

Federal Democratic Republic of Ethiopia

Ethiopian Electric Power

**STUDY ON ENVIRONMENTAL AND SOCIAL CONSIDERATIONS FOR ADDIS ABABA
TRANSMISSION AND DISTRIBUTION SYSTEM REHABILITATION AND UPGRADING
PROJECT IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA**



**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY
REPORT (FINAL)**



NEWJEC Inc.
Osaka, Japan



**Japan International
Cooperation
Agency**



ESSD Consultancy
Addis Ababa, Ethiopia

October 2018

Table of Contents

List of Abbreviations	viii
Executive Summary	i
1. Introduction	1
1.1 Project Background	1
1.2 Objectives of the Project.....	2
1.3 Scope of the Project	2
1.4 ESIA Team	2
2. Objectives, Scope and Methodology	3
2.1 Objectives and Scope of the ESIA Study	3
2.2 Approach and Methodology	4
2.2.1 Introduction.....	4
2.2.2 Screening and Scoping Process	4
2.2.3 Stakeholder and Public Consultation	4
2.2.4 Impact Identification and Evaluation	5
2.2.5 Impact Mitigation	6
2.2.6 Management and Monitoring	6
2.2.7 Reporting.....	6
3. Relevant Policy, Legal and Institutional Framework	7
3.1 Relevant National Policies	7
3.1.1 The Constitution of FDRE	7
3.1.2 The Environmental Policy of Ethiopia (EPE).....	8
3.1.3 Health Policy of Ethiopia.....	8
3.1.4 National HIV/AIDS Policy.....	9
3.1.5 National Policy on Women.....	9
3.1.6 Energy Policy of Ethiopia.....	9
3.2 Environmental Framework Legislations	9
3.2.1 Proclamation on Institutional Arrangement for Environmental Protection	9

3.2.2	Proclamation on Environmental Impact Assessment	10
3.2.3	Proclamation on Environmental Pollution Control	10
3.2.4	Proclamation on Forest Development, Conservation and Utilization	11
3.2.5	Proclamation on Expropriation of Land Holdings and Payment of Compensation	11
3.2.6	Proclamation on Solid Waste Management	12
3.2.7	Proclamation on Energy	12
3.2.8	Regulations on Electricity Operations	13
3.2.9	Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes.....	14
3.2.10	Addis Ababa City Administration Directive on Compensation of Assets and Replacement of Land for Expropriation of Landholdings for Public Purposes	14
3.3	Relevant Guidelines	15
3.3.1	EIA Directive.....	15
3.3.2	EPA's EIA Guidelines	16
3.3.3	JICA Guidelines for Environmental and Social Considerations	16
3.3.4	Directive on Clearance of Overhead Electric Lines and Quality of Supply.....	17
3.4	Institutional Framework.....	18
3.4.1	Federal and Regional States	18
3.4.2	The Ministry of Environment, Forest and Climate Change	18
3.4.3	Ministry of Water, Irrigation and Electricity	18
3.4.4	Addis Ababa City Administration Environmental Protection Authority	19
3.4.5	Addis Ababa City Administration Land Development and Urban Renewal Agency	20
4.	Description of the Project	21
4.1	Transmission Lines.....	21
4.1.1	Overhead Transmission Line (132 kV).....	21
4.1.2	Underground Cable Transmission Line (132 kV)	21
4.2	Substation facilities.....	21
4.3	Distribution Network	22

5.	Description of Baseline Conditions	24
5.1	Physical Environment	24
5.1.1	Topography	24
5.1.2	Geology and Soils	24
5.1.3	Climate and Meteorology.....	24
5.1.4	Drainage, Water Resources and Water Pollution.....	25
5.1.5	Air Quality.....	26
5.1.6	Land Use/Land Cover.....	27
5.2	Biological Environment	28
5.2.1	Vegetation and Flora	28
5.2.2	Habitats and Fauna	29
5.2.3	Protected Areas.....	30
5.3	Socio-economic Environment	33
5.3.1	Background of Addis Ababa City	33
5.3.2	Background of Project Affected Sub-Cities and Woredas	36
5.3.3	Potentially Affected Households and Assets.....	38
5.3.4	Public Utilities, Infrastructures & Other Assets Potentially Affected By the Project.....	48
5.3.5	Gender, Vulnerable Groups and Ethnic Minority.....	50
5.4	Current Situation of Power Transmission and Distribution System	51
6.	Stakeholder and Public Consultation Process	51
6.1	Introduction.....	51
6.2	Summary of Key Issues /Concerns Raised and Responses	52
7.	Analysis of Alternatives	62
8.	Anticipated Socio-Environmental Impacts and Mitigation Measures	64
8.1	Introduction.....	64
8.2	Positive Impacts	64
8.2.1	Reliable Energy Supply and Cost Reduction	64
8.2.2	Impacts on Local Economy and Employment	65

8.2.3	Impacts on Women.....	65
8.2.4	Landscape and Visual Impact.....	65
8.2.5	Benefits of Underground Cables over Overhead TL	65
8.3	Negative Impacts on Physical Environment	66
8.3.1	Impacts on Air Quality.....	66
8.3.2	Noise and Vibration	67
8.3.3	Impacts on Soils	68
8.3.4	Impacts on Water Resources.....	69
8.3.5	Impacts on Landscape.....	70
8.3.6	Waste Management	72
8.3.7	Management of Abandoned Sites.....	73
8.4	Negative Impacts on Biological Environment	74
8.4.1	Impacts on Protected Areas	74
8.4.2	Impacts on Ecosystem and Ecosystem Functions	75
8.4.3	Impacts on Flora and Fauna	75
8.5	Negative Impacts on Social Environment.....	78
8.5.1	Involuntary Resettlement of Residents	78
8.5.2	Loss of Farmlands, Crops and Grasslands	78
8.5.3	Temporary Disturbance of Petty Business/Trade Activities	79
8.5.4	Impacts on Road Infrastructure and Community Access.....	80
8.5.5	Impacts on Public Utilities.....	81
8.5.6	Occupational Health and Safety of Project Workers	82
8.5.7	Impacts on Community Health and Safety	83
8.5.8	Impacts on Road Traffic and Safety.....	84
8.5.9	Impacts on Women.....	87
8.5.10	Impacts on Cultural Heritage Resources	88
8.5.11	Impacts of Labor Influx and Its Management	90

8.5.12 Child Labor Influx and Management	90
8.5.13 Grievance Redress Mechanism	91
8.6 Cumulative Impacts	91
9. Environmental Management and Monitoring Plan	94
9.1 Environmental Management Plan	94
9.2 Gender Action Plan	94
9.3 Environmental Monitoring Plan	111
9.3.1 General	111
9.3.2 Monitoring Phases	111
9.4 Institutional Responsibilities for Environmental Management and Monitoring	120
9.4.1 Introduction	120
9.4.2 Project Proponent	120
9.4.3 Project Implementation Unit	120
9.4.4 Environmental Monitoring Unit	121
9.4.5 Construction Contractor	121
9.4.6 Project Operators	121
9.4.7 Ministry of Water, Irrigation and Electricity	122
9.4.8 Other Relevant Parties	122
9.5 Environmental Mitigation, Management and Monitoring Cost Estimate	123
10. Conclusion and Recommendations	125
REFERENCES	127
ANNEXES	129
Annex 1: List of Counsulted Persons	130
Annex 2: List of Flora Identified from Project Routes Corridor	131
Annex 3: Water supply and Sewer Lines in Project Impact Zone	132
Annex 4: Identified impacts characterization and evaluation	133
Annex 5: Monitoring Form	134

Annex 6: Minutes of Stakeholder Consultation Meetings	135
Annex 7: Photos Illustrating Stakeholder Consultation Meetings	136
Annex 8: Photos Illustrating Examples of Properties Found Within Direct Impact Zone of Overhead TL and Underground TLs.....	137
Annex 9: Terms of Reference.....	138
Annex 10: Competence Certificates and CVs of Consultants	139
Annex 11: Comments on Draft ESIA Report and Responses to the Comments.....	140

LIST OF ABBREVIATIONS

AAC	Addis Ababa City
AACA	Addis Ababa City Administration
ARCCH	Authority for Research and Conservation of Cultural Heritage
AACRA	Addis Ababa City Roads Authority
ADN	Addis North
ADC	Addis Center
AIDS	Acquired Immune Deficiency Syndrome
BLL	Black Lion
BPCDA	Beautification, Parks and Cemeteries Development and Administration
EEP	Ethiopian Electric Power
EEPCo	Ethiopian Electric Power Corporation
EEU	Ethiopian Electric Utility
EHSQ	Environmental, Health, Safety and Quality
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EA	Environmental Assessment
EMU	Environmental Monitoring Unit
EP	Environmental Protection
EPE	Environmental Policy of Ethiopia
ESIA	Environmental and Social Impact Assessment
ESMP	Environment and Social Management Plan
ESO	Environment and Social Office
FDRE	Federal Democratic Republic of Ethiopia
JICA	Japan International Cooperation Agency
km	kilometer
m	meter
masl	meter above sea level
MoEFCC	Ministry of Environment, Forest and Climate Change
MoWIE	Ministry of Water, Irrigation and Electricity
NADC	New Addis Center
OH	Overhead
PA	Project affected

PAP	Project affected people
PIU	Project Implementation Unit
PIZ	Project impact zone
SC	Sub-city
SESMP	Site specific Environmental and Social Management Plan
SS	Substation
STIs	Sexually transmitted infections (diseases)
TL	Transmission line
UG	Underground
WER	Wereganu

EXECUTIVE SUMMARY

1. Introduction

The current project is part of the Addis Ababa Transmission and Distribution System Rehabilitation and Upgrading Project that covers AACAA and an approximate 50km radius area around the city, and it comprises four components that are described in the project description section. The main objective of the project is to rehabilitate and upgrade transmission and distribution system to supply stable power to grid of the city and to contribute to the improvement of industrial infrastructures and socioeconomic development. This report presents the findings of Environmental and Social Impact Assessment (ESIA) study conducted for the project facilities described in section 4 below.

2. Objectives, Scope and Methodology of the ESIA Study

The main objective of carrying out ESIA study for the proposed project is to ensure informed decision-making and environmental accountability, and to assist in achieving environmentally sound and sustainable development. It is aimed to assist the project to be implemented without causing significant and unacceptable adverse environmental or social impacts, and any residual impacts reduced to an acceptable level. The scope of this study includes assessment of potential environmental and social impacts of the proposed project activities and proposal of appropriate mitigation measures for the adverse impacts and enhancement measures for the positive impacts. It also includes preparation of environmental management and monitoring plans.

This ESIA was conducted following the procedures specified in the Ethiopian EIA law and EIA guidelines as well as the JICA guidelines for environmental and social considerations. The EIA process was started with Screening and Initial Environmental Examination according to the Ethiopian EIA directive and guidelines as well as the JICA guidelines. Following the screening process, Scoping exercise was carried out to determine the major issues/ impacts that will be important in decision-making on the proposed rehabilitation of transmission and distribution systems, and those issues need to be evaluated in detail in the full scale ESIA study.

The methodology used to carry out the study also included consultations with key organizations who have administration, environmental and social responsibilities in relation to the current project as well as with the potentially affected communities. Potential positive and negative impacts of the construction and operation of the project components were identified and analyzed for their type, effect, duration, geographical extent, magnitude, and sensitivity, and significance. Corresponding to the significance of impacts, appropriate and cost effective mitigation measures were recommended to prevent or reduce the adverse impacts to acceptable level. The ESIA process also included development of appropriate Environmental and social Management Plan as well as Environmental Monitoring Plan.

3. Relevant Policy, Legal and Administrative Framework

Ethiopia has different levels of policy and legislative frameworks that cover various aspects of environmental and social management and sustainable development issues. These include the Constitution of the FDRE, which provides the foundation for all policies and legislations, the National Environmental Policy that provides the framework for environmental legislations and sectorial policies, and legislations that deal with specific sectorial environmental issues.

The Constitution through Article 92 provides environmental objectives and states that the design and implementation of development programs and projects shall not damage or destroy the environment. It also provides people the right to consultation and expression of views in the planning and implementation of environmental policies and projects that affect them directly. According to the provisions of the Constitution, the project proponent/ EEP and its Contractors have the duty to protect the environment, the wellbeing of the local communities and mitigate the adverse impacts resulting from implementation of the project and its subsequent operation.

The laws that are most relevant to the environmental and social considerations of the current project include EIA Proclamation (No. 299/2002), Procl. on Environmental Pollution Control (Proc. No. 300/2002), Procl. on Forest Devt, Conservation and Utilization (No. 542/2007), Procl. on Expropriation of Landholdings and Payment of Compensation (No. 455/2005), Procl. on Solid Waste Management (No. 513/2007), Regulations on Electricity Operations (No. 49/1999), and Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005). These and other relevant laws, guidelines and institutions were reviewed and described in Chapter 3 of this ESIA report.

4. Description of the Project

The current project comprises four components. These include construction of a double circuit 132 kV overhead TL (8.7km long) between Kaliti-1 substation and Gofa substation; construction of a double circuit 132 kV underground transmission cables between Black Lion substation and Gofa substation and between Weregenu substation and Connection Point-3, with a total length of 10km; construction of one new substation, namely New Addis Centre SS that will replace the existing Addis Centre SS, and upgrading of five existing substations (Kaliti-1, Black Lion, Addis North, Weregenu and Gofa substations); and rehabilitation of a total of 375 km long 33kV/15kV medium voltage distribution lines with highest number of outages in the city and environs.

5. Description of Baseline Conditions

5.1 Physical Environment

The topography of the corridors of the proposed overhead and underground transmission lines as well as most of the distribution lines are dominantly rolling with certain areas characterized by flat terrain. In addition, there are relatively small areas of hilly topography particularly along the Akaki river. The main rainy season (*Kiremit*) extends from June to September, with July and August presenting the highest average rainfall of 280 mm and 290 mm respectively. In general the period from November to January is the driest season. The drainage system of the city is generally in the north to south direction being drained by numerous streams, among which Kebena, Little Akaki and Great Akaki rivers are the major ones. Of the streams crossed by the project transmission lines, Little Akaki is the largest river and is crossed by the Kaliti 1 - Gofa overhead TL twice. The streams draining through Addis Ababa are highly polluted mainly due to uncontrolled disposal of municipal sewage, industrial wastes and solid wastes into the water bodies. Air quality in Addis Ababa is considered to be poor, mainly due to the high levels of traffic and the use of old motor vehicles.

5.2 Biological Environment

The corridors of the project routes contain little natural vegetation cover since the areas have been completely transformed into urban settlement and agricultural lands. Only some remnant or secondary growth indigenous trees and shrubs are observed here and there within cultivated lands, along rivers and streams, and within tree plantation areas, residential and commercial areas, compounds of religious and other institutions etc. Since the natural habitats of the project sites have severely degraded, they contain little habitats that could support wildlife except birdlife. As a result, the areas contain only a few wild animals that able to dwell inside burrows or in plantation forests.

There are two protected forest areas in the corridor of Kaliti I – Gofa overhead TL and Feeder ALM-15-04 (distribution line operating from the Addis Alem substation). The first one is located in Nifas Silk Lafto SC on right bank of Akaki river and is crossed by the aforementioned TL between Towers 23 & 24. The second one is named as Tulu Korma Research Centre for Native Trees, which is located at 53km west of Addis Ababa along the main road to Ambo. A short stretch (~200m length) of Feeder ALM-15-04 traverses the Research Centre.

5.3 Socio-economic Environment

The AACA is structured into ten sub-city and 116 Woreda administrations. The population of the city was estimated to be about 3, 434,000 in 2017 of which 47.3% are male and 52.7% are female. The facilities included in the current project would affect 6 sub-cities (Akaki Kaliti, Nefas Silk Lafto, Kirkos, Bole, Lideta, & Gulele) and 13 Woredas of the sub-cities. The total population of the project affected Woredas is estimated at 304,001, of which about 48% are male and 52% are female.

6. Stakeholder and Public Consultation

In accordance with the relevant policy and legal requirements specified in the Ethiopian Constitution, Ethiopian EIA Guideline Document and the JICA Guideline, engagement was made with key stakeholders at the sub-cities and woredas affected by the major project components as well as the potentially affected communities. Potential displacement of people and impacts on sources of livelihood, impacts on existing main roads and community access roads, impacts on public utilities (water supply, electric & telephone lines), impacts on vulnerable groups (female headed households, old people and economically poor people), impacts on ornamental trees/protected green areas, risks to health and safety of local communities, and air and noise pollution were among the key issues raised and discussed during the formal consultations and focus group discussions held with the key stakeholders and community members. The key issues or concerns raised and the recommendations forwarded by the stakeholders and communities are summarized in Chapter 6 (Table 6-1).

7. Analysis of Alternatives

For the 132 kV transmission lines between New Addis Centre and Kaliti-1 Substations, three alternatives have been identified and compared in terms of their significance or preference with respect to consistency with city planning, impact on natural environment, impact on social environment and project cost.

The alternative (Alt. 1) that considers a combination of underground transmission line between New Addis Center and Gofa substation (4.2km) and overhead transmission line (8.7km) between Gofa substation and Kaliti-1 substation is acceptable from the viewpoints of environmental and social impacts as well as city planning and project cost. Therefore, this alternative is recommended to be considered for the proposed construction of 132 kV transmission line between New Addis Center and Kaliti-1 substation.

8. Anticipated Socio-Environmental Impacts and Mitigation Measures

8.1 Positive Impacts

Reliable energy supply and cost reduction: The main anticipated benefit of the rehabilitation and upgrading of the transmission and distribution network in Addis Ababa and surrounds is improved and reliable energy supply and distribution to residents and businesses in the capital city and environs. It is expected to improve the coverage of reliable power supply, thereby stimulating the economy and social service delivery in the impact area. Reliable electric energy supply will also reduce the costs and inconvenience associated with using substitute forms of energy supply.

Employment opportunity for local people: Implementation of the project is expected to bring a positive impact on local economy through creation of employment opportunities for unskilled, semi-skilled and skilled labour that will be sourced within Addis Ababa including from the local communities.

Benefits of underground cables: Underground TLs have a number benefits over overhead TLs including the potential to reduce outages, maintenance cost and transmission losses. They create less visual impacts and other environmental impacts. They emit no electric field, require a narrower band of land to install thereby minimizing the requirement for land acquisition, and they are less susceptible to the impacts of severe weather.

8.2 Negative Impacts

Impacts on air quality: During construction there will be impacts on air quality resulting from dust emission caused by movements of vehicular traffic on unpaved roads and earth moving activities as well as exhaust emissions from construction vehicles and equipment. It is anticipated that air quality impacts will be generally minor, localized and temporary for the overhead TL and moderate, localized and temporary for the underground TLs.

Proposed mitigation measures include spraying water on unpaved access roads, exposed earth and any stockpiles on site to suppress dust emission; setting speed limits for vehicular traffic operating on unpaved access roads and enforcing the limit to reduce dust emission; and regular maintenance of diesel powered equipment and vehicles to reduce exhaust emissions.

Noise and vibration: The operation of plant and heavy duty equipment and construction traffic on site and to and from the site has the potential to generate noise and vibration impacts on the nearby residents and properties. The noise impact is assessed to be minor, localized and temporary for the overhead TL and Feeders, and moderate, localized and temporary for the underground cables.

Proposed mitigation measures include use of modern mechanical plant, equipment and vehicles fitted with effective noise silencers/ mufflers and their regular maintenance to minimize

noise levels; switching off equipment and vehicles when not in use to avoid noise emission; provision of ear protection equipment (earplugs) for workers in vicinity of noise emissions; and carrying out noisy construction activities in the vicinity of sensitive areas during normal working hours only.

Impacts on soils: During construction project activities including site clearing and excavation for foundation of towers and poles, construction of sub-surface cables and construction of access roads have the potential to cause damages to soil structure and expose the soil to runoff water erosion. In addition, project activities are likely to cause soil compaction during site clearing, excavation and other earthworks by heavy equipment as well as due to movement of construction vehicles on earth tracks. Moreover, there will be a risk of soil contamination from spillages of fuel from equipment and vehicles, and from poor handling of hazardous substances. The impact has been evaluated to be minor to moderate, localized and temporary.

Impacts on soils will be minimized through carrying out land clearing and excavation works in the dry season only; careful removal and proper stockpiling of the topsoil from the UG transmission routes, tower base, and access routes, and re-using it for site restoration when construction works are ended; keeping vehicles on defined access tracks to avoid soil compaction and impairment of its use for agriculture; and other measures listed in sec. 8.3.3.

Impacts on water resources: During construction there will be a risk of surface water and groundwater pollution due to inadequate handling and spillage of hazardous substances such as fuel, oils and paints, and discharge of effluents or wastewater. In addition, there will be increased sedimentation of Akaki river and streams crossed by the overhead and underground transmission lines due to soil erosion from areas cleared off vegetation cover and excavated for foundation of tower base or burying electric cables. The impact on water resources including water quality is anticipated to be minor to moderate.

Potential impacts on water resources will be reduced through execution of excavation works and earth moving activities during the dry season only; avoidance of depositing excavation materials on river banks where they could easily enter the watercourses; undertaking re-fueling of equipment and vehicles at standard fuel stations or properly designated dispensing points of fuels and lubricants; and proper storage and handling of hazardous substances (oil, fuel, used oil, paints, cement etc.) to avoid water and soil pollution by accidental spillages.

Impacts on landscape: During construction removal of existing trees and other vegetation found along certain sections of the underground routes and excavation works for laying underground cables have a negative impact on local landscape. In addition, rehabilitation of a number of feeders is likely to involve removal of plantation trees found along the distribution lines. It was observed that in several locations larger trees interfere with the electric lines causing power outages, and those trees need to be removed to avoid interference with electric lines thereby reducing power outages. The impact on landscape is assessed to be minor to moderate, localized and temporary to permanent direct impact.

Impacts on landscape will be reduced or mitigated through the actions including locating the BLL–NADC UG TL on one side of the median or under the last right lane of the carriageway where there is no any other utility, and this will save the trees located at the centerline of the median; in areas where existing distribution lines traverse dense trees, rerouting the lines to areas containing no trees or few trees; and upon completion of construction works, removal of

all excess or leftover construction materials and wastes from the site and transporting to places where the materials can be used for another project or disposed of properly.

Waste management: Spoil materials excavated from foundation of tower-base of overhead TL and trenches of underground TL; surplus materials left from construction works; solid wastes from construction materials including metal and wood scraps, wires, papers, plastics, etc.; hazardous wastes like used oil filters and containers of oil and lubricants; and wastes generated from dismantling of the existing towers and cables are the main potential sources of solid wastes during the construction stage. Liquid wastes, including sewage, will generate from site workers camps and site offices, and hazardous wastes like used oil will emanate from use of engine oil. The significance of wastes generated due to project activities has been assessed as moderate impact.

The project is required to establish appropriate solid and liquid wastes management system that includes avoidance of side-tipping of excavation materials on adjacent areas through proper collection and dumping of the materials only in approved disposal sites, or through proper stockpiling and re-using it for rehabilitation works when construction works are over; prohibition of littering and establishing routine clean-up at project sites and waste collection depots; management of solid and liquid wastes generated during construction and refurbishment activities of the project in accordance with applicable waste management laws and regulations; training of project staff in effective waste handling and management procedures; and other measures specified in section 8.3.6.

Impacts on protected areas: There are three 'protected areas' within the impact zone of the Kaliti 1 – Gofa overhead TL, BLL – NADC underground TL and Feeder ALM-15-04.

Kaliti 1-Gofa OH TL - About 200m length of the line crosses through a protected forest between Towers 23 & 24. However, the impact of the TL rehabilitation will be minor as the larger trees under the existing line have been removed and their regeneration from stocks or growth of new trees prevented through period clearing.

BLL – NADC UG TL – Construction of this line has the potential to cause damages to significant number of ornamental trees and shrubs provided that the transmission route would be located at the centerline of the road median.

Feeder ALM-15-04 – About 200m stretch of the Feeder crosses a small part of Tulu Korma Research Centre for Native Trees. Rehabilitation of the Feeder is likely to require removal of several indigenous trees given that the rehabilitation work would take place following the existing route of the distribution line.

Impacts on the protected areas will be avoided or reduced by following the route of the existing Kaliti 1 – Gofa overhead TL; locating the BLL – NADC UG TL either on one side of the median or under the last right lane of the road carriageway; and shifting the section of the Feeder ALM-15-04 traversing the Tulu Korma Research Centre to outside of the boundary of the Centre.

Impacts on flora and fauna: Related to the overhead TL site clearing during excavation for foundation of tower-base and during stretching of electric lines is expected to cause removal of some trees, shrubs and other plant communities. During operational phase for safety of the overhead TL and avoidance of increased risk of power outages through contact of trees with electric cables, uncontrolled growth of trees in the safe clearance zone need to be prevented.

Excavation for laying underground cables will require removal of many trees, shrubs and other plants planted along the proposed BLL – NADC – Gofa and Weregenu – Connection Point-3 transmission routes. During this assessment about 173 ornamental trees and 64 shrubs were identified from the road median proposed to be followed by the BLL – NADC – Gofa TL and these are potentially affected. Similarly about 250 trees and shrubs are potentially affected from the road median followed by the Weregenu – Conn. Pt-3 UG TL. The potentially affected trees include two vulnerable tree species, which are introduced ornamental trees.

Impacts on flora and fauna will be minimized or mitigated by following the route of the existing overhead TL, taking precautions during stringing of cables and through tower design; locating the BLL – NADC UG TL either on one side of the median or under the last right lane of the road carriageway; development of a protected green area above the underground cables through replanting of shallow rooted shrubbery and herbaceous plants to restore the greenery affected during construction of the underground lines.

Involuntary resettlement of residents: Within 30m corridor of the Kaliti 1–Gofa overhead TL, 117 households have been identified. However, none of these households will be required to be resettled as design of the TL will consider the minimum vertical distance from buildings and structures specified in the Ethiopian Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005). Similarly construction of the proposed underground TLs is not expected to involve resettlement of people as there are no residents within the clearance zone of the TLs.

Resettlement of households will be avoided through design of the overhead TL with the minimum vertical distance from buildings and structures specified in the Ethiopian Directive on Clearance of Overhead Electric Lines. In addition, safety risks to the local people due to transmission line snapping will be avoided through design, construction and operation of the electric line in such a way that the system would automatically break power transmission in case of any cable breaking due to man-made or natural hazards.

Loss of farmlands, crops and grasslands: Land taking for tower-base of the Kaliti 1-Gofa overhead transmission line is estimated to cause permanent loss of 1130m² (0.113ha) of farmland that belongs to 11 households and 64m² of grassland owned by 2 households. The croplands are mainly used to grow cereal crops dominantly wheat and teff through rain-fed cultivation. Similarly, construction of the NADC–Gofa underground TL is estimated to temporarily affect 800m² area of irrigated farmland and annual and perennial crops used by 8 households and one association. The households grow dominantly spinach and kale mainly through irrigation. They also grow some perennial crops dominantly *Enset* (false banana), but also some sugarcane and hop.

Loss of farmlands, crops and grasslands will be mitigated through payment of sufficient cash compensation for the affected households according to applicable government law and regulations and restoration of temporarily affected areas to productive state by removing any pavement materials, ripping compacted soils and spreading topsoil over the surfaces.

Temporary disturbance of petty business activities: There are some petty trade activities mainly selling of vegetables that are practiced on roadsides at two places along the NADC–Gofa UG TL. These activities are likely to be temporarily affected during construction of the TL due to lack of space, dust and noise disturbance and safety risks. It is proposed to mitigate the

impacts through arrangement of alternative work places for the traders or payment of cash compensation to traders for loss of income benefits during the construction period.

Impacts on road infrastructure and community access: Installation of the underground transmission lines is expected to cause significant damages to a number of main roads as well as community access roads due to cutting of the roads for burying electric cables. The impacts on road infrastructure will be mitigated through restoration of the damaged sections of the roads affected due to the project activities; and applying pipe jacking/drilling technique to install the envisaged electric cables without damaging major roads, squares, and utilities.

Impacts on public utilities: There are abundant public utility lines including water supply pipelines, sewer lines, telecommunication lines and electric distribution lines in the corridor of the underground and overhead transmission lines. Several of these are potentially affected during construction of the transmission lines particularly the underground cables as they intersect the electric lines at many places. Impacts on public utilities will be avoided or minimized by avoiding the location or route of major utility lines during detail design of the electric lines; relocation of the potentially affected utility lines prior to commencement of construction works; and at locations where primary water lines or sewer lines intersect with the underground TLs, adopting pipe jacking/drilling technique to install the envisaged electric cables without causing damages to the water or sewer lines.

Occupational health and safety of project workers: The project may have some degree of impact on the health and safety of workers involved in the construction as well as operation activities. There will be a risk of fall from pylons during construction of the overhead TL that would involve erecting towers and stretching cables. Project workers and equipment involved in construction of underground lines could be affected by traffic accidents as the UG lines are mainly located along existing roads that are usually very busy with high volume of vehicular traffic. In addition, there will be a risk of falling in trenches excavated for burying electric cables. During operational phase there can be a risk of electrocution during maintenance of the lines.

Safety of project workers can be ensured through implementation of a safety management plan, which includes provision of proper training and awareness education and appropriate protective clothing and equipment to the project workforce; delineation or fencing of work zone or dangerous areas and providing sufficient information about the site through posting of clearly visible signs; posting proper and clearly visible signs, barricades, and reflectors at appropriate locations so that road users (drivers) are aware of the active construction works; and setting and enforcing speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area.

Impacts on community health and safety: Transport of materials to project site, operation of equipment and vehicles, and the activities involved in construction of towers and stringing of electric cables have the potential to cause safety risks including traffic accidents to the people residing or working around the project activities. In addition, there could be potential risks from open foundation of towers and trenches of underground cables.

Proposed mitigation measures include prohibition/avoidance of access of un-authorized persons to the construction sites; fencing or blocking of excavation sites to prevent accidents to local residents, animals and vehicular traffic; provision of training for project workers in safety measures so that they take precautions in operation of equipment and vehicles and avoid

infringement into settlement areas, business centers or any other sensitive areas; and provision of awareness training for local communities about the risks related to the project activities and the safety measures they should take.

Impacts on road traffic and safety: The proposed underground transmission lines largely run along the median of main roads, which are mostly busy with high volume of vehicular traffic. The project activities including excavation of trenches using plant and equipment, earthmoving works, transport of materials to site and their handling or storage on site during installation of electric cables are likely to cause obstruction or disruption to normal traffic flows.

Proposed mitigation measures include implementation of appropriate traffic management plan; posting proper and clearly visible signs, barricades, reflectors at appropriate locations; delineation or fencing of work zone; setting and enforcing speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area; arrangement of alternative routes for normal traffic and provision of sufficient information for users through mass media and posting of appropriate and clearly visible signs to divert traffic from construction sites; reinstatement of the damaged sections of roads as soon as the construction works have been completed; and applying pipe jacking technique to install underground cables without damaging major roads and causing disruption to normal traffic flows.

Cumulative impacts: Within the corridor of the transmission lines of the current project, there are two road infrastructure development projects that are expected to be implemented during the timescale of this project. The road projects are expected to bring more significant adverse impacts than the transmission line project due to the nature and scale of new road construction works. The significant cumulative impacts likely to occur with respect to the construction of the electric lines and the road construction works include air and noise pollution, impacts on road traffic and safety, impacts on soils, disruption or damages of public utilities, risks to community health and safety, and disposal of spoil materials.

It is expected that proper implementation of the mitigation measures proposed in this ESIA study and the ESIA studies of the road projects will minimize the majority of the potential adverse impacts to acceptable levels. In addition, implementation of the TL project ahead of the road construction works will avoid or reduce a number of potential impacts.

9. Environmental Management and Monitoring Plan

9.1 Environmental Management Plan

The main environmental and social impacts anticipated to occur during the construction and operation phases of the project facilities have been identified and described in section 8 above. In addition, the mitigation measures that should be applied to avoid, minimize or offset the potential adverse impacts are proposed in the same section. Details of Environmental Management Plan (EMP) that includes the potential environmental, social and safety impacts, the proposed mitigation actions, the timing of implementation, and the responsibilities for implementation and monitoring are presented in section 9.1 of Chapter 9 (Table 9-1).

9.2 Gender Action Plan

In this study it was found out that the project would not have significant impact on gender issues. However, cash compensation and some health and safety measures are suggested for women whose petty trade activities may be interrupted temporarily and for those women who would be employed during the construction phase. The proposed action plan is given in section 9.2 of Chapter 9 (Table 9-2).

9.3 Environmental Monitoring Plan

Environmental monitoring provides feedback about the actual environmental and social impacts of a project. Environmental monitoring for the current project will be undertaken to check on whether the proposed mitigation and benefit enhancement measures have actually been implemented, and are proving effective in practice; and to provide a means whereby any impacts which were unforeseen at the time of preparation of the ESIA & ESMP can be identified, and to provide a basis for formulating appropriate additional mitigation measures. Details of the monitoring program during the construction and operation phases of the project are provided in section 9.3 of Chapter 9 (Table 9-3).

9.4 Institutional Responsibilities for Environmental Management and Monitoring

The main bodies responsible for environmental and social management and monitoring include the financier (JICA), the competent authority (MoWIE), the project proponent (EEP), the designers, contractors and operators (EEP & EEU). The responsibilities of the implementing parties and other stakeholders as well as the support to the various agencies required to ensure they have the necessary capacity to fulfil their environmental and social obligations are described in section 9.4 of Chapter 9.

