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MINISTRY OF WORKS, TRANSPORT
AND COMMUNICATIONS



TANZANIA AIRPORTS
AUTHORITY



CONSTRUCTION OF MSALATO INTERNATIONAL AIRPORT



FINAL REPORT

Environmental and Social Impact Assessment

► Environmental and Social Impact Assessment Report

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THE UNITED REPUBLIC OF TANZANIA

TANZANIA AIRPORTS AUTHORITY



Final Report

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF
THE PROPOSED CONSTRUCTION OF MSALATO INTERNATIONAL AIRPORT IN
DODOMA MUNICIPALITY, TANZANIA**

SUBMITTED TO:

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ATC	Air Tanzania Corporation
AfDB	African Development Bank
BATNEEC	Best Available Technology Not Entailing Excess Cost
BOQ	Bill of Quantities
CBD	Central Business District
CRB	Contractors Registration Board
DUWASA	Dodoma Urban Water and Sewerage Authority
DoE	Division of Environment
DRC	Democratic Republic of Congo
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental management Plan
EP	Environmental Permit
ESMP	Environmental and Social Management Plan
GOT	Government of Tanzania
HIV	Human Immune Deficiency Virus
ICAO	International Civil Aviation Organization
ILO	International Labour Organization
NACP	National HIV/AIDS Control Programme
NBS	National Bureau of Statistic
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non Governmental Organization
PLHAS	People Living with HIV/AIDS
RAP	Resettlement Action Plan
SEA	Strategic Environmental Assessment
SO	Operational Safeguard
STD	Sexually Transmitted Diseases
TAA	Tanzania Airport Authority
TACAIDS	Tanzania Commission for AIDS
TANESCO	Tanzania Electricity Supply Company
ToR	Terms of Reference
TMA	Tanzania Metrological Agency
VAT	Value Added Tax
WHO-GPA	World Health Organization Global Programme on AIDS

TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	i
ACRONYMS AND ABBREVIATIONS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	ix
LIST OF FIGURES	xi
EXECUTIVE SUMMARY	xii
CHAPTER ONE	1
1.0. INTRODUCTION.....	1
1.1 Background	1
1.2 Project Rationale.....	2
1.3. Objective of the ESIA Study	2
1.5 Methodology of the Study	3
1.5.1 Guidelines.....	3
1.5.2. Literature Review	3
1.5.3 Stakeholder Consultations.....	4
1.5.4 Socio-economic Survey	5
1.5.5 Site Visits.....	5
1.5.6 Transect Walks	6
1.5.7 On-site Measurements.....	6
1.6 Methodology of identification and characterization of the potential impacts of the project.....	7
1.6.1 Methodology of identification of the impacts of the project.....	7
1.6.2 Characterization of impacts.....	8
1.6.3 Impact assessment.....	9
1.7 Report structure.....	9
CHAPTER TWO	10
2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK.....	10
2.1 Overview of legislative aspects considerations in EIA.....	10
2.1.1 The National Environmental Policy (NEP, 1997)	10
2.1.2 National Investment Promotion Policy (1996)	11
2.1.3 Tanzania Wildlife Policy, 1998.....	11
2.1.4 National Forest Policy (1998).....	11
2.1.5 National Water Policy, 2002.....	12
2.1.6 National Transport Policy (2003)	12
2.1.7 National Land Policy (1999)	13

2.1.8 The Tourism Policy of 1991 (revised in 1999).....	13
2.1.9 National Mining Policy, 1997	13
2.1.10 The Tanzania Development Vision (2025).....	14
2.2 Relevant Legislation and Regulations	14
2.2.1 The Environment Management Act, No. 20 of 2004	14
2.2.2 EIA and Audit regulations, 2005 and 2018 Amendment.....	15
2.2.3 Dodoma Special Investment Area Act	15
2.2.4 The National Land Act No.4 (1999) and its Amendment (2004).....	15
2.2.5 Village Land Act No. 5 of 1999.....	16
2.2.6 Land Acquisition Act (1967)	16
2.2.7 The land Use Planning Act, 2007	16
2.2.8 Local Government (Urban Development Control and Regulations), 2008	17
2.2.9 The Local Government Laws (Miscellaneous Amendment) Act, 2006	17
2.2.10 The Forest Act, 2002	17
2.2.11 The Mining Act No. 5 (1998)	17
2.2.12 The Land Disputes Court Act. No.2 (2002).....	18
2.2.13 The Water Resources Management Act, 2009	18
2.2.14 The Water Supply and Sanitation Act No. 12 of 2009.....	18
2.2.15 Occupational Health and Safety Act No. 5 of 2003	19
2.2.16 Public Health Act 2009.....	19
2.2.17 The Contractors Registration (Amendment) Act, 2008.....	19
2.2.18 The Urban Planning Act, 2007.....	20
2.2.19 The Fire and Rescue Army Act, 2007	20
2.2.20 Mining Act, No. 17 of 1980, as Amended	20
2.2.21 The HIV and AIDS (Prevention and Control) Act of 2008	21
2.2.22 Environmental Management (Air Quality Standards) Regulations, 2007	21
2.2.23 Environmental Management (Soil Quality Standards) Regulations, 2007	22
2.2.24 Environmental Management (Water Quality Standards) Regulations, 2007..	23
2.3.25 The Workers Compensation Act, 2008.....	23
2.2.26 Civil Aviation Act Cap 80, 2006.....	24
2.3 International Agreements and Conventions	24
2.3.1 The United Nations Convention on Biological Diversity, 1992.....	24
2.3.2 Convention on Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration	25
2.3.3 ILO Convention:	25
2.3.4 International Civil Aviation Organization (ICAO)	25
2.4 Operational safeguards of AfDB	25
2.4.1 Operational Safeguard 1 (SO1): Environmental and Social Impact Assessment	27
2.4.2 Operational Safeguard 2 (SO2): Involuntary Resettlement, Land Acquisition, Population Displacement and Compensation.....	28
2.4.3 operational safeguard 3 (so3): biodiversity and ecosystem services.....	28
2.4.4 Operational Safeguard 4 (SO4): Prevention and Control of Pollution, Hazardous Materials and Efficient Use of Resources.....	28

2.4.5 Operational Safeguard 5 (SO5): Working Conditions, Health and Safety	28
2.5 Summary of Country and institutional System Assessment	29
3.0. PROJECT DESCRIPTION AND JUSTIFICATION	30
3.1 Location	30
3.2 Project Site Accessibility	32
3.3. Site Description.....	32
3.4 Major Project Components and Design.....	33
3.4.1 Project Components.....	33
3.4.1.1 Runway.....	33
3.4.1.2 Taxiway	33
3.4.1.3 Apron.....	33
3.4.1.4 Air traffic Control Tower.....	34
3.4.1.5 Meteorological Station	34
3.4.1.6 Cargo Terminal.....	34
3.4.1.7 Fire Station.....	34
3.4.1.8 Aircraft Hangar.....	35
3.4.1.9 GSE Building	35
3.4.1.10 Presidential Pavilions	35
3.4.1.11 TAA Headquarter Office.....	36
3.4.1.12 Passenger Terminal Building.....	36
3.4.2 Architectural Design	37
3.4.2.1 Sustainable Design Initiatives.....	37
3.4.2.2 Capacity	38
3.5 Implementation Phases.....	38
3.6 Project Cost.....	41
3.7 Development Conditions	42
3.8 Project Phases	42
3.8.1 Mobilization Phase	42
3.8.1. 1 Site Preparation Activities.....	42
3.8.1.2 Mobilization of Construction Materials and Equipment.....	43
3.8.1.3 Equipment and Machinery	45
3.8.2 Construction Phase	46
3.8.3 Demobilization Phase.....	49
3.8.4 Operation Phase	49
3.8.5 Decommissioning Phase	51
3.9 Sources of Atmospheric Emissions from the Project.....	51
3.10 Land acquisition and ownership	51
CHAPTER FOUR.....	52
4.0 DESCRIPTION OF PROJECT ENVIRONMENT.....	52
4.1 Introduction.....	52
4.1.2 Area of influence of the existing and the proposed airport.....	52

4.2	PHYSICAL ENVIRONMENT	52
4.2.1	Climate	52
4.2.3	Climate change.....	55
4.2.4	Topography.....	56
4.2.5	Soil and geology.....	56
4.2.6	Erosion Potential.....	58
4.2.7	Water Resources and Hydrology.....	58
4.2.7.1	Surface and Groundwater Hydrology	58
4.2.7.2	Water Supply and Consumption	58
4.2.7.3	Water Quality	58
4.2.7.4	Existing sources of environmental pollutants.....	59
4.2.8	Air Quality	59
4.2.8.1	Gaseous Emissions.....	59
4.2.8.2	Dust Emissions	60
4.2.9	Noise and Vibration Levels	60
4.2.9.1	Noise level	60
4.2.9.2	Vibrations	61
4.2.10	Seismic Activity	61
4.3	BIOLOGICAL ENVIRONMENT	62
4.3.1	Flora	62
4.3.2	Fauna	64
4.3.3	The Main Ecosystems and their Services.....	64
4.4	GENERAL SOCIOECONOMIC ENVIRONMENT OF PROJECT SITE	65
4.4.1	Occupation	65
4.4.2	Education.....	66
4.4.3	Economy	66
4.4.4	Health.....	66
4.4.5	Housing and Housing Pattern	67
4.4.6	Neighboring area.....	67
4.4.7	Special populations or areas more likely to be exposed to adverse impacts.....	67
4.5	Socio-Demographic Profile of PAPs	67
4.6	Socio Profile of Affected Households.....	68
4.6.4	Gender Issues	69
4.6.5	Occupational status of PAPs	70
4.7	Economic Profile of PAPs	70
	(Source: socio-economic survey, 2018)	71
4.7.3	Nature and Types of Assets and PAPs	71
	(Source: socio-economic survey, 2018)	71
4.7.7	Impact on Socially Vulnerable Groups	72
	(Source: socio-economic survey, 2018)	72
4.7.8	Community Property	72
4.8	Dodoma Municipal Council Socio-economic synopsis	72

4.8.1 Administration and history	72
4.8.2 Population.....	73
Source: Dodoma Municipal council socio-economic profile	74
4.8.3 Economy	74
4.8.4 Land Use	74
4.8.5 Social Services Provided by Dodoma Municipal Council.....	74
4.8.6 Health.....	76
4.8.7 Agriculture and Livestock	77
4.8.8 Cooperative Societies	77
4.9Transport	77
4.9.1 Roads.....	77
4.9.2 Railway	78
4.9.3 Airport.....	78
4.10 Wastewater Management.....	78
CHAPTER FIVE	80
5.0 PROJECT ALTERNATIVES CONSIDERED AND COMPARISON OF ALTERNATIVES	80
5.1 No project alternative.....	80
5.2 Alternative Site	81
5.3 Design Alternative	81
5.4 Energy Alternative	81
5.5 Waste Water Management Alternatives	81
CHAPTER SIX	83
POTENTIAL IMPACTS OF THE PROJECT	83
6.1 Introduction.....	83
6.2 Potential impacts during the preparatory phase (Site selection and design)	83
6.3 Potential impacts during the construction phase.....	84
6.4 Potential impacts during the operation phase.....	96
6.5 Cumulative Impacts.....	111
6.6 Impacts during Decommissioning phase	112
CHAPTER SEVEN.....	113
7.0 IMPACTS MITIGATION /ENHANCEMENT MEASURES AND COMPLEMENTARY INITIATIVES	113
7.1 Mitigation/Enhancement measures during the preparatory phase	113
7.2 Mitigation/Enhancement measures during the construction phase.....	115
7.2 Mitigation/Enhancement measures during the operation phase.....	120
7.4 Mitigation Measures for Impacts during Decommissioning phase	122
CHAPTER EIGHT	124

9.0 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM	124
9.1 Health and Safety.....	124
9.2 Cumulative impact	124
9.3 Monitoring of key environmental and social parameters.....	125
CHAPTER NINE	130
9.0 SUMMARY OF PUBLIC CONSULTATIONS AND THE OPINIONS EXPRESSED	130
9.1 Stakeholders Identification	130
5.2 Stakeholders’ Concerns and Recommendations	131
5.3. Response of Negative and Positive Impacts	131
9.4 Analysis of Stakeholder Concerns	138
CHAPTER TEN.....	140
10.0 ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PLAN.....	140
10.1 Impact Management Plan	140
10.2 Implementation of the Management Plan.....	140
10.3 Environmental and Social Cost.....	140
CHAPTER ELEVEN.....	165
11.0 CONCLUSION	165
REFERENCES.....	166
APPENDICES.....	168
Appendix 1: List of Stakeholders: Post consultation	168
Appendix 2: List of Stakeholders: Pre-consultation.....	177

LIST OF TABLES

Table 1: Environmental and Social Impact Management Plan for the proposed Msalato Airport in Dodoma.....	xv
Table 2: Monitoring programme during construction phase	xxxix
Table 3: Monitoring programme during operation phase	xl
Table 4: Monitoring programme during decommissioning phase	xli
Table 1.1: Identified Stakeholders	4
Table 1.2: Qualification and symbolism of the different characterization parameters	8
Table 3.1: Types, amounts and sources of project requirements during the construction phase	45
Table 2.3: Types, amounts and treatment/disposal of wastes during the construction phase	48
Table 3.3: Types, amounts and sources of project requirements during the demobilization phase	49
Table 3.4: Types and sources of project requirements during the operation	50
Table 4.1: Average values of measured parameters compared with local and/or International standards	59
Table 4.2: The recorded PM 10 concentrations levels.....	60
Table 4.3: Average values of measured noise levels compared with the available local and/or international ambient air quality standards and/or guidelines	61
Table 4.4: Ambient vibrations measured onsite	61
Table 4.5: Ambient vibrations measured onsite	64
Table 4.6: Main Ecosystem types and their services within the proposed airport site	65
Table 4.7: Sex Composition of PAPs	68
Table 4.8: Levels of Education of PAPs Project area	68
Table 4.9: Age Categories of PAPS by Project Area.....	68
Table 4.10: Type of Households by Project area	69
Table 4.11: Types of family in the Project Area.....	69
Table 4.12: Distances from Social Service Facility.....	69
Table 4.13: Women decision making powers in household matters	70
Table 4.14: PAPs Occupations status	70
Table 4.15: Sources of Households Income by Project Area	70
Table 4.16: Estimated PAPs Household Monthly Income	71
Table 4.17: PAPs and type of Assets	71
Table 4.18: PAPs asset ownership	71
Table 4.19: Vulnerability status of the PAPs of Affected Households	72
Table 4.20: Community Property Resources Affected	72
Table 4.21: Dodoma Municipal Council Population	73
Table 4.22: Pre-Primary school's enrolment	75
Table 4.23: Primary school's enrolment	75
Table 4.24: Number of Teachers	75
Table 4.25: Building and furniture's.....	75
Table 4.26: Secondary Schools enrolment.....	75
Table 4.27: Disability Centres Enrolment	76

Table 5.1: Project scenarios assumptions	81
Table 6.2: Identification and evaluation of the main impacts of the construction phase..	85
Table 6.3: On-site building work producing dust and gaseous emissions.....	86
Table 6.4: Off-site building work producing dust	87
Table 6.5: Activities generating noise on site.....	88
Table 6.6: Evaluation of noise impacts related to construction for the residential receivers.....	89
Table 6.7: Types and sources of waste water	90
Table 6.8: Sources of gray water and threat posed	91
Table 6.9: Sources of the harmful effects on health and safety	93
Table 6.10: Types of accidents, source and population exposed.....	94
Table 6.11: Types of accidents and risk factors.....	95
Table 6.12: Source of the atmospheric emissions in the project.....	97
Table 6.13: Passengers traffic forecast 2023 – 2043 (Thousand pax)	99
Table 6.14: Commercial aircraft movements forecast 2023-2043.....	101
Table 6.17: Time savings by traffic segment.....	106
Table 6.18: Effects of the main pollutants of the air on the public health.....	109
Table 6.19: Sources of risk of the airport activities on the human health	110
Table 9.1: Monitoring programme during construction phase	125
Table 9.2: Monitoring programme during operation phase	127
Table 9.3: Monitoring programme during decommissioning phase	128
<i>Table 9.1: Key stakeholder</i>	130
<i>Table 9.2: Issues Raised by the Stakeholders</i>	132
<i>Table 9.3: Identified socio-economic impacts</i>	138

LIST OF FIGURES

Figure 3.1: Map of Tanzania showing project area	31
Figure 3.2: Site accessibility map	32
Figure 3.3: Beacon that earmark the Airport boundary	33
Figure 3.5: Crusher (L) and aggregate (R) at Chigongwe quarry.....	44
Figure 3.6: Open borrow pits at Chigongwe area	45
Figure 4.1: Climate zone within Dodoma region.....	53
Figure 4.2: Maximum and minimum monthly rainfall and Temperature	53
Figure 4.3: Dodoma wind rose for the period 1986-2016	54
Figure 4.4: Maximum and Average wind speed and wind Gust.....	55
Figure 4.5: Tanzania geological map.....	57
Figure 4.6: Lift valley map	62
Figure 4.7: A thorny bush thicket and a scrub bushy vegetation in the project area	62
Figure 4.8: Some thorny bushes of Acacia and Euphorbia tirucalli (Local: Mnyaa) in the proposed project are.....	63
Figure 4.9: Big trees baobab and others found in the proposed project area.....	63
Figure 4.10: An area that gets flooded during rainy season with some characteristic grass	63
Figure 4.11: An eagle and a bird nest spotted in the project area	64
Figure 4.12: Animal grazing at the project site in Msalato ward. Source: Fieldwork,August, 2017	66
Figure 4.13: Honey Harvesting Source: Fieldwork,August, 2017.....	66
Figure 4.14: House type at the project site community Source: Fieldwork,August, 2017	67
Figure 4.15: Road connectivity via Dodoma	78

EXECUTIVE SUMMARY

Description of the Project

The proposed Msalato Airport (MA) Project site is located about 12km from the Dodoma Central Business District (CBD), along the Dodoma-Arusha highway. TAA has constructed four (4) access roads around the proposed project site. The proposed Msalato Airport will be built on the right hand side along the Dodoma-Arusha highway, some 12km from the Dodoma Central Business District (CBD). The land designated for the airport is 9 km long and 5 km wide, i.e. approximately 45 km². The Msalato Airport project will entail the construction of the runway, main passenger aircraft parking apron, aircraft control tower, passengers' terminal and office buildings, car parking lots, shops, commercial area, banking facilities, ancillary facilities such as fuel depots, airport catering, general aviation facilities, electrical and mechanical services including transformer and generator rooms, mechanical ventilation plant, refuse disposal units, pump rooms etc. The capacity of the airport for phase 1 is estimated at 1,500,000 passengers per annum with about 60% international traffic and 40% national traffic..

Baseline Conditions

The land designated for the airport site is 9 kilometres long and 5 kilometres wide which is approximately 45 km² at an elevation of about 1070masl. Presently, about 10 km² is used for small agriculture and livestock activities by the nearby communities and the remaining area of approximately 26km² is covered by bushy thickets mixed with annual grass and short trees.

The proposed new airport outside the city will have a longer runway length and weight-bearing capacity. The proposed airport terminal will be constructed in the middle of the proposed site with a total airport Phase 1 built up area of 40,000 square meters. Recently, the airport area was demarcated as such there is no major activity in the area, apart from livestock grazing and seasonal crops of maize and sunflower.

There are a few homesteads surrounding the area and about 4 houses still in the project area. These buildings require demolition to give space for the new Msalato International Airport. However, there is one structure used as toilet for guest visiting the site and beacons at the corner point and peripherals that earmark the boundary of the proposed site

Project Alternatives

No project Alternative

A “no-project” option will not let the expected benefits from the proposed project accrue to Tanzania

Alternative Site

The option of using another site (like the other TAA land in Dodoma) apart from that of the proposed one was considered. However, the proposed site was observed to have many advantages over others.

Energy Alternative Site

The use of other alternative energy sources apart from the National grid and diesel generators were considered. Being the case in most of developing countries, supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern. Solar energy was considered by the design team and used for public lighting.

Waste Water Management

The Dodoma Master Plan document has planned a wastewater treatment plant for the Dodoma city.

For the first phase of the airport, it is considered to design a compact treatment plant to cater for the peak flows (350 m³/day). In the final phase, the airport will be connected directly to the Dodoma WWTP.

Considering the peak wastewater flow of 350 m³/day that is expected to be generated from the airport, a package treatment plant has been recommended. Normally package treatment plants are recommended for the wastewater flows in the range of 38 to 950 m³/day. Package treatment plants are easy to operate and are designed to give effluent of high quality.

The effluent from the treatment plant may be recycled for irrigation within the airport or discharged directly into existing natural stream.

The package treatment plant will be designed to treat raw sewage with the following parameters:

- 500 mg/l BOD₅ per day per user;
- 1000 mg/l of COD per day per user;
- 650 mg/l MES per day per user;
- 100 mg/l of total nitrogen per day per user;
- 20 mg/l of phosphorus per day per user

Project impacts and mitigation measures/enhancement measures

The construction and operation of the proposed new airport at Msalato, Dodoma will enhance aircraft movement in the centre of the country and positive effects will ensue in including creation of employment, availability of social amenities and facilities, improved infrastructure, and increase in revenue among others. However, in spite of these noble impacts, negative impacts will also be experienced hence the need to critically examine them. The project is likely to have some adverse environmental impacts of which adequate mitigation measures have been proposed and incorporated in the project design. The consultant is of the opinion that the activities of mobilisation, construction and the operation phase should be well mitigated, the views of which are shared by the proponent who is committed to implementing the proposed mitigation measures. The Environmental and Social Management and monitoring plan have been developed provide a way forward for implementation of the identified mitigation measures. An estimated total amount of TZS 412 million will be required to implement the Environmental and Social Management and Monitoring Plan, out of which TZS 271 million is for implementing mitigation measures, TZS 105 million is for monitoring and TZS 36 million for HIV/Awareness and capacity building.

Table 1: Environmental and Social Impact Management Plan for the proposed Msalato Airport in Dodoma

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation	of Monitoring frequency	Relative cost (TZS)
Preparatory phase					
Land acquisition and population displacement	<ul style="list-style-type: none"> ○ The proponent shall determine project affected people(PAP) with land rights or properties or crops ○ Compensation calculation and payment shall be guided by Land Acquisition and Compensation plan/Resettlement action plan (RAP) that takes into considerations of applicable laws of land acquisition and compensation ○ Compensation shall be done before the commencement of the project. 	Contractor/ TAA	Preparatory phase		200, 000,000
Disruption of Economic and Social Activities and Services	<ul style="list-style-type: none"> ○ Tanzania Airport Authority shall strive to obtain legal rights to its land (Land right of Occupancy-Title Deed) ○ Enforcement of national and international laws ○ Awareness rising to community within the project core area ○ Inclusion of local leaders (Ward/sub-ward chairpersons/executive officers or /and councilors in the airport security and safety committee. 	Contractor/ TAA	Preparatory phase		
Impacts on the cultural, archaeological and	<ul style="list-style-type: none"> ○ The contract shall use Change Finds Procedure. The main objective of the Change Finds Procedure is to ensure 	Contractor/ TAA	Preparatory phase		

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
historical heritage	<p>correct action and minimize damage or loss in case unknown features/objects are encountered during programme activities. In case unknown features or objects are encountered especially during ground breaking works, the procedure should stop the work and require investigation by an archaeologist.</p> <ul style="list-style-type: none"> ○ Upon discovery of features or objects that may be of archaeological or historical interest, the responsible contractor shall stop any work that may damage or alter the position of the observed feature or object., and report to TAA for further action 				
Exploitation of borrow pits/quarries and other natural resources	<ul style="list-style-type: none"> ○ Exploitation of construction materials will be from the authorized source only ○ Restoration of the borrow pits/quarries after use constituting leveling the area and seeding or planting of trees and/or grasses will done in association with local government (natural resources department) and local environmental NGOs. If appropriate the leveled area will be left for natural re-vegetation. ○ Maintain construction equipment's in good running condition and refuel restriction at the at the working site. 	Contractor/ TAA	Preparatory phase	Daily	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Re-use of the excavated soils and demolition rubbles as part of the sub base material. ○ Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc. ○ Construction of underground water reserve tank and introducing rainwater harvest system. ○ Extraction of underground water resources. 				
Contamination and Impaired Quality of Receiving Body-Land and Water	<ul style="list-style-type: none"> ○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport. ○ To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required. ○ Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly disposed municipal waste at Mbanga damp site. Alternatively, in consultation with municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling. 	Contractor/ TAA	Preparatory phase	Daily	15,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Introduction of waste disposal bins, warning notices, posted at strategic points, through the airport area. ○ No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system. ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed contractor as appropriate. ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process. ○ Waste management training for all personnel, operators and services providers at the airport. ○ Liquid waste will be collected using a cesspit tanks system at the proposed airport area. When full Tanzania Airport Authority will make use of the existing municipal council/urban water supply and sewerage authority cesspit emptying services 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
Deteriorated / Impairment of Local Air Quality due to Emission Generated from Equipment's	<ul style="list-style-type: none"> ○ Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke. ○ Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use. ○ Routine Inspection of equipments 	Contractor/ TAA	Preparatory phase	Daily	10,000,000
Construction Phase					
Impacts on air quality	<ul style="list-style-type: none"> ○ Equipment shall be maintained in good running condition, no equipment to be used that generates excessive black smoke. ○ Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use. ○ There will be routine inspection of equipment ○ Trucks transporting materials shall be fully covered ○ Turn off engines to reduce idling ○ Protect stockpiles of friable material subject to wind through wetting. ○ Cover loads with of friable material during transportation. ○ Restrict speed on loose surface roads to 	TAA/ Contractor	Construction phase	Daily	20,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	30Km/hr during dry or dusty conditions. <ul style="list-style-type: none"> ○ Douse with water of roadways and work sites to reduce dust when necessary. 				
Impacts through noise and vibrations	<ul style="list-style-type: none"> ○ Vehicles carrying construction materials shall be restricted to work during day time only. ○ Machine operators in various sections with significant noise levels shall be provided with noise protective gear. ○ Construction equipments shall be selected, operated and maintained to minimize noise ○ Impact pile driving shall be avoided where possible in vibration sensitive areas ○ Vibratory rollers and packers shall be avoided 	Contractor/TAA	Construction phase	Daily	2,000,000
Disadvantages related to the management of wastewater, garbage and yard waste	<ul style="list-style-type: none"> ○ Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site and then finally to the authorised logons in Dodoma municipality ○ TAA to enforce procedures to implement mitigation measures for management of non-hazardous solid wastes; transportation, use, storage and disposal of hazardous materials; and management of fuels and hydrocarbons (oils, petroleum, lubricants) 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	50,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>including Spill Prevention and Control Plan / Response and Contingency Plan.</p> <ul style="list-style-type: none"> ○ Much of the excavated soil and rubble materials will be reused as initial filling materials where levelling is required. ○ Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste ○ Training on waste management shall be done to all personnel, operators and services providers 				
Erosion of Exposed Surfaces	<ul style="list-style-type: none"> ○ The construction will be as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant. ○ Runway water shall be diverted away from construction field ○ Maintain gravel fill and/or re-vegetate around the structures ○ Unnecessary ground clearance and sensitive re-alignments shall be avoided. ○ Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	7,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ The discharge points shall be carefully chosen to avoid erosion of arable land and creation of gullies. ○ Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil. ○ Directing flow to properly designated channels. ○ All excavation works shall be properly backfilled and compacted. ○ Sufficient ground cover will be added to protect the topsoil from rain, wind and other natural elements that gradually erodes the top layer of the soil. ○ Most of construction activities will be done during dry weather ○ Exploitation of construction materials will be from the authorized source only ○ The borrow pits/quarries shall be restored after use constituting levelling the area and seeding or planting of trees and/or grasses will done in association with local government (natural resources department). If appropriate the levelled area will be left for natural re-vegetation. ○ Construction equipments shall be maintained in good running condition and 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	refuel restriction onsite.				
Contamination and Impaired Quality of Receiving Body-Land and Water Bodies from Fuel, Oils, Lubricates Spillages/Leakages	<ul style="list-style-type: none"> ○ Routine maintenance and checks of contractor's equipment and trucks. ○ Training of site personnel in proper handling, storage and cleanup of contaminating material into the environment. ○ Storage and routine handling of fuels, lubricants, oils and other potentially contaminating materials to occur in weather protected areas equipped with secondary containment systems for spills as appropriate. ○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport. ○ To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required. ○ Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly disposed municipal waste at Mbanga damp site. Alternatively, in consultation with 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling.</p> <ul style="list-style-type: none"> ○ Introduction of waste disposal bins, warning notices, posted at strategic points, through the airport area. ○ No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system. ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed contractor as appropriate. ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process. ○ Waste management training for all personnel, operators and services providers at the airport. 				
Destruction of Vegetation Cover / Loss Local	<ul style="list-style-type: none"> ○ Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed. 	TAA/Contractor	Construction phase	Quarterly monitoring and	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
Biodiversity from Vegetation Clearance	<ul style="list-style-type: none"> ○ Rehabilitation by seeding or planting grasses to all areas that will not be occupied by runway, taxiway, apron, buildings and other airport facilities on the project site. ○ Avoid planting non-native and exotic species on the site as well as those that constitute obstacles according to the airport regulations. 			Verification Report	
Visual Impacts / Public Health Hazards from Waste	<ul style="list-style-type: none"> ○ Light pollution can be reduced by keeping lighting (e.g. of parking lots) to the minimum levels needed for safety, and through the careful choice of light fixtures such as the use of flat-glass lanterns in car parks. ○ Other measures may include landscape engineering, tree planting and ground modelling. ○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport ○ No, on site burial or open burning of solid waste shall be permitted at the airport. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	20,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system.</p> <ul style="list-style-type: none"> ○ Waste management training for all personnel, operators and services providers at the airport. ○ Locating parts of the development further away from viewers 				
Potential Impacts on the human health and safety	<ul style="list-style-type: none"> ○ Awareness campaigns /Education on HIV and STDs shall be provided to workers ○ Appropriate working gear (such as nose, ear mask and clothing) and good construction site management shall be provided. ○ During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. ○ A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some 	TAA/Contractor	Construction phase	Quarterly monitoring and number of complaints on health issues	8,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>health education to the workforce.</p> <ul style="list-style-type: none"> ○ Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation; ○ Incident recording and reporting protocols shall be in place ○ Emergency contact details in the event of an accident shall be provided ○ Develop and implement an emergency plan including spill response ○ Training all contractor staff in emergency planning and spill response ○ Developing a detailed health and safety plan and training all contractor staff on the plan 				
Jobs creation	<ul style="list-style-type: none"> ○ The contractor shall be encouraged to employ local, unemployed yet willing to work hard, manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project. ○ Employment should be on equal opportunities for both gender ○ Contractor shall provide on job skills and training ○ Local communities shall be encouraged to 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	produce quality goods and services in at the project site.				
Increase of Wastewater generation	<ul style="list-style-type: none"> Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak away Pit within the site and then finally to the authorised logons in Dodoma municipality. 	TAA	Construction phase	Weekly	9,000,000
Income to Local Suppliers and Service Providers	<ul style="list-style-type: none"> Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers. Municipal council in collaboration with Tanzania Airport Authority institute good revenue collection system from the Airport. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	1,000,000
Health hazards	<ul style="list-style-type: none"> Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphics programs in schools and communities. Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transpiration law and 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	20,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>standards.</p> <ul style="list-style-type: none"> ○ Inform community of airport construction activities and schedules. ○ Noise generating equipments, operational for short periods or during the times which they will cause less disturbances. ○ Awareness campaigns /Education on HIV and STDs shall be provided to workers ○ Appropriate working gear (such as nose, ear mask and clothing) and good construction site management shall be provided. ○ During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. ○ A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce. ○ Reporting mechanisms for the public to register concerns or complaints regarding 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>perceived risks to their health and safety due to the construction operation;</p> <ul style="list-style-type: none"> ○ Incident recording and reporting protocols shall be in place ○ Emergency contact details in the event of an accident shall be provided ○ Develop and implement an emergency plan including spill response ○ Training all contractor staff in emergency planning and spill response ○ Developing a detailed health and safety plan and training all contractor staff on the plan 				
Impact on housing availability due to Influx of temporary workers and associated Occupational Health, safety and compromised security due to social interaction	<ul style="list-style-type: none"> ○ Contractor shall develop housing plan that will be approved by client prior to commencement of construction activities, and the plan shall be continually improved to meet the housing demand over time. ○ Contractor may wish to provide transport to workers who will decide to reside in nearby town ○ Workers shall receive training and sign a labour code of conduct, in order not to create conflicts with the local environment. ○ Tanzania Airport Authority and contractor shall comply with relevant Tanzania 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	30,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>(OSHA, 18001 becomes ISO 45001) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements including the provision of Personal Protective equipment's (PPE), reasonable working hours and good working conditions and facilities.</p> <ul style="list-style-type: none"> ○ Develop and implement in-house manual/guard lines on Health and Safety (H&S) ○ Outer boundary fence shall be constructed as part of this construction project and shall be scheduled as one of the first activities during the implementation of the project. ○ Only key construction personnel to be accommodated at the site. ○ Enforcement of site security. ○ Screening of security personnel. ○ Prohibition of alcohol and drugs within the site. 				
Operational Phase					
Impacts on air quality and its contribution to climate change	<ul style="list-style-type: none"> ○ In preparation of Airport Master Plan, Contractor will model aircraft movements (including ground support equipment) to determine baseline and future conditions using an atmospheric dispersion model, such as, the Emissions and Dispersion 	TAA/CDA/Municipal council	Operation phase	Quarterly monitoring and Verification Report	8,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	Modelling System (EDMS) recommended by the relevant authority. EDMS uses information such as the number of flights per day, types of aircraft, taxi length, idling duration, numbers and type of support vehicles and refueling duration and frequency. The EDMS is designed to assess the air quality impacts of airport emission sources, and contains the latest aircraft engine emission factors from the International Civil Aviation Organization (ICAO) Engine Exhaust Emissions Data Bank. The FAA continues to enhance the model under the guidance of its government/industry advisory board to more effectively determine emission levels and concentrations generated by typical airport emission sources.				
Risk of pollution and degradation of water quality	<ul style="list-style-type: none"> The developed Surface Water Quality Program and a Spill Prevention and Response Plan will be used to manage and mitigate the pollution of surface and ground water on the proposed project site at Msalato. The ESMP describes the measuring and monitoring activities and tracks actions taken to manage surface and ground water discharges. 	TAA	Operation phase	Quarterly monitoring and Verification Report	7,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Constructed wetland, septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised logons in Dodoma municipality via sewerage system to be constructed ○ Minimize oil spillage ○ Discharge and treat foul drainage and sewage ○ Pass run off through oil interceptors 				
Animals and Birds Disturbance and safety	<ul style="list-style-type: none"> ○ Perimeter fencing ○ Habitat modification ○ Draining out rainwater impoundment ○ Use constructed wetland and septic and soak pit ○ Putting strict regulatory constraints on the amount of noise that can be generated by aircrafts and on the flight paths to be followed ○ Refusing planning permission where noise levels exceed 66dB(A) Leq at daytime and 57 dB(A)Leq at nighttime ○ Making technical adjustments to thrusts, angle of flight decent/ take-off, speed of aircraft accent etc. 	TAA	Operation phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
Stormwater generation and Overflows	<ul style="list-style-type: none"> ○ The design storm water drainage will be given a high priority, with the limitation of gradient (slope) required for the runway, taxiway and apron. ○ Proper hydrology analysis will be carried out, considering the airport topographical features, amount of rainfall and catchments area as the major factors of design of storm water channel. Channel with the capacity of accommodating the amount of water found will be provided/designed. ○ Rainwater harvesting will be used at the proposed airport ○ The design shall consider enough greeneries in the project site 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	10,000,000
Noise pollutions related to road and air traffic	<ul style="list-style-type: none"> ○ The design shall accommodate multiple runways so as to provide a room for noise-preferential runway to be used to change noise exposure patterns. Runways will be utilized based on the noise impact the aircraft generates, along with other environmental factors such as wind direction. ○ Special flight tracks/runways shall be considered to be part of design to minimize noise impacts ○ Noise Abatement flight procedures like steepest climb procedure and proposer 	TAA	Operation phase	Quarterly monitoring and Verification Report	25,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>orientation of runway (taking off-landing side) shall be encourage to avoid noise problem</p> <ul style="list-style-type: none"> ○ Passengers waiting lounge and boarding room will have noise proof-walls to reduce exposure to noise due to aircraft landing and take-off. 				
Olfactif nuance and disrupted airport operations due to inadequacies in operation and maintenance	<ul style="list-style-type: none"> ○ The proponent shall use constructed wetland to avoid several nuances from wildlife, complaints from the discharge of partial treated wastewater and related health effect ○ Water reserve tank of not less than 10,000 m³ shall be constructed at the airport ○ Monitoring and reporting for routine maintenance, repairs, replacements, of all environmental sensitive areas e.g. storm water channels, waste collections and storage. ○ Enforcements of all regulations instituted by the airport e.g. Warning notice ○ Availability of adequate resource particularly money for maintenance ○ Regular maintenance schedule of structures 	TAA	Operation phase	Quarterly monitoring and Verification Report	60,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> should be put in place ○ Proper operational and monitoring procedures should be put in place 				
Jobs creation	<ul style="list-style-type: none"> ○ Employment should be on equal opportunities for both gender 				
Increased Commercial and Social Activities (Induced Development)	<ul style="list-style-type: none"> ○ Efficient airport operation will be in place ○ Good security within the airport area and area of influence ○ Undertakes Strategic Environmental Assessment (SEA) and include in the region investment strategies and plans 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	40,000,000
Health and Safety Risks Due to Fire Hazards	<ul style="list-style-type: none"> ○ Adequate number of portable fire extinguishers shall be placed at strategic locations. ○ Good housekeeping shall be maintained at all sites to reduce the fire risk. ○ The design of the airport shall strictly adhere to the Fire Safety Standards ○ Fire detectors and sprinkler system shall be installed in the airport ○ The proponent shall insure the airport against fire Hazards 	TAA	Operation phase	Quarterly monitoring and Verification Report	20,000,000
Increased Pressure on Social Services and Utilities	<ul style="list-style-type: none"> ○ Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc. ○ Construction of underground water reserve tank and introducing rainwater harvest system ○ Extraction of underground water resources. 	TAA	Operation phase	Quarterly monitoring and Verification Report	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Alternative measures like use of solar power, drilling a borehole at site, water recycling shall be explored and implemented if found feasible. For instance, use of energy savers bulbs shall be given high priority ○ Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using natural ventilation system shall be strongly explored during the design process. 				
Total cost of mitigation measure (TZS)					412,000,000
ESMP Implementation					271,000,000
ESMP Monitoring cost					105,000,000
HIV/AIDS awareness and capacity building					36,000,000

Table 2: Monitoring programme during construction phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost (TZS) per year
Noise	Noise monitoring at direct interference (within 500 m)	Day and night noise levels	Weekly	Contractor/TAA	8,000,000
Health and safety	Health and Safety (H&S) monitoring and audits. H&S Performance evaluation. Personal Protected Equipment monitoring	Total recordable incidents, lost time incidents and other H&S indicators. Records verifying the conditions of Personal Protected Equipment	Weekly	Contractor/TAA	16,000,000
	Maintain grievance mechanism. Analyse workers and community grievance trends. Maintaining training records	Grievance mechanism records. Training records	Monthly	Contractor/TAA	5,000,000
Total					29,000,000

Table 3: Monitoring programme during operation phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Underground water	Monitoring of underground Water at direct interference (within 500 m)	Physicochemical analysis of Underground water	Every 12 months for sample analysis	TAA	5,000,000
Air quality	Air emissions monitoring through a Continuous Emissions Monitoring (CEM) System	Temperature Pressure drop H ₂ S Combustible gases	Continuous Continuous detection monitoring Continuous detection monitoring	TAA	5,000,000
Noise	Noise monitoring at direct interference (within 500 m)	Day and night noise levels	Every 6 months for the first two years	TAA	3,000,000
Health and safety	Inspection of the emergency and detection systems	Maintenance check, services and record verifying the condition of the emergency shutdown, fire detection, H ₂ S detection, combustible gas detection and fire water	According to the manufacturer	TAA	4,000,000

		systems			
	Inspection of the Personal Protected Equipment (PPE) and the safety equipment	Visual inspection and records verifying the condition of the safety equipment (life rafts, life jackets, flares, smoke canisters)	Monthly	TAA	8,000,000
	Monitoring of Health and Safety implementation by the workforce		Monthly	TAA	5,000,000
Total					30,000,000

Table 4: Monitoring programme during decommissioning phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Underground water	Monitoring of ground water quality	Turbidity / Suspended solids Oil and grease	Weekly One month after direct interference	TAA/contractor	5,000,000
	Identification and reporting of leakage events	Number of leakage events caused during the construction	Continuous		2,000,000
Noise	Noise monitoring at	Day and night noise	Weekly		5,000,000

	direct interference (within 500 m)	levels			
Health and safety	Health and Safety (H&S) monitoring and audits. H&S Performance evaluation Personal Protected Equipment monitoring	Total recordable incidents, lost time incidents and other H&S indicators. Records verifying the conditions of Personal Protected Equipment	Weekly		5,000,000
	Maintain grievance mechanism Analyse workers and community grievance trends Maintaining training records	Grievance mechanism records Training records	Monthly		5,000,000
Total					22,000,000

Public and Stakeholder Consultations

The overall aim of the consultation process is to ensure that all stakeholders have adequate opportunity to provide input into the process. More specifically the objectives of public consultation are to:

- Identify stakeholders and inform them about the proposed development
- Provide stakeholders with the opportunity to identify issues and concerns associated with the proposed airport construction; and

- Identify mitigation and management options to address potential environmental issues.

