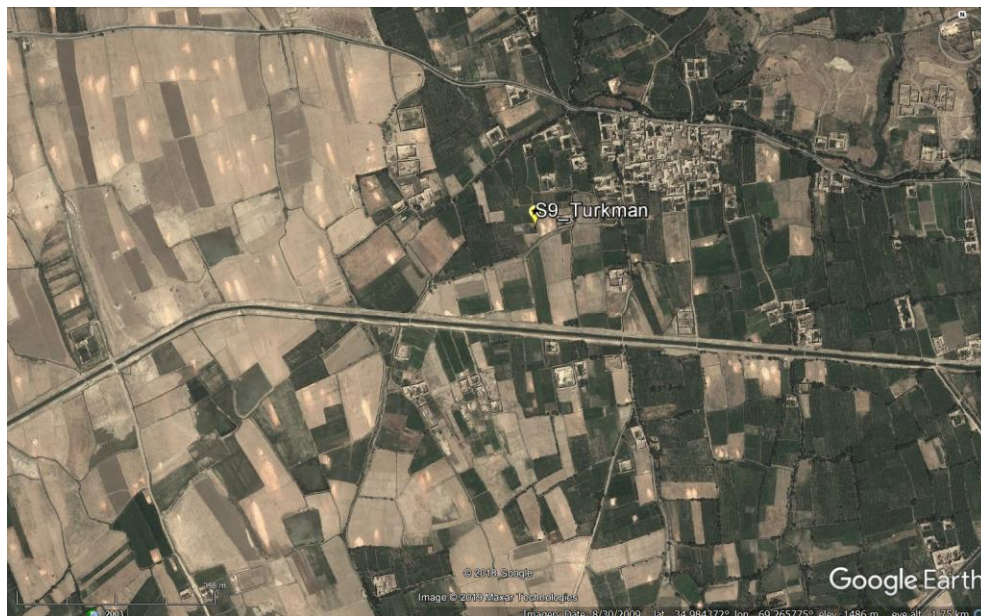


Figure 44 Satellite image of mini-grid location in Parwan – arable lands.

4.12 LAND OWNERSHIP AND CUSTOMARY TENURE

206. In Afghanistan the government owns rangelands, forests, barren lands and other lands, which do not belong to individual land-owners. These lands are assigned to the local communities, which have customary tenure over these lands. Thus the land ownership and tenure in some extent reflect the traditional use rights.

207. However, decades of conflict, population displacement within and outside of Afghanistan, changes in national political and economic ideologies, and variable climatic conditions (including drought) have resulted in a complex and unsettled landownership and management situation. Land rights are perceived to be highly insecure and disputes are widespread. This instability undermines prospects for

the greater investment needed to increase agricultural productivity and enhance economic recovery. This instability also increases the vulnerability of millions of Afghan households to poverty, and the Taliban and others use land disputes to foment general social unrest and conflict.⁸² In the current insurgency, the Taliban is building its rural support either by usurping the role of the central government in administering and adjudicating land tenure issues or by punishing people for cooperation with or receiving benefits from foreign or Afghan government authorities, whether civilian or military. For instance, in one case, insurgents stole compensation payments provided through Provincial Reconstruction Teams (PRT) from people whose land had been used for road construction in Kandahar.⁸³ This situation is not expected to impact on the project activities and in particular on the availability of land for the mini-grind installations. First, among the site selection criteria firm government control and high level of security figured prominently and no side is under Taliban control or any significant threat of takeover by anti-government elements. Second, even in the unlikely case of such a takeover the public lands under actual community use allocated for the mini-grids would not be a likely object of forceful changing of tenure as these are typically lands of low productivity and of limited interest for individual private use. And third, any anti-government elements and their supporters would be interested in maintaining electricity supply for their own needs and for the functioning of the local economy.

208. A majority of the contemporary pastoralists of Afghanistan are dependent upon the central highlands for summer pasture. The central highlands are marked by a long history of conflicts over grazing rights between ethnic Pashtun and Hazara peoples. Under the Taliban, the Pashtun nomads (*Kochi*) retained rights to summer pastures and water, and were viewed by the Hazara and others as allies and supporters of the Taliban. After the fall of the Taliban in 2001, the ethnic Hazara people regained control over high-mountain pasture in Baman and Daikundi provinces. In 2006, 2007, and 2008, fighting erupted over the contested land and grazing rights between Hazara people and Pashtun nomads during the seasonal movement of the *Kochi* herders. Many people were killed and injured, Hazara homes burned, and herds stolen. Pashtun pastoralists, exempt from disarmament requirements, used their weapons against the Hazara. Meanwhile, there is prevailing fear that the Pashtun *Kochi* are being armed by the Taliban. Recent (before 2010) initiatives by the ADB and FAO to strengthen community control and facilitate mediation and negotiation between nomads and settled communities over grazing rights and fees has met with some success in ameliorating conflicts⁸⁴

209. The planned mini-grid developments supposedly take place on land owned by the government, used by the local communities and the tenure not being disputed. For the mini-grids lands of sufficient size have been allocated by the CDCs, representing the local communities, and in agreement with the local government agencies in charge of land tenure. The PV mini-grids require space in the range of about 1.5 ha/MW. However, in two locations (Kandahar and Khost) where PV mini-grids are planned, the experts of the project together with the communities have identified suitable plots of sufficient size, which are all located on unproductive bare lands or on low-productivity rangeland. In Parwan 16,000 m² of irrigated arable land will have to be purchased by MRRD from the current private owner. According to the project designer a preliminary agreement has been reached with the community, but available information is inconsistent if the land will be “donated” (by whom?) or be “acquired” by MRRD⁸⁵.

⁸² <https://www.land-links.org/country-profile/afghanistan/>

⁸³ <https://usaidlandtenure.net/wp-content/uploads/2016/09/Land-Tenure-and-Property-Rights-in-Afghanistan.pdf>

⁸⁴ *Ibid.*

⁸⁵ Email by Ram Gobinda Yadav, UNDP, from 23 October 2019.

4.13 SOCIAL ASPECTS

4.13.1 Population

210. The population of sub-districts targeted by the project, the number of general beneficiaries of project activities and of those of the beneficiaries, which are planned to be provided with access to electricity, have been determined in the Funding Proposal:

- Access to electricity expected from implemented mini-grids: 7,806 households/49,000 persons, among them women 23,000 or 47%.
- Population targeted by planned additional mini-grids: 11,902 households/63,720 persons.

211. The population density in Afghanistan is 54 per km². 26.0 % of the population is urban. The median age in Afghanistan is 17.6 years.⁸⁶ The population in Afghanistan in general is growing by annually 2.34% (2016 est.)⁸⁷. Growth in rural areas is higher than in urban areas, but is partly compensated by migration to towns. Population growth in rural areas increasingly leads to overuse of natural resources, in particular overgrazing of rangeland, overharvesting of fuelwood and expansion of rain-fed cultivation onto marginal lands. Resulting conflicts over access to these resources are among the underlying reasons of tension at different levels.

212. In rural areas of Afghanistan resident population uses the land in an agro-pastoralist form, often in a transhumant manner with seasonal mobility between summer and winter pastures at different altitudes. Some groups of specialized livestock breeders maintain a nomadic lifestyle with long-distance migrations between summer and winter grazing areas. These nomadic pastoralists belong to different ethnic groups, mainly Pashtuns and few Kyrgyz. These nomads have assigned customary and/or formal rights over the seasonal grazing areas used by them. With the general population increase and overuse of rangelands conflicts about access to grazing areas became more common during the last decade. The nomadic pastoralists are often considered as disadvantaged, but with an own specialized Independent Directorate, representation in the parliament, key government officials originating in such communities and considerable wealth in form of livestock this perception is challenged by other social groups.

213. The mini-grids due to their limited capacity and distances to remote pastures used by transhumant agro-pastoralists and nomadic pastoralists can only supply the rural population resident in the villages. The programme will involve activities on clean cooking-cum-heating devices, which will benefit the people on remote pastures, reduce their exposure to indoor air pollution and the need for collecting fuelwood, thus also contributing to the maintenance of their key resource base.

4.13.2 Gender

214. The Gender Development Index (GDI), defined as the ratio of the female to the male HDI and which measures gender inequalities in terms of three basic dimensions of human development (health, education and command over economic resources), has a value of 0.609 for Afghanistan; this is in comparison to 0.925 for Nepal and 0.742 for Pakistan. Likewise, the Gender Inequality Index (GII) ranks Afghanistan at 154 out of 159 countries in the 2015 index. In addition, Afghanistan's National Gender Strategy⁸⁸ acknowledges that women have lacked the opportunities provided to men and as a result they fall behind men in all fields of self-advancement. As a result of lack of ownership of resources, women in rural areas are engaged more in activities such as carpet weaving, embroidery and tailoring.

215. The formal analysis of the gender dimensions of the impacts of climate change in Afghanistan has been relatively thin, even though it is important, given the precarious situation of women in the country. While equal rights for women are enshrined in the Constitution and some steps have been taken over

⁸⁶ <http://www.worldometers.info/world-population/afghanistan-population/>

⁸⁷ https://www.indexmundi.com/afghanistan/population_growth_rate.html

⁸⁸ National Gender Strategy 2012-2016, Islamic Republic of Afghanistan, Ministry of Public Health - Gender Department http://moph.gov.af/Content/Media/Documents/MoPH_National_Gender_Strategy_Final_English_2012164201212934246553325325.pdf

the past decade to increase the opportunities available to them, in general women in Afghanistan have limited access to financial resources and other assets, education and employment opportunities, freedom of movement, and a voice in shaping decisions.

216. More encouragingly, Afghanistan has strong experience of agricultural cooperatives, women self-help groups and other community development organisations that are now increasingly playing important roles in the social and economic development of farmers and rural communities.
217. Among the about 49,000 beneficiaries of the project approx. 23,000 (47%) are women, as estimated based on the population data determined during the Pre-feasibility Studies and the Feasibility Study. Women are typically responsible for cooking and heating. Thus they are in several ways affected by the available inefficient stoves. During their use the women as well as children are intensively exposed to the smoke from inefficient devices, causing severe health impacts (see also section 4.13.4). The high consumption directly causes the need for large amounts of fuel and the overuse of fuel resources in the vicinity of houses forces women and children to collect fuel from more and more remote locations. Thus they have to spend large amounts of time on collecting fuel, which is connected with hard physical work and walk long distances with heavy loads. This has substantial negative impact on their health, especially on their skeletons and motoric systems.

4.13.3 Employment, Economic Aspects and Livelihoods

218. The most common employment sectors are agriculture, where 45% of Afghans are employed, followed by skilled workers and artisans at 10% and sales and business at 9%. About 68% of households own livestock and over 36% of households are engaged in farming. However, the productivity in the agriculture sector is low, with agriculture contributing just over 25% of GDP. Fresh and dried fruits make the biggest contribution to the country's export base and there is significant potential for expansion. However, a major obstacle for an increase in fruit exports is the lack of facilities to process and package these products to international standards.
219. Opium poppy cultivation in Afghanistan (estimated to contribute close to 90% of the world's illicit supply⁸⁹) remains a significant concern. The lack of reliable, stable alternate sources of legal income has been identified as one of the major drivers for opium poppy cultivation⁹⁰. Analyses of climate change impacts on Afghanistan also suggest that water-intensive staple crops will become less remunerative to farmers, with a likely increase in the attractiveness of those that are more drought-hardy, including the opium poppy. In the mini-grid areas no opium poppy cultivation or opium processing has been documented during the Pre-feasibility Studies and the Feasibility Study.
220. Energy is required to produce, transport and distribute food, as well to extract, pump, lift, collect, transport and treat water. Access to modern forms of energy is closely linked to the ability of communities to enhance agricultural productivity, develop non-agricultural economic alternatives, and improve educational and health outcomes. The Afghanistan Rural Enterprise Development Programme (AREDP), which supports rural enterprises, has identified specific instances where the productivity and viability of rural industries such as agro and food processing, agriculture and apiculture have been constrained due to the lack of energy supply.
221. The communities, where the mini-grid development is planned are all rural and agriculture is the major source of livelihoods. There are small businesses in form of various shops. Local non-agricultural production is limited to small family-run workshops for carpentry, welding, whitesmith, blacksmith and tailor works.

⁸⁹ United Nations Office on Drugs and Crime (UNODC), "Drug Trafficking" <https://www.unodc.org/unodc/en/drug-trafficking/>

⁹⁰ UNODC, "Afghanistan Opium Survey 2015: Socio-economic Analysis" https://www.unodc.org/documents/crop-monitoring/Afghanistan/Afghanistan_opium_survey_2015_socioeconomic.pdf

4.13.4 Health

222. The health care system of Afghanistan has suffered from decades of war and civil unrest and the restrictive policies under the Taliban regime. Especially in rural areas health care is still insufficient despite international aid for the development of a new functional health care system.
223. The population of Afghanistan is affected by a high prevalence of infectious diseases, among them tuberculosis, poliomyelitis, leprosy, typhoid, hepatitis, leishmaniosis and others.
224. Women suffer from the effects of malnutrition, hard physical work and high frequency of child birth and nursing. Improved maternal and child care have reduced maternal and infant mortality.⁹¹ Decreases in these mortality rates are consistent with changes in key determinants of mortality, including an increasing age at marriage, higher contraceptive use, lower fertility, better immunisation coverage, improvements in the percentage of women delivering in health facilities and receiving antenatal and postnatal care, involvement of community health workers and increasing access to the Basic Package of Health Services.⁹²
225. Afghanistan is among the top 10 countries worst affected by indoor air pollution⁹³, which is the biggest cause of premature deaths in the country (estimated at 54,000 per year according to the World Health Organisation-WHO)⁹⁴. Especially women and small children are affected by indoor air pollution, caused by inefficient cooking and heating devices.

4.13.5 Labour and Working Conditions

226. No specific assessment has been undertaken to assess labour and working conditions in the project areas.
227. Generally, in Afghanistan's labour and working conditions are characterized by hard physical labour combined with a low level of mechanization. This situation also concerns civil works, like construction and maintenance of roads, bridges or water management systems.

4.14 WASTE MANAGEMENT

228. No specific data is available for waste management in the project areas. Generally, most urban and all rural areas lack any waste management system, and waste created by households, administration, agriculture and industry is mainly burned or disposed in an unregulated way. Livestock excrements are used as fertilizer or are dried and burned in heating and cooking stoves. Rural households also use crop residues as fuel for cooking, baking and heating.
229. Burning waste is an important source of air pollution. Waste disposed in landfills or in the open landscape negatively influences on aesthetic amenity and can cause hazards, mainly for ecosystems and agriculture.
230. There is no management system in place for collection, recycling and/or safe disposal of hazardous waste, including for used car batteries and similar devices. Reportedly even lead from car batteries is not recycled but unsafely disposed. Accordingly there is currently no management and recycling system available for the storage batteries of PV systems.

⁹¹ E.g. Bartlett et al. (2017). Progress and inequities in maternal mortality in Afghanistan (RAMOS-II): a retrospective observational study. (<http://www.sciencedirect.com/science/article/pii/S2214109X17301390>)

⁹² Rasooly M.H. et al (2014). Success in reducing maternal and child mortality in Afghanistan. <https://www.ncbi.nlm.nih.gov/pubmed/24003828>

⁹³ http://www.who.int/indoorair/health_impacts/burden_national/en/

⁹⁴ WHO, 2009: Country profile of Environmental Burden of Disease http://www.who.int/quantifying_ehimpacts/national/countryprofile/afghanistan-rev.pdf

4.15 RELIGION

231. Afghanistan is an Islamic Republic with 99.7% of the population being Muslim. Among them, the majority of about 90% are Sunni, the remaining 10% being Shia, mainly belonging to the 12er branch and a small minority being Ismaili.
232. Non-Muslim minorities make up maximum few hundred people each, including Zoroastrians, Sikhs, Hindus, Baha'i and Christian.
233. Most Jews fled Afghanistan before and after the Soviet invasion. The few remaining were forced to convert to Islam under the Taliban regime. In 2013 only one known Jew stayed in Afghanistan.⁹⁵

4.16 INDIGENOUS PEOPLES AND ETHNIC MINORITIES

234. As part of due diligence, an analysis and consultations were undertaken as to the probability of any of the project's activities involving indigenous people and/or ethnic minorities. Afghanistan does not have a history of colonization and that's why the concept of "Indigenous Peoples" is neither appropriately applicable to any ethnic group nor politically accepted. Therefore, no indigenous peoples live in Afghanistan and any project areas.
235. According to the Constitution of Afghanistan, Article Four "The nation of Afghanistan shall be comprised of Pashtun, Tajik, Hazara, Uzbek, Turkman, Baluch, Pachaie, Nuristani, Aymaq, Arab, Qirghiz, Qizilbash, Gujur, Brahwui and other tribes. The word Afghan shall apply to every citizen of Afghanistan." Thus no ethnic group is to be singled out as minority.
236. The *Kochi* of Afghanistan are nomadic pastoralists, belonging to several Pashtun and Kyrgyz tribes. Thus the term Kochi does not refer to an ethnic group but to certain complex of social-economic and cultural characteristics. While there is no special legislation on *Kochi*, for addressing of the specific issues related to their lifestyle and related vulnerability an Independent General Directorate of Kochi has been established. In the House of Elders, the upper house of the National Assembly, the parliament, two seats are reserved for representative of the nomadic pastoralists and two seats for members from amongst the impaired and handicapped.
237. The project pays attention that any discrimination is prevented and all people living permanently or seasonally (nomadic people) in the project areas, independent of their ethnical, religious or social affiliation, are equally involved and benefit from the project as far as technically possible.

4.17 ARCHAEOLOGICAL AND CULTURAL HERITAGE

238. Afghanistan has a rich archaeological and cultural heritage. This heritage has much suffered from war and civil unrest. With the intensified development of infrastructure and use of mineral resources new threats to this heritage emerge. There are objects of World Heritage, like the site of the Bamyan Buddhas or architectural monuments, e.g. in Herat and other cities. But Afghanistan also has sites, which are not yet recognized as protected heritage but would deserve such status, like the site of Mes Aynak, an archaeological site with a wealth of Buddhist and other artefacts, which is threatened by a planned large-scale copper mine.
239. In addition to the famous and globally and regionally important cultural and archaeological sites, there are as well sites of national or local importance, which are an important element of the identity of the nation, regions or local communities. Such sites can be remnants of small castles, often detectable by location names with the words "*qala*" or "*hisar*", mausoleums, locations of historical graveyards and others. These sites are not always officially registered and may sometimes be known to local people only. No matter their lack of official protected status such sites deserve protection under all

⁹⁵ <https://www.reuters.com/article/us-afghanistan-jews/last-jew-in-afghanistan-faces-ruin-as-kebabs-fail-to-sell-idUSBRE9AB0A120131112>

circumstances or if discovered during civil works, which cannot be replanned, careful archaeological excavation and scientific documentation should be mandatory.

240. None of the mini-grid sites are located in locations of so far known specific archaeological and/or cultural heritage value.

5 ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT

5.1 UNDP SOCIAL AND ENVIRONMENTAL SCREENING POLICY REQUIREMENTS

241. As this project is supported by UNDP in its role as a GCF Accredited Entity, the project has been screened against UNDP's Social and Environmental Standards Procedure. The Social and Environmental Screening Template was prepared and the project deemed to be a moderate risk (Category B) project. Discussions on the impact assessment are provided in the Social and Environmental Screening Template, which provided the rationale for the project being classified as a moderate risk. This ESAR provides further discussion below.
242. The document Annex VI (a): Social and Environmental Screening Template includes the triggers from UNDP safeguards.

5.2 IMPACT ASSESSMENT METHODOLOGY

243. An impact risk assessment was undertaken using the UNDP Social and Environmental Screening Procedure to assess the probability (expected, highly likely, moderately likely, not likely) and the impact of the risk (critical, severe, moderate, minor, negligible). From this, a significance value was attributed to the potential impact (negligible, low, medium, high and extreme).