9.5 Environmental Mitigation, Management and Monitoring Cost Estimate

Most of the proposed mitigation measures will not incur separate costs as they can be considered during the detail design; or can be implemented by proper planning of construction programs; or are engineering/ physical features, which are part of the construction items such as erosion protection structures, protection or replacing of drainage facilities, traffic signs, posting of traffic signs, barricades, reflectors; speed calming measures, delineation or fencing of work zone etc. Estimated costs for the mitigation measures that will incur separate costs are presented in section 9.5 of Chapter 9 (Table 9-4), and it is about 6.2 Million Eth. Birr.

10. Conclusion and Recommendations

This environmental and social impact assessment acknowledges that rehabilitation and upgrading of the transmission and distribution systems encompassed in the current project will bring a major benefit to a substantial part of Addis Ababa city and surrounds through provision of a reliable, re-enforced and expanded energy supply to residents and businesses. Implementation of the project will also bring socio-economic benefits in respect of employment of local labour and procurement of materials resulting in beneficial direct and indirect impacts.

The consultations held with local communities and officials of Federal, Regional, Sub-city and Woreda administration levels reveal that implementation of the proposed project is considered to contribute a lot to alleviate the existing frequent power interruption in the city. The project is in harmony with government policies and strategies to provide a sustainable electric power

supply to the city residents and developers thereby enhancing socio-economic as well as industrial development. Therefore, most of the consultees were happy about the project and they fully support the project and willing to provide all necessary support for successful implementation of the project. On the other hand, the communities living within the project impact zone also disclosed their concerns about potential displacement from their residence or loss of livelihood sources as well as health and safety risks related to the overhead TLs.

The project will not cause any physical displacement of people as it will be implemented within the right-of-way of the existing transmission line and all the new sections are located outside of areas occupied by residential houses or any other structures. Resettlement of illegal residents within the existing right-of-way is avoided through design of the transmission line with minimum vertical distance from buildings and structures specified in the Ethiopian directive on clearance of overhead electric lines. In addition, safety of the people residing under the transmission line is ensured through design of the system with automatic break of power transmission in case of any cable breaking.

Cash compensation will be provided to 13 households for loss of economic benefits from crop production on the farmland plots to be permanently taken for tower-base of the overhead transmission line from Kaliti-1 to Gofa substation. In addition, compensation will be paid to 8 households and one association for loss of income benefits from crop cultivation on farmland plots to be temporarily affected during installation of the underground TL from NADC to Gofa substation.

In addition, implementation of the proposed project is predicted to bring a number of adverse environmental and social impacts. Most of the adverse impacts will occur during the construction phase and thus, they are short-term and localized in nature. Most impacts are predicted to be small to medium in magnitude, and minor to moderate in significance. Nonetheless, the impacts can be mitigated to acceptable levels with careful siting of the TLs, appropriate engineering design and proper construction methods, as well as through application of appropriate environmental and social mitigation measures including those specified in this ESIA document. Therefore, it can be concluded that there are no serious environmental or social issues that will prevent the construction and operation of the transmission and distribution lines from proceeding to the implementation stage as long as the recommended mitigation and monitoring measures are properly considered and timely implemented.

It is recommended that the Proponent (EEP) ensures that the construction contractor has prepared site specific environmental and social management plan (SESMP), have a qualified and experienced EHS Manager in his construction team and allocated sufficient financial resources to implement the mitigation measures stipulated in his SESMP and in this ESIA document and is subject to clauses binding him to implementation of impact mitigation and monitoring as part of the construction works. In turn, EEP will secure sufficient competent supervisory staff to enforce compliance through surveillance and periodic monitoring.

1. INTRODUCTION

1.1 Project Background

Ethiopia has the second largest population in Africa with average GDP growth rate of 10.9% in the last 10 years because of the industrial policies. Such being the situation, the “Infrastructure Quality Improvement including Power Development” is one of the most prioritized policies in the “Growth and Transformation Plan II (2015/16~2019/20),(GTP2)” with the target which entered low middle-income country until 2025.

To support stability and continuous development of Ethiopia in particular, necessity of an investment to increasing of power generation capacity and as well as expansion of the transmission and distribution network is indicated. In addition, expansion of the transmission network from 16,018km (2014/15) to 21,728km (2019/20) is one of the prioritized target.

Target area of this preparatory survey is Addis Ababa administration area and an approximate 50km radius area around the city. Moreover, along with the economic and population growth, many development of housing and industrial field are planned.

According to the Addis Ababa Distribution Master Plan (AADMP) prepared by African Development Bank (AfDB) in 2015, the power demand in Addis Ababa is expected to increase from 800MW in 2014 to 3,576MW in 2034 continuously. However, such as much of the medium voltage distribution network and the utilization ratio of distribution transformer is beyond 100 % of rated capacity. Moreover, capacity of power network including substation is reaching a breaking point already.

Concretely, 1) approximately 19% loss in distribution system occurs due to lack of capacity and equipment deterioration, 2) capacity of transformer and distribution line is becoming overloaded because of rapid demand increase, and 3) aging degradation of equipment, are occurring the problem of frequent power outage and voltage drop in distribution network. Therefore, the upgrading of transmission and substations, and rehabilitation of distribution network are required.

Considering these situations, JICA implemented “Data collection survey on Addis Ababa Transmission and Distribution System from June 2017 through August 2017. The data collection survey conducted includes 1) Verifying the project component for expected package as Japanese Yen Loan, 2) Study on Applicable Quality Infrastructure, 3) Project funding for transmission, substation and distribution system in Addis Ababa. Based on the result of the Data Collection Survey, Addis Ababa Transmission and Distribution System Rehabilitation and Upgrading Project are scheduled to be implemented.

1.2 Objectives of the Project

In Addis Ababa capital city, Transmission and Distribution System was rehabilitated and upgraded. By doing so, it is possible to supply stable power to grid of capital city in Ethiopia and to contribute to the improvement of industrial infrastructures and socioeconomic development.

1.3 Scope of the Project

The scope of the project includes the following:

- 1) Preliminary Design for Overhead / Underground Transmission and Substation Facility that include:
 - 132kV Overhead / Underground Transmission Line from Kaliti-I S/S to Addis Centre S/S to Black Lion S/S
 - Upgrading the substation facilities including outdoor type GIS for Addis Centre (ADC) S/S, Addis North (AND) S/S, Wereganu (WER) S/S etc.
- 2) Preliminary Design for Distribution Network (Rehabilitation of 33kV/15kV medium voltage network, distribution transformers).
- 3) Environmental and Social Survey (Resettlement Action Plan, Screening and Initial Environmental Examination, and ESIA study)
- 4) Social Survey (Baseline Survey)
- 5) Training in Japan.

1.4 ESIA Team

This ESIA study was carried out by a team of senior consultants of a local consultancy firm, ESSD Consultancy and reviewed by a senior consultant from NEWJEC of Japan. ESSD Consultancy is a local consulting firm licensed by the Ministry of Environment, Forest and Climate Change (MoEFCC) to conduct Environmental and Social Impact Assessment (ESIA) studies and a copy of its Competence Certificate is shown in Annex 10. Similarly the ESSD Consultants are certified by the MoEFCC to carry out social and environmental analysis in ESIA studies. The list of the key consultants is shown below and copies of their Competence Certificates and CVs are presented in Annex 10.

Name of Consultant	Position in the ESIA study
Arebo Sambu	Senior Consultant/Team Leader (ESSD)
Zelege Chafamo	Senior Consultant/Ecologist (ESSD)
Ali Hassen (Dr)	Senior Consultant/ Socio-economist (ESSD)
Temesgen Yimer	Senior Consultant/ Sociologist (ESSD)
Lelisa Temesgen	Senior Consultant/ Sociologist (ESSD)
Akihiro Osada	Lead Consultant (NEWJEC)

2. OBJECTIVES, SCOPE AND METHODOLOGY

2.1 Objectives and Scope of the ESIA Study

The main objective of carrying out Environmental and Social Impact Assessment (ESIA) study for the Addis Ababa Transmission and Distribution System rehabilitation and upgrading project is to ensure informed decision-making and environmental accountability, and to assist in achieving environmentally sound and sustainable development. This would be achieved through identification and evaluation of the potential environmental and social impacts of the proposed project at the early stage of planning to allow for avoidance, minimization and mitigation strategies to be developed and integrated to the design, construction and operational plans. In summary it is aimed to assist the project to be implemented without causing significant and unacceptable adverse environmental or social impacts, and any residual impacts reduced to an acceptable level.

The scope of the ESIA study includes assessment of potential environmental and social impacts of the proposed project activities and proposal of appropriate mitigation measures for the adverse impacts and enhancement measures for the positive impacts. It also includes preparation of environmental management and monitoring plans. In more detail the scope of this ESIA includes the following:

- Review and description of environmental and development policies, legislations and institutional framework that are most relevant to the proposed project;
- Description of the current state of the environment of the project influence area including environmental components/issues that will be affected by or will affect the implementation and operation of the project facilities;
- Identification of the potential environmental and social impacts arising from construction of the project facilities and their subsequent operation, and evaluation of their significance.
- Determination of appropriate mitigation measures that would help to avoid or minimise potential adverse impacts to acceptable levels, or to compensate for adverse impacts that cannot be avoided or minimized, and
- Development of appropriate environmental management and monitoring plans to ensure that the recommended mitigation measures are fully adopted and proved effective in practice.

This ESIA study has been carried out in accordance with the laws and regulations of Ethiopia as well as JICA Guidelines. And this final ESIA report has been issued by incorporating the comments provided by the Competent Authority (MoWIE) as well as the Environment and Social Office of EEP on the draft ESIA report for approval by MoWIE.

2.2 Approach and Methodology

2.2.1 Introduction

According to the Ethiopian EIA law (Procl. 299/2000) EIA is mandatory for specified categories of activities undertaken either by the public or private sectors. If an EIA is required, then it must be submitted together with the ESMP in order to receive an authorization from the relevant Competent Authority, in this case the Ministry of Water, Irrigations and Electricity (MoWIE). Authorization must be granted prior to beginning construction of the project and is generally valid for a period of 18 months to two years. It will include conditions for the authorization and measures to ensure human health and the environment are protected. Further details on the Ethiopian EIA laws, regulations and guidelines are provided in section 3 of this ESIA report.

2.2.2 Screening and Scoping Process

The Environmental Assessment (EA) process for the current project was started with Screening and Initial Environmental Examination. Screening has been undertaken to determine whether or not the project components will result in significant environmental and social impacts, and the level of EA. It was exercised with reference to the Ethiopian EIA directive and guidelines as well as the JICA guidelines for environmental and social considerations. JICA has financed the preparatory studies of the current project and is expected to finance its construction as well.

The results of the screening process showed that two main components of the project are likely to result in some significant adverse impacts on the environment and society. These components include construction of 132 kV overhead transmission line between Gofa and Kaliti-1 substations, and construction of 132 kV underground transmission lines between Black Lion SS and Gofa SS (through NADC SS), and between Weregana SS and Connection Point-3. Thus, it was concluded that these project components will require further EA and Abbreviated Resettlement Action Plan (ARAP).

Following the screening process, Scoping exercise was carried out to determine the major issues/ impacts that will be important in decision-making on the proposed rehabilitation of transmission and distribution systems, and those issues need to be evaluated in detail in the full scale environmental and social considerations study. The Scoping process was primarily based on review of relevant previous studies, the baseline data collected through site surveys, consultation with key stakeholders and potentially affected communities, and the characteristics of the project facilities. A Scoping report was produced and submitted to MoWIE for review and comments. Finally, the feedback provided by the Ministry shows the need to conduct a detail study on the environmental and social conditions of the project.

2.2.3 Stakeholder and Public Consultation

From Federal to Woreda Administration level, key organizations who have administration,

environmental and social responsibilities in relation to the current project were consulted during the ESIA process. The objectives of the consultation were to inform the government administrations about the proposed transmission and distribution system rehabilitation and upgrading project and the feasibility, ESIA and preliminary design studies for the subject project. The key stakeholders were asked to:

- provide any available baseline information that could describe the Addis Ababa city in a wider context and the project affected sub-cities and woredas in particular;
- provide updated unit rates for different assets that apply for determination of the amounts of compensation for expropriated land and lost asset;
- identify any environmentally or socially sensitive areas/receptors within the project influence areas;
- identify the positive as well as negative environmental and social issues/ impacts likely to arise in relation to the location, design, construction and operation of the electrical facilities included in the proposed project;
- propose possible mitigation measures that could be applied to avoid, reduce or offset the potential adverse impacts and enhance positive impacts; and
- provide general opinion on the project such as their attitude towards the project and if they would support the project and cooperate with the proponents (EEP/EEU) to facilitate the planning and implementation of the project.

In addition, a number of formal consultations and focus group discussions were conducted with representatives of the communities potentially affected by the project components or activities. Five formal consultations were carried out with project affected communities during the ESIA process.

The main potential environmental and social issues/impacts identified by the stakeholders and community representatives and proposed mitigation actions are summarized in section 6.2 of this ESIA report.

2.2.4 Impact Identification and Evaluation

In section 8, the potential positive and negative impacts of the project facilities on the physical, biological and socio-economic environments were identified and their significance was evaluated. The impacts caused by the construction and operation of the project components were analyzed for their type (beneficial/adverse), effect (direct/indirect), duration in time (short-/medium-/long- term), geographical extent (localized/extensive), magnitude (low/medium/ high), and sensitivity (low/ medium/high).

The combination of the above parameters have been summarized in an all-encompassing measure of “significance”, which is the basis for impact assessment and prioritization of mitigation. The details of the impact analysis are presented in Chapter 8 of this report.

2.2.5 Impact Mitigation

Corresponding to the significance of impacts, appropriate and cost effective mitigation measures have been recommended to prevent or reduce the adverse impacts to acceptable level. The mitigation measures proposed for each identified impact are shown in section 8 of the ESIA report.

2.2.6 Management and Monitoring

The ESIA process has also included development of appropriate Environmental and social Management Plan (ESMP) as well as Environmental Monitoring Plan (EMP), which are presented in section 9 of the ESIA report. A comprehensive ESMP has been prepared in the form of a matrix that encompasses the environmental/ social impact and its significance, the set of proposed mitigation actions, the timing of implementation, and institutional responsibilities for implementation and monitoring (Table 9-1). Similarly EMP has been developed and presented in section 9.3.

2.2.7 Reporting

This ESIA has been carried out as per the procedures stipulated in the national EIA guidelines as well as the JICA guidelines for environmental and social considerations. Therefore, the ESIA practitioners to the extent possible have tried to incorporate the contents of both guidelines in this ESIA report.

The ESIA Consultants submitted a draft ESIA report to the Project Proponent (EEP) who in turn delivered copies of the document to the Competent Authority (MoWIE) and the Environment and Social Office (ESO) of EEP for review and comments. The purpose of the review was to ensure that the ESIA has adequately addressed the environmental and social impacts/issues likely to result from the implementation and operation of the project facilities, and that the document provides sufficient information for decision-making by the Competent Authority and the Project Proponent. Both MoWIE and ESO have reviewed the draft ESIA report and provided their comments. Then, the ESIA Consultants have addressed the comments in this final ESIA document.

3. RELEVANT POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Ethiopia has different levels of policy and legislative frameworks that cover various aspects of environmental and social management and sustainable development issues. This includes the Constitution of the Federal Republic of Ethiopia, which provides the foundation for all policies and legislations, the National Environmental Policy (NEP), that provides the framework for environmental legislations and sectorial policies, and legislations that deal with specific sectorial environmental issues. The following sections describe the policies, laws, guidelines and institutional framework that are most relevant to the environmental and social considerations of the proposed Addis Ababa transmission and distribution system rehabilitation and upgrading project.

3.1 Relevant National Policies

3.1.1 The Constitution of FDRE

The Constitution of the Federal Republic of Ethiopia, issued in August 1995, provides the overriding principles and legal provisions for all legislative frameworks in the country. The concept of sustainable development and the environmental rights of the people are enshrined in the Constitution's Articles 43, 44 and 92.

Article 43 gives the right to people to improved living standards and to sustainable development. It also states the people's right to participate in national development, and in particular, to be consulted with respect to policies and projects affecting their community.

Article 44 provides that all persons have the right to a clean healthy environment. It also provides all persons who have been displaced or whose livelihoods have been adversely affected as a result of State programs the right to commensurate monetary or other means of compensation including relocation (resettlement) with adequate State assistance.

Article 92 provides environmental objectives and states that the design and implementation of development programs and projects shall not damage or destroy the environment. It also provides people the right to consultation and expression of views in the planning and implementation of environmental policies and projects that affect them directly.

According to these provisions of the Constitution, the project proponent/ EEP and its Contractors have the duty to protect the environment, the wellbeing of the local communities and mitigate the adverse impacts resulting from implementation of the project and its subsequent operation. In addition, persons who have lost their landholdings and properties due to land acquisition for the purpose of the project are entitled to be compensated to a similar land and financial compensation for the lost assets. The Proclamation (No. 455/2005) and Regulations (No. 135/2007) on expropriation of land holdings and payment of compensation also appropriately recognizes that Article 44.2 of the Constitution provides the basis for the compensation and rehabilitation procedures.

Article 35 of the Constitution deals with the rights of women and addresses the prevalent gender prejudice and practices. According to this Article both sexes have constitutional rights and protections; women have equal rights to men; women have equal rights to men in marriage; entitlement to affirmative action; prohibition of laws, customs and practices oppressing or causing physical or mental harm to women; right to maternity leave with full pay; right to full consultation in the formulation of national development policies, the designing and execution of projects, particularly when projects affect the interests of women; property rights to acquire, administer, control, use and transfer of property; right to equality in employment, promotion, pay, and the transfer of pension entitlements; and right of access to family planning education, information and capacity.

3.1.2 The Environmental Policy of Ethiopia (EPE)

The Environmental Policy of Ethiopia (EPE) was issued in April 1997. The overall policy goal is to improve and enhance the health and quality of life of all Ethiopians, to promote sustainable social and economic development through sound management and use of natural, human and cultural resources and their environment as a whole, so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. The EPE seeks to ensure the empowerment and participation of the people and their organisations at all levels in environmental management activities, and to raise public awareness and promote understanding of the essential linkage between the environment and development.

EIA policies are included in the cross-sectoral environmental policies and the policies emphasize the early recognition of environmental and social issues in project planning, public participation, mitigation and socio-environmental management, and capacity building at all levels of administration. Among the policy elements, the ones most relevant for the subject power project are the need to carry out EIA and develop project specific management plan, and ensure that, at specified intervals during the project implementation, environmental monitoring, inspection and record keeping take place for the socio-environmental management activities implemented by the project implementer.

3.1.3 Health Policy of Ethiopia

The Ethiopia's health policy was issued in 1993, with the aim of giving special attention to women and children, to neglected regions and segments of the population, and to victims of man-made disasters. The priority areas of the policy are in the fields of Information, Education and Communication (IEC) of health to create awareness and behavioural change of the society towards health issues.

Emphasis is placed on the control of communicable diseases, epidemics, and of diseases that are related to malnutrition and poor living conditions; promotion of occupational health and safety; the development of environmental health; rehabilitation of health infrastructures; appropriate health service management systems; provision of essential medicines;

expansion of frontline and middle level health professionals; and carrying out applied health research.

3.1.4 National HIV/AIDS Policy

Ethiopia is one of the countries in the world that is facing HIV/AIDS pandemics. Having understood the magnitude of the HIV/AIDS pandemic and its paramount impacts on the socio-economic development of the country, the FDRE issued a Policy on HIV/AIDS in 1998, which calls for an integrated effort of multi-sectoral response to control the epidemic. The National HIV/AIDS Policy urges communities at large, including government ministries, local governments and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns. The general objective of the policy is to provide an enabling environment for the prevention and control of HIV/AIDS in the country. In order to address the problem and coordinate the prevention and control activities at national level, in 2000 National AIDS Council was established under the Chairmanship of the country's President, and in 2002 HIV/AIDS Prevention and Control Office was established.

Project implementers are required to execute measures that would help to minimize the risk of infection by HIV/AIDS and other sexually transmitted infections.

3.1.5 National Policy on Women

This Policy was issued in March 1993 emphasizing that all economic and social programs and activities should ensure equal access of men and women to the country's resources and in the decision making process, so that they can benefit equally from all activities carried out by the Federal and Regional Institutions. Among the main policy objectives is that laws, regulations, systems, policies and development plans that are issued by the government should ensure the equality of men and women, and that special emphasis should be given to the participation of rural women.

3.1.6 Energy Policy of Ethiopia

The Energy Policy issued in 1994 aims to improve all aspects of the energy sector in Ethiopia. It aims to promote a sustainable (reliable, affordable and long lasting) supply of energy to the country, whilst maximising efficiency in the development and utilization of energy resources. It provides guidelines and strategies to enable developments to progress faster in their implementation, whilst aiming to keep energy at an affordable price and encouraging energy to be provided by local Ethiopian energy sources (prioritizing hydropower projects as the backbone of the country's energy supply). Reference is made to the need to avoid environmental impacts during the development of energy projects, and the need to avoid ecological and environmental issues which may arise from the development of the projects.

3.2 Environmental Framework Legislations

3.2.1 Proclamation on Institutional Arrangement for Environmental Protection

The Federal Government issued a Proclamation on Institutional Arrangement for Environmental Protection (Proclamation No. 295/2002). The objective of this Proclamation is to formally lay down the institutional arrangements necessary to ensure environmentally sustainable development or ensure sustainable use of environmental resources, both at Federal and at Regional level. It is also intended to establish a system that fosters coordinated but differentiated responsibilities among environmental protection agencies at federal and regional levels.

This Proclamation re-established the EPA as an autonomous public institution of the Federal Government of Ethiopia. EPA again re-established as Ministry of Environment, Forest and Climate Change (MoEFCC) by the Proclamation No.803/2013. It also empowers every competent agency to establish or designate an environmental unit (Sectoral Environmental Unit) that shall be responsible for coordination and follow-up so that the activities of the competent agency are in harmony with this Proclamation and with other environmental protection requirements. Furthermore, the Proclamation stated that each regional state should establish an independent regional environmental agency or designates an existing agency that shall be responsible for environmental monitoring, protection and regulation in their respective regional states.

The Environment and Climate Change Directorate of the Ministry of Water, Irrigation and Electricity and the Environment and Social Office (ESO) of EEP are responsible for monitoring of environmental and social impacts management aspects of the subject project and taking necessary decisions on matters that require further actions.

3.2.2 Proclamation on Environmental Impact Assessment

The Federal Government has issued a Proclamation on Environmental Impact Assessment (Proc. No. 299/2002) and the primary aim of this Proclamation is to make EIA mandatory for specified categories of activities undertaken either by the public or private sectors, and possibly, the extension of EIA to policies, plans and programs in addition to projects. Categories of projects that will require full EIA, not full EIA or no EIA are provided. To effect the requirements of this Proclamation, the former EPA, now MoEFCC, issued a Procedural and Technical EIA Guidelines, which provide details of the EIA process and its requirements.\

This legislation may be triggered by the proposed Addis Ababa Transmission and Distribution System Rehabilitation and Upgrading Project as certain components of the project are expected to fall under the category of projects that require full EIA or preliminary environmental assessment (PEA). The project components that will require full EIA (ESIA) or PEA will be identified in the Screening process.

3.2.3 Proclamation on Environmental Pollution Control

The Proclamation on Environmental Pollution Control (Proc. No. 300/2002) is mainly based on the right of each citizen to a healthy environment, as well as on the obligation to protect the environment of the Country. The primary objective of this law is to provide the basis from

which the relevant ambient environmental standards applicable to Ethiopia can be developed, and to make the violation of these standards a punishable act. The Proclamation states that the “polluter pays” principle will be applied to all persons.

This legislation may be triggered by the subject project since it may cause some environmental pollution. Therefore, the Project Proponent/EEP and its Contractor(s) are responsible for preventing environmental pollution and taking remedial measures for any incidents that may occur during the project implementation.

3.2.4 Proclamation on Forest Development, Conservation and Utilization

The Proclamation No. 542/2007, issued in September 2007, provides for the development, conservation and sustainable utilization of forests in satisfying the needs of the society for forest products and in the enhancement of national economy in general. It provides the basis for sustainable utilization of the country’s forest resources. The Proclamation categories types of forest ownership as private forest and state forest. The Proclamation then goes on to give some specific direction for the development and utilization of private and state forests. Part two of the Proclamation contains provisions for the Promotion of the Utilization of Private Forest, while Part three gives provisions for Conservation, Development and Administration of State Forest. Lastly, Part four comprises Miscellaneous Provisions that, among others, include prevention of forest fire, production and movement of forest products, prohibitions, forest guards and inspectors of forest products movement, and powers and duties of the Ministry of Agriculture and Rural Development (MoARD) and Regional States.

3.2.5 Proclamation on Expropriation of Land Holdings and Payment of Compensation

This Proclamation, Proc. No. 455/2005, issued in July 2005, deals with appropriation of land for development works carried out by the government and determination of compensation for a person whose landholding has been expropriated. It includes provisions on power to expropriate landholdings, notification of expropriation order, responsibility for the implementing agency, and procedures for removal of utility lines. According to the Proclamation, the power to expropriate landholdings mainly rests on Woreda or urban administration authorities. Article 3 (1) of the Proclamation states that a Woreda or an urban administration shall, upon payment in advance of compensation in accordance with this Proclamation, have the power to expropriate rural or urban landholdings for public purpose where it believes that it should be used for a better development project to be carried out by public entities, private investors, cooperative societies or other organs, or where such expropriation has been decided by the appropriate higher regional or federal government organ for the same purpose.

In addition, the Proclamation deals with determination of compensation having articles on the basis and amount of compensation, displacement compensation, valuation of property, property valuation committees, complaints and appeals in relation to compensation. As per this Proclamation, a land holder whose holding has been expropriated shall be entitled to

payment for compensation for his property situated on the land for permanent improvements he made to such land, and the amount compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property. For houses in urban areas, the amount of compensation should not be less than the current market value of construction. In addition to the amount of compensation for the property expropriated, the Proclamation also gives a provision for cost of removal, transportation and erection.

3.2.6 Proclamation on Solid Waste Management

This Proclamation (No. 513/2007) is aimed to enhance at all levels capacities to prevent the possible adverse impacts of solid waste management whilst creating economically and socially beneficial assets. Activities associated with the implementation of the power project have the potential to generate wastes and pollute the environment. Therefore, assessment of the impacts related to waste generation and the required waste management activities shall be part of the ESIA and ESMP for the subject project.

3.2.7 Proclamation on Energy

Energy Proclamation (No. 810/2013) was issued in January 2014 to revise the Electricity Proclamation No.86/1997 based on the up-to-date national and regional development of energy regulations. The proclamation, under Article 4, provides the powers and duties of the Ethiopian Energy Authority (EEA), which was established by the Council of Ministers Regulation No.308/2014. The powers and duties of EEA, among several others, include the following:

- issue and renew license and certificate of competency in accordance with this Proclamation and regulations and directives issued hereunder;
- supervise the operations of licensees and holders of certificates of competency to ensure compliance with the provisions of this Proclamation and regulations and directives issued hereunder;
- formulate long-term, medium-term, and short-term energy efficiency and conservation strategy and program at national and sectoral levels;
- issue energy audit code, energy efficiency standards code, energy efficiency labelling code, grid code, customers' service code, technical inspection code, quality service standard code, building electrical installation code, technical standard code and other codes; and supervise the implementations of same;
- approve electric power purchase and network service agreements;

Part five (Articles 16 to 18) of the Proclamation contains provisions on *use of land for electricity supply activities*. Article 16 states that any generation, transmission or distribution and sale, import or export licensee:

- may enter the land or the premises in the holding of any person after securing prior permission from the person to carry out installation of new electricity supply, or to carry out activities required to connect, repair, upgrade, inspect or remove electrical lines;
- shall have the right to cut or lop trees or to remove crops, plants or other things that obstruct the construction or operation of electrical works or may cause danger to electrical lines.

Article 17 deals with *Compensation* issue and states that the licensee shall pay compensation, in accordance with the relevant law, for damages caused to the property of a landholder while performing the activities provided under Article 16 of this Proclamation.

Article 18 contains provisions on *Expropriation of Land* and it states that where public interest so justifies, any generation, transmission, distribution and sale, import or export licensee may be made the beneficiary of an expropriation measure, taken in accordance with the relevant law, by the government over private land holdings.

3.2.8 Regulations on Electricity Operations

This Council of Ministers Regulations No. 49/1999 was issued in 1999 pursuant to Article 28(1) of the Electricity Proclamation No. 86/1997 to provide the regulations of electricity operations in the country. The Regulations are divided into six parts, which include requirements for *Electricity Operation Licenses; Rights and Obligations of Licensees and Customers; Electricity Price and Tariff; Standards of Safety, Technical and Quality of Service; and Miscellaneous Provisions*. The provisions most relevant for the subject project are described below.

As part of the general safety requirements, Sub-article 47(1) prohibits undertaking any type of construction work or growing trees under electric power lines or within the distance of horizontal clearance thereof.

Under the safety requirements for *Transmission Lines and Substations*, Article 58 provides the requirements for *Clearance from Buildings and Structures*. Sub-article (1) states that the horizontal distance from conductors to any point of a building or structure shall, with maximum wind, be at least 4.5 meters. If the requirement stated under Sub-Article (1) cannot be fulfilled, the height of the conductor from the building or structure shall, at maximum temperature and with conductor broken in the neighboring span, be at *least 5.5 meters*.

Similarly Article 59 provides the safety requirements for *Clearance from Trees*. According to Sub-article (1) the vertical distance of conductors from trees shall be at least 1.5 meters plus the minimum distance between live and un-energized parts. In the case of fruit trees the distance shall be 4m plus the minimum distance between live and un-energized parts as per Sub-article (2). The distances stated above shall be maintained in accordance with the expected growth of trees (Sub-article 3).

3.2.9 Regulations on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes

Regulations No. 135/2007 came into effect in July 2007 and deal with payment of compensation for property situated on landholdings expropriated for public purposes. These Regulations were issued by the Council of Ministers pursuant to Article 5 of the Definition of Powers and Duties of the Executive Organs of the FDRE Proclamation No. 471/2005 and Article 14(1) of the Proclamation No. 455/2005 (discussed above) with an objective of not only paying compensation but also to assist displaced persons to restore their livelihood.

The Regulations contain provisions on assessment of compensation for various property types (including buildings, fences, crops, trees and protected grass), permanent improvement of rural land, relocation of property, mining license, burial ground, and formula for calculating the amount of compensation. In addition, it has provisions for replacement of urban land and rural land, displacement compensation for land used for crops, protected grass or grazing, and provisional expropriation of rural land. Further, the Regulations contain provisions that specify properties for which compensation is not payable and regarding furnishing of data to compensation committee, records of property, evidence of possession and ownership, and valuation costs.

This Regulation may be triggered by the subject project since it may involve expropriation of lands under individual holdings and used for crop production, residential and business activities, etc. Therefore, EEP or the Addis Ababa City Administration have the responsibility to pay compensation or provide replacement land, house etc. according to this Regulation and other relevant government laws.

3.2.10 Addis Ababa City Administration Directive on Compensation of Assets and Replacement of Land for Expropriation of Landholdings for Public Purposes

Pursuant to Article 14(2) of Proclamation No. 455/2005, the Addis Ababa City Council issued an amended directive (no. 19/2006 E.C.= 19/2014) on compensation of assets and replacement of land for expropriation of landholdings for public purposes. The Directive was issued in April 2014 and is divided into 6 sections and 36 articles as well as 7 attachments. The main focuses of the directive are legal rights of landholdings and compensation payment for various properties lost from the expropriated land and valuation of assets.

The Directive, among others, comprises procedures of expropriation of land holdings, involvement of the affected holders, collection of data on land holdings and assets, determination of the legality of affected holdings and properties, assessment of the basis and amounts of compensation for properties, determination of displacement compensation for private residential houses or enterprises and for land used for seasonal crops and perennial crops production, determination of land or house replacement, procedures of expropriation orders and complaints/grievances, and procedures for restoration and support for displaced people.

The landholder needs to provide evidence of landholding rights and property ownership for both urban and rural areas. If the development will result in the need for displacement from housing rented from government, then the lessee will need to provide evidence of a legal contract agreement for that rental. Compensation will not be paid for property developed after the cut-off date if the affected property does not have any legal evidence. Assets which are the property of Addis Ababa City Administration will not be compensated.

Attachment one of the Directive acknowledges that the amounts of compensation for expropriated land and lost asset is determined on the basis of Proclamation No. 455/2005 (Part 3 Article 7(3) and Regulations No. 135/2007 (Part 2 Article 13) as follows:

Compensation for building = cost of construction at current market value + cost of permanent improvement on land + the amount of refundable money for the remaining term of lease contract.

Compensation for crops = the total area of the land (in square meters) X value of the crops per kilo gram X the amount of crops to be obtained per square meter + cost of permanent improvement on land.

Compensation for unripe perennial crops = number of plants (legs) X cost incurred to grow an individual plant + cost of permanent improvement on land.

Compensation for garden vegetables = area of the land (in square meters) X current market value of the vegetable per kilo gram + cost of permanent improvement on land.