The main stakeholders consulted were:

- Ministries: Ministry of Natural Resources and Tourism (Wildlife division)
- Ministry of Natural Resources and Tourism (Tourism Division)
- Ministry of Agriculture, Livestock and Fisheries and Tanzania Tourist Board
- Tanzania Airport Authority - Dodoma
- Dodoma Municipal Council
- Dodoma Water and Sewerage Authority
- Msalato ward and street leaders

Concerns of Stakeholders

Issues raised by the stakeholders ranged from increase in population with its effects to neighbouring villages which will translate into many spin-offs such as increased revenue for the Municipal Council and transforming the subsistence economy into a more monetised one; from environmental impacts resulting from the sourcing construction materials (e.g. burrow pits) to monitoring of what goes on between the contractor and workers which poses challenges because experience shows that the former often faults regulations or does not adhere to what the laws stipulates. Overall the building of the airport was seen as a welcome (belatedly overdue) idea which will bring colossal benefits in an otherwise lethargic economic base.

CHAPTER ONE

1.0. INTRODUCTION

1.1 Background

The Government of the United Republic of Tanzania (URT) through the Tanzania Airports Authority (TAA) intends to construct a new International Airport at Msalato area, Dodoma City. The construction of the international airport is in tandem with the current impulse by the government to move her business and operations in her designated capital of Dodoma City. The URT has applied financial assistance to the African Development Bank (AfDB) to finance the project. The TAA commissioned a joint venture of STUDI International (Tunisia) and Advanced Engineering Solutions (Tanzania) to undertake detailed engineering designs of the airport and to conduct environmental and social impact assessment (ESIA) study in 2018. The design consultancy work was an update of the initial work carried out in 2014. The associated ESIA report was completed in 2014 and an Environmental Certificate was issued. However, the ToR for this work, required to update and repackage the ESIA study report to adhere to AfDB format. This is essentially because the AfDB requires loan applicants to comply with their Environmental and Social Assessment Procedures (ESAP).

From the national context point of view, it is a legal obligation for the developers to undertake ESIA studies before implementing projects in Tanzania. The principal legislation, the National Environmental Act No.20 of 2004, provides for conduction of Environmental Impact Assessment (EIA) of development projects. The amended EIA and Environmental Audit Regulations (2018) provide for the procedures and administration of the EIA studies. Under these regulations, construction of airports appear in Category A of which is mandatory to conduct a full EIA study. Similarly, the AfDB's ESAP of 2015, Annex 2- Environmental and Social Screening Categorization; construction of large-scale airports appear under Category 1, which require a full environmental and social impact assessment.

“Category 1 projects are likely to induce significant, irreversible adverse environmental and / or social impacts, or significantly affect environmental or social components that the Bank or the borrowing country considers sensitive. In a limited number of cases, Program-Based Operations (PBOs) or other regional and sector program loans may have significant adverse environmental or social risks and shall be deemed to be Category 1. Category 1 projects require a full Strategic Environmental and Social Assessment (SESA) in the case of PBOs or regional and sector loans or an Environmental and Social Impact Assessment (ESIA) in the case of investment projects, leading to the preparation of an Environmental and Social Management Plan (ESMP)” ESAP, Annex 1, pg.37.

The STUDI International and Advanced Engineering Solution joint venture commissioned an ESIA Team led by Prof. Rubhera RAM Mato (EIA registered Expert) to update the EIA study reflecting the current environmental, social, economic and political setting and reformat it to AfDB guidelines.

1.2 Project Rationale

Dodoma was designated the new Capital city of United Republic Tanzania in the year 1973. However, the capital city relocation programme has taken longer than planned but in the recent years it has regained momentum. Almost all the government ministries and agencies will have shifted to Dodoma by the year 2019. The existing medium airport, which is currently serving state and government officials, is not being exploited commercially. Hence, the building of a new international airport at Msalato, is investable and is also meant to decongest the Julius Nyerere International Airport (JNIA) in Dar es Salaam.

Moreover, the project is in accordance with national policies, which encourage investments in development activities. The proposed airport is anticipated to stimulate various commercial, economic, political and social activities in Dodoma City. Availability of a modern and viable airport in Dodoma is expected to accelerate overall socioeconomic development in the hitherto underdeveloped central zone. The new capital city, which has been under construction since the early 1970s, will get a major boost in various ways including easy accessibility for investors, both foreign and local.

Furthermore, the project will create jobs for local people and the multiplier effect of which will be to stimulate income generation to the populace and in numerous ways contribute to poverty reduction in accordance with National Vision 2025 and the current Five Year Development Plan. Construction works and increased business opportunities at the airport will be associated with the creation of employment opportunities and hasty generation of income.

1.3. Objective of the ESIA Study

The main objective of this study is to ensure that the proposed construction of the new airport at Msalato is designed and eventually implemented in a socially, economically, and environmentally friendly manner. The project will be implemented in a sustainable manner and optimizing resource use and management opportunities. Part IV of the Environmental Impact Assessment Regulations of (2018) provides the general objectives for carrying Environmental Impact Assessment in Tanzania, as follows:

- To ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal;
- To protect the productivity and capacity of natural systems and ecological processes which maintain their functions;
- To promote development that is sustainable and optimizes resources use and management opportunities;

- To establish impacts that are likely to affect the environment before a decision is made to authorize the project; and
- To enable information exchange, notification and consultations between stakeholders;

Specifically the purpose of this ESIA study is to assess the direct, indirect and cumulative environmental, social and economic impacts of the proposed construction Mslato International Airport and provide relevant mitigation plan for preventing or minimizing any adverse impacts of project implementation.

Apart from meeting the ESIA objectives in Tanzania, this study has also fulfilled the objective of the environmental and social assessment in the context of the AfDB, which among others are;

- To identify and assess the environmental and social impacts (including gender) and climate change vulnerability issues of Bank lending and grant financed operations in their area of influence
- To avoid or if not possible minimize, mitigate and compensate for adverse impacts on the environment and on affected communities;
- To ensure that affected communities have timely access to information in suitable forms about Bank operations and are consulted meaningfully about issues that may affect them

1.5 Methodology of the Study

1.5.1 Guidelines

The guidelines for conducting study were interpreted from the EIA and Audit Regulations G.N. No. 349 of 2005 and the amended version of 2018. Apart from the standard impact identification methodologies, wider stakeholder engagement was carried out. Stakeholders from the grassroots to the National level were consulted that includes the Msalato Village leaders and the community; the Director of Dodoma Municipal Council and related senior officials, the Director General of the Capital Development Authority (DCA) and the Manager, Tanzania Airports Authority (TAA) and others.

The AfDB Guidelines were used in the preparing this report.

1.5.2. Literature Review

This involved a desktop study involving review of relevant literature and documents. It included examination of the findings and recommendations from previous studies on

projects like the one under examination. Policies and pieces of legislation such as the Environmental Management Act (EMA) of 2004; Capital Development Authority (CDA), Local Government (District Authorities) Act, 1982, Land Use Planning Act, 2007. Baseline data and geo-information including non-spatial data such as socio-economic environment, institutional and legal regimes were collected from a variety of sources. The 2014 Final ESIA Report for this project was the main source of materials used in this Report. In addition, lot of literature was accessed from the AfDB portal, which have been used in this report.

1.5.3 Stakeholder Consultations

Identification of Stakeholders

The consultants identified stakeholders based on their responsibilities, roles and relevance to geographical boundaries within which the proposed site and project fall. The analysis found that the following stakeholders were important in as far as this project was concerned: Ministry of Works, Ministry of Lands, Housing and Human Settlements Development; Capital Development Authority (CDA), Dodoma Municipal Council, Tanzania Airports Authority (TAA), Tanzania Civil Aviation Authority (TCAA), MET, Ministry of Agriculture and Irrigation, Ministry of Agriculture and Fisheries, Ministry of tourism, Msalato Ward Development Committee and Msalato *Mtaa* Development Committee. These are likely to either affect the project or be affected by it, also some have mandate to intervene in case of conflict between developer and others.

Table 1.1: Identified Stakeholders

Stakeholder Group	Members/Target
National Level Authorities and Decision Makers	Ministry of Works; Ministry of Lands, Housing and Human Settlement; Capital Development Authority; Tanzania Airports Authority, Ministry of Agriculture and Irrigation, Ministry of Agriculture and Fisheries, Ministry of natural resources and tourism, Ministry of Internal affairs
District Level	Dodoma Municipal Council; the Msalato Ward Development Committee; Msalato Village Development Committee
Project Affected Parties	Local Communities.
Developer	TAA/ STUDI/AES

Different methods for involving various stakeholder were used, which are;

Focus Group Discussions

This included discussion with specific groups of people for the purpose of bringing them to the understanding of the project or get their opinions on the project. Groups like women, vulnerable groups like the elderly were involved. In addition, discussion were made with technical people like TAA Management at Dodoma airport, Dodoma City Officials, Msalato Village and Ward Development Committees etc.

Identified Stakeholders' Concerns

Through methods discussed above, stakeholders raised issues which the consulting team noted. Through detailed analysis issues raised were classified so as to identify how to deal with significant ones in the ESIA study. This helped to develop appropriate mitigation measures and action plans. For an issue to be reliable, the team tried to cross-check issue raised by one individual through discussion and triangulation with others.

1.5.4 Socio-economic Survey

This comprised of a detailed census/inventories with affected households as well as formal and semi-formal discussions with sample focus groups in the communities. A comprehensive questionnaire for baseline data collection was used. The questionnaire gathered information on the on the following:

- Household Bio data (Socio-demographic information);
- Livelihoods (such as sources of income and type of occupation; employment status; vulnerability); and
- Access to economic and social services infrastructure

1.5.5 Site Visits

The site visits began by holding meetings with the proponent to get an overall briefing on the proposed construction of the Msalato new airport and associated infrastructure. Thereafter, the consultants visited the earmarked site for the project accompanying proponent's representatives. It entailed site inspection and observations of the proposed area where the proposed new airport will be constructed. Besides, the visit assisted in identification of additional site and environment information which facilitated correlations with the raised significant social issues. The initial site visit was made on 7-9 August, 2017 and the actual study started on 08-10 February 2018 respectively.

During the visit the consulting team collected data related to description of the project including the activities taking place (physical and environmental conditions of the project site) and areas that might be impacted by the project. There were data on the land use and assessment of other socio-economic parameters including environmental risks, health and safety issues in the area. Also through communication and discussions with stakeholders,

the consultants collected qualitative data in the form of views, values and perceptions about the proposed activity.

1.5.6 Transect Walks

The consulting team made a transect walk under the guidance of the proponent to get a feel of the proposed site and the general characteristics which prompted the developer to identify the site as suitable for the project. Transect walks entails observation of the entire biological situation of the area under examination. It also facilitated identification of environmental information of the area in relation to others for final determination and correlation.

During the visit the consulting team collected the following data:

- a) Description of the project including the activities taking place (physical and environmental conditions of the project site) and areas that might be impacted by the project;
- b) Appraisal of the land use and assessment of other socio- economic parameters;
- c) Environmental risks, health and safety issues in the area;
- d) Communication with Stakeholders.

1.5.7 On-site Measurements

Noise Level Measurement:

Noise levels were measured in accordance to ISO 1996 -1:2003 using a digital sound level meter Sper Scientific type 850069 with measurement range of 30 to 130dB (A). On taking measurements, the device-meter scale was set to the “A” weighed measurement scale, which enables the device to respond in the same manner as the human ear. The device was held approximately 1.5m above the floor and at least 3m away from hard reflecting surfaces or objects. Four readings were taken at each point and the mean value used to represent that particular point. Moreover, recorded values for measured noise and air quality parameters were compared with Tanzania Standard and WHO guidelines to reveal any deviation from the respective stipulated standard limits.

Dust Level Measurements:

Particulate Matter (PM10) levels were determined by using a hand held instrument with a very fast response famously known as Micro dust pro Casella type 712. During testing the sampling equipment was fixed at a breathing height of approximately 1.5 meters above the ground for PM 10 determinations.

Ambient Gases Emissions:

Levels of ambient gases were measured using a Multigas Monitor type “MX6 Ibrid”. Parameters measured include: Carbon monoxide (CO) in mg/m³, Carbon dioxide (CO₂) in %, , Oxides of nitrogen (NO) in mg/m³, Sulfur dioxide (SO₂) in mg/m³ and Hydrogen sulphide (H₂S) in mg/m³. The results were compared with Local and International Standard. The greenhouse gases measurement were important for documenting climate change footprints of the project.

Vibration measurements:

Vibrations were measured using a vibration meter/Data logger. On taking measurements, the accelerometer transducer was mounted on the ground at the identified stations either for ambient or peak vibrations. To produce accurate results, the transducer was secured in direct contact with the ground. The levels of vibrations were recorded in terms of Peak Particle Velocity (PPV) in millimeters per second in the vertical direction

1.6 Methodology of identification and characterization of the potential impacts of the project

1.6.1 Methodology of identification of the impacts of the project

Impact identification is based on the principle of crossing impact sources during and after the works, with impact receptors: it is about the matrix method of Léopold.

- **Sources of impacts**

These are the different activities resulting from the project, which may have an impact on the environment. They are divided into two groups according to the project phase:

- i. During the realization phase**

The actions selected include/understand the whole of installation works, civil engineering works related to construction of airport. the personnel recruitment and their presence on the building site are regarded as sources of impact on the human environment through the risks of conflicts with the local populations and propagation of the STD/AIDS.

- ii. During the operation phase**

The actions listed concern the effects that may have the physical presence of the structure and the environmental impacts that may occur because of its use and maintenance work.

The consistency of this work has been described previously in order to highlight all the different activities of the project that may have an impact on the environment. Similarly, the description of the project environment has

highlighted the different environmental sensitivities of the site with regard to the projected works.

- **Receivers of impacts**

It is the Valued Elements of the Environment (EVE) that will be potentially affected by programmed work they are divided into three groups of components:

- Physical environment (air, ground, water surface and subterranean water, route),
- Biological environment (fragile areas, flora, fauna),
- Socio-economic and human environment (safety, health, transport condition, uses and incomes, economic activities, population and community life).

1.6.2 Characterization of impacts

This involves description of the impacts to facilitate the determination of their importance. Five criteria were used to characterize the impacts namely:

- **The nature** of the impact indicates if the impact is negative or positive,
- **The value of the component:** indicates whether the value is high, medium or low
- **The intensity** expresses the degree of environmental disturbance, depending on the vulnerability of the component being studied ; three classes are considered: high, average and low;
- **The extent** gives an idea of the space cover of the impact. One distinguished here also three classes: specific, local, regional;
- **The duration** of the impact indicates the manifestation of the impact over time; short-term refers to an impact that occurs during project implementation and less than a year later; in the medium term when it occurs more than one year after the implementation of the project ; and long-term to describe the impacts that have occurred since project implementation and continue during the operational phase and beyond one year.

Table 1.2: Qualification and symbolism of the different characterization parameters

Parameters	Qualification and symbolism
Nature	Negative (-) or positive (+)

Component value	Strong, average or weak
Intensity	Strong, average or weak
Extended	Specific, local or regional
Duration	Temporary (short term), Durable

1.6.3 Impact assessment

The impact assessment was based on the FECTEAU (simplified) method, which takes into account only three criteria of the characterization (Intensity, Duration and Extent). Its purpose is to attribute absolute importance to the anticipated impacts through the combination of the three criteria mentioned above.

The absolute importance can be major, medium or minor and can be used to determine the order of priority according to which impacts must be avoided, mitigated or compensated. Finally, the overall assessment of the project on the environment is obtained only based on residual impacts nearly applying the proposed environmental measures.

1.7 Report structure

The Report has been arranged in line with the national EIA Reporting and AfDB requirements. However, the national format has been used of which content-wise contains all that is required by the AfDB. The report contains eleven chapters in total. Chapter one gives the introduction on the context in which this study took place; Chapter two contains relevant policy, legal and institutional framework within which the EIA is carried out; Chapter three provides detailed description of the proposed project, Chapter four describes the Baseline condition or existing condition, chapter five describes project alternatives, chapter six details assessment of impacts and identification of alternatives. Chapter seven describes the proposed mitigation measures. Chapter eight provides the Environmental and Social Monitoring programme. Chapter nine provides stakeholder Consultations and participation, Chapter ten describes the Environmental and Social Management Plan and Chapter eleven gives the conclusions of the report and actions to implement the suggested approach. Finally, the annexes provide supporting and additional information to the various chapters.

CHAPTER TWO

2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Overview of legislative aspects considerations in EIA

Policies and legislative arrangement are important aspects of the institutional set up of the project execution and limitations. The ESIA requirements for addressing the potential positive and negative impacts on the ecological and social environments of the project therefore must be done in line with the existing relevant policies and/ or legal regime. In addition, there are international agreements and conventions to which Tanzania is a party, which also need to be considered during project construction and operation. The project proponent will consult and observe these policies and pieces of legislation in the course of designing and implementing the proposed project activities. The sectorial and cross-sectorial policies and international agreements and conventions in Tanzania, which sum up the need for EIA and provide a broad framework on how best to integrate them in Mslato International Airport project construction and management, are described in the proceeding sections

2.1.1 The National Environmental Policy (NEP, 1997)

The National Environmental Policy provides a framework for environmental conservation in the country. This is the major policy document, which requires that development should be done in a way that does not compromise environmental integrity. It outlines environmental problems and gives guidance to environmental management and projection in Tanzania. The policy seeks to promote the economy and livelihoods of people while promoting sustainable utilization of natural resources in the country. The policy provides the framework for the formulation of plans, programmes and guidelines for the achievement of sustainable development. Key objectives of this policy with regards the airport construction are to:

- Ensure sustainability, security and equity in the use of resources as stipulated in Section 28 and 29 that environmentally sound technologies should be used;
- Prevent and control degradation of life supporting land, water, vegetation and air;
- Conserve and enhance natural and man-made heritage;
- Section 56(f) states that workers' health shall be adequately protected from environmental health hazards.

The policy promotes the use of EIA's as a planning tool that integrates environmental issues into the planning process. The policy also stipulates the use of numerous approaches in environmental management in Tanzania. Chapter 4, Paragraph 64 of the

NEP states that “It is in the context of an EIA regime that policy guidance on choices to maximize long-term benefits of development and environmental objectives can be revealed and decided upon. The policy also advocates public consultation in carrying out Environment Impact Assessment. Specifically, paragraph 66 states that “One of the cornerstones of the Environment Impact Assessment process will be the institution of public consultations and public hearing in the Environment Impact Assessment procedures”. By carrying out this the Tanzania Airport Authority shall comply with this policy.

2.1.2 National Investment Promotion Policy (1996)

The National Investment Promotion Policy encourages protection of environment in line with the countries socio-economic policies. Under the policy, investors are required to undertake activities in a manner that best contributes to consumer and environmental protection. The investors are also encouraged to use local raw materials/components where possible. This Environment Impact Assessment is undertaken to ensure that Tanzania Airport Authority will abide by the relevant provisions of the policy to ensure compliance with the development.

2.1.3 Tanzania Wildlife Policy, 1998

The aim of the Wildlife policy is to involve a broader section of the society in wildlife protection, utilization, management and development of protected areas. The policy’s core objectives include ensuring the conservation of biological resources and the sustainable utilization of wildlife resources and ensuring that this conservation contributes to poverty alleviation and improving the quality of life of Tanzanians. It provides for the involvement of local communities in wildlife conservation, integrating wildlife conservation with rural development and fostering sustainable use of wildlife and ensuring that wildlife conservation competes with other forms of land use. Strategies laid out in the Policy for achieving these goals stress on the involvement of a broader section of society in wildlife conservation, particularly rural communities and the private sector.

The wildlife sector mandate is sustainable utilization of the wildlife resources. Anti-poaching activities have been intensified resulting in the decrease of poaching incidences. The wildlife policy and legislation focuses on peoples’ participation in the conservation and protection of the resources. The policy has facilitated improvement in performance of the sector in attaining the overall goal of effective conservation and sustainable utilization of the wildlife resources. The airport project is not close to any protected area ecosystem.

2.1.4 National Forest Policy (1998)

The aim of the policy is to enhance the contribution of the forest sector to the sustainable development of Tanzania and the conservation and management of natural resources for the benefit of present and future generations. This goal is to be realized through effective management of forest area, conservation of forest biodiversity, water catchments and soil fertility, and enhancing national capacity to manage and develop the forest sector in collaboration with other stakeholders. The policy provides the foundation, together with

the Forest Act (2002) for Participatory Forest Management and encourages community and private sector involvement in forest management through village land forest reserves, individual, group and community forests. The purpose of this decentralised structure of forest management was to improve governance and reduce illegal use of forest reserves and resources. The policy does not explicitly mention climate change issues and it has been revised to take into consideration significant changes and climate change issues which have occurred since it was enacted in 1998. The policy adopts a participatory approach to forest management by involving all stakeholders (including local and indigenous peoples) in management systems, demarcation of forest reserves, devising mechanisms to ensure equitable sharing of benefits and leasing out forest reserves to private investors. In the proposed airport project there are no forests that will be disturbed. The ESIA process will take on board the provisions of the forest policy.

2.1.5 National Water Policy, 2002

The main objective of the National Water Policy of 2002 is to develop a comprehensive framework for sustainable development and management of the nation's water resources and putting in place an effective legal and institutional framework for its implementation. The policy aims at ensuring that beneficiaries participate fully in all stages of water resource development. The policy recognizes the fundamental but intricate linkages between water and socio-economic development, including environmental requirements. It expounds on the importance of water for domestic use, agriculture, livestock keeping, mining, energy, fisheries, environment, human health, wildlife and tourism, forestry and navigation. As such, the policy calls for an Integrated Water Resource Management approach in Tanzania so that "there is equitable and sustainable use and management of water resources for socio-economic development, and for maintenance of the environment". Hence, water related activities should aim to enhance or to cause least detrimental effect on the natural environment.

The design and implementation of this ESIA process will take into consideration the provisions of water policy especially those related to pollution of surface and underground water resources. The project is going to use water both during construction and operation and issues of water conservation have to be considered

2.1.6 National Transport Policy (2003)

The National Transport Policy serves as a catalyst in production, as it facilitates movement of inputs to production points and also serves to evacuate products to storage or to market places. Its role is critical to all aspects of social and economic life of society. The National Transport Policy of 2003 provides the basis for the development and management of the transport sector towards its key function of facilitating the optimal development of the national economy. This policy is guided by the national development programmes such as Vision 2025, Millennium Development Goals the MKUKUTA, Civil Service Reform programme, private sector involvement in economic development, strategic environmental sustainability, gender issues, eradication of diseases and literacy campaign and other sector development programmes.

National transport policy, aims at enhancing transport safety and environmental protection, through taking steps to review and update national legislation in transport operations and safety requirements.

The main Policy objective in the transport sector is to enhance transport and promote environmental protection. Environmental problems created by the transport sector are pollution and safety. Emission into the environment from vehicles is beginning to take its toll in Tanzania. The majority of fuel is leaded and a lot of the vehicles are in poor condition. Furthermore, improper disposal of oils, fuels, and other pollutants from garages and petrol stations may contaminate soils and water sources. The implementation of this ESIA process will take aboard all these issues as appropriate.

2.1.7 National Land Policy (1999)

The National Land Policy advocates the protection of land resources from degradation for sustainable development. Among other things the policy requires that project development should take due consideration the land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Environmental Impact Assessment for this project is intended to identify if there is potential for the adverse impact and to propose means for mitigating them. TAA shall observe these provisions.

2.1.8 The Tourism Policy of 1991 (revised in 1999)

Knowing the potentiality of tourism sector, as a strategy for poverty alleviation, the National Tourism Policy of Tanzania was reviewed in 1999 to cope with the dynamism of the tourism industry. The overall objective of the policy is to assist in efforts to promote the economy and livelihood of the people, essentially poverty alleviation through encouraging the development of sustainable and quality tourism that is culturally and socially acceptable, ecologically friendly, environmentally sustainable and economically viable. It is also sought to market Tanzania as favoured tourist destination for touring and adventure in a country renowned for its cultural diversity and numerous beaches. The Government recognises that the private sector plays a major role in the industry's development, with the Government playing the catalytic role of providing and improving the infrastructure as well as providing a conducive climate for investment. One of the tourism policy objectives is to increase the industry's linkage with other sectors. The future growth of tourism in Tanzania is inextricably bound to the development of the air transport industry. The internal air access has been a problem in the country due to under capacity for scheduled and no-scheduled air services.

2.1.9 National Mining Policy, 1997

The Mineral Policy covers all activities regarding extraction from the ground. This includes minerals and material such as that for construction. The policy however, promotes private sector led mineral development relegating the role of the government to regulation, promotion and facilitation. The responsibilities of the government include monitoring of mining activities, collection and maintenance of geo-technical data for

promotional purposes and administration and inspection of mining activities, and environmental management with regards to mining. The project sourcing for materials shall be guided under this policy as extraction of sand, gravel and stone are considered as mining.

2.1.10 The Tanzania Development Vision (2025)

The Tanzania National Development Vision 2025 outlines broad national long-term goals, perspectives and aspirations. The core objective is to influence changes, coordinate and direct the people and the nation's strategic thinking and direct national resources towards those strategic interventions that will enable Tanzanians to attain their development goals and be able to compete in the growing and competitive world economy.

The Vision foresees the alleviation of widespread poverty through improved socio-economic opportunities, good governance, transparency and improved public sector performance. These objectives not only deal with economic issues, but also include social challenges such as education, health, the environment and increasing involvement of the people in working for their own development. The thrust of these objectives is to attain a sustainable development of the people. The building of a new airport in Dodoma contributes towards realisation of the Vision's objectives.

2.2 Relevant Legislation and Regulations

This section addresses the legal and regulatory conditions, which are relevant to the proposed Msalato new airport project. In compliance with the Environment Management Act 2004 PART V1 it is mandatory to carry out an Environmental Impact Assessment (EIA) for the proposed project before construction of a new airport at Msalato takes place. The project proponent will consult identified piece of legislation and regulations in the course of designing and implementing the proposed project activities.

2.2.1 The Environment Management Act, No. 20 of 2004

The Environment Management Act (EMA) provides a more flexible authorization framework, increases enforcement options and uses modern environmental management tools to protect human health and the quality of water, land and air in Tanzania. The EMA introduces a concept of right of Tanzanians to clean, safe and healthy environment and right of Tanzanians to access various segment of environment for recreational, educational, health, spiritual, cultural and economic purposes (Article 4 (1) and (2)). Under part XIV of the Act the public has the right to both participate in decision-making about the design of environmental policies, strategies, plans and programmes and to participate in the preparation of laws and regulation relating to the environment.

The Act imposes an obligation on developers to conduct an Environmental Impact Assessment prior to the commencement of the project to determine whether the project may/or is likely to have, or will have a significant impact on the environment. Article 81 makes EIA mandatory to all projects that fall under the EIA mandatory list (Schedule 3)

into which this project falls. The Act also requires that project developers undertake regular environmental audits of their facility.

2.2.2 EIA and Audit regulations, 2005 and 2018 Amendment

The regulations list rehabilitation of an airport among types of projects requiring a mandatory Environmental Impact Assessment. Since such project is likely to have significant adverse environmental impacts, an in-depth study is required to determine the scale, extent and significance of the impacts and to identify appropriate mitigation measures. Furthermore, the regulation specifically provides for procedures and guidelines for carrying out Environmental Impact Assessment in Tanzania. This EIA review has been carried out in accordance with these regulations.

2.2.3 Dodoma Special Investment Area Act

The Dodoma special investment area act was passed in 1989. The act declared Dodoma a special investment and provided for the remission of taxes, duties and other charges and costs so as to attract investments into Dodoma. This Act shall apply throughout the United Republic of Tanzania in relation to persons carrying such business or other specified investment in Dodoma as are conferred to in this Act for the purposes of conferring upon such persons such benefits in relation to their business or investment in Dodoma as are specified in that behalf by this Act. With effect from the commencement date, and for twenty years, the whole of the Dodoma Capital Development Area was declared to be a special investment area for the purposes of this Act. The minister responsible for capital city development was duty bound to institute appropriate fiscal and other economic measures for the attraction and benefit of investors in the Dodoma Capital Development Area.

2.2.4 The National Land Act No.4 (1999) and its Amendment (2004)

The Land Act of 1999 provides for the basic law in relation to land other than the village land, the management of land, settlement of disputes and related matters. Act lays down key fundamental principles for occupying and using the land. Among them, is the principle that any land user shall ensure that land is used productively and that any such use complies with the principles of sustainable development. This principle applies to categories of land.

The law as amended in 2004 recognizes the role of land in economic and urban development. The law provides for technical procedures for preparing land use plans, detailed schemes and urban development conditions in conformity with land use plan and schemes. The LGA has the power to impose conditions on the development of any area according to the land-use planning approved by the Minister. This project conforms to this law because it has followed all development conditions provided.

The Land Act seeks to control land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. This Act identifies three categories of land-village, public and general, and distinguish protected or

restricted land (e.g. national parks, forest reserves, etc.), and ensure that tenure and rights of legitimate land users are considered and respected. Land sensitivity and potential environment impacts of the proposed works shall be considered in order to ensure that the land is not polluted and to allow for natural and rapid restoration of cleared vegetation or disturbed land.

2.2.5 Village Land Act No. 5 of 1999

The Village Land Act provides for legal framework for the management and administration of land in villages. The Act empowers the Village institution or Council to manage all village land. It is important therefore that there should be close consultations and consideration of views of local authorities over any matter, e.g. compensation. The design and implementation of this ESIA process is in line with both legislations. The objectives of the Village Land Act are:

- i. To ensure that existing customary land rights are legally secured
- ii. To ensure efficient and effective village land administration
- iii. To enable villagers to participate in land administration
- iv. To ensure gender balance in land administration and ownership

2.2.6 Land Acquisition Act (1967)

The Act gives the power to the President to acquire any land for any estate or term where such land is acquired for any public purpose. The Act goes on to define the circumstances in which public interest could be invoked, e.g. for exclusive government use, public use, for or in connection with sanitary improvement of any kind; for or in connection with laying out any new city, municipality, township or minor settlement or extension or improvement of any existing city. Other purposes are in connection with development of any airfield, port or harbour; mining for minerals or oils; for use by the community or corporation within community; for use by any person or group of persons as the President may decide to grant them such land. The acquisition of the land for the right of way as well as for the resettlement sites is within the provision of this Act. Further the Act specifies other requirements prior to the acquisition of the land such as investigation for the land to be taken, issuing notice of intention to take land and mode in which notices will be served. It further defines the requirements for and restrictions on compensation.

2.2.7 The land Use Planning Act, 2007

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters. Under Section 3, among others the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development. Therefore the TAA has strictly followed provisions of this Act by acquiring land designated for the same purpose.

2.2.8 Local Government (Urban Development Control and Regulations), 2008

This Act provides for detailed responsibility for urban development and control of municipal councils in the administration of their day-to-day activities. EIA and waste management is pointed out as one of the activities to be managed by both district and urban authorities. Accordingly, the proposed investment project activities will seek to liaise closely with Dodoma Municipal Council and CDA authorities. But according to some of the authority's functions do collide with those of Dodoma Municipal Council hence the need for a law to create a clear demarcation of responsibilities between the two.

2.2.9 The Local Government Laws (Miscellaneous Amendment) Act, 2006

This Act established the local governments and urban authorities with mandates to spearhead developments in districts and urban centres (for cities and municipalities) respectively. By this law, the authorities have mandates to formulate bylaws to enhance environmental management within their district/urban authorities. EIA and waste management is pointed out as one of the activities to be managed by both district and urban authorities. Accordingly, the proposed investment project activities will seek to liaise closely with Dodoma Municipal Council authority. The construction of this proposed shall be guided by the Dodoma Municipal Council.

2.2.10 The Forest Act, 2002

The Forest Act aims at providing for the management of forests, and to repeal certain laws relating to forests and related matters. It provides for the general legal framework for the conservation and management of forests. In particular, it supports the implementation of Participatory Forest Management which is a strategy to achieve sustainable forest management by encouraging co-management of forest and woodlands by the communities living close to the resources. According to the Act, the Minister responsible for forests may declare forest reserves, restrict or prohibit the carrying out of certain activities in or around forests for the purpose of conserving or managing them. The Minister is also vested with the power to make rules for purposes of regulating the use or occupation of land and any other natural resources found in forest reserves.