Table 6 Rating of Probability of Risk

| Score | Rating |
|-------|-------------------|
| 5 | Expected |
| 4 | Highly Likely |
| 3 | Moderately likely |
| 2 | Not Likely |
| 1 | Slight |

Table 7 Rating of Impact of Risk

| Score | Rating | Definition |
|-------|------------|--|
| 5 | Critical | Significant adverse impacts on human populations and/or environment. Adverse impacts high in magnitude and/or spatial extent (e.g. large geographic area, large number of people, transboundary impacts, cumulative impacts) and duration (e.g. long-term, permanent and/or irreversible); areas impacted include areas of high value and sensitivity (e.g. valuable ecosystems, critical habitats); adverse impacts to rights, lands, resources and territories of indigenous peoples; involve significant displacement or resettlement; generates significant quantities of greenhouse gas emissions; impacts may give rise to significant social conflict |
| 4 | Severe | Adverse impacts on people and/or environment of medium to large magnitude, spatial extent and duration more limited than critical (e.g. predictable, mostly temporary, reversible). The potential risk impacts of projects that may affect the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples are to be considered at a minimum potentially severe. |
| 3 | Moderate | Impacts of low magnitude, limited in scale (site-specific) and duration (temporary), can be avoided, managed and/or mitigated with relatively uncomplicated accepted measures |
| 2 | Minor | Very limited impacts in terms of magnitude (e.g. small affected area, very low number of people affected) and duration (short), may be easily avoided, managed, mitigated |
| 1 | Negligible | Negligible or no adverse impacts on communities, individuals, and/or environment |

Table 8 UNDP Risk matrix

| | | | | | | |
|---|--------------------|---|---|---|---|---|
| Impact | 5 | | | | | |
| | 4 | | | | | |
| | 3 | | | | | |
| | 2 | | | | | |
| | 1 | | | | | |
| | | 1 | 2 | 3 | 4 | 5 |
| | Probability | | | | | |
| Green = Low, Yellow = Moderate, Red = High | | | | | | |

244. When undertaking the risk assessment, all activities were assessed, including, hard/soft infrastructure and livelihood interventions. Specific measures for each matter, e.g., water, erosion, noise etc. are discussed along mitigation measures later in this ESAR.
245. The unmitigated risk level of the project would be high because of three issues of high risk level: land use transformation and land acquisition, hazardous waste from used batteries and standard design for MV distribution lines known to cause high mortality of birds, including globally threatened species.
246. If the impact of the project is mitigated in accordance to the ESAR the project would be of low risk level.

5.3 ASSESSMENT OF IMPACTS BY ACTIVITIES

247. This section assesses the possibility and severity of impact and the resulting risk level, possibly caused by the project activities – unmitigated and with avoidance and mitigation measures.

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|--|---|---|---|--|
| 1.1: Regulations for mini-grids and tariff mechanisms and structure developed and approved | The development of these regulations does not involve any physical impact on the environment and does not have direct social impact on the target groups. The indirect impact of the policy, which will be developed, on environmental and social issues cannot yet be assessed at this stage. The risk that these issues are not adequately taken into consideration during the regulation development process cannot be excluded. | Probability: 3 Impact: 3 Risk level: Moderate | Ensure the full participation of all relevant stakeholders, including representatives of rural communities. Ensure the full consideration of all potential future environmental and social impacts, including gender issues, of the regulations and include the respective social and environmental safeguards. Ensure the development of a cost-efficient system and the setting of tariffs for services that would prevent undue affordability barriers to electricity for vulnerable social groups. | Probability: 1 Impact: 1 Risk level: Low |
| 1.2: Technical standards and guidelines developed for design and operation of mini-grids | The development of standards and guidelines does not involve any physical impact on the environment and does not have direct social impact on the target groups. The risk that these issues are not adequately taken into consideration during the policy development process cannot be excluded. In particular, there is a risk that the standards do not address effectively the safety of birds on distribution lines. | Probability: 3 Impact: 3 Risk level: Moderate | Ensure the full consideration of all potential future environmental and social impacts, including bird safety, of the standards and include the respective social and environmental safeguards. | Probability: 1 Impact: 1 Risk level: Low |

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|---|---|---|---|--|
| 1.3: Policy on fostering institutional reform and coordination mechanism among responsible institutions for mini grid development drafted | The development of a policy does not involve any physical impact on the environment and does not have direct social impact on the target groups. The indirect impact of the policy, which will be developed, on environmental and social issues cannot yet be assessed at this stage. The risk that these issues are not adequately taken into consideration during the policy development process cannot be excluded. | Probability: 3 Impact: 3 Risk level: Moderate | Ensure the full participation of all relevant stakeholders, including representatives of rural communities (sedentary, transhumant and nomadic <i>Kochi</i>), relevant NGOs and government agencies, with participation of women. Ensure the full consideration of all potential future environmental and social impacts, including gender issues, of the policy and include the respective social and environmental safeguards. | Probability: 1 Impact: 1 Risk level: Low |
| 1.4: Framework for financial de-risking RE mini-grids designed | The development of a framework for financial de-risking RE mini-grids does not involve any physical impact on the environment and does not have direct social impact on the target groups. The indirect impact of the policy, which will be developed, on environmental and social issues cannot yet be assessed at this stage. The risk that these issues are not adequately taken into consideration during the framework development process cannot be excluded. | Probability: 3 Impact: 3 Risk level: Moderate | Ensure the full participation of all relevant stakeholders, including representatives of rural communities. Ensure the full consideration of all potential future environmental and social impacts, including gender issues, of the framework and include the respective social and environmental safeguards. | Probability: 1 Impact: 1 Risk level: Low |
| 2.1: Capacity strengthening activities designed and delivered for government entities on technical, | The building of capacity government entities does not involve any physical impact on the environment and does not have direct social impact on the target groups. The assessment of the indirect impact will | Probability: 3 Impact: 3 Risk level: Moderate | Include the consideration of environmental and social issues in all capacity development programs for government entities. Ensure the involvement of women, | Probability: 1 Impact: 1 Risk level: Low |

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|---|--|---|--|--|
| managerial, administrative and financing aspects of RE mini-grids | depend on the consideration of environmental and social issues in the capacity development program. There are risks that these issues are not adequately taken into consideration resulting in future adverse environmental and social impact from the designing, operating, maintaining and sustaining RE mini-grids. | | their capacity development and representation in all institutions. | |
| 2.2: Community commitment and local business interest activities designed and delivered for beneficiaries of 3 solar RE mini-grid systems | The community commitment activities do not involve any physical impact on the environment and do not have direct social impact on the target groups. The indirect impact of the mini-grids on environmental and social issues has been assessed. The risk that identified issues are not adequately taken into consideration during the framework development process cannot be excluded. | Probability: 3 Impact: 3 Risk level: Moderate | The project will pay attention that all identified social and environmental issues, including those identified during the community commitment activities, will be properly addressed. The concerns brought up by the stakeholders shall be fully taken into consideration. | Probability: 1 Impact: 1 Risk level: Low |
| 2.3: Capacity strengthening activities designed and delivered for private sector/RESOs on designing, operating and maintaining mini-grids | The building of capacity of different actors on designing, operating, maintaining and sustaining RE mini-grids does not involve any physical impact on the environment and does not have direct social impact on the target groups. The assessment of the indirect impact will depend on the consideration of environmental and social issues in the capacity development program. There are risks that these issues are not adequately taken into consideration | Probability: 3 Impact: 3 Risk level: Moderate | Include the consideration of environmental and social issues in all capacity development programs for different actors involved in designing, operating, maintaining and sustaining RE mini-grids. Ensure the involvement of women, their capacity development and representation in all institutions. | Probability: 1 Impact: 1 Risk level: Low |

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|--|--|---|--|--|
| | resulting in future adverse environmental and social impact from the designing, operating, maintaining and sustaining RE mini-grids. | | | |
| 3.1: Construction of 3 greenfield solar mini-grids, <u>including</u> : | | | | |
| 3 Mini-grids based on photovoltaic | This activity involves the construction of permanent structures (photovoltaic panels, fence, service house, diesel generators). This leads to environmental impact during construction in form of vegetation removal, earth works, construction material storage, dumping of excavated substrates. In the result the relief, vegetation and land-use in the immediate areas occupied by the constructed structures will be permanently transformed; those areas only used during construction works will be temporarily or permanently modified. | Probability: 4 Impact: 2 Risk level: Moderate | Avoid and minimize impact through site selection based on community participation and agreement with CDCs, with priority given to locations with bare land, low productivity range land and without any high growing vegetation, which would require clearing. Remove and dispose all construction remnants in accordance to applicable rules. Recultivate temporarily used lands. | Probability: 4 Impact: 1 Risk level: Low |
| | In the result of this activity areas will be permanently fenced for prevention of damage to the photovoltaic systems. This will exclude livestock grazing from these areas. The social impact of this exclusion will be negligible as these areas are of small size and productivity is low. Exclusion of grazing may allow for local rehabilitation of | Probability: 4 Impact: 1 Risk level: Low | No avoidance and mitigation measures needed. | Probability: 4 Impact: 1 Risk level: Low |

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|----------|--|---|--|---|
| | vegetation which can be harvested for forage and can serve as source of seeds for natural regeneration of forage plants | | | |
| | One site (Parwan) will be located on irrigated arable lands. This will require the change of the current land use and the acquisition of this land by MRRD. The social impact of this transformation and land acquisition will affect the agriculture-based livelihoods of the household(s) currently using these lands. | Probability: 5 Impact: 4 Risk level: High | The project may look for an alternative site, not used for arable farming. As such site most likely is not available, compensation of the farmers losing their land has to be ensured, taking into consideration the sustainability of the livelihoods of these household(s) | Probability: 4 Impact: 2 Risk level: Moderate |
| | Solar panels have typically a lifetime of more than 20 years, losing over this period 10-20% of their original capacity. The batteries last much less and, depending on the temperature regime and other factors, may need replacement after 15 years or earlier. The replaced batteries and panels are waste, which is partly hazardous. So far no system has been identified for safe disposal and/or recycling of used batteries. | Probability: 5 Impact: 4 ⁹⁶ Risk level: High | The project is required to ensure that maintenance contracts for future replacement of system parts will include the safe removal, disposal and recycling of changed elements in accordance to environmental standards and regulations. As the changed parts will be considered valuable resources market mechanisms are expected to provide incentives for recycling. | Probability: 3 Impact: 2 Risk level: Moderate |
| | Diesel generators will be installed for backup and support of the PV systems. The diesel generator pose environmental risks in terms of potential fuel leakage and resulting | Probability: 3 Impact: 2 | The diesel generators and fuel tanks need to have containments preventing spillage of fuel. Noise and air pollution have to be minimized by proper O&M and placement of | Probability: 4 Impact: 1 |

⁹⁶ In a previous version of the draft ESAR in 2017 the impact had been assessed with 3 because its severity depends on the availability of safe disposal and recycling options. However, the issue has yet not been addressed in the project design and therefore specific mitigation measures are required.

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|--|---|---|--|---|
| | groundwater and surface water and soil contamination, noise, air pollution and health of maintenance staff. | Risk level: Moderate | generators minimizing exposition of people. Labour safety instructions have to be followed to minimize health risk for staff. | Risk level: Low |
| LV and MV distribution lines in 3 mini-grids | The construction of medium voltage power lines in standard design of poles would lead to electrocution of birds; furthermore collisions with powerlines are possible, but less likely. Low voltage lines if constructed with fully insulated ABC conductor cables pose no substantial risk. | Probability: 5 Impact: 4 ⁹⁷ Risk level: High | Construct LV lines as fully insulated ABC cables. Apply a bird-friendly design of poles of MV reticulation systems, which excludes or minimizes the risk of electrocution. | Probability: 3 Impact: 2 Risk level: Moderate |
| | The construction of powerlines requires localized earth works and possibly clearing of vegetation for installing the poles, the immediate area occupied by poles will be permanently transformed; under the power lines no growth of larger trees can be permitted. The occupied areas are of negligible size, large growing trees are limited to cultivated poplars, the planting of which can be spatially adapted to avoid interference with distribution lines. | Probability: 3 Impact: 1 Risk level: Low | No avoidance or mitigation required. | Probability: 3 Impact: 1 Risk level: Low |
| Access roads for mini-grids | Temporary or permanent unpaved access roads might be needed where such roads do not exist. Construction of powerhouses with | Probability: 3 Impact: 3 | Minimize the need for additional roads by using existing roads, the modification of which should have priority over construction | Probability: 3 Impact: 2 |

⁹⁷ In a previous version of the draft ESAR in 2017 the impact had been assessed with 3 because its severity depends on the applied design and can easily be avoided or mitigated by application of bird-safe design as prescribed in section 6 (ESMP). However, within two years the design has not been changed for avoidance and mitigation of bird losses, and the project developers indicated that this change is unlikely due to DABS standards.

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|--|---|--|---|--|
| | turbines and generators requires access for trucks and cranes; all materials for other structures can be delivered with light trucks or even with donkeys. Additional roads will be of short distances, maximum 5 km per site (powerhouses). Road construction causes temporary or permanent destruction of vegetation, increased potential of erosion, and change of land-use. | Risk level: Moderate | of new roads. Plan roads based on community participation and agreement with CDCs, for minimizing loss of ecosystems and land-use opportunities; involve local communities and land-users in planning to address their needs and interests by placing all road expansion on communally used state owned land. During use of gravel roads for construction of facilities minimize dust emissions by watering of the roads. | Risk level: Moderate |
| All construction activities for mini-grids | <p>The construction activities will require earth works for building foundations of PV panels, hydraulic structures of HP systems, powerhouses and service buildings, which all can cause localized erosion by wind and water.</p> <p>Construction machinery can cause air, soil and water pollution.</p> | <p>Probability: 3</p> <p>Impact: 3</p> <p>Risk level: Moderate</p> | <p>In the course of all construction works adequate site-specific measures are to be implemented to minimize erosion during construction and avoid erosion during operation.</p> <p>Construction machinery has to be kept in technically appropriate condition in accordance to environmental standards to minimize air pollution and avoid soil and water pollution.</p> | <p>Probability: 3</p> <p>Impact: 2</p> <p>Risk level: Moderate</p> |
| 3.2: Set-up of knowledge platform | The set-up of the knowledge platform does not involve any physical impact on the environment and does not have direct social impact on the target groups. The activity includes the development of investment design reports in an additional 5 mini-grids. The impact of these mini-grids on environmental and social issues had been | <p>Probability: 3</p> <p>Impact: 3</p> <p>Risk level: Moderate</p> | The project will pay attention that all identified social and environmental issues, including those identified during the community commitment activities, will be properly considered in the knowledge platform and addressed in the design of the additional five mini-grids. | <p>Probability: 1</p> <p>Impact: 1</p> <p>Risk level: Low</p> |

| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|---|---|---|---|---|
| | preliminarily assessed, but is not reflected in this ESAR. The risk that identified issues are not adequately taken into consideration during the framework development process cannot be excluded. | | | |
| LV and MV distribution lines in design of 5 additional mini-grids to be planned under 3.2 | The construction of medium voltage power lines in standard design of poles would lead to electrocution of birds; furthermore collisions with powerlines are possible, but less likely. Low voltage lines if constructed with fully insulated ABC conductor cables pose no substantial risk. | Probability: 4 Impact: 3 Risk level: Moderate | Include in the design from bird-safe solutions for reticulation networks, including construction of LV lines as fully insulated ABC cables, bird-friendly design of poles of MV reticulation systems, which excludes or minimizes the risk of electrocution and avoidance of crossing locations with high numbers of medium and large birds crossing at the height of power lines; and if such locations cannot be avoided, mitigate impact by improving the visibility of power lines and other suitable measures. | Probability: 3 Impact: 2 Risk level: Moderate |
| 3.3: Green procurement policy for mini-grids developed and mainstreamed | Development and mainstreaming of green procurement policy does not involve any physical impact on ecosystems and social situation. | Probability: 2 Impact: 2 Risk level: Low | Ensure that all procurements of goods and services are carried out in accordance to applicable environmental and social standards. | Probability: 1 Impact: 1 Risk level: Low |
| 3.4: Social and environmental safeguards policy for mini-grids developed and mainstreamed | This activity will not have any direct environmental or social impact beyond the normal impact caused by travel and meetings with stakeholders. There is a minor risk that the social and environmental safeguards policy may not sufficiently | Probability: 2 Impact: 2 Risk level: Low | Ensure that all potential issues are appropriately covered by the policy, including issues identified in this ESAR and being of general relevance for RE. | Probability: 1 Impact: 1 Risk level: Low |



| Activity | Unmitigated Impacts | Probability and Impact | Avoidance and Mitigation Measures | Probability and Impact post mitigation |
|----------|---|------------------------|-----------------------------------|--|
| | address all potential issues and/or may not be effectively implemented. | | | |

5.4 SPECIFIC IMPACTS ON ENVIRONMENTAL AND SOCIAL SITUATION

248. The project is expected to have impacts on the environmental and social situation. Here these possible impacts are explained with reference to the description of the current situation provided in section 4 of this ESAR.

5.4.1 Topography, Geology and Soils

5.4.1.1 Possible impact during construction

249. It is not expected that any land preparation or civil works under the project could result in temporary blockage or alteration of natural flow paths, thus causing changes in the drainage patterns in the respective area.

250. Civil works and transportation of construction materials could cause localized alteration of vegetation and soil increasing the proneness to erosion by wind and water.

251. The construction of PV mini-grids requires only minor earth works at flat or slightly sloped lands.

252. Activities, which involve significant disturbance of soil or operating with drainage lines and waterways, will be planned to be undertaken during the driest months. All required erosion and sediment control mechanisms in such sites will be in place before the onset of the wet season. Activities on drylands will be carried out in a way that minimizes disturbance of vegetation and soil structures, and resulting wind and water erosion.

5.4.1.2 Possible impact during operation

253. Due to the character of the interventions and effective mitigation measures impact during regular operation will be small if any. Possibly fencing of PV sites and resulting regeneration of vegetation may reduce erosion.

254. The diesel generators and required fuel storages have a high inherent risk of incidents causing pollution of soil by leakage of fuel and/or lubricants during refuelling and in case of failure during operation. The areas where generators and fuel tanks are located will have to be sealed to prevent soil pollution in case of spillage by accident.

5.4.1.3 Seismic Activity

255. The project activities will not have any impact on seismic activity.

256. The locations of mini-grids and other project activities are located in zones of low and medium seismic activity, with the majority of sites being located in low risk zones.

5.4.2 Unexploded Ordnances

257. The areas, where the project activities take place, were not subject to recent military or insurgency activities. Unexploded ordnances have either been removed or risk locations are known to local government agencies and CDCs. Thus risk caused by unexploded ordnances is low.

258. The project does not include activities for detection and removal of unexploded ordnances, but in case of detection by chance the necessary measures will be taken in accordance to established protocols.

5.4.3 Climate

259. The project activities will not have any adverse impact on climate.

260. The implemented PV mini-grids are expected to contribute to climate change mitigation by annual emission reductions of 3,644 tCO₂e. These emission reductions have been attributed to the production of electricity, which replaces the otherwise needed diesel generators (mitigation potential over the 25

years expected useful system life 91,104 tCO₂e). The operation of diesel generators as backup and support will cause an estimated 5,441 tCO₂ over the 25 years expected useful system lifetime. It is assumed that these emissions, which would count only for approx. 6% of the estimated GHG emission reductions, are not additional emissions caused by the project but would as well occur without the project by use of individual generators based on fossil fuel.

261. The development of five additional mini-grids will allow for an additional estimated GHG reduction of 7,140 tCO₂e per annum.

5.4.4 Air Quality

262. All construction activities have the potential to cause air quality nuisance. In the case of the construction of PV mini-grids such activities are very limited in scale and impact. Also the construction or widening of access roads and the transportation of construction materials may cause emissions from engines and dust. Due to the localized use of such machinery and the high portion of manual works the pollution caused by the civil works will be of very limited significance.

263. Workers involved in construction and operation activities should be familiar with methods minimising the impacts of deleterious air quality and alternative construction procedures as contained in Afghanistan's legislation or good international industry practice.

264. **None of the mini-grid components, with the exemption of the backup diesel generators, emits any air pollutants, including ozone.** The operation of diesel generators for backup and support will result in localized air pollution with fumes during refuelling and exhaustion gases during operation. The location of diesel generators at distances of several ten meters from houses will minimize exposition of people to this air pollution. Air pollution from these diesel backup and support generators and exposition of people will be much lower compared with the alternative of individual generators.

5.4.5 Ambient Light

265. The project has very limited impact on ambient light, caused by lighting of mini-grid facilities established under the project. For the purpose of energy efficiency such lighting will be limited to the minimum and will not cause any substantial impact.

5.4.6 Ambient Noise

266. All construction and operation activities have the potential to cause noise nuisance. Vibration disturbance to nearby residents and sensitive habitats is likely to be caused through the use of vibrating equipment.

267. Only very localized small-scale blasting might possibly be required to be undertaken as part of this project, in particular for construction of buildings (service buildings, PV battery storages).

268. The use of machinery or introduction of noise generating facilities could have an adverse effect on the environment and residents if not appropriately managed.

269. Contractors involved in construction activities should be familiar with methods of controlling noisy machines and alternative construction procedures as contained within specific Afghanistan legislation or in its absence, good international industry practice may be used if the legislation has not been enacted.

270. Potential noise sources during construction may include:

- a. heavy construction machinery;
- b. power tools and compressors;
- c. delivery vehicles; and
- d. rock blasts.

271. During operation the use of diesel generators for backup and support energy generation will result in localized and temporary noise. The location of diesel generators at distances of several ten meters

from houses will minimize exposition of people to this noise. Noise level from these diesel backup and support generators and exposition of people due to distance, lower number of noise emitting devices and much lower number of operation hours will be much lower compared with the alternative of individual generators without solar mini-grids.