Compensation for ripe perennial crops = the annual yield of the perennial crops (in Kilo grams) X the current price of the produce of the perennial crops + cost of permanent improvement on land.

Compensation for relocated property = cost of removal + cost of transferring + cost of reinstallation.

Compensation for protected grass = area covered the grass (in square meters) X the current market price of the grass per square meter.

The Addis Ababa City Administration Land Development and Urban Renewal Agency in consultation with concerned bureaus and agencies establishes unit rates for each asset and other items for calculation of compensation and revises the unit rates annually. Accordingly, the Agency has developed updated unit rates for different assets and distributed to the Land Development and Urban Renewal Office at Sub-city level.

3.3 Relevant Guidelines

3.3.1 EIA Directive

EIA Directive No. 1/ 2008 was issued to determine the categories of projects subject to the Environmental Impact Assessment Proclamation No. 299/ 2002. It lists the types of Projects for which the Environmental Impact Assessment Proclamation No. 299/ 2002 shall be applied. None of the facilities covered in this study are mentioned in the Directive.

3.3.2 EPA's EIA Guidelines

With a view to implement the environmental laws and regulations, several environmental guidelines have been issued by the former Environmental Protection Authority (EPA). Among these are the technical and procedural EIA guidelines, which were issued in 2000 and 2003 respectively. They are intended to guide developers, competent agencies and other stakeholders in carrying out EIAs. The procedural guideline details the required procedures for conducting an EIA, the permit requirements, the stages and procedures involved in EIA process, and the roles and responsibilities of parties involved in the EIA process. The guidelines also include the categories of projects (schedule of activities) concerning the requirement of EIA, and list of project types under each category.

According to the guidelines *high power transmission lines* are categorized as Schedule 1, thus, they require a full scale EIA. In addition, *electricity transmission lines* are listed under Schedule 2 activities that implies they require preliminary environmental assessment. There is no specific description for substations and distribution lines in the guidelines.

In addition, the guidelines state that all projects in environmentally sensitive areas should be treated as equivalent to Schedule 1 activities irrespective of the nature of the project. Of the sensitive areas mentioned in the guidelines is *Religiously important area* and it might be relevant for the subject project as there are some churches and mosques in the corridor of the overhead transmission line and underground transmission lines.

3.3.3 JICA Guidelines for Environmental and Social Considerations

The objectives of the guidelines are to encourage Project proponents etc. to have appropriate consideration for environmental and social impacts, as well as to ensure that JICA's support for and examination of environmental and social considerations are conducted accordingly. The guidelines outline JICA's responsibilities and procedures, along with its requirements for project proponents etc., in order to facilitate the achievement of these objectives.

JICA classifies projects into four categories according to the extent of environmental and social impacts, taking into account an outline of project, scale, site condition, etc.

Category A: Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas.

Power transmission and distribution lines involving large-scale involuntary resettlement are among the sensitive sectors and large-scale involuntary resettlement is a sensitive characteristic.

Category B: Proposed projects are classified as Category B if their potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.

Category C: Proposed projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society.

Category FI: Proposed projects are classified as Category FI if they satisfy all of the following requirements: JICA's funding of projects is provided to a financial intermediary or executing agency; the selection and appraisal of the sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding, so that the sub-projects cannot be specified prior to JICA's approval of funding (or project appraisal); and those sub-projects are expected to have a potential impact on the environment.

3.3.4 Directive on Clearance of Overhead Electric Lines and Quality of Supply

This Directive (No. EEA/1/2005) was issued by the Ethiopian Electricity Agency pursuant to the authority vested on it by Articles 55, 67 and 69 of Electricity Operations Council of Ministers Regulations No. 49/1999. The objective of this Directive is to set standards for the clearance spaces associated with transmission and distribution lines for the purpose of the protection of persons from risk and property from damage, as well as to specify the quality of supply voltage.

Article 6 of the Directive sets standards for clearance of overhead electric lines. Sub-Article 6.1 (6.1.4) applies for *a line with a voltage exceeding 66kV but not exceeding 132kV* and it requires that *the height above ground of an overhead electric line shall not, at any time, be less than 8.0 meters above a road accessible to vehicular traffic and 7.0 meters above any other point*. This requirement applies to the Gofa - Kaliti-1 Overhead Transmission Line as its voltage is 132kV. In this EA study it is assumed that any other point includes buildings and any other structures found under an overhead transmission line.

Sub-Article 6.5 is applicable for the distribution network covered in this project. It indicates that *an overhead electric line shall not, at any time, be closer to a part of a building or structure than the following minimum distances corresponding to the voltage of the line:*

- 6.5.1 *Vertically above those parts of a building or structure normally accessible to a person - 4.6 meters for a line with a voltage exceeding 1kV but not exceeding 33kV.*
- 6.5.4 *In any other direction from windows, openings and balconies and those parts of a building or structure normally accessible to a person - 2.7 meters for a line with a voltage exceeding 1kV but not exceeding 33kV.*
- 6.5.5 *In any direction from a footbridge - 4.6 meters for a line with a voltage not exceeding 33kV.*

Article 7 of the Directive sets standards for clearance from vegetation and Sub-Article 7.1 is applicable for both the Gofa - Kaliti-1 TL and the distribution network. The Sub-Article states that *growing of trees under overhead electric lines shall not be allowed. An overhead electric line shall not, at any time, be closer to vegetation in all directions than the following minimum distances corresponding to the voltage of the line:*

7.1.1 Not exceeding 33kV - 2.5 meter. This applies for the distribution network

7.1.3 Exceeding 66kV but not exceeding 132kV - 13.0 meter. This applies for the overhead TL.

In addition, Sub-Article 7.2 which states that *the space vertically above the overhead electric line shall be kept clear of vegetation at all times.* This applies for both the Gofa-Kaliti 1 TL and the distribution network.

Article 11 comprises provisions for *Position, Insulation and Protection of Electric Lines.* Sub-Article 11.1 is relevant for the distribution network and it states *any part of an electric line placed above ground, which is not connected with earth and which is ordinarily reached by hand from any scaffolding, ladder or other construction erected or placed on, in, against or near to a building or structure shall be de-energized, or so insulated that it is protected against mechanical damage or interference, or adequately protected to prevent danger.*

3.4 Institutional Framework

3.4.1 Federal and Regional States

The Federal Democratic Republic of Ethiopia (FDRE) was formally established in 1995. The FDRE comprises of the Federal States with nine Regional States and two City Administrations – Addis Ababa and Diredawa.

3.4.2 The Ministry of Environment, Forest and Climate Change

In the year 2013, as part of the effort to realize the government's Climate Resilient Green Economy strategy, the former Environment Protection Authority has been upgraded to Ministry of Environment, Forest and Climate Change. The new Ministry is responsible among other undertakings for spearheading the reforestation, and other wide-ranging tasks. As stipulated in a bill which was enacted by the parliament, making the economy free from carbon emission would entitle the country to get the support of industrialized nations.

3.4.3 Ministry of Water, Irrigation and Electricity

The Ministry of Water, Irrigation and Electricity (MoWIE) is mandated and responsible for exploration, allocation and utilization of water resources in Ethiopia. Furthermore, the Ministry needs to ensure measures are put in place so as to prevent and control pollution to the country's water resources. The Ministry is also responsible for ensuring sustainable development in the energy sector.

The MoEFCC is mandated to drive environmental impact assessment processes in Ethiopia. However, it has delegated the MoWIE review and decision making authority for ESIA documents of projects in the water and energy sectors.

3.4.4 Ethiopian Electric Power

The Ethiopian Electric Power (EEP) is a government-owned, power related organization accountable to the Ministry of Water, Irrigation and Electricity (MoWIE). Until recently, the Ethiopian Electric Power Corporation (EEPCo) was the sole public utility responsible for generation, transmission and distribution of electric power throughout Ethiopia. The Ethiopian Government has recently established two new organizations, known as the Ethiopian Electric Power (EEP) and Ethiopian Electric Utility (EEU) under the supervision of MoWIE through Council of Ministers Regulations No. 302/2013 and No. 303/2013 respectively.

Some of the major responsibilities of EEP include undertaking feasibility studies, design and survey of electricity generation, transmission and substation; undertaking electricity generation, transmission and substation construction and upgrading; handling electricity generation and transmission operation and maintenance activities; leasing electricity transmission lines as required; selling bulk electric power; and, undertaking universal electric access works.

EEP has extensive experience in the preparation and implementation of Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for its power projects. In EEP, the Environmental & Social Office (ESO) is responsible for the monitoring and evaluation of ESIA and RAP documents prepared for power projects and its implementation.

EEP's ESO, which is under the Environment, Social, Health, Safety and Quality (EHS&Q) Directorate, has the overall responsibility to coordinate, monitor and evaluate ESIA and RAPs for power projects. The ESO was consulted in the preparation of this ESIA Report and Abbreviated Resettlement Action Plan (ARAP).

3.4.5 Addis Ababa City Administration Environmental Protection Authority

The Addis Ababa City Administration Environmental Protection Authority (EPA) is one of the executive organs of the city government established by Proclamation No.15/2001, which has been amended several times. According to the amendment made in 2012 by Proclamation No. 35/2012 the AAC EPA, being accountable to the Mayor, shall have the following powers and functions, among others:

- prepare the City's environmental protection standards in accordance with the standards prepared by the Federal Environmental Protection Authority; design strategies to protect the environment from pollution; coordinate stakeholders with regards to environmental protection;

- cause the due propagation of environmental protection and the sustainable and non-abuse use of natural resources; aware the public about environmental protection through mass media;
- follow up and control that the disposition of industrial residue, by-products and waste are in accordance with the law;
- in consultation with the concerned bodies, prepare and submit strategies of environmental protection; ensure implementation of same upon approval;
- study the site and economic, social, cultural and environmental benefits of various plant species and implement same; determine the plant type and quantity to be planted on areas designated for recreational parks, forest, beaches and other green areas in accordance with the master plan of the City;
- cause the undertaking of forest development and soil conservation activities on forest areas and beaches designated as green areas in accordance with the master plan of the City; and
- give permit for cutting of trees grown on private or Government holdings; follow up and supervise to protect the cutting of trees without the knowledge and permit of the Authority.

3.4.6 Addis Ababa City Administration Land Development and Urban Renewal Agency

The Addis Ababa City Administration Land Development and Urban Renewal Agency is one of the government offices under the AAC Land Development and Management Bureau. Among the mandates of the Agency are preparation of directive on compensation of assets and replacement of land for expropriation of landholdings for public purposes and establishing unit rates for assets on the basis of the directive. It is also responsible for assessment of project affected people and assets, calculation of compensation for affected assets and payment of compensation for affected people, as well as for arrangement of land replacement for people who lost their land due to expropriation of landholdings. The Agency has branch offices in all the sub-cities of Addis Ababa and the sub-city level offices are responsible for executing the tasks related to compensation and land replacement issues at local level.

4. DESCRIPTION OF THE PROJECT

This section presents a brief description of the facilities or components covered in this study. These are briefly described in the following sections.

4.1 Transmission Lines

4.1.1 Overhead Transmission Line (132 kV)

This project component will involve dismantlement of the existing single circuit overhead transmission line and construction of a new double circuit transmission line between Kaliti-I substation and Gofa station. This transmission line is 11km long and its main features are shown in the table below.

No.	From	To	Voltage (kV)	Number of Circuit	Distance (km)
OH_Route1	Connection Point 1 at Gofa Substation	Connection Point 2 at Kaliti-I SS	132	2	8.7

* Connection point is between overhead transmission line and underground cable.

4.1.2 Underground Cable Transmission Line (132 kV)

This component of the project comprises construction of four underground transmission lines (cables). These are shown in the table below.

No.	From	To	Voltage (kV)	Number of Circuit	Distance (km)
UG_Route1	NADC Substation	Connection Point 1at Gofa Substation	132	2	4.2
UG_Route2	Connection Point 2	Kaliti-I Substation	132	2	0.1
UG_Route3	NADC Substation	BLL Substation	132	1	1.95
UG_Route4	Wereganu Station	Connection Point 3	132	2	3.5

4.2 Substation facilities

Under this component one new substation will be constructed and five existing substations will be upgraded. The new substation is located at nearby the African Union and it will replace the existing Addis Centre substation located at Mexico. Details of the facilities are shown in the table below.

Name	Main Component	Primary Voltage (kV)
NADC Substation	Full replacement of substation (Outdoor type GIS) Transformers 250 MVA(50 x 5units)	132 kV
KALI Substation	Reinforcement of receiving equipment (2 c.c.t./ AIS)	132 kV
BLL Substation	Reinforcement of receiving equipment (1 c.c.t./ Indoor type GIS)	132 kV
ADN Substation	Upgrading of transformers 100MVA(50+50)	132 kV
WER Station	Reinforcement of receiving equipment (2 c.c.t./ AIS)	132 kV
Gofa Substation	Modification of outdoor equipment existing substation.	132 kV

4.3 Distribution Network

The distribution network covered in this project comprises rehabilitation of 33kV/15kV medium voltage distribution lines and replacement of distribution transformers. It will involve rehabilitation of a total of 275 km long 33kV/15kV medium voltage distribution lines with highest number of outages in the Addis Ababa City (Item B). The project will also include rehabilitation of a total of 100 km long 33kV/15kV medium voltage distribution lines in the environs of the city (Item C). In addition, it will comprise replacement of 757 units of distribution transformers in the city and 120 units outside of the city.

No.	Main Component	Length of Middle Voltage (km)	Distribution transformer (Unit)	Low Voltage
Item A	3 areas including the city center	-	1,290	Out of scope
Item B	Feeders of highest number of outages	275	757	Out of scope
Item C	Feeders of outside of Addis Ababa City	100	120	Out of scope

The location of target facilities is shown in Figure 2-1 below.

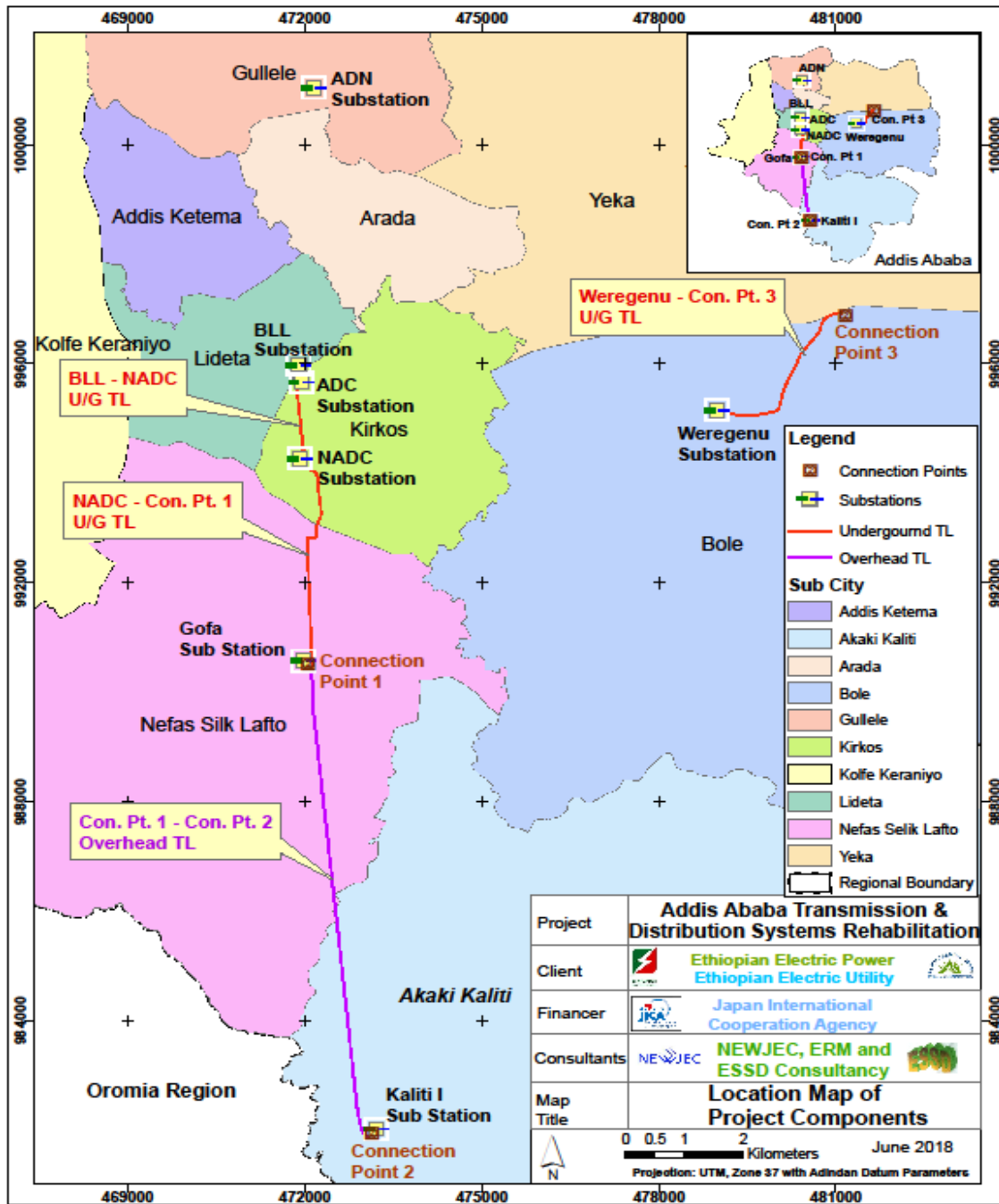


Figure 4.1 Location of target facilities

5. DESCRIPTION OF BASELINE CONDITIONS

The following sections describe the natural environment and socio-economic baseline conditions of the Addis Ababa city and the project affected areas. It is mainly based on review of previous studies such as the *Addis Ababa City Atlas (2015)* and other documents listed in the list of references, as well as the primary information collected during field observations and inventory of properties found in the project direct impact zone. It also describes the current situation of power transmission and distribution system in the city that justify the need for rehabilitation and upgrading of the system.

5.1 Physical Environment

5.1.1 Topography

The Addis Ababa City (AAC) is located in the high plateaus of central Ethiopia. It is situated between 8° 49' 55.9" and 9° 5' 53.8" North latitude and between 38° 38' 16.6" and 38° 54' 19.5" East longitude. The altitude of the city ranges from 2,050 masl at Akaki plain at the southern edge of the city to 3,000 masl at Entoto Mountain in the north.

The topography of Addis Ababa is rugged with many typical volcanic features. The central is characterized by gentle and rolling topography with patches of hills, while the southern and eastern parts are dominantly flat.

The topography of the corridors of the proposed overhead and underground transmission lines are dominantly rolling while certain areas are characterized by flat terrain. In addition, there are relatively small areas of hilly topography particularly along the Akaki river. Similarly the topography of the areas traversed by most of the distribution lines is dominantly rolling followed by areas of flat terrain.

5.1.2 Geology and Soils

According to the Ethiopian Geological Surveys Institute (1996) the geology of Addis Ababa constitutes Late Tertiary to Quaternary Volcanic to Sedimentary rocks, mainly of Bishoftu Formation (NQtb). These are plio-pleistocene basalt flows associated with scoria on the escarpments.

Three major soil types are identified in Addis Ababa. These include Vertisols, Nitisols and Luvisols. Vertisols are dominant covering about 55.4% of the city and these soils are characterised by swelling when wet and cracking when dry, which makes cultivation and construction difficult and problematic. Nitisols cover about 31.4% of the city while Luvisols comprise around 12.5%. The transmission routes as well as distribution lines mostly run through areas characterized by Vertisols.

5.1.3 Climate and Meteorology

Addis Ababa is characterized by a subtropical highland climate, with temperature differences of up to 10°C, depending on the elevation. The city's proximity to the equator means that temperatures do not fluctuate much during the year. Highest average temperatures (24 – 25°C) occur during February to May and lowest average temperatures (8 - 9°C) occur during November to February.

The city falls within the central highlands that has about seven rainy months from March to September. The main rainy season (*Kiremit*) extends from June to September, with July and August presenting the highest average rainfall of 280 mm and 290 mm respectively. In addition, small rains occur between March and May. In general the period from November to January is the driest season.

5.1.4 Drainage, Water Resources and Water Pollution

Addis Ababa is situated in the upper part of the Awash river system. The river rises on the High plateau near Ginchi town west of Addis Ababa and flows along the rift valley, and terminates in Lake Abbe on the border with Djibouti. The drainage system of the city is generally in the north to south direction. It is drained by numerous streams, among which Kebena, Little Akaki and Great Akaki rivers are the major ones. All the streams finally join the Great Akaki river, which has a catchment area of 917 km² at the bridge on the Lebu – Akaki main road. Akaki river is a tributary of Awash river. Of the streams crossed by the project transmission lines, Little Akaki is the largest river and is crossed by the Kaliti 1 - Gofa overhead TL twice that is between TR-23 & TR-24 and between TR-37 & TR-38 (see Figure 5-1 below).

The streams draining through Addis Ababa are highly polluted due to uncontrolled disposal of municipal sewage, industrial wastes and solid wastes into the water bodies as well as urban runoff water or storm-water entering the streams during the wet seasons. Most of the wastewater reaches the streams untreated, seriously polluting the water bodies. According to the Addis Ababa City Atlas (2015) the discharge of untreated effluents and wastewater from industries, households and institutions are the main sources of water pollution in the city. Same source indicates that industrial wastewater is the primary cause of water pollution followed by domestic wastewater and human excreta. Wastewater is discharged directly into streams while several of them are important sources of water for small scale farmers in and around the city for producing vegetables and fodder for livestock. Most industries release their effluents containing pollutants into the natural environment including streams and rivers without any treatment, causing serious environmental pollution with serious health and social effects on those exposed to it. Use of wastewater for producing vegetables through irrigation is likely to pose high public health risks.



Figure 5-1: Little Akai river crossed by the Kaliti 1 - Gofa TL bn TR-23 & TR-24 (left) and bn TR-38 & TR-39 (right) – it is highly polluted by domestic & industrial wastes; yet it is used for growing vegetables through irrigation.

5.1.5 Air Quality

According to Parsons Brinckerhoff *et. al.* (2016) air quality in Addis Ababa is considered to be poor, mainly due to the high levels of traffic and the use of old motor vehicles. Nonetheless, carbon monoxide (CO) levels were found to be within WHO standards, along with nitrous dioxide (NO₂) and sulphur dioxide (SO₂) concentrations. Particulate matter (PM_{2.5}) concentration levels in the ambient air are nevertheless higher than WHO guidelines for most of the city. There is a concern that CO 8-hr WHO guidelines might be exceeded in the future if mitigation measures are not put in place.

The US Embassy's air quality monitoring data gathered at two locations - one at the Embassy and the other at International Community School (ICS) reveals a moderately polluted atmosphere. Air quality index (AQI) as a measure of PM_{2.5} (fine particulate matter) readings from the US system showed a reading ranging between 61 and 65. On 28 July, 2018 AQI reading was 63 (min. 42, max. 163) at US Embassy and 87 (min. 61, max. 161) at ICS. With regards to health implications, this level of air quality is generally acceptable. However, for some pollutants there may be a moderate health concern for people who are unusually sensitive to air pollution. According to AQI, the index for moderate pollution ranges from 51 to 100 and a good air quality ranges between zero and 50.

Air pollution level in Addis Ababa is presumed to be high due to the prevalence of old vehicles, substandard road infrastructure and inadequate road network. Assessment of CO concentration as a measure of traffic air pollution showed that the mean for 15 minutes CO concentration was 2.1 ppm and 2.8 ppm for wet and dry seasons, respectively (Kume, A, et.

al., 2010). The CO temporal and spatial profiles among the two seasons were similar. The overall mean on-road CO concentration was 5.4 ppm, and 15% of roadside samples and all on-road samples exhibited more than 50% of the 8-hr CO WHO guideline. The consistency in spatial and temporal profiles and the variation on both on-road and road side traffic lines imply that vehicles are the main source of traffic air pollution. There is a concern that the CO 8-hr World Health Organization guideline might be exceeded in future.

5.1.6 Land Use/Land Cover

According to Addis Ababa City Atlas (2015) generally about 35% of Addis Ababa city is classified as a built up area and is the largest overall land use type. Other land uses include green areas (32%), field crop (27%) and agriculture (14%). The plantation forests (mainly eucalyptus plantations) that cover the northern and north-western parts of the city (the Entoto Mountain & its foot) comprise the greater portion of the green areas.

The predominant land use/land cover of the corridor of the transmission routes is built up areas comprising residential and commercial areas as well as road infrastructure. Crop lands are also significant in the corridor of the Kaliti 1 – Gofa overhead TL and the last 115m section of the NDAC-Gofa underground TL; Figure 5-2 below illustrates examples of farmlands developed through irrigation and rain-fed cultivation. Vegetables are mainly grown on the banks of Akaki river and its major tributary through irrigation by diverting the rivers water. Elsewhere rain-fed cultivation is practiced to produce mainly cereal crops including wheat and maize. Other land use/land cover types include areas covered by forest & trees, and grasslands mainly along the Akaki river.

Similarly the dominant land use/land cover in the corridor of the feeders located in Addis Ababa and the towns in the environs of Addis is built up areas mainly residential areas followed by commercial centers and road infrastructure. A number of the feeders located outside of Addis Ababa traverse farmlands used mainly for producing cereal crops including wheat, maize and teff through rain-fed cultivation. Plantation trees/forest and grasslands (grazing areas) also comprise a significant proportion of the land use/land cover.



Figure 5-2: Cropland crossed by the last 115m section of the NDAC-Gofa UG TL (left) and farmland found between Tower 44 & T. 46 of Gofa-Kaliti 1 overhead TL (right).

5.2 Biological Environment

5.2.1 Vegetation and Flora

According to the general classification of Ethiopian vegetation the climax vegetation of Addis Ababa and environs is Dry Evergreen Montane forest and grassland. However, most of the natural vegetation has been deforested for expansion of cultivation and settlement areas including urbanization of the city as well as due to exploitation of wood materials for construction, fuel wood and timber production. The forest would have been dominated by *Juniperus procera* (Tid) with stands of *Podocarpus falcatus* (Zigba), *Acacia abyssinica* (Girar), *Olea europaea cuspidata* (Weira), *Hagenia abyssinica* (Yekosso Zaf), *Ficus* spp. (Sholla), and *Croton macrostachyus* (Bisana) particularly at the higher altitudes of the Entoto Mountain range and its foot.

Currently the Entoto mountain range is largely covered with Eucalyptus plantations dominantly *Eucalyptus globulus*. The area also contains several indigenous tree species of which the most common species include *Juniperus procera*, *Olinia rochetiana*, *Myrsine africana*, *Erica arborea*, and *Maesa lanceolata*. In addition, the area consists of some sparsely distributed indigenous tree species such as *Hagenia abyssinica*, *Ilex mitis* and *Apodytes dimidiata*.

The corridors of the project routes contain little natural vegetation cover since the areas have been completely transformed into urban settlement and agricultural lands. Only some remnant or secondary growth indigenous trees and shrubs are observed here and there within cultivated lands, along river and stream banks, along streets, and within tree plantation areas, residential and commercial areas, compounds of religious and other institutions etc. Several indigenous tree species are observed in these areas including *Acacias* (mainly *A. abyssinica*), *Cordia africana* (Wanza), *Croton macrostachyus* (Bisana), *Ficus sur* (Sholla),

Millettia ferruginea (Birbira), *Olea europaea* (Weyra), *Albizia schimperiana* (Sassa), and *Vernonia amygdalina* (Girawa). In most places plantation trees (dominantly exotic species) and shrubs are more common than the indigenous trees. The commonly observed exotic tree species include *Eucalyptus camaldulensis*, *Grevillea robusta*, *Casuarina equisetifolia*, *Cupressus lusitanica*, *Schinus molle* and *Jacaranda mimosifolia*.

Grevillea robusta (Silky Oak) is commonly planted on roadsides and at road median for town beautification while it also contributes to carbon sequestration. There are also some other ornamental trees and shrubs that are planted at road median or on roadsides particularly along the BLL – NADC underground transmission route. These include *Araucaria heterophylla* (Norfolk Island pine), *Phoenix canariensis* (Canary Island Date Palm), and *Callistemon* sp. (Bottle-brush).

A detail list of the flora identified from the corridor of the transmission lines is provided in Annex 2.

5.2.2 Habitats and Fauna

Since the natural habitats of the project sites have severely degraded, they contain little habitats that could support wildlife except birdlife. As a result, the areas contain only a few wild animals that able to dwell inside burrows or in the plantation forests. Hyenas are the main wild animal found in the areas and they scavenge on wastes around the city. As indicated by local officials and local people other mammals observed in the corridor of the Gofa-Kaliti 1 overhead transmission line and certain feeders include Common Duiker, Common Jackal, Abyssinian Hare, Bush Pig and Abyssinian Genet. These wild animals particularly occur in the protected forest found between Towers 23 & 24 of Gofa-Kaliti 1 OH TL and the plantation forests found in the corridor of several feeders such as ALM-15-01, ALM-15-02, ALM-15-04, SUL-15-03, SUL-15-04, and Sebeta-07.

In contrast, the study area contains a variety of both terrestrial and water-birds. The Akaki floodplain is an important area for birdlife conservation. Because of its importance in supporting wintering water birds, Globally threatened species and biome restricted species, BirdLife International and the Ethiopian Wildlife and Natural History Society (EWNHS) selected the Lake Aba-Samuel and the wetlands along Akaki river as one of the “Important Bird Areas (IBAs)” in the country. The Akaki floodplain is often seasonally inundated mainly in July and August, which attracts large numbers of water birds.

The Akaki IBA is important for wintering water birds with over 20,000 occasionally being present, with high numbers noted for Ruff, Northern Shoveler and Lesser Flamingo. Resident water-birds occurring in numbers include Great White Pelican, Yellow-billed Stork, Greater Flamingo, Egyptian Goose, Yellow-billed Duck, Black-winged Stilt, Black-winded Lapwing and Black Crowned Crane.

The project routes corridors contain a variety of bird species dominantly water-birds, song birds and seed-eaters. The water-birds observed on the banks of Akaki river and at the wastewater treatment plant around Towers 39 to 42 during the site visit along the Gofa-Kaliti 1 overhead TL include Watled Ibis (endemic species), Sacred Ibis, Egyptian Goose, Yellow-billed Duck, Black-winged Stilt, Spur-winged Plover and Hamerkop.

Song birds include Speckled Pigeon, Doves (Ring-necked Dove, Red-eyed Dove & Laughing Dove, Greater Blue-eared Starling, Little Bee-eater, Fork-tailed Drongo, Fan-tailed Raven, Pied Crow, Thick-billed Raven, Abyssinian Ground-hornbill and Red-billed Oxpecker. Seed-eaters comprise Village Weaver, Speckled Mouse-bird, Swainson's Sparrow, Ethiopian Boubou, Mocking Cliff Chat, Red-cheeked Cordon-bleu, Red-billed Fire-finch, etc. Moreover, several raptors occur in the study areas and these include a number of vultures (Egyptian Vulture, Hooded Vulture, White-backed Vulture & Rüppell's Vulture), Yellow-billed Kite, Dark Chanting Goshawk and Tawny Eagle.

5.2.3 Protected Areas

There are two protected forest areas in the corridor traversed by the Kaliti I – Gofa overhead transmission line and Feeder ALM-15-04 (distribution line operating from the Addis Alem substation). These are briefly described below.

(i) Protected Forest in Nifas Silk Lafto Sub-city

This protected forest is located in Woreda 12 of Nifas Silk Lafto Sub-city on right bank of Akaki river on hilly terrain (see Figure 5-3 below). The forest area is managed by the Sub-city Environmental Protection Office. It is crossed by the Kaliti I – Gofa overhead transmission line between Towers 23 & 24.

The forest contains a mixture of indigenous trees as well as exotic trees. The main indigenous trees occurring in the forest include *Acacia abyssinica*, *A. sieberiana*, *Croton macrostachyus* and *Vernonia amygdalina*. Exotic tree species include *Eucalyptus camaldulensis*, *Gravillea robusta*, *Acacia mearnsii*, and *Acacia saligna*. Larger trees under the existing transmission line have been removed to avoid contacts/interference with the TL that could cause power outages. According to the Energy Directive No. EEA/1/2005, the overhead electric line (with voltage of 132kV) shall not be closer to vegetation in all directions than 13m.



Figure 5-3: Part of the Protected Forest area between TR-23 & TR-24; the forest under the TL has been cleared to avoid interference of trees with the electric cables.

(ii) Protected Green Area at Road Median along Mexico Sq. to AU Office

There is a well-managed Green Area at the median of the road running from Mexico square to African Union Office. The green area has been developed by the AAC Beautification, Parks and Cemeteries Development & Administration Agency for town beautification or aesthetic value and is currently managed by the Agencies Branch Office at Kirkos Sub-city. It is traversed by the existing Kaliti 1 – ADC overhead transmission line between Towers 2 & 7 and by the proposed BLL – NADC underground TL between Mexico sq. & AU Office.

The green area contains several ornamental trees and shrubs as well as a number of herbaceous plants and grasses. The dominant trees and shrubs are *Araucaria heterophylla* (Norfolk Island pine), *Phoenix canariensis* (Canary Island Date Palm), *Callistemon* sp. (Bottle-brush) and *Rosa abyssinica* (Abyssinian Rose). Figure 5-4 below illustrates parts of the green area.



Figure 5-4: Examples of ornamental trees and shrubs planted at the road median along the BLL-NADC route for town beautification or aesthetic value.