2.2.11 The Mining Act No. 5 (1998)

This act provides for prospecting of minerals, mining and dealing in minerals. It also provides for building materials including all forms of rock, stones, gravel, sand, clay, volcanic ash or cinder or other minerals being used for the construction of buildings, roads, dams, and aerodromes or similar works. The Legislation makes Environmental Impact Assessment mandatory as a precondition for granting various categories of mining licenses. Building the Dodoma new airport will require materials from borrows pits and quarries. Acquisition of these construction materials are all covered by this Environmental Impact Assessment study and respective licenses will be acquired by the Contractors on behalf of Tanzania Airport Authority.

2.2.12 The Land Disputes Court Act. No.2 (2002)

Every dispute or complainant concerning land shall be instituted in the Court having jurisdiction to determine land dispute in the given area (Section 3). The Courts of jurisdiction include: -

- (i) The Village Land Council
- (ii) The ward Tribunal
- (iii) District Land and Housing Tribunal
- (iv) The High Court (Land Division)
- (v) The Court of Appeal of Tanzania.

The Act gives the ward tribunals powers to resolve land disputes involving lands. If the ward tribunal fails to resolve the dispute, the matter can be referred to the District land and housing tribunal as established by the Land Act (1999). If any dispute will arise as a result of this project, the provision of this Act shall be observed.

2.2.13 The Water Resources Management Act, 2009

This law provides for an institutional and legal framework for the management and development of water sources. The Act is premised on promoting the principles of the National Water Policy and also deals with ownership and management of water sources. It vests ownership of water sources in the President as trustee and puts in place mechanisms for harvesting and using water. It also establishes a National Water Board and provides for its functions. Among these, is the power to regulate water catchment areas, putting in place water management plans, classification of water resources and restricting the use of water during certain periods. The Act also establishes Basin Water Boards and charges them with the duty of undertake various works. In the course of discharging their functions, these Boards may, under section 84 (2), acquire lands under the Land Acquisition Act. The Minister may also, under section 112 (2) (f) of the Act, transfer easements registered in water right. The Act also emphasizes the importance of carrying out Environmental Impact Assessment (EIA) to proposed projects in accordance with the provisions of the Environmental Management Act of 2004

The proponent shall, therefore ensure sources of water are not contaminated to ensure the supply of water is clean and safe to the society.

2.2.14 The Water Supply and Sanitation Act No. 12 of 2009

This is a new legislation that provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; provides for establishment of water supply and sanitation authorities as well as community owned water supply organizations; and provides for appointment for service providers. The main aim of this law is to ensure the right of every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interest

of customers. Under this law, the Minister responsible for water affairs shall establish water authority and cluster water authorities in order to achieve commercial viabilities.

2.2.15 Occupational Health and Safety Act No. 5 of 2003

This Act makes provisions for the safety; health and welfare of persons at work in factories and all other places of work. Also provides for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work. It also places emphasis on the prevention of accidents, ill health and injury.

The long term goal of the Act is to create a healthy and safe working culture among all Tanzanian employees and employers. The Act apply to all work places, and for this purpose work place is defined to mean: - “Means any premises or place where a person performs work in the course of his employment”. The task of enforcement, supervision, promotions and implementation of the Act is put on the Occupational Health and Safety Authority (OSHA). OSHA is the executive agency established in 2001 by the ministry of labour to ensure health and safety of workers and their safe working environment in more effective and efficient manner.

The law requires employers to provide a good working environment to workers in order to safeguard their health. The employers need to perform medical examinations to determine fitness before engaging employees. Employers must also ensure that the equipment used by employees is safe and shall also provide proper working gear as appropriate. This shall be adhered to during construction and operational phase of the new Msalato Airport.

2.2.16 Public Health Act 2009

The Act provides for the promotion, preservation and maintenance of public health with the view to ensuring the provision of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. Section 66 of the Act state that: (1) A building or premises shall not be erected without first submitting the plans, sections and specifications of the building site for scrutiny on compliance with public health requirements and approval from the Authority. (2) A building or premises or its part or any structure shall not be occupied until a certificate of occupancy has been granted. (3) The provisions of subsections (1) and (2) shall not apply to the dwelling houses in the rural areas or houses erected in urban which have been recognized as such under the Squatter Upgrading Programme. The proponent is aware of this Act and shall strictly adhere to its provisions.

2.2.17 The Contractors Registration (Amendment) Act, 2008

The Contractors Registration Act requires contractors to be registered by the Contractors Board (CRB) before engaging in practice. It requires foreign contractors to be registered

by the Board before gaining contracts in Tanzania. The proponent shall comply with the law requirement during the recruitment of contractors for project implementation.

2.2.18 The Urban Planning Act, 2007

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters. Under Section 3, among others the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development. Therefore the proposed Msalato International Airport development is in line with the objectives of this law.

Section 58 of the Urban Planning Act provides for protection of buildings or group of buildings of special architectural or historic interest. The law states “The planning authority may compile a list of areas, buildings or group of buildings of special architectural or historic interest and may amend any list so compiled, such areas may include; buildings, group of buildings, areas of unique biodiversity; and rare species of trees and special trees”. Section 59 gives powers to the planning authority to grant permission for demolition of such buildings or otherwise powers to restrain any proposed demolition.

This project is in line with this law as the Msalato International Airport shall be constructed at the area where no relocation of people is needed and also there are no buildings of special architectural or historic interest.

2.2.19 The Fire and Rescue Army Act, 2007

The Act provides for the better organization, administration, discipline and operation of fire and rescue brigade services. Section 17(1) of the act states that "Every building which has a storey the floor of which is more than thirty-five feet above the level of the street or ground surface adjoining any part of the building shall be provided in every such storey, with adequate free and unobstructed means of escape from there leading to the roof of the building and to the street or ground surface adjoining the building". The fire escape stairs have been provided in this building so as to comply with this law.

2.2.20 Mining Act, No. 17 of 1980, as Amended

The Act sets out government policy on all forms of mining and is supported by various regulations covering claims, prospecting rights, mining rights and royalties. Mining license applicants are required to submit plans for environmental protection. Each industry is required to establish realistic resource recovery standards and to adhere to them. Mining plans are required to be presented before operations begin. The implementation of investment sub-projects will take on board all the relevant provisions of the mining act.

2.2.21 The HIV and AIDS (Prevention and Control) Act of 2008

The law provides for public education and programmes on HIV and AIDS. Section 8(1) of the law states that “The Ministry (Health), health practitioners, workers in the public and private sectors and NGOs shall for the purpose of providing HIV and AIDS education to the public, disseminate information regarding HIV and AIDS to the public”. Furthermore, Section 9 states that “Every employer in consultation with the Ministry (Health) shall establish and coordinate a workplace programme on HIV and AIDS for employees under his control and such programmes shall include provision of gender responsive HIV and AIDS education....” This project shall abide by HIV/AIDS Act in the fight against the disease.

2.2.22 Environmental Management (Air Quality Standards) Regulations, 2007

The objectives of the Regulations were stated to be the following:

- “... set baseline parameters on air quality and emissions based on a number of practical considerations and acceptable limits...”
- “...enforce minimum air quality standards prescribed by the National Environmental Standards Committee...”
- “...help developers such as industrialists to keep abreast with environmentally friendly technologies...”
- “...ensure protection of human health and the environment from various sources of pollution.”
- Other aspects of the Regulations that may be relevant to this study include inter alia:
 - “Every person shall be required to comply with the minimum air quality standards approved and published pursuant to these Regulations.”
 - “Where it is necessary for effective implementation of laws, the Minister shall identify and allow the continued operation of existing minimum air quality standards made under other written laws.”
 - “A person whose activities do not comply with minimum air quality standards prescribed under these Regulations shall apply for registration in relation to such main air polluting activity.”
 - “The owner or operator of main air polluting activity shall apply for a permit issued by the Council.”

Fugitive dust emissions represent the most likely issue requiring avoidance or mitigation in relation to the construction and operation of Project facilities. The limit for dust emissions in terms of the Second Schedule to the Regulations is 250mg/Nm³ (mean over a 24-hour period). Besides, fumes emissions, also will be strictly adhered to specified limits of this Second Schedule.

2.2.23 Environmental Management (Soil Quality Standards) Regulations, 2007

Soil in terms of these Regulations is defined as “...earth, sand, rock, shell, mineral, vegetation and the flora and fauna in the soil and derivatives thereof such as dust..”. The objectives of the Regulations were stated to be the following:

- “...set limits for soil contaminants in agriculture and habitat...”
- “...enforce minimum soil quality standards prescribed by the National Environmental Standards Committee...”
- “...prescribe measures designed to maintain, restore and enhance the sustainable productivity of the soil...”
- “...prescribe minimum soil quality standards to maintain restore and enhance the inherent productivity of the soil in the long term...”
- “...enforce minimum soil standards prescribed by the National Environmental Standards Committee for such purposes as agricultural practices...”
- “...ensure implementation of criteria and procedures prescribed by the National Environmental Standards Committee for the measurement and determination of soil quality...”
- “...prescribe measures and guidelines for soil management...”
- “...ensure compliance with any such measures and guidelines for soil management that may be prescribed by the Minister.”
- Other aspects of the Regulations that may be relevant to this study include inter alia:
 - “Contaminants of heavy metals in habitat and agricultural soils shall comply with parameters and upper limits specified in Table 2 of the First Schedule to these Regulations.”
 - “Contaminants of other metals in habitat and agricultural soils shall comply with parameters and upper limits specified in Table 4 of the First Schedule to these Regulations.”
 - “The Minister wherever he deems it necessary for effective implementation of laws, may identify and allow the continued operation of existing soil quality standards made under other written law.”
 - “The Council shall designate certain categories of human activities to be main soil polluting activities for which prior grant of discharge permit by the Council are mandatory.”
 - With regard to maximum limits: “In areas where contaminants naturally exceed these limits, measures need to be taken to control increase of such contaminants in the environment.”

Elevated levels of heavy metals may occur naturally within the soils. However, the proposed project will be designed to avoid the release of acid water, with elevated levels of heavy metals, to the environment.

2.2.24 Environmental Management (Water Quality Standards) Regulations, 2007

Water in terms of these Regulations is defined as “...drinking water, river, stream, water-course, reservoir, well, dam, canal, channel, lake, swamp, open drain, or ground water”.

The objectives of the Regulations were stated to be the following:

- “...protect human health and conservation of the environment...”
- “...enforce minimum water quality standards prescribed by the National Environmental Standards Committee...”
- “...enable the National Environmental Standards Committee to determine water usages for purposes of establishing environmental quality standards and values for each usage...”
- “...ensure all discharges of pollutants take account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned”.

Other aspects of the Regulations that may be relevant to this study include inter alia:

- “Every applicant for water right or permit under relevant laws governing management of water resources, abstraction and use of water shall within twenty one day of lodging their application, file through Basin Water Officer a statement to the Council indicating the likely impact on the environment if the water right or permit is granted.”
- With regard to the above: “A statement made...shall before being submitted to the Council be endorsed for the comments by respective City Environment Management Officer, Municipal Environment Management Officer, District Environment Management Officer and Town Environment Management Officer.”
- “Effluents shall be treated on-site prior to discharge so that the dilution shall not be regarded as treatment.”
- “The Council shall designate certain categories of human activities to be main water polluting activities for which prior grant of discharge permit by the Council shall be mandatory...”
- “A person whose activities do not comply with minimum quality standards prescribed under these Regulations shall apply to register any of the said activity as a main polluting activity.”
- “A holder of water right or permit, owner or occupier of premises shall be required to ensure that all incidents of inadvertent or accidental emissions or pollution of bodies of water in violation of standards prescribed under these Regulations or any other written laws shall within thirty days of the occurrence report to the respective Basin Water Officer, City Environment Management Officer, Municipal Environment Management Officer, District Environment Management Officer or Town Environment Management Officer for transmission to the Council.”

Msalato airport will be designed to avoid the release of polluted water, with elevated levels of hydrocarbon to the environment.

2.3.25 The Workers Compensation Act, 2008

The Act focuses mainly on:

- (a) Provision for adequate and equitable compensation for employees who suffer occupational injuries or contract occupational diseases arising out of, and in the course of their employment, and in the case of death to their dependants;
- (b) Provision for the rehabilitation of employee who have suffered occupational injuries or contacted occupational diseases in order to assist in restoring their health in dependence and participate in society;
- (c) Provision for a frame work for the effective prompt and empathetic consideration, settlement and payment of compensation benefits to employee and their dependants;
- (d) Provide for the establishment, control and administration of workers to compensation fund, and the legal framework for the contribution to and payment from the fund;
- (e) Give effective to international obligations with respect to compensation and
- (f) Promote prevention of accidents and occupational diseases.

This Act provides the right for compensation to workers for occupational injury in section 19 (1) - (5) or accident in section 20 and 21. Also in section 22 (1) - (5), employee has the right to compensation for occupational diseases. The proponent will operate within the requirements of this legislation and abide by all relevant sections provided by this Act.

2.2.26 Civil Aviation Act Cap 80, 2006

The Act makes provisions to enable effect to be given to the Chicago Convention (1944). The Act provides for the control, regulation and orderly development of civil aviation in Tanzania and to establish a regulatory authority in relation to air transport, aeronautical airport services, air navigation services and to provide for its operation. The operation of Mslato Airport must adhere to the provisions in this Act.

2.3 International Agreements and Conventions

The international Conventions in which Tanzania is a Party relevant to this project are as follows:

2.3.1 The United Nations Convention on Biological Diversity, 1992

This Convention, which calls for the sustainable use of biological diversity, was ratified by Tanzania in 1996. The objective of the Convention is to conserve biological diversity, promote the sustainable use of the components and encourage equitable sharing of the benefits arising from the use of genetic resources. Dodoma Municipality, where the project will be implemented has a very low diversity of both flora and fauna. However, best practices of flora and fauna protection will be observed during the Construction Phase.

2.3.2 Convention on Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration

This Convention, ratified by Tanzania in 1984, provides the framework for ensuring a safe working environment for workers. The implementation of the project will ensure that it prevents the exposure of its workers and the public from any occupational hazards by providing appropriate security and safety equipment.

2.3.3 ILO Convention:

C182 Worst **Forms** of child labour Convention, 1999 which was ratified by Tanzania in 2001. This project shall ensure no child is employed in its activities.

2.3.4 International Civil Aviation Organization (ICAO)

This institution is a Convention on International Civil Aviation, drawn up by a conference in Chicago in November and December 1944, and to which each ICAO Contracting State is a party. This Convention is also known as the Chicago Convention. In October 1947, ICAO became a specialized agency of the newly-established United Nations. The Chicago Convention set down the purpose of ICAO: *"WHEREAS the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world, yet its abuse can become a threat to the general security; and WHEREAS it is desirable to avoid friction and to promote that co-operation between nations and peoples upon which the peace of the world depends; THEREFORE, the undersigned governments having agreed on certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of opportunity and operated soundly and economically;"* ([https://www.skybrary.aero/index.php/International_Civil_Aviation_Organisation_\(ICAO\)](https://www.skybrary.aero/index.php/International_Civil_Aviation_Organisation_(ICAO)), accessed on 26th April 2019).

ICAO is responsible for safety; registration; airworthiness; prevention of economic waste; fair competition; standardization and aviation law.

2.4 Operational safeguards of AfDB

In addition to the national regulation framework, the project is subjected to the environmental and social requirements of African Development Bank (AfDB). First institution of financing of the development in Africa, the African Bank of Development gathers 78 Member States, including 53 African countries. The major challenge of the AfDB is the reduction of poverty in Africa.

Environmental and social durability is the angular stone of the economic growth and the reduction of poverty in Africa. The long-term strategy (2013-2022) of the AfDB stresses the need for helping the regional Member States in their efforts aiming carrying out an inclusive growth and at ensuring the transition towards the green economy. Moreover, the ADB is committed ensuring social and environmental viability projects, which it supports.

The Bank has developed an **Integrated Safeguards System (ISS)** to update its safeguards policies and consolidate them into a set of Operational Safeguards (OSs) supported by revised ESAPs and Integrated Environmental and Social Impact Assessment (IESIA) Guidance Notes.

The ISS of the AfDB is conceived to promote the durability of the results of the projects by environmental protection and the people against the possible negative impacts of the projects. The safeguards of the ADB aim at:

- avoiding, as far as possible, negative impacts of the projects on the environment and the people concerned, while optimizing the potential benefit of the development;
- minimizing, attenuating and/or compensating for the negative impacts of the projects on the environment and the touched people, failing to avoid them; and
- helping the borrowers/customers to reinforce their systems of safeguard and to develop their capacity to manage the environmental and social risks. The Bank requires that the borrowers/customers conform to these safeguards during the preparation and of the execution of the projects.

The declaration of policy of safeguards integrated establishes the essential principles which found the approach of the Bank as regards safeguard. Consequently, the Bank adopted five Operational Safeguards, thus limiting their number at least necessary to achieve its goals and to ensure the optimal operation of ISS:

Table 2.1: List of operational Safeguard and their Objectives

Operational Safeguard		Objective
SO1	Environmental and Social Impact Assessment	Establishes the procedure to determine the category of the project and the social and environmental impacts.
SO2	Involuntary Resettlement, Land Acquisition, Population Displacement and Compensation	This safeguard consolidates the political commitments and requirements established by the Bank on involuntary resettlement and incorporates a number of details to improve the operational efficiency of these requirements

SO3	Biodiversity and Ecosystem Services	It has the objective of conserving biological diversity and promoting sustainable use of natural resources. It also reflects the commitment of the AfDB's policy on integrated management of water resources within the operational requirements
SO4	Prevention and Control of Pollution, Hazardous Materials and Efficient Use of Resources	It covers a range of key impacts of pollution, waste and hazardous materials that are part of international agreements and conventions as well as specific standards, including gas greenhouse effect that other development banks also follow.
SO5	Working Conditions, Health and Safety	It establishes the bank's requirements to their borrowers or customers with respect to the conditions of workers' rights and protection against abuse and exploitation. It also ensures wide harmonization with most other multilateral development banks.

The Operational Safeguard 1 is a mandatory requirement for projects funded by the AfDB to its borrowers. The remaining safeguards support the implementation of the first and indicate specific requirements related to different environmental and social issues, including gender and vulnerability, which are triggered if the evaluation process shows that the project will have certain risks.

2.4.1 Operational Safeguard 1 (SO1): Environmental and Social Impact Assessment

The Operational safeguard 1 requires among others that screening for potential impacts is carried out early, in order to determine the level of EIA to assess and mitigate potential adverse impacts. During the phase of identification of the project, exercise of screening stresses environmental and social dimensions of the project subjected to financing in order to classify it in one of the four following categories

- Category 1: projects which are likely to have the most serious effects environmental and social and require a full ESIA .
- Category 2: projects which are likely to have harmful impacts and specific effects of the environmental impacts and social which can be minimized by the application of the measurements of attenuation included in a ESMP.
- Category 3: projects which should not induce environmental and social negative impacts and do not need other environmental or social measures.
- Category 4: projects which imply investments of the funds of the Bank by the means of the financial intermediaries in sub-projects which can involve environmental or social effects. The specific requirements for this type of project

include/understand an evaluation of the Financial capacities of the Intermediaries to treat the environmental and social considerations

According to this categorization, Msalato airport project would be regarded as a project of Category 1 that requires a full ESIA.

2.4.2 Operational Safeguard 2 (SO2): Involuntary Resettlement, Land Acquisition, Population Displacement and Compensation

The Involuntary Resettlement policy is intended to assist displaced people arising from development projects in this case the planned of the new airport and associated infrastructure improve or at least restore the social and economic base. The planned activities require land or could affect livelihoods and some community infrastructure or cultural features such as cemeteries, shrines or other sacred sites

A Resettlement Action Plan (RAP) is prepared to ensure it prescribes measures to minimize the negative impacts and ensure that the displaced people benefit from the project. Thus, in implementing this project the Government of Tanzania legislation on land occupancy and the Bank Operation safeguards on Involuntary Resettlement have to be complied with. Although, the entire area is already demarcated for airport activities, this policy is likely to be triggered since a few houses could still be observed in the area.

2.4.3 operational safeguard 3 (so3): biodiversity and ecosystem services

From the baseline studies, this SO is deemed to be triggered by the proposed project activities because planned activities are likely to impact natural resources of significant conservation value (natural, modified) or source of ecosystems services to surrounding communities. The ESIA process has considered biodiversity and ecosystem services to be triggered by this project. Thus, the assessment shows that impacts on ecosystem services and biodiversity are taken into account in project design and implementation and appropriate mitigation measures adopted.

2.4.4 Operational Safeguard 4 (SO4): Prevention and Control of Pollution, Hazardous Materials and Efficient Use of Resources

The provisions in SO4 are considered as part of the ESIA process analyzed under SO1. The proposed project shall make the project site susceptible to pollution from the release of hazardous substances. The project will utilize the pollution prevention and emergency response plan as part of the ESIA to mitigation any potential source of pollution from the proposed project activities

2.4.5 Operational Safeguard 5 (SO5): Working Conditions, Health and Safety

The provisions in OS5 are considered as part of the ESIA process analyzed under OS1. The OS5 is applicable as the scope of construction activities are of a large scale and

involves large workforce for the works. The opportunities and actions identified for strengthening the system for OS1 are applicable to OS5 Capacity-building for TAA staff, environmental consultants, and district environmental officers will include training in workplace health and safety procedures and enforcement and in preparing and enforcing health and safety provisions in construction and operating contracts.

2.5 Summary of Country and institutional System Assessment

The assessment has established that Tanzania has the legislative and regulatory basis and the institutions to ensure consistency with the requirement of the ISS. However, implementation is not consistently effective in the areas of Environmental and Social Management Plan (ESMP) implementation, field supervision, monitoring and enforcement; and stakeholder consultation.

The most significant social findings are that Tanzania has land laws and land acquisition procedures that, if judiciously followed, would result in outcomes generally in line with Operational Safeguard 2, provided additional attention is given to livelihood restoration and to the rights of project-affected people who cannot prove ownership of the land. In practice, acquisition of land for the proposed project relies heavily on voluntary contributions of land and land based assets (crops and trees), while it avoids personal and public structures. The process has lacked proper documentation of the processes when land was provided voluntarily. The study includes recommended measures to bring the land acquisition up to national standards, as well as additional steps to meet the requirements of OS 2.

The main thrust of the measures is for proponent to develop systematic procedures to guide its staff in acquiring land, using, as a resource, the guiding principles of the OS 2. The assessment also found that Tanzania does not have any laws specifically aimed at protecting the rights of indigenous peoples. However, Tanzania does recognize vulnerable groups as a category of potentially affected people, and various processes such as environmental impact assessments do consider potential impacts on them.

The measures identified in the assessment to achieve the objectives of OS 2 are mainly for the proponent to strengthen its existing policy and procedures to ensure that the possible presence of vulnerable groups is considered when potential investments are appraised and that if any are likely to be affected, the principles of free prior informed consultation are applied.

3.0. PROJECT DESCRIPTION AND JUSTIFICATION

3.1 Location

The proposed Mlasato International Airport is located in Dodoma City, Dodoma administrative region. The region lies between 4° to 7° latitude South and 35° to 37° longitude East. It is a region centrally positioned in Tanzania and is bordered by four regions namely: Manyara in the North, Morogoro in the East, Iringa in the South and Singida in the West. Much of the region is a plateau rising gradually from some 830 metres in Bahi Swamps to 2,000 metres above sea level in the highlands north of Kondoa. Currently Dodoma region comprises seven districts: Bahi, Chamwino, Mpwapwa, Kongwa, Kondoa, Chemba, Dodoma urban (municipality). The region is the 12th largest in the country and covers an area of 41,310 sq. km equivalent to 5% of the total area of Tanzania Mainland.

Dodoma City is located approximately at the centre of Tanzania. It is bordered by Chamwino district in the East and Bahi district in the West. It lies between Latitudes 6.00° and 6.30° South, and Longitude 35.30° and 36.02° East. It is 456 km to Dar es Salaam and 426 km to Arusha (figure 3.1)

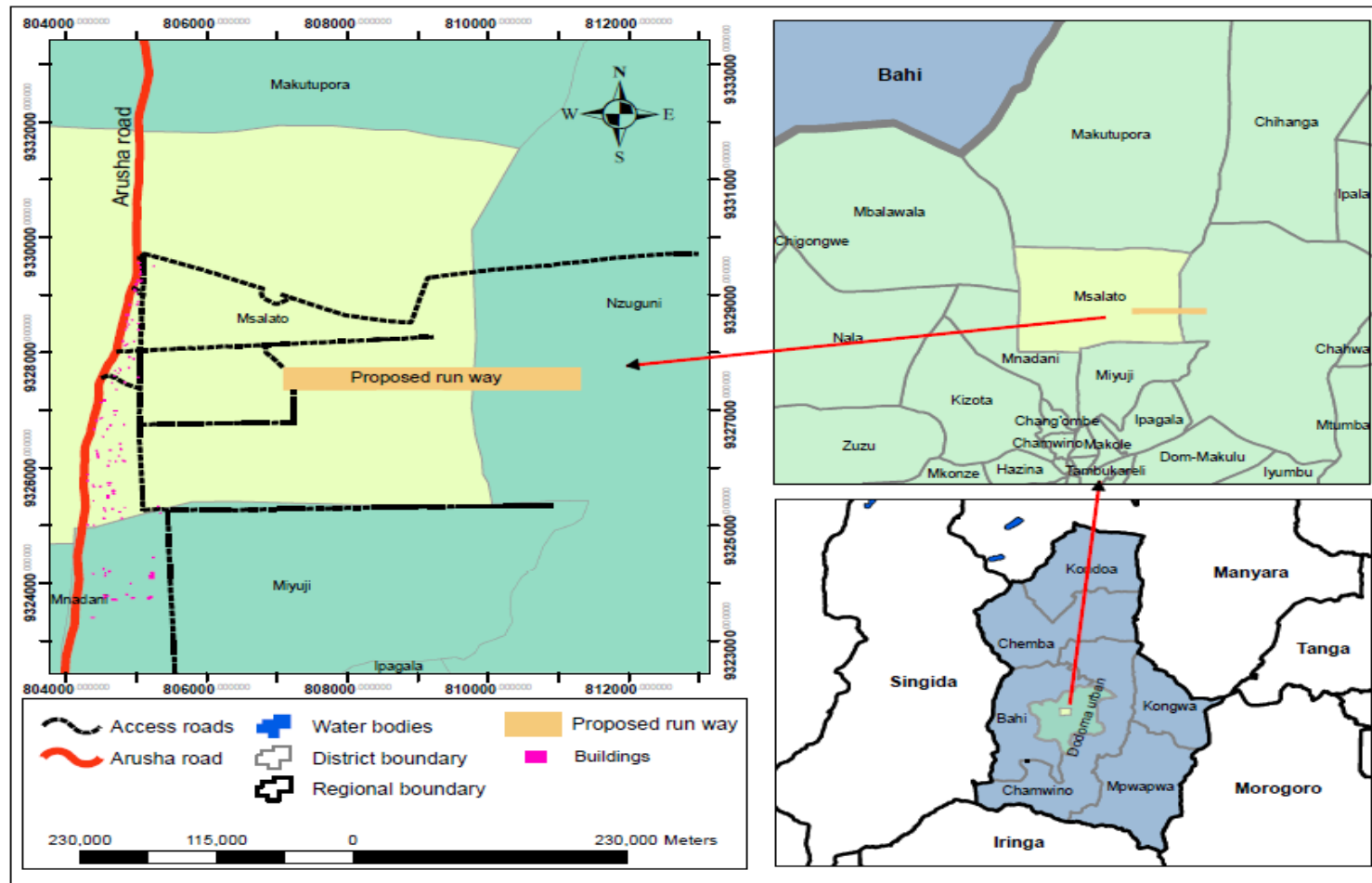


Figure 3.1: Map of Tanzania showing project area

Source: Consultant, 2018

3.2 Project Site Accessibility

The proposed Msalato Airport (MA) Project site is located about 12km from the Dodoma Central Business District (CBD), along the Dodoma-Arusha highway (figure 3.2). The airport divides in the administrative wards of Msalato, Nzuguni and Miyuji. TAA has constructed four (4) access roads around the proposed project site. The road from Dodoma Municipality to Msalato airport is being improved to bitumen standard.

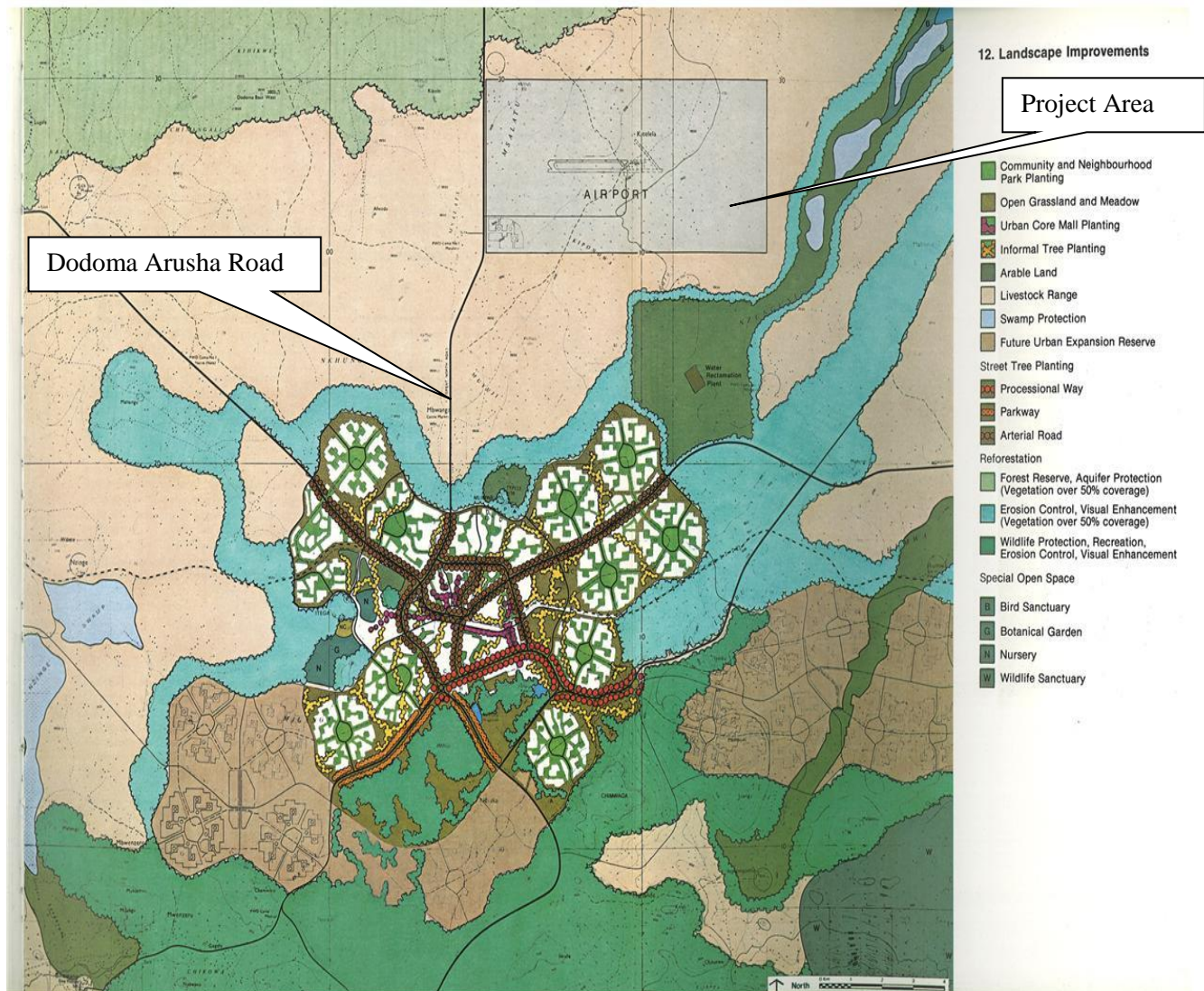


Figure 3.2: Site accessibility map (Source:Dodoma Municipal Council)

3.3. Site Description

The land designated for the airport site is 9 kilometres long and 5 kilometres wide, which is approximately 45 km² at an elevation of about 1070masl. At present, nearby communities use about 10 km² for small agriculture and livestock activities and the remaining area of approximately 26km² is covered by bushy thickets mixed with annual grass and short trees.

The proposed new airport is located outside the city boundaries and has a longer runway length and weight-bearing capacity. The proposed airport will be constructed in the middle of the proposed site with a total airport Phase 1 built up area of 25,000 square meters. Recently, the airport area was demarcated as such there is no major activity in the area, apart from livestock grazing and seasonal crops of maize and sunflower.

There are a few homesteads surrounding the area and about 4 houses still in the project area. These buildings require demolition to give space for the new Msalato International Airport. However, there is one structure used as toilet for guest visiting the site and beacons at the corner point and peripherals that earmark the boundary of the proposed site.



Figure 3.3: Beacon that earmark the Airport boundary (Source: **Photograph by Consultants, 2018**)

3.4 Major Project Components and Design

3.4.1 Project Components

The project shall entail clearance of bushes, cut and fill at the site to provide space for the proposed new airport. The proposed project area has been earmarked by Airways route system as the one among the aircrafts refilling station in east and central Africa.

The Msalato Airport project will entail the construction of the runway, aircraft parking apron, Air traffic control tower, meteorological station, cargo terminal, fire station, air craft hangar, presidential pavilion, passengers' terminal buildings office buildings, car parking lots and internal roads.

The design incorporates sustainable design strategies such as use of existing roads and providing garden features between and within various portions of the terminal that contribute to better site drainage.

3.4.1.1 Runway

The principal runway will be a paved to bitumen surface along its entire length. Construction of the Msalato Airport will enable the operation of bigger aircrafts such as Boeing and other bigger planes.

3.4.1.2 Taxiway

Taxiway and runway furniture such as ground lights and pavement markings will also be installed and improved to ensure compliance with aviation safety standards.

3.4.1.3 Apron

Aprons are hard-surfaced areas on the airfield where aircrafts park for passengers to board or disembark, as well as for loading and fuelling. On the aprons are fuel hydrant pits from which aircrafts re-fuel. These pits are part of a fuel hydrant system comprising a fuel depot where the fuel is stored, connected by underground pipelines to the fuel hydrant pits. Refuelling is done by special metered equipment that connect the pit to the aircraft tanks using hoses. The

aprons to be constructed will be fitted with fuel hydrant pits and fuel distribution lines that will connect the pits to the fuel depot.

3.4.1.4 Air traffic Control Tower

The air traffic control tower is located in the South side of the terminal passenger

The Air Traffic Control Tower is the facility that supervises, directs and monitors the arrival and departure of air traffic around the airport and its immediate airspace.

The site of the Tower includes a separate area for parking spaces for visitors and staff and emergency generator.

The location of the ATCT and technical block building insures:

- ❑ Maximum visibility of airborne traffic patterns.
- ❑ Complete visibility to all airport surface areas used for the movement of aircraft, which are under the control of the ATCT. This includes runways, taxiways and aircraft aprons.
- ❑ Minimum Exterior noise.
- ❑ An adequate eye elevation so that the controllers can have an unobstructed line of sight to all runways, taxiways and other movement areas.

The functional part of the shaft is composed essentially by:

- The technical HVAC floor
- The Amenities floor
- The air traffic control cabin

3.4.1.5 Meteorological Station

The building will have a meteorological station, observer's office, sanitary facilities (2), rest room and kitchen.

3.4.1.6 Cargo Terminal

The cargo terminal building is located on the west side of the Terminal Zone

The cargo terminal is oriented so as to achieve a logical flow of goods from both sides (the airside and landside) with an efficient circulation and processing of vehicles at the landside.

The cargo is divided into 2 sections, Import and Export zones separated by an office block (70% import, 30% export). A warehouse and offices are located on the ground floor in a separate building.

Other facilities, like perishable area, a freezer, and storage areas for human remains, vaccines, living organs, valuable, dangerous, fragile and radio-goods & other special goods are considered in the design.

The cargo is composed by:

- ❑ Import zone (70%)
- ❑ Export zone (30%)
- ❑ Storages
- ❑ Cold rooms, freezers
- ❑ Toilets and pantry
- ❑ Loading dock
- ❑ And offices in a separate building.

3.4.1.7 Fire Station

The fire station building is located on the west side of the Terminal Zone

Two entities are structurally separated but functionally linked.
The connection between the service area and the parking is ensured.
The service area is designed around a patio.

3.4.1.8 Aircraft Hangar

The Air Craft Hangar is located in the west side of Terminal zone

The different activities of the hangar are located outside and around the hangar within an independent structure.

The hangar is planned to accommodate:

- ❑ B737 aircraft or A320 aircraft,
- ❑ ATR aircraft,
- ❑ workshops,
- ❑ storages
- ❑ offices
- ❑ Changing rooms and toilets

The different activities of the hangar are located outside and around the hangar within an independent structure.