5.4.7 Visual Amenity

272. The physical structures erected under the project will locally impact on the visual amenity towards a more developed or even industrialized impression. Most structures are small and local only. The largest structures will be PV systems. Also distribution lines influence the visual amenity. In what extent these changes are considered as adverse impact is highly subjective. Given the connection of electricity with modernity and improvement of social-economic conditions it can safely be expected that most stakeholders will value the impact as neutral or even positive. Local people welcomed the prospect of electricity supply. They considered the transformation of their visual environment as negligible and even welcomed change.

273. No sites of especially high vulnerability in terms of visual amenity will be impacted by structures erected under the project.

5.4.8 Surface Water and Hydrology

5.4.8.1 Flow dynamics

274. PV systems do not have any impact on surface water runoff, neither during construction nor during operation.

275. HP systems to be designed under Activity 3.2 will be separately assessed during the detailed planning. No impact on river discharge is expected during the construction of HP systems. But, the operation of HP systems unavoidably has an impact on the river discharge in the section between intake and tailrace. The discharge in this section of the main river is reduced by the amount diverted through the HP system.

5.4.8.2 Water quality

276. PV systems do not have any impact on surface water quality, neither during construction nor during normal operation.

277. The diesel generators and required fuel storages have a high inherent risk of incidents causing pollution of water by leakage of fuel and/or lubricants during refuelling and in case of failure during operation. The areas where generators and fuel tanks are located will have to be sealed to prevent pollution of surface water in case of spillage by accident.

278. HP systems to be designed under Activity 3.2 will be separately assessed during the detailed planning. The construction and operation of the HP systems will not substantially change the existing conditions for growth of aquatic vegetation, including phytoplankton as there is no construction of reservoirs planned.

5.4.9 Groundwater

279. The construction of the PV mini-grids does not have any impact on ground water quantities. The construction works will neither cause any impact on infiltration of precipitation into the ground nor a substantial abstraction of ground water. The PV systems will all be equipped with wells for supply of water needed for regular cleaning of the solar panels.

280. Pollution of ground water during construction will be prevented by proper control and maintenance of machinery. Leakage of hazardous liquids from machinery and storage is a risk, which concerns, e.g. fuel, oil, hydraulic liquid, brake fluid and coolants. This risk has to be minimized by handling these

liquids with care, storage on sealed ground and prevention of leakage into soil during operation and maintenance of construction machinery.

281. The operation of PV mini-grids will not substantially influence the quantity of ground water. In the operation of PV only minor use of water for cleaning of solar panels is involved. The low amount of water needed for cleaning of solar panels will not affect water availability for other needs.
282. Local improvement of vegetation caused by reduced fuel wood consumption and protective measures may slightly increase the replenishment of groundwater due to reduced surface runoff and increased infiltration of water from precipitation.
283. The ground water quality will not be influenced by the normal operation of PV mini-grids. The diesel generators and required fuel storages have a high inherent risk of incidents causing pollution of groundwater by leakage of fuel and/or lubricants during refuelling and in case of failure during operation. The areas where generators and fuel tanks are located will have to be sealed to prevent infiltration of pollutants in case of spillage by accident.
284. At the mini-grid sites because of the arid climate and the soil characteristics precipitation does not sink deep enough into the ground to reach groundwater. This will even in the case of an accident further minimize the risk of groundwater pollution.
285. HP systems to be designed under Activity 3.2 will be separately assessed during the detailed planning. The construction and operation of the HP systems will not influence the groundwater quality.

5.4.10 Vegetation, Flora and Fauna

5.4.10.1 Possible impact on vegetation and flora

286. As explained above in section 4.10.2, at all sites planned for the construction of PV mini-grids is the vegetation cover is already highly transformed from its natural stage and rather poor. It can therefore be excluded that the construction and operation of PV will cause any negative impact on natural vegetation. All sites are in intensively used agricultural landscapes and most sites are located in the immediate vicinity of villages.
287. The locations of the two PV systems in the provinces Kandahar and Khost have either bare ground or only very degraded vegetation on drylands. The surface area required for the foundations of the solar panels and other structures does not cause any significant loss of actual or potential vegetation. The fencing of the PV sites will exclude livestock and allow for the recovery of herbs and sub-shrubs at these sites, which thus can become small pockets of revegetation of degraded lands and sources of seed dispersal. The PV systems require that vegetation is kept short enough to prevent shading of the panels and allow for access for cleaning and other maintenance. For this reason the vegetation can be used for haymaking, but it will not be possible to let trees and shrubs grow in the PV system areas. Thus the overall impact of the PV systems on vegetation cover is expected to be slightly positive as the loss of surface for erection of structures will be compensated by the improved growth conditions for vegetation within the fenced sites.
288. The location of the PV system in Parwan province is irrigated agricultural land. The construction of the PV system (solar panels and all auxiliary structures and buildings) will require the transformation of the vegetation from agricultural crops to other vegetation. Given the requirements of the PV system herbal vegetation can develop, which can be used for haymaking.
289. HP systems to be designed under Activity 3.2 will be separately assessed during the detailed planning. They will have their intake and canal structures and powerhouses in areas, which are potentially more vegetated than the PV sites.

5.4.10.2 Possible impact on fauna

290. The program's impact on fauna can be indirect through the transformation or destruction of habitats and specific habitat features animal species rely on and direct through an increased mortality. No specific information on the occurrence of animal species at the specific planned sites is available. Based

on existing knowledge about the distribution of potentially critical species and due to the planned location of mini-grids in or close to village areas it can be assumed that no habitat of such species will be affected by the program.

291. Disturbance during construction and installation of PV systems is limited in terms of time and affected area. The PV systems cause a local change of habitat only in small areas where the systems are installed. These habitat types are of large scale; sites of PV systems are in the vicinity of villages and will cover areas without or with much degraded vegetation. So presence of rare or endangered reptile species is highly unlikely and therefore negative impacts on fauna are not expected. This also concerns reptiles and small mammals. Furthermore all or most construction will take place during seasons when reptiles and other fauna are active and can easily avoid the construction sites. The fencing of the PV systems will locally cause a regeneration of vegetation. This will likely improve habitat conditions for some animal species, where vegetation is degraded in a large scale.
292. HP systems to be designed under Activity 3.2 will be separately assessed during the detailed planning. Their construction would include the weir and intake structures, headrace canal with sediment traps and forebay tanks, penstock, powerhouse and tailrace canal. The overall impact of the construction phase on fauna is expected to be not problematic for fauna in general and for rare or endangered species populations in particular. The operation of the HP systems reduces the river discharge between intake and tailrace due to the diversion of a part of the flow, typically in short river sections of few hundred meters only. Weirs, where blocking the whole river section can create barriers, which either hamper or totally prevent migrations of fish species.
293. All planned mini-grids will have 26 kilometres of medium (MV) and 51 km of low voltage (LV) distribution lines (Table 5) with in total almost 1,800 poles. The available design suggests that all LV distribution lines would be fully insulated ABC cables, which are likely bird-safe. However, the MV distribution lines in the currently planned standard design of DABS (see Section 2.2.3, figures 5-13) would cause a high mortality by electrocution of large and medium sized birds (figure 45). All species of birds, which visit power poles, in order to perch, to roost and /or to nest are at risk of being affected. In particular for already threatened species this will trigger further declines, but also populations of not yet threatened species are at risk if rural electrification in Afghanistan further expands with the current unsafe design. Afghanistan is a signatory to the UN Convention on the Conservation of Migratory Species (CMS) and should apply the guidelines for bird safety at electricity power grids adopted by the CMS Secretariat⁹⁸. Furthermore the conservation of biodiversity is an inherent and important element of the SDGs and of UNDP and GCF safeguard policies and has to be addressed in all projects. GCF Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources asks institutions to: a. Assess and avoid impacts on biodiversity and ecosystem services if possible, and otherwise implement measures to minimize and restore any impacts.
294. The increased mortality by electrocution is especially critical for falcons, eagles, buzzards, Egyptian vultures and other birds of prey, some of which are globally threatened species, for the conservation of which Afghanistan has special responsibilities as these and other species breed in the country or visit it during migration. In the largely treeless landscapes of Afghanistan village areas and valleys are important bird habitats and the poles of distribution lines are attractive perches for many birds. The reasons for electrocution are the short distances between conductor lines and between conductor lines and grounded parts at all types of pole tops currently installed in Afghanistan. These distances can be bridged by medium and large birds, beginning from about the size of a kestrel or dove.
295. This issue has been raised with UNDP, DABS, MRRD and NEPA during the development of an earlier draft of this ESAR. All stakeholders had expressed their readiness to apply a bird-safe design of the MV distribution lines. Further consultations on this topic took place with UNDP, NEPA and the NGO WCS in May 2019. However, the designs of all three mini-grids stick to the standard, which would cause an unacceptably high and avoidable mortality of birds. Discussions with the lead expert of UNDP for the proposed project indicated a low level of awareness about the issue.

⁹⁸ CMS (2011) Guidelines for Mitigating Conflict Between Migratory Birds and Electricity Power Grids. UNEP/CMS/Conf.10.30/Rev.2 1 November 2011; available at http://www.cms.int/sites/default/files/document/doc_30_electrocution_guidlines_e_0_0.pdf

296. Additionally, the project activities 1.2 (development of technical standards and guidelines), 2.3 (capacity development of RESCOs), 3.2 (knowledge management), including the design development of five more mini-grids, 3.3 (green procurement) and 3.4 (social and environmental safeguards policy for mini-grids) all bear a high additional risk that this important issue is not properly addressed and current biodiversity-unfriendly practices continue and are further replicated. On the other hand, this project would provide an excellent opportunity to develop and mainstream bird-safe design solutions of distribution lines, include them in regulations, standards and guidelines and promote their application within all rural electrification projects across the country.



Figure 45 Typical designs of poles causing high bird mortality by electrocution⁹⁹

⁹⁹ All photos from Haas, D.; Nipkow, M., Fiedler, G., Schneider, R., Haas, W., Schürenberg, B. Protecting birds on powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects. NABU Germany.

297. The most problematic elements of the current design of poles are:

- Standing support insulators of low height (assemblies AS-05; AS-06; AS-07; AS-08);
- Short insulators (assembly AS-09) on tension poles;
- Not insulated conductor bridges (jumpers) on tension poles and tension branches;
- Conductor bridges (jumpers) leading over the cross-arms, not under these;
- Standing insulator on top of pole or close to the top;
- Steel cross-arms, uninsulated;
- Insufficient clearances between steel cross-arms on double circuit poles;
- Insufficient clearances between insulators and between conductor cables.

298. Also LV distribution lines with wooden or concrete poles (figure 45) can be deadly traps for birds. Here also the low distances between conductor and grounded parts of the pole are the reasons. Reinforced concrete is generally not insulating, but also wooden poles are not effectively insulating when wet. If fully insulated ABC cables are used, as the available designs suggest, there is no obvious risk of electrocution. However, in Kazakhstan observations have shown that the combination of insulated cables with certain types of lightning rods, directly connected to the conductors without insulation, also can cause electrocution of birds.

299. Examples for distribution lines of similar design are presented in figure 45.

300. Collision of birds with power lines is mainly a risk for large birds at larger power line structures, typically high and medium voltage lines, crossing critical habitats like wetlands, large gorges and other structures where such birds regularly fly. Where power lines cross such structures with likely regular flights of birds, in particular vultures and large raptors, the location of the lines can be adapted and where crossing critical sites is unavoidable special markings on the lines can improve the visibility for birds and reduce collision risk for these as well as for bats, which can locate these markings by their echolocation. Generally, PV systems and low and medium voltage distribution grids are not known to pose particular threats to bats. While bats have not yet been studied in the sites it can be assumed from available habitats that bat species present are widely distributed species, which are common in and near urban habitats and are not particularly affected by PV systems, LV and MV distribution lines.

5.4.10.3 Protected Areas

301. None of the proposed mini-grids is located in or adjacent to an existing, previous, planned or proposed protected area, but one side (H3 in Bamyan) proposed for design planning under this project is located at the edges of a planned protected area (Northern Plateau).

5.4.11 Land Use

302. The planned mini-grids will not have any substantial direct impact on land-use. Any impact is localized, and due to the location of most installations on communally used land and the involvement of communities via the CDCs, with the exception of the PV site in Parwan, no adverse impact on livelihoods of individual households and entire communities will be caused.

303. The sites with PV installations exclude arable farming and livestock grazing. Therefore these areas will be permanently fenced for prevention of damage to the photovoltaic systems. These areas are of small size (approx. 1.5 ha/MW_p).

304. At the sites in Kandahar and Khost (figures 42 and 43) are bare lands and rangelands will be used as PV sites. Given the low productivity of overgrazed rangelands in the vicinity of villages and the small size of the transformed land the land-use impact of this exclusion will be negligible. This negligible loss of communal grazing land will be more than compensated where the exclusion of grazing will allow for local rehabilitation of vegetation, which can be harvested for forage and can serve as source of seeds for natural regeneration of forage plants in the surrounding rangelands. Thus the net impact will be neutral (in case of land unsuitable for vegetation) or positive (in case of low-productivity rangeland).

305. At the site in Parwan (figure 44) the transformation of 16,000 m² irrigated farmland of moderate or high productivity will be required due to the lack of other available land. After fencing and installation of the PV system this land can in some extent be used for vegetation, which can be harvested for forage.
306. Mini-grids to be designed under Activity 3.2 will be separately assessed during the detailed planning.

5.4.12 Land Ownership and Customary Tenure

307. The findings of the Pre-Feasibility Studies and the Feasibility Study clearly showed that all communities at the planned mini-grid sites have requested access to electricity and therefore have agreed with lands used by the communities being allocated for the needs of RE development.
308. The project activities in Kandahar and Khost provinces have no impact on land ownership and only very limited impact on customary land tenure and land-use. The lands needed for the construction of photovoltaic systems, including the necessary infrastructure (service buildings, access roads and other structures) are owned by the government, but allocated to the communities for permanent use. The project and its sub-projects do not require involuntary resettlement or acquisition of land although they may locally impact on land use opportunities during construction activities, which will be temporary in nature.
309. The need for transformation of lands for RE development have been agreed with the communities at the mini-grid sites during the elaboration of the Pre-feasibility Studies and the Feasibility Study and have received full support by CDCs and community members. All issues related to land ownership and land tenure will be managed along the same lines and procedures as in numerous other projects on rural infrastructure and energy implemented in Afghanistan by agencies like Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Aga Khan Foundation and many others. The allocation of lands for temporary or permanent use of such community infrastructure takes place through on-site decisions made by the respective CDC and agreed with the implementing organization.
- 310.
311. So far the design did not allow identifying needs for widening of access roads. As all mini-grids are in populated areas such needs are unlikely and if any would be of temporary character and the land can later be returned to its previous state and use. Temporary access roads will be constructed only after written agreement by the CDC of the respective village and where individual land owners are concerned upon their written consent. These lands will be returned to its original state after the end of the construction works and no permanent impact is expected.
312. For distribution lines, the placement of poles on government owned land, used by the communities, will be given priority. But, especially for low voltage lines connecting households, placement of poles on private lands cannot entirely be excluded. The area needed for this is negligible (0.36 m² foundation area: 1.44 m² per pole, see figure 13 in section 2.2.3); exact locations of poles have been determined by technical needs in consultation with the respective land owners. As the use of the distribution lines is for the benefit of the households themselves, compensation will neither be expected nor needed. Any household is accepting this as this is a basic precondition for getting electricity.
313. In the provinces of Kandahar and Khost, the project will not lead to any requirement for any compulsory land acquisition and/or compensation to be paid. Loss of land-use opportunities caused by the occupation of land by PV systems, including related infrastructures, will be insignificant and more than compensated by the benefits of electricity supply for the land-users. For these reasons, neither Economic Displacement nor Livelihood Restoration will be necessary.
314. At the site in Parwan the required land (irrigated arable lands of 16,000 m²) will have to be purchased by MRRD from the current private owner or owners. No information is available if the plot is used by one household or shared by several households. According to the project designer a preliminary agreement has been reached with the community, but available information is inconsistent if the land

will be “donated” (by whom?) or be “acquired” by MRRD¹⁰⁰. No information is available if the plot is used by one household or shared by several households. More recently the information has been revised “The private land owners have provided their consents to sell their land to the MRRD. The survey report as well as the owner’s consents have been submitted to the ‘Ministry of Urban Development and Land’, Afghanistan for their endorsement, after which the land owners will receive full compensation of their land. The compensation to be paid by MRRD in case of acquisition is not indicated in any available documentation. The mini-grid projects are important for the community and MRRD has full support and consent from beneficiaries of the project.”¹⁰¹ For this reason, Economic Displacement and Livelihood Restoration will be necessary for the affected households in Parwan and will be developed at the start of project implementation, **see Annex 4 for the Livelihood Action Plan Framework**.

315. Mini-grids to be designed under Activity 3.2 will be separately assessed during the detailed planning. The pre-feasibility and feasibility studies suggest that the project will use only land owned by the government, which is either used by the communities as common lands for grazing and other purposes, or which is not used at all. For the construction of hydraulic structures the permissions from the water management authorities in charge of the respective river sections will be obtained.

5.4.13 Social aspects

316. The project has been designed with the assistance of stakeholders and aims to provide benefits to the broader community. Notwithstanding, as with any project that involves construction, some dissatisfaction can occur and conflicts may arise. It is important that potential areas of tension are recognised early and appropriate actions taken to avoid or minimise conflict.
317. Households in villages will benefit from electricity used by them and from better functioning of institutions (including schools, health centres, and others) and from the better economic situation of small and medium enterprises.

5.4.13.1 Population

318. The project will not have direct impact on population. The project will cause neither resettlement from nor to the project sites. No direct impact on birth rates will be caused by the project.

5.4.13.2 Gender

319. The project activities will not have any adverse impact on gender equality, but it is designed to enhance the development of women. Access to energy is an intervention that has proven to contribute to economic empowerment of women. Availability of electricity for cooking and corresponding benefits of reduced indoor air pollution particularly advantage women who do the bulk of the cooking. Benefits of improved climate resiliency accrue particularly to women as they often disproportionately suffer the impacts of climate change. But women are not just climate change victims or beneficiaries. They are imperative to climate change adaptation efforts by practicing adaptive measures as a part of daily life.

5.4.13.3 Employment, Economic Aspects and Livelihoods

320. The project will not have any adverse impact on employment, economic aspects and livelihoods, beyond the impact on land use by one of few households in Parwan, mentioned in section 5.5.12.
321. Availability of electricity will improve the conditions for agricultural and non-agricultural business development and by this positively influence employment opportunities, local economic conditions and livelihoods of the population in the project areas.

¹⁰⁰ Email by Ram Gobinda Yadav, UNDP, from 23 October 2019.

¹⁰¹ Email by Ram Gobinda Yadav, UNDP, from 29 November 2019.

322. Due to their lifestyle and working conditions the nomadic pastoralists only in exceptional cases will get access to electricity. Their camps are typically too far from electricity generating PV systems to allow for their connection to the distribution networks.

323. Reduced fuel wood consumption in rural households will free resources (labour and/or money) for other needs.

5.4.13.4 Health

324. No adverse impact on human health will be caused by the project activities. All planned electrical installations, including PV systems and distribution networks, are in conformity with the “Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)” (International Commission on Non-Ionizing Radiation Protection (ICNIRP (1998)) and electric and magnetic fields are technically much below exposure limits for general public exposure.

325. The solar mini-grids will have guards from the local communities, which will ensure that unauthorized entering possibly causing serious injuries or death is prevented. There will not be any external security personal and so there is no risk related to this.

326. The introduction of clean cooking with electricity will reduce indoor air pollution and thus result in the improvement of health. Also the reduction of fuel wood consumption for cooking will reduce heavy physical work, which is harmful to health. Especially women and children, which bear the main load of collecting fuel will benefit from these improvements.

5.4.13.5 Labour and Working Conditions

327. No adverse impact on labour and working conditions will be caused by the project activities.

328. During the construction and operation of mini-grids the applicable regulations of labour and working conditions, *in particular safety instructions as established by DABS with regard to avoidance of electrocution from live power lines and safety during working at height* will be followed.

329. The availability of electricity will contribute to improved labour and working conditions in businesses and households.

5.4.14 Waste

5.4.14.1 Possible impact during construction

330. The key waste streams generated during construction are likely to include residual sediment and construction wastes such as:

- a. the excavation wastes unsuitable for reuse during earthworks;
- b. wastes from construction equipment maintenance. Various heavy vehicles and construction equipment will be utilised for the duration of the construction and drilling phase. Liquid hazardous wastes from cleaning, repairing and maintenance of this equipment may be generated. Likewise leakage or spillage of fuels/oils within the site needs to be managed and disposed of appropriately;
- c. non-hazardous liquid wastes will be generated through the use of workers’ facilities such as toilets; and
- d. general wastes including scrap materials and biodegradable wastes.

5.4.14.2 Possible impact during operation

331. Key waste streams generated during operations are likely to include:

- a. used machinery parts may not be properly disposed;
- b. used panels (currently expected lifetime up to 20+ years) of PV systems will have to be replaced after the lifetime of the programme;
- c. used batteries of lead acid and lithium ion type (currently expected lifetime up to 15+ years depending on storage and maintenance) are hazardous waste.