(iii) Tulu Korma Centre for Native Trees

The Tulu Korma Centre for Native Trees was founded by Legesse Negash who is a Professor of Plant Physiology at the Faculty of Biological Sciences of Addis Ababa University. It was established in July 2004 with a primary objective of providing a platform for research and development on indigenous trees, shrubs, biodiversity, watersheds, and key natural resources including water and soils (Legesse Negash 2010, cited in Zewdie Kassa *et al.* (2016). The Centre is located at about 53km west of Addis Ababa along the main road to Ambo at about 3km west of Addis Alem town. Administrative wise, it is situated in Ejere Woreda of West Shewa Zone of Oromia National Regional State.

A short stretch (about 200m length) of Feeder ALM-15-04 traverses the Research Centre on right hand side of the main road to Ambo; Figure 5-5 below depicts part of the forest crossed by the subject Feeder. The Feeder runs from the Addis Alem substation in west direction to the town of Ehud Gebeya along the main road. The main indigenous tree species occurring in the area crossed by the Feeder include *Acacia abyssinica* (dominant), *Albizia schimperiana*, *Croton macrostachyus*, *Bersama abyssinica*, and *Ficus sycomorus*. Small trees and shrubs include *Dovyalis abyssinica*, *Vernonia amygdalina*, *Calpurna aurea*, *Carissa spinarum*, *Euclea divinorum*, and *Rhus spp.* In addition, the Centre contains other important indigenous trees including *Juniperus procera*, *Podocarpus falcatus* and *Olea europaea subsp. cuspidata*, but not in the corridor traversed by the Feeder. During site visit it was observed that a number of larger trees contact with the electric cables of the distribution line and this situation could cause power outages. According to the Energy Directive No. EEA/1/2005, the electric distribution line (with voltage of 15kV) shall not be closer to vegetation in all directions than 2.5m.



Figure 5-5: Part of the Tulu-Korma Research Centre for Indigenous Trees crossed by Feeder ALM-15-04. Geographic Coordinate: 429629 E, 996966 N.

5.3 Socio-economic Environment

5.3.1 Background of Addis Ababa City

5.3.1.1 Administrative Structure

The Addis Ababa City Administration is structured into ten sub-city and 116 Woreda (district) administrations. The Woredas are further subdivided into 842 sub-woredas (sub-districts) and 3,003 *Sefers* (neighbourhoods) (AACAA, 2015).

5.3.1.2 Population Size and Density

In the year 2012, the total number of households in Addis Ababa was about 827,364. The crude population projection for 2017 estimated that Addis Ababa had about 3, 433,999 of which 47.3% are male and 52.7% are female (CSA, 2013). The city has a population growth rate of 2.5. The population density of the city is 6,346 people per Km². Crude population densities of the sub-cities vary between 3, 203 people/Km² and 32, 069 people per Km². Addis Ketema, Arada, Lideta and Kirkos sub-cities have higher density, whereas Akaki Kaliti, Bole and Yeka have lower population density.

5.3.1.3 Ethnicity and Religion

The largest ethnic groups in the city are the Amhara (47.04%), Oromo (19.51%), Gurage (16.34%), Tigray (6.18%), Silt'e (2.94%) and Gamo (1.68%) (CSA, 2007 Census). All of these

ethnic groups speak their own language. The religious composition in Addis Ababa consists of 74.7% Orthodox Christian and 16.2% Muslim, 7.77% Protestant and 0.48% Catholic (AACA, 2014).

5.3.1.4 Main Occupations

The main sources of employment amongst the economically active population in Addis Ababa City are self-employment (37.6%) (mainly wholesale and retail); government workers (21.8%) and private organization employees (19.3%).

5.3.1.5 Education Status and School Facilities

As of 2015 data, of all population aged ten years and above, about 90% were literate, and the rest 10% were illiterate in the city. Of the total population aged five years and above, 35.3% were attending school in the same year and 55% did attend in the past (CSA, 2015). In terms of education facilities, there are 1,085 Early Childhood Care and Education (ECCE) Schools; 795 primary; 308 secondary schools, 27 universities, and 107 colleges in Addis Ababa city (AACA, 2015).

5.3.1.6 Health Facilities, Services and Main Problems

Health institutions in the city include 58 hospitals (11 are government owned general hospitals and 3 owned by NGOs); 90 health centers (82 run by government, 5 by private and 3 by NGOs); 592 clinics (6 government owned, 586 private clinics); and 452 drug vendors (AACA, 2015).

Of the top ten diseases prevalent in the city, acute upper respiratory infection is the most prevalent disease affecting 217,979 people (29.52% of the cases) in the year 2012. This is followed by other or unspecified diseases related to the eyes and adnexa (11.51%), pneumonia (9.42%), dyspepsia (8.77%) and dental or gum diseases (8.00%) of the cases recorded in 2012 (Parsons Brinckerhoff and Tropics Consulting Engineers, 2016).

5.3.1.7 Worship Places/Religious Sites

In the city there are a total of 682 various worship places. The distribution of worship places in relation to population across sub-cities is uneven and not sufficiently available (AACA, 2015).

5.3.1.8 Commercial and Public Services and Other Infrastructures

Over 5,200 various commercial services, public services and other infrastructures are available in the city. Of the total services, banks account for 13.3%, garages for 13.3%, large and medium scale industries for 12.11%, small and micro enterprises for 10.61%, government offices for 9.71%, police stations for 7.51%, water points for 6.67%, etc. (AACA, 2015).

5.3.1.9 Employment Status and Occupation Groups

Based on the definition of *economic activity status*, the number of economically active population (including employed and unemployed persons) aged ten and above was 1,728,296 and population not active was 1,116,099. The activity rate (i.e. labor force participation rate) of the urban population in Addis Ababa city was 60.8 (CSA, 2015). *Regarding employment and unemployment rate*, unemployment survey of 2012 showed that the highest unemployment rate (23.0%) was observed in Addis Ababa City Administration followed by Dire Dawa Administration 22.7 percent (CSA, 2012). As of 2012, the proportion of persons working in the informal sector was about 13 percent (CSA, 2012).

In the city, the majority of the persons (i.e. 28%) were engaged in service and sales occupation group followed engagement in craft and related trade activities (16%) and in elementary occupation (15%) (CSA, 2015). In Addis Ababa there is a considerable need for creation of jobs for individuals who have just completed high school. Unemployment rates are as high as 36% among male youth who have just graduated high school (HCES, 2011 cited in WB, 2015).

5.3.1.10 Income Source and Expenditure

The main expenditure sources in Addis Ababa include wages and salaries (47%), non-agriculture enterprises (21%), remittance from local households (6%), urban agriculture enterprises (1%) and others sources account for 24% of the total source (CSA, 2012). Survey conducted on consumption and expenditure in 2012, indicated that the expenditure per capita for Addis Ababa was 9,048 Birr, and per adult expenditure was 12,701 Birr. Expenditure major item groups include food & non-alcoholic beverages accounting for 39% of average per capita expenditure with expenditure for housing, water, fuel & energy accounting for 29% of the per capita. Generally, the two expenditure item categories combine make up 68% of per capita expenditure in Addis Ababa (CSA, 2012).

5.3.1.11 Gender and Employment Situation

In Addis Ababa city, about 33% of the livestock keeper households are headed by women. The unemployment rate in Addis Ababa is about 47% and females account for 58% of the unemployed. There is a high dependency ratio; 69% of the total population depends on the remaining 31% of the society (ILRI, no date). The majority of livestock keepers depend solely on livestock farming, while the rest are retired or civil servant men involved in livestock keeping.

A study undertaken by Azage Tegegne *et al.* (2002) in Addis Ababa showed that about 45% of livestock owners are women. The average age of women and men livestock owners is 55 and 57 years, respectively. The level of education of these farmers ranges from illiterate to secondary school (slightly more men than women) (ILRI, no date).

5.3.2 Background of Project Affected Sub-Cities and Woredas

5.3.2.1 Project Affected Sub-Cities and Woredas

The facilities included in the current project would affect 6 sub-cities and 13 Woredas of the sub-cities. Table 5-1 below shows the sub-cities and woredas affected by the project facilities.

Table 5-1. Woredas, sub-woredas, Sefers and blocks in the project affected Woredas

Sub-city	Woreda	Sub-woredas	Sefers	Blocks	Project Components in the Woredas
Akaki Kaliti	Woreda 4	9	61	189	Kaliti I – Gofa Overhead TL & Kaliti I Substation
	Woreda 7	19	62	162	Kaliti I – Gofa Overhead TL
Nefas-Silk-Lafto	Woreda 5	5	21	68	Kaliti I – Gofa Overhead TL
	Woreda 6	7	23	81	NADC-Gofa Underground TL, OH TL, Gofa SS & Cable Terminal
	Woreda 11	11	36	77	Kaliti I – Gofa Overhead TL
	Woreda 12	11	40	98	Kaliti I – Gofa Overhead TL
Kirkos	Woreda 5	4	13	37	NADC-Gofa Underground TL
	Woreda 6	3	11	36	BLL-NADC-Gofa U/G TL
Lideta	Woreda 8	-	-	-	BLL-NADC U/G TL & Black Lion SS
Bole	Woreda 6	-	-	-	Weregenu-Connection Pt-3 Underground TL
	Woreda 7	-	-	-	As above
	Woreda 14	-	-	-	As above plus Weregenu SS
Gulele	Woreda 7	8	25	79	ADN Substation

Source: AACAA (2014) Addis Ababa City Atlas, and Project Document

5.3.2.2 Population Size and Density

As can be seen from Table 5-2, the total population of the project affected Woredas is 304,001, of which 146,069 are male and 157,932 female. As can be seen from Table 5-2, Woreda 7 (in Gulele Sc); Woreda 8 (in Lideta Sc); Woreda 7 (in Bole Sc) and Woreda 5 & 6 (in Nefas Silk Lafto Sc) comprise higher proportion of the total population of the project affected Woredas, whereas Woreda 6 (in Kirkos Sc), and Woredas 11 & 12 (in Nefas Silk Sc) have lower proportion of the total population (AACAA, 2014). The crude population densities of the project affected Woredas vary between 16 people per km² in Woreda 4 (in Akaki Kalitu Sc) and 384 people per km² in Woreda 8 (in Lideta Sc). Accordingly, Woreda 8 (in Lideta), Woreda 5 (in Kirkos); Woreda 5 (in Nefas Silk) have higher density, whereas Woreda 4 & 7 (in Akaki Kaliti); and Woreda 11 & 12 (in Nefas Silk) have lower population density. In terms of age structure of the population, the majority (i.e. 71-75%) of the population in the sub-cities is in economically active age group (AACAA, 2014).

Table 5-2. Distribution of Population, Areas and Density by Woredas

Sub-city	Woreda	Population				Area (hectare)	Density
		Male	Female	Total	% of the total		
Akaki Kaliti	Woreda 4	10,130	11,019	21,149	7.0	1326	15.9
	Woreda 7	11,457	11,446	22,903	7.5	780	29.4
Lideta	Woreda 8	14,283	14,888	29,171	9.6	75.92	384.2
Nefas Silk Lafto	Woreda 5	12,765	14,216	26,981	8.9	196.22	137.5
	Woreda 6	13,444	15,270	28,714	9.4	312.84	91.8
	Woreda 11	8,051	8,619	16,670	5.5	488.35	34.1
	Woreda 12	9,841	10,535	20,376	6.7	421.22	48.4
Kirkos	Woreda 5	11,058	9,867	20,925	6.9	121.76	171.9
	Woreda 6	5,828	5,214	11,042	3.6	118.13	93.5
Bole	Woreda 6	10,705	12,802	23,507	7.7	241.85	97.2
	Woreda 7	13,000	14,122	27,122	8.9	349.24	77.7
	Woreda 14	7,954	10,475	18,429	6.1	179.93	102.4
Gullele	Woreda 7	17,553	19,459	37,012	12.2	470.81	78.6
Total		146,069	157,932	304,001	100	4491.18	67.68845

Sources: CSA (2013) Population projection for 2017; and AACA (2014) Addis Ababa City Atlas.

5.3.2.3 Ethnicity and Religion

The data compiled from 2007 census showed that the major ethnic group in the project affected sub-cities is Amhara followed by Oromo, Guragie and Tigre. Regarding composition of religion, the major religion in the sub-cities is Orthodox Christian, followed by Islam, and Protestant Christian (AACA, 2014).

5.3.2.4 Education Facilities

There are a total of 267 educational facilities/services in the project affected Woredas. Of these, 152 are KG (i.e. Early Childhood Care and Education Schools), 77 primary schools, 22 secondary and preparatory schools, 11 higher institutions (colleges, university colleges and universities), and 5 training centers/TVs (AACA, 2014).

5.3.2.5 Health Facilities and Main Health Problems

In total there are 160 facilities in the project affected Woredas. Of these, 66 are medium clinics, 17 higher clinics, 9 health centers, and 55 pharmacy and drug stores (AACA, 2014).

The most frequently diagnosed health disorders in the sub-cities are acute upper respiratory tract infections accounting for 20-23% of the cases. Other major health problems include dyspepsia (11%), urinary tract infections (11%), acute febrile illness (10-11%), diarrhea (non-

bloody) (8-10%) and diseases of musculoskeletal and connective tissues (9%) (Sub-cities Health Offices, 2008 and 2009 EC).

5.3.2.6 Water Reservoirs, Fire Hydrant Points and Solid Waste Plates

In the project affected Woredas, there are 67 water reservoirs/water points, 14 hydrate points and 104 solid waste plates (AACAA, 2014).

5.3.2.7 Commercial and Public Services, and Infrastructures

Over 291 such and other facilities are available in the project affected Woredas. Of these 291, the offices and financial institutions (banks) account for 25.7%, and 25.4% of total services and facilities respectively; police stations account for about 17.5%, recreation centers for 14.4% and main hotels for 7.6% (AACAA, 2014).

5.3.2.8 Market Centers, Enterprises and Factories

There are 419 factories/industries, 119 micro and small enterprises and 26 market centers (supermarkets) in the woredas. Woreda 4 and 7 of Akaki Kaliti sub-city, Woreda 12 of Nefas-Silk, and Woreda 7 of Bole sub-city are mainly industrial areas (AACAA, 2014).

5.3.2.9 Livelihoods

There is no specific livelihood data available at either the Sub-city or Woreda level. It is considered that the employment types and percentages are likely to be similar to those recorded for Addis Ababa city in section 5.3.1.9 above. Accordingly the employment groups include self-employment (mainly wholesale and retail); government workers and private organization employees. Regarding types of livelihoods in the project affected Woredas, brief description of employment status of project affected households is provided in section 5.3.3.2 below.

5.3.3 Potentially Affected Households and Assets

5.3.3.1 Households and Properties within 30m Corridor of Kaliti 1 – Gofa Overhead TL

Inventory of the households and their properties found within 30m corridor of the overhead transmission line between Kaltiti-I substation and Gofa substation was carried out by the Consultant team. The survey has identified 117 households within 30m corridor of the transmission line. However, most of the households under the line will not be required to be relocated as design of the TL will consider the minimum vertical distance from buildings and structures specified in the Ethiopian Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005). According to the Directive, structures located with vertical distance of less than 8m from electrical lines are subject to resettlement. The inventory was done on the following issues:

- i. Demographic characteristics of the potential affected households.
- ii. Occupation and employment status of the households.

- iii. Property types.
- iv. Legal status of landholding and properties such as houses/buildings.
- v. House structures (types of house construction materials).

The following sections briefly describe the results of the inventory on each of the above-mentioned topics/issues.

(i) Socio-economic Characteristics of Potentially Affected Households

Number of Households and Household Headship: Inventory of the potential affected households identified that 117 households are located within 30m corridor of the overhead transmission line that runs through Akaki Kaliti and Nifas Silk Lafto sub-cities. Of the total potentially affected households, 69 HHs are from Akaki Kaliti and 48 from NS Lafto Sub-city (Table 5-3). In terms of gender, about 73% are male headed households and the rest 27% are female headed households.

Family Size and Total Population: As can be seen from Table 5-3 below, the total population size of the potentially project affected people is estimated at 482 people, of which 279 are from Akaki Kaliti sub-city and the rest 203 are from NS Lafto sub-city. The average household size is calculated to be 4 people per household.

Table 5-3 Distribution of Family Size and Total Population (within 30m corridor of TL)

Family size	Akaki Kaliti		Nifas Silk Lafto	
	No. of Households	Household Population	No. of Households	Household Population
1	7	7	4	4
2	5	10	6	12
3	12	36	5	15
4	21	84	12	48
5	13	65	11	55
6	7	42	4	24
8	2	16	4	28
9	1	9	1	8
10	1	10	1	9
Total Households	69 (m=51; f=18)		48 (m=37; f=14)	203
Pop. of the HHs	-	279	-	203
Average Family Size-		4.0	-	4.7

Age Structure of Household Heads: As can be seen from table 5-4 below, over 82% of the household heads are within active age group (20-50 years), and about 18% of the household heads are above the age of 50 years.

Table 5-4 Distribution of Household Heads by Age Group (within 30m corridor of TL)

Age group	Akaki Kaliti		Nifas Silk Lafto		Total (A+B)	
	Number (A)	%	Number (B)	%	Number	%
20 - 30	14	20.3	3	6.3	17	14.5
31- 40	26	37.7	13	27	39	33.3
41-50	19	27.5	21	43.7	40	34.2
Above 50	10	14.5	11	23	21	18.0
Total	69	100	48	100	117	100

Occupation of the Household Heads: The majority (30%) of the household heads are employees followed by traders (i.e. 24%). The rest 6% and 5.1% are engaged in handcraft and farm-related activities respectively. And 8.5% of the female household heads are housewives engaged household chores. Whereas 17% of the households are unemployed, 4.3% of the household heads are pensioners. In general the dominant occupation in the project affected neighborhoods are government/private created employment; and trade activities (both formal and petty trade) (See Table 5-6).

Table 5-6 Distribution of Household Heads by Occupation and Sub-city

Occupation	Akaki Kaliti		Nifas Silk Lafto		Total	
	Number	%	Number	%	Number	%
Employee	21	30.4	14	29.2	35	30
Daily Labor	5	7.2	-	-	5	4.3
Farm related activities	2	3	4	8.3	6	5.1
Formal trade/petty trade	13	18.8	15	31.3	28	24
Handcraft/skilled labor	4	5.7	3	6.2	7	6
Housewife	10	14.5	-	-	10	8.5
Pensioner	2	3	3	6.2	5	4.3
Unemployed	12	17.4	8	16.7	20	17
Student	-	-	1	2.1	1	0.8
Total	69	100.0	48	100	117	100

(ii) Types of Properties within 30m corridor of TL

In Akaki Kaliti Sub-city: Table 5-7 depicts the types of properties which would be affected by the proposed project activities in Akaki Kaliti sub-city. These include, in order of their number, houses which account for about 88%, fences accounting for 7%, and others (farmland and stores) combine make up about 3%.

In Nifas Silk Lafto Sub-city: Like that of Akaki Kaliti sub-city, the major property types which would be affected by the project activities in Nifas Silk Lafto Sub-city include houses (owned by about 64% of the household heads), fences owned by 10%, garages owned by 6% and shops owned by 4% of the possibly affected households (see Table 5-7 below).

Table 5-7: Distribution of Properties (within 30m corridor of TL)

Type of Properties	Akaki Kaliti		Nefas Silk Lafto	
	No. of Households Owned the Property	%	No. of Households Owned the Property	%
Clinic	-	-	1	2.1
Farm land*	1	1.4	1	2.1
Fence	5	7.2	5	10.4
Garage	-	-	3	6.3
Grocery	-	-	2	4.2
House	61	88.4	31	64.6
House and Fence	1	1.4	1	2.1
Idir House	-	-	1	2.1
Restaurant	-	-	1	2.1
Shop	-	-	2	4.2
Store	1	1.4	-	-
Total	69	100	48	100.0

* There are several farmland plots in Woredas 4&7 of Akaki Kaliti; and Woreda 11 of Nifas Silk Lafto SC. However, data on no. of users/ land owners couldn't be collected as the survey crew couldn't find the owners

(iii) Housing Structures and Construction Materials

In Akaki Kaliti Sub-city: As can be seen from Table 5-8 below, the houses made from wood and mud wall and roofed corrugated iron sheet account for about 92% of the house structures in the sub-city. The rest 5% are huts (tukuls) made from wood and mud walls and roof covered with grasses/thatches. Only 1.5% of the structures are made from hollow blocks.

In Nifas Silk Lafto Sub-city: Regarding structures, similar pattern is observed in Nifas Silk Lafto Sub-city. Houses that are made from wood and mud account for 71%; whereas 21% are made from hollow blocks. The rest 8% are made from corrugated iron sheet (see Table 5-8 below).

Table 5-8 Distribution of Housing Structures by Type of Construction Materials

Type of Houses	Akaki Kaliti		Nefas Silk Lafto	
	Number	%	Number	%
Hollow blocks made house	1	1.6	8	21.1
Hut (thatched houses)	3	4.9	-	-
Wood & mud made houses (roofed with corrugated iron sheet)	56	91.8	27	71.1
Corrugated iron sheet houses (both the wall & roof are made of iron sheet)	-	-	3	7.9
Only wood made house – wall made of wood only but covered with iron sheet.	1	1.6	-	-
Total	61	100.0	38	100

(iv) Legal Status of Housing Units as Reported by Household Heads

In Akaki Kaliti Sub-city: As can be observed from Table 5-9 below, only 30% of the households have land holding certificate for their houses while nearly 50% of households reported that their housing units were seen on the aerial photo of 1997EC, but they don't have land holding certificate. About 10% have no certificate, but they do pay land use tax. The remaining 10% of the households have neither land certificate nor pay land use tax.

In Nifas Silk Lafto Sub-city: In the sub-city, 12 households (34% of the affected households) have land certificate for their houses; whereas 18 households (51%) don't have land certificate, but they pay land use tax. Four (4) house owners (11%) reported that their houses are seen on the aerial photo of 1997EC, but don't have land certificate. The remaining one household lives in a house rented from Kebele administration/local government (Table 5-9).

Table 5-9 Status / Legality/ of Houses (within 30m corridor of TL)

Status	Akaki kaliti		Nefas Silk Lafto	
	Number	%	Number	%
Do not have land certificate but paying land tax	6	9.8	18	51.4
Land certificate holder	18	29.5	12	33.4
Neither own certificate nor pay tax	6	9.8	-	-
Houses seen on aerial photo of 1997 EC, but don't have land holding certificate	31	50.8	4	11.4
Kebele (government) house	-	-	1	29.9
Total	61	100.0	35	100

5.3.3.2 Households Affected by Overhead and Underground Transmission Lines

In order to grasp the status of households affected by the project, asset inventory and socio-economic survey were conducted from July 13 to 15, 2018.

(i) Project Affected Households

This section briefly describes the socio-economic profile of households affected by the tower base of the Kaliti 1 - Gofa overhead transmission line and the NADC - Gofa underground TL. Table 5-10 below shows the number of households potentially affected by the aforementioned transmission lines. The BLL – NADC and Weregenu – Connection Point-3 underground TLs will not affect individual households.

Table 5-10: Number of households potentially affected by Kaliti 1 - Gofa overhead TL and NADC - Gofa underground TL

Name of Transmission Line	No. of affected HHs	Type of project facility
Kaliti 1 - Gofa Overhead TL	13	Tower base
NADC - Gofa Underground TL	8	Underground Cable
Total	21	

Source: Field Survey Data, July 2018.

(ii) Socio-Economic Characteristics of the Potential Affected Households

Residence and Headship of Households: Table 5-11 below illustrates the distribution of project affected households by sub-city and woredas. About 62% of the households are from Nifas Silk Lafto sub-city, and the rest 38% are from Akaki kality sub-city. Of the total 21 households, the majority (i.e. 90%) is male headed households and the rest 10% are female headed households.

Table 5-11 Distribution of Project Affected Households by Sub-city and Woreda

Sub-city	Woreda	Number of Impacted HHs	Percent
Akaki Kality	Woreda 4	4	19.05
	Woreda 7	4	19.05
Nifas Silk Lafto	Woreda 6	8	38.10
	Woreda 11	5	23.80
Total	4	21	100

Source: Field Survey Data, July 2018.

Population and Family Size: As depicted in Table 5-12 below, the total population of the survey households is 100, with average family size of 4.7 people per household. Of these 100 members of households, 43 are male and 57 are female.

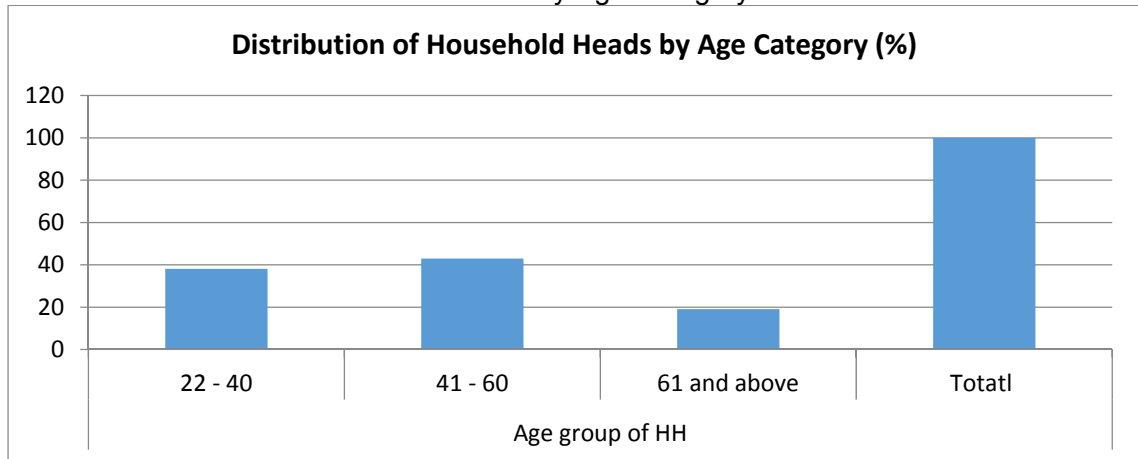
Table 5-12 Households' Population and Family Size

HH Size	Frequency	Household Population
2	2	4
3	3	9
4	4	16
5	6	30
6	3	18
7	1	7
8	2	16
Total	21	100
Average HH size		4.7
Total HHs Surveyed		21
Total HH Population		Male = 43 Female= 57 =100

Source: Field Survey Data, July 2018

Age Category and Marital Status of Household Heads: Chart 5-1 below illustrates the distribution of household heads by age category. The majority (about 43%) are in age range of 41-60 years, while 38% are between the ages of 22-40 years. Only 19% of the household heads are 61 and above years.

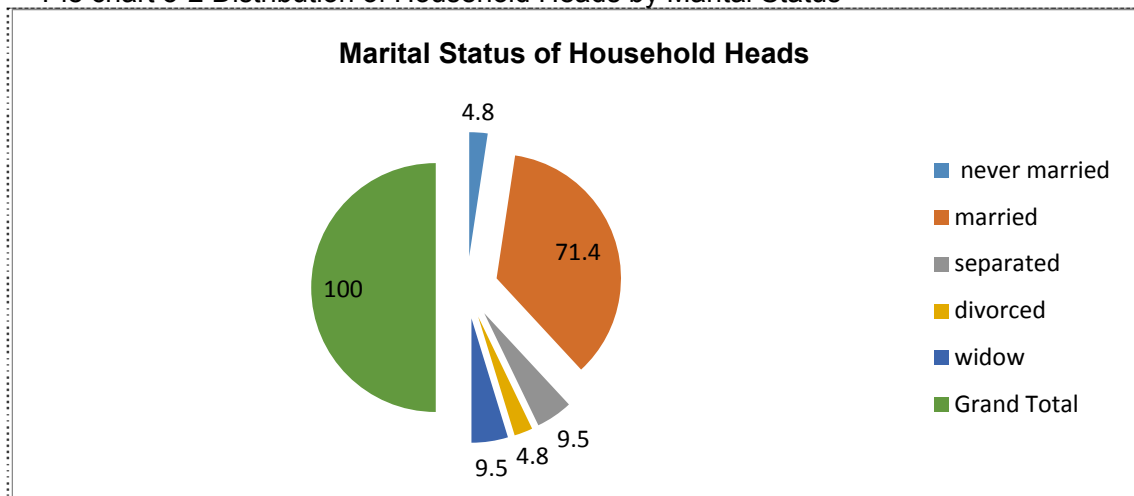
Chart 5-1: Distribution of Household Heads by Age Category



Source: Field Survey Data, July 2018.

Pie chart 5-2 below depicts the marital status of household heads. The majority (about 71% are married. Nine percent each are separated and widow. The rest 5% each are divorced and never married.

Pie chart 5-2 Distribution of Household Heads by Marital Status



Source: Field Survey Data, July 2018.

Educational Level of Households Heads: Self-reported literacy rate of household heads (for reading and writing) is 14%, whereas 24 % are illiterate. About 33% attended primary school, and 9% and 19% attended high school and preparatory school respectively. The details are shown in Table 5-13 below.

Table 5-13: Education level of Household Heads

Education level of HH head	Frequency (HH)	Percent (%)
Illiterate	5	23.8
Writing and reading	3	14.3
1 st cycle Primary School (1-4 th Grade)	1	4.8
2 nd cycle Primary School (5-8 th Grade)	6	28.6
High School (9-10 th Grade)	2	9.5
Preparatory (11-12 th Grade)	4	19.0
Total	21	100.0

Source: Field Survey Data, July 2018.

Health Status of Household Heads: Table 5-14 below presents the health status of the household heads. Accordingly, the majority (about 90%) reported healthy status, whereas one household was physically impaired and another one was chronically ill at the time of the survey.

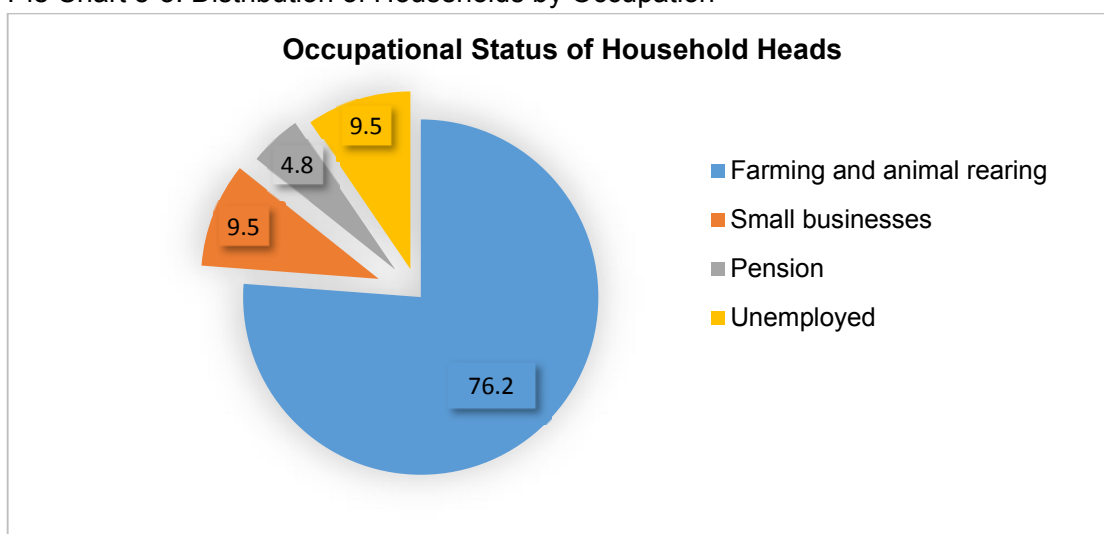
Table 5-14 Health Status of Household Head

Health status	Frequency (HH)	Percent (%)
Healthy	19	90.5
Physically impaired	1	4.8
Chronically ill	1	4.8
Total	21	100.0

Source: Field Survey Data, July 2018.

Occupation of Household Heads: Pie Chart 5-3 below depicts the occupation of the household heads. Accordingly, 76.2% of the household heads are engaged in farming and animal rearing, whereas two household heads were unemployed and one person was pensioner at the time of the survey.

Pie Chart 5-3: Distribution of Households by Occupation



Source: Field Survey Data, July 2018.

(iii) House Ownership and Housing Condition

House Ownership: As depicted in Table 5-15 below, 14 household heads have their own private house, whereas 6 households live in rented house. One household lives in a house without rent. The average room for the survey households is about 2. Of the total households, 9 households have less than 3 rooms; 5 have 3 rooms. 2-3 households have 4 or five rooms. Only one household has 14 rooms.