3.4.1.9 GSE Building

The facilities of this building include staging, servicing and repairing vehicles and equipment used for the servicing of aircraft which consist of a number of special vehicles which are not roadworthy.

The airport maintenance department consists on a big airside area for parking and various workshops.

The different functions are arranged in an L shape around the airside parking station.

Maintenance facilities for motors, includes wash bays, service bays, tire store, oil store and a battery room

The building is located away from the terminal building. This location minimizes the effect of noise generated and at the same time provides direct access for vehicles.

In the GSE building, maintenance of ground support equipment (GSE) and all other mobile equipment at the airport depends on the operator.

The program of this building is light on-site maintenance, which will be limited to minor maintenance and minor repairs.

3.4.1.10 Presidential Pavilion

The Presidential Pavilion is allocated for the use of the President and visiting dignitaries when they travel from/to the new Msalato airport.

On the landside, an elaborate ceremonial approach is provided for the access to the pavilion and it consists on having a special path for the president with a majestic entrance porch.

A surface car park is also provided on the landside for accompanying Vip visitors and staff vehicles.

On the airside a dedicated wide apron is planned for the presidential pavilion, this apron is also accessible from the internal Vip road dedicated to the president.

The design of the pavilion intent to induce a general ambience of monumentality and formality while providing a simple and direct spatial relationship between the building functions.

The pavilion is designed as two important cubic buildings with an imposing cover,
The building is divided into 2 entities:

- the main presidential pavilion.
- a secondary pavilion for accompanying persons, delegation, press and media.

They are interconnected with the luggage control.

A main big reception hall is planned in the centre of the main volume, and the other functions are arranged around it.

A presidential office, VIP lounges, press facilities and appropriate services are all accommodated in the design in a direct and logical sequences to insure perfect functionality.

The elevation treatment, the exterior and the interior finishes are planned to be on the highest standards and quality, reflecting a modern architecture that aspires future.

3.4.1.11 TAA Headquarter Office

The TAA HQ building is located in the North West side of the project

The building will mainly house the Directorate and many other services.

It is essentially composed of the following sections:

1. Directorate
2. administrative services
3. technical services
4. common spaces

The entrance is a circular central lobby topped with a majestic dome as the terminal building. two entities are linked to the main volume hosting the different administrative and technical services. The outcome of the principal axis of entrance in the ground is an important conference room.

The ground floor is composed of different services as:

- Custom care
- Human resources
- Environmental unit
- Internal audit
- Legal
- Procurement and management unit
- Fire

The first floor is composed of different services as:

- Engineering and technical services
- Human resources
- Regional airport

The Second floor is composed of different services as:

- Compliance unit
- Director general
- Finance and business
- Marketing

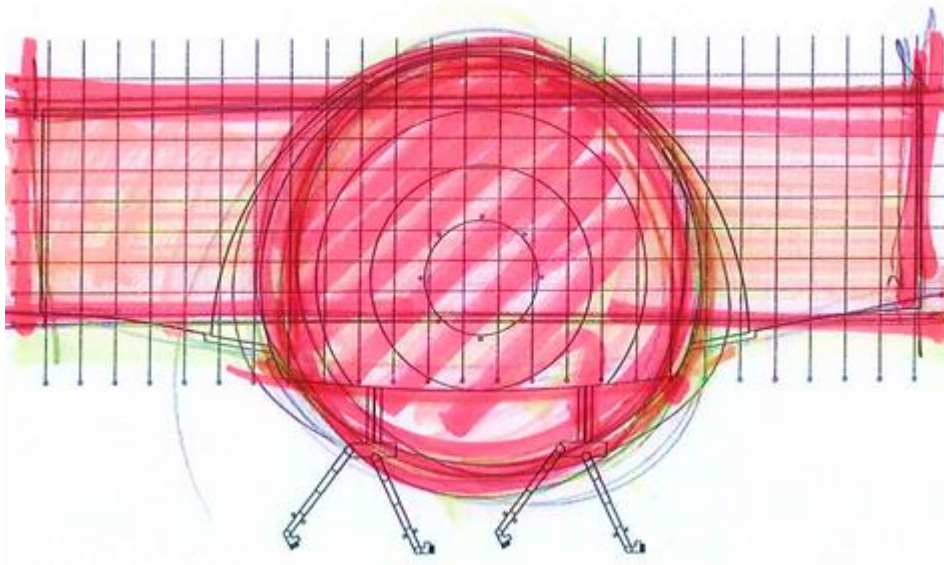
3.4.1.12 Passenger Terminal Building

The terminal building is configured in simple linear shape enhanced in the central part by an imposing dome.

The design intent to induce a general ambience of grandeur and formality while providing a simple and direct spatial relationship between the building functions.

The elevation treatment as well as the exterior and interior finishes is to be to the highest standards and quality in a modern setting that aspires to the future. This emphasizes the modern spirit of the building style from both internal and external environments.

The skylight in the dome concentrates the curve feeling in the interior and provide unique and interesting ambiances inside the high space under the dome.



3.4.1.13 Utility Network

This will involve construction of Wastewater Sewerage system, Water supply system, electrical, telecommunication network and fuel farm

3.4.2 Architectural Design

All the buildings inside the Msalato Airport have considered the design criteria which include the following

- The maximum and allowable runway length and its maximum distance from the nearest building.
- Aircraft safety signs
- The maximum number of storey the buildings shall have
- Threshold noise level for Airport with regard to distance from the nearest village houses.
- Easy vehicular access to and from the building, this is possible through utilization of two possible existing access gates.
- Short internal walking distances
- Ensure easy flow of clean air
- Aesthetic values added
- Proper orientation to reduce indoor discomfort and minimize the effect of the sun
- Ensure coherence, diversity compatible uses and scale in the context

3.4.2.1 Sustainable Design Initiatives

In simple terms, sustainable design means doing more with less, and making intelligent design decisions that reduce energy consumption and minimize the impact that a building has on the environment. Most of the decisions regarding sustainability are of a detailed nature and have been formalized during the detailed design phase. A framework has been set that

incorporates concepts that will contribute to a building that once fully designed, will conform to current sustainability principles. These will serve as a useful guideline for making environmentally responsible design decisions and the following five categories that have been considered to make sustainable design:

- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design

3.4.2.2 Capacity

The capacity of the airport for Phase 1 is estimated at 1,500,000 passengers per annum with about 60% international traffic and 40% national traffic.

3.5 Implementation Phases

The project will be implemented in three phases.

Initially, the bidding documents for **Phase 1** were prepared considering a first lot (lot 1) for infrastructures and a second lot (lot 2) for buildings.

It should be noted that the TAA headquarters documents have been prepared for a separate Bidding documents (lot 3).

After various exchanges with the client and in view of his discussions with the AfDB which required to consider all necessary components for a fully operational airport since the first phase, the Detailed Design & tender documents have been prepared in compliance with the AfDB recommendation, regarding the following allotment:

Phase 1 will include Lot 1 and Lot 3 as per below:

Lot 1:

Current works & Provisional works for phase one, lot 1

N°	CURRENT WORKS	PROVISIONAL WORKS
1/ Infrastructures	<input type="checkbox"/> Movement Areas <ul style="list-style-type: none"> • Runway (3600m) • Taxiways (C, D, H) • Several Aprons to serve the: <ul style="list-style-type: none"> ✓ Passenger Terminal ✓ Presidential Pavilion 	<input type="checkbox"/> Movement Areas <ul style="list-style-type: none"> • Taxiways (A, B, E,F & G) • Several Aprons to serve the: <ul style="list-style-type: none"> ✓ Cargo Terminal ✓ Aircraft Hangar ✓ Isolated Aircraft Parking Position ✓ General Aviation
	<input type="checkbox"/> Landside <ul style="list-style-type: none"> • Western Portion of the Main Access Road • Portion of the Service roads between the two control access • Carparks • Fences and gates 	<input type="checkbox"/> Landside <ul style="list-style-type: none"> • Eastern portion of the Main Access Road • Presidential Pavilion access road • Remaining portions of Service Roads and perimeter security

N°	CURRENT WORKS	PROVISIONAL WORKS
		roads
	<input type="checkbox"/> Water Systems <ul style="list-style-type: none"> • Storm water drainage system and flood protection • Partial Water supply system • Partial Firefighting system • Sewerage system including sewerage system plant 	<input type="checkbox"/> Water Systems <ul style="list-style-type: none"> • Rest of Water supply system • Rest of Firefighting system
	<input type="checkbox"/> Electrical Systems <ul style="list-style-type: none"> • Power supply & MV Network • Airfield Lighting • Street lighting • ULV Network • Telecommunication Platform 	<input type="checkbox"/> Electrical Systems Rest of Stopbars and Taxiway Edge Lighting (Airfield Ground lighting System)
2/ Buildings	<input type="checkbox"/> Passenger Terminal Building <input type="checkbox"/> Air Traffic Control Tower <input type="checkbox"/> Fire Station Building <input type="checkbox"/> Power station and sub-station	<input type="checkbox"/> MTO Building

N°	CURRENT WORKS	PROVISIONAL WORKS
3/ Equipment	<input type="checkbox"/> Aeronautical Systems Facilities <ul style="list-style-type: none"> • Radio Navigation Aids <ul style="list-style-type: none"> ✓ Instrument Landing System (ILS), including: Localizer, Glide Path, Terminal Distance Measuring System (T-DME) ✓ Doppler VHF Omni-Range Radio / Distance Measuring System (DVOR/DME) ✓ Remote Control and status Monitoring System (RCMS) ✓ Communication Network (Optic fiber) • Communication Systems <ul style="list-style-type: none"> ✓ Very High Frequency (VHF) radio equipment (Transmitters, Receivers) ✓ Mobile communication system VHF/AM Emergency Transceivers ✓ Hand Held and Vehicle VHF Radio • Voice Communications Control System (VCCS) • Voice Recording and Playback System • Automatic Terminal Information Service (ATIS) • Aeronautical Fixed Telecommunication Network (AFTN/AMHS) • VSAT Ground Station • Control Tower Equipment <ul style="list-style-type: none"> ✓ Flight Data strips ✓ Consoles in the tower Cab and Approach room ✓ Chairs for Control Working Position ✓ Air traffic light Gun 	
	<input type="checkbox"/> Meteorological system <ul style="list-style-type: none"> • AWOS <ul style="list-style-type: none"> ✓ AWOS Runway 09/27 sensors ✓ Observatory and ATC equipment 	<ul style="list-style-type: none"> • Upper Air Sounding System • Balloon Filling System (Hydrogen Generator)

N°	CURRENT WORKS	PROVISIONAL WORKS
	<input type="checkbox"/> Terminals Systems <ul style="list-style-type: none"> • Baggage Handling System (BHS) • Metal Detector Gate, Hold/Oversized baggage X-Ray, Cabin Hand baggage X-Ray • Passenger Boarding Bridges (PBB) • Visual Docking Guidance System (VDGS) • 400 Hz solid-state ground power supply unit 	

Lot 3:

- ☐ TAA Headquarters

Phase 2 will include: Lot 2:

- ☐ Presidential Pavilion
☐ Cargo Terminal Building
☐ Aircraft Hangar
☐ GSE Building

Phase 3 will finally be undertaken in later years and would include other extensions as Terminal 2 and 3 extensions together with Parallel Runway, etc.

3.6 Project Cost

The investment costs are mainly the capital required for the construction works. They also include the costs of monitoring and those relating to environmental measures. At the economic prices of 2018, they amount to **four hundred twenty-five million dollars**.

The cost of the project includes:

- ☐ Initial cost invested in 2020 (Phase 1 current works): represents the most important part of the investment and includes the components necessary for the commissioning of the airport in 2023,
- ☐ Provisional works cost, to be invested starting from 2023 following the end of the phase 1 (current works)
- ☐ The cost of the components that could be postponed to 2030 (Phase 2): they are components whose delay does not impact the operation of the infrastructure and can be executed later when the need arises,

The cost of the project is broken down as follows:

Investment cost (million US\$)

	Phase 1 (Million US\$)		Phase 2
	Current Works	Provisional Works	Millions US\$
GENERAL & PRELIMINARY	5	3	2
INFRASTRUCTURES	130.1	50.4	3.2
BUILDING WORKS	158.6	0,.39	25
AGL, NAVAIDS, METEO	10.63	0.37	0
Dayworks	0.12	0.12	0.12

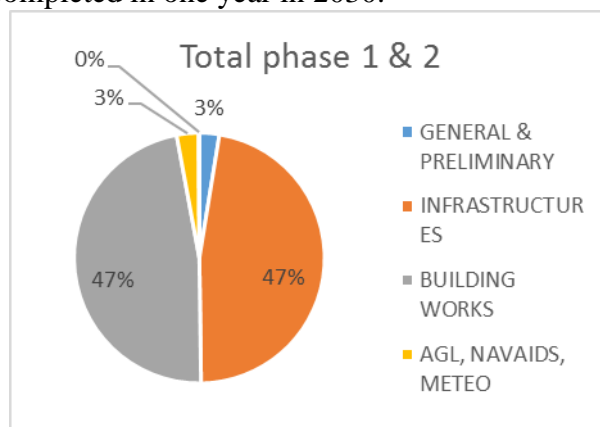
Total	304.5	54.3	30.3
	358.7		30.3

With a 47 % share, infrastructure dominate construction costs. Building works ranks second with 46 % of total investment. The items "General & Preliminary" and "Agl, Navaid, Meteo" respectively occupy the third and fourth positions.

The construction works for the phase 1 (current works) will extend over three years according to the following schedule:

1. 1st year: 30 %
2. 2nd year: 30 %
3. 3rd year: 40 %

The provisional works will be executed during a 2 years period, 50% in 2023 and 50% in 2024. Phase 2 will be completed in one year in 2030.



Breakdown of the investment cost

3.7 Development Conditions

The Dodoma Master plan of 1976 designated the Msalato land area for construction of the Airport and since then the area has been retained for the same land use. The proposed site has no specification of building height. The master plan is on the way to review. The current height zoning in Dodoma Municipality shows that the maximum height is eight (8) storey and is situated at CBD. The height keeps on decreasing outside the CBD whereby areas around the proposed airport site are observed to have single storey buildings. DMC has by default designated the site to have single storey buildings to favor flying and landing of aircrafts. Therefore, the proposed new airport conforms to the land use of the area.

3.8 Project Phases

The undertaking involves various phases from the planning phase all the way to the construction and operation phase. Each specific phase has its own activities which are well elaborated in following sections;

3.8.1 Mobilization Phase

3.8.1. 1 Site Preparation Activities

At Msalato airport site preparation will involve:

- **Land acquisition-** This is the process by which the developer acquires private land for the purpose of airport and development of infrastructural facilities and providing compensation to the affected land owners and resettlement.
- **Soils and Materials Investigation-** This aims at obtaining information on the physical properties of soil and rock around a site to design earthworks and foundations for proposed structures and for repair of distress to earthworks and structures caused by subsurface conditions.
- **Material purchase, importation/transportation, storage and preparation-** This will be done prior to commencement of construction activities since, other materials will need to be imported
- **Identification of borrow pits, quarry sites and sources of water-** This will be done along the proposed project line so that to reduce costs for acquiring materials.
- **Architectural and Services Designs-** Preparation of Architectural drawings is done by architects to provide drawings which fits the proposed airport
- **Environmental Impact Assessment (EIA)-** This EIA has been conducted by following the EIA and Audit regulations of 2005
- **Acquisition of various permits/ certificates** (i.e. Building Permits)- This include getting the building permits, water user rights etc. from relevant authorities
- **Construction of camp site-** the contractor will construct site camps so that workers who come outside Dodoma can reside in

Duration

The duration of this phase will be six (6) months.

3.8.1.2 Mobilization of Construction Materials and Equipment

Sources of Materials

The project will require various standard construction materials including gravel, aggregates, sand, bitumen and water. These will be obtained from quarry site, located at Chigongwe area in Dodoma about 35km from the proposed airport site. Gravel will be obtained from the burrow pit about 9km from the proposed airport.

Bitumen will be purchased in Dar es Salaam or abroad, and at the quarry site and burrow pits, the materials will be excavated by excavator and wheel loader machine and loaded into trucks.

Interior materials will be selected that have low Volatile Organic Compound (VOC) emissions. Smoking areas, if required or permitted, will be separately ventilated.

Aggregates

The large percent (95%) of construction materials (aggregates) will be sourced at Chigongwe area which is 35Km far from the proposed Msalato Airport (Figure 3.4 and 3.5). The transportation of materials from the authorized quarry at Chigongwe will require the construction of temporary short cut road from the source to the proposed site at Msalato, alternatively, they will use a normal road which cover 35km to the project site. Routes assessment will be done before final decision of using which road and it's a cost dependent.



Figure 3.4: The Chigongwe area with a lot rocks

Source: Photograph by Consultants



Figure 3.5: Crusher (L) and aggregate (R) at Chigongwe quarry

Source: Photograph by Consultants

Sand

Chigongwe area has also part which allow sand quarrying on open borrow pit which is within the water flowing channel and wide valley downstream. This area has been earmarked by the municipal council as the source of sand for many construction sites in Dodoma region. The distance covered from this sand quarry to the proposed project site is 33Km (Figure 3.6).



Figure 3.6: Open borrow pits at Chigongwe area
Source: Photograph by Consultants

3.8.1.3 Equipment and Machinery

The contractor will use different types of equipment during the implementation of this project including heavy excavators, earth moving equipment, compactors and other lighter equipment and hazardous substances like bitumen/asphalt, fuel and oils. It is envisaged that these activities will cause significant environmental and social impacts that may be reversible depending on their magnitude and mitigation measures to be put in place

Types, Amounts and Sources of Project requirements

Types, amounts and sources of project requirements during the construction phase are shown in Table 3.1:

Table 3.1: Types, amounts and sources of project requirements during the construction phase

Requirements	Type	Source	Quantity (Estimates)
Raw Materials	Aggregates	Chigongwe (35km from the site)	2500m ³
	Sand	Mahomanyika (2km from site)	2100m ³
	Cement	Dar es Salaam	2000Tons
	Water	Water Boozers	30 Cu.m
	Reinforcement bars	(Local Vendors) Dodoma	1500Tons
	Timber	(Local Vendors) Dodoma	20Tons
	G45 gravel	Ntyuka (6km from site)	
Manpower	Skilled	Contractor	20
	Unskilled	Local People	200
Equipments	Excavator	Contractor	10
	Wheel loader	Contractor	3
	Water Boozers	Contractor	20

Requirements	Type	Source	Quantity (Estimates)
	Bull dozer	Contractor	5
	Motor grader	Contractor	4
	Roller Compactor	Contractor	7
	Plate compactor	Contractor	9
	Tippers	Contractor	60

Source: Consultant Analysis, 2018

3.8.2 Construction Phase

The construction phase will involve two major activities. These are quarrying and concrete production, and building work

Activities during quarry and concrete work

This activity intends to ensure that aggregates, sand and stones are enough for building and airport construction. The following are the activities to be done during quarrying;

- **Clearing and removal of overburden at quarry Sites**-The quarry area will be cleared for vegetation and overburden prior to drilling. If due to time constraints, this may not be possible, the overburden will be removed by suitable equipment during the works, but preferably outside the rainy periods. In areas where there will be water remaining, especially in the rainy season, this water will be pumped out to avoid erosion to surrounding infrastructure. Clearing of overburden will however continue in separate isolated places while drilling starts at spots first cleared.
- **Rock fragmentation**-Rock fragmentation shall be done in order to achieve the sizes needed in the shortest possible time. During the works this same method of fragmentation assessment will be used to amend the blasting pattern and charging to achieve the required result to programme.
- **Drilling and blasting**- Drilling will be performed in accordance with plans approved by the quarry supervisor, each shot/blast will be recorded with drilling plan, drilling report and blasting report. The drilling positions will be set out by the blaster and marked out on site. The driller will then be given an instruction sheet detailing the hole depth, angle, burden and spacing of the holes to be drilled. This is particularly important within the inspection and test plan as it prevents time consuming re-drilling. After drilling and prior to charging with explosives, the face will be inspected by the Quarry Manager. The decision on the method of charging of the holes will be decided upon after the face inspection is complete. The shot firer will draw up a blast proposal and this will be checked by the Quarry Manager, or his designated person, prior to the commencement of charging. The blasting ratio, which will be used, is expected to be around 0.5-0.7 kilogram/m³ of rock blasted, but will be adjusted blast-by-blast to suit the fragmentation achieved. The explosives used will essentially be of three types: ANFO (Ammonium Nitrate Fuel Oil mixture), Packaged explosives Power gel Magnum and Power gel 750 as booster/bottom charge and The ANFO will be ready mixed and brought to the quarry in man-handleably (25kg) bags.

The explosives will be initiated using non- electric handiest. These have been chosen for safety reasons as they cannot be initiated by stray currents. This can be a major

problem in the tropics where thunderstorms are not only regular but at times very severe.

The explosives will be placed in the holes as per the blast proposal. If ANFO is being used the holes will be checked for water prior to the charging commencing. If there is any doubt that the holes will remain dry, then the ANFO will only be used if placed in double thickness plastic tubes. If this is impracticable then packaged explosives such as Power gel 750 will be required. It is important that material for stemming contain aggregate materials and not dust to maximize the explosive force available and to minimize the danger from gunning of the holes.

- **Mixing-** Ideally mixing water is drinking water. Mixed water shall be subject to specified BS EN 1008 standards compliance testing and shall be used where appropriate. Mix water temperature shall not be ignored to affect the temperature of the concrete. Water mixture to be used in concrete production will be checked on whether it contains or does not contain organic ingredients. Checks with the naked eye will always be performed without being tied to a specific time interval. Other than that, the water used in concrete production quality control monitoring and acceptance criteria shall be in accordance with the following BS EN 206-1:2005.
- **Concrete pumping-**When pumps are used; the end of the supply pipe will be kept at an elevation that will allow maximum 1m free fall of concrete. Mortar and water used for the concrete pump, in order to make the pipes suitable for pumping concrete through properly, must be taken out of formworks.

Activities during building work

The following are the main activities to be executed on the site during building work are as follows:

- **Earthworks (site clearance)-**This shall be done by means of motor grader. This will ensure that the drainage pattern of the site is not interfered with construction activities.
- **Foundations excavation-** Most part of the site is covered in vegetation. The same will be removed and disposed off by a licensed waste handler to pave way for the construction.
- **Material transportation-** Materials (fine and course aggregates) from quarries will be transported by trucks to the construction site. Water will be brought to the site by tanker trucks, when there will be water supply interruptions from the City articulation system. Other materials like cement, timber and reinforcement bars will be transported by trucks to the construction site.
- **Material Storage-** Materials like aggregates and sand will be stored at the backyard of the camp site ready for use. Cement and reinforcement bars will be stored in special storage rooms. Timber will directly be used at the required areas and consequently there will be no stockpiling of timber at the camp sites in 20ft container.
- **Masonry, Concrete works and related activities-** The construction of the building walls, foundations, floors, pavements, drainage systems, taxi way, apron, run way and parking area among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mixers.

- **Steel Structure works-** The buildings will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection.
- **Roofing and Sheet metal works-** Roofing activities will include sheet metal cutting, raising the roofing materials such as clay roofing tiles and structural timber to the roof and fastening the roofing materials to the roof.
- **Electrical Work-** Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.
- **Plumbing-** Installation of pipe-work for water supply and distribution will be carried out within all units and associated facilities. In addition, pipe-work will be done to connect sewage from the premises to the soak away pits.
- **Landscaping-** improve the aesthetic value or visual quality of the site once construction ceases, the developer will carry out landscaping. This will include establishment of flower gardens and lush grass lawns where applicable and will involve replenishment of the topsoil. It is noteworthy that the developer will use plant species that are available locally preferably indigenous ones for landscaping

Duration

The duration of this phase will be eighteen (18) months.

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the construction phase are shown in Table 2.3:

Table 2.3: Types, amounts and treatment/disposal of wastes during the construction phase

Waste	Types	Amount	Treatment/ Disposal	Quantity
Solid Waste (Degradable)	Remnants of timber.	1400m ³	Shall be sold to recyclers	1500m ³
	Food remains, cardboards and papers	150kg/day (based on generation rate of 0.3kg/day/person and 500 people)	To be collected in the large skip bucket at site ready to be disposed at the dumpsite	66kg/day
Solid Waste (Non-Degradable)	Demolition waste Spoil Soil	1200 m ³	The debris shall be used to fill un-uniform terrain at the site, timber and iron sheet shall be sold to recyclers.	1200 m ³
	Scrap metals, drums	Few	To be Sold to Recyclers	few
	Tins, glasses and plastics	Few	To be Sold to Recyclers	few
Liquid waste	Sewage	7.04m ³ /day (Based on 220 people, water consumption rate of	To be directed to the septic tank system.	7.04m ³ /day

Waste	Types	Amount	Treatment/ Disposal	Quantity
		40L/capita/day and wastewater discharge factor of 80%)		
	Oils and greases	Non	service and maintenance of vehicles will be done at designated garages	Non

Source: Consultant calculation, 2018

3.8.3 Demobilization Phase

Activities

Demobilization of temporary structures will be done for proper restoration of the site. Other activities include rehabilitation of the workshop and stockpile yard, at least to the original condition, clearance of all sorts of wastes including used oil, sewage, solid wastes (plastics, wood, metal, papers, etc.). Deposit all wastes to the authorized dumpsite and termination of temporary employment.

Duration

Demobilization stage will last for a period of three (3) months.

Types, Amounts and Sources of Project requirements

Types, amounts and sources of project requirements during the demobilization phase are shown in Table 3.3:

Table 3.3: Types, amounts and sources of project requirements during the demobilization phase

Requirements	Type	Source
Manpower	Skilled	Contractor
	Unskilled	Local People along the road
Equipment	Bull dozer	Contractor
	Motor grader	Contractor
	Roller Compactor	Contractor
	Plate compactor	Contractor
	Tippers	Contractor

Source: Consultant Analysis, 2018

Types, Amounts and treatment/disposal of Wastes

The demobilization of the temporary structures will result mainly into solid wastes such as timber, iron sheets and rubbles from demolitions. Timber and metal sheets will be sold to people in the nearby communities for reuse while rubbles will be used in backfilling the borrow pits.

3.8.4 Operation Phase

Activities

The activities that are expected to be executed during operational phase include

- **Office-** The proposed airport shall have office activities to facilitate smooth operation of the airport.

- **Business activities**-The proposed airport shall have business activities like shopping, bar and clearing and forwarding.
- **Transportation**-The airport shall handle 1,750,000 passengers per year (both local and international). This approximates to 4,800 passengers per day.
- **Good housekeeping of the area**- Cleanliness contractors shall be responsible for cleanliness outside the building. The inside cleanliness will be the responsibility of tenant. Operations will involve the use of substantial amounts of water, disinfectants and detergents.
- **Project Maintenance**- The buildings and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, painting, maintenance of flower gardens and grass lawns, and replacement of worn out materials among others. This shall be the responsibility of the proponent.

Duration

The duration of this phase will be more than Fifty (50) years

Types, Amounts and Sources of Project requirements

Types and sources of project requirements during the operational phase are shown in Table 3.4

Table 3.4: Types and sources of project requirements during the operation

Requirements	Type	Estimated quantity	Source
Water		144m ³ /day (Water consumption is 60L/day/person X4,800X50% of workers who will use toilet)	DUWASA
Energy	Electricity	8000kwh	• TANESCO (National Grid)
	Diesel Standby Generator of 110kVA	100-200L/month	• Proponent

Source: Consultant Analysis, 2018

Domestic Wastes

During operational phase only domestic wastes are expected which includes solid wastes and Wastewater. Domestic shall include liquid wastes and general refuse.

i. Solid Wastes

The Solid wastes such as papers, boxes, cardboards, kitchen wastes, tins, glass, food wastes, etc. are expected during operational phase. Collection at the site shall be the responsibility TAA or contractor. Skip buckets shall be provided at the strategic areas within the premises to collect all the waste from airport. These skip buckets shall be collected by a Contracted company twice per week for disposal at authorized Dumpsite in Dodoma Municipality.

Assuming that

- There will be 4800 people (worst case scenario)
- Generation Rate 0.35kg/capita/day
- Fifty percent of passengers will generate solid waste

Solid waste generation per day = $4,800 \times 0.35 \times 0.5$

Approximately 840kg/day of solid waste shall be produced from the airport

ii. Liquid Wastes

All the liquid wastes from toilets, kitchen, bathrooms etc. will be collected and directed to two septic tank systems and thereafter directed to constructed wetlands

Assuming that

- There will be 4800 people (worst case scenario)
- Water consumption 60l/capita/day 80% of the water consumed become wastewater
- Fifty percent of passengers will use toilets

Wastewater generation per day = $4800 \times 60 \times 0.8 \times 0.5$

Approximately 1.920m³ per day of liquid waste shall be produced from the airport

iii. Storm water Management

The proposed airport will generate a lot of storm water that will need immediate handling. The proponents shall employ rainwater harvesting technology at the site and Shall be used for domestic purposes.

3.8.5 Decommissioning Phase

Decommissioning of the proposed airport is not anticipated in the foreseeable future. However, if this will happen, may entail change of use (functional changes) or demolition triggered by change of land use. Since, the nature of this project is long term, then with design life of 100 years and regular maintenance, the airport is likely to survive.

3.9 Sources of Atmospheric Emissions from the Project

The project will have implications to atmospheric emissions notably CO₂, SO₂, NO₂, VOCs and particulate matter. The emission sources are categorized into stationary, combustion facilities and mobile sources. This project will have stationary and mobile sources of pollutants. Emissions from these sources will be generated during working hours (8 hours per day). Fugitive emissions have the potential for much greater ground-level impacts per unit than stationary source emissions, since they are discharged and dispersed close to the ground.

3.10 Land acquisition and ownership

The proposed site for the new Msalato airport was partly owned by TAA and partly by indigenous people. The site was planned for airport use since 1970s. Since then villagers at Msalato were using the land for residential, cultivation and pastoralism. The construction of the airport at Msalato area will involve resettlement of indigenous people. Thus, to ensure that the rights of the indigenous people is not lost, TAA will use involuntary resettlement policy to assist displaced people arising from development of the proposed airport.

CHAPTER FOUR

4.0 DESCRIPTION OF PROJECT ENVIRONMENT

4.1 Introduction

This chapter provides the baseline environmental condition of the project area that will make a reference frame to mark out the potential environmental impacts that might arise after implementing the proposed project. The affected environment includes the biophysical, social and economic environment that could be affected by, or could affect the development.

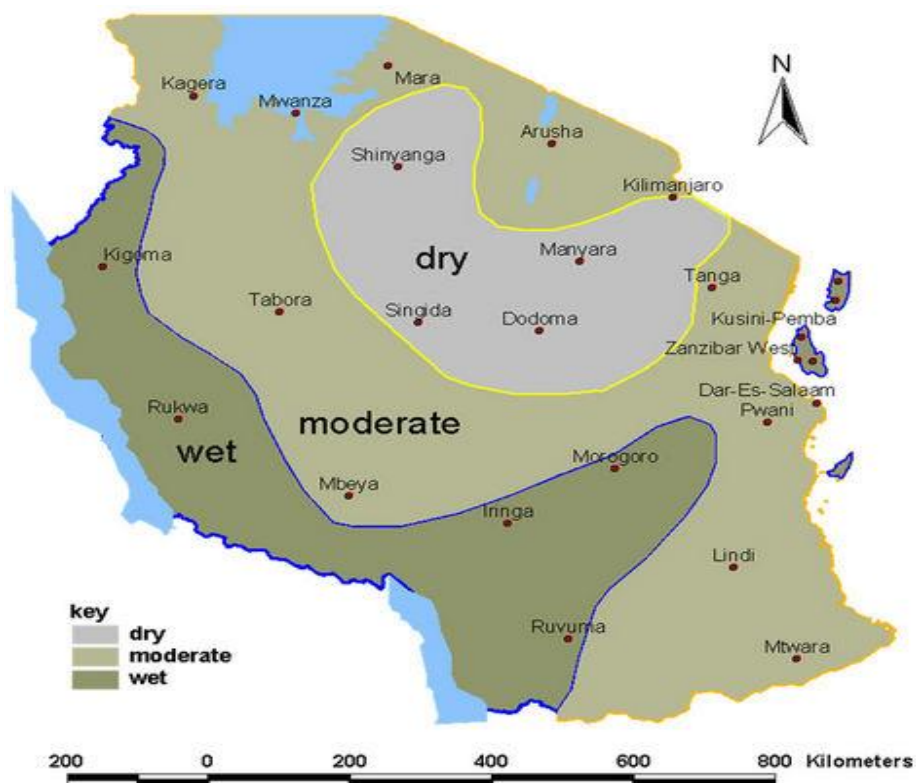
4.1.2 Area of influence of the existing and the proposed airport

The proposed airport has direct and indirect influence to communities surrounding the proposed site. The proposed construction of airport will directly influence settlements around the proposed project area particularly Msalato, Nzuguni and Miuji wards. The most affected ward-three quarter of the proposed project site falls under Msalato ward which has total of three streets includes; Msalato, Senje and Chikole. The indirect area of influence includes all communities in Dodoma Municipality. They will be source of building materials, food, workforce as well as provision of accommodation during both construction and operation phase, to mention few. These are due to multiplier effects emanating from the airport construction and operation activities. However, the proposed project shall indirectly influence the global climate due to indirect emissions of greenhouse gases from fuel consumptions during both construction and operation phase.

4.2 PHYSICAL ENVIRONMENT

4.2.1 Climate

Dodoma region has dry Savannah type of climate which is characterized by low and unpredictable unimodal rainfall (Fig 4.1). It has a marked seasonal rainfall distribution with a long dry season starting from late April to late November and a short wet season starting late November to the end of April (Fig 4.2).



Source: Consultant, 2018

Figure 4.1: Climate zone within Dodoma region

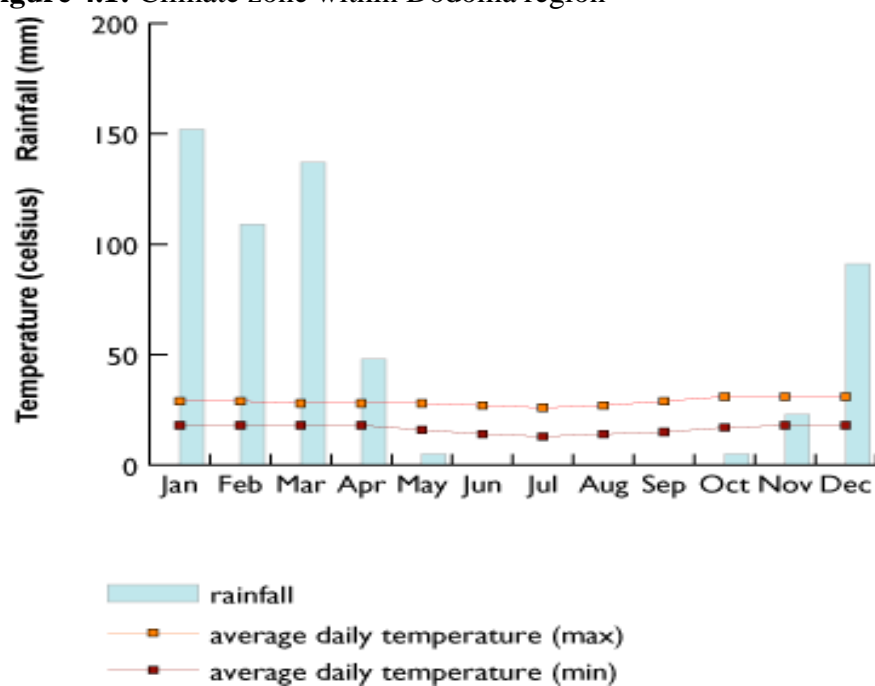


Figure 4.2: Maximum and minimum monthly rainfall and Temperature
Source: TMA

Rainfall

The average annual rainfall falls in the ranges of 550mm – 600mm. The heaviest rainfall occurs during the months of December and February. January usually has very unpredictable rainfall while March and April have low rainfall. The months of May, June, July, August, September and November are usually the dry. On the average, about 85% of the total rainfall is received within the first four months of the rain season i.e. from months of December and March.

Temperature

The minimum average temperatures vary from 10°C in July to 20°C in November. July is the coldest month whereas November is the hottest month, with mid-day temperatures exceeding 30°C. Source TMA, 2012

Wind

According to wind rose of the Dodoma station for period 1986-2016, wind direction is predominantly in East-West direction (Figure 4.3). This confirms that the East and West can be used as flying and land zones. This makes possible orientations of runway due to maximum values of the load actors as per ICAO.