332. For PV panels recycling is still in early stages of development and will not become relevant within or shortly after the programme's implementation.
333. Solar batteries will be replaced once (after 15 years of operation) during the project lifetime. Currently, there is no battery recycling plant in Afghanistan. However, local suppliers/contractors provide 'take back and recycling programs'. The issue of safe recycling and/or disposal of used batteries has not yet been satisfactorily addressed. It is expected that batteries recycling facilities will be available in the country in next decade where used batteries from the mini-grid projects will be recycled and wastes will be safely disposed. UNDP considers proposing that the owner/operator of the mini-grid will sign an agreement with the recycling company in the region or the battery supplier. Alternatively, MRRD will procure 'take back and recycling' services from the battery supplier. Another proposed option would be to replace the lead based batteries during the procurement of construction of the mini-grid, but this would still not solve the issue that the alternative – lithium ion batteries – is also hazardous waste. The issue requires a firm solution prior implementation of mini-grids.
334. Workers involved in construction and operational activities should be familiar with methods minimising the impact of waste generated by the project.

5.4.15 Religion

335. The project does not have any impact on religious believes and exercise. None of the project activities and results has any direct influence on religion.
336. The selection of RE mini-grid sites and the implementation of the project activities as well as the access to benefits from the project are non-discriminatory in terms of religion.

5.4.16 Indigenous Peoples and Ethnic Minorities

337. The project does not have any impact on indigenous peoples or ethnic minority because no recognized indigenous peoples and ethnic minorities are present in the project areas.
338. Beneficiaries of the project are rural Afghan people independent of their ethnicity. During the Pre-feasibility Studies and the Feasibility Study the project preparation teams did not record the ethnic composition of the population in the targeted communities. However, the location of the mini-grid sites in areas with varying ethnic composition suggests that members of the main ethnic groups of the country, including Pashtu, Tajik, Uzbek and Hazara, will benefit from the provision of electricity and the introduction of clean cooking-cum-heating devices.

5.4.17 Archaeological and Cultural Heritage

339. There are no known cultural, archaeological and historical heritage sites at the planned locations of PV mini-grids.
340. At some RE mini-grid sites so far unknown cultural, archaeological or historical objects may exist. In the case of PV systems hills in the vicinity of villages with a plateau on top might be considered for the installation of the solar systems. Such sites often have been historical locations of small fortifications or of graveyards. Careful screening by interviewing local people and site assessments should avoid that new structures are built on these. Only if government agencies in charge of cultural, archaeological or historical heritage and local communities have agreed, such sites should be used for the erection of mini-grid structures under the condition that artefacts are properly recorded, documented and preserved.

5.5 INDIRECT IMPACTS ON ENVIRONMENTAL AND SOCIAL SITUATION

341. Beyond the direct and indirect environmental and social impacts no other impacts are predicted.
342. Government stakeholders had informally expressed concerns that through the development of renewable energy in the project areas additional free or cheap electricity might become available, which

by replacing expensive diesel could in some rural areas indirectly cause an intensification of groundwater abstraction by electric pumps for irrigation purposes and thus lead to a depletion of groundwater resources and a falling groundwater table. Currently 936 pumps are known in the three mini-grid areas, where PV systems are planned. The overall installed capacity of the new mini-grids will be too limited to cause any substantial additional pressure on groundwater resources. Furthermore, electricity will have to be paid for and the RESCOs will regulate electricity consumption to prevent blackouts caused by overly excessive consumption, e.g. by introducing limits or progressive pricing. These two factors will in some extent additionally regulate the use of electricity for pumping of irrigation water and prevent harmful overdraft of groundwater.

5.6 CUMULATIVE IMPACTS

343. No cumulative impacts are possible because the locations of all mini-grid sites are located far from each other.

5.7 CONCLUSION

344. The environmental and social conditions in Afghanistan and in the areas of planned project activities provided the basis for the detailed assessment of impacts of activities planned under the project. The assessment of impact also included the no-action alternative and considerations of alternative locations for the implementation of the project.

345. The project activities will not take place in locations with known particularly sensitive ecological or social features.

346. The impact of the planned project activities on environmental and social factors is generally positive as beneficial impacts are more substantial than possible adverse impacts. All adverse impacts are either insignificant or can be mitigated.

347. Positive impact among others includes climate change mitigation by avoided greenhouse gas emissions, conservation and rehabilitation of vegetation due to reduced fuel wood consumption, reduced air pollution thanks to opportunities of cooking with electricity with resulting improved health, especially of women and children, improved social-economic conditions due to availability of electricity and reduced expenses for heating materials.

348. In one site 16,000 m² of arable land have to be transformed and need to be acquired from the current owners and/or users¹⁰². Otherwise no significant land-use changes and no land acquisition, economic displacement or resettlement are required.

349. PV systems require land areas, on which the solar panels are installed, and which need to be fenced against damage by livestock and unauthorized persons. Due to the area size of these installations (typically up to 2 ha per community) and the priority selection of sites without vegetation or with low-productivity rangelands the loss of pasture land for the local communities is insignificant (in the order of magnitude below one per mill of the local communal pastures) lost grazing opportunities are insignificant. In one site 16,000 m² of irrigated arable lands have to be transformed. Fenced PV sites can be used for haymaking and will provide more forage than the unfenced rangelands would provide.

350. The most critical adverse impact is caused by the current design of MV distribution lines of the mini-grids. The planned design of poles would cause high mortality of medium-sized and large birds due to electrocution. This high bird mortality would especially affect species of already unsatisfactory conservation status. Required avoidance and mitigation measures include the change of the pole design and the application of a bird-safe design, by which bird mortality caused by electrocution can be minimized or even excluded. This change of design is mandatory, as without its implementation the adverse environmental impact would be severe and the project would not be eligible for international

¹⁰² See Annex 4 for the Livelihood Action Plan Framework

funding and contradict Afghanistan's national legislation and the country's obligations under international environmental conventions.

351. The construction and normal operation of RE mini-grids will not cause adverse impact on soil, surface and groundwater dynamics and quality, air quality and social factors. No soil erosion will be caused by the construction and operation of the mini-grids and indirect beneficial impact on land cover will reduce overall erosion risk. Risk of pollution from diesel generator and associated fuel tanks has to be minimized by appropriate measures.
352. Waste accrued during construction will be managed to avoid harm to environment and human health. In the long term the PV systems will have to be replaced, causing partly hazardous waste, which has to be treated in accordance to national legislation and international best practice. So far recycling options have not yet been firmly identified. Recycling technologies are currently advancing and are expected to be more efficient and effective by the end of the useful lifetime of the PV systems than nowadays.
353. The ESMP provides an overview on key environmental and social indicators and the related performance criteria, management, monitoring and reporting.

6 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

6.1 OVERVIEW AND OBJECTIVES OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

354. An ESMP is a management tool used to assist in minimising the impact to the environment and socially; and establish a set of environmental and social objectives. To ensure the environmental and social objectives of the projects are met, the ESMP will be used by the project implementers to structure and control the environmental and social management safeguards that are required to avoid or mitigate adverse effects on the environment and communities.
355. UNDP and the Government ensure that the ESMF and its associated plans are complied with through the life of the project as well as post the project and this is part of the O and M Plan. The ESMF also becomes part of any contract that is issued under the project and the IE and UNDP will ensure it is followed.
356. The environmental and social objectives of the project are to:
- a. provide rural energy access in Afghanistan and thus avoid the GHG emissions that would have arisen due to the use of diesel and kerosene;
 - b. increase resilience and enhance livelihoods of the most vulnerable people, communities and regions, including improving the condition for development and operation of rural SMEs;
 - c. improve educational opportunities in schools as well as improve access to information and communication at household level;
 - d. introducing more efficient devices for providing thermal energy as compared to burning wood and other material, resulting in:
 - e. reduced GHG emissions and unsustainable use of fuel-wood from forests, woodlands and rangelands;
 - f. make rural households, including nomadic *Kochi* herders, more food-secure by reducing their vulnerability to the (un)availability of fuel-wood; and
 - g. significantly reduce indoor air pollution-related health impacts, particularly for women;
 - h. by improving energy access, increasing efficiency of thermal energy and thus reducing ecosystem degradation address climate change vulnerabilities of rural communities.
357. The environmental and social objectives of the ESMP are to:
- a. encourage good management practices through planning, commitment and continuous improvement of environmental practices;
 - b. comply with applicable laws, regulations and standards for the protection of the environment;
 - c. adopt the best practicable means available to prevent or minimise environmental impact, in particular:
 - d. prevent or minimise the pollution of land, air and water;
 - e. prevent or minimise potential adverse impact on river dynamics, environmental flow and water use;
 - f. prevent or minimize the destruction or degradation of vegetation and soil;
 - g. protect native flora, fauna and important ecosystems from additional adverse impact;
 - h. identify key environmental and social indicators;
 - i. describe monitoring procedures required to identify impacts on the environment;
 - j. provide an overview of the obligations of MRRD, UNDP, local partners and contractors in regard to environmental obligations; and
 - i. provide a grievance system to manage potential complaints and/or grievances.
358. The ESMP will be updated from time to time by the implementing Project Management Unit (PMU)/contractor in consultation with the UNDP staff and MRRD to incorporate changes in the detailed design phase of the projects.

6.2 OVERVIEW OF INSTITUTIONAL ARRANGEMENTS FOR THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

359. The ESMP will be assessed for each sub-project by the GoIRA and UNDP prior to any works being undertaken. The ESMP identifies potential risks to the environment and social matters from the projects and outlines strategies for managing those risks and minimising undesirable environmental and social impacts. Further, the ESMP provides a Grievance Redress Mechanism for those that may be impacted by the projects that do not consider their views have been heard.
360. The National Environmental Protection Agency (NEPA) will be responsible for the supervision of the ESMF. The UNDP will gain the endorsement of NEPA and will ensure the ESMP is adequate and followed. The PMU will ensure timely remedial actions are taken by the implementer and contractors where necessary.

6.2.1 Administration of Environmental and Social Management Plan

361. The MRRD will be responsible for the revision or updates of this document during the course of work. It is the responsibility of the person to whom the document is issued to ensure it is updated. The revision or update has to be endorsed by NEPA.
362. As the implementing agency, MRRD will be responsible for the implementation and compliance with the ESMP via the collaborating partners and contractors. The ESMP will be part of any tender documentation.
363. The UNDP and MRRD are accountable for the provision of specialist advice on environmental and social issues to the delivery organisations (e.g. contractors and/or NGOs) and for environmental and social monitoring and reporting. The MRRD or its delegate will assess the environmental and social performance of the delivery organisations (e.g. contractors) in charge of delivering each component throughout the project and ensure compliance with the ESMP.
364. The Supervising Engineers/Project Manager will supervise the contractors, while the contractors will be responsible for implementation of all activities on environment and social issues. The contractors will be responsible for the day to day compliance of the ESMP.
365. The contractors will maintain and keep all administrative and environmental records, which would include a log of complaints together with records of any measures taken to mitigate the cause of the complaints.
366. The site supervisors will be responsible for daily environmental inspections of the construction sites. The MRRD will cross check these inspections by undertaking monthly audits. During operations the delivery organisations will be accountable for implementation of the ESMP. Personnel working on the projects have accountability for preventing or minimising environmental and social impacts.
367. The Field Officer will be responsible for daily environmental inspections of the project/construction site. The MRRD or its delegate will cross check these inspections by undertaking monthly audits.

6.2.2 Procedures, specific work plans/instructions, inspection checklists, incident reporting

368. Environmental procedures provide a written method describing how the management objectives for a particular environmental element are to be obtained. They contain the necessary detail to be site or activity-specific and are required to be followed for all construction works. Site and activity-specific work plans and instructions are to be issued and will follow the previously successful work undertaking similar projects by the UNDP, GoIRA and MRRD.
369. The delivery organisation (e.g. contractors) will maintain and keep all administrative and environmental records, which would include a log of complaints together with records of any measures taken to mitigate the cause of the complaints. The delivery organisation will record any incidents with regard to the ESMP using an Incident Record and enter the details into a register. Any incidents, including non-conformances to the procedures of the ESMP are to be recorded using an Incident Record and the details entered into a register. The contractors will maintain and keep all administrative

and environmental records, which would include a log of complaints together with records of any measures taken to mitigate the cause of the complaints.

370. Any incidents and/or non-conformances to the ESMP are to be noted in weekly environmental inspections and logged into the register. Depending on the severity of the non-conformance, the camp officer may specify a corrective action on the weekly site inspection report. The progress of all corrective actions will be tracked using the register. Any non-conformances and the issue of corrective actions are to be advised to MRRD.

6.2.3 Review and auditing

371. MRRD (as national executing agency) will be responsible for the revision or updates of this document during the course of work. The ESMP will be updated from time to time by the implementing Project Management Unit (PMU)/contractor in consultation with the UNDP staff and MRRD to incorporate changes in the detailed design phase of the projects. The ESMP and its procedures are to be reviewed at least every 6 months by the Project Board/Steering Committee. The objective of the review is to update the document to reflect knowledge gained during the course of project delivery/construction and to reflect new knowledge and changed community standards (values). Any changes are to be developed and implemented in consultation with UNDP Staff. The revision or update has to be endorsed by NEPA. When an update is made, all site personnel are to be made aware of the revision as soon as possible e.g. through a tool box meeting or written notification.

372. The ESMP will be reviewed and amendments made if:

- There are relevant changes to environmental conditions or generally accepted environmental practices; or
- New or previously unidentified environmental risks are identified; or
- Information from the project monitoring and surveillance methods indicate that current control measures require amendment to be effective; or
- There are changes to environmental legislation that are relevant to the project; or
- There is a request made by a relevant regulatory authority.

6.2.4 Capacity Building

373. The NEPA in its Division for Environmental Impact Assessment and Sustainable Development has about fifty staff members with the required capacity for the review process of the ESMP and for the monitoring and supervision of its implementation. Depending on the character and significance of the project and its environmental impact the inspection and monitoring is done by NEPA's national or provincial offices. Special capacity development activities on the implementation and monitoring of the ESMP and on the specific environmental and social management issues identified will take place; they might be useful for MRRD staff in charge of the project. The project will hire experienced national consultants for providing training as capacity building to MRRD staff and contractors.

374. Thanks to long cooperation, UNDP is generally very familiar with the capacities of MRRD and NEPA. Both agencies have a long track record in implementing projects funded by ODA and have developed relevant capacity since 2002. A further and more specific Capacity Needs Assessment will be conducted under Activity 2.1 Capacity strengthening activities designed and delivered for government entities on technical, managerial, administrative and financing aspects of RE mini-grids. Additionally there is Activity 3.4 Social and environmental safeguards policy for mini-grids developed and mainstreamed. This activity will further develop and enhance safeguards policy and also have capacity building on this policy for government and include its own capacity needs assessment as basis. Further, there will be a safeguards officer in the project to ensure the mini-grids will be developed and implemented following UNDP safeguards policy and later on the national policy to be developed in the project.

375. Delivery organisations have the responsibility for ensuring systems are in place so that relevant employees, contractors and other workers are aware of the environmental and social requirements for construction, including the ESMP. All project personnel will attend an induction that covers health,

safety, environment and cultural requirements. All workers engaged in any activity with the potential to cause serious environmental harm (e.g. handling of hazardous materials) will receive task specific environmental training.

6.3 STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION

376. The ESAR includes public consultation as part of the stakeholder engagement plan. The ESMP topics have been included in the public consultations as part of the stakeholder engagement plan during project preparation. The project was discussed with a wide range of stakeholders including relevant government departments, industry groups, NGOs, CDCs and individual community members and approved by Government. Extensive on-ground consultation has been undertaken during the design of the project and of the three mini-grids in particular (as well as during the earlier projects that this project is aiming to upscale). These consultation with the local communities – with CDCs as well as with a broad range of community members – have been used to identify needs, potentials and possible challenges for the development of the mini-grids, which the mini-grid planners accordingly addressed in the design. Results from engagement with the local communities of the 3 sites for solar mini-grid development can be found in Annex II Feasibility Studies, including the Detailed Project Reports for the three projects. Consultation with any affected communities will continue. It is anticipated that based on the communities' needs, the projects will be fully accepted.
377. The entire project in terms of soft activities is inherently participatory and based on stakeholder involvement. Stakeholder participation in the implementation of the three mini-grids is limited by the technical nature of the works and there is little space for participation of local communities in the actual installation of mini-grids. The mini-grids have been designed by specialized companies under consideration of stakeholder interests, in particular those of local communities, and they will have to be installed by such experienced companies as well.
378. The UNDP and MRRD will develop and release updates on the project on a regular basis to provide interested stakeholders with information on project status. Updates may be via a range of media, e.g. print, radio, social media or formal reports. A publicized telephone number will be maintained throughout the project to serve as a point of contact for enquiries, concern, complaints and/or grievances. All enquiries, concern, complaints and/or grievances will be recorded on a register and the appropriate manager will be informed. All material must be published in English, Dari and Pashtu as appropriate.
379. Where there is a community issue raised, the following information will be recorded:
- a. time, date and nature of enquiry, concern, complaints and/or grievances;
 - b. type of communication (e.g. telephone, letter, personal contact);
 - c. name, contact address and contact number;
 - d. response and investigation undertaken as a result of the enquiry, concern, complaints and/or grievances; and
 - e. actions taken and name of the person taking action.
380. Some enquiries, concern, complaints and/or grievances may require an extended period to address. The complainant(s) will be kept informed of progress towards rectifying the concern. All enquiries, concerns, complaints and/or grievances will be investigated and a response given to the complainant in a timely manner. A grievance redress mechanism has been included in the ESAR and ESMP to address any complaints that may not be able to be resolved quickly.
381. Nominated PMU/contractor staff will be responsible for undertaking a review of all enquiries, concern, complaints and/or grievances and ensuring progress toward resolution of each matter.

6.4 COMPLAINTS REGISTER AND GRIEVANCE REDRESS MECHANISM

382. During the construction and implementation phases of any project, a person or group of people can be adversely affected, directly or indirectly due to the project activities. Should such a situation arise, there must be a mechanism through which affected parties can resolve such issues in a cordial manner

with the project personnel in an efficient, unbiased, transparent, timely and cost-effective manner. To achieve this objective, a two tier grievance redress mechanism has been included in the ESMP for this project. This complaint and grievance mechanisms will also be accessible for the project workers and deal with any issues, which may arise in the course of their work.

383. The project complaints and grievance process has been designed to be problem-solving mechanism with voluntary good-faith efforts. The Grievance Redress Mechanism is not a substitute for the legal process. The Grievance Redress Mechanism will as far as practicable, try to resolve complaints and/or grievances on terms that are mutually acceptable to all parties. When making a complaint and/or grievance, all parties must act at all times, in good faith and should not attempt to delay and or hinder any mutually acceptable resolution.
384. The Safeguards officer in the PMU will be designated as the key officer in charge of the Grievance Redress Mechanism. The Terms of Reference for these positions (as amended from time to time) will have the following key responsibilities:
- a. coordinate formation of Grievance Redress Committees before the commencement of constructions to resolve issues;
 - b. act as the focal point at the PMU on Grievance Redress issues and facilitate the resolution of issues within the PMU;
 - c. create awareness of the Grievance Redress Mechanism amongst all the stakeholders through public awareness campaigns;
 - d. assist in redress of all grievances by coordinating with the concerned parties;
 - e. maintain information on grievances and redress;
 - f. monitor the activities of MRRD on grievances issues; and
 - f. prepare the progress for monthly/quarterly reports.
385. Local communities and other interested stakeholders may raise a grievance/complaint at all times to UNDP and/or MRRD. Affected local communities should be informed about the ESMP provisions, including its grievance mechanism and how to make a complaint. All complaints and/or grievances regarding social and environmental issues can be received either orally (to the field staff), by phone, in complaints box or in writing to the UNDP, MRRD or the Construction Contractor. A publicized telephone number will be maintained throughout the project to serve as a point of contact for enquiries and concerns. Complainants may specifically contact the Safeguards Officer and request confidentiality if they have concerns about retaliation. In cases where confidentiality is requested (i.e. not revealing the complainant's identity to UNDP, MRRD and/or the Construction Contractor). In these cases, the Safeguards Officer will review the complaint and/or grievance, discuss it with the complainant, and determine how best to engage project executing entities while preserving confidentiality for the complainant.
386. All enquiries, complaints and concerns will be investigated and a response given to the complainant in a timely manner. The National Project Coordinator will be responsible for undertaking a review of all enquiries, complaints and concerns and ensuring progress toward resolution of each matter. All complainants shall be treated respectfully, politely and with sensitivity. Every possible effort should be made by the PMU and construction contractor to resolve the issues referred to in the complaint and/or grievance within their purview. All meetings in connection with the Grievance Redress Mechanism, including the meetings of the Grievance Redress Committee, must be recorded. The deliberations of the meetings and decisions taken are recorded.
387. Wherever possible, the project team will seek to resolve the complaint as soon as possible, and thus avoid escalation of issues. Some enquiries, complaints and concerns may require an extended period to address. The complainant(s) will be kept informed of progress towards rectifying the concern. Any complaint will be advised to the UNDP within 24 hours of receiving the complaint.
388. The first tier redress mechanism involves the receipt of a complaint and/or grievance at the site and/or district MRRD level. As soon as a complaint and/or grievance is received, the Safeguards Officer would issue an acknowledgement. After registering, the Safeguards Officer will study the complaint and/or grievance made in detail and forward it to the concerned officer with specific dates for replying and redressing the same. The Safeguards Officer will hold meetings with the affected persons /

complainant and then attempt to find a solution to the complaint and/or grievance received. If necessary, meetings will be held with the concerned affected persons / complainant and the concerned officer to find a solution to the problem and develop plans to redress the grievance. The resolution at the first tier will normally be completed within 15 working days and the complaint and/or grievance will be notified of the proposed response through a disclosure form.