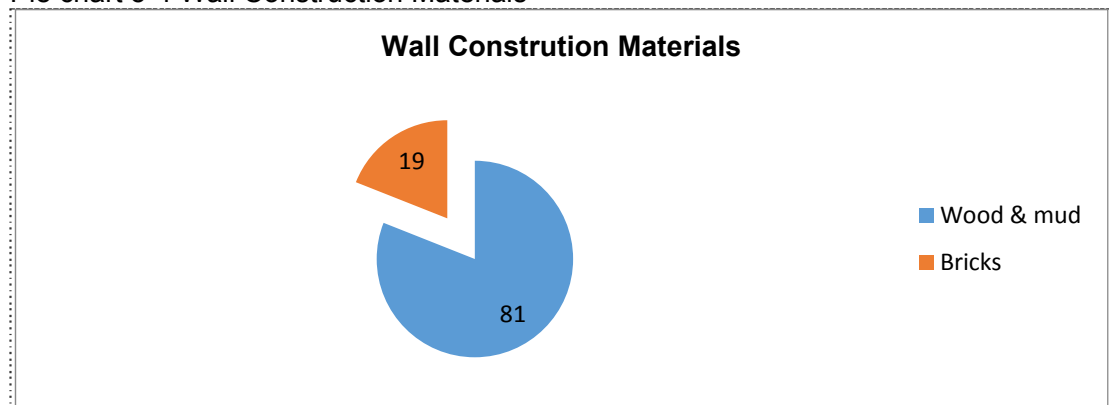
Table 5-15: House Ownership

House ownership	Frequency (HH)	Percent (%)
Privately owned	14	66.7
Rented house	6	28.6
owned without rent	1	4.8
Total	21	100.0

Source: Field Survey Data, July 2018.

House Construction Materials: As can be seen from Pie Chart 5.4 below, the walls of houses (81% of them) are made from wood and mud wall. Only four (19%) are made from bricks. All the roofs are made from corrugated iron sheet. Floors of seven houses are made from earth and rest 14 from cement concrete.

Pie chart 5-4 Wall Construction Materials



Source: Field Survey Data, July 2018

(iv) Kitchen and Toilet

Nineteen households have separate kitchens, whereas 2 households have kitchen inside the house. Regarding sanitation facilities, 13 households have private toilet, whereas seven households use public toilets. Only one household uses open field.

(v) Sources of Drinking Water

Nine households use public tap, whereas another nine households have private tap. Only one household purchases water from private tap. Two households use well water as source of water. The main problems of source of drinking water are interruption (81%); poor quality (9.5 %) and queuing (9.5%).

(vi) Source of Lighting and Cooking

Twenty households use electricity, and one household use solar for lighting. The main source of cooking is electricity (66%); followed by charcoal (24%) and firewood (10%).

(vii) Income and Expenditure

Income Sources of Households: As depicted in Table 5-16, the main income source for households is crop production which accounted for about 51% of the total income. This income source is followed by income from house rent accounting for about 22%, and trade for 8% of the total income. The average annual income earned from all income sources is 45833.33 Birr.

Table 5-16 Household yearly income from different sources

Source of HH Income	Birr	Percent
Agricultural and related activities	489,700	50.9
Livestock production and related activities	38,000	3.9
Trade	74,500	7.7
Handcraft	28,000	2.9
House rent	209,100	21.7
Daily labor	24,000	2.5
Employment	99,200	10.3
Total Income	962,500	100.0
Average income	45833.33	-

Source: Field Survey Data, July 2018.

Annual Expenditure: Table 5-17 illustrates annual expenditure on different items. Expenditure items in their order of importance were food, clothes and medical care. The amount of money spent by all households on these items was 426,200 Birr, which accounted for 62% of the total expenditure. Other expenditure items in their order of importance include house rent, education and social expenses which account for 9%, 8.6% and 8.4% of the total expenditure respectively. The average annual expenditure for the survey households is calculated at 32,891 Birr.

Table 5-17 Household Annual Expenditure on different items

List of items	Total (in Birr)	Proportion n for the total (%)	Average annual Expenditure
Household expenditure on food, clothes and medical care	426,200	61.7	20295.2
Expenditure for education	59,100	8.6	2814.3
Farming and livestock production activities	49,840	7.2	2373.3
Renting house	61,700	8.9	2938.1
Social activities (holiday, Idir...)	57,730	8.4	2749.0
Transport & communication	36,140	5.2	1721.0
Total expenditure	690,710	100.0	32891.0

Source: Field Survey Data, July 2018.

5.3.4 Public Utilities, Infrastructures & Other Assets Potentially Affected By the Project

There are several public utilities, infrastructures and other assets in the corridor of the overhead and underground transmission lines. Some of these may be affected during the construction of the transmission lines. Some of those assets are briefly described below.

5.3.4.1 Water Supply Pipelines

There are plenty of water supply pipelines ranging from primary lines to distribution systems along both the overhead and underground transmission routes. In particular the density of water supply network along the Black Lion-New Addis Centre-Gofa and Weregenu-

Connection Point 3 underground routes is high. Most of the pipelines run in parallel to the transmission routes while several pipelines cross the electric lines. The size (diameter) of the water pipelines crossed by the electric transmission lines range from about 13mm to 110mm. The water supply pipelines potentially affected during installation of the proposed underground transmission lines are shown in Annex 3-1.

5.3.4.2 Sewerage Lines

Similar to the water supply network, there are several sewerage lines in the corridor of the Black Lion-New Addis Centre-Gofa underground transmission route and only one or two sewer lines crossed by the Kaliti 1 - Gofa overhead transmission line. No any sewer line traversed or in the corridor of the proposed Weregenu – Connection Point 3 underground transmission route. Examples of the sewer lines crossed by the proposed electric transmission routes and that may be affected during construction of the electric lines are shown in Annex 3-2.

5.3.4.3 Main Roads and Access Roads

The proposed underground and overhead transmission lines traverse or run along the median of a number of main roads, most of which are mostly busy with high volume of vehicular traffic. In addition, they travel along or cross several access roads, most of which are built from cobblestone. The roads potentially affected by the proposed TLs are indicated below.

BLL – NADC UG TL: This route crosses one-way of the road from Mexico square to Diafrique Hotel and runs at the median of this road for 70m and crosses Mexico square. Then travels at the median of a two-way main road running from Mexico square to African Union Office through the Sudan Embassy for about 1km length.

NADC - Gofa UG TL: This route travels at the median of AU-Bulgaria road for 190m stretch and runs along a cobble stone access road of av. 5.5m wide for about 240m length. Then, it goes along an access road (old asphalt road) of 6-7m wide for about 500m length. Thereafter, it crosses the Sarbet-Kera main road and travels on RHS of this road following pedestrian walkway for about 620m, and follows a cobblestone access road for 350m stretch. The remaining section totally follows the route of the existing overhead TL, which is not yet built for road infrastructure except one main road and several access roads that cross the route. The TL crosses the Gofa Gebreal – Germany main road between the existing Towers 16 & 17 and one main access road (asphalt road) just after Tower 20. In addition, it crosses about 6 cobblestone built access roads between Towers 13 and 20. Moreover, a new two-way asphalt road is planned to be constructed by the Addis Ababa City Roads Authority (AACRA) between Tower 12 (Kera) and Tower 20 (Gofa Condominium area) on both sides of the existing overhead TL.

Weregenu – Connection Point 3 UG TL: This proposed UG transmission line runs at the median of the road from Ring Road (Anbessa City Bus Garage) to Jackros to Sahalet Mihret

Church. The road section followed by the UG TL is about 3.5km long and has several road junctions, two road intersections and one major square.

Kaliti 1 - Gofa OH TL: This overhead TL crosses four main roads and some access roads. The main roads are located between Tower (TR)-23 & TR-24, TR-28 & TR-29, TR-31 & TR-32, and TR-33 & Tr-34. In addition, a new two-way asphalt road is planned to be built by AACRA between TR-25 and TR-31 on both sides of the overhead TL.

5.3.5 Gender, Vulnerable Groups and Ethnic Minority

5.3.5.1 Households and Properties within 30m Corridor of Kaliti 1 – Gofa Overhead TL

Disaggregated data on gender by sub-city and Woredas is hardly available in offices visited by the study team. Yet the data obtained from the inventory of houses and other property types from the communities found within 30m corridor of the overhead TL indicated that about 27% of the households are female headed households.

The observations regarding vulnerable groups are concerned with the unemployed household heads mentioned in the above section (Pie Chart 5-3), the female headed households (Table 5-11) and physically impaired and ill persons (see Table 5-14).

As indicated in Table 5-3 in section 5.3.3.1 above, a total of 117 households were identified from the 30m corridor of the overhead TL. Of the 117 households, 32 (27%) were female headed households. As shown in section 5.3.3.2 above only 21 households were identified to be potentially affected (economic impact without involving resettlement) by the overhead TL as well as the underground TL as potential impacts on the remaining households are avoided through tower and transmission system design.

Of these 21 households, two were female headed households. These female headed households depend on their adult sons and relatives for labor and this may be the special needs of FHHs. But this relation would not be affected by the project. As the loss of land or assets would be very small, and proper compensation would be provided for this level of loss, they can cope with the effects of land take (loss of use right) for tower base of overhead TL or for temporary land take during construction of underground cables. In addition, detail survey of the 21 households indicated that one household head was physically impaired and another one household was seriously ill at the time of the survey.

Generally, except these groups, no any other vulnerable groups were identified to be affected by the project. In the preparation of Abbreviated RAP, special consideration will be given for the above-mentioned groups and women group. In addition, gender action plan or mitigation actions to be taken to mitigate gender related issues or impacts during implementation as well as operation phases of the project will be shown in the impact assessment and management plan sections.

Regarding minority ethnic group, the project affected sub-cities do not have any ethnic minorities or tribal people whose traditional life style would be compromised through the project activities.

5.4 Current Situation of Power Transmission and Distribution System

Power demand in Addis Ababa City is expected to increase from 800MW in 2014 to 3,600MW in 2034 mainly due to population increase and development plan. To cope with this rapid increase in power demand, active investment is being done in the power sector. As a result of such investments, a number of new power plants have started operation, and currently, the country has sufficient power generation capacity. In addition, power development utilizing the abundant hydropower potential is being carried out, which aims at acquiring foreign currency by exporting electricity to neighboring countries.

On the other hand, in the transmission and distribution field including substation, a remarkable deterioration has occurred owing to aging and a shortage in supply has occurred due to insufficient maintenance and investment. For example, as per the data after January 2015, there has been a poor quality of supply with an average of 42 times power outage per week because of cable disconnection of 15kV distribution line and operation of substation's circuit breaker. And there is a decrease in service quality as around 20,000 customers are waiting for electricity connection.

To cope with further economic growth, improvement of distribution and transmission network in Addis Ababa is an urgent issue for the power sector in Ethiopia. In addition, consistent and balanced counter measures in the fields of substation, transmission and distribution are important in order to expand the facilities efficiently and effectively.

The transmission lines, substations and distribution network described in Chapter 4 are among the old transmission and distribution systems that need rehabilitation and upgrading in order to alleviate the existing frequent power outages and meet the current and future power demand of the city.

6. STAKEHOLDER AND PUBLIC CONSULTATION PROCESS

6.1 Introduction

The Ethiopian Constitution gives the right to people to be consulted and participate in the planning and implementation of programs and projects that would affect them. The Ethiopian EIA Guideline Document also recognizes that interested and affected parties are key to a successful EIA and are responsible for providing input and comments at various stages in the EIA process.

Early engagement provides a valuable opportunity to influence public perception and set a positive attitude with stakeholders. It is an opportunity to generate ideas and alternative solutions at the design stage. Furthermore, the consultation process is required to fulfil

international funding agency guidelines such as the JICA Guideline.

Stakeholder engagement was conducted for the Kaliti 1 - Gofa overhead transmission line (TL), and Black Lion – New Addis Centre – Gofa and Weregenu – Connection Point 3 underground TLs as well as the substations connected by the TLs. Accordingly, formal consultations and focus group discussions were carried out with key stakeholders of the sub-cities and woredas as well as the communities affected by the aforementioned project components. Four formal consultations with key stakeholders of four sub-cities and ten woredas, and five consultations with project affected communities have been conducted. In addition, consultation was held with officials of a number of relevant agencies including the Addis Ababa Water Supply and Sewerage Authority (AAWSSA), Addis Ababa City Roads Authority (AACRA) and Addis Ababa City Road Traffic Management Agency (AACRTMA).

The main issues discussed during the stakeholder consultation meetings include the following:

- Stakeholders awareness or information about the proposed project before the meeting,
- Stakeholders experience of similar projects, if any,
- Potential project impacts or concerns about the proposed project activities,
- Mitigation measures to be considered during the project design/preparation and implementation stages, and
- Any other relevant issues.

Following brief introduction about the proposed project activities by the Consultant's team, the participants of the meetings including community leaders and representatives of the affected communities, sub-city and woreda officials and experts, officials and experts of sector offices mentioned above thoroughly discussed on the above listed issues and provided valuable information and opinions. Summaries of the key findings of the stakeholder consultations are presented in the following sections. Minutes of meeting was taken for each consultation and the minutes are attached in Annex 5. In addition, sample photos that show the consultation meetings are presented in Annex 6.

6.2 Summary of Key Issues /Concerns Raised and Responses

The potentially affected communities and key stakeholders raised several questions, issues and concerns. The key issues/concerns raised, the actions or mitigation measures proposed to address the issues, and the responses provided by the ESIA Team are summarized in Table 6-1 below.

Table 6-1: Key Issues and Concerns Raised, Actions Recommended and Responses

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
I. Communities Affected by Overhead TL (Consultations held with 4 communities in 3 Woredas – Woredas 4 & 7 of Akaki Kaliti SC & W. 11 of Nifas Silk Lafto SC)		
1. Displacement of households living within 30m corridor of the TL		
<p>As a development project they do not oppose the project. However, there are many households that have constructed residential houses within the 30m corridor of the TL and lived there for many years. They were very much concerned about displacement from the area as they don't have alternative houses that could be used for residence or sources of livelihood. Displacement will cause economic, social and psychological problems to affected people.</p> <p>Displacement will cause loss the social capitals that they had established with their current communities.</p> <p>On the basis of the existing government laws and regulations the compensation that would be paid for eligible properties and land use right would be inadequate.</p> <p>Displacement without any compensation for households that don't have legal documents of land holdings,</p> <p>Land replacement only wouldn't be enough to restore the affected houses or other assets as the affected people don't have capital to construct new houses.</p>	<p>Strongly requested the city government and EEP to arrange alternative residential houses and provide adequate support that would help them to restore their sources of livelihood if they have to be relocated from the 30m corridor of the TL.</p> <p>Payment of fair compensation for affected properties that would be adequate to replace the lost properties</p>	<p>The ESIA team explained to the participants that EEP and the Design Consultant will make possible efforts to avoid or minimize displacement of households from the 30m corridor through tower design and other mitigation measures. However, if this wouldn't be achievable, the Study Consultant will develop a resettlement action plan (RAP) that will consider the proposal given by the participants; RAP will be implemented in coordination with the concreted sub-city government.</p>
2. Loss of existing livelihood sources due to displacement		
<p>Loss of employment, income generation activities or other sources of livelihood.</p> <p>Relocated people may not be able to restore their livelihood or the current living standard if infrastructures (like road, water supply, market) and social services (schools, health) development in the new settlement area is poor or inadequate, which is the case for most new settlement sites.</p>	<p>For the people earning their livelihood from pity trade and renting their houses, alternative sources of livelihood should be created for them at the new settlement area or at reasonable distance from where they live.</p>	
3. Impacts on community access roads and public utilities		

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
<p>Existing cobblestone roads could be damaged during the project construction period.</p> <p>Potential damages to public utilities (like electric distribution lines, water supply systems, telephone lines) found within the 30m corridor and other project operation areas such as access roads and materials stockpile or laydown areas.</p>		<p>The project will repair any damages caused to community access roads. Impacts on public utilities will be minimized and any damages repaired properly through consultation with the service providers.</p>
4. Impacts on vulnerable groups		
<p>There are a number of vulnerable groups within the 30m corridor and these include female headed households, old people and economically poor people. These would become more vulnerable if they were displaced from their current residences.</p>	<p>Provision of additional support for the vulnerable groups to help them to reconstruct replacement houses or provide built houses and to restore their livelihood.</p>	<p>The proposed action will be considered in ARAP if the project will involve resettlement of such groups or impacts on livelihood of those groups.</p>
5. Community support to or cooperation with the project		
<p>The participants expressed that they would fully support the proposed project as far as they would be provided with adequate compensation for what they would lose and supported in restoration of their means of living.</p>		<p>The ESIA team well noted the participants' concerns about potential displacement of people and loss of livelihoods resulting from project activities. The issues will be well considered in the ESIA and in the design of the transmission system.</p>
II. Communities Affected by the Underground TL (Consultations held with representatives of communities in 3 Woredas – Woredas 5 & 6 of Kirkos SC & W. 6 of NSL SC)		
1. Community support to or cooperation with the project		
<p>The participants expressed their willingness to support the project as it is expected to alleviate the prevailing electric power interruption in Addis Ababa city</p>		<p>The ESIA team appreciated their cooperation with the project and requested them to provide support to the project from design stage through operation phase</p>

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
2. Management problems in provision of electric power supply		
<p>Currently there are management problems with regards to provision of electric power supply to communities. In this regard they suggested that along with the improvement of the electric power supply there should be improvement in the management system of EEU that manages the electric power supply service to the users</p>	<p>The need to improve the management system of EEU along with the improvement of the electric power supply.</p>	<p>The ESIA team believes that EEU will consider their comments in the improvement of the Utility's management system.</p>
3. Loss of ornamental vegetation and impact on landscape		
<p>Construction of the proposed underground electric transmission line at the road median would cause removal of trees and other vegetation that have been planted and managed for beautification of the city. Loss of trees will reduce the beauty or aesthetic value of the area.</p>		<p>Maximum efforts will be made to avoid or minimize loss of ornamental trees and other vegetation during final route selection</p>
4. Impact of prolonged project construction period		
<p>Previous projects including installation of distribution lines by EEU or its contractors were extended much beyond the original schedule and didn't consider safety measures. As a result it has been common to observe open pits and electric poles laid at various places that caused accident risks to local people. Therefore, unless the current project is executed according to the project implementation schedule and in a professional manner, project activities are expected to cause accident risks to road users and the communities along the transmission route.</p>		<p>Considering the urgency of the project and the Financier policy, it is expected that EEP will give due to attention to facilitate completion of project construction of the within the original schedule by commissioning the project to competitive contractors and with diligent supervision mechanism.</p>
5. Impact on community access roads		
<p>Construction of the proposed underground TL is likely to cause significant damages to a cobblestone roads as well as asphalt paved access road found in Woreda 5 and W. 6 as the TL is proposed to run at the centerline of access roads or intersect them.</p>	<p>Carrying out construction of the TL within shortest possible period and repairing damaged road sections as soon as the construction works have been completed.</p>	<p>Damaged roads will be repaired upon completion of construction works.</p>
6. Safety of local communities during construction		

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
<p>The activities involved in the construction of the TL including operation of equipment and vehicles and excavation of trenches have the potential to cause accident risks to local communities unless necessary prevention measures were taken.</p>	<p>Before commencement of construction works, it is important to provide awareness creation on safety issues for the local communities so that they would be aware of potential risks and take necessary precautions to protect themselves from accident risks related to project activities while it would help to get acceptance and support from the communities.</p>	<p>The safety concern and the suggested measure were well noted. Safety of local communities will be given due attention and necessary mitigation measures such as awareness training for local communities and equipment operators and prevention of access to construction sites will be taken.</p>
<p>III. Officials of the Sub-cities and Woredas affected by the overhead transmission line</p>		
<p>1. Impacts on health and safety of people living under the existing TL</p>		
<p>There will be safety risks to local people living under the existing TL both during construction and operation phases, There could be health impacts on the local people living within the right-of-way of the TL due to long term exposure to electromagnetic fields (EMF)</p>	<p>Relocation of the people living within the right-of-way of the TL to safe places through local government and project support.</p>	<p>The potential impacts of the project on health and safety of local people will be assessed in detail and appropriate mitigation measures proposed. The possibility to minimize impacts through system design will be explored.</p>
<p>2. Displacement of people residing under the existing overhead TL and problems associated with resettlement</p>		

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
<p>There will be potential displacement of people from the TL right-of-way due to demolition of housing units – there are many houses most of which are low standard and illegally constructed. Economic and social problems to the displaced people due to low economic status of the majority of the affected people and inability to re-construct the affected structures unless they are supported by the city government or the electric project. Social disruption of the PAP due to separation from the community they had established different social links. From experience, the people resettled to new settlement areas face several problems such as lack of potable water supply, electric power, access road, and health and education services. The existing government laws and regulations on compensation and land replacement matters apply only for people who have legal entitlement of landholding and properties. Therefore, as the majority of the potentially affected people don't have land or property certificate, the local government and the power project would face a major problem in relocating the people and keeping the RoW free of settlements unless special considerations would be taken. Disruption of social and economic interactions of the PAP if they were relocated to places far from the current location or community.</p>	<p>Implementing compensation, land replacement and/or restoration measures for the PAP who are eligible for compensation as per the relevant government laws and regulations. Provision of special consideration and support for the affected people who have no legal rights of land ownership and properties located within the project right-of-way esp. for the poor households, elders and female headed households who don't have the capacity to arrange alternative residential houses or means of living.</p>	<p>EEP and the Design Consultants will make maximum efforts to avoid or minimize displacement of people through transmission system design. Resettlement would be the last resort.</p>
<p>3. Impacts on community access roads, public utilities and new road construction works</p>		
<p>There will be potential damages to access roads mainly cobblestone roads due to operation of heavy equipment and vehicles during construction of the TL, and this situation may affect the economic and social activities of the road users. Excavation works for construction of the TL may cause damages to water supply lines and interruption of water supply. AACRA is in preparatory stage to construct a new asphalt road between Tower-25 & TR-31 of the existing TL. The AACRA's plan is to build a new road on both sides of the TL most likely within the right-of-way of the TL.</p>	<p>EEP to contact and discuss with AACRA's authorities to avoid conflicts between road construction and the TL due to overlap of right-of-way. Considering the tubular type pylon for the TL project as it would occupy much less space than the normal tower (lattice type).</p>	<p>Damaged roads will be repaired upon completion of construction works and the costs of road maintenance will be covered by the project or EEP. Care will be taken during design as well as construction time to avoid or minimize damages of public utilities, and</p>

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
		<p>unavoidable damages will be repaired by the service providers while EEP will cover the costs.</p> <p>The ESIA team will provide EEP with the information about the AACRA's plan to build a new road along the TL, and advice EEP to contact AACRA & discuss about the issue.</p>
IV. Officials of the Sub-cities and Woredas affected by the underground transmission lines		
1. Experience of previous projects of similar nature		
<p>The sub-cities and Woredas officials had experiences of many previous projects of similar nature including road construction, urban renewal development, water supply and sewerage constructions, etc. that been carried out in the sub-cities and woredas. Main problems observed during the implementation of those projects include obstruction of access to residential, business & social services etc. areas; impediment to traffic movements contributing to traffic congestion and increased traffic accidents; safety risks at excavation areas; dust and noise pollution; extended construction period related to design changes, capacity of contractors, etc., which means extension of project impacts much more than what has been expected.</p>		<p>Appreciated the participants for sharing such information and this will be a lesson for the TL project for assessing the significant impacts and designing appropriate mitigation measures.</p>
2. Positive impacts of underground transmission lines		
<p>Electric towers, poles and lines affect the scenery of the city. Thus, replacing the existing overhead transmission lines with underground lines will have a positive impact for the city's landscape.</p> <p>Besides the landscape value, UG TL is preferred to overhead TL as it would avoid the land requirement for tower base and the safety risks caused by overhead transmission line.</p>		<p>One of the objectives of considering UG TLs is to improve the landscape of the AA city through removal of existing towers, poles & electric lines and avoidance of construction of new overhead TLs.</p>
3. Impacts on drainage facilities and increased risks of flooding		
<p>The corridor of the BLL – NADC – Gofa UG TL is among parts of the city subject to flooding problem during the rainy seasons due to substandard or old drainage facilities, increased intensity of rainfall and increased</p>	<p>Considering the location of existing drainage facilities during construction works and taking care to safeguard the facilities.</p>	<p>The recommended action will be considered in the project design and implementation. The</p>

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
<p>rate of surface runoff. Implementation of the envisaged UG TL may aggravate the problem due to damaging of drainage pipes during construction.</p>		<p>drainage systems intersected by the UG TL will be identified during the detail design so that mitigation measures will be included in the project implementation. Scheduling construction for dry season and replacement of affected facilities by new ones will be among the mitigation measures.</p>
<p>4. Impacts on existing main roads & access roads plus a planned road project</p>		
<p>Construction of the proposed UG TLs is expected to cause damages to existing roads intersected by the TLs at many locations and to the road lane adjacent to the medians with narrow width; for example the median of the road followed by the Weregenu – Conn. Pt-3 is only 0.90m wide and this width wouldn't be enough install the proposed electric cables.</p> <p>Construction of the proposed NADC – Gofa UG TL is expected to cause damages to several access roads (cobblestone roads) that have been constructed through community participation. This situation can bring complains from the local communities or users of the roads.</p> <p>AACRA is in preparatory stage to construct a new asphalt road between Tower-13 & TR-20 of the existing TL that is from Kera to Gofa Condominium houses. The AACRA's plan is to build a new road on both sides of the TL most likely within the right-of-way of the TL.</p>	<p>Restoration of the damaged sections or spots of existing roads progressively upon completion of the construction works of the UG TLs.</p> <p>EEP to contact and discuss with AACRA's authorities to avoid conflicts between road construction and installation of UG TL due to overlap of right-of-way.</p>	<p>The ESIA team appreciated the proposed mitigation measure and indicated that it will be included in the ESMP. As indicated above the costs of road maintenance will be covered by the project or EEP.</p> <p>The ESIA team will provide EEP with the information about the AACRA's plan to build a new road along the TL, and advice EEP to contact AACRA & discuss about the issue.</p>
<p>5. Impacts on public utilities</p>		
<p>Excavation works for installation of underground cables may cause damages to water supply, telecommunication and underground electric lines, and interruption of the supply of those utilities to users.</p>		<p>Care will be taken during design as well as construction time to avoid or minimize damages of public utilities, and unavoidable damages</p>

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
		will be repaired by the service providers while EEP will cover the costs.
6. Impacts on ornamental trees and other vegetation or green area developed at road medians		
Installation of the BLL – NADC UG TL may cause significant damages to ornamental trees and other vegetation or as a whole to a well-developed green area at a road median of 4 to 8m wide.	Considering the option to locate the transmission route outside of the green area like under road carriageway, or if this option is not practicable, locating it on either side of the median thereby avoiding or minimizing the impacts on ornamental trees that are mainly located at centerline of the median.	The possible mitigation action proposed by the participants was well-noted and it will be considered during the detail design stage.
Construction of the Weregenu – Conn. Pt-3 UG TL is expected to involve removal of the trees and shrubs planted at the road median for aesthetic value, carbon sequestration and traffic safety by breaking traffic light.	Replanting of trees to compensate for the trees removed; trees should be replanted elsewhere in consultation with the Bole SC Beautification, Parks & Cemeteries Office (BPCO) while shallow rooted shrubs and other plants can be planted above the cables.	The recommended mitigation measure will be included in the ESMP and costed for. EEP and Bole SC BPCO will make formal arrangements for implementation of the action before commencement of construction.
7. Air and noise pollution during construction phase		
Project activities that would involve operation of heavy equipment, plant and vehicles to execute construction works such as excavation of trenches, drilling in ground or rock, and transport of materials are likely cause significant air and noise pollution problems.	Taking all appropriate measures to reduce air and noise pollution problems during construction period to acceptable levels.	Potential air and noise pollution problems are among the issues that will be assessed in the ESIA study and appropriate mitigation measures provided.
8. Impacts on road traffic and safety		
The project construction works are expected to cause disruption or obstruction of traffic movements and increase accident risks to vehicular traffic as well as pedestrians unless sufficient mitigation measures were taken.	Implementation of sufficient safety measures at construction sites like fencing of risky areas, posting of clearly visible safety signs or , and implementation proper	The ESIA team noted the proposed actions and will include them, among other mitigation measures, in the ESMP.

Key Issues and Concerns Raised by Communities & Other Stakeholders	Actions Recommended by Stakeholders	Responses Provided by the ESIA Team
	traffic management plan including provision of alternative routes.	
9. Spoil materials management		
The project is expected to generate significant excavation or spoil materials that may cause environmental pollution, access and safety problems etc. unless properly collected and disposed of at approved disposal sites.	Proper management of excavation or spoil materials through timely collection and disposal of the materials at approved disposal sites.	The issue and proposed mitigation was well noted, and it will be included in the ESIA & ESMP.
10. Quality of design study and capacity of contractors		
Lack of sufficient design study, poor planning and management of construction works, and low capacity of construction contractors are among the main causes of poor performance for many existing and previous infrastructure projects in the city. This situation may not be exceptional for the TL project unless necessary precautions are taken in time.	Conducting sufficient design study, recruitment of contractors proved to be technically capable to execute the construction works and arrangement of capable supervision consultant.	The ESIA team well noted the notice and recommendation, and believed that EEP will consider the recommendation in the design of the project, procurement of contractors and supervision consultant.
11. Coordination with key stakeholders		
It is imperative to work in close consultation with authorities or agencies responsible for development and operation of road infrastructure and utilities such as the Addis Ababa City Roads Authority (AACRA), Addis Ababa Water Supply and Sewerage Authority (AAWSSA), Ethio-Telecom and Ethiopian Electric Utility (EEU) to minimize impacts on roads and utilities and mitigate where avoidance of damages is not feasible.		The recommendation was well noted and it will be included in the ESMP for EEP/PIU to consider from the preparation for construction stage through post-construction period.
12. Support for the implementation of the project		
Finlay, the consulted officials were very happy about the project and disclosed that they will provide all necessary support for the successful implementation of the project. They believed that implementation of the project will contribute a lot to permanently solve the existing high rates of power interruption in the city.		The ESIA team appreciated the participants for expressing their willingness to support the project.

7. ANALYSIS OF ALTERNATIVES

For the 132 kV transmission lines between New Addis Center and Kaliti-1 Substations, three alternatives have been identified and compared in terms of their significance or preference with respect to the following criteria:

- Consistency with city planning,
- Impact on natural environment,
- Impact on social environment, and
- Project cost.

Description of the proposed alternatives and their comparison with respect to the above indicated criteria are shown in Table 7-1 below.

Table 7-1: Comparison of proposed alternatives for 132 kV transmission lines between NDC and Kaliti-1 Substations

Item	Alternative 1	Alternative 2	Alternative 3
Outline/ description of the alternatives	Overhead transmission line (8.7km) and Underground transmission line (4.2km) are combined: underground transmission line between NADC and the connection point at Gofa substation, plus overhead transmission line between the connection point at Gofa substation and Kaliti-1 substation	Overhead transmission line (11km) is applied for all sections between New Addis Center substation and Kaliti-1 substation	Underground transmission line (13km) is applied for all sections between New Addis Center substation and Kaliti-1 substation
Consistency with city planning	Alternative 1 is consistent with the city planning.	According to the Addis Ababa City Planning, it is not allowed to construct new overhead transmission lines in the center of AAC.	Alternative 3 is consistent with the city planning.
Impact on natural environment	Temporary impact on the surrounding environment is expected during the construction such as noise and vibration. On the other hand, no impact is expected during the operation.	Temporary impact on the surrounding environment is expected during the construction such as noise and vibration. On the other hand, no impact is expected during the operation.	Temporary impact on the surrounding environment is expected during the construction such as noise and vibration. On the other hand, no impact is expected during the operation.
Impact on social environment	No involuntary resettlement and land acquisition is expected because the construction is done within	No involuntary resettlement and land acquisition is expected because the construction is done within	Involuntary resettlement of illegal residents within the existing ROW is expected assuming that construction

Item	Alternative 1	Alternative 2	Alternative 3
	the existing ROW. Impact on traffic is predicted during the construction. In the operation stage, the landscape is maintained in the city area by applying underground cable.	the existing ROW. In case some residents live within the site of existing tower base, resettlement is required. Since the overhead line passes through densely populated areas, some illegal residents will be temporarily affected. Impact on traffic is also predicted during the construction.	is done within the existing ROW. Impact on traffic is predicted during the construction. In the operation stage, the landscape is maintained by applying underground cable.
Project cost	The project cost is lower than Alternative 3, because the distance of underground transmission line is shorter.	Compared with Alternative 1, the project cost is relatively low, because Alternative 2 does not include the construction of underground cable.	Compared with Alternative 1 and 2, the project cost is very high, because the construction of UG TL is much more expensive than that of overhead transmission line.
City planning	⊙	×	⊙
Natural environment	○	○	○
Social environment	⊙	×	⊙
Project cost	○	⊙	×
Evaluation	⊙ (Alternative 1 is recommended from the viewpoints of environmental and social impacts and project cost)	×	×
		(Alternative 2 is NOT recommended from the viewpoints of city planning and social impacts.)	(Alternative 3 is NOT recommended from the viewpoints of social impacts and project cost.)

Conclusion and Recommendation:

Alternative 1 is acceptable from the viewpoints of environmental and social impacts as well as city planning and project cost. Therefore, this alternative is recommended to be considered for the proposed construction of 132 kV transmission line between New Addis Center and Kaliti-1 substation.

8. ANTICIPATED SOCIO-ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

8.1 Introduction

In this section the potential adverse impacts on the physical, biological and socio-economic environments are identified and their significance is analyzed. The impacts caused by the construction and operation of the project components are evaluated for their type (beneficial/adverse), effect (direct/indirect), duration in time (short-/medium-/long- term), geographical extent (localized/extensive), magnitude (low/medium/high), and sensitivity (low/medium/high). Details of the impact characterization and evaluation are presented in Annex 4.

The identification of impacts resulting from the construction and operation of the project facilities takes into consideration and brings together the project characteristics and baseline environmental and social settings with the aim of ensuring that all potentially significant environmental impacts (beneficial or adverse) are identified and their significance taken into account in the ESIA process.