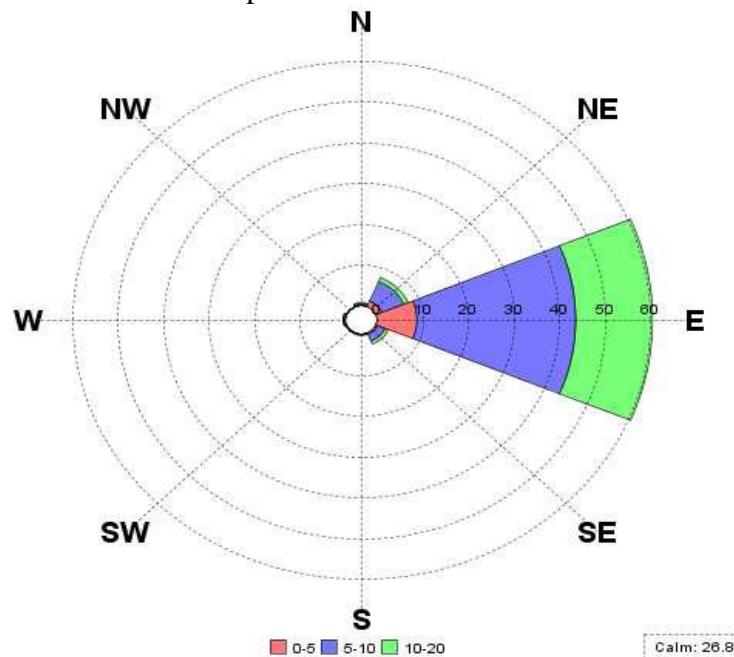


Figure 4.3: Dodoma wind rose for the period 1986-2016

Source:TMA

Records show that the average wind speed over 15 years from January 2010 to Sept 2016 has generally been increasing from 4.3km/h to 14.3 km/h. During this period the max wind speed ranged from 6.4 km/h to 19.5km/h; with gusts ranging from 7.2km/h to 19,5km/h. Monthly records reveals that the minimum wind speed is experienced in January while the highest speed and gusts are experienced around September (Fig 4.4).

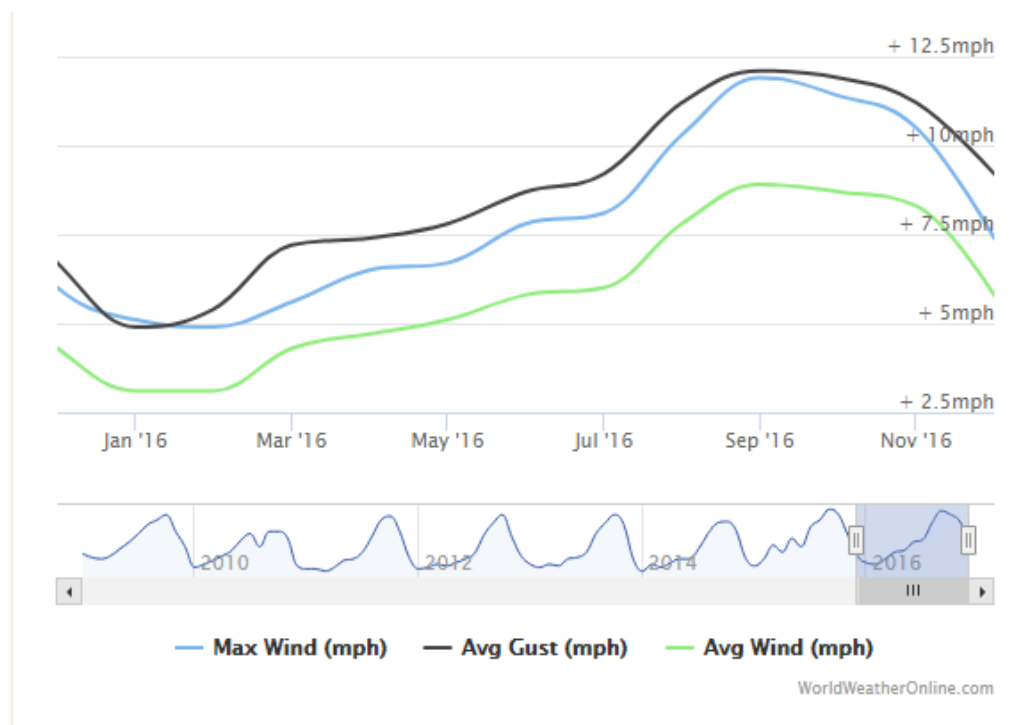


Figure 4.4: Maximum and Average wind speed and wind Gust

Source: <https://www.worldweatheronline.com/dodoma-weatheraverages/dodoma/tz.aspx>;

Humidity

Dodoma experiences persistent desiccating air and low humidity especially during dry seasons. When the sky is very clear, the humidity is 65%.

4.2.3 Climate change

The earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era (Asrar *et al* 2001). At global level, the cause is the natural and artificial (man-made) emissions of greenhouse gases exceeding Earth system thresholds. At local level (Tanzania), the main cause is natural events or increase of human interventions in the environment, which indirectly have been leading to changes in terms of means, extremes, frequency and spatial patterns of temperature, precipitations, wind and visibility (IPCC, 2004).

In Tanzania, climate change is real and its impacts are mainly time and location dependent. In some areas rainfall decrease while other areas, does increase. Among the areas are: Arusha, Tabora, Singida and Iringa in which rainfall has decreased by 7% , 5%, 6% and 5% respectively while in Dodoma, there is a percentage increase of 4%. Floods, food shortage, landslides and land degradation due to rainfall variability are disasters that were not experienced before in many parts of the country, but now have already been realized. For instance, in recent years frequent drought has resulted into electricity rationing which affected all economic sectors. Also drought has accelerated land degradation in dry lands like Shinyanga, Singida, Mara, Dodoma, Iringa and some parts of Kilimanjaro, Tanga, Morogoro and Tabora (Kiunsi, 2002). In general, the operation of the proposed project is likely to be affected by climate change related disasters due to the increase of rainfall amount in Dodoma

region. On the other hand it is likely to be affected by the decrease of rainfall amount that has implication of power.

4.2.4 Topography

The site is plateau sloping towards the South-East. Slight as the general topographical differences are, so is the case for Dodoma region relief in general. The site location is therefore suitable for the construction of the proposed airport as there is no elevated obstacles that could constitute a hazard to air navigation. The predominant obstacles in Dodoma region are high rise buildings which are located at CBD area at about 10km from the site. However, according to Dodoma Municipality master plan, the building height decreases as one goes outside the CBD. This plan favors the presence of the proposed airport at Msalato as it constitutes low rise building. The revision of master plan is about to start of which much consideration on building height restriction especially in the flying and landing zones has already been taken in to account.

4.2.5 Soil and geology

Site observation shows that the nature of the soil is clay-sand soil. The soil is characterized by cohesive clay-silty with good drainage properties. The top thin layer is red-brown and little amounts of organic matter (litter/ humus). The lower strata are red soils well drained that support growth of vegetation. Though the site is flat, the site is not subject to seasonal water logging. In terms of geology, the site (Dodoma region) has been classified to have kimberlitic, sedimentary-cretaceous-tertiary and unconsolidated sedimentary rocks (Fig 4.5).

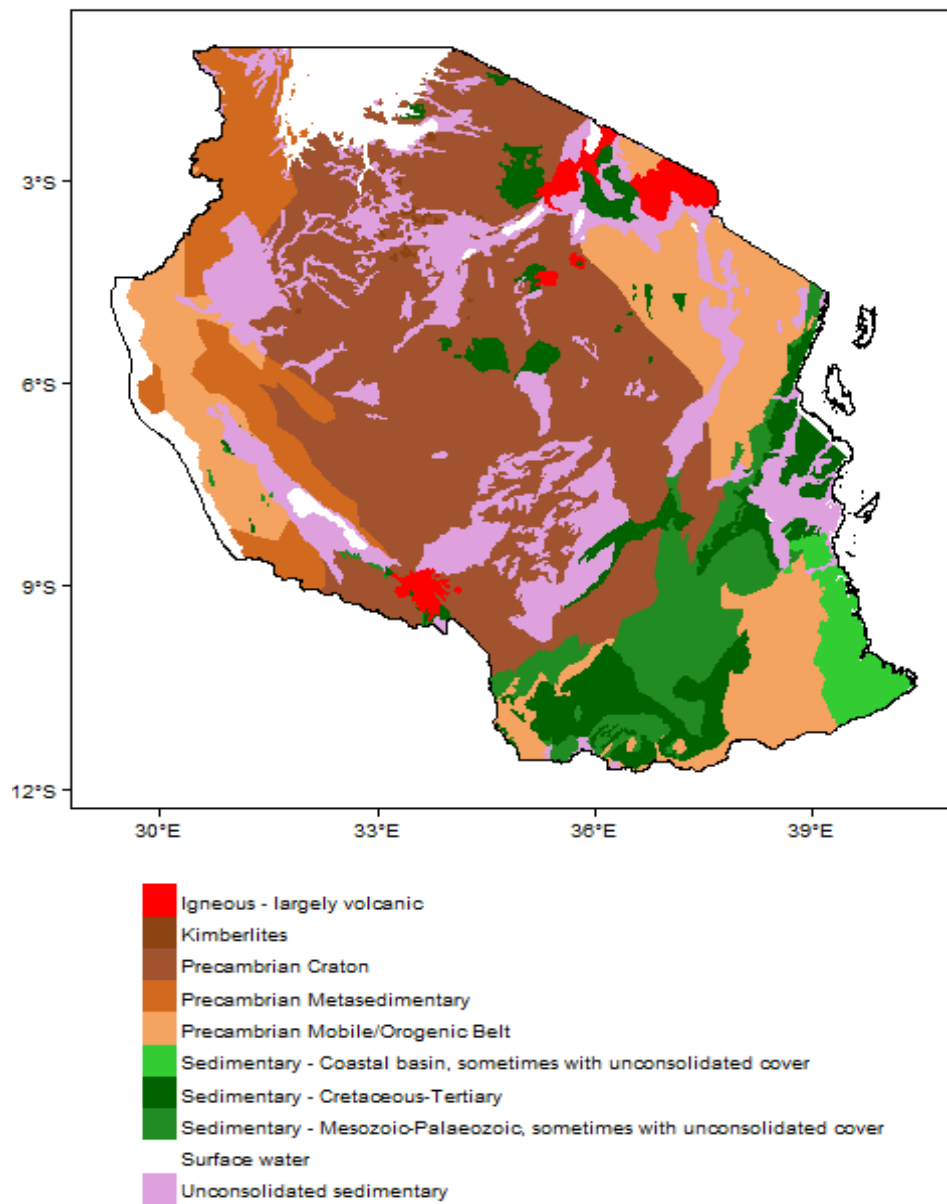


Figure 4.5: Tanzania geological map

4.2.6 Erosion Potential

The proposed site is susceptible to soil erosion by the agent of wind and rainwater. The site experiences a long draught and short rainfall seasons. Due to unreliable rainfall, the area has scanty vegetation such as herbs, grasses as well as conspicuous baobab and acacias trees such that soil becomes prone to erosion due to wind. Construction and operation of the proposed airport will increase potential of soil erosion due to various activities that will increase exposure of soil to erosion by both wind and rainwater runoff. These include site excavation, clearance and quarrying to mention few.

4.2.7 Water Resources and Hydrology

4.2.7.1 Surface and Groundwater Hydrology

The project area has no rivers or wetland areas. The ground water level is usually in excess of 2 meters deep and consequently should present no problem for the airport project. The site is located in flat area away from wetlands and prolific aquifers; the site is not in seismic impact zone and unstable areas; the site has suitable founding conditions with low permeability silty-clay soils and good potential for wind shelter. The area supports dense woody thickets which have low conservation value.

4.2.7.2 Water Supply and Consumption

Dodoma Urban Water Supply & Sewerage Authority (DUWASA) is enhancing the availability in the whole Municipality including the proposed site for airport, Makutupora is the main source of water supply in Dodoma town due to presence of large aquifer with the estimated water quantity of 72,000m³/day, Mzakwe was earmarked as a location of water source from Makutupora basin where nine boreholes were drilled. 30,000m³/day is pumped from Mzakwe source to the Dodoma town.

Another source of water to the town is Ihumbu, which has a capacity of 600m³/day. This source is mainly supply water to the Dodoma university and its surrounding areas. There is also the proposed construction of Farkwa dam at Mombose and Bubutole villages in Chemba district, which is 60 km from the Dodoma town. This source will be supplying water to Dodoma town by gravity and therefore it will save cost in operations of the proposed project.

The water demand was projected to 2034 (designing period of 20 years) and estimated to be 142,000m³/day. The expected quantity of water to be extracted from Farkwa dam will be 170,000m³/day, take into account the water losses of 20%.

The current water supply facilities in Dodoma consist of the following components

- Drinking water production and distribution system
- The Makutupora well fields and collectors' system
- Pumping station facilities at Mzakwe
- Transmission system including booster stations
- The distribution and Reticulation system including reservoirs

Construction of new transmission and distribution mains from Mzakwe to the city centre is now in progress. Two pipes of 600mm and 200mm being laying down passing along Msalato village hardly 200m from the proposed project site.

Current capacity of clean water is 62,000m³/day while the average production in the past five years was 26,000m³/day and the current water demand is 16,000m³/day. Therefore, this show that, there will be enough quantity of water (36,000m³/day) for the proposed Msalato Airport

4.2.7.3 Water Quality

Data on water quality from boreholes and shallow wells was not available to the consultant during the study. Even though, the quality of ground water during the interview with the local

people indicated that groundwater source from Makutopora Basin (Mzakwe area) is not saline and hence it is used for domestic and other municipal uses. However, excessive groundwater extraction may cause land subsidence. The findings on bacteriological water quality which analysed in the laboratory showed that all boreholes are free from Total coliform, E-coli and faecal coliforms.

4.2.7.4 Existing sources of environmental pollutants

Sources of environmental pollutants ranges from air pollution, water pollution, land pollution, noise pollution and visual pollution sources. During ESIA study, the team estimated that about 90% of the proposed site has no settlements where no sources of pollution within the area of influence. With the remaining the 10% passing through the settlements, it was observed that there were no significant sources of pollution. Some of the identified sources of pollutants were mobile air pollutants, sanitation facilities and improper solid waste management.

4.2.8 Air Quality

There are many existing sources of air pollutants like Carbon Monoxide (CO), Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂) and volatile compounds; and particulate matters (dust) found in the proposed project site. The pollutants are classified into stationary sources and fugitive /mobile sources. The typical stationary sources of air pollutants include households that use firewood for cooking and heating. The air pollutants associated with stationary sources include nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), and particulate matter (PM), as well as other air pollutants including certain volatile organic compounds (VOCs). Typical fugitive/mobile sources of pollutants are movements of cars and trucks crossing the area. In general, spatial distribution of sources of air pollutants along/within the proposed site is very small. The proposed project is found in the undeveloped land-forests and bush lands.

In order to determine the baseline air quality at the site, five locations were established. The results for different air quality parameters were as discussed hereunder;

4.2.8.1 Gaseous Emissions

The average measured concentrations of CO, CO₂, NO, H₂S and SO₂, from the named five sampling stations are shown in Table 4.1 below. All the measured parameters were found to be within stipulated local (TBS) and/or international guidelines i.e., WHO Ambient Air Quality Guidelines and thus safe for human health and surrounding environment.

The higher recorded readings for NO were noted at point SP1 that located closed to the project site there was evidence of vehicle movements close to the sampling point and thus the readings are not from any site sources/activities. However, for the other concentration values that show a zero reading does not necessarily indicate the measured gases are absent, but it rather indicates that the levels present (if any) might be below the lowest resolution of the measuring device. On the other hand, zero reading results indicate that the measured parameters are below the pollution limit/thresholds.

Table 4.1: Average values of measured parameters compared with local and/or International standards

Point	Coordinates		Measured Parameters				
			CO ₂	CO	NO	SO ₂	H ₂ S
	Easting	Northings	%	mg/m ³	mg/m ³	mg/m ³	mg/m ³
SP1	0807074	9327589	0.00	0.00	0.06	0.00	0.00
SP2	0807117	9327661	0.00	0.00	0.05	0.00	0.00

SP3	0807246	9327631	0.00	0.00	0.07	0.00	0.00
SP4	0807205	9327871	0.00	0.00	0.01	0.00	0.00
SP5	0807171	9327612					
TBS			-	10	0.12	0.5	
WHO Guideline			-	30	0.12	0.5	

Source :Field Results February, 2018

4.2.8.2 Dust Emissions

The average measured Concentration of PM₁₀ levels were found to range between 13 µg/m³ to 89µg/m³. The highest levels of concentrations were measured at SP 5 while the lowest concentrations were measured at stations SP2 and SP3. The high level of PM₁₀ at SP5 might be due to wind blow dust as the result of absence of trees and vegetation witnessed during the study; this could also be contributing to the increase of particulate matter.

Based on the study results, the average PM₁₀ concentrations measured at most of stations were found to be below the respective standards stipulated by IFS/International and Tanzanian Emission standards (Table 4.2).

Table 4.2: The recorded PM 10 concentrations levels

Point	Coordinate		Average PM10 (micro gram/m ³)
	Easting	Northings	
SP 1	0807074	9327589	18
SP 2	0807117	9327661	13
SP 3	0807246	9327631	13
SP 4	0807205	9327871	15
SP5	0807171	9327612	89
Emissions Limit			60-90
WHO/IFS Standard			50
NAAQS Guideline			150

Source : Field Results, February, 2018

4.2.9 Noise and Vibration Levels

4.2.9.1 Noise level

Noise pollution may be regarded special mainly because personal and subjective judgment is a big part of recognizing a sound as noise pollution or not. In addition, the damage is localized and sporadic in comparison to other types of pollution for example, water and air pollution. The problem of noise pollution is exacerbated by improper land use planning in most of our cities, municipalities, towns and industrial areas. There are evidences suggesting that noise levels can cause various physiological and psychological health problems ranging from annoyance and disturbance to heart diseases. In addition, hearing damage caused by loud noise can be irreversible.

Based on noise measurements taken during the day time at elevation stations, the recorded levels were between 47.1-49.2dB (A). It was noted, however, that the main contributor of the measured noise at the proposed site are ongoing vehicles movement along Dodoma Arusha road.

Tanzania Standard TZS 932:2007 stipulates maximum permissible day and night time noise levels for residential buildings, mixed residential (with some commercial and entertainment and residential and small scale production and commerce. Likewise, the stipulated TBS and IFC/WHO guidelines require noise emission levels of less than 85dBA and 70 dBA in the

working areas. Most of measured noise levels are on the low side as per TBS-NES limits and WHO/IFC guidelines (Table 4.3).

Table 4.3: Average values of measured noise levels compared with the available local and/or international ambient air quality standards and/or guidelines

Sampling Stations	Time	Coordinates		Noise in dBA	TBS-Limit	WHO Guidelines
SP1	Day	0807074	9327589	47.1	55	55
SP2	Day	0807117	9327661	47.6	55	55
SP3	Day	0807246	9327631	47.4	55	55
SP4	Day	0807205	9327871	48.1	55	55
SP5	Day	0807171	9327612	49.2	55	55

Source : Field Results, February, 2018

4.2.9.2 Vibrations

Results show that measured ground vibrations were not more than 0.20 mm/s RMS during the day time. This implies that all onsite and offsite stations found with vibration levels below the prescribed Australian Standard 2187.2-2006 limit of 10mm/s (Table 4.4). It can be concluded that, the area does not experience vibrations to nearby local communities around the project site. Therefore, some efforts should be directed to maintain these lowest values during constructions and operations activities of the proposed project.

Table 4.4: Ambient vibrations measured onsite

Station	Coordinates		Background vibrations(in mm/s)
	Easting	Northing	
SP1	0807074	9327589	0.00mm/s
SP2	0807117	9327661	0.00mm/s
SP3	0807246	9327631	0.20mm/s
SP4	0807205	9327871	0.10mm/s
SP5	0807171	9327612	0.00mm/s

Source: Field Results February, 2018

4.2.10 Seismic Activity

In the project area, there is no any volcanic eruption event that has been reported before. There is no even any volcano signals to erupt in the project area especially along the area of direct influence. The project area is also vulnerable to earthquake as it lies in the lift valley (Fig 4.6). The recent earthquake occurred in 2016 with the magnitude of 5.1 (USGS Page). The biggest magnitude of the earthquake recorded in the regions was 5.5 Magnitude which occurred in 2002 (USGS Page).



Figure 4.6: Lift valley map

Source: USGS

4.3 BIOLOGICAL ENVIRONMENT

4.3.1 Flora

The vegetation in the area consist a mixture of scrub bushes and thickets and a few trees. Also, there are open areas having been cleared for cultivation of millet, sorghum, (*Sorghum purpureosericeum*) sunflower (*Helianthus annuus*) and maize (*Zea mays*)(Fig 4.7).



Figure 4.7: A thorny bush thicket and a scrub bushy vegetation in the project area

Source: Fieldwork, August 2017

The bushes consist of mainly of the thorny sicklebush *Dichrostachys cinerea*, a few shrubs of the type *Euphorbia tirucali* locally known as minyaa, Other vegetation nnoted include sisal (*Agave sisalana*). The extensive Itigi thicket is usually known to contain a variety of thorny shrub species (Fig 4.8).



Figure 4.8: Some thorny bushes of *Acacia* and *Euphorbia tirucalli* (Local: Mnyaa) in the proposed project area

Source: Fieldwork, August 2017

There are also some few scattered trees consisting of *Ficus*, Baobab (*Adansonia digitata*) (Fig 4.9), mango, (*Mangifera indica*) large euphorbia tree (*Euphorbia candelabrum*), *Eucalyptus* species and various species of *acacia*.



Figure 4.9: Big trees baobab and others found in the proposed project area.

Source: Fieldwork, August 2017

Also, there are a number of places forming depressions where water from the catchment collect during rainy season to form temporary swamps which support water loving plants (Fig 4.10). A study at Farqwa dam in Kondoa district, Dodoma, established that the wooded *acacia* surrounding the dam site recorded 27 bird species.



Figure 4.10: An area that gets flooded during rainy season with some characteristic grass

Source: Fieldwork, August 2017

4.3.2 Fauna

Although the area is semi-arid, it has some habitats that can harbor some animals. The reported animals in the area include some small mammals such as hare mice and shrews and some reptiles such as snakes and skinks.

This semi-arid land also is home to reptiles such as snakes and lizards, small mammals including scrub hare, mice and skinks some of which may be preyed upon by large birds such as buzzards. Moreover, the presence of bushes and a few tall trees provide some birds suitable habitats for them to perch (Table 4.5). A variety of birds were observed in the proposed project area including the following:

Table 4.5: Ambient birds at site

Common name	Scientific name
ring necked dove	<i>Streptopelia capicola</i>
house sparrow	<i>Passer domesticus</i>
common bulbul,	<i>Pycnonotus-barbatus</i>
speckled mousebird,	<i>Colius striatus</i>
buzzard	<i>Geranoaetus melanoleucus</i>

In addition, some temporary water logged areas may also be attracting some water loving birds especially during rainy season.

Also, the cultivation of grains including sorghum, sunflower and maize in and around the project area also attracts grain eating birds such as quelea quelea, ring necked dove, house sparrow, common bulbul, speckled mouse bird, eagle and others (Fig 4.11).



Figure 4.11: An eagle and a bird nest spotted in the project area

Source: Fieldwork, August 2017

On the other hand, the proposed quarry site and the surrounding vegetation may be harboring some fauna animals. A study in the rocky hills around Farkwa dam revealed the presence of rock hyrax *Procavia capensis* and others.

4.3.3 The Main Ecosystems and their Services

According to botanical study, the proposed site has a mixture of four (4) ecosystems. All ecosystems provide benefits which are collectively known as services which are important to human survival. They have environmental, ecological, social and economic benefits to the people at local, regional and global level. The ecosystem services are cultivated land, dryland, forest and urban. Table 4.6 shows ecosystem services classified basing on Millennium Ecosystem Assessment approach. These are provisioning services (products people obtain from ecosystems), regulation services (benefits people obtain from the regulation of ecosystem processes), cultural services (Non-material benefits people obtain from ecosystem) and supporting services (services Necessary for the production of all other ecosystem services).

Table 4.6: Main Ecosystem types and their services within the proposed airport site

Ecosystem services		Cultivated	Dryland	Urban	Spatial benefits		
Provisioning	Food	✓			L	R	
	Timber, fuel and fibre, building materials,	✓			L	R	
	Biochemical, natural medicines	✓	✓		L		
Regulating	Biodiversity regulation	✓	✓	✓	L	R	
	Air quality and climate	✓	✓	✓	L	R	G
	Disease regulation		✓	✓	L		
	Detoxification		✓	✓	L		
Cultural	Recreational	✓	✓	✓	L		
	Intellectual development	✓	✓	✓	L		
	Spiritual fulfilment	✓	✓	✓	L		
Supporting	Water recycling	✓	✓	✓	L	R	G
	Nutrient recycling	✓	✓	✓	L		
	Decomposition	✓	✓	✓	L		
	Soil formation	✓	✓	✓	L		
	Primary production	✓	✓	✓	L	R	

Note: L=Local, Regional and Global

Source: Consultant analysis

4.4 GENERAL SOCIOECONOMIC ENVIRONMENT OF PROJECT SITE

The proposed Msalato Airport project is located in three wards of Dodoma municipality which includes Msalato, Nzuguni and Miuji. Three quarter of the project site falls under Msalato ward which has total of three streets includes; Msalato, Senje and Chikole.

4.4.1 Occupation

Most population of the project surrounding community engage themselves in agriculture. Food crops cultivated includes maize, sorghum, bulrush millet, paddy, beans and oil seeds mainly groundnuts, simsim, sunflower and castor, also some of them engage themselves in livestock keeping particularly Cattles and Goats (Fig 4.12).



Figure 4.12: Animal grazing at the project site in Msalato ward. **Source:** Fieldwork, August, 2017

4.4.2 Education

Msalato ward has three primary schools which includes, Msalato Primary school, Stanway Mission and Bwawani primary school. There is also Chikole secondary school, Msalato secondary school and one Bible College which known as Msalato Theological College. Msalato primary and Msalato secondary schools are very close to project site, which will make them vulnerable to noise hazards from the Airport. In general, the level of education in surrounding community is primary school.

4.4.3 Economy

The surrounding community depends mostly on small business. For instance, in every Saturday, there is animal auction. Also women depend mostly on Tomato and other veggie selling. They also depend on beekeeping. During site visit, some few beehives were observed in the proposed project site (Fig 4.13). Honey and beeswax has for long time been known to traditional beekeepers in Msalato ward. Near all the beehives are of traditional design which tied on a tree.



Figure 4.13: Honey Harvesting **Source:** Fieldwork, August, 2017

4.4.4 Health

Msalato community has two health centers which include 673 KJ Msalato and Magereza Msalato health center which owned by Tanzania Prison. According to the local leaders around the project area, it would be better if more health center could be added in their society due to rapidly growth of the population during and after project construction.

4.4.5 Housing and Housing Pattern

Msalato ward is characterized by single storey buildings. Most of the houses are made of sand and iron steel. Few of them are of medium standards (Fig 4.14). Housing/settlement is characterized by three main patterns. The hamlets/villages are dominated by a nucleated settlement pattern in which a lot of buildings are clustered together. Some have dispersed settlement patterns in which the buildings are spread out. However, others have a linear settlement pattern in which the buildings are built in lines and are often found along the roads.



Figure 4.14: House type at the project site community **Source:** Fieldwork, August, 2017

4.4.6 Neighboring area

The proposed site is located away from the Dodoma Business District of about 10km. The proposed land use of this plot was earmarked as airport area. The neighboring areas are villages, farms and large part of bush land. The site is bordered by residential buildings of low rise. The unavailability of grass suitable for thatching, people in the region developed an intricate structure of housing type roofed with sticks and clay supported inside by poles placed asymmetrically, the *tembe*.

4.4.7 Special populations or areas more likely to be exposed to adverse impacts

The proposed site for airport project crosses the areas with human settlements and the areas without settlements. The areas where special population groups are more likely to experience impacts are those where the project area crosses the human settlements. Special population groups likely to be more exposed to adverse impacts include children, elders and petty business dealers. The potential impacts during construction and operation include: noise and dust from construction activities and vehicles transporting construction materials. During operation phase, noise is expected from the flying and landing of aircrafts of which the identified population groups will be vulnerable to the effects of noise pollution. Another impact to be experienced by the vulnerable population during operation phase includes frequent traffic movements.

4.5 Socio-Demographic Profile of PAPs

Survey study collected Socio-demographic data using a sample sample of **1230 PAPs**.

4.5.1 Sex Composition of PAPs

Census survey revealed that PAPs are mainly small scale farmers with limited sources of income and low levels of education. Data in **Table 4.7** shows that PAPs are more or less evenly distributed between male and female.

Table 4.7: Sex Composition of PAPs

Sex	Dodoma City Council	%
Male	674	55
Female	556	45
Total	1230	100

(Source: socio-economic survey, 2018)

4.5.2 Educational Status of PAPs

Data in **table 4.8** indicates that generally PAPs have low educational attainment levels. About 19% of PAPs are illiterate and do not know how to read and write while about 36% have attained only primary school education.

Table 4.8: Levels of Education of PAPs Project area

Education Status	Dodoma City Council	%
Illiterate	233	19.%
Primary Schooling	282	23%
Primary School level	369	30.1%
Secondary Schooling	185	15.1%
Secondary School level	90	7.3%
Higher Secondary Schooling	23	1.8%
Higher Secondary School level	22	1.7%
Graduate	10	0.8%
Post Graduate	8	0.6%
Technical	8	0.6%
Total	1230	100

(Source: socio-economic survey, 2018)

4.5.3 Age Categories of PAPs

Census survey of PAPs shows that there is a significantly high age dependency ratio. About 46% of all PAPs are children (1-17 years of age) and the elderly (over 65 years old). Age-wise this data indicates a high possibility of vulnerability among PAPs because of age factor (**Table 4.9**).

Table 4.9: Age Categories of PAPS by Project Area

Age Categories	Dodoma City council	%
1-5	230	18.6
6-17	275	22.3
18-24	326	26.5
25-44	184	14.9
45-64	154	12.5
>65	61	5.2
Total	1230	100

(Source: socio-economic survey, 2018)

4.6 Socio Profile of Affected Households

The overall results from the survey show that affected households have generally low socio-economic profiles.

4.6.1 Type of Household (male and female headed households)

Male-headed households are the majority among the PAPs while 18% of all households are female-headed and 1% is child-headed (**Table 4.10**). This has significant poverty taking into consideration that female and child-headed households are often associated with high levels of poverty. The female and child-headed households are thus likely to face greater degrees of vulnerability because of social and economic dislocations brought about by the project.

Table 4.10: Type of Households by Project area

Type of Household	Total	%
Male Headed	680	79
Female Headed	113	13
Child headed	10	1
Others	57	7
Total	860	100

(Source: socio-economic survey, 2018)

4.6.2 Type of Family Structure

Table 4.11 indicated that 87.9% of all households are extended families which imply significantly higher social and economic burdens and challenges even under normal circumstances. However this may depend on the nature and capacity of the extended family members to support each other because of potential socio-economic impacts that might arise from land acquisition to pave way for the project.

Table 4.11: Types of family in the Project Area

Type of Family	Total	%
Extended	756	87.9
Nuclear	104	12.1
Total	860	100

(Source: socio-economic survey, 2018)

4.6.3 Distances from Social Service Facility

Most of the PAPs live within fairly long distances from social service facilities such as health, primary and secondary schools with some variations between the project airport and between the facilities. For example large percentage 51% of PAPs live between 1km and 2Km from health centers, primary and secondary schools and access to tap water (**Table 4.12**).

Table 4.12: Distances from Social Service Facility

Type of Facility	0.5 -1 KM	1-2 KM	> 2KM
Primary School	179	54	49
Secondary School	124	94	42
Health Facility	140	160	37
Tap Water	16	70	58
Total	459	378	186

(Source: socio-economic survey, 2018)

4.6.4 Gender Issues

Low levels of education, lack of ownership of property, limited decision-making powers in the households, pre-occupation with household chores are among the factors linking women with low socio-economic status in the households and families generally in Tanzania. This study focused on women decision making authority in the households.

Data in **table 4.13** shows that women do have substantial decision making powers regarding issues deemed important in the households. Out of all the PAPs only 95 women were willing and able to freely disclose their participation in decision making within their homes, the remaining did not take part in making major decisions within their homesteads. However, some of the family decisions that

women are able to fully participate include but not limited to; Child healthcare and education, day to day activities, social functions, money matters and purchase of assets.

Table 4.13: Women decision making powers in household matters

Decision on:	Total
Financial Matter	89
Education of child	94
Healthcare of Child	95
Purchase of Assets	94
Day to Day Activities	94
Social Functions	85
Others	298
Total	580

(Source: socio-economic survey, 2018)

4.6.5 Occupational status of PAPs

The main occupation for the majority of PAPs is farming (crop cultivation). However, a significant proportion (26.3%) of all PAPs indicated that they are unemployed (**Table 4.14**). The employment status reveals another social and economic vulnerability for the PAPs to be able to cope with challenges that might arise from project impact.

Table 4.14: PAPs Occupations status

Type of Occupation	Dodoma Council	City	%
Farming (crop cultivation)	551		44.7
Unemployed	274		22.4
Agricultural labourer	128		10.5
Self Employed	59		4.8
House wife	45		3.7
Pastoralist	48		3.9
Daily Wage Earner	30		2.4
Public Sector/ Government Salaried	22		1.7
Private Sector	21		1.7
Pensioner	5		0.4
Other	47		3.8
Total	1230		100

(Source: socio-economic survey, 2018)

4.7 Economic Profile of PAPs

4.7.1 Sources of Household Income of PAPs

Majority of PAPs have more than one income to meet their basic livelihood requirements. The main sources of income are agriculture (64%). This is followed by livestock (22%) as shown in **table 4.15**.

Table 4.15: Sources of Households Income by Project Area

Source of Income	Dodoma Council	City	%
Agriculture	601		64%
Livestock	206		22%
Formal Employment	43		4%
Self Employment	59		6%
Rent, interest	14		1%
Other	30		3%
Total	953		100

4.7.2 Average Monthly Income of PAPs

Heads of affected households were asked about average monthly income of members of households from all sources of income. About 75% of PAPs earn up to TShs 300,000 per month (**Table 4.16**). Therefore majority of PAPs are poor in economic terms and with the household sizes coupled with inflation this level of income is even far from adequate.

Table 4.16: Estimated PAPs Household Monthly Income

Income Categories	Dodoma City Council	%
100,000-300,000	642	74.6%
300,001-500,000	87	10.1%
500,001-600,000	32	3.8%
600,001-1,200,000	70	8.2%
1,200,001 & above	29	3.3%
Total	860	100

(Source: socio-economic survey, 2018)

4.7.3 Nature and Types of Assets and PAPs

The nature and types of assets affected in the proposed project include:

- Land, buildings and surrounding trees and plantations
- Land, trees and plantations
- Trees and plantations
- Land only

Table 4.17: PAPs and type of Assets

Name of ward (in which project Passes)	No. of Households with building/structure Affected
Msalato	172
Nzuguni	69
Miyuji	0
Total	241

(Source: socio-economic survey, 2018)

4.7.4 Type of assets owned

The most commonly owned assets are radio, mobile phones and bicycles as shown in **table 4.18**, which is indicative of typical poor social and economic conditions of most rural people in the country.

Table 4.18: PAPs asset ownership

Asset Owned	Number of Owners
2-Wheeler	27
4-Weeler	5
Cooking Gas	9
Bicycles	87
Motor bicycles	26
Hand Cart	9
Radio	278
Refrigerator	9
Cars	8
Mobile phone	426

Television	18
Total	902

(Source: socio-economic survey, 2018)

4.7.5 Building Structures

The affected building structures are generally residential units mainly made of mud-pole walling and thatch-roofing construction and few with concrete blocks. The mud-wall-thatch-roof structures account for **32%**, mud-wall-CIS-roof account for **38%**, and remaining **30%** are brick-wall structures. Few of these structures have retail business room outlets. The business outlets are in all cases owned by the house owners.

4.7.6 Land, Trees and Plantations

A various trees and plantation on the entire project airport that will be affected are given in **Table 4.17**. The trees and plantation are of diverse types and common trees and plantation affected are 539. However, the seasonal crops such as cassava, paddy, maize etc were not included in the compensation since PAPs can be allowed to harvest before commencement of the construction.

4.7.7 Impact on Socially Vulnerable Groups

Results of the survey indicate that 68 PAPs can be categorized as being vulnerable (**Table 4.19**). Major vulnerability indicators are:

- PAPs who are below the poverty line;
- Female-headed households; and
- Child-headed households and the elderly.

Table 4.19: Vulnerability status of the PAPs of Affected Households

Type of Household	Dodoma District Council	
	Fr	%
HH earning under USD(\$1 per day	549	92
Female-Headed (incl. widows)	48	7
Child-Headed	3	1
Total	600	100

(Source: socio-economic survey, 2018)

4.7.8 Community Property

Census identified that there is one community dispensary and one primary school that will be affected (**Table 4.20**). In addition, some public utilities such as electric poles and water pipes and wells will have to be relocated. Also there 9 graves along the project will be affected

Table 4.20: Community Property Resources Affected

Type of Community Structure	Total
Msalato dispensary	1
Mahomanyika Primary School	1

4.8 Dodoma Municipal Council Socio-economic synopsis

4.8.1 Administration and history

Dodoma Municipality is administratively divided into 4 divisions, 30 wards, 40 villages and 70 mitaa. The Municipality is represented by two members of parliament, one being elected

and the other obtained from special seats reserved for women, and by virtue of their positions they are also councilors.