389. A Community Project Implementation Committee would be formed to oversee the first tier of the Grievance Redress Mechanism. The Community Project Implementation Committee would include:

- a. the heads of all CDCs related to the respective project site;
- b. a representative of the district council;
- c. a representative of the provincial department of MRRD;
- d. a representative of the provincial NEPA department; and
- e. Safeguards Officer of the PMU.

390. Should the grievance be not resolved within this period to the satisfaction of the complainant, the grievance will be referred to the Grievance Redress Committee, which would address the grievance in the second tier. In any case, where the issue is not addressed within 20 working days, the matter is referred to the next level. The Safeguard Officer from the PMU will coordinate with the respective Commissioner of Local Government in getting these Committees constituted for every province by the circulars issued by the Provincial Governor, who would also be the Chairman of the Committee.

391. The Structure of the committee would be:

- a. A representative of the provincial governor – Chairman;
- b. a representative of the provincial department of MRRD;
- c. a representative of the provincial NEPA department;
- d. a representative of each district authority of the territory, which the grievance concerns;
- e. a representative of each CDC of the territory, which the grievance concerns; and
- f. Safeguards Officer of the PMU.

392. The Terms of Reference for the Grievance Redress Committee are:

- a. providing support to the affected persons in solving their problems;
- b. prioritize grievances and resolve them at the earliest;
- c. provide information to the PMU and MRRD on serious cases at the earliest opportunity;
- d. coordinate with the aggrieved person/group and obtain proper and timely information on the solution worked out for his/her grievance; and
- e. study the occurring grievances and advise PMU and Project Board on remedial actions to avoid further occurrences.

393. The Grievance Redress Committee will hold the necessary meetings with the aggrieved party/complainant and the concerned officer and attempt to find a solution acceptable at all levels. The Grievance Redress Committee would record the minutes of the meeting and will communicate proposed responses to the complainant formally. If the proposed response satisfies the complainant, the response will be implemented and the complaint and/or grievance closed. In cases where a proposed response is unsatisfactory to the complainant, the Grievance Redress Committee may choose to revise the proposed response to meet the complainant's remaining concerns, or to indicate to the complainant that no other response appears feasible to the Grievance Redress Committee. The complainant may decide to take a legal or any other recourse if s/he is not satisfied with the resolutions due to the deliberations of the three tiers of the grievance redress mechanism.

394. A key part of the grievance redress mechanism is the requirement for the PMU and construction contractor to maintain a register of complaints and/or grievances received at the respective project site offices. A summary list of complaints received and their disposition must be published in a report produced every six months. All enquiries, concerns and complaints will be recorded on a register and the appropriate manager will be informed. The following information will be recorded, i) time, date and nature of enquiry, complaint or concern; ii) type of communication (e.g. telephone, letter, personal contact); iii) name, contact address and contact number; iv) response and investigation undertaken as a result of the enquiry, complaint or concern; and v) actions taken and name of the person taking action.

395. In addition to the project-level and national grievance redress mechanisms, complainants have the option to access UNDP's Accountability Mechanism, with both compliance and grievance functions. The Social and Environmental Compliance Unit investigates allegations that UNDP's Standards, screening procedure or other UNDP social and environmental commitments are not being implemented adequately, and that harm may result to people or the environment. The Social and Environmental Compliance Unit is housed in the Office of Audit and Investigations, and managed by a Lead Compliance Officer. A compliance review is available to any community or individual with concerns about the impacts of a UNDP programme or project. The Social and Environmental Compliance Unit is mandated to independently and impartially investigate valid requests from locally impacted people, and to report its findings and recommendations publicly.
396. Any grievance related to corruption or any unethical practice should be referred immediately to the Office of the Attorney General of the Islamic Republic of Afghanistan and the Office of Audit and Investigation within the UNDP in New York.
397. The Stakeholder Response Mechanism offers locally affected people an opportunity to work with other stakeholders to resolve concerns about the social and environmental impacts of a UNDP project. Stakeholder Response Mechanism is intended to supplement the proactive stakeholder engagement that is required of UNDP and its Implementing Partners throughout the project cycle. Communities and individuals may request a Stakeholder Response Mechanism process when they have used standard channels for project management and quality assurance, and are not satisfied with the response (in this case the project level grievance redress mechanism). When a valid Stakeholder Response Mechanism request is submitted, UNDP focal points at country, regional and headquarters levels will work with concerned stakeholders and Implementing Partners to address and resolve the concerns. Visit www.undp.org/secu-srm for more details. The relevant form is attached at the end of the ESMP.

6.5 AVOIDANCE AND MITIGATION MEASURES

398. The project possibly has impacts on the environmental and social situation. Specific avoidance and mitigation measures on these possible impacts are planned with reference to the description of the current situation and possible impact provided in sections 4 and 5 of this ESAR. Avoidance and mitigation measures by activity are explained in section 5.3 of this ESIA and are the basis for the assessment of the finally expected impacts of the project activities in the result of implemented avoidance and mitigation measures.

399. This section refers to the key environmental and social indicators and outlines respective management objectives, potential impacts, control activities and the environmental performance criteria against which these indicators will be measured. This section further addresses the need for monitoring and reporting of environmental performance with the aim of communicating the success and failures of control procedures, distinguish issues that require rectification and identify measures that will allow continuous improvement in the processes by which the projects are managed.

6.5.1 Climate

400. The project activities will not have any adverse impact on climate and thus not require avoidance and mitigation measures on this environmental factor.

401. All activities, which have the potential to reduce the emission of greenhouse gases, are to be planned and implemented in a way, delivering cost efficient and effective mitigation of climate change.

6.5.2 Topography, Geology and Soils

6.5.2.1 Possible impact during construction

402. Activities that have the potential to cause erosion should be undertaken with the likely weather conditions in mind. Activities which involve significant disturbance of soil or operating with drainage lines and waterways will be planned to be undertaken during the driest months. It is also important to ensure that all required erosion and sediment control mechanisms in such sites are in place before the onset of the wet season. Activities on drylands will be carried out in a way that minimizes disturbance of vegetation and soil structures, and resulting wind and water erosion.

403. The ESMP provides additional information on requirements regarding the avoidance and mitigation of adverse impact on soil. Erosion, drainage and sediment control measures will be implemented in accordance to the ESMP.

6.5.2.2 Possible impact during operation

404. The ESMP provides additional information on requirements regarding the avoidance and mitigation of adverse impact on soil. Erosion, drainage and sediment control measures will be implemented in accordance to the ESMP.

6.5.2.3 Seismic Activity

405. The project activities will not have any impact on seismic activity.

406. Where mini-grids are developed in areas with seismic risks, these risks are to be taken into consideration during construction of all civil structures and buildings. In particular design and location planning of canals has to minimize risk of failure and of damage caused to human lives and to property by possibly failing hydraulic structures.

6.5.2.4 Performance Criteria

407. The following performance criteria are set for the projects:

- a. no substantial erosion by wind and water initiated during the construction activities due to timing and minimization measures;



- b. no substantial permanent build-up of sediment in the aquatic environments and/or surface water as a result of construction and operation activities;
- c. all structures for release of water exiting the project sites provide for best practice erosion control; and
- d. effective implementation of site-specific EDSCP.

408. By following the management measures set out in the ESMP, construction and operation activities of the projects will not have a significant impact as a result of sedimentation across the broader area.

6.5.2.5 *Monitoring*

409. A standardised sediment control monitoring program has been developed for the projects (Table 9). The program is subject to review and update at least every two months from the date of issue. The camp officer will be required to:

- a. conduct site inspections on a weekly basis, after rainfall events exceeding 20 mm in a 24 hour period and during and after events of flow discharge exceeding the average discharge by 5 times;
- b. develop a site-specific checklist to document non-conformances to this ESMP or any applicable EDSCPs; and
- c. communicate the results of inspections, ensure that any issues associated with control failures are rapidly rectified and processes are put in place to ensure that similar failures are not repeated and ensure that in cases of sediment build up above the weir and/or vertical or lateral riverbed erosion of an extent threatening infrastructure, settlements, cultivated lands or valuable habitat immediate preventive or rehabilitative measures are implemented.

6.5.2.6 *Reporting*

410. All sediment and erosion control monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The MRRD, MEW and NEPA must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to erosion and sediment control is exceeded.

Table 9 Erosion, Drainage and Sediment Control Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|--|---|-----------------------------|----------------|----------------------------|
| E1: Loss of soil material and sedimentation to the surface water from site due to earthwork activities | E1.1: Develop and implement an EDSCP for any surface works, embankments and excavation work, water crossings. | Construction phase | Contractors | Maintain records |
| | E1.2: Schedule/stage works to minimise cleared areas and exposed soils at all times. | Pre and during construction | Contractors | Maintain records |
| | E1.3: Schedule/stage planned works to ensure that major vegetation disturbance and earthworks are carried out during periods of lower rainfall and wind speeds. | Pre and during construction | Contractors | Maintain records |
| | E1.4: Strip and stockpile topsoil for use during revegetation and/or place removed soils back on the original site. | Pre and during construction | Contractors | Maintain records |
| | E1.5: Schedule/stage works to minimise the duration of stockpiling topsoil material. | During construction | Contractors | Maintain records |
| | E1.6: Locate stockpile areas away from drainage pathways, waterways and sensitive locations. | Pre and during construction | Contractors | Maintain records |
| E2: Soil Contamination | E2.1: If contamination is uncovered or suspected (outside of the project footprints), undertake a Stage 1 preliminary site contamination investigation. The contractor should cease work if previously unidentified contamination is encountered and activate management procedures and obtain advice/permits/approval (as required). | Construction phase | Contractors | Daily and maintain records |

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|-------|--|--------------------|----------------|----------------------------|
| | E2.2: Adherence to best practice for the removal and disposal of contaminated soil/ material from site (if required), including contaminated soil within the project footprints. | Construction phase | Contractors | Daily and maintain records |
| | E2.3: Drainage control measures to ensure runoff does not contact contaminated areas (including contaminated material within the project footprints) and is directed/diverted to stable areas for release. | Construction phase | Contractors | Daily and maintain records |

6.5.3 Unexploded Ordnances

411. The project does not include specific activities to deal with unexploded ordnances as all project sites are either not affected by previous armed conflict or are assumed to be cleared before any activities start.
412. However, unknown existence of unexploded ordnances can never be completely ruled out. Therefore a protocol for unexpected detection of unexploded ordnances will be put in place in accordance to national legislation and best practices to prevent harm and ensure their safe removal and disposal.
413. The ESMP provides additional information on requirements regarding the avoidance and mitigation of adverse impact caused by unexploded ordnances.

6.5.3.1 Performance Criteria

414. The following performance criteria are set for the projects:
- a. no harm to staff of contractors, local population and other people caused by unexploded ordnances;
 - b. detected unexploded ordnances are marked, reported and protected in-situ from unauthorized treatment; and
 - c. treatment and disposal of unexploded ordnances by qualified authorized persons in accordance to applicable legislation and safety requirements.

6.5.3.2 Monitoring

415. A standardised management program for unexploded ordnances has been developed for the projects (Table 10). The program is subject to review and update as new knowledge on the presence of unexploded ordnances becomes available. The camp officer will be required to:
- a. instruct all workers on the detection of and dealing with unexploded ordnances;
 - b. develop a site-specific checklist to document non-conformances to any applicable legislation and safety instructions; and
 - c. communicate the results of inspections, ensure that any detections are immediately reported, the location be secured and the required treatment process by qualified authorized persons is put in place to ensure that harm to people and property is prevented.

6.5.3.3 Reporting

416. All unexploded ordnances incidents will be tabulated and reported as outlined in the ESMP. The MRRD, the Mine Clearance Planning Agency (MCPA) and Organization for Mine Clearance and Afghan Rehabilitation (OMAR) or the Demining Agency for Afghanistan (DAFA) must be notified immediately in the event of detection of any suspected unexploded ordnances, which may cause harm to live, health, property or environment.

Table 10 Unexploded Ordnances Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|--|--|-----------------------------------|--|--|
| UO1: Deal with detected unexploded ordnances | UO 1.1: Instruction of workers on detection of unexploded ordnances during construction. | Pre and during construction | Contractors | Maintain records |
| | UO 1.2: Detection of unexploded ordnances during construction. | Pre and during construction | Contractors | Report immediately to above mentioned agencies |
| | UO 1.3: Marking and securing of detected unexploded ordnances. | Pre and during construction | Contractors | Maintain records |
| | UO 1.4: Treatment and safe disposal of unexploded ordnances. | Pre and during construction | Qualified authorized staff of above mentioned agencies | Maintain records |
| | UO 1.5: Clearance of site of detected unexploded ordnances. | After treatment and safe disposal | Qualified authorized staff of above mentioned agencies | Maintain records |

6.5.4 Air Quality

417. Workers involved in construction and operation activities have to be familiar with methods minimising the impacts of deleterious air quality and alternative construction procedures as contained in Afghanistan’s legislation or good international industry practice.
418. Diesel generators as backup and support of the mini-grids have to be maintained to minimize air pollution and to be installed in locations far enough from human habitation to avoid exposition of people to exhaustion gases. All safety measures, in particular with regard to ventilation, have to be in place and regularly controlled.
419. The ESMP provides additional information on requirements regarding the avoidance and mitigation of adverse impact on air quality.

6.5.4.1 Performance Criteria

420. The following performance criteria are set for the construction of the projects:
- release of dust/particle matter must not cause an environmental nuisance;
 - undertake measures at all times to assist in minimising the air quality impacts associated with construction and operation activities; and
 - corrective action to respond to complaints and/or grievances is to occur within 48 hours.

6.5.4.2 Monitoring

421. A standardised air monitoring program has been developed for the projects (Table 11). The program is subject to review and update at least every two months from the date of issue. Importantly:
- the requirement for dust suppression will be visually observed by site personnel daily and by MRRD staff when undertaking routine site inspections; and
 - vehicles, machinery and diesel generator emissions – visual monitoring and measured when deemed excessive.

6.5.4.3 Reporting

422. All air quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The MRRD must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to air quality is exceeded.

Table 11 Air Quality Management Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|--|---|-----------------------------|----------------|----------------------------|
| A.1 Increase in dust levels at sensitive receptors | A1.1: Implement effective dust management measures in all areas during design, construction and operation. | Pre and during construction | Contractors | Daily and maintain records |
| | A1.2: Restrict speeds on roads and access tracks. | During construction | Contractors | Daily and maintain records |
| | A1.3: Manage dust/particulate matter generating activities to ensure that emissions do not cause an environmental nuisance at any sensitive locations | During construction | Contractors | Daily and maintain records |
| | A1.4: Implement scheduling/staging of planned works to ensure major vegetation disturbance and earthworks are minimised. | Entire construction | Contractors | Daily and maintain records |
| | A1.5: Schedule revegetation activities to ensure optimum survival of vegetation species. | During construction | Contractors | Maintain records |
| | A1.6: Rubbish receptacles should be covered and located as far as practicable from sensitive locations | During construction | Contractors | Maintain records |
| | A1.7: Source sufficient water of a suitable quality for dust suppression activities complying with any water restrictions. | During construction | Contractors | Daily and maintain records |

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|---|--|-----------------------------|----------------|--|
| A2. Increase in vehicle / machinery emissions | A2.1: Ensure vehicles/machines are switched off when not in use. | During construction | Contractors | Daily and maintain records |
| | A2.2: Ensure only vehicles required to undertake works are operated onsite. | During construction | Contractors | Daily and maintain records |
| | A2.3: Ensure all construction vehicles, plant and machinery are maintained and operated in accordance with design standards and specifications. | During construction | Contractors | Daily and maintain records |
| | A2.4: Develop and implement an induction program for all site personnel, which includes as a minimum an outline of the minimum requirements for environmental management relating to the site. | Pre and during construction | Contractors | Daily and maintain records |
| | A2.5: Direct exhaust emissions of mobile plant away from the ground. | During construction | Contractors | Daily and maintain records |
| A3 Diesel generators | A3.1: Install diesel generators in locations, which minimize exposition of people to exhaustion gases. | During construction | Contractors | Daily and maintain records |
| | A3.2 Purchase diesel generators which meet or exceed applicable standards in terms of exhaust emission, including sulphur oxides and nitrogen oxides as potential sources of low-lying ozone. | During construction | Contractors | During procurement document technical standards required and met in comparison with devices offered by competitors |
| | A3.3: Operate and maintain generators in accordance to the best available technical standards to minimize the content of poisonous substances in exhaustion gases. | During operation | Contractors | Daily and maintain records |



Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal



6.5.5 Ambient Light

423. The improvement of lighting of outdoor space is considered as positive impact on the social environment and no general avoidance or mitigation is required.
424. Local households and businesses shall be advised to install lighting equipment, which is energy efficient (LED) and lights space without glaring people.

6.5.6 Noise and Vibration

425. All construction machinery shall be maintained and used in a way that minimizes noise.
426. Noisy works are to be scheduled at daytime to prevent disturbance during the night hours.
427. Diesel generators as backup and support of the mini-grids have to be maintained to minimize noise emission and to be installed in locations far enough from human habitation to avoid exposition of people to substantial noise. All safety maintenance instructions, in particular with regard to noise control, have to be in place and regularly controlled.

6.5.6.1 Performance Criteria

428. The following performance criteria are set for the construction of the projects:
- noise from construction and operational activities must not cause an environmental nuisance at any noise sensitive place;
 - undertake measures at all times to assist in minimising the noise associated with construction activities;
 - time noise emitting construction activities, e.g. rock blasts, during day hours;
 - no damage to off-site property caused by vibration from construction, including rock blast, and from operation activities; and
 - corrective action to respond to complaints and/or grievances is to occur within 48 hours.

6.5.6.2 Monitoring

429. A standardised noise and vibration management and monitoring program has been developed for the projects (Table 12). The program is subject to review and update at least every two months from the date of issue. Importantly, the site supervisor will:
- ensure equipment and machinery is regularly maintained and appropriately operated; and
 - carry out potentially noisy construction activities during 'daytime' hours only.

6.5.6.3 Reporting

430. All noise monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The MRRD must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to noise is exceeded

Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal

Table 12 Noise and Vibration Management Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|----------------------------|---|-----------------------------|----------------|----------------------------|
| N1: Increased noise levels | N1.1: Select plant and equipment and specific design work practices to ensure that noise emissions are minimised during construction and operation, including unavoidable rock blasts. | All phases | Contractors | Maintain records |
| | N1.2: Specific noise reduction devices such as silencers and mufflers shall be installed as appropriate to equipment. | Pre and during construction | Contractors | Maintain records |
| | N1.3: Minimise the need for and limit the emissions as far as practicable if noise generating construction works, including rock blasts, are to be carried out outside of the hours: 7am-5.30pm | Construction phase | Contractors | Daily and maintain records |
| | N1.4: Consultation with nearby residents in advance of construction activities particularly if noise generating construction activities are to be carried out outside of 'daytime' hours: 7am-5.30pm. | Construction phase | Contractors | Daily and maintain records |
| | N1.5: All incidents complaints and non-compliances related to noise shall be reported in accordance with the site incident reporting procedures and summarised in the register. | Construction phase | Contractors | Maintain records |
| | N1.7: The contractors should conduct employee and operator training to improve awareness of the need to minimise excessive noise in work practices through implementation of measures. | Pre and during construction | Contractors | Maintain records |

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|-----------------------------------|--|---|--------------------|---|
| N2 Diesel generators | N2.1: Install diesel generators in locations, which minimize exposition of people to noise. | During planning and construction | Contractors | Daily and maintain records |
| | N2.2 Purchase diesel generators which meet or exceed applicable standards in terms of noise emission | During construction | Contractors | During procurement document technical standards required and met in comparison with devices offered by competitors |
| | N2.3: Operate and maintain generators in accordance to the best available technical standards to minimize noise. | During operation | Contractors | Daily and maintain records |
| N3. Vibration due to construction | N3.1: Identify properties, structures and habitat locations that will be sensitive to vibration impacts resulting from construction, including rock blasts, and operation of the project. | Pre and during construction | Contractors | Maintain records |
| | N3.2: Design to give due regard to temporary and permanent mitigation measures for noise and vibration from construction, including rock blasts, and operational vibration impacts. | Pre-construction | Contractor | Maintain records |
| | N2.3: All incidents, complaints and non-compliances related to vibration, including rock blasts, shall be reported in accordance with the site incident reporting procedures and summarised in the register. | Construction phase | Camp officer | Maintain records |

6.5.7 Surface Water

6.5.7.1 Water quality

431. For maintaining the water quality contamination with pollutants has to be prevented during construction and operation, including the avoidance of additional entry of sediments into the river.
432. Place diesel generators and fuel tanks in sufficiently large sealed containments, which prevent the pollution of surface water in case of leakage.