The combination of the above parameters have been summarized in an all-encompassing measure of “significance”, which is the basis for impact assessment and prioritization of mitigation. Corresponding to the significance of impacts, appropriate mitigation measures have been identified and proposed to prevent or reduce the adverse impacts to acceptable level.

8.2 Positive Impacts

8.2.1 Reliable Energy Supply and Cost Reduction

The main anticipated benefit of the rehabilitation and upgrading of the transmission and distributions network in Addis Ababa and surrounds is improved and reliable energy supply and distribution to residents and businesses in the capital city and environs. It is expected to improve the coverage of reliable power supply in urban and rural areas of Addis Ababa, thereby stimulating the economy and social service delivery in the impact area.

The overall impact of implementation of the current project is anticipated to be beneficial in respect of a more reliable, re-enforced and expanded energy supply to residents and businesses and will help service the rapid rate of new development within Addis Ababa city and its surrounds. Improved coverage and reliability of energy supply will also help improve mobile phone and internet services, which are currently impacted during interrupted supply.

Reliable electric energy supply will also reduce the costs and inconvenience associated with using substitute forms of energy supply. Frequent power outages force both households and businesses to switch to diesel generators, kerosene lighting and even candles. These

substitutes incur additional expenses, risks and inconvenience to the users. Businesses which cannot afford reserve energy sources are often forced to close during power disruptions resulting in lost production while still incurring cost of labour and overheads.

Generally the current project is an important part of the AADMP projects and programmes that are expected to have major, long term socio-economic indirect beneficial impact for Addis Ababa as a whole.

8.2.2 Impacts on Local Economy and Employment

Implementation of the project is expected to bring a positive impact on local economy through creation of employment opportunities for unskilled, semi-skilled and skilled labour that will be sourced within Addis Ababa including from the local communities.

To enhance this positive impact, it is recommended that that EEP will encourage the contractor(s) to hire workers from local project affected communities based on skills of the people. In addition, EEP in cooperation with local stakeholders and contractors will provide trainings for people who have potential skills that can be used in this project as well as in future projects.

8.2.3 Impacts on Women

Implementation of the project is expected to create employment opportunity for women through direct employment and engagement in small businesses around the construction sites. Both women as well as men will benefit from the short term, local employment opportunities created during the construction phase. It is common to see women working as daily laborers, time keepers, store keepers and other positions. Therefore, women can benefit from employment during the construction phase.

It is also anticipated that there will be indirect benefits to women as they can actively engage in different income generating activities through sales of goods and services to the construction workers. It is evident that a number of catering services, coffee and tea shops, restaurants, kiosks and bars around many construction project sites are mainly managed and run by women. The participation of women in such income generating activities could increase their income and help them to empower themselves economically.

8.2.4 Landscape and Visual Impact

Demolishment of the existing towers and overhead transmission line along the ADC (Mexico square) - Gofa route and replacement with underground cables will have a positive impact on landscape.

8.2.5 Benefits of Underground Cables over Overhead TL

Underground transmission lines have a number benefits over overhead TLs. They have the potential to reduce outages, maintenance cost and transmission losses. They create less

visual impacts and other environmental impacts. They emit no electric field, require a narrower band of land to install thereby minimizing the requirement for land acquisition, and they are less susceptible to the impacts of severe weather.

In addition, underground cables are inherently safe as they are insulated, electrically shielded, and out of the way. Underground transmission poses very little risk as there is no electrocution hazard for people or wildlife; no collision hazards for birds; no risk of line exposure from traffic collisions; and no fire risk to people, wildlife, nature or homes from arching lines during windy conditions.

8.3 Negative Impacts on Physical Environment

8.3.1 Impacts on Air Quality

It is expected that during construction there will be some impacts on air quality resulting from dust emission caused by movements of vehicular traffic on unpaved roads and earth moving activities as well as exhaust emissions from construction vehicles and equipment. In general construction activities including cutting in soil, moving, loading and unloading of materials will be carried out at small scale for a short duration at discrete locations across a wide area for the overhead transmission line and linearly extensive location for the underground transmission lines. It is anticipated that air quality impacts will be generally minor, localized and temporary for the overhead TL and moderate, localized and temporary for the underground TLs.

Considering the limited scale and duration of the construction works, the distance of project site/ activities from sensitive receptors such as residential and commercial areas as well as social services (schools), the significance of air quality impact is assessed to be minor for the overhead TL and Feeders, and moderate for the underground TLs.

Impacts on air quality are expected to be negligible to minor during operation period.

Proposed mitigation measures

Impacts on air quality will be minimized by implementing the following mitigation measures:

- Implementing measures that will reduce dust from construction activities including spraying water on unpaved access roads, exposed earth and any stockpiles on site to suppress dust emission, and where feasible, covering over stockpiles on site with plastic materials;
- Setting speed limits for vehicular traffic operating on unpaved access roads esp. in the vicinity of sensitive areas (residential and business areas, social services, religious places) and enforcing the limit to reduce dust emission;

- Switching off equipment and vehicles when not in use to avoid the release of emission of pollutants;
- Regular maintenance of diesel powered equipment and vehicles to reduce excessive exhaust emissions; and
- Avoidance of burning of combustible, non- hazardous wastes at nearby sensitive areas including residential and commercial areas, institutions and social services (schools, health facilities) etc.

8.3.2 Noise and Vibration

The operation of plant and heavy duty equipment and construction traffic on site and to and from the site has the potential to generate noise and vibration impacts on the nearby residents and properties. The activities that are expected to generate significant noise and/or vibration include:

- Operation of the traffic that will delivery construction materials to and from the lay down areas and to site;
- Open excavation works to install a conduit system for underground cables;
- Drilling of pipe jacking to install a conduit system for underground cables where an open excavation method cannot be applied like at the Mexico square and the crossing of major roads;
- The activities involved in the fabrication and construction of the towers and stringing of the lines; and
- The dismantling of the existing tower structures and decommissioning of the electric lines.

Based on the nature, scale and duration of the construction works, and the proximity of project site/ activities to sensitive receptors such as residential and commercial/ business areas, international & government organizations (like African Union, Sudan Embassy), various enterprises, social services (like schools), religious institutions (churches), the noise impact is assessed to be minor, localized and temporary for the overhead TL and Feeders, and moderate, localized and temporary for the underground cables. The number of sensitive receptors is particularly high along the BLL NADC – Gofa and Weregenu – Conn. Point 3 underground transmission routes as they are located in the highly built and densely populated parts of the Addis Ababa city.

No significant noise impacts are anticipated during the in-service period.

Proposed mitigation measures

Noise and vibration levels and their consequences should be minimized by applying a number of mitigation measures including the following:

- Use of modern mechanical plant, equipment and vehicles fitted with effective noise silencers/ mufflers and their regular maintenance to minimize noise levels;
- Switching off equipment and vehicles when not in use to avoid noise emission;
- Provision of ear protection equipment (earplugs) for workers in vicinity of noise emissions;
- Limitation of working time within extreme sound emissions and it should be in compliance with best practice guidelines; and
- Carrying out noisy construction activities in the vicinity of sensitive areas during normal working hours only.

8.3.3 Impacts on Soils

During construction project activities including site clearing and excavation for foundation of towers and poles, construction of sub-surface cables and construction of access roads to the overhead TL have the potential to cause damages to soil structure and expose the soil to runoff water erosion. It is expected that existing roads will be used for the whole section of the underground TLs and for most section of the overhead TL. However, new access roads may need to be constructed for the sections between Towers 35 and 40, and between Towers 47 and 52 of the overhead TL. Most of the Feeders are expected to be accessed through existing roads while some Feeders could be accessed through open field during dry periods.

In addition, project activities are likely to cause soil compaction during site clearing, excavation, ground-levelling and other earthworks by heavy duty equipment as well as due to movement of construction vehicles on earth tracks. Compaction of ground surface can lead to an increased rate of surface runoff as the water cannot infiltrate into the ground.

Moreover, there will be a risk of soil contamination from spillages of fuel from equipment and vehicles, and from poor handling of hazardous substances used on site such as paint, fuels or oils.

The impact of construction works on soils has been evaluated to be minor to moderate, localized and temporary without applying any mitigation measures.

During operation phase no significant impacts on soils are expected.

Proposed mitigation measures

Impacts on soils (soil erosion, compaction and contamination) will be minimized through the following mitigation measures:

- Carrying out land clearing (vegetation removal) and excavation works in the dry season only to reduce exposure of soil to runoff water erosion;
- Careful removal and proper stockpiling of the topsoil from the underground transmission routes, tower base of overhead TL, and access routes, and re-using it for site restoration when construction works are ended.

- Prevention of the stockpiles of topsoil from water or wind erosion by carefully depositing the soil at areas away from any water channel and by covering with plastic sheets where possible;
- Keeping vegetation clearing to the imperative area required for the construction works.
- Keeping vehicles on defined access tracks to avoid soil compaction and impairment of its use for agriculture and other purposes.
- Reducing the time exposed surfaces or excavated soils remain bare following completion of works by scheduling construction works and restoration measures so that large areas of soil or large volume of excavated soil are not laid bare.
- Reinstating temporarily used access roads to productive state by removing any pavement materials, ripping compacted soils and spreading topsoil over the surfaces.
- Re-establishment of vegetation cover progressively as the construction works are completed through replanting or seeding of suitable grasses such as Kikuyu Grass (*Pennisetum clandestinum*) and Bermuda Grass (*Cynodon dactylon*), and shrubs that are capable of binding by increasing its shear resistance;
- Performing regular maintenance of construction equipment and vehicles in standard garages or properly demarcated servicing areas designed to contain fuel and oil spillages;
- Undertaking re-fueling of equipment and vehicles at standard fuel stations or properly designated dispensing points of fuels and lubricants provided with drip pans or other facilities for catching any spills available;
- Availing appropriate facility to capture and contain any spills both on construction and operational sites;
- Proper storage and handling of hazardous substances (oil, fuel, used oil, paints, cement etc.) to avoid water and soil pollution by accidental spillages;
- Avoidance of leakages from vehicles and equipment by regular and effective maintenance;
- All wastes and hazardous wastes generated through the use of substances like fuel, engine oil and lubricants shall be properly collected, separated according to their waste type and properly disposed of in compliance with the applicable national laws and guidelines or best practice guidelines; and
- Insulating oil as well as transformers will be set in the metal box.

8.3.4 Impacts on Water Resources

During construction phase there will be a risk of surface water and groundwater pollution due to inadequate handling and spillage of hazardous substances such as fuel, oils and paints, and discharge of effluents or wastewater. In addition, there will be increased sedimentation of Akaki river and streams crossed by the overhead and underground transmission lines or running in the corridor of the TLs due to soil erosion from areas cleared off vegetation cover

and excavated for foundation of tower base or burying electric cables. This impact is likely to be small magnitude. There are no sensitive surface or ground water resources such as potable water supply sources within the project impact area that would be affected by the project activities.

The existing water quality of Akaki river and other streams in the project area is very poor owing to unrestrained disposal of municipal sewage, industrial wastes and solid wastes into the water bodies as well as urban runoff water entering the streams during the wet seasons. In comparison with the existing water quality of the streams in the project influence area, the impact of project activities on water quality is considered to be minor. The impact on water resources including water quality is anticipated to be minor to moderate.

Impacts on water quality impacts are expected to be minor during operation period.

Proposed mitigation measures

Potential impacts on water resources will be reduced by applying the following mitigation measures:

- Execution of excavation works and earth moving activities during the dry season only thereby minimizing erosion or transport of excavated materials by runoff water to water bodies;
- Taking maximum care during excavation works adjacent to or on the banks of streams to avoid excavation or earth materials from entering the water bodies;
- Avoidance of depositing excavation materials on the banks of streams and river where they could easily enter the surface watercourses;
- Performing maintenance of construction equipment and vehicles in properly designated servicing areas or garages;
- Undertaking re-fueling of equipment and vehicles at standard fuel stations or properly designated dispensing points of fuels and lubricants provided with drip pans or other facilities for catching any spills available.
- Availing appropriate facility to capture and contain any spills both on construction and operational sites;
- Proper storage and handling of hazardous substances (oil, fuel, used oil, paints, cement etc.) to avoid water and soil pollution by accidental spillages;
- Avoidance of washing equipment and vehicles in or near streams and river;
- Most of the mitigation measures proposed for the impacts on soils particularly the measures shown under bullets 6 to 13 are also applicable to avoid or reduce impacts on water resources.

8.3.5 Impacts on Landscape

Construction phase:

Removal of existing plantation trees and other vegetation found along certain sections of the underground routes and excavation works for laying underground cables have a negative impact on local landscape. In particular the corridor of the BLL – NADC and Weregenu – Connection Point-3 sections of the underground transmission routes contain significant number of potentially affected trees and shrubs that have been planted mainly for town beautification or landscape value (see section 5.2.1 for the details).

In addition, rehabilitation of a number of feeders is likely to involve removal of plantation trees found along the distribution lines. It was observed that in several locations larger trees interfere with the electric lines causing power outages. Figure 8-1 below illustrates an example of cutting roadside trees interfering with the electric lines dispatching from Weregenu substation and causing power outages. According to the Energy Directive No. EEA/1/2005, an overhead electric line with voltage not exceeding 33kV shall not be closer to vegetation in all directions than 2.5m distance. In order to avoid interference with electric lines thereby reducing power outages, it will be necessary to remove a considerable number of trees that have been planted on roadsides for town beautification. During detail design, where possible, efforts will be made to locate distribution lines outside of the areas covered by trees.

Operation phase:

Demolishment of the existing towers and overhead transmission line along the ADC (Mexico square) to Gofa route and replacement with underground cables will have a positive impact on landscape. On the other hand, permanent loss of existing plantation trees from the UG routes will be a negative impact as deep rooted trees and shrubs can't be replanted above the UG cables.

The impact on landscape is assessed to be minor to moderate, localized and temporary to permanent direct impact.

Proposed mitigation measures

Impacts on landscape will be reduced or mitigated through the following actions:

- Locating the BLL–NADC underground transmission route on one side of the median or under the last right lane of the carriageway where there is no any other utility. This option will save the trees located at the centreline of the median, which is mostly 6 to 8m wide;
- In areas where existing distribution lines traverse dense trees, where feasible, rerouting the lines to areas containing no trees or few trees;
- In areas where landscape has been affected due to removal of vegetation and excavation works, restoration of the affected sites through back-filling by materials excavated from the site during construction works, levelling and blending the site to surrounding terrain and spreading topsoil over the surfaces, and finally, re-establishing vegetation cover through replanting of suitable grasses and shrubs; and

- Upon completion of construction works, removal of all excess or leftover construction materials and wastes from the site and transporting to places where the materials can be used for another project or disposed of properly. Following removal of all materials, the stockpile areas shall be re-graded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation.



Figure 8-1: An example of cutting roadside trees that contact with electric lines and cause power outages.

8.3.6 Waste Management

Spoil materials excavated from foundation of tower-base of overhead TL and trenches of underground TL; surplus materials left from construction works; solid wastes from construction materials including metal and wood scraps, wires, papers, plastics, etc.; hazardous wastes like used oil filters and containers of oil and lubricants; and wastes generated from dismantling of the existing towers and cables are the main potential sources of solid wastes during the construction stage. Liquid wastes, including sewage, will generate from site workers camps and site offices, and hazardous wastes like used oil will emanate from use of engine oil.

The significance of wastes generated in relation to project construction activities has been assessed as moderate impact without any mitigation measures.

No significant wastes are expected to be generated during the operation stage.

Proposed mitigation measures

The project is required to establish appropriate solid and liquid wastes management system that includes, among others, the following practices:

- Avoidance of side-tipping of excavation materials on adjacent areas where it may affect road infrastructure, storm-water drainage systems, crops/croplands, trees and other vegetation or green areas through proper collection and dumping of the materials only in approved disposal sites, or through proper stockpiling and re-using it for rehabilitation works when construction works are over;
- Prohibition of littering and establishing routine clean-up at project sites and waste collection depots;
- Management of solid and liquid wastes generated during construction and refurbishment activities of the project in accordance with applicable waste management laws and regulations;
- Training of project staff in effective waste handling and management procedures.
- Collection of all oily wastes like used oil, used oil filters generated on site from equipment and vehicles with particular care in appropriate containment such as impervious or spill free containers and storing them in a bounded area. Similarly proper handling of empty containers of engine oil and lubricants with particular care until the final destination of the wastes for recycling or reuse; and
- Transferring of hazardous wastes to a licensed company/companies who has/have the capacity to dispose wastes according to national or international standards. Complete documentation of waste streams including types and quantities from origin until disposal shall be handed over to EEP/EEP's Representative/ Project Auditor.

8.3.7 Management of Abandoned Sites

Construction materials laydown areas, temporary access roads and construction campsites have potential impacts on land use, landscape/ aesthetic quality, drainage systems, erosion, etc. unless all the temporary structures and leftover materials are properly removed and site restoration measures are taken.

Proposed mitigation measures

Upon completion of construction works, all excess or leftover construction materials and wastes shall be removed from materials laydown areas and all project sites and transported to places where the materials can be used for another project or disposed of properly. Following removal of all materials, the stockpile areas shall be re-graded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation.

8.4 Negative Impacts on Biological Environment

8.4.1 Impacts on Protected Areas

There are three 'protected areas' within the impact zone of the Kaliti 1 – Gofa overhead TL, BLL – NADC underground TL and Feeder ALM-15-04; the details of these are shown in the baseline description (section 5.2.3).

Kaliti 1 - Gofa OH TL: About 200m length of the overhead TL crosses through a protected forest between Towers 23 & 24. However, the impact of the TL rehabilitation activities will be minor as the larger trees under the existing line have been removed and their regeneration from stocks or growth of new trees prevented through period clearing. Clearing and excavation for foundation of Tower 24 are expected to affect a few small trees, shrubs and other vegetation, but this impact is considered to be minor; Tower 24 is located at the southern edge of the PF. The impact on the protected forest has been assessed as minor, localized and temporary adverse impact.

BLL – NADC UG TL: The underground TL has the potential to cause damages to significant number of ornamental trees and shrubs that have been planted mainly for town beatification or landscape value assuming that the transmission route would be located at the centerline of the road median; Figure 5-4 illustrates parts of the green area. The impact on the green area esp. on ornamental trees has been assessed as moderate, localized and permanent adverse impact in the absence of any mitigation measures.

Feeder ALM-15-04: A short stretch (~200m length) of the Feeder crosses a small part of Tulu Korma Research Centre for Native Trees. Rehabilitation of the Feeder is likely to require removal of several indigenous trees assuming that the rehabilitation work would take place following the existing route of the distribution line. The impact on the Research Centre or indigenous trees has been assessed as moderate, localized and permanent negative impact without any mitigation measures.

No significant impacts are expected during the operation phase for all the three protected areas.

Proposed mitigation measures

Impacts on the protected areas will be avoided or reduced through the following mitigation measures:

- For the protected forest between Towers 23 & 24 of Kaliti 1 – Gofa overhead TL, following the route of the existing TL and taking maximum care during stringing of cables will avoid or minimize impacts on the forest;
- For the BLL – NADC UG TL, locating the transmission route either on one side of the median or under the last right lane of the road carriageway where there is no any

other utility. This option will save the trees located at the centreline of the median (separator) or totally avoid the impact on the green area;

- For the Feeder ALM-15-04 – shifting the section of the distribution line traversing the Research Centre to outside of the boundary of the Centre. The Centre can be avoided by shifting the line either to right hand side or left hand side.

8.4.2 Impacts on Ecosystem and Ecosystem Functions

There are no sensitive natural ecosystems in the corridor of the transmission lines and feeders other than those described in sections 5.2.3 and 8.4.1 above. Project activities are not anticipated to bring significant impacts on ecosystems or ecosystem functions. Thus, no mitigation measures required.

8.4.3 Impacts on Flora and Fauna

8.4.2.1 Impacts of Overhead Transmission Line

Construction phase: Site clearing during excavation for foundation of tower-base and during stretching/ stringing of electric lines is expected to cause removal of some trees, shrubs and other plant communities. With regards to impacts on fauna, project activities are likely to cause some disturbances to the habitats that support terrestrial and water birds and the birds themselves particularly in the areas along Akaki river (between Towers 23 & 24 and Towers 37 & 39) and around the liquid waste treatment plant located at nearby Towers 39 to 43. The impacts on flora and fauna during the construction phase are considered as minor, localized and temporary.

Operational phase: For safety of the transmission line and avoidance of increased risk of power outages through contact of trees with electric cables, uncontrolled growth of trees particularly taller trees like Eucalyptus and Grevillea trees that have the potential to grow to the height of the TL need to be removed permanently from the safe clearance zone. As per the Energy Directive No. EEA/1/2005, trees and other vegetation should be kept at a minimum distance of 13m from the overhead TL. As the majority of the birds occurring in the corridor of the OH TL are low-flying birds and the height of the line will be high enough, the risk of bird strike will be low. The impacts on flora and fauna during the operation period are considered as minor, localized and permanent.

Proposed mitigation measures

Impacts on flora and fauna will be minimized by following the route of the existing TL, taking precautions during stringing of cables and through tower design.

8.4.2.2 Impacts of Underground Transmission Lines

Construction phase: Excavation for laying underground cables will require removal of many trees, shrubs and other plants planted along the proposed BLL – NADC – Gofa and

Weregenu – Connection Point 3 transmission routes. During this assessment about 173 ornamental trees and 64 shrubs were identified from the road median proposed to be followed by the BLL – NADC – Gofa TL and these are potentially affected. About 85% of the trees and shrubs are found along the BLL – NADC section. 95% of the trees are exotic species while only 5% are indigenous trees. Similarly about 250 trees and shrubs are potentially affected from the road median followed by the proposed Weregenu – Conn. Pt 3 UG TL. The impacts on flora during the construction phase are predicted as moderate, localized and temporary to permanent direct negative impact. The impact on deep rooted trees and shrubs will be permanent as the plants can't be replanted above the UG TL.

The potentially affected trees include two tree species that are categorized by IUCN as Vulnerable species. These are *Araucaria heterophylla* and *Jacaranda mimosifolia*, which are introduced ornamental trees. Construction of the BLL – NADC TL along the centerline of the road median will affect about 92 Araucaria and 3 Jacaranda trees, which are small to medium in size. Therefore, impacts on those trees and other vegetation need to be mitigated through the measures proposed below.

As the habitats along the underground transmission routes are highly disturbed by noise pollution created by vehicular traffic, they don't contain significant faunal species including birds. The impact on fauna during the construction period is judged as negligible, localized and temporary.

Operational phase: For safety of the underground cables, deep rooted trees and shrubs shall not be replanted along the UG TL. Impacts on flora and fauna during the operation phase are considered as negligible.

Proposed mitigation measures

The impacts of the underground lines on flora will be mitigated by

- For the BLL – NADC UG TL - locating the electric transmission route either on one side of the median or under the last right lane of the road carriageway where there is no any other utility. The former option will save the trees located at the centreline of the median while the latter option will totally avoid the impact on the whole green area including the trees.
- If the above proposal wouldn't be practicable, implementing replanting of trees in another suitable area to be proposed by the Kirkos Sc Beautification, Parks & Cemetery Devt & Administration Office to compensate for the trees lost due to construction of the UG TL.
- If the BLL – NADC UG TL would cross through the protected green area at the road median, restoration of the greenery affected during construction of the line through replanting of shallow rooted shrubbery and herbaceous plants above the underground cables and on the rest of the median.

- For the Weregenu – Conn. Pt-3 UG TL - development of a protected green area above the underground cables through replanting of shallow rooted shrubbery and herbaceous plants to compensate for the trees lost and for aesthetic value of the site.

8.4.2.3 Impacts of Feeders/Distribution Lines

Construction phase: For several Feeders excavation for foundation of electric poles and stretching of electric lines are likely involve removal of a considerable number of trees, shrubs and other plant communities that are found along the feeders unless rerouting of the lines is considered. In addition, trees may need to be removed to provide a safe clearance corridor for the operational lines. The Feeders that are expected to cause significant impacts on vegetation include Sebeta-07, Gefersa-04, Addis Center-15, Weregenu-12, Cotobie-33, Sululta-15-03, Sululta-15-04, the feeders (5 in no.) transmitting from Addis Alem substation and the lines supplying from Debrezeyt-II substation. In most cases the potentially affected trees are dominantly exotic species including Eucalyptus, Grevillea, Cypress/Cupressus, Jacaranda, Australian beefwood/ Shewshewe, etc. In some places a number of indigenous trees are also potentially affected and these include *Acacia abyssinica* (Girar), *Millettia ferruginea* (Birbira), *Cordia africana* (Wanza), *Croton macrostachyus* (Bisana), *Albizia schimperiana* (Sassa), *Ficus sycomorus* (Sholla) and *Vernonia amygdalina* (Girawa). The impacts on flora during the construction period are evaluated as minor to moderate, localized and temporary to permanent.

The trees and other vegetation found in the corridor of several feeders are important habitats and nesting places for a variety of terrestrial birds. Loss or disturbance of vegetation means loss of habitats of birds. As the birds displaced from the affected areas could use the abundant remaining trees and other vegetation found in the routes corridor, the impacts on birdlife is considered to be minor, localized and temporary.

Operational phase: For safety of the distribution lines and avoidance of increased risk of power outages through contact of trees with electric cables, uncontrolled growth of trees need to prevented within the safe clearance zone. According to the Energy Directive No. EEA/1/2005, trees and other vegetation should be kept at a minimum distance of 2.5m from overhead electric lines with voltage of up to 33kV. The impacts on flora and fauna during the operation period are considered as minor, localized and permanent.

Proposed mitigation measures

Where possible, potential impacts of Feeders on trees and other vegetation and fauna will be reduced through rerouting/shifting the sections of the distribution lines running through areas containing dense trees or where trees contact with electric lines to areas containing no trees or few trees.

8.5 Negative Impacts on Social Environment

8.5.1 Involuntary Resettlement of Residents

Survey of the households and their properties found within 30m corridor of the Kaltiti 1 – Gofa overhead transmission line has identified 117 households within 30m corridor of the transmission line. Those households have illegally settled within the existing right-of-way of the transmission line. It is considered that none of these households will be required to be resettled as design of the TL will consider the minimum vertical distance from buildings and structures specified in the Ethiopian Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005). Similarly construction of the proposed underground transmission lines is not expected to involve resettlement of people as there are no residents within the clearance zone of the transmission lines.

Proposed mitigation measures

Resettlement of the households living within 30m corridor of the transmission line will be avoided through the following mitigation measures:

- Designing of the transmission line with the minimum vertical distance from buildings and structures specified in the Ethiopian Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005). According to the Directive, structures located with vertical distance of less than 8m from electrical lines are subject to resettlement.
- Avoidance of safety risks to the local people due to transmission line snapping through design, construction and operation of the electric line in such a way that the system would automatically break power transmission in case of any cable breaking due to man-made or natural hazards.

8.5.2 Loss of Farmlands, Crops and Grasslands

It was identified that 13 households will permanently lose a small part of their farmland holdings and grasslands due to land taking for tower-base of the Kaliti 1 – Gofa overhead TL. The total area of the potentially affected cropland is 1130 meter square (0.113 ha) of which 995 m² is rain-fed farmland and 135 m² is irrigated farmland. The croplands are owned by 11 households, and the affected farmlands is only 0.2 to 2.6% (av. 0.6%) of their total farmland holdings. In addition, 64 m² of grassland owned by 2 households is potentially affected by tower-base. Eight (73%) of the potentially affected farmers grow cereal crops dominantly wheat and teff through rain-fed cultivation while the rest three farmers grow vegetables including tomatoes, spinach (*Kosta*) and kale (*Abesha Gomen*) mainly through irrigation, but also through rain-fed cultivation.

In addition, 8 households and one association will temporarily lose their irrigated farmland and annual and perennial crops due to construction of the NADC – Gofa underground TL just before end of the TL at the EEP warehouse. In total these households would lose 800 m² area of farmland. The potentially affected farmlands comprise about 11 to 100% (av. 50%) of

the total farmland holdings of the households. The households grow dominantly spinach and kale mainly through irrigation. They also cultivate maize, potatoes etc. during wet season. In addition, they grow some perennial crops dominantly *Enset* (false banana), but also some sugar cane and hop (*Gesho*).

Moreover, temporary loss of farmlands and grasslands is expected due to use of certain area of land for access roads and storage of materials and operation of equipment and vehicles during construction. This situation may cause temporary loss of crop production, thus, loss of livelihood for some households.

The impact on farmlands and crops has been assessed as a moderate, short term adverse impact with respect to temporary land take during the construction period (for construction of underground cable & access roads) and a moderate permanent impact with respect to permanent land take for tower-base.

Proposed mitigation measures

Loss of farmlands, crops and grasslands will be mitigated through payment of sufficient compensation and site restoration measures as specified below:

- Permanent or temporary loss of farmlands and crops will be mitigated through payment of sufficient cash compensation for the affected households according to applicable government law (Procl. No. 455/2005) and regulations (Regulations No. 135/2007). Based on the Regulations and the procedures provided by the AAC Land Devt and Urban Renewal Agency, details of the project affected households and compensation cost estimate are provided in the ARAP;
- Execution of the construction works in farmlands during the dry season only that is after crop harvest and before the next cultivation season;
- Restriction of land taking and project activities to the area absolutely required for the project activities;
- Careful removal, proper stockpile and re-use of the topsoil from the underground route section located in farmland, temporary access route and materials laydown areas for restoration of the temporarily affected sites when construction works are completed; and
- Restoration of temporarily affected areas including the route of UG cables, access roads and materials stockpile areas to productive state by removing any pavement materials, ripping compacted soils and spreading topsoil over the surfaces.

8.5.3 Temporary Disturbance of Petty Business/Trade Activities

There are some petty trade activities mainly selling of vegetables that are practiced on roadsides at two places along the NADC – Gofa underground transmission line. The geographic coordinates of these places are 472109 E, 994300 N and 472214 E, 991141N.

Figure 8-2 below shows the first location where several people practice petty trade activities on both sides of a cobblestone access road. These small scale economic activities are carried out by low income people as a source of livelihood. These activities are likely to be temporarily affected during construction of the underground TL due to lack of space, dust and noise disturbance and safety risks.

Proposed mitigation measures

The temporary impacts on petty trade activities will be mitigated through arrangement of alternative work places for the traders or payment of cash compensation to traders for loss of income benefits during the construction period. The former mitigation measure will be implemented by officials of respective Woredas that is Woreda 6 of Kirkos SC and W. 6 of Nifas Silk Lafto SC.



Figure 8-2: Cobble-stone built access road (5m wide) followed by the NADC-Gofa underground TL where some petty trade is practiced on roadsides.

8.5.4 Impacts on Road Infrastructure and Community Access

The proposed underground and overhead transmission lines traverse or run along the median of a number of main roads. In addition, they travel along or cross several access roads, most of which are built from cobblestone. The roads potentially affected during construction of the transmission lines are described in section 5.3.4 above. Installation of the underground lines is expected to cause significant damages to the main roads as well as community access roads due to cutting of the roads for burying electric cables. In addition, a community road is potentially affected due to excavation for foundation of tower-base of two towers, namely Tubular Towers 11 and 12. The geographic coordinate of these towers is 472426 E, 988050 N and 472442 E, 987891 N respectively.

Moreover, damages could be caused to the roads esp. the cobblestone built community roads used by project vehicles and equipment as access roads during construction. This situation may affect the economic and social activities of the local people resulting in community complains. The impact on road infrastructure has been evaluated as a major, short term adverse impact.

Proposed mitigation measures

The impacts on road infrastructure will be mitigated by taking the following measures:

- Restoration of the damaged sections of the main roads and community roads affected due to the project activities as soon as possible;
- For major road intersections and square mostly busy with high vehicular traffic volume like the Mexico square and roads around it, and the roads that would be provided with new BRT system, applying pipe jacking/drilling technique to install the envisaged electric cables without damaging roads, squares, and underground utilities including water supply pipelines, sewer lines and telecommunication lines; and
- Shifting of the location of Tubular Towers 11 and 12 to either side of the affected community access road to avoid damaging of the road and the obstruction to be created by the towers.

8.5.5 Impacts on Public Utilities

There are abundant public utility lines including water supply pipelines, sewer lines, telecommunication lines and electric distribution lines in the corridor of the underground and overhead transmission lines. Several of these are potentially affected during the construction of the transmission lines particularly the underground cables as they intersect the electric lines at many places. In particular the possible impact on water supply network along the BLL – NADC – Gofa and Weregenu – Conn. Pt-3 underground routes is anticipated to be high because of the high density of water lines and their occurrence at shallow depth. This means the pipelines are easily vulnerable to damages during excavation in ground for installation of electric cables. Details of the potentially affected water supply lines and sewerage lines are presented in Annex 3.

Fortuitous damages of utility lines during construction of the envisaged electric lines could result in unexpected interruption of utility services to users. This situation can lead to complains from the users as well as the service providers. In addition, it can result in wastage of resources or environmental pollution if damages were caused to water lines or sewer lines respectively.

Impacts on public utility networks during construction are judged to be moderate, temporary and direct adverse impacts.

No significant adverse impacts are anticipated to occur on public utilities during the operation phase.