Dodoma region was established in 1963 consisting of three rural districts and one Township Authority (Dodoma), then. Currently Dodoma region comprises seven districts: Bahi, Chamwino, Mpwapwa, Kongwa, Kondoa, Chemba, Dodoma urban (municipality). Covering an area of 41,310 sq. km equivalent to 5% of the total area of Tanzania it is the 12th largest in the country and with a population of 2,083,588 (2012 census), ranked the 8th in terms of population size of the 26 regions of mainland Tanzania.

Dodoma is a semiarid region with a total annual rainfall of 400mm to 600mm, mostly falling in a single rainy season from December to April. The history of the Dodoma region has been described as one punctuated by seasons, it is a history almost rhythmic in its ups and downs, periods of fat and lean years, marked by extraordinary endurance. The dominating influence of the climate on life in the region is the uncertainty; when rain fell evenly and plentifully, food was in abundance and the living good. In normal years, the rainy season starts in mid December until mid April, but in one in every five years it is prone to fail completely making the region one of the poorest areas in Tanzania. The local people's response to the natural environment was, "...adaptation for survival, which stresses agro-pastoralism and social and geographical mobility in the face of the variability of agricultural production in this environment, defines the Gogo people more than anything else" (Maddox, 1996:43). A proponent of the potentiality of the region has written, the point is that with good leadership and mobilisation of resources Dodoma can be improved greatly; it is better endowed than many people tend to think" (Mvungi, 1990:103).

4.8.2 Population

The current projected population is 462,968 based on the population and Housing census of 2002. The total number of House hold is 76,112 with an average population growth rate of 3.3 (Table 4.6).

Table 4.21: *Dodoma Municipal Council Population*

SN	WARD/ SHEHIA	TOTAL	MALE	FEMALE
0	Total	410,956	199,487	211,469
1	Viwandani	4,883	2,437	2,446
2	Uhuru	2,419	1,229	1,190
3	Chamwino	19,175	9,063	10,112
4	Kiwanja/ndege	10,129	4,629	5,500
5	Makole	10,504	4,953	5,551
6	Miyuji	14,965	7,187	7,778
7	Msalato	6,718	3,356	3,362
8	Makutupora	14,430	7,762	6,668
9	Chihanga	11,004	5,366	5,638
10	Hombolo	22,457	10,845	11,612
11	Ipala	6,026	2,903	3,123
12	Nzuguni	15,466	7,412	8,054
13	Dodoma Makulu	17,097	8,219	8,878
14	Mtumba	17,268	8,440	8,828
15	Kikombo	8,343	4,025	4,318
16	Ng'hong'honha	9,536	4,513	5,023
17	Mpunguzi	17,891	8,650	9,241
18	Tambukareli	6,584	3,222	3,362
19	Kilimani	6,471	3,137	3,334
20	Kikuyu-Kusini	5,974	2,724	3,250

21	Kikuyu-Kaskazini	9,852	4,814	5,038
22	Mkonze	12,515	6,134	6,381
23	Mbabala	11,901	5,683	6,218
24	Zuzu	6,485	3,103	3,382
25	Hazina	9,540	5,182	4,358
26	Madukani	2,421	1,101	1,320
27	Majengo	5,214	2,531	2,683
28	Kizota	34,453	16,506	17,947
29	Nala	5,567	2,735	2,832
30	Mbalawala	8,830	4,204	4,626
31	Ntyuka	4,558	2,165	2,393
32	Chigongwe	7,281	3,447	3,834
33	Chang'ombe	25,415	12,583	12,832
34	Iyumbu	2,700	1,332	1,368
35	Chahwa	4,365	2,092	2,273
36	Mnadani	14,373	7,087	7,286
37	Ipagala	18,146	8,716	9,430

Source: Dodoma Municipal council socio-economic profile

4.8.3 Economy

About **75%** of the Municipal income comes from agriculture and animal husbandry. 25% of the population is engaged in petty Businesses such as retail shops, carpentry and food venders. Other activities include small and medium industries, consultancy and construction work. Main industrial products are wine, mattress and packed water. From forestry, there are honey, wax and herbs.

4.8.4 Land Use

Most of the land in the District is used for subsistence agriculture grazing and forest reserve. The District has the roads which are accessible in all year round. However, in some few areas accessibility is difficult during rainy season. About 70% of the total area (196,000 hectares) is suitable for agricultural production. The estimated area for food crop production is 107,249 hectares and about 49,304 hectares are for cash crops production. The rest of the land is subdivided into grazing land (44,028 hectares), forest reserves (30,046 hectares), Public Land (11,362 hectares) and urban area covers 38011 hectares.

4.8.5 Social Services Provided by Dodoma Municipal Council

4.8.5.1 Education

(a) Pre-Primary Education

Dodoma Municipal Council has 91 pre-primary classrooms, among which 79 are owned by the government, and 12 are owned by religious institutions and private organizations. Pre-Primary classrooms have 4,412 Pupils. Table 4.22 below shows sex distribution for public and private owned Primary Schools.

Table 4.22: Pre-Primary school's enrolment

S/NO	Institutions	Number of pupils		Total
		Boys	Girls	
1	Public/Government owned	1,594	1,824	3,418
2	Religious/ Private owned	420	574	994
	Total	2,014	2,398	4,412

Source: Dodoma Economic Profile

(b) Primary Education

Dodoma Municipal Council has 104 primary schools and 71,381 pupils. Among them 67,064 are public owned schools' pupils and 4,317 are private owned schools' pupils. Tables 4.23 and 4.24 below show number of pupils and teachers by sex for public and private owned schools as well as buildings and furniture.

Table 4.23: Primary school's enrolment

S/NO	Institutions	Number of Pupils		Total
		Boys	Girls	
1	Public/Government owned	33,439	33,605	67,064
2	Religious/ Private owned	2,109	2,208	4,317
	Total	35,568	35,813	71,381

Source: Dodoma Economic Profile

Table 4.24: Number of Teachers

S/NO	Institutions	Number of Teachers		Total
		Male	Female	
1	Public/Government owned	381	1,102	1,483
2	Religious/ Private owned	96	84	180
	Total	477	1,186	1,663

Source: Dodoma Economic Profile

Table 4.25: Building and furniture's

S/NO	Areas of Improvement	Quantity required	Quantity available	Percentage
1	Classrooms	1,552	1,102	71
2	Teachers houses	785	149	19
3	Desks	18,628	12,457	67
4	Latrine holes	2,661	1,623	61

Source: Dodoma Economic Profile

(c) Secondary Education

Dodoma Municipal Council has 52 secondary schools of which 36 are public and 16 private schools. 3 secondary schools among 36 public secondary schools are boarding and the rest are day schools (**boarding secondary schools** Bihawana - 395 Students, Dodoma Secondary School - 290 Students and Msalato Girls Secondary School – 693 Students). There are 22,668 students whereby 11,563 are Boys and 11,105 Girls. The table 4.26 below shows sex distribution for Public and Private Owned schools.

Table 4.26: Secondary Schools enrolment

S/NO	Institutions	Number of Students	Total
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		Boys	Girls	
1	Public/Government owned	8,547	7,889	16,436
2	Religious/ Private owned	3,016	3,216	6,232
	Total	11,563	11,105	22,668

Source: Dodoma Economic Profile

There are 521 Public/Government Secondary School Teachers whereby 270 are Male and 551 Female. Private Secondary Schools have the total of 224 Teachers whereby 195 are Male and 29 Female.

(d) **Special Education**

The Council has 8 centers for pupils with disabilities. These centers include Mpunguzi, Nala, Mlezi, Kaloleni, Hombolo, Chinangali, Dodoma Viziwi and Miyuji Cheshire with total of 461 pupils. The table below shows Pupils with disabilities by sex.

Table 4.27: Disability Centres Enrolment

S/NO	Type of Disability	Number of Pupils		Total
		Boys	Girls	
1	Blind	12	16	28
2	Deaf	41	43	84
3	Blind and Deaf	6	4	10
4	Disable	75	73	148
5	Brain	55	48	103
6	Otism	12	6	18
7	Multiple Disability	12	5	17
8	Other Disability	23	20	43
	Total:	236	215	451

Source: Dodoma Economic Profile

4.8.6 Health

Dodoma Municipal Council has 3 Hospitals, 2 of which are owned by the Government and 1 hospital owned by the Religious Institution. There are 5 health centers, 3 owned by the Council and 2 are privately owned.

However, there are 48 Dispensaries, 23 owned by the government, 15 belong to religious institutions and 10 are privately run. Dodoma Regional Hospital (General Hospital) serves as Dodoma Municipal Council Hospital because the district does not have a Hospital of its own, this leads to overcrowding of patients at the region hospital. Effort is being made in this financial year 2009/10 to construct a District Hospital to solve this problem, preliminarily acquisition of land estimated at 8 hectares and special request in 2009/10 budget worth 13 billion has been submitted.

As far as health is concerned, Dodoma urban district has 10 frequently occurring diseases as listed below

- Malaria
- Acute respiratory infection(ARI)
- Pneumonia
- Diarrhea
- Skin diseases
- Sexually transmitted diseases (HIV and AIDS)
- Anemia

- Eye diseases
- Asthma
- Pregnancy complications

4.8.7 Agriculture and Livestock

The District has 67 extension officers positioned in different 30 wards of the municipality. These officers attend more than 54,812 agricultural households within their respective wards. Extension officers are argued to put more emphasis in initiating groups of farmers and livestock keepers instead of individuals, so as to enhance, the delivery of knowledge/new and better skills to more farmers, livestock farmers within a short period of time as compared to individuals. Also this approach provides room for peer education among the farmers themselves. About 42,722 farmers have been imparted with knowledge on appropriate techniques of crop production.

4.8.8 Cooperative Societies

Establishment of SACCOS is on progress and positive results have been achieved, of which new 12 SACCOs have been recently registered including 7 at the ward level. This makes the total number of SACCOS to be 42 within the Municipality.

4.9Transport

4.9.1 Roads

Dodoma Municipality has a total of 526.4 kilometers of road in which 45.6 km (8.7%) are tarmac, 62 km (11.8%) are gravel and 418.8 km (79.5%) are earth roads. Dodoma is on a major highway connected with the former capital of Dar es Salaam via the Morogoro region in the east. However, the proposed new Msalato airport can be accessed by the legendary Great North Road (Cape to Cairo) that links the Municipality with Arusha to the north, via Kondoia. To the west of Dodoma Municipality, there are roads to Mwanza via Shinyanga and Kigoma through Tabora. The Municipality is also served by the Central railway line which connects it over a distance of 465 kilometres (289 miles) with Dar es Salaam in the east.

Today Dodoma also is the nation's central meeting point in terms of road network. A trunk road (the Morogoro-Dodoma section built in 1980 with Brazilian funding) connects Dodoma with Dar es Salaam on the east coast. And to the west are roads to Kigoma through Tabora, and north to Mwanza on the southern shore of Lake Victoria. This is in addition to the central railway running from east to west which passes through Dodoma. The Great North Road – also known as Cape to Cairo also passes through Dodoma, hence linked Kenya to the north and Zambia and Malawi to the south (Figure 4.28).

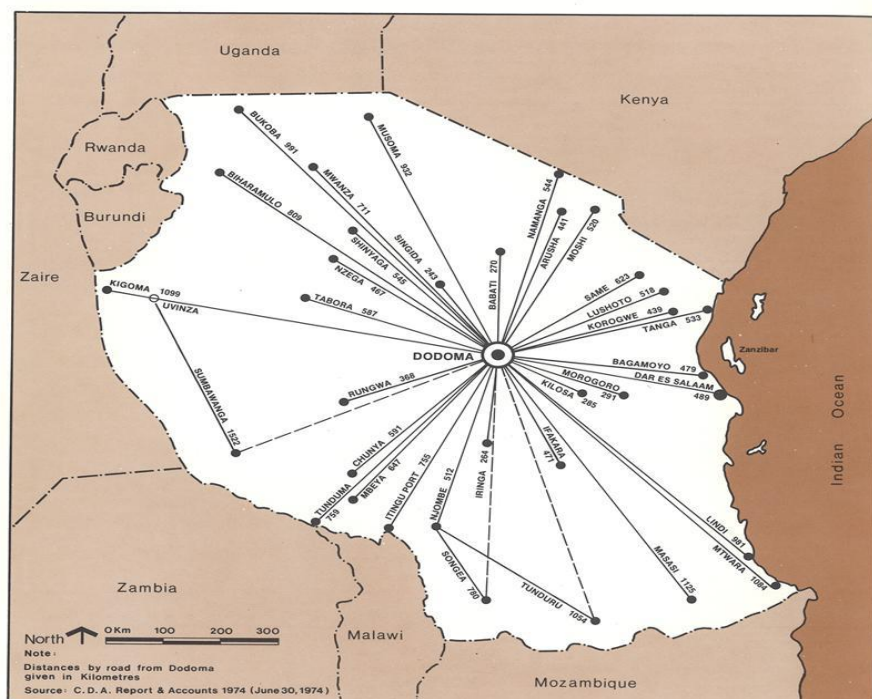


Figure 4.15: Road connectivity via Dodoma

4.9.2 Railway

Dodoma can be reached from Dar-es-Salaam by the Central Railway line to Tabora, Mwanza, Kigoma and to the neighbouring countries. This creates opportunities for investment in godowns, storage, yards for cargo as alternative cargo transit point for the goods destined to inland regions and countries beyond.

4.9.3 Airport

The current Dodoma airport located in the core of the city, in a highly consolidated residential area which makes it impossible to expand airport facilities. Hence, it is neither economically beneficial or commercially viable. Thus the proposed airport site has several advantages over others such as potential effects on landscape and visual amenity. The terminal to handle extra passenger growth is far from congested of motor way links and other major developments of the Municipality.

The location of the proposed site was carefully selected since the new capital was conceived to be both convenient to the new capital and to minimize the effect of aircraft noise. Uses to be permitted in the new airport include restaurants, offices, light industrial and storage buildings, but no residential uses, other than those considered essential for specialized key staff such as police, health and fire services. Building height and other zoning restrictions are to be applied to the area around the airport, based upon international navigational safety requirements and noise standards.

4.10 Wastewater Management

Dodoma town has different types of wastewater treatment and management and the most dominant wastewater disposal is on-site sanitation which comprise of pit latrine and septic tank system with associated soak pits and French drains for the area with high water table. About 70% of the wastewater disposal use these technologies and the remaining 30% comprise of central sewerage system.

The wastewater carried with a central sewer has a final destination at Swaswa oxidation ponds. There are 4 ponds arranged in series from one (1) Anaerobic pond, two (2) Facultative pond and one (1) Maturation pond.

Dodoma Urban Water supply and Sanitation Authority (DUWASA) has a plan to construct a new oxidation ponds (9 ponds) at Nzuguni area which will cover the large part of wastewater disposal.

CHAPTER FIVE

5.0 PROJECT ALTERNATIVES CONSIDERED AND COMPARISON OF ALTERNATIVES

The key strength of EIA is that it identifies and assesses alternative options for the proposed project. One of the objectives of the EIA is to consider the ‘status quo’, ‘do nothing’ or ‘No project’ alternative, as it provides the benchmark for comparison of the other alternatives.

Consideration of project alternatives is crucial in ensuring that the developer and decision-makers have a wider base from which they can choose the most appropriate option. In this report and the EIA in general, the following alternatives are considered and will be examined in detail during the EIA process:

- The Do-Nothing or No project alternatives
- Alternative site
- Design alternatives
- Energy alternatives

5.1 No project alternative

The no project alternative entails retaining the current status quo (No construction of the new airport). Adopting this option would mean avoiding most of the negative effects associated with the presence of the airport and missing all the positive benefits such as benefits to communities resulting from employment during and after construction a new airport and increased revenue to the company, Municipality and Country as a whole. A “no-project” option will not let the expected benefits from the proposed project accrue to Tanzania.

Non-construction of Msalato International Airport “without project scenario”, all demand for air transport will be directed to the current Dodoma Airport until it reaches saturation. Since the maximum capacity of Dodoma airport cannot exceed 50,000 pax per year, saturation will be reached in 2023. Given the absence of competition, as the state is the only possible developer of an airport infrastructure project, all the surplus of potential users of air transport will fall back on other modes of transport, in our case the ground transportation, with all that it implies as a waste of time for national and international passengers.

On the other hand, building the new Msalato airport would not only help meeting the demand for air transport to Dodoma and reduce passenger transport time, but would also generate additional aeronautical and non- aeronautical revenue and help postponing part of the investment planned for Dar Salam Airport by redirecting a portion of the passengers in transit to Msalato Airport. To be noted that apart from its direct impact on the air transport supply available in Dodoma, preventing the capital from accommodating growing demand for air transport services by denying it additional airport capacity may have a negative impact on the economic development of the region .Table 5.1 summarizes the main assumptions used for the "with project" and "without project" scenarios.

Table 5.1: Project scenarios assumptions

Traffic and economic growth scenario	Without project	With Project
	Low scenario	High scenario
Air transport supply available in Dodoma	capped at 50 000 pax per year	1 500 000 pax per year in 2023
Satisfied air transport demand	Partial, the surplus would switch to ground transportation modes	100%
550 000 m ² strategically located in the center of Dodoma (current airport)	not available	available
Dar Salam expansion phase 2	to be executed on schedule	Could be partially postponed for 5 years

Source: Feasibility study by International STUDI

5.2 Alternative Site

The option of using another site (like the other TAA land in Dodoma) apart from that of the proposed one was also considered. However, the proposed site was observed to have the following advantages over others;

- The plot is large and owned by TAA, (No need to buy a new piece of land).
- Residence who were given land for cultivation within project boundaries have been compensated.
- The plot is located on a favorable piece of land; for such kind of development.
- The proposed plot is the centre and it has been earmarked as the potential re-filling station of the international flights across Tanzania and east Africa by Aviation routes system.
- Location is good due to the road network and easy access to public transportation

5.3 Design Alternative

The project shall involve construction of International Airport on the proposed site. This is the appropriate design given the nature of the use and the available space. Also, the Tanzania Airport Authority has earmarked the site as the Airport development plot since 1976.

5.4 Energy Alternative

The use of other alternative energy sources apart from power from the National grid and diesel generators were considered. As it is the case in most of developing countries, supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern. On the other hand, diesel generators, which are mainly used during power interruptions, emit many greenhouse gases especially when they are run for a long time. Solar energy was considered and the design team shall explore the feasibility of using this alternative.

5.5 Waste Water Management Alternatives

Alternative one: Use of stabilization ponds/lagoons

This refers to the use of a series of ponds/lagoons, which allow several biological processes to take place, before the water is released back to the water body. Speaking of space this method

requires a large field for natural treatment to take place, which is not economic to this project. Furthermore, lagoons will present vulnerable situations due to tress passers and birds/wildlife which affect aviation. They are usually a nuisance to the public because of smell from the lagoons/ponds. However, the option has very low annual operation cost except for occasional desludging (once in five or more years) which demands relatively huge amount of money. Approximately Tshs. 5.0 million will spent annually for operation of the ponds based on cost for hiring a labour services.

Alternative two: Wastewater treatment plant

About 1.920m³ of wastewater will be produced per day. This option operates on chemical additions to treat effluent to acceptable levels before discharging the water into the open environment. This process is expensive and requires vigilant attention and use of substantial amount of space hence not feasible in this project. About T Shs. 200,000/=–300,000/= per day will be required for meeting treatment cost.

Alternative three: Constructed wetland

Constructed wetlands are engineered system designed and constructed to copy natural processes taking place in the natural wetlands. Constructed wetlands remove pollutants in wastewater through the combination of physical, biological and chemical processes. They are either subsurface flow where the flow is below the surface of soil or surface flow where the flow of wastewater is above the soil. This alternative is feasible compared to waste stabilization ponds /lagoons given the space available for the proposed project. The operation cost is about Tshs. 1,000,000/= per year.

Alternative four: Use of septic tank and soak pit

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is less expensive to construct though regular emptying in large discharge points is required. Also, septic tanks and soak pits demand little space compared to other options. The construction cost is estimated at TShs. 9.0 Million while the operation cost is about 300,000/= per annum.

Alternative five: Discharge direct to the sewer system

The site is not surrounded by sewer line. This is not feasible at the moment since there is no municipal sewerage system in Msalato area. However, when the sewer will be constructed, this option will offer the least cost and more robust option for managing wastewater from Msalato airport.

Conclusion: Alternative three and four were thought to be the best alternative solution to wastewater management from the airport. They are simple to implement and can make bird/wildlife control easier. Septic tanks and soak pits are usually closed and constructed wetland occupy small area that can easily fenced and fully covered.

CHAPTER SIX

POTENTIAL IMPACTS OF THE PROJECT

6.1 Introduction

Identifying the consequences of a project on its environment is the key step in any environmental and social assessment. These consequences, more usually known as impacts, are deduced from the overlay analysis of the project content, both during the construction and operation phases, and the components of the affected domains or environments. This chapter presents;

- i. Identification of the foreseeable, direct and indirect impacts of the project on the components of its environment, both for the human and natural aspects. The process of impact identification was done in each phase of the proposed project by using matrix method. All adverse environmental impacts that will arise from the anticipated Msalato international airport construction were identified
- ii. The evaluation of the intensity of the identified impacts, basically done on a qualitative criteria.

The affected fields or mediums were divided into two groups:

- natural environment (Biophysical environment)
- the human and socio-economic environment that will bring together questions of perceptions, health, safety, of quality of life.

6.2 Potential impacts during the preparatory phase (Site selection and design)

6.2.1 Land acquisition and population displacement

Site acquisition presents the overarching impacts of the presence of the project on the general natural settings at the project area. Land acquisition is the integral part of this project. Within the land required for the proposed construction of Msalato airport there are natural features of ecological value that will be disturbed/cleared. Also, the land is owned by different individuals who need to be compensated.

The census surveys and consultations conducted between late July and August 2018 to 860 households revealed that there were affected assets and households. A total of 1806 persons in three wards (Msalato, Nzuguni and Miyuji) were identified as having properties (such as buildings, land, tree and plantation that will be affected because of the airport construction project (Table 6.1). A total of 241 structures are affected by the project of which are fully completed. The various uses of the affected completed structures are for residents

Table 6.1: Number of PAPs along the airport ward wise

S/N	NAME OF WARD	-x-* OF PAPs
1	Msalato	426
2	Nzuguni	969
3	Miyuji	411

(Source: Socio-economic survey, 2018)

6.2.2 Disruption of economic and social activities and services

The proposed Msalato airport has been used by indigenous people for cultivation, livestock keeping and beekeeping, to mention few. Land acquisition for the proposed project will force indigenous people to find another areas to get similar services.

6.2.3 Impacts on the cultural, archaeological and historical heritage

Impact to cultural heritage from the proposed airport work could be moderate in magnitude but limited in scope. The construction of airport facilities could unintentionally be sited on sites of significant historical/cultural importance (such unmarked grave/tombs and idols for worship or shrines) to families within the beneficiary communities. This impact is local, long term and of medium negative impact to indigenous people at Msalato area.

6.2.4 Exploitation of borrow pits/quarries and other natural resources

Extractions of construction materials from both authorized borrow pits and quarries on government land, communal land and on private-owned land are associated with rampant degradation at points of source with no efforts of restoration/re-vegetation. Most exploited borrow pits are found on communal land of natural forests and woodlands or planted trees which have been cleared/disturbed. Pollution risks include sediment overload to water bodies during rains and contamination by oils from excavators/loaders. This impact will be localized, long term and moderate

6.2.4 Contamination and /Impaired Quality of Receiving Body – Land and Water

Main sources of construction waste are cleared vegetation and top soil (overburden) and domestic waste from quarries. During quarrying activities, various type of wastes will be generated including solid and liquid wastes. The wastes may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies. This impact will be localized and weak.

6.2.5 Impairment of Local Air Quality and contribution to climate change

Air pollution by gaseous emissions from various sources is an issue for consideration during design stage particularly in the choice of technologies and practices to be used under the project. Sources of air pollution during construction phases of the project will be gaseous emissions such as CO₂, NO_x, SO_x, particulate matters and hydrocarbons from fuel powered equipment and vehicles. Main impact is impairment of local air quality, the extent of which will depend on quantities emitted, duration and prevailing atmospheric conditions. This impact is localized and will be short term. Moreover, it will contribute to climate change though at very low level.

6.3 Potential impacts during the construction phase

The construction phase is a transitory step limited in time and space but whose impacts should not be neglected. The characteristic effects of the construction activities are relatively related to the installation of works, the movements of the construction equipment and the construction of the new airport. The nuisances that it is likely to cause are not always temporary and their effects can persist after works or even only appear later. Despite the

temporary nature of the work compared to the life of the structures, the impacts can be significant:

- The effects are not always limited to the work phase.
- They can also lead to severe damage that is almost irreversible.
- They concern a larger geographical area than the direct influence of the airport (career materials, rejections, circulation, sexually transmitted infections, etc.).
- The perception of inconvenience can be done at great distances (pollution of rivers, air pollution, etc.).

The impacts of the construction site on the natural environment are established in terms of nuisance caused to the surrounding environment. The neighboring population of the site considers them as impacts on the human environment because they are directly noticeable. Table 6.2 identifies and assesses the main potential impacts of the airport project on its environment.

Table 6.2: Identification and evaluation of the main impacts of the construction phase

Tasks	Activities	Impacts	Evaluation of the impacts
Construction sites, workshop, garage and store, base-life, fixed and mobile installations.	Releases of oil, grease, acid on site, discharge or discharge of sewage, water entrainment of toxic products, poaching and excessive consumption of wood.	Local pollution of water and soil by domestic discharges and toxic products, damage to health, loss of agricultural land, deforestation, poaching.	Extended : local to regional duration : temporary to permanent Intensity : low to medium
Stripping	Discovery not regaled, discomfort of the water flows.	Damage to the natural environment, erosion of bare soils reconstitution of the compromised vegetation. Blockage of natural drainage system	Extended: local Duration: temporary Intensity: average
Earthworks (cuttings, embankments)	Circulation of the earthmovers and the trucks, dangerous obstacles for the road users, during the rainy season washing of fine materials and deposit in existing drainage systems .	Damage to user safety, erosion of the earthworks, water pollution by solid products, disposal of unsuitable land	Extended: local Duration: temporary Intensity: average
Runways of circulation on the building site.	Increased traffic and danger for users by the circulation of	Obstruct motor vehicle traffic, setting in danger of the	Extended: local Duration: temporary

Tasks	Activities	Impacts	Evaluation of the impacts
	construction equipment and materials, risk and annoyance of pedestrian traffic dust emission	pedestrians, air pollution.	Intensity: weak
Material loan and careers	Deforestation exaggerated, discovery not regaled, discomfort of water flows	Attack in the natural environment, reconstitution of the compromised vegetation, risk of demolition and pulling up of protected forest species.	Extended: local Duration: temporary with permanent Intensity: average
Execution of coating (Take-off runways, place served and access roads, etc)	Difficulties and danger of circulation for the road users, smell pollutions by the bitumen.	Obstruct and danger to the users and the residents.	Extended: local Duration: temporary Intensity: weak
Manpower acquisition	Housing	Local community housing need	Extended: local Duration: temporary Intensity: Average

Source: International STUDI

The impacts identified in the previous table are analyzed below by distinguishing the effects on natural environment from those on the human and socio-economic environment.

6.3.1 Impacts on natural environment

6.3.1.1 Impacts on air quality

During the works, several sources on the site are likely to generate a deterioration of the air quality. They are mainly related to the movement of materials and machinery and construction work. This is about dust emissions and gaseous emissions. Potential sources of dust at the site and off site are summarized in table 6.3 and 6.4.

Table 6.3: On-site building work producing dust and gaseous emissions

Operation	Source of production of dust	impact zone
Clearance and terracing of the site	Earthworks Initial soil spraying after excavation. The movement of construction traffic and movement of materials Stored materials subjected to wind action	Punctual : construction site
Earthwork and constructions of the roadways		

Operation	Source of production of dust	impact zone
Excavation	The important sources are: The movement of traffic of construction The handling and the storage of waste The excavation and the transport of materials and potential storage on the site.	Punctual circumscribed at the site area
Earthworks - Training work roads, parking areas and track	The main sources are: The movement of construction traffic The handling and the storage of the aggregates and other imported soft materials.	Parking space, runways, area terminal
Coating	Limited to Construction traffic movement on unpaved roads.	
Building Construction		
Building Foundations	The important sources are: Foundation excavation The movement of construction traffic The handling and the storage of waste The excavation and the transport of materials and potential storage on the site.	Punctual : terminal structure
Building Works	Movement of traffic of construction. Potential of a certain strongly localized harmful effect if the completion of work requires “smoothing and sanding” of the wall to obtain a desirable completion.	
Auxiliary work -		

Source: International STUDI

Table 6.4: Off-site building work producing dust

Main court	Any movement of traffic on unpaved roads Surface Materials brought by the wind
Aggregate mixing unit	Stored materials Input of the handling of the materials Filtering and another process of materials Handling of materials/loading output Traffic of construction
Tool maintenance course	Materials of surface brought by the wind Traffic of construction
Sites of borrow	Clearing the site Excavation Stored materials Material loading
Material transportation	Transportation and offloading of materials

Source: International STUDI

When dust is exceptionally fine and when the populations resident undergo an exposure prolonged and persistent (such as in proximity of a career) there are risks of attacks of the public health. This is not the case on the level of the site of construction of the new airport, where the emissions and the exposure of the residents are limited because the area of completion of the generating work of atmospheric pollution are rather far away from the inhabited areas.

With regard to the gaseous emissions, the sources of atmospheric emissions associated with the airport during the phase of building site are mainly the units of construction and the possible generators:

By evaluating these sources, the following conclusions can be drawn:

- The majority of the sources is mobile and will generate dispersed emissions and in a temporary way;
- The majority of the emissions will be generated starting from the concentrations of activities which are rather far away from the sensitive receivers.

The level of the emissions of the precursory pollutants and the atmospheric pollutants will vary from day to day, according to the type of the activity (for example, the emissions associated with the release with the ground will be higher than those relating to the construction of the air terminal), but even if the impact is very limited in time, it does not remain about it less than it is subjected to a factor of expansion in space with knowing the weather conditions. Of this fact the intensity of the impact of the building site on air pollution especially by the suspended particles is evaluated like average.

6.3.1.2 Impacts through noise and vibrations

The standards used as regards noise and specific vibrations by the international community are similar. The World Health Organization (WHO) and the Organization for coordination and economic development (OECD) are two of the main organizations that have collected data and having developed their own studies on the effects of exposure to environmental noise.

In addition to general Directives EHS, the SFI developed sectoral directives specific to industry such as the environmental, medical and sedentary directives. Directives EHS are technical reference documents containing of the examples of international Industrials good practices, or relating to a sector in particular.

During the works, the noises and vibrations come mainly from the units of building site (power picks, mechanical shovels, cranes, road rollers, concrete batching and mixing plant, etc), of the trucks and semitrailers charged to transport materials as well as use of explosives (career of massive rock). Table 6.5 shows typical activities generating noise at project site.

Table 6.5: Activities generating noise on site

Activity	Explanation
Clearance and earthwork of the site	Small groups of tools noisy working in small islands of activities. Tools insulated working uninterrupted.
Earthwork and construction of roadway	Similar to the earthwork of the site, but with a greater diversity of installation of use, a higher intensity of use and a concentration of larger

	activity.
Building construction and construction sites	Groups of tools in the sites of construction produce grondement constant as of the early hours jusqu `at the evening, sometimes for relatively long periods.
	The building sites can be located anywhere within the main site. Those are supposed to have equipment functioning uninterrupted during day's work. However, the equipment used is relatively "quiet".

Source: International STUDI

The extent of the nuisance will depend on the spatial organization of the site and mainly the location of the base-life, the borrow pits, as well as the crushing plant, concrete plants and other noisy machines compared inhabited areas. The importance rating matrix defines the level of importance based on sound levels during construction; it is presented in table 6.6.

Table 6.6: Evaluation of noise impacts related to construction for the residential receivers

Period of exploitation	Diurnal acoustic level, dB LAeq*, 1:00 (of 07:00 to 22:00)				Night acoustic level, dB LAeq*, 1:00 (of 22:00 to 07:00)				LAMax over all the periods
Classification of the impacts	<i>Nonsignificant</i>	<i>Minor</i>	<i>Moderated</i>	<i>Major</i>	<i>Nonsignificant</i>	<i>Minor</i>	<i>Moderated</i>	<i>Major</i>	<i>Critical</i>
Short-term exposure < 1 month	< 70	70-75	75-80	80	< 55	55-60	60-65	65	85
Medium-term exposure from 1 to 6 months	< 65	65-70	70-75	75	< 45	45-55	55-60	60	
Long-term exposure 6 months	< 55	55-60	60-65	65	< 45	45-50	50-55	55	

Source: EISE Simandou, Volume III Port 2012

- LAeq (the acoustic level are equivalent balanced A),
- Nonsignificant - not need to hold of it account in decision making, any need for attenuation.
- Minor - a significant impact, in front of being taken into account by the decision makers, but sufficiently weak so that the practices of management of the noise guarantee that the acoustic levels remain lower than the criteria of importance.

- Moderated - a significant impact; an attenuation must be considered. The attenuation will probably affect the design and the costs.
- Major - a significant impact; an attenuation will have obligatorily to be considered. The attenuation will modify the design and the costs of the project. The impacts will be undesirable if they are not treated.
- Critical - causing direct and immediate negative effects potential on the health and the human comfort, which will stop the advance of the project in this form and of important attenuations will be necessary to modify the design. In terms of noise, the “critical” impacts will be declared as such where the levels of the receivers exceed the 85 dBa, level from which risks of auditive after-effects start to be declared.

Since impacts by gas and dust emissions and those by noise and vibration will only be felt in the immediate vicinity of the work area, they will be local in scope. They are likely to be caused by gear operating in restricted areas and for a limited time. Their intensity is low to medium.

6.3.1.3 Disadvantages related to the management of wastewater, garbage and yard waste

The bases of life are most often at the origin of wastewater discharge and solid waste in the natural environment with all that it can generate like pollution of the environment, unhygienic sanitary conditions and nuisances to the human perceptions. The types of potentially wastewater generated during airport construction and their sources are summarized in table 6.7.

Table 6.7: Types and sources of waste water

Type	Source	Quantity	Comments
Sewers	Works Camp	100l/p/day 500 people A return factor of 0.8 40000 l/day	Linked to the building
	Offices Other elements of the main camp	60 l/p/day 40 people A return factor of 0.8 1920 l/day	Linked to the building
	Remote secondary facilities	60 l/p/day 15 people A return factor of 0.8 Nearly 720 l/day	Linked to the building
	Sites	150 people	Scattered
Gray water	Works Camp	Including septic waste - not of separation considered	Linked to the building
	Offices/Other camps		
Hunting and process water	Well spill	Unknown quantity	Specific to the site
	Aggregates and process plants	Unknown quantity	Specific to the site Unknown quantity

Type	Source	Quantity	Comments
	Equipment maintenance centers	Unknown quantity	Specific to the site Unknown number at this stage
	Ordinary sites	Unknown quantity	Dispersed, sites of washing of small equipment

Source: EIES of the International airport Blaise Diagne - Senegal 2010

Sewage effluent from camps and associated buildings will be produced in the sanitary facilities provided and collected on site. Sewers would include high levels of BOD₅, ammonia and *E. coli*, and would also include a significant threat to human health (direct and indirect), and would be a pollutant.

Septic waste produced in scattered sites will also pose a problem to human health. This will be particularly severe if the waste is not collected directly and / or is released directly into the wild without any treatment. In short, the production of sanitation waste is a significant impact and the collection and clean disposal of septic waste will be a major consideration of the contractor.

Gray sewage will pose less of a direct problem to human health but will be produced in large quantities in the camps. This waste must be collected at least, whether through a specially designed system or a combined septic / gray system, which is the responsibility of the contractor. Table 6.8 provides an initial overview of the different sources

Table 6.8: Sources of gray water and threat posed

Source	Quantity	Threaten
Cooked	Moderated >10l/p/day	low - Water of washing or food preparation f - often pulp.
Personal wash	Moderated >10l/p/day	low - Moderated. The directly bound threat and increases with the presence of ablution. A certain contamination of surface waters or aquifers surface is possible. The importance will be depend on the number of daily washes, the frequency of the use of detergents and medium of washing used on the site.
Another wash; for example oe clothes	Moderated	low - Moderated. The threat on health is minimal except if the washed object is contaminated itself. A certain contamination of surface waters or aquifers surface is possible. The importance will be dependent on the number of daily washings, the frequency of the use of detergents and washing medium used on the site.