6.5.7.2 Performance Criteria

433. The following performance criteria are set for the construction of the projects:
- no significant decrease in water quality as a result of construction and operational activities;
 - water quality shall conform to any approval conditions stipulated by MEW, NEPA and/or other government departments, or in the absence of such conditions follow a 'no worsening' methodology;
 - effective implementation of site-specific EDSCPs, where relevant;
 - all machinery and storage of potentially poisonous liquids placed in sealed containments.

6.5.7.3 Monitoring

434. Table 13 outlines the management and monitoring required.

6.5.7.4 Reporting

435. All water quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The MRRD and NEPA must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to water quality is exceeded.

Table 13 Surface Water Management Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|---|---|---|----------------|--|
| W1: Elevated contaminants in surface water systems. | W1.1: Develop and implement site specific measures to address control of erosion and sedimentation and stockpiling of materials including soil during construction of all components of the projects. | Pre and during earthworks | Contractors | Initial set up and then as required with reporting to MRRD |
| | W1.2: Construction materials will not be stockpiled in proximity to aquatic environment that may allow for release into the environment. Construction equipment will be removed from in proximity to the aquatic environment at the end of each working day or if heavy rainfall is predicted | Entire construction and operation phase | Contractors | Maintain daily records |
| | W1.3: Designated areas for storage of fuels, oils, chemicals or other hazardous liquids should have compacted impermeable bases and be surrounded by a bund to contain any spillage. Refuelling to be undertaken in areas away from water systems. | Entire construction and operation phase | All Personnel | Weekly with reporting to MRRD |
| | W1.4: Diesel generators and fuel tanks placed in sealed containments and regularly controlled for leakages; any leakage immediately fixed and leaked liquids safely disposed. | Entire construction and operation phase | All Personnel | Weekly with reporting to MRRD |

6.5.8 Groundwater

436. Pollution of ground water will be prevented by proper control and maintenance of machinery.

The risk of leakage of hazardous liquids from machinery and storage, which concerns, e.g. fuel, oil, hydraulic liquid, brake fluid and coolants, has to be minimized by handling these liquids with care, storage on sealed ground and prevention of leakage into soil during operation and maintenance of construction machinery.

437. As the operation of PV mini-grids will not influence the ground water quality no avoidance and mitigation measures are required during operation.

6.5.8.1 Performance Criteria

438. The following performance criteria are set for the project:

- a. no significant impact on the quantity of groundwater in proximity to the projects as a result of construction and operational activities;
- b. no significant decrease in the quality of groundwater as a result of construction and no influence of operational activities in proximity to the projects;
- c. development and implementation of a hazardous liquids management plan for any potentially hazardous liquids from construction machinery covering among others: storage, maintenance, application and refuelling as well as disposal procedures and location requirements related to fuel, lubricants, coolants, hydraulic liquids, brake fluid and other potentially hazardous liquids;
- d. effective implementation of site-specific measures to protect groundwater.

439. By following the management measures set out in the ESMP the project will not have a significant impact on water quality across the broader area.

6.5.8.2 Monitoring

Refer to Table 14 for the management and monitoring requirements for groundwater.

6.5.8.3 Reporting

All water quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The MRRD and NEPA must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to water quality is exceeded.

Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal

Table 14 Groundwater management measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|---|--|---|-------------------|---|
| GW 1: Increase of gross pollutants, hydrocarbons, metals and other chemical pollutants into the groundwater and/or surface water environment. | GW1.1: Control daily all machinery (vehicles, pumps, generators etc.) for leakages of potentially hazardous liquids. Undertake refuelling at designated places away from water systems. | Construction phase | Contractor | Daily, with weekly reporting to MRRD and NEPA |
| | GW 1.2: Designated areas for storage of fuels, oils, chemicals or other hazardous liquids should have compacted impermeable bases and be surrounded by a bund to contain any spillage. Refuelling to be undertaken in areas away from water systems. | Construction phase | Contractor | Daily, with weekly reporting to MRRD and NEPA |
| | GW 1.3: Diesel generators and fuel tanks placed in sealed containments and regularly controlled for leakages; any leakage immediately fixed and leaked liquids safely disposed. | Entire construction and operation phase | All Personnel | Weekly with reporting to MRRD |
| | GW 1.4: Ensure safe storage and disposal of hazardous liquid waste (old lubricants and other liquids). | Construction phase | Contractor | Daily, with weekly reporting to MRRD and NEPA |
| | GW 1.5: Refrain from the use of any herbicides, pesticides and other chemicals that have impact on water quality, flora and fauna. Use only as per directions | Construction and operation | Contractor, RESCO | Monthly reporting to MRRD and NEPA |

6.5.9 Vegetation, Flora and Fauna

6.5.9.1 Avoidance and mitigation of possible impact on vegetation and flora

440. Preference for the exact location of the PV systems will be given to areas with either bare ground or only very degraded vegetation on drylands, by this minimizing impact on existing vegetation. The fencing of the PV sites will exclude livestock and allow for the recovery of herbs and sub-shrubs at these sites, which thus can become small pockets of revegetation of degraded lands and sources of seed dispersal.
441. The use of electricity for cooking should be accompanied by training and awareness raising on its efficient use to reduce the consumption of fuel wood and reduce pressure on vegetation.
442. The ESMP provides additional information on requirements regarding the avoidance and mitigation of adverse impact on flora and vegetation.

6.5.9.2 Possible impact on fauna

443. Bird safety must be achieved by suitable design of the distribution lines' power poles and their technical components. The designs of poles and their technical components suggested in the currently available detailed designs do not fulfil these requirements and without the change of the design the environmental impact on bird populations would not be acceptable and the project must not be implemented with the currently planned design of distribution lines. Sufficient long-term mitigation cannot be achieved through modification of pole designs by the use of auxiliary bird safety devices, such as diverters, insulating covers etc. Such auxiliary devices are not safe enough and have a service life of approx. 20 years, while typical power poles have a service life of approx. 50 years. In contrast, the below explained technical solutions, which are safe for birds by design, e.g. power poles with suspension insulators (hanging insulators) will always remain safe.
444. The following requirements for bird safety have to be fulfilled in the revised design of the distribution lines:
- All potential landing and perching sites, which are grounded and not insulated shall have a minimum distance of 600 mm from energized parts.
 - Use instead of poles with standing upright insulators poles with suspended insulators, which are fairly safe provided the distance between a likely perch (cross-arm) to the energized parts (conductors) is at least 600 mm.
 - Conductors should be spaced at least 1,200 mm apart.
 - Bird-safe tension poles require insulating chains at least 600 mm in length.
 - At tension poles and junctions the conductor bridges (jumpers) should run below the cross-arm at distance of at least 600 mm.
 - In instance where the conductor bridges (jumpers) have to run above or closer to the cross-arm, tubing/insulated cable should be used.
445. The guidelines by CMS¹⁰³, Haas et al.¹⁰⁴ and the VDE application guide¹⁰⁵ provide examples of bird-safe design of power lines, which should be followed in the program. Figures 46-52 provide selected such design examples from VDE for different elements of distribution lines and various types of pole designs.

¹⁰³ CMS (2011) Guidelines for Mitigating Conflict Between Migratory Birds and Electricity Power Grids. UNEP/CMS/Conf.10.30/Rev.2 1 November 2011; available at [http://www.cms.int/sites/default/files/document/doc_30_electrocution_guidlines_e_0_0.pdf](http://www.cms.int/sites/default/files/document/doc_30_electrocution_guidelines_e_0_0.pdf)

¹⁰⁴ Haas, D.; Nipkow, M., Fiedler, G., Schneider, R., Haas, W., Schürenberg, B. Protecting birds on powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects. NABU Germany.

¹⁰⁵ VDE-AR-N 4210-11:2011-08 (English translation of the VDE application guide, valid as from 2011-08-01) Protection of birds on medium voltage overhead lines. Forum Netzwerktechnik/Netzbetrieb im VDE.

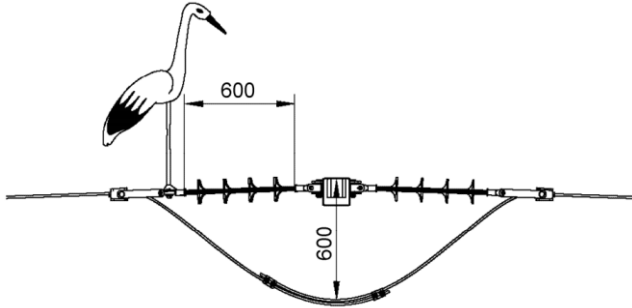


Figure 46 Prevention of phase-to-ground contact on the angle support by maintaining the minimum clearances

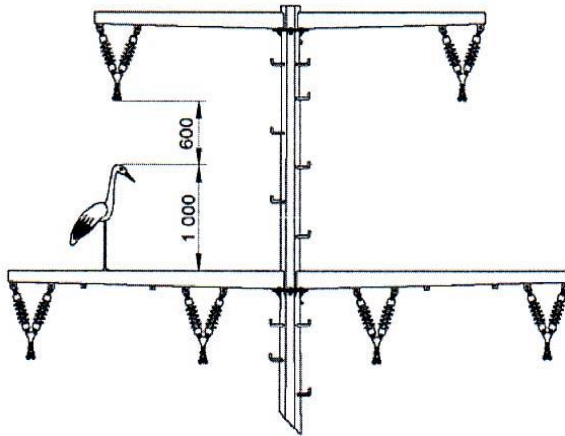


Figure 47 Prevention of phase-to-ground contact by maintaining the vertical minimum clearances at double circuit poles (conductors at several levels)

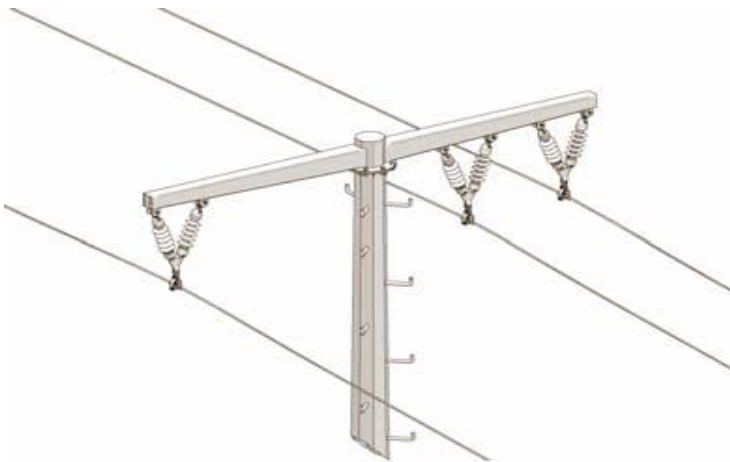


Figure 48 Cross-arm on grounded pole with suspension insulators, vertical distance between conductor and top side of cross-arm 600+ mm

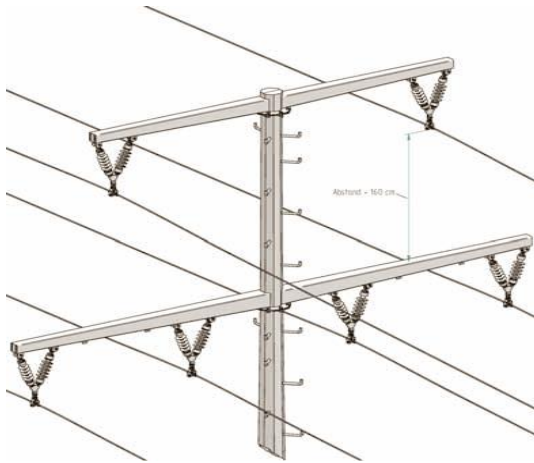


Figure 49 Cross-arm on grounded pole with suspension insulators, conductors at several levels, vertical distance between conductor(s) and top side of cross-arm 600+ mm, vertical distance between the top side of the lower cross-arm and the conductor rope suspension of the upper cross-arm 1,600+ mm

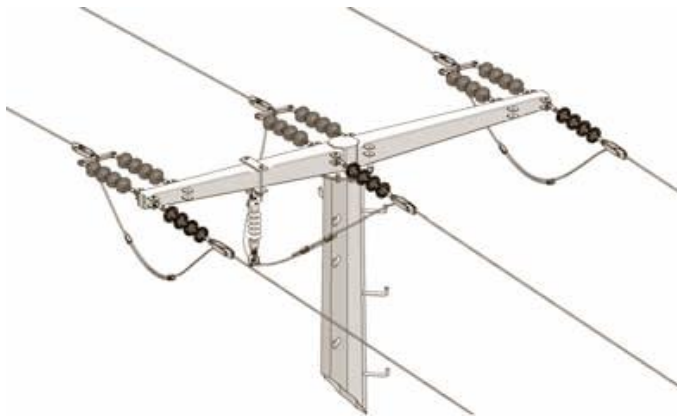


Figure 50 Cross-arm on grounded pole with tension insulators, conductors in one or several levels, length of insulator 600+ mm, vertical distance between conductor rope bridge (jumper) and top side of cross-arm 600+ mm, route all conductor bridges below the cross-arm, in case of conductors arranged in several levels vertical distance between the top side of the lower cross-arm and the conductor rope bridge (jumper) of the upper cross-arm 1,600+ mm

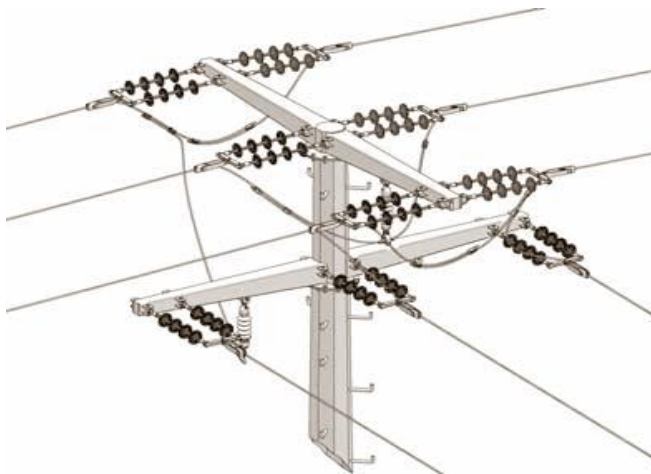


Figure 51 Grounded junction pole with tension insulators, in one or several levels with single or double junction, as in Fig. 46, additionally minimum distance between conductor rope bridge (jumper) and grounded parts 600+mm, else

insulated conductor rope bridges; vertical distance between the top side of the lower cross-arm and the upper conductors 1,600+ mm

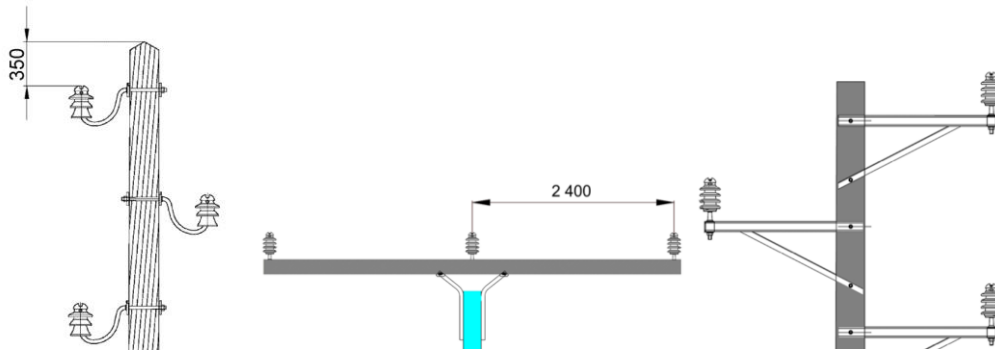


Figure 52 Wooden pole - Distance from the pole top to the energized part 350+ mm; only bent insulator supports to be used(left); **insulated** cross-arm with pin insulators (centre), distance between not insulated conductors has to be 2,400+ mm, with insulation of conductor in the centre distance can be reduced to 2,400+ mm between outer, not insulated conductors; cross-arm on an **insulated** top hamper in triangular arrangement, distance between grounded pole and insulator 1,000+ mm (right)

446. Collision with distribution lines is another – albeit in the case of the proposed program lower – risk for birds. The distribution lines, planned under this project are not expected to cross bird habitats with high collision risk. For minimizing the likelihood of birds colliding with powerlines these lines should not cross lakes, wetlands, river valleys and other habitats with high numbers of medium and large birds. Where crossing of important bird habitats cannot be avoided, the visibility of conductor lines should be improved by attaching durable visible structures. Collisions can only be entirely avoided by using underground cables for LV and MV distribution.
447. Before any tendering the PMU will have to agree with DABS on a bird-safe design of power lines as specified above. Bird safe power lines will be a condition in the tendering documents for the solar mini-grids.
448. The bird-safety requirements will be included in the technical standards and guidelines developed under Activity 1.2 and be mainstreamed through Activities 2.3, 3.2, 3.3 and 3.4 related to capacity development, design of additional mini-grids, knowledge management, green procurement and environmental and social safeguards.

6.5.9.3 Protected Areas

449. No action required.

6.5.9.4 Performance Criteria

450. The following performance criteria are set for the construction and operation of the projects:
- no clearance of vegetation outside of the designated clearing boundaries;
 - no death to native fauna as a result of construction activities;
 - no deleterious impacts on terrestrial habitats;
 - no bird mortality caused by electrocution due to suitable design in accordance with international best practice experience;
 - Bird-safety included in technical standards and guidelines, capacity development materials and curricula, design of additional mini-grids, knowledge management, green procurement and environmental and social safeguards;
 - A flora and fauna management program will be implemented (Table 15)).

6.5.9.5 Monitoring

451. A monitoring program will be implemented (Table 15), especially focussing at monitoring of bird-safety of distribution lines.

452. The delivery organisation will when undertaking works, compile a weekly report to MRRD outlining:
- a. any non-conformances to this ESMP;
 - b. the areas that have been rehabilitated during the preceding week; and
 - c. details of the corrective action undertaken.

6.5.9.6 Reporting

453. All flora and fauna monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The MRRD must be notified in the event of any suspected instances of death to native fauna and where vegetation is detrimentally impacted.

Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal

Table 15 Flora and Fauna Management Measures

| Issue | Control Activity (and Source) | Action Timing | Responsibility | Monitoring and Reporting |
|--|---|---|----------------------------|---|
| FF1. Vegetation, flora and habitat loss and disturbance of fauna | FF1.1: Survey PV locations for critical terrestrial flora, fauna and habitats | Pre-construction | MRRD | Once, prior construction |
| | FF1.2: Limit vegetation clearing and minimise habitat disturbance through adequate protection and management of retained vegetation. | During construction | Camp officer | Daily and maintain records |
| | FF1.3: Ensure that all site personnel are made aware of sensitive fauna/habitat areas and the requirements for the protection of these areas. | During construction | Contractor | Daily and maintain records |
| | FF1.6: Minimise disturbance to on-site fauna by adequate timing of construction activities outside of periods of special sensitiveness of critical fauna. | During construction | Contractor | Daily and maintain records, report |
| | FF1.7: Power distribution lines to be built bird-safe in accordance to requirements set in section 5.2.3 and there quoted guidelines, standards and international best practice. | During planning, construction and operation | MRRD, Contractor and RESCO | Prior and after construction, during operation surveys during critical seasons and annual reports |
| | FF1.8: Bird-safety to be included in technical standards and guidelines, capacity development materials and curricula, design of additional mini-grids, knowledge management, green procurement and environmental and social safeguards | During implementation of Activities | UNDP | Reporting on project implementation, evaluations |

6.5.10 Land Use, Ownership and Customary Tenure

454. The expected overall very small and insignificant impact on land-use will be further mitigated by involvement in the detailed design planning of communities via the CDCs to avoid that any adverse impact on livelihoods of individual households and entire communities will be caused.
455. Necessary changes of existing land use and acquisition of privately owned/used irrigated agricultural land in Parwan province are to be carried out based on informed consent, fully compensated, including the restoration of sustainable livelihoods of affected households, and in accordance with applicable national legislation and UNDP and GCF requirements.
456. Where the fencing of PV installations causes loss of communal grazing land, this will not be perceptible in terms of lost grazing capacity. This negligible loss will be more than compensated because the exclusion of grazing will allow for local rehabilitation of vegetation, which can be harvested for forage and can serve as source of seeds for natural regeneration of forage plants in the surrounding rangelands.
457. The temporary or permanent use of land for the installation of mini-grids will not affect land ownership and customary tenure. All affected lands are government owned and used by the respective communities, which will further use these lands for their benefit, both directly from the generation and distribution of electricity and from secondary use, where feasible.
458. The use of these lands for mini-grids will be agreed upon through on-site agreements with the respective CDCs, applying the same mechanisms as used by GIZ, Aga Khan Foundation and other agencies in support of rural communal infrastructure development.