Proposed mitigation measures

Potential impacts on public utilities will be avoided or minimized through the following mitigation measures:

- Considering the location or route of major utility lines such as the primary and secondary water supply lines and sewer lines during detail design of the electric lines thereby avoiding or minimizing impacts on existing utility lines;
- If there would be unavoidable impacts, relocation of the potentially affected utility lines by the concerned utility agencies prior to commencement of construction works at the particular locations, or re-connection of the utility line that has been disconnected before the beginning of electric line works as soon as the works have been completed;
- In case of unavoidable interruption of utility services due to the construction works, announcement of the situation to users well ahead of the interruption date; and
- At locations where primary water lines or sewer lines intersect with the underground TLs, adopting pipe jacking/drilling technique to install the envisaged electric cables without causing damages to the water or sewer lines.

8.5.6 Occupational Health and Safety of Project Workers

The project is assumed to have some degree of impact on the health and safety of workers involved in the construction as well as operation activities. Construction of the overhead transmission line would involve working at height when erecting towers and stretching the cables. Thus, there will be a risk of fall from pylons during construction. Construction of the underground lines will take place along existing roads that are usually very busy with high volume of vehicular traffic. This situation could pose project workers and equipment to traffic accidents. In addition, there will be a risk of falling in trenches excavated for burying electric cables.

During operational phase there can be a risk of electrocution during maintenance of the lines. During construction, electrocution can be avoided by disconnecting power transmission through the existing lines.

The impact on the health and safety of workers is anticipated to be a moderate, short term to long term and direct adverse impact.

Proposed mitigation measures

It is recommended that a number mitigation measures implemented to ensure the safety of project workers during construction as well as operation phase. The proposed mitigation measures including the following:

- Implementation of a safety management plan, which includes provision of proper training and awareness education and appropriate protective clothing and equipment to the project workforce; Protective equipment include Ear protection devices for workers exposed to high noise levels, safety shoes, gloves and helmets and these shall be provided to and used by the workers;
- Provision and securing of fall prevention and protection provisions for all workers working at heights;
- Delineation or fencing of work zone or dangerous areas and providing sufficient information about the site through posting of clearly visible signs;
- Posting proper and clearly visible signs, barricades, reflectors at appropriate locations so that road users (drivers) are aware of the active construction works and take precautions while driving through or at nearby project operational area;
- Setting and enforcing speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area.
- Provision of awareness training for project workers so that they are aware of sexually transmitted infections (STIs) such as HIV/AIDS and their prevention, and that the workforce respect any cultural differences between them and the local communities or respect local norms to avoid any form of conflict.

8.5.7 Impacts on Community Health and Safety

Transport of materials to project site, operation of equipment and vehicles, and the activities involved in construction of towers and stringing of electric cables have the potential to cause safety risks including traffic accidents to the people residing or working around the project activities. In addition, they can create safety risks to pedestrians and drivers/normal traffic using the roads or paths crossed or followed by the overhead TL or underground transmission routes.

The socio-economic environment of the project corridor comprises residential, business, social service and industrial areas characterized by dynamic movement of people and vehicles. Therefore, any construction work that involve excavation is likely to cause harm to people and vehicles particularly if pits and trenches are left open during the construction phase without taking proper safety measures.

The possible safety risks include those associated with the operation of vehicles and equipment in close vicinity to nearby residential or business areas and on access roads used by local communities. In addition, there could be potential risks from open foundations of towers and trenches of underground cables. Construction works along the sections of the NADC – Gofa UG TL that runs along community/internal roads (with narrow width) located mainly in dense residential areas, but also where some petty business activities take place, have the potential to cause more safety risks to nearby residents and road users. In addition, certain sections of the Kaliti 1 – Gofa overhead TL mainly between Towers 31 & 34, 42 & 44,

and 51 & 53 cross dense settlement areas where public safety can be a major concern during construction.

The impacts on community health and safety during construction are considered to be a moderate, short term and direct adverse impact.

During operation phase the potential safety risks to local people is due to transmission line snapping and transmission tower collapse as well as due to fire and/or explosion due to dielectric oil release. The likelihood of this impact is envisaged to be low.

Proposed mitigation measures

Risks on community health and safety can be minimized by adopting appropriate mitigation measures including the following:

- Prohibition/avoidance of access of un-authorized persons to the construction sites;
- Fencing or blocking of excavation sites for foundation of towers of the overhead TL and for trenches of underground cables to prevent accidents to local residents, animals and vehicular traffic;
- Provision of training for project workers in safety measures so that they take precautions in operation of equipment and vehicles and avoid infringement into settlement areas, business centers or any other sensitive areas to avoid accident risks to members of local communities, their animals and other properties;
- Provision of awareness training for local communities about the risks related to the project activities and the safety measures they should take; and
- Design, construction and operation of the transmission line in such a way that the system would automatically break power transmission in case of cable breaking due to man-made or natural hazards.

8.5.8 Impacts on Road Traffic and Safety

The proposed underground transmission lines largely run along the median of main roads, which are mostly busy with high volume of vehicular traffic. The project activities including excavation of trenches using plant (road cutting machine) and equipment (excavator), earthmoving works, transport of materials to site and their handling or storage on site during installation of electric cables are likely to cause obstruction or disruption to normal traffic flows. The construction works are expected to aggravate the existing traffic jam/congestion problem on the roads particularly along the Weregenu – Jackros – Conn. Pt-3 (Sahelet Mihret Church) road; Figure 8-3 below illustrates an example of existing traffic congestion on this road. The other critical locations are Mexico square and a section of the main road at south of the square, which are crossed or followed by the BLL – NADC UG TL, and these locations are usually congested by high traffic volume (see Figure 8-4 below).

Construction of the Weregenu – Conn. Pt-3 UG TL is likely to involve cutting of up to 0.60m width in the road lane adjacent to the median, which has only 0.9m width. This and the requirement for operational space for equipment and plant may entail total blockage of one-way of the road for normal traffic. The median of the road from Mexico sq. to African Union Office is mostly 4 to 8 m wide and this space can be quite sufficient for construction of the BLL – NADC UG TL. However, shifting of the TL to either side of the median or to the right lane of the road carriageway has been recommended by stakeholders to reduce the impact on the well-developed green area esp. the ornamental trees found at the centerline of the median.

In addition, construction of the NADC – Gofa underground TL is expected to cause total blockage of vehicular traffic flows along certain sections of internal or community access roads, which mostly have narrow width of 5 to 6m. This impact is associated with excavation of trenches at the centerline of those internal roads to install underground cables. This situation would cause damages to part of the carriageway while the project equipment on site would cause additional impediment to movements of vehicular traffic and pedestrians.

The impacts on road traffic and safety during construction are envisaged to be moderate to major, short term and direct adverse impacts.

No appreciable adverse impacts are foreseen to happen on road traffic and safety during the operation phase.

Proposed mitigation measures

The impacts on road traffic and safety will be reduced by implementing appropriate traffic management plan and a number of other mitigation measures including the following:

- Scheduling and execution of construction works during dry season to avoid or reduce the impacts of project activities that would be aggravated during the wet season;
- Scheduling and execution of construction works outside of the time of high traffic flows;
- Posting proper and clearly visible signs, barricades, reflectors at appropriate locations so that road users (drivers) are aware of the active construction works/site and take precautions while driving through or at nearby project operational area;
- Delineation or fencing of work zone esp. risky areas and providing sufficient information about the site through posting of clearly visible signs;
- Setting and enforcing speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area;
- Arrangement of alternative routes for normal traffic and provision of sufficient information for users through mass media and posting of appropriate and clearly visible signs to divert traffic from construction sites;

- Minimizing the duration of construction works through arrangement of capable and professionally trustful contractor and supervision consultant;
- Reinstatement of the damaged sections of roads as soon as the construction works have been completed;
- At major road intersections and squares that are mostly busy with high traffic volume like the Mexico square and roads around it, and the roads that would be provided with new BRT system, applying pipe jacking/drilling technique to install the envisaged underground cables without damaging roads and causing disruption to normal traffic flows; and
- During construction phase working closely with the AAC Road Traffic Management Agency and AA Police Commission or concerned sub-cities police office to obtain technical/professional and material support from the agency for traffic management activities at project sites.



Figure 8-3: An example of traffic congestion on the main road followed by the proposed Weregenu – Connection Point-3 underground transmission line.



Figure 8-4: Section of the main road at south of Mexico sq. where one of the two lanes on each side is used as a station for mini-bus taxis and city buses for loading and unloading of passengers.

8.5.9 Impacts on Women

The social survey conducted for the TL project has identified 21 potentially affected households (PAHs) out of which 2 are female headed households. Although the number of female headed households affected by the project is very small, the number of female population in the PAHs is higher than male population. Out of the total 100 population of the 21 PAH members, 57 are female. This shows that more number of women population will be directly or indirectly impacted by the proposed project.

According to the socio-economic survey carried out on households residing within 30m corridor of the overhead TL, 27% of the households are female headed families. In addition, a significant proportion of the inhabitants in the area are low income households that earn their livelihoods mainly by engaging in small-scale business activities such as small shops, tea rooms, groceries, vegetables market etc. It is not uncommon to see a number of women involved in petty trade activities such as selling injera, local drink (*Tela, Areke*), vegetables and other small businesses just at their door step as well as at village open market usually called Gulet for survival. Some of these activities are located within the direct impact zone of the project, thus, they are likely to be affected during the construction works. It is expected that some project activities or project impacts would affect more women than men, particularly if appropriate considerations or actions were not taken to mitigate the adverse impacts.

In addition, women could be affected due to discrimination during recruitment of workforce as most construction companies prefer to employ only men. This will lead to unequal

treatment of women during employment of the construction workforce. It is also evident that some of the project activities are not convenient for women due to their biological nature and sometimes expose them to physical and psychological injuries. Moreover, local women can be exposed to certain risks such as sexually transmitted diseases including HIV/AIDS and unwanted pregnancies due to the relations with certain men workers.

The impacts on women are anticipated to be minor to moderate, short term direct and indirect adverse impacts.

Proposed mitigation measures

- Ensuring women's participation and employment opportunities through provision of equal employment opportunities for women and men and through avoidance of discrimination against women;
- Giving priority in employment opportunities created in the construction works for women for the works they fit;
- Respecting the country's labor code concerning the rights of women workers and assigning women in those jobs that fit to their biological and physical conditions'
- Supporting FHHs and other women interested in provision of catering services to contractors' workforce;
- Project implementers to be more responsive to women's needs and interests. For example, during construction installing separate toilets for women workers including at satellite camps; and
- Provision of awareness education for local women so that they are aware of the risks of sexually transmitted diseases including HIV/AIDS and their prevention measures as well as about reproductive health including the risk of unwanted pregnancies.

8.5.10 Impacts on Cultural Heritage Resources

On the basis of site surveys and review of relevant documentation there are no any physical cultural heritage sites within the direct impact zone of the project sites. However, there are some historical sites and several worship places (churches & mosques) in the corridor of the overhead and underground transmission lines, but none of these would be affected by project activities. The list of main historical and religious places is shown in the table below.

List of Main Historical and Religious Sites in the Corridor of the Overhead and Underground TLs

	Name of Historical/ Religious Site	Type	Name of Nearest Project Site	Minimum Distance from Project Site	Sub-city/ Woreda
1	Kidus Mikael Church (St. Michael Church) at south of African Union)	Worship place	NADC SS & NADC – Gofa Underground TL	30m Southwest	Kirkos SC, Woreda 6
2	Lafto Kidus Mikael Church (St. Michael Church) at east of Tubular Tower-1)	Worship place	Kaliti 1 – Gofa Overhead TL	70m East	NSL, W. 12
3	Hana Maryam Church (St. Mary Church)	Historical Church	Kaliti 1 – Gofa Overhead TL	800m West	NSL, W. 11
4	Salo Giorgis Church (St. George Church)	Historical Church	Kaliti 1 Substation & Kaliti 1 – Gofa Overhead TL	>500m East	Akaki Kaliti SC, Woreda 4
5	Sahelete Mihret Church (St. Mary Church)	Worship place	Weregenu – Conn. Point 3 UG TL	Connection Point within church compound	Bole SC, Woreda 7

The presence or absence of any archaeologically or culturally important properties underneath of the transmission lines is not very sure at this stage, and assets of archaeological or cultural value may become apparent during excavation for the tower-base of the overhead TL or for underground cables. Therefore, it is important that the Contractor is aware of this situation and take necessary precautions during the construction works and take necessary actions (as recommended below) if any properties of cultural value are uncovered.

Proposed Mitigation Measures

Mitigation measures recommended for any potential impacts on cultural heritage sites include the following:

- At locations nearby religious sites, activities producing excessive noise levels should be avoided during the time when spiritual programs are underway.
- In the event of accidental discovery of any archaeological remains or properties of cultural value, the Contractor shall immediately halt works at that particular section or spot and notify the Supervision Consultant/ Engineer and shall protect and keep same intact until the relevant authority like the ARCCCH or the AAC/ the relevant Sub-city Culture and Tourism Office takes delivery thereof. The Contractor sets up rapid

response system for physical cultural resources findings with concerned authorities.

8.5.11 Impacts of Labor Influx and Its Management

There is a huge influx of labor or in-migrants from different parts of the country into the metropolitan city of Addis Ababa due to construction booms. Therefore, the magnitude of labor influx due to this particular project can be overshadowed by other in-migration dimensions into the city. As a result it is difficult to determine or ascertain precisely the magnitude of labor influx into the project sites due to the current project. And yet the project contractor would integrate an in-migration dimension into the program activities during the implementation of the project by employing the following strategies prior to the construction phase:

- Setting workforce recruitment policy and management for the project;
- Communicating the project's recruitment policy through Local Employment Offices to potential in-migrant workers;
- Limiting recruitment of labor locally that is within the project affected Woredas and/or sub-cities boundary; and
- Monitoring the migrant population (in-migrants) into the project sites.

8.5.12 Child Labor Influx and Management

Ethiopia has ratified international conventions concerning child labor, and issued laws and regulations related to child labor and management. The Ethiopian government protects children from labor exploitations and hazardous works through proclamation No. 377/2003 of the Labor Law. Therefore, the contractor of the subject project is required to comply with the provisions of the Ethiopian law and international conventions while recruiting workers for the project activities.

The Labour Law protects children from economic exploitation. It sets the minimum age for work as 14 years and categorizes workers of ages 14 to 18 years as young workers. Accordingly, young workers are given a right to special protective measures. As per the law young workers can work for a maximum of seven working hours per day compared to the eight working hours for adults. In addition, the law prohibits employment of young workers for night work, overtime work, and work on weekly rest days or public holidays.

According to the Labour Law, among the activities that young workers are not allowed to work include the following:

- Work in the transport of passengers, and goods by road, rail, air, and internal water way;
- Work in docksides and ware houses involving heavy weight lifting, pulling or pushing or any other related type of labour;

- Work connected with electric power generation plants, transformers or transmission lines;
- Working under ground in areas of mining, stone excavation and related occupations;
- Construction activities which involve the use of scaffold at high heights moreover, carrying, handling of goods from heavy loads and moving goods by using machines (cranes and lifts) loading;
- Cave quarrying occupations;
- Working with occupations in dangerous and poisonous chemicals like arsenic, lead, mercury, calcium, manganese and related metals, minerals and solvents; working in the production and usage of explosive and flammable areas;
- Other occupations/ works that have a detrimental effect on the young workers' physical, mental and moral development.

It is recommended that the project contractor complies with all the requirements of the Ethiopian law including the above listed provisions and international conventions in recruitment and management of the labour force required for the project construction. In addition, EEP through the Environmental Monitoring Unit (EMU) shall monitor and make sure that the contractor strictly complies with the requirements of the applicable Ethiopian laws and regulations as well as international conventions in hiring and managing workers.

8.5.13 Grievance Redress Mechanism

Mechanisms for handling grievances related to compensation process are described in section 7 of the ARAP document. In addition, any grievances raised by project affected people or any other stakeholders will be redressed as recommended below.

EEP and project contractor shall ensure that any complaints or inquiries raised by local people/ project affected people or any other stakeholders are documented properly and brought to the attention of project management and properly addressed by the responsible body including EEP and contractor. To this effect, EEP and the contractor shall set up "Community Grievance Hearing Procedures" at the project sites and the project office. Therefore, specific complaints and concerns from local people or any other stakeholder would be documented properly and referred to the project management for appropriate follow-up and addressing the complaints or grievances in accordance with grievance handling procedures.

8.6 Cumulative Impacts

At the city level (AAC) there are considerable number of infrastructure development plans and projects that are either currently under construction or committed. These include construction of new transmission and distribution lines and associated new substations as

well as rehabilitation of existing electrical systems. In addition, there are many ongoing road infrastructure development projects.

Within the corridor of the transmission lines of the current project, there are two road infrastructure development projects that are expected to be implemented during the timescale of this project. The road construction projects are located along the route of existing Towers 12 to 20 which is followed by the proposed NADC – Gofa UG TL, and along the Kaliti 1 – Gofa overhead TL between Towers 25 and 31.

The road projects are expected to bring more significant adverse impacts than the transmission line project due to the nature and scale of new road construction works. The significant cumulative impacts likely to occur with respect to the construction of the overhead and underground transmission lines and the road construction works are shown in the Table below:

	Potential Adverse Impact	Main Receptors	Significance of Cumulative Impact
1	Air and noise quality impacts arising from construction works and haulage of construction and spoil materials	Local communities	Major
2	Impacts on road traffic and safety	Local communities & road users	Moderate
3	Competition for land use – there could be competition for development space between the TL project & the road projects	EEP & AACRA	Minor for UG TL section & Moderate for OH TL section
4	Impacts on soils – road construction involves extensive excavation works that will cause destruction to soil structure and expose the soil to runoff water erosion	Soils in the direct impact zone	Major
5	Impacts on road infrastructure – construction of new roads may affect two existing major roads and several community access roads that are crossed by the new road alignments.	Two main asphalt roads and over 6 access roads (cobblestone roads)	Major
6	Impacts on public utilities – many water supply pipelines, some sewer lines, telephone cables and electric distribution	Water supply, sewer, telephone and electric	Major

	lines are likely to be affected during construction the new roads.	distribution lines	
7	Impacts on community health and safety – road construction works have the potential to cause safety risks including traffic accidents to local communities including roadside residents and road users (pedestrians & drivers) resulting from operation of equipment and vehicles.	Local communities, and road users	Moderate
8	Waste disposal – the road projects are likely to generate bulk quantities of spoil materials (excavation soil materials) that need to be transported and disposed of at approved disposal sites.	Local communities, road users & disposal site	Moderate to Major

Proposed mitigation measures

It is expected that proper implementation of the mitigation measures proposed in this ESIA study and the ESIA studies of the road projects will minimize the majority of the potential adverse impacts to acceptable levels. In addition, implementation of the TL project ahead of the road construction works will avoid or reduce a number of potential impacts. For example, demolition of the existing towers and construction of the NADC – Gofa UG TL will save much space for road construction while avoiding potential impacts of construction of UG electric cables on the new road along the transmission route if the road construction precedes installation of the TL.

9. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

9.1 Environmental Management Plan

The main environmental and social impacts anticipated to occur during the construction and operation phases of the project facilities have been identified and described in section 8 above. In addition, the mitigation measures that should be applied to avoid, minimize or offset the potential adverse impacts are proposed in the same section. This chapter provides Environmental Management Plan (EMP) that includes the potential environmental, social and safety impacts, the proposed mitigation actions, the timing of implementation, and the responsibilities for implementation and monitoring. The details of the proposed EMP are presented in Table 9-1 below.

9.2 Gender Action Plan

In the detail study of the affected HHs, it was found out that the project would not have significant impact on gender issues. However, cash compensation and some health and safety measures can be suggested for women whose petty trade activities may be interrupted temporarily and for those women who would be employed during the construction phase. A proposed action plan is given in Table 9-2 below.

Table 9-2: Proposed Gender Action Plan

Action	Monitoring methods	Monitoring indicators	Monitoring frequency	Responsible body
Install separate toilets for women's workers during the construction	Check the number and conditions of separate toilets	To be determined prior to the construction	Monthly	EEP's EMU/ Contractor
Cash payment for women traders whose activities may be interrupted during construction of underground TLs.	Audit the compensation payment	To be disbursed prior to the construction	Once after the payment is disbursed.	EEP's EMU/ Contractor

Table 9-1 Environmental and Social Management Plan

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
1	Impacts on Physical Environment						
1.1	Impacts on air quality resulting from dust and vehicular/equipment/plant exhaust emissions	Minor to Moderate	<p>Spraying water on unpaved access roads, exposed earth and any stockpiles on site, and where possible, covering over stockpiles on site with plastic materials;</p> <p>Setting traffic speed limits on unpaved access roads in the vicinity of sensitive areas (residential and business areas, social services, religious places), and enforcing it;</p> <p>Training project drivers to respect the speed limits set by the Contractor;</p> <p>Switching off equipment and vehicles when not in use;</p> <p>Regular maintenance of diesel powered equipment and vehicles</p>	Throughout construction period	Contractor (s)	EEP's EMU/Supervision Engineer	Included in the Contractor's costs
1.2	Noise and vibration generated by plant, equipment and construction traffic	Minor to Moderate	<p>Use of modern mechanical plant, equipment and vehicles fitted with effective noise silencers/ mufflers;</p> <p>Regular maintenance of equipment and vehicles;</p> <p>Switching off equipment and vehicles when not in use;</p>	Throughout construction period	Contractor (s)	As above	Included in the Contractor's

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			Provision of ear protection equipment for workers in vicinity of noise emissions; Limitation of working time within extreme sound emissions; and Carrying out noisy construction activities during normal working hours only.				
1.3	Impacts on soils - loss of topsoil, soil compaction by equipment & soil contamination by hazardous substances	Minor to moderate	Carrying out land clearing and excavation works in the dry season; Careful removal and proper stockpiling of the topsoil excavated from project sites; Reinstating temporarily used access roads to productive state; Re-establishment of vegetation cover through replanting or seeding of suitable grasses such as Kikuyu Grass & Bermuda Grass, and shrubs; Proper storage and handling of hazardous substances (oil, fuel, used oil, paints, cement etc.); and Other mitigation measures outlined in section 8.3.3.	During construction phase and following completion of construction works	Contractor (s)	EEP's EMU/ Supervision Engineer and Sub-city & Woreda Environmental Protection Offices	Included in the Contractor's costs
1.4	Impacts on water resources - water pollution & increased sedimentation	Minor to moderate	Execution of excavation works and earth moving activities during dry seasons only; Avoidance of depositing excavation materials on the banks of streams and river;	Throughout construction phase	Contractor (s)	As above	Included in the Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			Proper storage and handling of hazardous substances (oil, fuel, used oil, paints, cement etc.); Avoidance of washing equipment and vehicles in or near streams and river; Other mitigation measures proposed in section 8.3.4.				
1.5	Impacts on landscape – loss of the aesthetic value of ornamental trees and other vegetation removed due to clearing during construction of TLs and due to contacts with overhead distribution cables	Minor to moderate	Locating the BLL–NADC UG TL on one side of the median or under the last right lane of the carriageway to save the trees located at the centerline of the median; In areas where existing distribution lines traverse dense trees, rerouting the lines to areas containing no trees or few trees.	During detail design	Design Consultant	EEP	Included in the Design Consultant's costs
			Restoration of affected sites through back-filling by materials excavated from the site during construction works, levelling and blending the site to surrounding terrain and spreading topsoil over the surfaces, and finally, re-establishing vegetation cover through replanting of suitable grasses and shrubs.	During construction and following completion of construction works	Contractor (s)	EEP's EMU/ Supervision Engineer and Sub-city & Woreda Environmental Protection Offices	Included in the Contractor's costs
			Removal of all excess or leftover construction materials and wastes from the site and transporting to places where the materials can be used for another project or disposed of properly. Following removal	Upon completion of construction works	Contractor (s)	As above	Included in the Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			of all materials, the stockpile areas shall be re-graded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation.				
1.6	Waste management - solid & liquid wastes generated in relation to project activities. These include excavation/ spoil materials, surplus materials left from construction works; metal and wood scraps; wires, papers, plastics; sewage waste, used oil	Moderate	Avoidance of side-tipping of excavation materials on adjacent areas where it may affect road infrastructure, storm-water drainage systems, crops/croplands, trees etc.; Prohibition of littering and establishing routine clean-up at project sites and waste collection depots; Management of solid and liquid wastes generated during construction in accordance with applicable waste management laws and regulations; Training of project staff in effective waste handling and management procedures; Other mitigation measures specified in section 8.3.6.	Throughout construction phase and upon completion of construction works	Contractor (s)	EEP's EMU/ S. Engineer and, and concerned Sub-city & Woreda Environmental Protection Offices, and Sanitation Offices	Included in the Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
1.7	Management of abandoned sites	Moderate	Removal of all excess or leftover construction materials and wastes from materials laydown areas and all project sites and transporting to places where the materials can be used for another project or disposed of properly. Following removal of all materials, the stockpile areas shall be re-graded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation	Upon completion of construction works	Contractor (s)	EEP's EMU/ S. Engineer and, and concerned SC & Woreda Environmental Protection Offices	Included in the Contractor's costs
2	Impacts on Biological Environment						
2.1	Impacts on protected areas	Minor	For the protected forest between Towers 23 & 24 of Kaliti 1 – Gofa overhead TL, following the route of the existing TL and taking maximum care during stringing of cables to avoid or minimize impacts on the forest.	During detail design & construction	Design Consultant & Contractor	EEP, EMU, and Nifas Silk Lafto Sub-city Environmental Protection Office	Included in the Design Consultant's & Contractor's costs
		Moderate	For the BLL – NADC UG TL - locating the transmission route on one side of the median or under the last right lane of the road carriageway where there is no any other utility and taking maximum care during construction to save the trees	During detail design & construction	Design Consultant & Contractor	EEP, EEP's EMU, and Kirkos SC Beautification, Parks &	Included in the Design Consultant's & Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			located at the centerline of the median or totally avoid the impact on the green area.			Cemetery Devt & Adm. Office	
		Moderate	For the Feeder ALM-15-04 – shifting the section of the distribution line traversing Tulu Korma Research Centre for Native Trees to outside of the boundary of the Centre.	During detail design	Design Consultant	EEP	Included in the Design Consultant's costs
2.2	Impacts on flora and fauna - removal of trees & other flora from construction sites and under overhead transmission lines and disturbance of habitats used by fauna esp. birds due to construction works and noise pollution	Minor	<u>Kaliti 1 – Gofa overhead TL</u> - Impacts on flora and fauna will be minimized by following the route of the existing TL, taking precautions during stringing of cables and through tower design.	During detail design & construction	Design Consultant & Contractor	EEP, EMU, and Nifas Silk Lafto Sub-city Environmental Protection Office	Included in the Design Consultant's & Contractor's costs
Moderate		<u>Underground TLs</u> - The impacts of the underground lines on flora & fauna will be mitigated through the following measures:					
		<u>BLL – NADC UG TL</u> - locating the TL either on one side of the median or under the last right lane of the road carriageway where there is no any other utility to save the trees located at the centerline of the median or totally avoid the impact on the whole green area.	During detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs	
		<u>BLL – NADC UG TL</u> - If the above proposal wouldn't be practicable,	As soon as possible	Kirkos SC Beautification,	AAC Beautification,	933,000.00 ¹	

¹ Cost estimate provided by Kirkos SC Beautification, Parks & Cemetery Devt & Adm. Office

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			implementing replanting of trees in another suitable place to be proposed by the Kirkos Sc Beautification, Parks & Cemetery Devt & Adm. Office to compensate for the trees lost from the route of the UG TL.	during construction &/ or operation phase as appropriate	Parks & Cemetery Devt & Adm. Office	Parks & Cemetery Devt & Adm. Agency	
			<u>BLL – NADC UG TL</u> – If the line would cross through the protected green area at the road median, restoration of the green area affected during construction of the UG TL through planting of shallow rooted shrubbery and herbaceous plants above the UG cables and on the rest of the median.	Upon completion of construction of the UG TL	Kirkos SC Beautification, Parks & Cemetery Devt & Adm. Office	AAC Beautification, Parks & Cemetery Devt & Adm. Agency	977,625.00 ²
			<u>Weregenu – Conn. Pt-3 UG TL</u> - development of a protected green area through planting of shallow rooted shrubbery and herbaceous plants above the UG cables to compensate for the trees lost and for aesthetic value of the site.	Upon completion of construction of the UG TL	Bole SC Beautification, Parks & Cemetery Devt & Adm. Office	AAC Beautification, Parks & Cemetery Devt & Adm. Agency	1,058,000.00 ³
		Minor to Moderate	<u>Feeders/Distribution Lines</u> - Where possible, potential impacts of Feeders on trees and other vegetation and fauna will be reduced through rerouting/ shifting the sections of the distribution lines running	During detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs

² Cost estimate provided by Kirkos SC Beautification, Parks & Cemetery Devt & Adm. Office

³ Cost estimate provided by Bole SC Beautification, Parks & Cemetery Devt & Adm. Office

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			through areas containing dense trees or where trees contact with electric lines to areas containing no trees or few trees.				
3	Impacts on Social Environment						
3.1	Involuntary resettlement of people residing under the overhead transmission line	Major	Design of the TL with the minimum vertical distance, which is 8m, from buildings and structures specified in the Ethiopian Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005). Design of the transmission line in such a way that the system would automatically break power transmission in the event of any cable breaking due to man-made or natural hazards.	During detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs
3.2	Loss of farmlands, crops and grasslands	Moderate	Payment of sufficient cash compensation for the affected households according to applicable government laws and regulations.	Before commencement of construction works	EEP and Akaki Kaliti & Nifas Slik Lafto SCs Land Devt & Urban Renewal Offices	Akaki Kaliti & Nifas Slik Lafto SCs Administration Offices	Included in Abbreviated Resettlement Action Plan (ARAP)
			Execution of the construction works in farmlands during the dry season only that is after crop harvest and before the next cultivation season.	During construction and upon completion of	Contractor (s)	EEP's EMU and Trade Offices of concerned Sub-cities (Akaki	Included in Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			Restriction of land taking and project activities to the area absolutely required for the project activities; Careful removal, proper stockpile and re-use of the topsoil from the project construction sites for restoration of the temporarily affected sites when construction works are completed; and Restoration of temporarily affected areas including the route of UG cables, access roads and materials stockpile areas to productive state by removing any pavement materials, ripping compacted soils and spreading topsoil over the surfaces.	construction works		Kaliti & Nifas Slik Lafto SCs)	
3.3	Temporary disturbance of petty business/ trade activities	Moderate	Arrangement of alternative work places for the traders for the construction period.	Before commencement of construction works	Adm. Offices of Woreda 6 of Kirkos SC and W. 6 of Nifas Silk Lafto SC	Adm. Offices of Kirkos & NSL SCs	Part of the routine costs of the concerned offices
3.4	Impacts on road infrastructure and community access	Major	For major road intersections and square mostly busy with high vehicular traffic volume like the Mexico square and roads around it, and the roads that would be provided with new BRT system, applying pipe jacking/drilling technique to install the envisaged electric cables without	During preliminary/ detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs
				Construction phase	Contractor	EEP's RMU, and AACRA	Included in Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			damaging roads, squares, and underground utilities.				
			Shifting of the location of Tubular Towers 11 and 12 to either side of the affected community access road to avoid damaging of the road and the obstruction to be created by the towers.	During preliminary/ detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs
			Restoration of the damaged sections of the main roads affected due to the project activities as soon as possible.	Progressively upon completion electric line construction works	Addis Ababa City Roads Authority (AACRA)	AACRA's Quality Assurance & Road Safety Inspection Directorate	To be provided by AACRA
			Restoration of the damaged sections of the community roads (cobblestone roads) affected due to the project activities as soon as possible.	Upon completion of underground electric lines construction works for the sections traversing community roads	Kirkos SC & Woreda 6 Community Participation Offices and Community Devt Committee (CDC)	Woreda 6 Adm. Office	270,000.00 ⁴
					Nifas Silk Lafto SC & Woreda	Woreda 5 Adm. Office	700,000.00 ⁵

⁴ Cost estimate provided by Kirkos SC Community Participation Office (CPO)

⁵ Estimated on the basis of rates provided by Kirkos SC CPO

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
					5 Community Participation Offices and CDC		
				Upon completion of Tubular Towers 11 & 12 construction works	NSL SC & Woreda 11 Community Participation Offices and CDC	Woreda 11 Adm. Office	20,000.00
3.5	Impacts on public utilities	Moderate	Considering the location or route of major utility lines such as the primary and secondary water supply lines and sewer lines during detail design of the electric lines.	During detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs
			At locations where primary water lines or sewer lines intersect with the underground TLs, adopting pipe jacking/drilling method to install the envisaged electric cables without causing damages to the water or sewer lines.	During detail design stage	Design Consultant	EEP	Included in the Design Consultant's costs
				During construction phase	Contractor	EEP's UMU and Utility Agencies (AAWSSA, Ethio-Telecom)	Included in Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			<p>If there would be unavoidable impacts, relocation of the potentially affected utility lines prior to commencement of construction works at the particular locations, or re-connection of the utility line that has been disconnected before the beginning of electric line works as soon as the works have been completed;</p> <p>In case of unavoidable interruption of utility services due to the construction works, announcement of the situation to users well ahead of the interruption date.</p>	During construction phase	Concerned Utility Agencies (AAWSSA or Ethio-Telecom)	EEP's EMU	Part of routine costs of the utility agencies
3.6	Impacts on health and safety of workers	Moderate	<p>Implementation of a safety management plan, which includes provision of proper training and awareness education and appropriate protective clothing and equipment to the project workforce;</p> <p>Provision and securing of fall prevention and protection provisions for all workers working at heights;</p> <p>Delineation or fencing of work zone or dangerous areas and providing sufficient information about the site through posting of clearly visible signs;</p> <p>Posting proper and clearly visible signs, barricades, reflectors at appropriate locations so that road users (drivers) are</p>	During construction phase	Contractor	EEP's UMU and Social Affairs Offices of affected sub-cities (Akaki Kaliti, NSL, Kirokos & Bole)	Included in Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			<p>aware of the active construction works and take precautions;</p> <p>Setting and enforcing speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area.</p>				
3.7	Impacts on community health and safety	Moderate	<p>Prohibition/avoidance of access of un-authorized persons to the construction sites;</p> <p>Fencing or blocking of excavation for foundation of towers of the overhead TL and for trenches of underground cables;</p> <p>Provision of training for project workers in safety measures so that they take precautions in operation of equipment and vehicles and avoid infringement into settlement areas, business centers or any other sensitive areas; and</p> <p>Provision of awareness training for local communities about the risks related to the project activities and the safety measures they should take.</p>	Throughout construction phase	Contractor	EEP's EMU and Social Affairs Offices of affected sub-cities (Akaki Kaliti, NSL, Kirokos & Bole)	Included in Contractor's costs
			<p>Design, construction and operation of the transmission line in such a way that the system would automatically break power transmission in case of cable breaking due to man-made or natural hazards.</p>	During detail design and construction phases	Design Consultant & Contractor	EEP, EEP's EMU	Included in the Design Consultant's & Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			Provision of awareness training for project workers about STIs such as HIV/AIDS and their prevention, and about the need to respect local culture and local norms to avoid any form of conflict.	During construction period	Contractor	EEP's EMU & Health Offices of respective sub-cities	Included in the Contractor's costs
3.8	Impacts on road traffic and safety	Moderate to Major	<p>Execution of construction works during dry season;</p> <p>Carrying out construction works outside of the time of high traffic flows;</p> <p>Posting proper and clearly visible signs, barricades, reflectors at appropriate locations so that road users are aware of the active construction works/site and take precautions while driving through or at nearby project operational area;</p> <p>Delineation or fencing of work zone esp. risky areas and providing sufficient information about the site through posting clearly visible signs;</p> <p>Setting and enforcing speed limits for vehicular traffic around project operational area;</p> <p>At major road intersections and squares that are mostly busy with high traffic volume, applying pipe jacking/drilling technique to install the envisaged</p>	Throughout construction phase	Contractor	EEP's EMU and AAC RTMA	Included in the Contractor's costs

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			underground cables without damaging roads and causing disruption to normal traffic flows.				
			Working closely with the AAC Road Traffic Management Agency (AACRTMA) to obtain technical/professional and material support from the agency for traffic management activities at project sites.	During construction phase	Project Implementation Unit (PIU)	EEP	Included in the PIU's cost
			Arrangement of alternative routes for normal traffic and provision of sufficient information for users through mass media and posting of appropriate and clearly visible signs.	During construction phase	AACRTMA		Part of the routine costs of AACRTMA
			Reinstatement of the damaged sections of roads as soon as the construction works have been completed.	Progressively upon completion of construction works	Addis Ababa City Roads Authority (AACRA)	AACRA's Quality Assurance & Road Safety Inspection Directorate	To be provided by AACRA
3.9	Impacts on women		Provision of equal employment opportunities for women and men and avoidance of discrimination against women; Giving priority in employment opportunities created in the construction works for women for the works they fit to;	During construction phase	Contractor, PIU	EEP's EMU and Sub-city & Woreda Women Affairs Offices	Included in the Contractor's & PIU's costs, and routine costs of local women offices

No	Environmental/ Social Impact/ Issue	Impact Signifi- cance	Proposed Mitigation Measures	Timing of Implementatio n	Responsibility for Implementation	Responsibility for Monitoring	Cost Estimate (Eth. Birr)
			<p>Respecting the country's labor code concerning the rights of women workers and assigning women in those jobs that fit to their biological & physical conditions;</p> <p>Supporting FHHs and other women interested in provision of catering services to contractors' workforce;</p> <p>Project implementers to be more responsive to women's needs and interests. For example, during construction installing separate toilets for women workers at project sites; and</p> <p>Provision of awareness education for local women so that they are aware of the risks of STDs including HIV/AIDS as well as about reproductive health including the risk of unwanted pregnancies.</p>				

9.3 Environmental Monitoring Plan

9.3.1 General

Environmental monitoring provides feedback about the actual environmental and social impacts of a project. Inclusion of a framework for monitoring can significantly improve the effectiveness of ESMP since it can provide a mechanism for ensuring whether mitigation measures have been carried out and whether predictions were accurate. Monitoring results help judge the success of mitigation measures in protecting the environment and the community in the project impact zone. They are also used to ensure compliance with environmental standards, and to facilitate any needed project design or operational changes.