Source: EIES of the International airport Blaise Diagne - Senegal 2010

In most cases, such impacts are classified as significant. They are estimated as a means since they are avoidable by the application of relative mitigation measures. As for the rejects of the site, the risk of their abandonment on the spot at the end of the work is discarded since the last stage of the site is devoted to the cleaning of the places and their restoration. The impacts of this waste are therefore of no appreciable importance, unless they do not comply with the minimum rules of site management or uncontrolled waste disposal.

Particularly for this project, it is awaited that the demolition of the constructions located in the influence of the new airport (during the preparatory phase, but also being able to be prolonged during work) generates significant amounts of rubble whose management can prove to be constraining in spite of their inert character.

6.3.1.4 Erosion of Exposed Surfaces

Inadequate compaction and resurfacing compounded by rain, trampling, vegetation clearance etc. may cause erosion and consequent sediment load in runoffs. This is mostly likely to happen if construction is undertaken during the months of rain seasons -heavy rains. Impacts associated are considered as: Impacts localized, long term and moderate significance.

6.3.1.5 Contamination and /Impaired Quality of Receiving Body – Land and Water

Main sources of construction waste are cleared vegetation and top soil (overburden) and domestic waste from construction crews. During construction phase of the airport, various type of wastes will be generated including solid and liquid wastes from food in cafeteria and offices. The wastes may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies. Other impacts include increased bird population (attracted by food waste). This impact will be localized and will have long term impacts if not mitigated.

6.3.1.6 Vegetation clearance

Site clearance may result into large amount of vegetation removal to allow construction of the airports and hence generate dust. There is a possibility of generation of large amount of dust within the project site and surrounding areas as a result of excavation works. This aspect has to be considered in order to keep dust levels within the required limits and be mindful of maintaining an undisturbed ecosystem. Dust may pose a threat to residents in the vicinity. Generally, dust is expected to be short-term and of low environmental impact. The impact is considered to be permanent with low impact magnitude.

6.3.1.7 Landscape and visual impacts

Like any development, there is a 'zone of visual intrusion' from which it can be seen. Airport-related developments shall affect the landscape by removing existing landscape features in place such as trees and replacing them by concrete and gravel surface. If operated at night, the lights of the runways, aircraft and terminals will lead to the increase of light pollution. The following components of the landscape can be affected by development:

- Physical factors: geology, landform, microclimate, drainage, soil, ecology
- Aesthetic factors: proportion, scale, enclosure, texture, colour views as well as sounds

However, the presence of the proposed airport can also change the overall character of an area to make it look harder and more urban. The development of the airstrip can also have visual impacts. These refer to the impacts of landscape change on people: on the views that people have from their homes, offices, footpaths, cars as they drive past etc. This impact is local, moderate and will be of long term.

6.3.2 Potential impact on human and socio-economic environment

Positive

6.3.2.1 Jobs creation

The construction envisaged will create more employment opportunities to local people. The Company expects to employ more than 500 workers from the locality and it is expected that more jobs will be directly connected with construction of the infrastructure and future operations. The impact is considered to be short term and of high benefits to the communities near the project site, Tanzania and international at large.

6.3.2.2 Income to local suppliers and service providers

The proposed project will need construction materials and other services within Dodoma region. Other materials will be sourced outside Dodoma region like cement. Materials need for this project is very large. This is good news to suppliers of building materials as well as those who will provide food and waste collection services.

Negative

6.3.2.3 Potential Impacts on the human health

During the building work, the risks related on public safety and the personnel increase. The building work of the new airport will induce possible harmful effects on public safety and the workmen. The sources of the threats were identified in the table 6.9

Table 6.9: Sources of the harmful effects on health and safety

Type of harmful effect	Sources of the threat
Accident risk	<ul style="list-style-type: none"> • During excavation work, rôleage and excavation • Movements and operations of heavy equipment • Access to danger zones (warehouses of the dangerous matters) • Transport, handling and storage of the materials
Direct risk on health and transmission of the Infections Sexually Transmissible and the AIDS	<ul style="list-style-type: none"> • Direct contact with infected people • Disease due to the climatic factors • Respiratory and skin diseases
Indirect health risk	<ul style="list-style-type: none"> • Environment Pollution • Contamination of water or food

Source: International STUDI

Since construction is extensive, the potential significance of the risk to health and public safety will depend on the size of the population and the workers exposed and the degree of

exposure. Workers permanently on the site will be exposed to air pollution throughout the construction period. This impact, of medium intensity is limited in time and space.

Work accidents during construction work are quite common. This is due to the presence and handling of hazardous equipment and materials. The risk associated with work-related accidents is assessed as strong, but is temporary and punctual. The indicative estimates of the number of population affected by category are shown in table 6.10.

Table 6.10: Types of accidents, source and population exposed

Activity of risk	Exposed population	Number
Excavations	(I) Visitors of the site (II) Any personnel	(I) <30 per day (II) > 300
Movement and operation of tools	(I) Visitors of the site (II) Pastoral populations and other former users of the ground (III) Ordinary access (iv) All personnel	(I) < 30 per day (II) Unknown - Weak (III) Unknown - Weak (iv) >300
Stored materials, including fuels and other chemicals	(I) Visitors of the site (II) Specific elements of the personnel	(I) <30 per day (II) Specific personnel <30
Sites of treatment or concrete batching and mixing plant	(I) Visitors of the site (II) Specific elements of the personnel	(I) <30 per day (II) Specific personnel >100
Modification made to the known plans of route	(I) Visitors of the site (II) Any personnel (III) All road users	(I) <30 per day (II) > 300 (III) > 1000
Climatic factors	All personnel	(I) >300
Domestic	(I) Personnel resident	(I) 500

Source: EIES of the International airport Blaise Diagne - Senegal 2010

Table 6.11: Types of accidents and risk factors

Activity of risk	Site	Exposed population	Type and Frequency of exposure	Impact
Excavations	Onsite	>330	8 hours	<i>Raised</i>
Movement and operation of the equipment	Onsite	>330	8 hours	<i>Raised</i>
Stored materials, including fuels and other chemicals	Onsite	<60	<2hours	<i>Moderated</i>
Sites of treatment or concrete batching and mixing plant	offsite	>130	8 hours	<i>Raised</i>
Modification made to the known plans of route	Onsite	>1,330	<1hours	<i>Moderated</i>
Climatic factors	Onsite and offsite	>300	24 hours	Weak
Domestic	Onsite	500	16hours	<i>Raised</i>
Public highways	Offsite	>1000	24hours	<i>Raised</i>
Access roads	Offsite	>500	8hours	Weak

Weak

Moderated

Raised

In addition the lack and respect of the minimum rules of health represent a threat to the health of workers who may be subject to many diseases (diarrhea, waterborne diseases, etc.). The proliferation of hygiene-related diseases is of moderate, temporary and punctual intensity. Potential impacts of the construction phase on human health can be passed on to workers and non-residents in the project area. Their analysis can also be strong.

6.3.2.4 Impact on housing availability due to Influx of temporary workers and associated Occupational Health, safety and compromised security due to social interaction

The proposed project will need both skilled and non-skilled workforces. The skilled construction workers will be imported to the area of construction and will reside in labour camps. Low-skilled jobs may be envisaged. These will reside in Msalato community. It is expected that the increased number of workers and higher concentration of residents near construction sites will have impact on local communities housing need. This will push up housing price and hence making housing unaffordable to low income group within the community. Also, the proposed project will have effect on occupational health, safety and compromised security due to social interaction. Uncontrolled movement of workers and residents will affect safety and healthy of the same. Due to this movement of workers in the area around the construction sites and mode of movement must be well organized and defined by agreement between the Employer and the Contractor(s).

However, entry of a temporary labour force can compromise the security issues of the project into an area could cause different negative impacts to the local communities apart of housing availability. This includes conflicts between local community members and newly arrived people due to the socio-cultural differences and other issues. This impact is local, medium term and has moderate impact.

6.4 Potential impacts during the operation phase

6.3.1 Impacts on natural environment

6.4.1.1 Impacts on air quality and its contribution to climate change

Airport operations will be associated with gaseous emissions arising from fuel combustion and energy use. The principal pollutants which are termed as greenhouse gases are CO₂, PM and NO_x, plus to a lesser extent CO and hydrocarbons, together with SO_x. The major sources of air pollution shall be emanating from aircrafts and vehicles movements. Electrical energy consumption sourced from National grid will be the main source of power of which is fed from multiple energy sources associated with indirect emissions due to the use of fossil fuel during electricity generation. Thus, fuel combustion and energy use lead to generation of gases, which have implication on climate change.

In general, during the operation of the airport, sources of air pollutants and precursor emissions are aircraft, support equipment, auxiliary electrical units such as generators, automobiles, fuels, and training fires. A variety of runway equipment will serve large commercial aircraft while they are passengers and disembark passengers at the airport. This equipment will include aircraft tugboats, grasshoppers, air conditioning units, and baggage tugboats. The sources of the future Main Atmospheric Emissions and Airport area of the impact are identified in the table 6.12:

Table 6.12: Source of the atmospheric emissions in the project

Operation	Sources of the gas emissions	Area of impact
Air traffic	<ul style="list-style-type: none"> • Movement of planes • Movement of the auxiliary equipments • The movement of the service and service vehicles 	Punctual : Track, Park Aircraft, ancillary buildings
Road traffic	<ul style="list-style-type: none"> • Traffic disappointing the airport • Vehicles of shuttle 	Punctual : at the entrance to the airport

Source: International STUDI

It is difficult to obtain an exact estimates of the emissions coming from the various types of aircraft since the various companies can use different engines and it may have recent changes because of the fact that many companies want to reduce the noise levels. However, estimation can be difficult due to lack of knowledge of the air fleet landing on the proposed airport.

In general, Nox emissions dominate relative with raised mode, therefore on takeoff and in climb. Approximately 75% of the emissions occur with cruising speed in troposphere and low stratosphere (10-12 km). With the mode of idle and the taxiing, it releases little Nox but relatively much CO and HC. On takeoff and in climb the emissions of Nox and particles are high, those of CO and relatively weak HC.

In 1993, the International agency of Energy (IEA) pointed that air transport deals with climate change well than other modes of transport. In one of these studies, aircraft reject carbon dioxide, high altitude, the boundary between the troposphere and the stratosphere, nitrogen oxide and water vapor in large quantities.

Most existing organizations for calculating air pollution indices base their calculations up to 1000 m altitude (Regional Air Quality Plan for cities with more than 100,000 inhabitants).With

regard to the atmospheric pollution generated by the terrestrial traffic of access, the exhaust fumes of the vehicles will involve an increase in the ambient concentrations of gas contaminants, mainly the particulate CO₂.

However, the additional concentrations of atmospheric contaminants in the ambient air decrease exponentially as one moves away from the site and the routes, so that the negative impacts on the quality of the air will be felt only in the sectors located with the accesses of the site of the project and the transport routes.

A much larger level, the transportation sector in general, emits 14% of the greenhouse gases. The aviation sector does contribute 2% globally to the emission of greenhouse gases. In addition, the amount of CO₂ emitted per passenger transported is estimated at 0.16 tonnes ((The General Council of Roads and Bridges).The operation of the airport has a small impact on the increase of the greenhouse gas to traffic road. Thus, the impact to the quality of air is rated to average and permanent.

6.4.1.2 Risk of pollution and degradation of water quality

This pollution will be mainly a result of sanitation system (Septic tank system) that will be used at the airport. This is due to the fact the proposed airport expects to receive an increasing number of passengers with time. According to passenger forecast scenarios, the proposed airport will receive 1 million pax by 2043 for the high growth scenario which provides favorable conditions for all air traffic generating activities and asserts the Msalato airport a hub for the sub-region. It will amount to 674 thousand pax for the base case scenario, which holds more moderate growth forecasts. In case of the combination of unfavorable development conditions, major constraints and a critical geo-economic context, air traffic would reach 235 thousand pax by 2043 (Table 6.12). Onsite sanitation systems always cause groundwater pollution due to infiltration of the effluent during disposal. The site has high water table (2m) and hence putting ground water at high risk from pollution. Also, poor control of oil spills from refueling unit, can cause groundwater pollution. This impact is regional, long term and of high negative impact taking into account that groundwater is the main source of water for Dodoma municipality.

Table 6.13: Passengers traffic forecast 2023 – 2043 (Thousand pax)

Scenario	Traffic segment	2023	2030	2035	2040	2043
High scenario	Domestic	80	131	201	328	439
	International/Private	5	14	21	31	40
	International/Business	3	10	16	25	32
	International /tourism	100	150	191	232	261
	Domestic / tourism	100	150	191	232	261
Total		288	455	621	849	1 035
Base case scenario	Domestic	75	120	176	248	305
	International/Private	3	13	18	24	29
	International/Business	2	10	14	20	24
	International /tourism	-	45	87	140	158
	Domestic / tourism	-	45	87	140	158
Total		81	234	382	573	674
Low scenario	Domestic	50	55	60	72	79
	International/Private	-	4	7	11	13
	International/Business	-	3	6	9	11
	International /tourism	-	-	10	41	66
	Domestic / tourism	-	-	10	41	66
Total		50	61	93	174	235

Source: International STUDI

Also, surface water is at risk of pollution due to drainage of contaminated impervious surfaces. In this case, the main pollutants include solid matters, floating and macro waste, heavy metals, in particular: zinc (cable routing channels), copper, nickel, iron, micro pollutants (hydrocarbons, pesticides) and organic matters. During the rain season, the surface waters will drain the pollutants directly towards the natural discharge system if the project does not envisage pretreatment of rain water. Thus, the risk of water degradation is assessed as important, which may have an indirect impact on the water table too.

6.4.1.3 Animals and Birds Disturbance and safety

The proposed site for Msalato airport contains a variety of animals and birds which play a big role in regeneration and fertilization of Msalato ecosystem. Vibration and generation of noise from the aircraft may disturb spatial and temporal distribution of animals and birds. Also, bird strikes occur when aircraft hit birds during take-off and landing can cause accidents. The number of bird strikes at a given airstrip is a function of:

- The number of birds within and outside the airport
- The types of birds at the airport
- The likelihood of a bird being struck by an aircraft depends in part on the height at which it flies and its flight patterns.
- The number of aircraft landings and takeoffs at the airport: the greater number of aircraft movements, the greater the likelihood of a bird strike

It is therefore essential that the airport operator develop an effective bird management plan. Thus, the hazard study will identify avian risks that require the establishment of a specific management plan during the exploitation phase. Mitigation measures shall be developed and implemented at the beginning of the operation phase. Monitoring of the affected species will occur during the construction phase and during the preliminary operation phases to determine the need for additional mitigation measures.

Currently, available data on birdlife in the region do not quantify the likelihood of bird hazard within the new airport. It is therefore important to identify the existence of bird species to determine that a significant risk exists on the movement of the aircraft. Although this risk exists, the probability of occurrence is considered low in the proposed airport.

6.4.1.4 Stormwater generation and overflow

The proposed airport will generate a lot of stormwater due to presence pavements, concrete surfaces and buildings. Airport runways, aprons, taxiways, parking spaces and building roofs are the main contributors of storm water generation at the proposed airport. The structures will tend to compromise the infiltration capacity of the land surface and hence rendering water free to the environment. The storm water generated might have impacts on structures downstream as well as being a factor for soil erosion and poor water quality.

6.4.2 Impacts on the human and socio-economic environment

6.4.2.1 Noise pollutions related to road and air traffic

Analysis of land access traffic shows a road traffic varies according to the growth scenario, between 300 and 700 vehicles per day by 2030. It should establish 400 vehicles per day by 2043 in the case of the low scenario and reach 1650 vehicles per day for the high growth scenario. Traffic will be generated by employees working in the airport: staff, airline employees, bank employees and other businesses, etc. The main contribution of traffic flow will be passenger cars followed by taxis. Thus, the increase in the road traffic and the road traffic taking the public routes to reach the airport will be a source of noise pollutions. However, the access road does not cross an urban center. So the impact of the project is judged like weak and specific.

Moreover, the number of commercial aircraft movements envisaged by 2043 at high scenario, base case scenario and low scenario will be 32,290, 21,240 and 6,890 respectively (Table 6.14). Thus the proposed project will increasingly induce noise pollutions at Msalato area.

Table 6.14: Commercial aircraft movements forecast 2023-2043

Scenario	Traffic segment	2023	2030	2035	2040	2043
High scenario	Domestic	10 140	14 270	18 490	24 510	29 310
	International	1 300	1 890	2 300	2 700	2 980
	Total	11 440	16 160	20 790	27 210	32 290
Base case scenario	Domestic	4 240	8 410	12 370	16 990	19 360
	International	70	740	1 200	1 730	1 880
	Total	4 310	9 150	13 570	18 720	21 240
Low scenario	Domestic	2 850	2 770	3 310	4 930	6 080
	International	-	80	240	580	810
	Total	2 850	2 850	3 550	5 510	6 890

Source: International STUDI

In the majority of the countries, the limiting law between 110 and 120 Pndb (perceived noise level) on the ground under the trajectory of vol. the dwellings located near the airport will be exposed to high acoustic levels. Table 6.15 shows acoustic impacts for the residential receivers. For goals of evaluation, a plan of noise exposure (PEB) was elaborate within the framework of the actualization of the technical feasibility study.

A PEB consists of an introductory report and a card delimiting three (even four) areas of noise inside of which will apply restrictions of town planning. Since 2002, it is an indication of Lden noise which is used to delimit the areas of noise of the PEB.

- Area of noise strong a: Area included/understood inside the curve of index Lden 70
- Area of noise strong b: Area ranging between the curve of index Lden 70 and the curve of index chosen between 62 and 65
- Area of moderate noise C: Area ranging between the limit external of the area B and the curve of index chosen between 57 and 55
- The area of noise D: Area ranging between the limit external of the area C and the curve of index Lden 50 (the delimitation of an area D is optional).

Table 6.15: Evaluation of the study of the acoustic impacts for the residential receivers - Exploitation

Period of exploitation	Diurnal, LAeq, 1:00 dBa				Night, LAeq, 1:00 dBa				All periods
Classification of the impacts mining Production run	<i>Nonsignificant</i>	<i>Minor</i>	<i>Moderated</i>	<i>Major</i>	<i>Nonsignificant</i>	<i>Minor</i>	<i>Moderated</i>	<i>Major</i>	<i>Critical</i>
Exploitation	< 55	55-60	60-65	65	< 45	45-50	50-55	55	85
Acoustic level Specific									
Impact of the background noise (LAeq, 1:00 - LA90)	10	10-15	15-20	20	10	10-15	15-20	20	

Source: EISE Simandou, Volume III Port 2012

- LAeq (the acoustic level are equivalent balanced A),
- Nonsignificant - not need to hold of it account in decision making, any need for attenuation.
- Minor - a significant impact, in front of being taken into account by the decision makers, but sufficiently weak so that the practices of management of the noise guarantee that the acoustic levels remain lower than the criteria of importance.
- Moderated - a significant impact; an attenuation must be considered. The attenuation will probably affect the design and the costs.
- Major - a significant impact; an attenuation will have obligatorily to be considered. The attenuation will modify the design and the costs of the project. The impacts will be undesirable if they are not treated.
- Critical - causing direct and immediate negative effects potential on the health and the human comfort, which will stop the advance of the project in this form and of important attenuations will be necessary to modify the design. In terms of noise, the “critical” impacts will be declared as such where the levels of the receivers exceed the 85 dBa, level from which risks of auditive after-effects start to be declared.

6.4.2.2 Olfactive nuisance and disrupted airport operations due to inadequacies in operation and maintenance

The proposed project is not served by a sewerage system. The new International Airport will be equipped with a sanitation network and a planned compact wastewater treatment plant.

Four categories of impacts can be foreseen for the collection, treatment and disposal of liquid and generic wastes of nuisance olfactive:

- Pollution and Contamination: the uncontrolled spillage of liquid septic waste from any part of the system that collects, processes and rejects a significant threat to public health. Localized contamination of the soil (and probably aquatic surfaces) by system leakage may be predicted to a lower degree;
- Secondary waste or processes from the treatment plant, biological waste, sand and solids, which also pose a public health problem;
- Inadequate treatment
- Attraction for Wildlife: Wastewater treatment plants are known to be wildlife attractions and are seen as a growing risk on airport operations

Table 6.16: Evaluation of the default risk of the purification plant

Impact	Risk event	Effect	Importance of the impact
Primary and secondary phases			
Effective total failure (closing of the station)	Very weak	Treatment of waste water higher than the acceptable standards. Possible "Escape" of waste contaminated of the site.	Potentially very important. The absence not attenuated of an alternative option of discharge will cause the discharge of the effluents. The site of discharge will be under complete control to limit the negative impacts.
Partial failure > 6 hours with 24:00	Moderated	The design of the system will comprise a redundancy to carry a partial failure.	Secondary with less than 6 a.m., but increases with the duration of the failure up to one period maximum of 18-24 hours. Consequently, classified like a total failure.
Partial failure < 6 hours	Probable	The redundancy of the design of the system will support almost certainly the failure.	Secondary and temporary with a minimum of risk of external effects.
Bad maintenance	Almost	Frequency increased in	Harmful effect of odor. The

Impact	Risk event	Effect	Importance of the impact
	some	the partial failures and associated impacts	other impacts depend on the frequency of the rupture but will have to be easily contained.
Tertiary phase			
Failure - Partial or total	Weak	Limited provisional reduction of the levels of treated waste water. The design of the system will include/understand a redundancy to support a partial failure.	Harmful effect of odor. The other impacts depend on the frequency of the rupture but will have to be easily contained.

Source: International STUDI

The design of this project will adopt using Constructed wetland- the engineered system designed and constructed to copy natural processes taking place in the natural wetlands. Constructed wetlands remove pollutants in wastewater through the combination of physical, biological and chemical processes. This will avoid partial treatment of wastewater and even attracting wildlife.

6.4.2.3 Economic and social impacts

6.4.2.3.1 Job creation and economic empowerment

Jobs generated by an airport platform can be divided into two (02) categories: direct and indirect jobs; their volume depends strongly on the level of airport activity, which is apprehended by the annual air traffic managed by the infrastructure.

Direct jobs are those generated by aeronautical activities operating in the platform; these are mainly jobs related to the services of the airport operator, the control of air traffic, freight, ground assistance, airlines, catering and commercial activities inside the enclosure airport. Various socio-economic studies of airport projects show that the airport sector creates 1000 direct jobs for every one million passengers.

Indirect jobs are those created by the positive impact of airport infrastructure on economic sectors other than aeronautics. First and foremost, these sectors are highly dependent on air transport: tourism, agricultural export sectors, etc. The ripple effect (or catalyst) on the entire regional and national economy is also the origin of the creation of 'indirect' jobs. Several studies and documents have dealt with this theme; they note that an airport platform generates an average of 2.5 indirect jobs for each direct job. In this respect, the impact of the project on job

creation is considered as positive important, with a regional scope. Therefore, the project will greatly contribute to economic empowerment of communities in Dodoma.

6.4.2.3.2 Increased commercial and social activities (Induced development)

Growth of Business around the Project Location

Construction of a new airport is anticipated will attract more businesses in a way create vibrant businesses within Dodoma municipality. The impact is regional, long term and of high positive impact.

Added Value generated by the activity of the new airport

According to feasibility, the construction of the Msalato international airport would generate a community benefit equivalent to the Value Added generated by the aeronautical activities as well as the related services "non-aeronautical activities": rental of commercial premises. The estimated Value Added is apprehended by establishing a balance between the revenue and the intermediate consumption resulting from the operation of the infrastructure.

Designed for a much lower capacity than the expected demand, the current Dodoma Airport's facilities will soon reach saturation, with all the negative impacts in terms of (i) processing times, (ii) user comfort and (i) (iii) quality of service in general. Maintaining this situation would substantially undermine the attractiveness of the administrative capital and would constitute an obstacle to the development of the air transport and the economic activities that depend on it.

The project will provide sufficient capacity to meet the demand for air transport generated by the relocation of administrative structures as well as the new economic dynamics planned for Dodoma. Traffic forecast based on socio-economic development prospects show that demand for air transport will increase steadily over the next two decades.

On this basis, the additional "passenger" traffic that will be drained by the new airport infrastructure, is as follows:

1. 236 000 pax by 2023,
2. 410 000 pax by 2030,
3. 990 000 pax by 2042.

Time savings

According to feasibility study, the entry into service of the new airport platform would allow the establishment of adequate facilities and for a faster passenger processing. This should result in time savings for airport users and the community compared to the baseline situation (the current

airport of Dodoma), in which the infrastructure will soon reach saturation according to traffic forecasts.

The time savings generated by the construction of the new airport are estimated by the consultant on the basis of interviews with operators, users and previous experiences on similar projects. the current Dodoma airport will soon reach saturation, some users will continue to use it under these conditions, others will fall back on other competing modes namely ground transportation.

The time savings offered by Msalato airport are summarized in table 6.17:

Table 6.17: Time savings by traffic segment

Traffic segment	Time savings (Old vs New airport)	Time savings (Land transportation vs New airport)	Time value (USD/Hour) ⁸
Domestic	0.5	7	4.7
International	1	7	7
National / tourism (Transit)	3	NA	7

Source: Feasibility study, International STUDI

The benefits related to time saving are valued at \$ 8.5 million in 2023 and would reach \$ 70 million by 2053.

Dodoma airport land value

The construction of Msalato Airport will free up the existing airport right-of-way, making available 550,000 m² of land strategically located in the center of Dodoma City. By analyzing current prices in Dodoma and similar locations in Dar es Salaam and taking into account the economic development prospects in Dodoma, the value of the land could reach 100 USD in 2023. its sale would mobilize \$ 54.8 million.

Impact on the tourism sector

According to the Tanzania Tourism Sector Survey⁹ “About 41 percent of the visitors expressed their concerns on the conditions of roads and other transportation facilities (...). They were also concerned with traffic jams to and from the Julius Nyerere International Airport, airport facilities like inadequate number of washrooms and cleanliness, defective air conditioners; and slow visa processing were also identified as areas that need improvement. ».

Improving the quality of the air transport supply by offering the possibility to transit through the Msalato airport to tourists heading to the parks in the vicinity of Dodoma would enhance the attractiveness of Tanzania as a tourist destination and generate an additional value added to the local and national economy, estimated based on the ratio value added per tourist multiplied by the share of the cost of the airport in the investments necessary to accommodate the additional demand¹⁰.

In the case where Msalato airport will not be built “without project scenario”, the touristic traffic would pass through JNIA with what it implies in terms of discomfort and impact on the attractiveness of the Tanzanian destination. For the purpose of the study we consider for the “without project scenario” a traffic growth rate lower by 1.5% than the “with project scenario” resulting from the constraints in JNIA airport. The new airport would then generate 135,000 additional tourist arrivals by 2053¹¹.

During 2016, Tanzanian tourism sector generated direct value added amounting to 2.3 billion dollars, or 4.7% of GDP¹². The value added / arrival ratio is estimated at \$ 1630 at 2016 prices or \$ 1770 at 2018 prices¹³.

Additional tourist arrivals require to increase the accommodation capacity by 5,550 beds, for a total investment of US\$ 830 million, based on an investment of 150 000 US\$/bed. The share of the cost of the airport in all the investments necessary to accommodate the additional demand would be 40 %. The proportion of value added per tourist attributable to the airport is \$ 690 at 2018 prices.

The value added surplus generated by tourism activities is estimated to 35 million US\$ in 2040 and 94 million US\$ by 2053.

Increase of revenue to TAA

The main revenues come from aeronautical charges (passenger, landing, parking, etc.) and non-aeronautical charges, primarily commercial fees.

In Tanzania, aeronautical fees are collected by the TAA, the government body in charge of regulating air services, airport services and providing air navigation services, in Tanzania. Revenues received in respect of the operation of the aeronautical activity are defined by the note published by the TCAA in November 2016 concerning the revision of the charges for airport and navigation services. These charges are calculated according to the following scale:

- **Passenger service charge:** Whenever departing from the government aerodrome a passenger is charged airport service charge as follows:
 - Domestic flight: **Tshs 10,000.00**
 - International flight: **USD 40.00** or equivalent in a convertible currency.
- **Landing charges:** The charges are based on the maximum permissible take-off weight of the aircraft as authorized by the certificate of airworthiness. At Dodoma airport the landing charges per single landing per 1,000 Kg or part thereof are **4.5 USD** or equivalent in a convertible currency.
- **Parking charges:** The charges for parking an aircraft will be assessed on the aircraft maximum takeoff weight as authorized in the aircraft's certificate of airworthiness. No charge shall be levied for the first two hours.

In addition to the usual airport charges applied at the national level, an additional charge may be collected at the new airports to partially offset the cost of the investment. For the airport of

Msalato we propose to set up a development fee of \$ 10 for international travelers and \$ 5 for nationals applicable from the commissioning of the airport and valid for through life of the project.

Based on current fee rates, the additional revenue to be collected in 2030 will be \$ 6 million, 66% of which corresponds to the increase in the "passenger" charge. The parking and landing charges are estimated at 18% and 16% respectively.

According to TAA financial statements for the years 2009 - 2013, non-aeronautical revenues represent on average 30% of aeronautical revenues for all the airports managed by TAA. To be noted that this ratio varies depending on the size of the airport and the commercial areas available. After completion Msalato airport will serve the country's administrative capital and will be one of the most important airports in the country after Dar Es Salam. The ratio observed in airports operating under similar conditions generally varies between 50% and 100%. The average value of 75% is retained for this project. The non-aeronautical would start at \$ 3 million in 2023 and would reach \$ 21 million by 2053.

6.4.2.3 Potential impacts on the human health

Impacts related to the noise

The establishment of the international airport will induce harmful effects of various nature. In general, the noise is often regarded as most awkward. This phenomenon generates harmful effects on the organization.

These noises cause at the man of the emotional disorders which result in a phenomenon of anguish and faintness that one calls the stress. If this situation is prolonged, these multiples small aggressions will lead to anger with unverifiable and sometimes violent components.

While wanting to protect itself, to preserve his space private, his own person, the individual will tend to isolate himself or will isolate himself from the noise and others.

It is as advisable to specify as:

- to 45 dB, the noise start to disturb the sleep and the intelligibility of the word;
- to 60 dB, the noise start to disturb the sleep and intelligibility requires to speak aloud up to 2 Mr.
- to approximately 70 dB, a normal conversation is impossible and 10% of the population target will have a disturbed sleep.

6.4.2.4 Impacts related to air quality and its contribution to climate change

At all airports, emissions from airplanes, ground service equipment, ground access vehicles, stationary sources and private vehicles supplemented with the total charge of air pollution from operations. At the airport , aircraft should be the dominant source, although equipment and vehicles will contribute to the overall balance of total emissions.

With regard to particles, it is currently very certain that fine particles (PM_{2.5}) are more dangerous than larger particles (coarse particles) in terms of mortality and other cardiovascular and respiratory effects.

The elements that are proven to contribute to toxicity in epidemiological and controlled exposure studies are metal content, the presence of PAHs (Polycyclic Aromatic Hydrocarbons) and other organic compounds. The coarse fraction of PM₁₀ is also known as dangerous. In toxicological and controlled human exposure studies, the physical, biological and chemical characteristics of the particles have been shown to cause respiratory responses.

Table 6.18 provides a summary of the health effects of air pollutants

Table 6.18: Effects of the main pollutants of the air on the public health

Pollutant	Characteristics	Effects on health	Primary sources
Ozone	A photochemical pollutant highly reactive created by the action of the solar rays on the ozone precursors (mainly of hydrocarbons and reactive oxides of nitrogen). Often called smoked photochemical (smog photochemical).	Irritation of the eyes Attack with the respiratory function.	Sources of combustion such as the factories and the cars, and the fuel and solvent evaporation.
Carbon monoxide	The carbon monoxide is a gas without odor, without color, which is strongly toxic. Formed by the incomplete combustion of the fuels.	Attack with the transport of oxygen in blood. Aggravation of the cardiovascular diseases. Tire, headaches, confusion, giddiness. Can be mortal in the event of strong concentrations.	Gas exhaust of cars, fuel combustion, wood combustion in the chimneys and wood stoves.
Nitrogen dioxide	A reddish-brown gas, which fades the air, formed during combustion.	Elevated levels of chronic and intense respiratory diseases.	Exhaust of gas of cars and trucks with diesel, processes industrial, powerplants with fossile fuel.

Pollutant	Characteristics	Effects on health	Primary sources
Sulfur dioxide	A gas without color with an irritating bitter odor.	Aggravation of chronic diseases of obstruction of the lungs. High risk of chronic and intense respiratory diseases.	Exhaust of gas of vehicles with diesel, powerplants with oil, processes industrial.
Suspended particle	Solid and liquid particles of dust, soots, aerosols and other matters which are enough small to remain suspended in the atmosphere for one long period.	Aggravation of chronic diseases and symptoms of cardiac/pulmonary diseases.	Combustion, cars, fire of building site, factories and routes not asphalted. In the same way, a result of the photochemical processes.

Source: WHO

Thus, the pollutants can have effects according to various scales:

- Immediate effects, nobody fragile, nourrissons
- Short-term effects
- Long-term effects after a chronic exposure, even with concentrations which can be very weak

Risks on the human health

During the production run, the generating independent sources of health hazards for the public and the personnel are enumerated in the table 6.19:

Table 6.19: Sources of risk of the airport activities on the human health

Sources	Activities
Incident and accident	<ul style="list-style-type: none"> • Use or a bad handling of the equipment • Access nonprotected to active danger zones (sites of storage of dangerous matters, etc)
Direct propagation of diseases	Direct contact with people reached (visitors, passengers, personnel)
Propagation indirect of contaminants	Contamination of water, the food or environment by products imported by the passengers

Source: International STUDI

The airport management will implement a management and control plan and will take into account personnel security measures with access controls, the obligation to put Personal Protective Equipment (PPE) and maintenance and periodic maintenance of equipment at risk. Thus, the impact on the health of staff and users of the airport is estimated as low and punctual.

In addition, the monitoring of hygiene rules, consumer products and the control of their implementation in the airport minimize the risk of contamination and to a lesser extent the pest risk. The significance of the spread of diseases related to sanitation is considered low and permanent.

As in any transport project and more particularly air transport, the increase in the flow of passengers increases the risk of spreading epidemics and STI / AIDS with the absence of a rigorous health control, the impact is considered strong and sustainable.

Health and Safety Risks Due to Fire Hazards

Buildings are very prone to fire hazards because of different types of combustible materials and machines, which are used and installed, respectively. Electrical fault is by large the main culprit in fire accidents in buildings in Tanzania. The components of a fire are fuel (combustible substance), heat and oxygen. Unless all three are present fire will not occur. Fire can cause the following effects:

- Loss of lives
- Serious Injuries
- Loss of properties etc

Increased Pressure on Social Services and Utilities

The Presence of the Airport has the potential to increase pressure on social services and utilities such as electricity and water. The demand may strain the existing service delivery system in one way or the other. Based on social economic survey, Msalato in particular has a great deficit in terms of social services. The increase of population in due to employment opportunities at the airport will definitely strain the existing social services.

6.5 Cumulative Impacts

In Dodoma City, there are currently a lot of on-going and planned small and major development projects. Among these, include local and trunk roads construction (including the Outer Ring and Inner Ring Roads-on design stage), the national stadium, the construction of the Dar es Salaam-Makutopora (Dodoma) Standard Gauge Railway line; improvement of Dodoma City local roads and solid waste landfill (World Bank financed); planned improvement of stormwater drainage, construction of new headquarters for government ministries and agencies (after shifting from Dar es Salaam) etc. Many of these projects will

cause similar environmental and social impacts to the broader Dodoma City. There are no sufficient data to quantify the extent of the cumulative impacts. However, the following cumulative impacts will be potentially occur

Pressure to public utilities: Demand for services like water supply, access to sewerage, power (electricity) and waste collection and disposal will cumulatively be high. Moreover, the projects in Dodoma will attract many people to the city and further put pressure on the public services, which currently they already stressed.

HIV/AIDS and increased demand for counseling services: Considering all the on-going and planned projects happening in Dodoma, there will be increase of people interactions with eventual increase in new cases of HIV/AIDS. Despite of the efforts the government is putting to prevent the spread of the disease, with the planned projects there will be a high likelihood of the HIV/AIDS increase. In this case, there will be bigger demand for counseling services.

Job creation and improved local and national economy: The projects in Dodoma will create jobs that will improve incomes of people and the local and central government through various taxes.

Increased Greenhouse gases emission and climate change impacts: The on-going and planned infrastructure projects in Dodoma will increase greenhouse gases emissions (such as CO₂, CH₄, CO, NO_x, and Hydrocarbons) through fossil fuel use during construction and operation phases. The number of trucks mobilized during construction phase is tremendous and the through traffic that will be cruising over the roads in the city is high and further magnified by the planes that will be using the Msalato airport. The population increase of which a high percentage (over 70%) depending on charcoal for homestead use will further increase greenhouse gases emissions. The cumulative impact will contribute to global climate change with further consequences of erratic floods, drought and other associated problems.

Loss of habitat and biodiversity: Localized loss of habitat and biodiversity will be evident although to very low extent. This is not regarded as an issue.