6.5.10.1 Performance Criteria

459. The following performance criteria are set for the project:
- no resettlement will occur as a result of the project;
 - activities requiring access to lands will only be undertaken following the signing of a voluntary agreement by the CDC and (if any) the current land-user(s). Where a voluntary agreement cannot be established, the land will not be used;
 - the required land acquisition of private farmland in Parwan by MRRD will be done with informed consent, full compensation and livelihoods restoration of the affected households;
 - where there is the need for temporary access to land for any project activity, the land will be returned in the same condition as it was prior to any access;
 - in the case of fencing for PV systems, all land needs will ensure beneficial use by existing land users;
 - ensure full compliance with the UNDP Social and Environmental Standards Guidance Note for Standard Five (5) on Displacement and Resettlement, in particular with regard to the required land acquisition of private farmland in Parwan;
 - complaint and grievance mechanisms are put in place and proactively managed; and
 - long-term social benefits are achieved.
460. Local stakeholders and community members have a key role to play in the implementation and monitoring of the project.
461. Consultation with stakeholders will continue. This will help ensure that stakeholders continue to be aware of the project, its progress and any changes in the project. It will also assist in identifying any issues as they arise.
462. The MRRD will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training and backstopping in the implementation of programme activities.

6.5.10.2 Reporting

463. Records of all consultations and agreements on land access and land-use are to be kept and reported on monthly basis.
464. The MRRD must be notified in the event of any individual or community complaint or dissatisfaction and ensure the Grievance Redress Mechanism is complied with.

Table 16: Land Ownership Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|-------|---|---|----------------|------------------------|
| LO1: | LO 1.1: Carry out community consultation on the purpose, needs for and benefits of any land access and changes to land use | Pre-construction | MRRD | Maintain records |
| | LO 1.2: Land acquisition in Parwan carried out with informed consent, full compensation and restoration of sustainable livelihoods of affected household(s) | Pre-construction | MRRD | Maintain records |
| | LO 1.3: Ensure all access is undertaken consistent with signed voluntary agreements by CDCs and affected land-users (if any) | Pre-construction | MRRD | Maintain records |
| | LO 1.4: Ensure full compliance with the UNDP Social and Environmental Standards Guidance Note for Standard Five (5) on Displacement and Resettlement | Entire construction and operation phase | MRRD | Maintain records |
| | LO 1.5: Ensure compliance with the Grievance Redress Mechanism process | Entire construction and operation phase | MRRD | Maintain records |

6.5.11 Social Management

465. In the participatory planning of site selection during the design stage sites of special visual amenity should be identified by local communities and CDCs and negative impacts on such sites be prevented by adaptive planning.
466. For prevention of negative impact on visual amenity all installations of mini-grids should as much as possible be adapted to the surrounding landscape, all remnants of construction materials and other traces of construction activities be carefully removed and affected sites be recultivated.

6.5.11.1 Performance Criteria

467. The following performance criteria are set for the project:
- the community has been consulted and project elements have been designed with their informed consultation and participation throughout the project;
 - all stakeholders are appropriately represented;
 - avoid adverse impacts to local community during construction and operations and where not possible, minimise, restore or compensate for these impacts;
 - cultural heritage is not adversely impacted;
 - community health and safety is protected and overall well-being benefits derived from the project;
 - complaint and grievance mechanisms are put in place and proactively managed; and
 - long-term social benefits are achieved.
468. During procurement of all electrical installations, including PV systems and distribution networks, conformity with the “Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)” (International Commission on Non-Ionizing Radiation Protection (ICNIRP (1998)) has to be ensured and electric and magnetic fields have to be technically much below exposure limits for general public exposure.
469. Local stakeholders and community members have a key role to play in the implementation and monitoring of the project. The solar mini-grids must have guards from the local communities, which have to ensure that unauthorized entering possibly causing serious injuries or death is prevented. A Code of conduct for security personnel will be established and implemented to avoid conflicts.
470. Consultation with stakeholders will continue. This will help ensure that stakeholders continue to be aware of the project, its progress and any changes in the project. It will also assist in identifying any issues as they arise.
471. MRRD will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training and backstopping in the implementation of programme activities.

6.5.11.2 Reporting

472. Records of all consultations are to be kept and reported on monthly basis.
473. The MRRD and UNDP must be notified in the event of any individual or community complaint or dissatisfaction and ensure the Grievance Redress Mechanism is complied with.

Table 17: Social Management Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|--|---|---|------------------------------|--|
| SM1: | SM 1.1: Carry out community consultation on the purpose and benefits of planned activities (mini-grids, clean cooking-cum-heating devices) | Pre-construction | MRRD | Maintain records |
| | SM 1.2: Get community buy-in on any physical works and modification of land use | Pre-construction | MRRD | Maintain records |
| | SM 1.3: Ensure compliance with the Grievance Redress Mechanism process | Entire construction and operation phase | MRRD | Maintain records |
| SM2: Public nuisance caused by construction/operation activities (e.g. noise, dust, electric and magnetic fields etc.) | SM 2.1: Carry out community consultation prior to undertaking activities | Pre-construction | MRRD | Maintain records |
| | SM: Ensure that all procured elements of electric installations comply with the “Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)” | Pre-construction | MRRD | Maintain records and keep certifications |
| | SM 2.3: Implement appropriate management plans (refer to all other sections of the ESMP) | Construction operation | and Site supervisor and MRRD | Daily and maintain records |
| | SM 2.4: Ensure compliance with the Grievance Redress Mechanism process | All phases | MRRD | Maintain records |

6.5.12 Gender

6.5.12.1 Performance Criteria

474. The following performance criteria are set for the project:

- a. ensure the project has gender equality and women empowerment within all activities;
- b. ensure the project does not have any gender-based discrimination and/or inequalities;
- c. where practicable, preference should be given to women for any employment;
- d. complaint and grievance mechanisms are put in place and proactively managed; and
- e. long-term social benefits are achieved.

475. Local stakeholders and community members have a key role to play in the implementation and monitoring of the project.

476. Consultation with stakeholders will continue. This will help ensure that stakeholders continue to be aware of the project, its progress and any changes in the project. It will also assist in identifying any issues as they arise.

477. The MRRD will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training and backstopping in the implementation of programme activities.

6.5.12.2 Reporting

478. Records of all consultations are to be kept and reported on monthly basis.

479. The MRRD must be notified in the event of any individual or community complaint or dissatisfaction and ensure the Grievance Redress Mechanism is complied with.

Table 18: Gender Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|--|--|---|----------------|------------------------|
| GE1: Gender Equality and Women Empowerment | GE 1.1: Ensure the project has gender equality and women empowerment within all activities | Pre-construction | MRRD | Maintain records |
| | GE 1.2: Ensure the project does not have any gender-based discrimination and/or inequalities | Entire construction and operation phase | MRRD | Maintain records |
| | GE 1.3: Where practicable, preference should be given to women for any employment | Entire construction and operation phase | MRRD | Maintain records |

6.5.13 Employment, Labour and Working Conditions

6.5.13.1 Performance Criteria

480. The following performance criteria are set for the project:

- a. ensure compliance with Afghanistan labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organisation fundamental conventions, including freedom of association, elimination of discrimination in employment and occupation, elimination of forced or compulsory labour, and
- b. ensure no forms of child labour;
- c. where possible, local residents will be employed first for all construction activities;
- d. all employees and contractors will be paid equally;
- e. where practicable, preference should be given to women for any employment;
- f. ensure workers' health and safety is protected and overall well-being benefits derived from the project;
- g. ensure workers are trained in occupational health and safety;
- h. ensure workers are provided appropriate personal protective equipment suitable for their duties; and
- i. complaint and grievance mechanisms are put in place and proactively managed.

481. Local stakeholders and community members have a key role to play in the implementation and monitoring of the project and therefore preference should be given to them with respect to employment.

482. MRRD will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training and backstopping in the implementation of programme activities.

6.5.13.2 Reporting

483. Records of all consultations are to be kept and reported on monthly basis.

484. The MRRD should keep records on local employment and pay conditions;

485. The MRRD must be notified in the event of any individual or community complaint or dissatisfaction and ensure the Grievance Redress Mechanism is complied with.

Table 19: Labour and Working Conditions Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring reporting & |
|------------------------------------|---|---|----------------|------------------------|
| WC1: Labour and Working Conditions | WC 1.1: Ensure compliance with Afghanistan labour and occupational health and safety laws | Entire construction and operation phase | MRRD | Maintain records |
| | WC 1.2: Employ local residents and women first where practicable | Entire construction and operation phase | MRRD | Maintain records |
| | WC 1.3: Ensure workers' health and safety is protected and overall well-being benefits derived from the project | Entire construction and operation phase | MRRD | Maintain records |
| | WC 1.4: Ensure workers are trained in occupational health and safety | Entire construction and operation phase | MRRD | Maintain records |
| | WC 1.5: Ensure workers are provided appropriate personal protective equipment suitable for their duties | Entire construction and operation phase | MRRD | Maintain records |

6.5.14 Ethnic Minorities and Internally Displaced Persons

486. The project does not have any impact on indigenous peoples and ethnic minorities and accordingly no avoidance and mitigation measures are required.

6.5.15 Archaeological and Cultural Heritage

487. No adverse impact, which would require avoidance and mitigation, is expected.

6.5.15.1 Performance Criteria

488. The following performance criteria are set for cultural heritage issues related to the project:

- a. There will be no impact on any important Archaeological, Indigenous and/or Cultural Heritage sites;
- b. Manage any so far not detected or recognized specific sites of important Archaeological, Indigenous and/or Cultural significance (significant sites);
- c. Work with the village communities to identify sites of cultural and/or religious significance (uses and physical form) within each mini-grid area during the design and construction phases of the project.

6.5.15.2 Monitoring

489. Local stakeholders and community members have to play a key role in the implementation and monitoring of the project.

490. Cultural heritage specialists of the Ministry of Information and Culture of Afghanistan will be involved if any potentially important site is detected.

491. Consultation with stakeholders will continue. This will help ensure that stakeholders continue to be aware of the project, its progress and any changes in the project. It will also assist in identifying any issues as they arise.

492. MRRD will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training and backstopping in the implementation of programme activities.

6.5.15.3 Reporting

Records of all consultations and any findings of sites or objects of potential cultural, archaeological or historical value are to be kept and reported on monthly basis. MRRD will provide all information to the Ministry of Information and Culture of Afghanistan.

Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal

Table 20: Archaeological and Cultural Heritage

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|--|---|-----------------------------|----------------|--|
| CH1: Damage or disturbance to significant important Archaeological, Indigenous and/or Cultural Heritage during the earth disturbances and land clearing activities | CH1.1: Should any important Archaeological, Indigenous and/or Cultural Heritage sites, immediately cease work within the area that the site has been observed and consult with the Ministry of Information and Culture of Afghanistan, relevant Museum/traditional owner groups, UNDP and archaeologist available for implementation during construction. | Pre and during construction | Contractor | Daily, maintain records and immediately notify MRRD and Ministry of Information and Culture of Afghanistan of any find |

6.5.16 Waste Management

493. As the implementing agency, the UNDP advocate good waste management practice. The preferred waste management hierarchy and principles for achieving good waste management is as follows:

- a. waste avoidance (avoid using unnecessary material on the projects);
- b. waste re-use (re-use material and reduce disposing);
- c. waste recycling (recycle material such as cans, bottles, etc.); and
- d. waste disposal (all petruscible and/or contaminated waste to be dumped at approved landfills).

494. The programme will assist the MRRD, MEW and NEPA in the development of a system for safe management, recycling and safe disposal of used batteries and its operation and control by a suitable government agency.

495. For the prevention of unmanaged hazardous waste from used solar batteries and panels UNDP will require from MRRD that the owner/operator of the mini-grid will sign an agreement with the recycling company in the region or the battery supplier about the safe recycling and/or disposal of used batteries and panels.

6.5.16.1 Performance Criteria

496. The following performance criteria are set for the construction of the projects:

- a. waste generation is minimised through the implementation of the waste hierarchy (avoidance, reduce, reuse, recycle);
- b. no litter will be observed within the project area or surrounds as a result of activities by site personnel;
- c. no complaints received regarding waste generation and management;
- d. waste oils will be collected and disposed or recycled off-site, local oil companies or shipped for recycling.

497. The following performance criteria are set for the operation of the projects:

- a. used machinery parts are properly disposed;
- b. used PV panels and other electric/electronic parts are safely managed, recycled and safely disposed;
- c. used batteries are safely managed, recycled and safely disposed; UNDP will ensure that all mini-grid owners/operators conclude contracts, which include appropriate respective requirements.

6.5.16.2 Monitoring

498. A waste management monitoring program has been developed for the projects (Table 21). The program is subject to review and update at least every two months from the date of issue.

6.5.16.3 Reporting

499. The MRRD must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to waste is exceeded.

Table 21 Waste Management Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|--|---|-----------------------------|----------------|-----------------------------|
| WT1: Production of wastes and excessive use of resources | WT1.1: Preference shall be given to materials that can be used to construct the project that would reduce the direct and indirect waste generated. | Pre and during construction | Contractors | Maintain records |
| | WT1.2: Daily waste practices shall be carried out unless these are delegated to the activities of external waste management bodies. | During construction | Contractors | Daily and maintain records |
| | WT1.3: The use of construction materials shall be optimised and where possible a recycling policy adopted. | During construction | Contractors | Weekly and maintain records |
| | WT1.4: Separate waste streams shall be maintained at all times i.e. general domestic waste, construction and contaminated waste. Specific areas on site shall be designated for their management. | During construction | Contractors | Weekly and maintain records |
| | WT1.5: Any contaminated waste shall be disposed of at an approved facility. | During construction | Contractors | Weekly and maintain records |
| | WT1.6: Recyclable waste (including oil and some construction waste) shall be collected separately and disposed of correctly. | During construction | Contractors | Weekly and maintain records |
| | WT1.7: Waste sites shall be sufficiently covered to ensure that wind does not move waste and domestic and wild animals do not have access. | During construction | Contractors | Daily |
| | WT1.8: Disposal of waste shall be carried out in accordance with the Government of Afghanistan requirements. | During construction | Contractors | Weekly and maintain records |

WT1.9: Fuel and lubricant leakages from vehicles and plant shall be immediately rectified. During construction Contractors Daily and maintain records

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|---|--|---|------------------|--|
| WT1: Production of wastes and excessive use of resources | WT1.10: Major maintenance and repairs shall be carried out off-site whenever practicable. | During construction | Contractors | Weekly and maintain records |
| | WT1.11: Where possible, fuel and chemical storage and handling shall be undertaken at central fuel and chemical storage facilities, such as petrol stations. | During construction | Contractors | Daily and maintain records |
| | WT1.12: On-site storage of fuel and chemicals shall be kept to a minimum. | During construction | Contractors | Daily, maintain records and report any incidents |
| | WT1.13: Any waste oils and lubricants are to be collected and transported to recyclers or designated disposal sites as soon as possible. | During construction | Contractors | Daily and maintain records |
| | WT1.14: Any dangerous goods stored on site shall be stored in accordance with Afghanistan regulations. | During construction | Contractors | Daily and maintain records |
| | WT2: Management of waste during operation | WT 2.1: Used machinery parts are properly disposed; | During operation | RESCO |
| WT 2.2: Used PV panels and other electric/electronic parts are safely managed, recycled and safely disposed | | During operation | RESCO | Maintain records |
| WT 2.3: Contracts in place requiring the appropriate safe management, recycling and/or disposal of used batteries | | During hand-over/ pre operation | UNDP/MRRD | Documentation of contract and records |



Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal



WT 2.4: Used batteries are safely managed, recycled and safely disposed.

During operation

RESCO

Maintain records

6.5.17 Emergency Management Measures

500. In the event of actions occurring, which may result in serious health, safety and environmental (catastrophic) damage, emergency response or contingency actions will be implemented as soon as possible to limit the extent of environmental damage.

501. The delivery organisation will need to incorporate emergency responses into the project complying with the requirements under the Occupational, Health and Safety Policy of the delivery organisation and the relevant legislation of the Islamic Republic of Afghanistan.

6.5.17.1 Performance Criteria

502. The following performance criteria are set for the construction of the projects:

- a. no incident of fire outbreak;
- b. no failure of water retaining structures;
- c. no major chemical or fuel spills;
- d. explosives for rock blasts stored safely with all security measures according to the legislation of Afghanistan being implemented;
- e. no preventable industrial or work related accidents, including no damage caused to workers and other people during rock blasts;
- f. provide an immediate and effective response to incidents that represent a risk to public health, safety or the environment; and
- g. minimise environmental harm due to unforeseen incidents.

6.5.17.2 Monitoring

503. An emergency response monitoring program has been developed for the projects (Table 22). The program is subject to review and update at least every two months from the date of issue. Importantly, visual inspections will be conducted by camp officer daily with reporting to MRRD and NEPA staff on a weekly basis (minimum) noting any non-conformances to this ESMP.

6.5.17.3 Reporting

504. The MRRD and NEPA staff must be notified immediately in the event of any emergency, including fire or health related matter including those that have resulted in serious environmental harm.

Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal

Table 22 Emergency Management Measures

| Issue | Control activity (and source) | Action timing | Responsibility | Monitoring & reporting |
|---|--|-----------------------------|----------------|----------------------------|
| E1. Fire and Emergency management and prevention strategies implemented | E1.1: Flammable and combustible liquids and explosives bunding/storage areas to be designed in accordance with appropriate international standards | Pre and during construction | Contractors | Daily and maintain records |
| | E1.2: Fire extinguishers are to be available on site | During construction | Contractors | Daily and maintain records |
| | E1.3: No open fires are permitted within the project area | During construction | Contractors | Daily and maintain records |
| | E1.4: Communication equipment and emergency protocols to be established prior to commencement of construction activities. | During construction | Contractors | Daily and maintain records |
| | E1.5: Train all staff in emergency preparedness and response (cover health and safety at the work site). Coordinate with NDMO. | During construction | Contractors | Daily and maintain records |
| | E1.6: Check and replenish First Aid Kits | During construction | Contractors | Daily and maintain records |
| | E1.7: Use of Personal Protection Equipment | During construction | Contractors | Daily and maintain records |

6.6 BUDGET

505. A budget has been prepared for the implementation of the ESMP as follows:

Table 23 Budget

| Item | Cost |
|---|-----------------|
| ESMF Updating and Auditing | \$2,000 |
| General ESMF Expenses | \$5,000 |
| Bird-safety Monitoring (3 sites - two assessments/year over five years) | \$12,000 |
| Archaeological Management | \$1,000 |
| Stakeholder Engagement Workshop | \$14,000 |
| Grievance Redress Mechanism | \$5,000 |
| Total | \$39,000 |

7 REFERENCES

All references are provided in the footnotes.

Annex 1: Guidance for Submitting a Request to the Social and Environmental Compliance Unit and/or the Stakeholder Response Mechanism



*Empowered lives.
Resilient nations.*

Guidance for Submitting a Request to the Social and Environmental Compliance Unit (SECU) and/or the Stakeholder Response Mechanism (SRM)

Purpose of this form

- **If you use this form, please put your answers in bold writing to distinguish text**
- **The use of this form is recommended, but not required. It can also serve as a guide when drafting a request.**

This form is intended to assist in:

- (1) Submitting a request when you believe UNDP is not complying with its social or environmental policies or commitments and you believe you are being harmed as a result. This request could initiate a 'compliance review', which is an independent investigation conducted by the Social and Environmental Compliance Unit (SECU), within UNDP's Office of Audit and Investigations, to determine if UNDP policies or commitments have been violated and to identify measures to address these violations. SECU would interact with you during the compliance review to determine the facts of the situation. You would be kept informed about the results of the compliance review.

and/or

- (2) Submitting a request for UNDP "Stakeholder Response" when you believe a UNDP project is having or may have an adverse social or environmental impact on you and you would like to initiate a process that brings together affected communities and other stakeholders (e.g., government representatives, UNDP, etc.) to jointly address your concerns. This Stakeholder Response process would be led by the UNDP Country Office or facilitated through UNDP headquarters. UNDP staff would communicate and interact with you as part of the response, both for fact-finding and for developing solutions. Other project stakeholders may also be involved if needed.

Please note that if you have not already made an effort to resolve your concern by communicating directly with the government representatives and UNDP staff responsible for this project, you should do so before making a request to UNDP's Stakeholder Response Mechanism.

Confidentiality If you choose the Compliance Review process, you may keep your identity confidential (known only to the Compliance Review team). If you choose the Stakeholder Response Mechanism, you can choose to keep your identity confidential during the initial eligibility screening and assessment of your case. If your request is eligible and the assessment indicates that a response is appropriate, UNDP staff

will discuss the proposed response with you, and will also discuss whether and how to maintain confidentiality of your identity.