The monitoring program for the transmission and distribution system encompassed in the current project will be undertaken to meet the following objectives:

- To check on whether the proposed mitigation and benefit enhancement measures have actually been implemented, and are proving effective in practice;
- To provide a means whereby any impacts which were unforeseen at the time of preparation of the ESIA & ESMP can be identified, and to provide a basis for formulating appropriate additional mitigation measures; and
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future similar projects.

9.3.2 Monitoring Phases

(i) Detail Design/Pre-construction Stage Monitoring

Monitoring during the detail design or pre-construction phase of the project will be concerned with two aspects:

- Checking that the project final route, designs and specifications incorporate appropriate measures to minimize negative impacts and to enhance beneficial impacts.
- Checking that the appropriate environmental protection clauses have been included in the contract documents to allow control of actions by the contractor, which are potentially damaging to the environment.

These activities are carried out as part of the detail design and preparation of designs for the project.

(ii) Construction Phase Monitoring

During construction, monitoring will comprise regular compliance monitoring and inspection, to ensure that all the environmental protection and safety assurance measures are in place at project sites and the construction works are being undertaken in an environmentally responsible manner. Environmental monitoring during the construction phase will comprise two principal groups of activities:

- Review of the Contractor's plans, method statements, temporary works designs, and arrangements relating to obtaining necessary approvals from EEP or EEP's Representative (Supervision Engineer), so as to ensure that environmental protection measures specified in the contract documents are adopted, and that the Contractor's proposals provide an acceptable level of impact control.
- Systematic observation on a day-to-day basis of all site activities including construction sites, materials laydown areas etc. as a check that the contract requirements relating to environmental matters are in fact being complied with, and that no impacts foreseen and unforeseen are occurring.

These activities will be fully integrated with other construction supervision and monitoring activities carried out by EEP or EEP's Representative. Primary responsibility for ensuring that an adequate level of environmental monitoring is carried out will lie with the Contractor, as part of his duties connected with general site supervision. Actual monitoring on a day-to-day basis will be carried out by the EEP's Representative and/or EEP's Environmental Monitoring Unit (EMU).

The majority of monitoring will comprise visual observations, carried out at the same time as the engineering monitoring activities. Site inspections will take place with emphasis on early identification of any environmental problems and the initiation of suitable remedial action. Where remedial actions have been required on the part of the Contractor, further checks will need to be made to ensure that these are actually being implemented to the agreed schedule and in the required form. Each part of the site where construction is taking place needs to be formally inspected from an environmental viewpoint on a regular basis.

The EEP's Representative/Engineer will decide on the appropriate course of action to be taken in cases where unsatisfactory situations are observed on site regarding environmental matters. The Engineer will advise the Contractor on the need for remedial action or issue a formal instruction to the Contractor to take remedial action, depending on the degree of the matter.

Monthly, quarterly and annual reports prepared by the Contractor should contain a section referring to environmental matters, which provides the results of site monitoring, remedial actions, which have been initiated, and whether or not the resultant action is having the

desired result. The report will also identify environmental problems and will recommend suitable additional actions.

(iii) Operation Phase Monitoring

Operation stage monitoring will focus on the following key issues:

- Soil erosion situation around tower base and along underground transmission lines;
- Health and safety of the communities residing within 30m corridor of the overhead transmission line – checking the minimum requirement on Clearance of Overhead Electric Lines (No. EEA/1/2005);
- Safety of towers - protection of tower base from erosion, cultivation, growing of trees or crops etc.;
- Safety of electric lines – avoidance of growing trees under overhead transmission and distribution meeting the standards specified in the Directive on Clearance of Overhead Electric Lines (No. EEA/1/2005);
- Safety of underground cables – avoidance of any structures and growing trees above the UG electric lines; proper performance of safety signs and protective facilities or devices at manholes and along the TLs;
- Restoration of trees and greenery areas affected during construction of underground electric cables.

The responsibility for monitoring of these aspects will lay on the EEP's Environment, Health, Safety and Quality (EHSQ) Office. In addition, the EHSQ should advise the Operation and Maintenance Department on environmental protection requirements and monitor the occurrence of any environmental damages on an intermittent basis. Furthermore, the EHSQ should conduct monitoring to check whether the maintenance works are being undertaken and the environmental protection facilities instituted during the construction phase are working effectively.

Table 9-3 below presents the proposed Environmental Monitoring Plan for the Construction and Operation phases of the project facilities.

Table 9-3: Environmental Monitoring Plan

Environmental monitoring parameters	Parameters/ Indicators to be Monitored	Monitoring Site/ Location	Methods of Monitoring	Frequency	Responsible body	Cost (Eth. Birr)
Construction Phase						
Air quality	Dust and exhaust emissions level	Construction sites and nearest noise sensitive receptor sites (residential & business areas, religious places, schools etc.)	Visual observation, Interviews of local residents, Recording of complaints	<ul style="list-style-type: none"> • Daily (Construction site, access roads) • Once/week (nearest sensitive areas) 	EEP's Environmental Monitoring Unit (EMU)/ Representative (Consultant)	50,000.00
Noise	Noise Level	Construction site and nearest noise sensitive receptor sites (residential & business areas, religious places, schools etc.)	Measurement by noise meter	<ul style="list-style-type: none"> • Daily (Construction site, access roads) • Once/week (nearest sensitive areas) 	As above	150,000.00 (including cost of noise meter rent)
Soils	Soil erosion, soil compaction & soil contamination levels	Project construction sites, access roads and materials laydown areas	Visual observation, Interviews of local residents & local experts	Once/week	EEP's EMU/ Representative	40,000.00
Protected areas & flora/ vegetation	Area of PAs affected, No. of indigenous/ exotic trees affected esp. trees having ornamental or ecological values	Protected Areas located bn Towers 23 & 24 of OH TL, along BLL – NADC UG TL, & Tulu Korma Native Trees Research Centre (TKNTRC) along Feeder ALM-15-04 at nearby Addis Alem town	Metric measurement of affected area; Recording of no. & type of trees affected; Interviews of officials/ experts of Sub-city & Woreda EPOs, & officials/ experts of TKNTRC	Daily during construction at particular site	As above	60,000.00

Environmental monitoring parameters	Parameters/ Indicators to be Monitored	Monitoring Site/ Location	Methods of Monitoring	Frequency	Responsible body	Cost (Eth. Birr)
Waste management	Type and quantity of wastes generated at construction sites	Construction site, materials laydown areas, campsites	Recording the type and quantity of wastes generated at construction sites (Weight or volume), and site investigation.	Once/2 weeks or month depending on the quantity of wastes generated	Contractor & EEP's EMU or EEP's Representative	Included in the Contractor's costs & 50,000 for EMU
Land use & livelihoods	Area of farmland affected by project activities; Types of crops affected & loss of household income, and compensation situation for loss of crops or land use right	Users of the farmland bn Towers 20 & 21 affected by the NADC – Gofa UG TL, Users of the farmlands affected by tower-base and access roads located bn Tower 35 & TR 55	Collecting data on land taken for project activities and on compensation paid to PAP; Interviews with affected people	Once/2 months	EEP's EMU	60,000.00
Petty businesses	No. of people losing petty trade activities and losing household income, Situation on compensation or mitigation measures taken	People affected	Interviews with affected people; Woreda Adm. Officials or	Once/3 months	EMU	25,000.00
Road infrastructure	Type, location, length of roads affected; Type, location, length of roads restored upon completion of construction works	Construction site, access roads used by project vehicles & equipment	Site investigation; Interviews of contractor; Interviews of AACRA; Interviews of SC/Woreda Official & Local Devt Committee	Once/month	EMU	60,000.00
Public utilities	Type, location, length of public utilities affected;	Construction site	Interviews of utility agencies, Interviews of local residents	Once/month	EMU	30,000.00

Environmental monitoring parameters	Parameters/ Indicators to be Monitored	Monitoring Site/ Location	Methods of Monitoring	Frequency	Responsible body	Cost (Eth. Birr)
	Type, location, length of public utilities restored		or users			
Project workers health and safety	No. of workers provided with training & awareness education and protective clothing & equipment; No. of project sites secured safe & provided with safety facilities/materials; Traffic management on site	Construction site; access roads; materials laydown areas	Site investigation; Interviews of contractor & workers	Daily during active construction period	EMU/EEP's Representative (Supervision Consultant)	70,000.00
Community health and safety	Measures taken to ensure safety at construction sites: <ul style="list-style-type: none"> No. of risky construction sites prevented by fencing or blocking access; No. of project workers esp. equipment operators & drivers provided training in safety measures; No. of awareness training provided for local communities 	Construction site; settlement areas; access roads; materials laydown areas	Site investigation; Interviews of contractor & workers; Interviews of local residents & local officials/experts	Once/week	As above	30,000.00

Environmental monitoring parameters	Parameters/ Indicators to be Monitored	Monitoring Site/ Location	Methods of Monitoring	Frequency	Responsible body	Cost (Eth. Birr)
Road traffic and safety	<ul style="list-style-type: none"> • Safety of work zone through fencing, posting signs, barricades, reflectors etc. • Traffic management at & around construction sites - speed limits, provision of alternative routes to divert traffic from construction sites, • Construction season & duration • Occurrence and frequency of accidents, and causes and measures taken to prevent accidents • Reinstatement of damaged road sections 	Construction sites, access roads	Site investigation; Collection of accident report from contractor & traffic office; Interviews of contractors & site workers; Interviews of traffic police	Once/week	EMU/EEP's Representative, AAC Road Traffic Management Agency (AACRTMA)	80,000.00
Gender issues	<ul style="list-style-type: none"> • Employment condition of women that is if women have given equal employment opportunities, • Provision of separate toilets for women workers at project sites, • Indirect employment opportunities created for 	Contractors, construction sites	Site observation; Interviews of contractors & reference to employment records of employees; Interviews of women workers; Interviews of officials/experts of local women affairs offices	Quarterly (Once/3 months)	EMU, EEP's Women & Youth Affairs Directorate	25,000.00

Environmental monitoring parameters	Parameters/ Indicators to be Monitored	Monitoring Site/ Location	Methods of Monitoring	Frequency	Responsible body	Cost (Eth. Birr)
	women like through catering services to contractors' workforce					
Operation Phase						
Soil erosion	Soil erosion situation	Areas around tower base and along underground transmission lines	Site visits to check the occurrence of soil erosion and photographic recording	Once/month during wet seasons	EEP's Env't, Health, Safety and Quality (EHSQ) Office	Included in the routine costs of EHSQ or operation cost of the facilities
Community health and safety and safety of electric lines	Performance of safety measures at substations, overhead & underground electric lines: <ul style="list-style-type: none"> • Performance of transmission system automatic break in case of electrical line breaking; • Minimum vertical distance of electrical lines from buildings and structures; it should be 8m for overhead TL & 4.6m for distribution line; • Safety of towers – protection of tower base from erosion, cultivation, growing of trees or crops etc. 	Substations, overhead TL & DLs, underground TLs	Site visits at substations & along overhead and underground transmission lines as well as selected distribution lines; Interviews of facility operators	Quarterly (Once/3 months)	As above	As above

Environmental monitoring parameters	Parameters/ Indicators to be Monitored	Monitoring Site/ Location	Methods of Monitoring	Frequency	Responsible body	Cost (Eth. Birr)
	<ul style="list-style-type: none"> • Safety of electric lines – avoidance of growing trees under electric lines; it should be minimum of 13m for OH TL & 2.5m for DLs in all directions; • Safety of underground cables – avoidance of any structures and growing trees above the UG electric lines; proper performance of safety signs and protective facilities or devices at manholes and along the TLs. 					
Green Areas, ornamental trees & other vegetation	Restoration of trees and greenery areas affected during construction works,	Protected green area at road the median along BLL – NADC & Weregeenu – Conn. Point-3 UG TLs, Tree restoration area (s) implemented to compensate for the trees lost from UG TLs	Site visits; Interviews of officials/ experts of Sub-city & Woreda Beautification, Parks & Cemeteries Devt & Adm Offices	Biannually (twice a year)	As above	As above

9.4 Institutional Responsibilities for Environmental Management and Monitoring

9.4.1 Introduction

This section identifies the various bodies responsible for environmental and social management and monitoring. These include the financier (JICA), the Competent Authority (MoWIE), the project proponent (EEP), the designers, contractors and operators (EEP & EEU). It also briefly discusses the responsibilities of various implementing parties and other stakeholders. In addition, it identifies the support to the various agencies required to ensure that they have the necessary capacity to fulfil their environmental and social obligations.

The Financier (JICA) is responsible for integrating environmental and social considerations for the subject project according to the Agency's requirements. The internal monitoring of the project implementation will be carried out by the EEP through the Project Implementation Unit (PIU) expected to be established by EEP. It is anticipated that external monitoring of implementation process will be undertaken by the MoWIE to ensure that the implementation and operation of the project is in compliance with the Ethiopian environmental policy and other relevant policies as well as applicable legislations.

9.4.2 Project Proponent

The Ethiopian Electric Power (EEP) is the Proponent for the implementation of the transmission lines and substations included in the current project. Whereas the Ethiopian Electric Utility (EEU) is the Proponent for the Feeders (distribution lines) incorporated in this project package. EEP will work with the successful designer in further developing the detailed design of the project facilities. EEP will be responsible for ensuring integration of environmental mitigation measures in the detail design and inclusion of environmental and social considerations in the tender document for contractors, and finally, in the contract document for successful contractor. EEP will also be responsible for submission of the final version of the ESIA/ARAP to all implementing parties.

In addition, EEP will be responsible for developing and implementing public relations and communications for the project to ensure the continuation of consultation process, ensure transparency and build trust and confidence in the project. EEP will make known details of the project and its time schedule, impacts and mitigation measures, and grievance procedures for host communities, especially those measures relating to compensation.

9.4.3 Project Implementation Unit

It is recommended that EEP establishes a Project Implementation Unit (PIU) that will oversee the development and implementation of the ESMP and all associated plans and their incorporation into the construction and operations and maintenance manuals. The PIU will also be responsible for setting up the Environment Management System (EMS) for the project implementation including all the relevant monitoring, auditing and reporting requirements for

both construction and operations phases.

In addition, the PIU will ensure that the mitigation and enhancement as well as compensation measures are implemented as stipulated in the ESMP and ARAP, and in accordance with national policies. The PIU must report performance to the management of EEP at regular intervals.

9.4.4 Environmental Monitoring Unit

It is suggested that EEP establishes an Environmental Monitoring Unit (EMU) by selecting environmental and social experts from the EEP's Environmental, Health, Safety and Quality (EHSQ) Directorate. The EMU will focus on inspection and monitoring of the implementation in order to ensure that the proposed mitigation measures are properly implemented, benefits are enhanced and compensation is properly paid to the PAP.

The EMU will assist EEP in monitoring progress of the contractor's works regarding the environmental and social protection measures as well as coordinating the implementation of the ESMP for those activities outside of the contractor's responsibilities.

9.4.5 Construction Contractor

The Construction Contractor will develop a site specific Environmental and Social Management Plan (SESMP) to implement the ESMP requirements associated with the construction and commissioning phases of the project. The ESMP requirements should be provided to the contractor through main and subcontract clauses in the tender documents.

The SESMP must demonstrate the contractor's commitment to address the potential impacts identified in the ESMP. The SESMP will identify his methods for addressing impacts identified in the project ESMP and any additional impacts that the contractor may identify during the detailed design, pre-construction and construction phases.

The successful tenderer is expected to implement the construction related environment and social actions defined in his SESMP as well as in the current ESMP. This will include the appointment of an Environment, Health and Safety (EHS) Manager or Specialist within his construction team.

The SESMP should be agreed by EEP and the relevant implementing authorities, should be enforced by the contractor's site manager and its implementation periodically audited by the PIU. All workers taking part in the construction works shall be informed of their responsibilities in regards to the SESMP and be trained to comply with its requirements.

9.4.6 Project Operators

EEP will operate and maintain both the overhead and underground transmission lines and substations once commissioned while EEU will operate and maintain the feeders and will manage the supply of power to consumers. It is recommended that EEU prepares an

Operational Environmental and Social Management Plan (OHSEMP) for the project facilities in order to ensure that the operation and maintenance is carried out so as to avoid harm to the environment and host communities. This will also help prolong the operational life and sustainability of the project facilities.

The OHSEMP should be incorporated into the overall EEP and EEU Operations and Maintenance Manuals (OMM). The OHSEMP requirements should be enforced by the EEP and EEU operations site managers and implementation periodically audited by EEP's/EEU's own in-house EHSQ team. All workers taking part in operation and maintenance works shall be informed of their responsibilities with regards to the OHSEMP and be trained to comply with its requirements.

9.4.7 Ministry of Water, Irrigation and Electricity

In the water and energy sectors, MoWIE is the Competent Authority at federal level responsible for ensuring that the EPA's (now MoEFCC) environmental guidelines are followed during project planning and implementation stages. In this project the Ministry's responsibilities include review and approval of the ESIA and ARAP documents, review of the environmental monitoring and compliance reports, and conducting site visits or external monitoring to verify the reports, if required.

9.4.8 Other Relevant Parties

It is recommended that EEP employs an independent environmental auditor that will conduct an independent external monitoring of the implementation of the project facilities. The auditor approves or rejects the undertakings of the contractor in relation to the requirements of the contract documents. The auditor reports to the PIU and EMU, and in parallel to MoWIE.

The key stakeholders at sub-city and woreda administration levels and project affected communities have the right to be consulted and needs to be involved at different stages of the project implementation to ensure that their views and concerns are considered as appropriate. Such stakeholder and public engagement will increase the overall project acceptance. Local NGOs may also play a role in the implementation process, as their knowledge and opinions will be requested as required.

9.5 Environmental Mitigation, Management and Monitoring Cost Estimate

Most of the proposed mitigation measures will not incur separate costs as they

- can be considered during the detail design like improvement of transmission route and design of pipe jacking to avoid or reduce major environmental or social impacts;
- can be implemented by proper planning of construction programmes like scheduling construction works for dry season, and following proper construction methods, which shall be specified in the tender document, technical specifications and construction contract documents; or
- are engineering/ physical features, which are part of the construction items such as erosion protection structures, protection or replacing of drainage facilities, traffic signs, posting of traffic signs, barricades, reflectors; speed calming measures, delineation or fencing of work zone etc.

Other mitigation measures that will have separate cost implications include:

- Replanting of trees to compensate for the trees lost due to project activities;
- Restoration of the green areas affected during construction of underground transmission lines;
- Reinstatement of community access roads damaged during construction of underground transmission lines; and
- Compensation for loss of income benefits from crop production due to permanent farmland taking for tower-base and temporary land taking for construction of underground transmission line

Table 9-4 below presents estimated costs for the mitigation measures that will incur separate costs, while the costs of most of the remaining mitigation measures are considered to be included in the construction contractor's costs. As shown in Table 9-4 below the total environmental costs are estimated to be about 6.2 Million Eth. Birr.

Table 9-4: Environmental Mitigation, Management and Monitoring Cost Estimate

Ser. No.	Reference	Cost Items	Cost Estimate (Eth. Birr)
1	Table 9-1	Replanting of trees to compensate for the trees lost from the route of Black Lion – New Addis Center Underground TL	933,000.00
2	Table 9-1	Restoration of the green area affected during construction of the Black Lion – New Addis Center UG TL through planting of shallow rooted plants above the UG cables and on the rest of the median.	977,625.00
3	Table 9-1	Development of a green area through planting of shallow rooted plants above underground cables to compensate for the trees lost from Weregenu – Conn. Pt-3 UG TL	1,058,000.00
4	Table 9-1	Restoration of the damaged sections of community access roads	990,000.00
5	ARAP	Compensation for loss of income benefits from crop production due to permanent farmland take for tower-base and temporary land take for construction of underground transmission line	463,872.70
6	Table 9-3	Environmental monitoring and capacity building costs	730,000.00
Total			5,152,497.70
Contingency (20%)			1,030,498.94
Grand Total			6,182,966.64

10. CONCLUSION AND RECOMMENDATIONS

This environmental and social impact assessment acknowledges that rehabilitation and upgrading of the transmission and distribution systems encompassed in the current project will bring a major benefit to substantial part of Addis Ababa city and surrounds through provision of a reliable, re-enforced and expanded energy supply to residents and businesses in the service areas. Implementation of the project will also bring local socio-economic benefits in respect of employment of local labour and procurement of materials resulting in both beneficial direct and indirect impacts.

The consultations held with local communities and officials of Federal, Regional, Sub-city and Woreda administration levels reveal that implementation of the proposed project is considered to contribute a lot to alleviate the existing high rates of power interruption in the city. The project is in harmony with government policies and strategies to provide a sustainable electric power supply to the city residents and developers thereby enhancing socio-economic as well as industrial development. Therefore, most of the consultees were happy about the project and they fully support the project and willing to provide all necessary support for successful implementation of the project. On the other hand, the communities living within the project impact zone also disclosed their concerns about potential displacement from their residence or loss of livelihood sources as well as health and safety risks related to the overhead electric lines.

The project will not cause any physical displacement of people as it will be implemented within the right-of-way of the existing transmission line and all the new sections are located outside of areas occupied by residential houses or any other structures. Resettlement of illegal residents within the existing right-of-way is avoided through design of the transmission line with minimum vertical distance from buildings and structures specified in the Ethiopian directive on clearance of overhead electric lines. In addition, safety of the people residing under the transmission line is ensured through design of the system with automatic break of power transmission in case of any cable breaking.

Cash compensation will be provided to 13 households for loss of economic benefits from crop production on the farmland plots to be permanently taken for tower-base of the overhead transmission line from Kaliti-1 to Gofa substation. In addition, compensation will be paid to 8 households and one association for loss of income benefits from crop cultivation on farmland plots to be temporarily affected during installation of the underground TL from NADC to Gofa substation. Abbreviated resettlement action plan (ARAP) is prepared to address the economic impacts on local people, to provide cost estimate for compensation and to provide the implementation procedures for compensation measures.

In addition, implementation of the proposed project is predicted to bring a number of adverse environmental and social impacts, most of which will occur during the construction phase.

Most of the potential impacts are related to location of the transmission lines mainly within the densely settled parts of the city, along existing major roads and community access roads, and in areas comprising high density of public utilities (water supply, sewerage & telecommunication lines); involvement of excavation works esp. for laying underground electric cables; operation of heavy equipment and vehicles for construction works and haulage of construction materials.

Most of the potential adverse impacts will occur during the construction period and thus, they are short-term and localized in nature. Most impacts are predicted to be small to medium in magnitude, and minor to moderate in significance. Nonetheless, the impacts can be mitigated to acceptable levels with careful siting of the TLs, appropriate engineering design and proper construction methods, as well as through application of appropriate environmental and social mitigation measures including those specified in this ESIA document. Therefore, it can be concluded that there are no serious environmental or social issues that will prevent the construction and operation of the transmission and distribution lines from proceeding to the implementation stage as long as the recommended mitigation and monitoring measures are properly considered and timely implemented.

It is recommended that the Proponent (EEP) ensures that the construction contractor has prepared site specific environmental and social management plan (SESMP), have a qualified and experienced EHS Manager in his construction team and allocated sufficient financial resources to implement the mitigation measures stipulated in his SESMP and in this ESIA document and is subject to clauses binding him to implementation of impact mitigation and monitoring as part of the construction works. In turn, EEP will secure sufficient competent supervisory staff to enforce compliance through surveillance and periodic monitoring.

LIST OF REFERENCES

1. Addis Ababa US Embassy Air Pollution: Real-time Air Quality Index (AQI). Website: <http://aqicn.org/city/ethiopia/addis-ababa/us-embassy/>. Referred on 28 July, 2018.
2. Addis Ababa International Community School Air Pollution: Real-time Air Quality Index (AQI). Website: <http://aqicn.org/city/ethiopia/addis-ababa/international-community-school/>. Referred on 28 July, 2018
3. Addis Ababa City Administration (2015) "Addis Ababa City Atlas", prepared by "Integrated Land Information Center". First Edition, Addis Ababa, Ethiopia.
4. Addis Ababa City Administration Directive on Compensation of Assets and Replacement of Land for Expropriation of Landholdings for Public Purposes, April 2014.
5. Central Statistical Agency (2012) Key Findings on the 2012 Urban Employment Unemployment Survey. September 2012.
6. Central Statistical Agency (2012): Analytical Report, Household Consumption and Expenditure (HCE) Survey 2010/11. Analytical Report, October, 2012 Addis Ababa.
7. Central Statistical Agency (2015): Statistical Report on the 2015 Urban Employment Unemployment Survey. October 2015. Addis Ababa.
8. Central Statistical Agency (2013). Population Projection of Ethiopia for All Regions at Wereda Level from 2014 to 2017.
9. Council of Ministers Regulations No. 49/1999. Regulations to provide for the Regulations of Electricity Operations.
10. Council of Ministers Regulations No. 135/2007 on Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes, May 2007.
11. Council of Ministers Regulation No. 302/2013. Ethiopian Electric Power Establishment Regulation.
12. Council of Ministers Regulation No. 303/2013. Ethiopian Electric Utility Establishment Regulation.
13. Directive No. EEA/1/2005. Directive on Clearance of Overhead Electric Lines and Quality of Supply.
14. Directive No.1/ 2008. A Directive Issued to Determine Projects Subject to Environmental Impact Assessment.
15. The Environmental Policy of Ethiopia, 1989.
16. Environmental Impact Assessment Guidelines Document (EPA, July 2000).
17. Kume, A; Charles, K; Berehane, Y; Anders, E; Ali, A (2010). Magnitude and variation of traffic air pollution as measured by CO in the City of Addis Ababa, Ethiopia. https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/2139934. Downloaded on 28 July 2018.

18. Legesse Negash (2012). Technical Report on Center for the Restoration of Ethiopia's Biodiversity and Keystone Natural Resources [Established on 10 July 2004]. Website: <https://www.researchgate.net/publication/266402908>. Downloaded on 26 July, 2018.
19. Proclamation No. 1/1995. The Constitution of Federal Democratic Republic of Ethiopia.
20. Proclamation No. 197/2000. Proclamation on Ethiopian Water Resources Management.
21. Proclamation No. 200/2000. Proclamation on Public Health.
22. Proclamation No. 299/2002. Environmental Impact Assessment Proclamation.
23. Proclamation No. 295/2002. Proclamation for Establishment of Environmental Protection Organs.
24. Proclamation No. 300/2002. Environmental Pollution Control Proclamation.
25. Proclamation No. 377/2003. Labour Proclamation
26. Proclamation No. 455/2005. Proclamation on Expropriation of Land Holdings and Payment of Compensation.
27. Proclamation No. 542/2007. Proclamation on Forest Development, Conservation and Utilization.
28. Proclamation No. 513/2007. Proclamation on Solid Waste Management.
29. Proclamation No. 810/2013. A Proclamation on Energy (to revise the Electricity Proclamation No.86/1997).
30. Parsons Brinckerhoff and Tropics Consulting Engineers (2016): Environmental and Social Impact Assessment, ESIA Report (Draft). Addis Ababa Distribution Master Plan Study. Addis Ababa, Ethiopia, May, 2016.
31. World Bank (2015) Ethiopia: Poverty Assessment. Report No. Aus6744, January 2015.
32. Zewdie Kassa, Zemed Asfaw and Sebsebe Demissew (2016). Plant diversity and community analysis of the vegetation around Tulu Korma project centre, Ethiopia. In Tropical Plant Research.

ANNEXES

ANNEX 1: LIST OF COUNSULTED PERSONS

ANNEX 2: LIST OF FLORA IDENTIFIED FROM PROJECT ROUTES CORRIDOR

ANNEX 3: WATER SUPPLY AND SEWER LINES IN PROJECT IMPACT ZONE

ANNEX 4: IDENTIFIED IMPACTS CHARACTERIZATION AND EVALUATION

ANNEX 5: MONITORING FORM

ANNEX 6: MINUTES OF STAKEHOLDER CONSULTATION MEETINGS

ANNEX 7: PHOTOS ILLUSTRATING STAKEHOLDER CONSULTATION MEETINGS

**ANNEX 8: PHOTOS ILLUSTRATING EXAMPLES OF PROPERTIES FOUND WITHIN
DIRECT IMPACT ZONE OF OVERHEAD TL AND UNDERGROUND TLS**

ANNEX 9: TERMS OF REFERENCE

ANNEX 10: COMPETENCE CERTIFICATES AND CVS OF CONSULTANTS

ANNEX 11: COMMENTS ON DRAFT ESIA REPORT AND RESPONSES TO THE COMMENTS