Guidance

When submitting a request please provide as much information as possible. If you accidentally email an incomplete form, or have additional information you would like to provide, simply send a follow-up email explaining any changes.

Information about You

Are you...

1. A person affected by a UNDP-supported project?

Mark "X" next to the answer that applies to you: Yes: No:

2. An authorized representative of an affected person or group?

Mark "X" next to the answer that applies to you: Yes: No:

If you are an authorized representative, please provide the names of all the people whom you are representing, and documentation of their authorization for you to act on their behalf, by attaching one or more files to this form.

3. First name:
4. Last name:
5. Any other identifying information:
6. Mailing address:
7. Email address:
8. Telephone Number (with country code):
9. Your address/location:
10. Nearest city or town:
11. Any additional instructions on how to contact you:
12. Country:

What you are seeking from UNDP: Compliance Review and/or Stakeholder Response

You have four options:

- Submit a request for a Compliance Review;
 - Submit a request for a Stakeholder Response;
 - Submit a request for both a Compliance Review and a Stakeholder Response;
 - State that you are unsure whether you would like Compliance Review or Stakeholder Response and that you desire both entities to review your case.
13. Are you concerned that UNDP's failure to meet a UNDP social and/or environmental policy or commitment is harming, or could harm, you or your community? Mark "X" next to the answer that applies to you: Yes: No:
 14. Would you like your name(s) to remain confidential throughout the Compliance Review process?

Mark "X" next to the answer that applies to you: Yes: No:

If confidentiality is requested, please state why:

15. Would you like to work with other stakeholders, e.g., the government, UNDP, etc. to jointly resolve a concern about social or environmental impacts or risks you believe you are experiencing because of a UNDP project?

Mark "X" next to the answer that applies to you: Yes: No:

16. Would you like your name(s) to remain confidential during the initial assessment of your request for a response?

Mark "X" next to the answer that applies to you: Yes: No:

If confidentiality is requested, please state why:

17. Requests for Stakeholder Response will be handled through UNDP Country Offices unless you indicate that you would like your request to be handled through UNDP Headquarters. Would you like UNDP Headquarters to handle your request?

Mark "X" next to the answer that applies to you: Yes: No:

If you have indicated yes, please indicate why your request should be handled through UNDP Headquarters:

18. Are you seeking both Compliance Review and Stakeholder Response?

Mark "X" next to the answer that applies to you: Yes: No:

19. Are you unsure whether you would like to request a Compliance Review or a Stakeholder Response?
Mark "X" next to the answer that applies to you: Yes: No:

Information about the UNDP Project you are concerned about, and the nature of your concern:

20. Which UNDP-supported project are you concerned about? (if known):

21. Project name (if known):

22. Please provide a short description of your concerns about the project. If you have concerns about UNDP's failure to comply with its social or environmental policies and commitments, and can identify these policies and commitments, please do (not required). Please describe, as well, the types of environmental and social impacts that may occur, or have occurred, as a result. If more space is required, please attach any documents. You may write in any language you choose

506.

507.

508.

509.

23. Have you discussed your concerns with the government representatives and UNDP staff responsible for this project? Non-governmental organisations?

Mark "X" next to the answer that applies to you: Yes: No:

If you answered yes, please provide the name(s) of those you have discussed your concerns with

Name of Officials You have Already Contacted Regarding this Issue:



Annex VI (b) – Environmental and Social Assessment Report

Green Climate Fund Funding Proposal

| | | | | | | |
|------------|-----------|-------------------|---------------------------|------------------------|------|-----|
| First Name | Last Name | Title/Affiliation | Estimated Date of Contact | Response of Individual | from | the |
|------------|-----------|-------------------|---------------------------|------------------------|------|-----|

24. Are there other individuals or groups that are adversely affected by the project?

Mark "X" next to the answer that applies to you: Yes: No:

25. Please provide the names and/or description of other individuals or groups that support the request:

| | | | |
|------------|-----------|-------------------|---------------------|
| First Name | Last Name | Title/Affiliation | Contact Information |
|------------|-----------|-------------------|---------------------|

Please attach to your email any documents you wish to send to SECU and/or the SRM. If all of your attachments do not fit in one email, please feel free to send multiple emails.

Submission and Support

To submit your request, or if you need assistance please email: project.concerns@undp.org

Annex 2: Stakeholder Consultation and Stakeholder Engagement Plan

This Annex outlines communications and stakeholder engagement with key stakeholder groups. It describes procedures for ensuring consultation and stakeholder engagement during assessment, development of action plans, project implementation and monitoring of social and environmental impacts associated with specific project activities, including information disclosure requirements.

GENERAL COMMUNICATIONS

The UNDP will develop and release updates on the project on a regular basis to provide interested stakeholders with information on project status. Updates may be via a range of media e.g. print, radio, social media or formal reports. A publicized telephone number will be maintained throughout the project to serve as a point of contact for enquiries, concern, complaints and/or grievances. All material must be published in English and local language as appropriate.

STAKEHOLDER CONSULTATION AND INFORMATION DISCLOSURE

The project builds on extensive stakeholder engagement and consultations, which will continue throughout project implementation in line with the project's Stakeholder Engagement Plan, including in the identification, assessment, and development of management measures for forthcoming project activities. The project was discussed with a wide range of stakeholders including relevant government departments, industry groups, NGOs, and individual community members and approved by Government.

Meaningful, effective and informed stakeholder engagement and participation will continue to be undertaken that will seek to build and maintain over time a constructive relationship with stakeholders, with the purpose of avoiding or mitigating any potential risks in a timely manner. The scale and frequency of the engagement will reflect the nature of the activity, the magnitude of potential risks and adverse impacts, and concerns raised by affected communities.

The project team met with a wide array of stakeholders during project preparation, including representatives of local organizations and private sectors, renewable energy (RE) mini-grid developers and investors, renewable energy associations (such as AREU), multi-lateral development agencies and bilateral development agencies. Apart from six workshops in different regions in Afghanistan, MRRD arranged for technical working groups to discuss the project design. UNDP will continue to engage with these stakeholders throughout project implementation. Starting immediately during the inception period, the project's outreach, technical assistance, and rural RE projects will be designed in direct recognition of input received from these stakeholders.

STAKEHOLDER ENGAGEMENT SEQUENCING AND ITERATIVE CONSULTATIONS

Key project stakeholders are given in the Stakeholder Engagement Plan as described in Annex VII.

The project will effectively engage the stakeholders involved in the project to get their support and guide the project implementation to achieve higher results.

- Project outreach proposed includes project website, media (print/audio visual), workshops, trainings etc.
- The PMU and the Project Board will ensure that the Gender Action Plan recommended by the project is pursued and implemented. The various groups especially women will be engaged during the consultation meetings, prioritized to avail the program and be included in the different capacity building programs.
- Meetings, monitoring visits, surveys, and written communications will be used to receive feedback to continue the ongoing dialogue as well as during the course of implementation. Communication materials will be available in the local language as required and conducted in a culturally sensitive manner.
- The project will follow a participatory approach in decision making by engaging all the relevant stakeholders. The Government agencies, NGOs, CSOs and the private sector actors will be actively involved during the project implementation.

The UNDP and MRRD will develop and release updates on the project on a regular basis to provide interested stakeholders with information on project status. Updates may be via a range of media, e.g. print, radio, social media or formal reports. A publicized telephone number will be maintained throughout the project to serve as a point of contact for enquiries, concern, complaints and/or grievances. All enquiries, concern, complaints and/or grievances will be recorded on a register and the appropriate manager will be informed. All material must be published in English, Dari and Pashtu as appropriate.

Where there is a community issue raised, the following information will be recorded:

- a. time, date and nature of enquiry, concern, complaints and/or grievances;
- b. type of communication (e.g. telephone, letter, personal contact);
- c. name, contact address and contact number;
- d. response and investigation undertaken as a result of the enquiry, concern, complaints and/or grievances; and
- e. actions taken and name of the person taking action.

Some enquiries, concern, complaints and/or grievances may require an extended period to address. The complainant(s) will be kept informed of progress towards rectifying the concern. All enquiries, concerns, complaints and/or grievances will be investigated and a response given to the complainant in a timely manner. A grievance redress mechanism has been included in the ESAR and ESMP to address any complaints that may not be able to be resolved quickly.

Nominated PMU/contractor staff will be responsible for undertaking a review of all enquiries, concern, complaints and/or grievances and ensuring progress toward resolution of each matter.

Stakeholder engagement is an ongoing process, which requires key inputs from relevant stakeholders, not only in project planning, but also throughout project implementation, in order to ensure that projects interventions are in line with intended outcomes and field-level impacts. In addition to the consultations carried out in the planning phase of the project, stakeholder consultations will also follow the technical assessments to help determine and validate project interventions sites for mini-grid development. Following an initial phase of technical assessments of potential sites for investment design reports, project staff will carry out a more detailed mapping of potential local beneficiaries and stakeholders, as well as prepare communication products on detailed feasibility of pilot sites, as well as environmental and social risks to share with local stakeholders. This will allow local stakeholders to inform site-specific assessments, raise potential concerns and help to design appropriate mitigation measures. Particular attention will be paid at this stage to inclusive consultations, including participation of female-headed households and community members that may have access restrictions (disabled, elderly).

INFORMATION DISCLOSURE

Stakeholders will have access to relevant project information in order to understand potential project-related opportunities and risks and to engage in project design and implementation. Specifically, the following information will be made available: Per the UNDP's Disclosure requirements [here](#).

- Stakeholder engagement plans and summary reports of stakeholder consultations
- Social and environmental screening reports (SESP) with project documentation
- Draft social and environmental assessments, including any draft management plans
- Final social and environmental assessments and associated management plans
- Any required social and environmental monitoring reports

This information is to be disclosed in a timely manner, in an accessible place, and in a form and language understandable to affected persons and other stakeholders. These elements of effective disclosure are briefly elaborated below:

- Timely disclosure: information on potential project-related social and environmental impacts and mitigation/management measures will be provided in advance of decision-making whenever possible. In all cases, draft and final screenings, assessments and management plans must be disclosed and consulted on prior to implementation of activities that may give rise to potential adverse social and environmental impacts.
- Accessible information: Appropriate means of dissemination will need to be considered in consultation with stakeholders. This could include posting on websites, public meetings, local councils or organizations, newsprint, television and radio reporting, flyers, local displays, direct mail.
- Appropriate form and language: Information needs to be in a form and language that is readily understandable and tailored to the target stakeholder group.

ESIA/ESAR and an Environmental and Social Management Plan (ESMP) has to be disclosed at least 30 days in advance of the approval decision. The safeguard reports will be available in both English and the local language (if not English). The reports will be submitted to GCF and made available to GCF via electronic links in both the AE and the GCF's website as well as in locations convenient to affected peoples in consonance with requirements of GCF Information Disclosure Policy and Section 7.1 of (Information Disclosure) of GCF Environmental and Social Policy.

Annex 3: Erosion, Drainage and Sediment Control Management Plan and Contaminated Soil Disposal Management Plan Outline

Project Description

- a. Provide a comprehensive description of the project; and
- b. Include an overview of the pre-construction, construction, and operational phases of the project.

Purpose, Scope and Objective

The section should include:

- a. Scope of the Erosion, Drainage and Sediment Control Management Plan (EDSCP) and Contaminated Soil Disposal Management Plan (CSDMP)
- b. Establish objectives for general EDSCP and CSDMP;
- c. Establish specific objectives for site specific EDSCP and CSDMP;
- d. Relationship to specific mitigation measures

Statutory and Regulatory Requirements

- a. Legislative requirements as prescribed in the Project Environmental and Social Management Plan (ESMP)

Potential Impacts

- a. Overview of impacts identified in ESAR and ESMP;



Erosion and sediment control impacts and mitigations

| Source of Impact | Potential Impact and Relevant Management Plan Objective | Mitigation and Management (Design Feature/Specific Measure) Mitigation Measure Activity/Monitoring | Frequency | Duration | Responsibility | Evidence |
|-------------------------|--|---|------------------|-----------------|-----------------------|-----------------|
| | | | | | | |

Resources

- a. Equipment requirements including erosion and sediment control devices (sediment fencing, silt curtains, etc) water quality monitoring equipment; and on-site weather monitoring station;
- b. Staff involved including Construction Environmental Officer; Environmental Coordinator; Monitoring Officer; Environmental and Regulatory Manager; and
- c. Registers including water quality monitoring record; and non-conformance register.

Schedule

- a. Multi-year schedule of implementation for the component programs/ interventions and the overall plan.

Monitoring and Evaluation

- a. Overall monitoring and evaluation framework that integrates the monitoring and evaluation requirements for the component programs/ interventions.

Reporting and Notification

- a. Contractor's monthly report including results of the surveys and inspections; and number and results of verification inspections, including but not limited to landform stability inspections, sediment control structure and stockpile inspections and control measures implemented to manage failing sediment control structures and stockpiles.

Budget

- a. Budgets for the component programs/ interventions and the total cost of the plan.

Annex 4: Livelihood Action Plan Framework

UNDP SOCIAL AND ENVIRONMENTAL STANDARDS:

LIVELIHOOD ACTION PLAN

Please refer to the [UNDP SES Guidance Note: Standard 5: Displacement and Resettlement](#) for additional information.

A Livelihood Action Plan (RAP) details the **procedures** and **actions** that will be undertaken in order to ensure that the capacity, production levels, and standards of living of economically displaced people are improved or at least restored, and that displaced people are compensated adequately. This plan must be developed after it has been determined, following the process outlined in Standard 5, that displacement is unavoidable. The LAP reflects the commitment made by the Implementing Partner and UNDP to affected people and communities to meet obligations arising from economic displacement.

1. Introduction

- Briefly describe the project and associated facilities (if any)
- Describe project components requiring economic displacement; land acquisition and resettlement; give overall estimates of land and/or resources to which access has been restricted
- Provide explanation of how economic displacement is necessary to achieve the project objectives, how the project is in the 'public interest' and how displacement is proportional to project outcomes

2. Minimizing Displacement

- Describe the justification for the displacement
- Describe efforts and measures to minimize displacement, and expected outcomes of these efforts and measures
- Describe how requirements of Indigenous Peoples Standard have been addressed if Indigenous Peoples are displaced.

3. Census and Socioeconomic Surveys

- Provide results of the census, assets inventories, natural resource assessments, and socioeconomic surveys and briefly describe how these were performed, i.e., techniques used, individuals interviewed, etc.
- Identify all people and communities potentially affected by displacement activities and potential impacts to each

4. Legal Framework

- Describe all relevant international, national, local, and community laws and customs that apply to displacement activities, with particular attention to laws and customs relating to tenure rights
- Describe how free, prior, informed consent was obtained for displacement of indigenous peoples and tribal communities, if applicable
- Describe project-specific mechanisms to address conflicts
- Describe entitlement/compensation policies for each type of impact
- Describe method of valuation used for affected structures, land, trees, and other assets
- Prepare entitlement matrix, which includes budget and timeframe for payment of entitlements

5. Displacement-related Property

- Describe how affected people have been involved in a participatory process to identify

replacement property when they have lost access to property to which they have legitimate rights. Describe the advantages and disadvantages of the properties, including the property chosen.

- Describe how affected people whose livelihoods are urban-based have been involved in a participatory process to identify livelihood replacement and support opportunities.
- Describe how affected people whose livelihoods are land-based have been involved in a participatory process to identify lands they can access, including lands with productive potential, locational advantages, and other factors at least equivalent to that being lost.
- Describe how affected people whose livelihoods are natural resource-based have been involved in a participatory process to identify resources they can access with equivalent livelihood-earning potential and accessibility.
- Describe how affected people whose access to legally designated parks and protected areas has been restricted have been involved in identifying and choosing measures to mitigate impacts.
- Describe the feasibility studies conducted to determine the suitability of chosen lands and/or natural resources described above, including natural resource assessments (soils and land use capability, vegetation and livestock carrying capacity, water resource surveys) and environmental and social impact assessments of the sites.
- Give calculations relating to land and resource availability
- Describe, as relevant, mechanisms for: 1) procuring, 2) developing and 3) allotting displacement property, including the awarding of title or use rights to allotted lands and/or resources. Indicate to whom titles and use rights will be allocated, including by gender.
- Provide detailed description of the arrangements for site development for agriculture, including funding of development costs
- If circumstances made it difficult to provide land or resources as described above, provide evidence of mutual agreement with affected people/communities on alternative measures.

6. Income Restoration

- Are compensation entitlements sufficient to restore and/or improve livelihoods and income streams for each category of impact? Attach independent review of opportunities to restore and improve incomes/livelihoods. What additional economic rehabilitation measures are necessary?
- Briefly spell out the restoration strategies for each category of impact and describe their institutional, financial, and technical aspects
- Describe the process of consultation with affected populations and their participation in finalizing strategies for income restoration
- How do these strategies vary with the area of impact?
- Does income restoration require change in livelihoods, development of alternative farmlands or some other activities that require a substantial amount of training, time for preparation, and implementation?
- How are the risks of impoverishment to be addressed?
- What are the main institutional and other risks for the smooth implementation of the resettlement programs?
- Describe the process for monitoring the effectiveness of the income restoration measures
- Describe any social or community development programs currently operating in or around the project area. If programs exist, do they meet the development priorities of their target communities? Are there opportunities to support new programs or expand existing programs to meet the development priorities of communities in the project area?

7. Institutional Arrangements

- Describe the institution(s) responsible for delivery of each item/activity in the entitlement policy; implementation of income restoration programs; and coordination of the activities associated with

- and described in the livelihood action plan
- State how coordination issues will be addressed where displacement is spread over a number of jurisdictions or where displacement will be implemented in stages over a long period of time
 - Identify the agency that will coordinate all implementing agencies. Does it have the necessary mandate and resources?
 - Describe the external (nonproject) institutions involved in the process of income restoration (land development, land allocation, credit, training) and the mechanisms to ensure adequate performance of these institutions
 - Discuss institutional capacity for and commitment to displacement
 - Describe mechanisms for ensuring independent monitoring, evaluation, and financial audit of the LAP and for ensuring that corrective measures are carried out in a timely fashion
8. Implementation Schedule
- List the chronological steps in implementation of the LAP, including identification of agencies responsible for each activity and with a brief explanation of each activity
 - Prepare a month-by-month implementation schedule of activities to be undertaken as part of resettlement implementation
 - Describe the linkage between resettlement implementation and initiation of civil works for each of the project components
9. Participation and Consultation
- Describe the various stakeholders
 - Describe the process of promoting consultation/participation of affected populations and stakeholders in resettlement preparation and planning
 - Describe the process of involving affected populations and other stakeholders in implementation and monitoring
 - Describe the plan for disseminating LAP information to affected populations and stakeholders, including information about compensation for lost assets, eligibility for compensation, displacement assistance, and grievance redress
10. Grievance Redress
- Describe the step-by-step process for registering and addressing grievances and provide specific details regarding a cost-free process for registering complaints, response time, and communication modes
 - Describe the mechanism for appeal
 - Describe the provisions for approaching civil courts if other options fail
11. Monitoring and Evaluation
- Describe the internal/performance monitoring process. Ensure monitoring program seeks to measure whether displaced enjoy at least a standard of living and access to livelihoods equal to what they enjoyed before displacement
 - Define key monitoring indicators derived from baseline survey. Provide a list of monitoring indicators that will be used for internal monitoring, including number and location of displaced persons
 - Describe institutional (including financial) arrangements
 - Describe frequency of reporting and content for internal monitoring
 - Describe process for integrating feedback from internal monitoring into implementation
 - Define methodology for external monitoring
 - Define key indicators for external monitoring
 - Describe frequency of reporting and content for external monitoring. Ensure monitoring program is regular and ongoing following project completion until durable solutions are reached

- Describe process for integrating feedback from external monitoring into implementation
- Describe arrangements for final external evaluation
- Describe need for updates to census, assets inventories, resource assessments, and socioeconomic surveys, if necessary, as part of LAP monitoring and evaluation

12. Costs and Budgets

- Provide a clear statement of financial responsibility and authority
- List the sources of funds for displacement and describe the flow of funds
- Ensure that the budget for displacement is sufficient and included in the overall project budget. Include provisions for non-anticipated adverse impacts.
- Identify displacement costs, if any, to be funded by the government and the mechanisms that will be established to ensure coordination of disbursements with the LAP and the project schedule. Prepare estimated budget, by cost and by item, for all displacement costs including planning and implementation, management and administration, monitoring and evaluation, and contingencies
- Describe the specific mechanisms to adjust cost estimates and compensation payments for inflation and currency fluctuations
- Describe the provisions to account for physical and price contingencies
- Describe the financial arrangements for external monitoring and evaluation including the process for awarding and maintenance of contracts for the entire duration of displacement

Annexes

- Copies of census and survey instruments, interview formats, and any other research tools
- Information on all public consultation including announcements and schedules of public meetings, meeting minutes, and lists of attendees
- Examples of formats to be used in monitoring and reporting on LAP implementation
- Entitlement matrix
- Evidence of prior informed consent for indigenous peoples and tribal communities