Improved transportation and accessibility: The on-going and planned projects will make Dodoma more reachable. Internal transportation will also be improved thus propelling business and economy in Dodoma city.

6.6 Impacts during Decommissioning phase

6.6.1 Disposal of Waste from Demolished Structures

In the event of future rehabilitations and upgrading, the airport facilities may need to be demolished necessitating disposal of demolished waste. Haphazard disposal may cause contamination/impaired quality of receiving body – especially land, and water resources. Impacts associated are considered as: Negative, short term and moderate significance. This impact is local and will be of short term.

CHAPTER SEVEN

7.0 IMPACTS MITIGATION /ENHANCEMENT MEASURES AND COMPLEMENTARY INITIATIVES

This chapter is devoted to describing measures or interventions that shall be implemented so as to minimize the potential impacts identified in the preceding chapter. Many of the mitigation measures put forward are nothing more than good engineering practice that shall be adhered to during all the project phases.

7.1 Mitigation/Enhancement measures during the preparatory phase

Site selection

7.1.1 Land acquisition and population displacement

- The proponent shall determine project affected people(PAP) with land rights or properties or crops
- Compensation calculation and payment shall be guided by Land Acquisition and Compensation plan/Resettlement action plan (RAP) that takes into considerations of applicable laws of land acquisition and compensation
- Compensation shall be done before the commencement of the project.

7.1.2 Disruption of Economic and Social Activities and Services

- Tanzania Airport Authority shall strive to obtain legal rights to its land (Land right of Occupancy-Title Deed)
- Enforcement of national and international laws
- Awareness rising to community within the project core area
- Inclusion of local leaders (Ward/sub-ward chairpersons/executive officers or /and councilors in the airport security and safety committee.

7.1.3 Impacts on the cultural, archaeological and historical heritage

- The contract shall use Change Finds Procedure. The main objective of the Change Finds Procedure is to ensure correct action and minimize damage or loss in case unknown features/objects are encountered during programme activities. In case unknown features or objects are encountered especially during ground breaking works, the procedure should stop the work and require investigation by an archaeologist.
- Upon discovery of features or objects that may be of archaeological or historical interest, the responsible contractor shall stop any work that may damage or alter the position of the observed feature or object., and report to TAA for further action

7.1.4 Exploitation of borrow pits/quarries and other natural resources

- Exploitation of construction materials will be from the authorized source only

- Restoration of the borrow pits/quarries after use constituting leveling the area and seeding or planting of trees and/or grasses will be done in association with local government (natural resources department) and local environmental NGOs. If appropriate the leveled area will be left for natural re-vegetation.
- Maintain construction equipment's in good running condition and refuel restriction at the at the working site.
- Re-use of the excavated soils and demolition rubbles as part of the sub base material.
- Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc.
- Construction of underground water reserve tank and introducing rainwater harvest system.
- Extraction of underground water resources.

Design phase

7.1.5 Contamination and Impaired Quality of Receiving Body- Land and Water

- Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport.
- To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required.
- Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly disposed municipal waste at Mbanga damp site. Alternatively, in consultation with municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling.
- Introduction of waste disposal bins, warning notices, posted at strategic points, through the airport area.
- No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system.
- Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed contractor as appropriate.
- Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process.
- Waste management training for all personnel, operators and services providers at the airport.
- Liquid waste will be collected using a cesspit tanks system at the proposed airport area. When full Tanzania Airport Authority will make use of the existing municipal council/urban water supply and sewerage authority cesspit emptying services.

7.1.6 Deteriorated / Impairment of Local Air Quality due to Emission Generated from Equipment's;

- Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke.
- Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use.
- Routine Inspection of equipments

7.2 Mitigation/Enhancement measures during the construction phase

7.2.1 Mitigation/Enhancement measures on natural environment

7.2.1.1 Impacts on air quality

Impairment of air quality due to emissions

- Equipment shall be maintained in good running condition, no equipment to be used that generates excessive black smoke.
- Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use.
- There will be routine inspection of equipment
- Trucks transporting materials shall be fully covered
- Turn off engines to reduce idling

Impairment of Air Quality Due to Dust

- Protect stockpiles of friable material subject to wind through wetting.
- Cover loads with of friable material during transportation.
- Restrict speed on loose surface roads to 30Km/hr during dry or dusty conditions.
- Douse with water of roadways and work sites to reduce dust when necessary.

7.2.1.2 Impacts through noise and vibrations

- Vehicles carrying construction materials shall be restricted to work during day time only.
- Machine operators in various sections with significant noise levels shall be provided with noise protective gear.
- Construction equipments shall be selected, operated and maintained to minimize noise
- Impact pile driving shall be avoided where possible in vibration sensitive areas
- Vibratory rollers and packers shall be avoided

7.2.1.3 Disadvantages related to the management of wastewater, garbage and yard waste

- Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site and then finally to the authorised logons in Dodoma municipality
- TAA to enforce procedures to implement mitigation measures for management of non-hazardous solid wastes; transportation, use, storage and disposal of hazardous materials;

and management of fuels and hydrocarbons (oils, petroleum, lubricants) including Spill Prevention and Control Plan / Response and Contingency Plan.

- Much of the excavated soil and rubble materials will be reused as initial filling materials where levelling is required.
- Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste
- Training on waste management shall be done to all personnel, operators and services providers
- Liquid waste will be collected using a cesspit tanks system at the airport area. When full Tanzania Airport Authority will make use of the existing municipal council/urban water supply and sewerage authority cesspit emptying services.

7.2.1.4 Erosion of Exposed Surfaces

- The construction will be as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant.
- Runway water shall be diverted away from construction field
- Maintain gravel fill and/or re-vegetate around the structures
- Unnecessary ground clearance and sensitive re-alignments shall be avoided.
- Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water.
- The discharge points shall be carefully chosen to avoid erosion of arable land and creation of gullies.
- Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil.
- Directing flow to properly designated channels.
- All excavation works shall be properly backfilled and compacted.
- Sufficient ground cover will be added to protect the topsoil from rain, wind and other natural elements that gradually erodes the top layer of the soil.
- Most of construction activities will be done during dry weather
- Exploitation of construction materials will be from the authorized source only
- The borrow pits/quarries shall be restored after use constituting levelling the area and seeding or planting of trees and/or grasses will done in association with local government (natural resources department). If appropriate the levelled area will be left for natural re-vegetation.
- Construction equipments shall be maintained in good running condition and refuel restriction onsite.

7.2.1.5 Contamination and Impaired Quality of Receiving Body- Land and Water Bodies from Fuel, Oils, Lubricates Spillages/Leakages;

- Routine maintenance and checks of contractor's equipment and trucks.
- Training of site personnel in proper handling, storage and cleanup of contaminating material into the environment.
- Storage and routine handling of fuels, lubricants, oils and other potentially contaminating materials to occur in weather protected areas equipped with secondary containment systems for spills as appropriate.
- Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport.
- To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required.
- Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly disposed municipal waste at Mbanga damp site. Alternatively, in consultation with municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling.
- Introduction of waste disposal bins, warning notices, posted at strategic points, through the airport area.
- No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system.
- Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed contractor as appropriate.
- Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process.
- Waste management training for all personnel, operators and services providers at the airport.

7.2.1.5 Destruction of Vegetation Cover / Loss Local Biodiversity from Vegetation Clearance

- Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed.
- Rehabilitation by seeding or planting grasses to all areas that will not be occupied by runway, taxiway, apron, buildings and other airport facilities on the project site.
- Avoid planting non-native and exotic species on the site as well as those that constitute obstacles according to the airport regulations.

7.2.1.6 Visual Impacts / Public Health Hazards from Waste

- Light pollution can be reduced by keeping lighting (e.g. of parking lots) to the minimum levels needed for safety, and through the careful choice of light fixtures such as the use of flat-glass lanterns in car parks.
- Other measures may include landscape engineering, tree planting and ground modelling.
- Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport
- No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system.
- Waste management training for all personnel, operators and services providers at the airport.
- Locating parts of the development further away from viewers

7.2.2 Mitigation/Enhancement measures on human and socio-economic environment

7.2.2.1 Jobs creation

- The contractor shall be encouraged to employ local, unemployed yet willing to work hard, manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project.
- Employment should be on equal opportunities for both gender
- Contractor shall provide on job skills and training
- Local communities shall be encouraged to produce quality goods and services in at the project site.

7.2.2.2 Income to Local Suppliers and Service Providers

- Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers.
- Municipal council in collaboration with Tanzania Airport Authority institute good revenue collection system from the Airport.

7.2.2.3 Health hazards

- Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphics programs in schools and communities.
- Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transpiration law and standards.
- Inform community of airport construction activities and schedules.

- Noise generating equipments, operational for short periods or during the times which they will cause less disturbances.
- Awareness campaigns /Education on HIV and STDs shall be provided to workers
- Appropriate working gear (such as nose, ear mask and clothing) and good construction site management shall be provided.
- During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply.
- A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce.
- Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation;
- Incident recording and reporting protocols shall be in place
- Emergency contact details in the event of an accident shall be provided
- Develop and implement an emergency plan including spill response
- Training all contractor staff in emergency planning and spill response
- Developing a detailed health and safety plan and training all contractor staff on the plan

7.2.2.4 Impact on housing availability due to Influx of temporary workers and associated Occupational Health, safety and compromised security due to social interaction

Impact on housing availability due to Influx of temporary workers

- Contractor shall develop housing plan that will be approved by client prior to commencement of construction activities, and the plan shall be continually improved to meet the housing demand over time.
- Contractor may wish to provide transport to workers who will decide to reside in nearby town
- Workers shall receive training and sign a labour code of conduct, in order not to create conflicts with the local environment.

Occupational Health, safety and compromised security due to social interaction

- Tanzania Airport Authority and contractor shall comply with relevant Tanzania (OSHA, 18001 becomes ISO 45001) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements including the provision of Personal Protective equipment's (PPE), reasonable working hours and good working conditions and facilities.
- Develop and implement in-house manual/ guard lines on Health and Safety (H&S)

- Outer boundary fence shall be constructed as part of this construction project and shall be scheduled as one of the first activities during the implementation of the project.
- Only key construction personnel to be accommodated at the site.
- Enforcement of site security.
- Screening of security personnel.
- Prohibition of alcohol and drugs within the site.

7.2 Mitigation/Enhancement measures during the operation phase

7.3.1 Impacts on natural environment

7.3.1.1 Impacts on air quality and its contribution to climate change

In preparation of Airport Master Plan, Contractor will model aircraft movements (including ground support equipment) to determine baseline and future conditions using an atmospheric dispersion model, such as, the Emissions and Dispersion Modelling System (EDMS) recommended by the relevant authority. EDMS uses information such as the number of flights per day, types of aircraft, taxi length, idling duration, numbers and type of support vehicles and refueling duration and frequency.

The EDMS is designed to assess the air quality impacts of airport emission sources, and contains the latest aircraft engine emission factors from the International Civil Aviation Organization (ICAO) Engine Exhaust Emissions Data Bank. The FAA continues to enhance the model under the guidance of its government/industry advisory board to more effectively determine emission levels and concentrations generated by typical airport emission sources.

7.3.1.2 Risk of pollution and degradation of water quality

- The developed Surface Water Quality Program and a Spill Prevention and Response Plan will be used to manage and mitigate the pollution of surface and ground water on the proposed project site at Msalato. The ESMP describes the measuring and monitoring activities and tracks actions taken to manage surface and ground water discharges.
- Constructed wetland, septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised logons in Dodoma municipality via sewerage system to be constructed
- Minimize oil spillage
- Discharge and treat foul drainage and sewage
- Pass run off through oil interceptors

7.3.1.3 Animals and Birds Disturbance and safety

- There will perimeter fencing
- Habitat modification
- Draining out rainwater impoundment
- Use constructed wetland and septic and soak pit
- Putting strict regulatory constraints on the amount of noise that can be generated by aircrafts and on the flight paths to be followed

- Refusing planning permission where noise levels exceed 66dB(A) Leq at daytime and 57 dB(A)Leq at nighttime
- Making technical adjustments to thrusts, angle of flight decent/ take-off, speed of aircraft accent etc.

7.3.1.4 Climate change responsive design Stormwater generation and Overflows

- The design storm water drainage will be given a high priority, with the limitation of gradient (slope) required for the runway, taxiway and apron.
- Stormwater infrastructure shall consider climate change impacts. Facilities capacities shall be intentionally increase to cope with unexpected increased flows so as to avoid flooding at the airport. A climate change responsive design shall be used.
- Proper hydrology analysis will be carried out, considering the airport topographical features, amount of rainfall and catchments area as the major factors of design of storm water channel. Channel with the capacity of accommodating the amount of water found will be provided/designed.
- Rainwater harvesting will be used at the proposed airport
- The design shall consider enough greeneries in the project site

7.3.2 Impacts on the human and socio-economic environment

7.3.2.1 Noise pollutions related to road and air traffic

- The design shall accommodate multiple runways to provide a room for noise-preferential runway to be used to change noise exposure patterns. Runways will be utilized based on the noise impact the aircraft generates, along with other environmental factors such as wind direction.
- Special flight tracks/runways shall be considered to be part of design to minimize noise impacts
- Noise abatement flight procedures like steepest climb procedure and proposer orientation of runway (taking off-landing side) shall be encourage to avoid noise problem
- Passengers waiting lounges and boarding rooms will have noise proof-walls to reduce exposure to noise due to aircraft landing and take-off.

7.3.2.2 Olfactif nuance and disrupted airport operations due to inadequacies in operation and maintenance

Olfactif nuance

- The proponent shall use constructed wetland to avoid several nuances from wildlife, complaints from the discharge of partial treated wastewater and related health effects

Disrupted Airport Operations and Contamination and/Impaired Quality of Receiving Body (land and water) due to Inadequacies in Operation and Maintenances

- Water reserve tank of not less than 10,000 m³ shall be constructed at the airport
- Monitoring and reporting for routine maintenance, repairs, replacements, of all environmental sensitive areas e.g. storm water channels, waste collections and storage.

- Enforcements of all regulations instituted by the airport e.g. Warning notice

Deterioration of Public Health and Sanitary Conditions due to Inadequacy Operation and Maintenance

- Availability of adequate resource particularly money for maintenance
- Regular maintenance schedule of structures should be put in place
- Proper operational and monitoring procedures should be put in place

7.3.2 Economic and social impacts

7.3.2.1 Jobs Creation

- Employment should be on equal opportunities for both gender

7.3.2.2 Increased Commercial and Social Activities (Induced Development)

- Efficient airport operation will be in place
- Good security within the airport area and area of influence
- Undertakes Strategic Environmental Assessment (SEA) and include in the region investment strategies and plans

7.3.2.3 Health and Safety Risks Due to Fire Hazards

- Adequate number of portable fire extinguishers shall be placed at strategic locations.
- Good housekeeping shall be maintained at all sites to reduce the fire risk.
- The design of the airport shall strictly adhere to the Fire Safety Standards
- Fire detectors and sprinkler system shall be installed in the airport
- The proponent shall insure the airport against fire Hazards

7.3.2.4 Increased Pressure on Social Services and Utilities

- Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc.
- Construction of underground water reserve tank and introducing rainwater harvest system
- Extraction of underground water resources.
- Alternative measures like use of solar power, drilling a borehole at site, water recycling shall be explored and implemented if found feasible. For instance, use of energy savers bulbs shall be given high priority
- Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using natural ventilation system shall be strongly explored during the design process.

7.4 Mitigation Measures for Impacts during Decommissioning phase

7.4.1 Disposal of Waste from Demolished Structures

- Much of the excavated soil and rubble materials will be reused as initial filling materials where levelling is required.
- Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste
- Training on waste management shall be done to all personnel, operators and services providers

CHAPTER EIGHT

9.0 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. There are four types of monitoring that are also relevant to this EIA.

- **Baseline monitoring** – the measurement of environmental parameters during a pre-project period and operation period to determine the nature and ranges of natural variations and where possible establish the process of change.
- **Impact/effect monitoring:** involves the measurement of parameters (performance indicators) during establishment, operation and decommissioning phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project. This monitoring provides experience for future projects and lessons that can be used to improve methods and techniques.
- **Compliance monitoring:** takes the form of periodic sampling and continuous measurement of levels of compliance with standards and thresholds – e.g. for waste discharge, air pollution.
- **Mitigation monitoring** aims to determine the suitability and effectiveness of mitigation programs designed to diminish or compensate for adverse effects of the project.

To ensure that mitigation measures are properly done, monitoring is essential. Table 8.1 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer should be included in the project cost.

9.1 Health and Safety

Careful observance of safety regulations and guidelines will be ensured in order to avoid unhealthy occurrences:

- All workers shall be provided with safety gears including coats, overshoes, gloves and dust masks to protect them from exposure to various products, etc.
- Safety equipment will be provided and extinguishers will be situated in all buildings.
- To avoid disease transmission, the company should provide HIV, STDs and social awareness education to contractor personnel and local community
-

9.2 Cumulative impact

This development over time will result in a variety of changes. The most evident of these changes may be:

- This development will see a significant change in the land cover and landscape of the area.

- The general culture of the area would change. A more likely result is a formal urban setting with the associated physical infrastructure and amenities

9.3 Monitoring of key environmental and social parameters

Monitoring of all key environmental and social parameters that could potentially lead to an impact will be required to analyse the impacts of construction and operation on the environment. Therefore, self-mentoring and reporting techniques will be adopted to carry out monitoring. TAA Environmental Manager shall be responsible for monitoring of residual impacts. The department will identify the best monitoring techniques and frequency of selected parameters for monitoring will be followed.

An outline of the monitoring programmes proposed for the construction and operation phases, is presented in the following tables. Monitoring process will enable TAA to understand how environmental performance will change over time and will facilitate improvements to the Environmental and social management system.

Table 9.1:Monitoring programme during construction phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost (TZS) per year
Noise	Noise monitoring at direct interference (within 500 m)	Day and night noise levels	Weekly	Contractor/TAA	8,000,000
Health and safety	Health and Safety (H&S) monitoring and audits. H&S Performance evaluation Personal Protected Equipment monitoring	Total recordable incidents, lost time incidents and other H&S indicators. Records verifying the conditions of Personal Protected Equipment	Weekly	Contractor/TAA	16,000,000
	Maintain grievance	Grievance mechanism	Monthly	Contractor/TAA	5,000,000

	mechanism Analyse workers and community grievance trends Maintaining training records	records Training records			
Social	Implementing RAP	<ul style="list-style-type: none"> • Number of PAPs compensated • Number of Bank Accounts opened • Number of Buildings demolished • Number of PAPs able to establish pre-displacement activities, land, crops • Number of community properties relocated • Number of trees cleared • Number of PAPs compensated • Number of PAPs resuming business at pre-displacement level or better • Number of PAPs paid relevant allowances 	Weekly	Contractor/TAA	8,000,000

		<ul style="list-style-type: none"> • Number of consultations held • Number of vulnerable individuals supported • Number of grievances received • Number of grievance resolved 			
Total					37,000,000

Table 9.2: Monitoring programme during operation phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Underground water	Monitoring of underground Water at direct interference (within 500 m)	Physicochemical analysis of Underground water	Every 12 months for sample analysis	TAA	5,000,000
Airquality	Air emissions monitoring through a Continuous Emissions Monitoring (CEM) System	Temperature Pressure drop H2S Combustible gases	Continuous Continuous detection monitoring Continuous detection monitoring	TAA	5,000,000
Noise	Noise monitoring at direct interference (within 500 m)	Day and night noise levels	Every 6 months for the first two years	TAA	3,000,000
Health and safety	Inspection of the emergency and detection	Maintenance check, services and record verifying the condition of the	According to the manufacturer	TAA	4,000,000

	systems	emergency shutdown, fire detection, H2S detection, combustible gas detection and fire water systems			
	Inspection of the Personal Protected Equipment (PPE) and the safety equipment	Visual inspection and records verifying the condition of the safety equipment (life rafts, life jackets, flares, smoke canisters)	Monthly	TAA	8,000,000
	Monitoring of Health and Safety implementation by the workforce		Monthly	TAA	5,000,000
Total					30,000,000

Table 9.3: Monitoring programme during decommissioning phase

Receptor	Monitoring activities	Monitoring parameter	Timing	Responsibility	Cost
Underground water	Monitoring of ground water quality	Turbidity / Suspended solids and Oil and grease	Weekly One month after direct interference	TAA/contractor	5,000,000
	Identification and reporting of leakage	Number of leakage events caused during	Continuous		2,000,000

	events	the construction			
Noise	Noise monitoring at direct interference (within 500 m)	Day and night noise levels	Weekly		5,000,000
Health and safety	Health and Safety (H&S) monitoring and audits. H&S Performance evaluation Personal Protected Equipment monitoring	Total recordable incidents, lost time incidents and other H&S indicators. Records verifying the conditions of Personal Protected Equipment	Weekly		5,000,000
	Maintain grievance mechanism Analyse workers and community grievance trends Maintaining training records	Grievance mechanism records Training records	Monthly		5,000,000
Total					22,000,000

CHAPTER NINE

9.0 SUMMARY OF PUBLIC CONSULTATIONS AND THE OPINIONS EXPRESSED

9.1 Stakeholders Identification

The consultants organized consultation meetings soliciting public opinions from Ward Office and mtaa office. The consultant team also held interviews and meetings with officials from government ministries, departments and agencies, district authorities and mtaa leaders (Table 9.1). Thus, the following emerged as the key stakeholders for the proposed Msalato airport and their signatures are shown in appendix 1.

Table 9.1: Key stakeholder

Stakeholder	Justification
Project Proponent –Tanzania Aviation Authority	As client for the project are responsible for provision of all necessary information with regard to the proposed project for ESIA purposes.
Ministries: Ministry of Natural Resources and Tourism (Wildlife division), Ministry of Natural Resources and Tourism (Tourism Division), Ministry of Agriculture, Livestock and Fisheries and Tanzania Tourist Board	These are statutory body with regard to EIA approval process and thus were automatically involved.
Local Government Authorities: the Dodoma Municipal Council staffs and key personnel such as: District Engineer, Environmental and Health Officer, Msalato ward and street leaders, and Nzuguni ward and street leaders	-These are daily responsible for overseeing social economic activities and developmental activities are undertaken in harmony with the community, environment and the legal aspects of the area and the development within their area of jurisdiction.
Neighbours and institutions within the project area	These could be affected parties with respect to the project development due to their closeness to the project site

Typically, the Agenda for the consultations included:

- Presenting the Project:
- Obtaining their environmental and socio-economic concerns and perceptions regarding the proposed project which included; land use of the project site, land ownership conflicts, envisaged negative environmental impacts, negative and positive impacts of the project, management aspects of the identified negative impacts, enhancement mechanism of positive impacts and aspects to be considered for sustainable project operations. Figure 9.1 shows local community

attending the consultative meeting during RAP exercise. The method used to get the views of the stakeholders was through professional discussion



Figure 9..1: Picture showing community consultative meeting at Msalato Ward

5.2 Stakeholders' Concerns and Recommendations

Consultations with stakeholder were carried out to determine socio-economic aspirations of the local and also assess the people's perception about the proposed project. Generally, consultation with local stakeholders indicated that they generally view the proposed project as a positive venture that might stimulate new economic and social activities and enhance development in Dodoma region and Tanzania in general. In addition, participants were convinced that the project would not pose irreversible negative impacts on the environment or community in the foreseeable future. Immediate threats of the proposed project to the nearby communities were identified as air pollution and noise (Table 9.2).

5.3. Response of Negative and Positive Impacts

The study provided a wide variety of views and opinions on what are considered to be the main concerns and issues of different stakeholders. The raised concerns were analysed and then given a due weight based on the frequency of issue was raised. Stakeholders

expect that the project proponent will take their views into consideration in the planning and implementation of the project as per chapter seven, eight and nine.

Table 9.2: Issues Raised by the Stakeholders

S/ N	Category of Stakeholders	Issues Raised
1.	Ministry of Natural resources and Tourism (Wildlife Division)	<ul style="list-style-type: none"> ○ It is very important to have a new Airport in Dodoma since the existing one is around town and it is the small one ○ TAA must make sure that there is no close community especially close to the landing park ○ Airbuses should have Gadgets in their Engine ○ Airport design must comply with Dodoma Urban planning ○ Dodoma is growing rapidly now more than ever considering that the Government is moving there ○ It also very important to put more consideration to Soil type and wind blowing such as Cross, Head and Tail winds ○ Runways must be well designed with lights ○ More considerations must be brought to vegetation to be planted at the site, with root types, flowers and fruits trees are more advantageous, trees can also break wind speed and create micro climate which add more oxygen ○ Water supply should also be considered ○ For the air busses (flight) transport costs must consider value of money ○ TAA should put more encouragement and sensitization on Airbuses (Flight) usage than buses
2	Ministry of Natural Resources and Tourism (Tourism Division)	<ul style="list-style-type: none"> ○ It is important to put more consideration on endangered species, identification of all species then if possible endangered one must be translocated ○ Waste disposal has to be well designed for solid, liquid and gaseous wastes ○ The project should ensure the availability of well managed sanitation systems at the site like drainage system and sewerage system. ○ The Airport design should be part of attraction and environmental friendly, good example of Kualarlumpa Airport in Malaysia ○ Dust during construction has to be well controlled

S/ N	Category of Stakeholders	Issues Raised
		<p>and managed not to affect the surrounding community</p> <ul style="list-style-type: none"> ○ Foreseen business which might impact the surrounding with the right disposal mechanisms ○ Indigenous species which found in Dodoma
3	Ministry of Agriculture, Livestock and Fisheries	<ul style="list-style-type: none"> ○ Location and size of the new Airport has to be out of the town (city center) with provision of facilities, plan has to go beyond 50 Years in consideration of future expansion ○ Airport access roads should be wide enough to easily reach flight on time without traffic jam ○ Reliable Electricity, water supply (with wide diameter pipes) good design to accommodate all important facilities ○ There must be a reliable waste management system and it has to be well organised and manageable ○ Airport design has to consider communication system & security in maximum as well as fire fighting, disabled, first Aid system ○ Livestock tress passing has to be given a priority ○ The project site should be fenced ○ Selection of perennial tree species to be planted at the project site, this will get rid of wind ○ There will be loss of biodiversity due to destruction of birds, insects and animal habitat ○ The design must include provision of accommodation facilities nearby such as nice hotels, Bank services, duty shop etc ○ More consideration on Tourism attraction to announce and promote Tanzania such Mount Kilimanjaro, Game reserve, National parks etc
4	Tanzania Tourist Board	<ul style="list-style-type: none"> ○ Big Investments will be attracted such as five star hotels since Msalato Airport is about to be there, and also because Dodoma is a real capital city of Tanzania now ○ Presence of an International Airport in Dodoma it will open Tourism in southern part of Tanzania, especially in Ruaha National Park will be easily accessed from Dodoma than from Dar es salaam Airport

S/ N	Category of Stakeholders	Issues Raised
		<ul style="list-style-type: none"> ○ Presence of Airport will speed up Dodoma into a big city, It will also speed up nearby Regions such as Iringa ○ Tanzania Tourist Board deals with Tourism Promotion, so having an International Airport in Dodoma will boost up Tourism, facilitate travel, and accommodation to our Guests ○ In design point of view, Airport itself can be an attraction, please put that into consideration
5	Dodoma Municipal Council	<p>From the economic point of view the following are noted:</p> <ul style="list-style-type: none"> ○ Increase in population with its attendant effects-note that 2012 census showed that DMC had 410,956 residents ○ Increase in employment and income generating avenues ○ More opportunities arising from businesses such as taxi, hotels, passenger arrivals and departures ○ Development of small scale industries ○ Tourism will be boosted. e.g. the rock paintings in Kondoa and local culture ○ The airport will make it easier for people to travel to and fro as many government offices shifted to Dodoma ○ Impetus for developments in the neighbouring villages which will translate into many spinoffs such as increased revenue for the council, transforming the subsistence economy into a more monetized one ○ Employment during and after construction and locals must be given first priority <p>Environmental impacts and concerns are:</p> <ul style="list-style-type: none"> ○ Sourcing construction/building materials such as sand, G 45, gravel and aggregates-possible sites are Ntyuka, Chigongwe, Mahomanyika, Mbalawala and closer villages such as Msalato itself... ○ Issue of burrow pits and what happens after ○ How will the waste (including liquids) and debris be disposed ○ Design of the Msalato Airport should be an environmental friendly, it should have some recreational advantageous

S/ N	Category of Stakeholders	Issues Raised
		<p>Human precautions These pertain to impacts on workforce that will be engaged in the construction of the airport</p> <ul style="list-style-type: none"> ○ Provision of Personal Protective Equipment (PPEs) ○ Health status of employees to be checked ○ Monitoring of what goes on between the contactor and workers poses the greatest challenges because experience has shown that the former faults regulations or does not adhere to what the laws [labour] stipulates ○ There is also a precaution on what may happen to livestock around the area e.g. eating waste/debris from the activities in the site ○ HIV/AIDS awareness and sensitization must be given to the local community, since there is going to have social interaction and different culture <p>2. Social issues</p> <ul style="list-style-type: none"> ○ The fact that the proposed airport has taken so long to materialise has led to unforeseen developments such as encroachment on the site by human activities ○ Protracted question of fair and adequate compensation; many people complain that they got inadequate compensation and others are not yet compensated; others have lodged new compensation claims on land they allege they owned either as a result of “bega kwa bega” farming campaigns or villagisation ○ Introduction of the project to all levels from District, wards and streets ○ There should have strategies which will bring development to the surrounding community such as water supply etc ○ It is obvious that there was lack of coordination among the various institutions (PMO, DMC, TAA) such that monitoring slacked or was absent altogether ○ Resettlement issues must be cleared as early as possible ○ Speculators have emerged especially now that it is becoming certain that the project will take off Value of land that has escalated <p>Height limitation on development of the city</p> <ul style="list-style-type: none"> ○ The height zoning is not yet in place. The committee has been appointed by Prime Minister officer to review the 2010 master plan of the city. This has not yet

S/ N	Category of Stakeholders	Issues Raised
		<p>started. Dodoma Municipal council recommends that TAA to continue developing the plot since the flying and landing zones as well as the surrounding proposed airport has single storey buildings. The new master plan will accommodate all the requirements of height zoning for smooth aircraft operations.</p> <ul style="list-style-type: none"> ○ The height zoning is developed at CBD only. The maximum height is 8 storey at the center and keeps decreasing outside the CBD.
6	Dodoma Water and Sewerage Authority	<ul style="list-style-type: none"> ○ The contractor who will be awarded the proposed project for construction shall visit DUWASA office to get the pipe layout plan so that he/she cannot destroy the infrastructure
7	Tanzania Airport Authority - Dodoma	<ul style="list-style-type: none"> ○ There are still four (4) houses standing within the airport area, due to their owners not being satisfied with the compensation given ○ Apart from 1,438 people having been compensated amounting to 1.3 billion shillings in 2008, in July 2010 another 870 claimants from Nzuguni and Mahomanyika lodged claims for crops and land within the airport area which were sent to the Municipal Council and estimated to be worth 3.8 billion shillings ○ In 2012 the amount of claimants has increased to 1,053 ○ Will provide enough information on Resettlement situation of the project site ○ We are planning o taking the whole area close to the main road just to avoid Community interlocation ○ We are hoping that RAP will be included as part in your report ○ Wildlife study will be included in the final report ○ ICAO standards can be used in relation to Airport Standards ○ It will be great if we can go together as a one team in site visitation ○ Transfer of knowledge has to be done and one of TAA Environmental officer must attend ○ We are going to provide all the documents needed, such as ICAO Standards, TAA waste management procedures/guidelines etc.

S/ N	Category of Stakeholders	Issues Raised
8	Msalato and Nzuguni Wards & Mtaa/Street representatives	<p><u>Social Economic Impacts</u></p> <ul style="list-style-type: none"> ○ The building of the airport is a welcome idea which will bring colossal benefits ranging from economic spin offs to stimulating entrepreneurship in an otherwise lethargic economic base...opportunities will be at our door steps ○ Infrastructure will be improved such of roads, water etc ○ Employment within the construction site will be generated as well as on the fringes ○ The village has some building materials which can be used by the project and thereby inject cash into the village economy <p><u>Social and Environmental Concerns</u></p> <ul style="list-style-type: none"> ○ It is a fact that Msalato has been squeezed by the airport project, Prisons, and JWTZ which surround the village ○ As a result, on average a villager has between a quarter of an acre to one acre where before people and more land ○ Apparently the village pivotal as it has not been surveyed ○ There has been a significant in migration from other areas some out of speculation on benefits of the new airports ○ There will be degradations on the environment e.g. clearing of vegetation will make the area bare expose villagers to winds ○ This has been demonstrated by the current contractor who has dug burrow pits inside the village causing disturbance and discomfort to villagers, the school etc.; and he does so with temerity and apparently in collusion with fellow villagers/leaders ○ Lack of awareness on what is going on: even the master plan concepts are not known to the ordinary villagers ○ Delaying of the project has had its impact on villagers' outlook, who have continued to utilize the resources of the airport site such as grazing livestock, farming season crops and even making bricks in the site <p><u>Recommendations</u></p> <ul style="list-style-type: none"> ○ Give priority to locals when employing labourers ○ Improve social services ○ Settle compensation claims ○ Plant trees to grapple with winds and inculcate culture of tree growing ○ Ensure cooperation (full involvement) between the

S/ N	Category of Stakeholders	Issues Raised
		<p>contractor and the affected people (villagers)</p> <ul style="list-style-type: none"> ○ Build police post to combat any criminal activities that might arise ○ Conduct awareness campaigns/programmes including about the project and its possible impacts, HIV and its prevention, ○ Filling of the borrow pits ○ Participates in community social response taking an example of TANAPA ○ For any extension of the area the ward offices should be consulted

9.4 Analysis of Stakeholder Concerns

According to the Environmental Management Act Cap 191 of 2004 and Environmental Impact Assessment and Audit Regulations of 2005 regulation 17, the EIA process emphasizes the significance of engaging stakeholders as partners in the planning and implementation of a proposed development. To be in line with the Environmental legal requirements all key stakeholders were consulted.

Generally, consultation with local stakeholders indicated that they generally view the proposed project as a positive venture that might stimulate new economic and social activities and enhance development in Dodoma region and country at large. In addition, participants were convinced that the project would not pose irreversible negative impacts on the environment or community in the foreseeable future.

Socio-economic issues that emerged during the consultations with stakeholders and from other sources regarding the proposed project were categorized and sorted into specific topics. The categorization includes economic impacts – employment, businesses, livelihoods, health impacts; safety and security; community services; and general wellbeing impacts. Both actual and perceived impacts are described, having been gathered from people's opinion as well as factual data and comment.

Most of the economic impacts of the proposed project are positive. Many of the anticipated community impacts – especially on safety and competition for limited community services and resources - are based on the belief that the presence of more than expected number of people migrating to the project area due to employment opportunities and on the other hand will lead to generation of solid wastes and liquid wastes that need prompt handling. The identified socio-economic impacts are summarized in the following Table 9.3.

Table 9.3: Identified socio-economic impacts

Topics	Aspect	Potential Impacts
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Economic issues	Macro economics	<ul style="list-style-type: none"> Levy and tax payments to the Government resulting in local and national economic development
	Employment	<ul style="list-style-type: none"> Availability of jobs
	Business and market opportunities	<ul style="list-style-type: none"> Opportunities for local businesses to provide goods and services to the community
Health issues	Noise levels to the community	<ul style="list-style-type: none"> Perceived there will be an increase of noise levels in the area due to construction activities
	Air quality – dust from the project	<ul style="list-style-type: none"> Increase in dust generation and fumes/emissions from the project resulting from increased activity/movement and thus leading to airborne diseases
Occupational and Safety issues	Occupational accidents	<ul style="list-style-type: none"> Increased risk of accidents to community due to traffic movements
Demographics and population movements	Influx of people in project area	<ul style="list-style-type: none"> Competition for community services Increased adverse social impacts associated with the influx of people Increased economic opportunities
General wellbeing	Community expectations, attitudes and perceptions	<ul style="list-style-type: none"> Raised expectations for job opportunities and other benefits
Closure and post-closure	Decommissioning and closure of facilities	<ul style="list-style-type: none"> Generation of employment for decommissioning & demolition of facilities; Creation of community benefits from scrap metals and other reusable materials
	Long-term impacts	<ul style="list-style-type: none"> Decreased health risks and other negative impacts following cessation of operations Loss of economic opportunities

Source: Consultant analysis, July 2017 to February 2018

CHAPTER TEN

10.0 ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT PLAN

10.1 Impact Management Plan

Plans for the implementation of mitigation measures for the proposed project are provided below. The Plans indicate institutional responsibilities, time to take the action and estimated costs. The proposed costs are only indicative, should the proposed development proceed with the suggested changes, the developer will work out on actual costs and include them in the overall cost of the project. Based on the EMA, (URT 2004), NEMC is required to ensure compliance of all the agreed conditions for authorization. The measures are given in Table 10.1. TAA is committed to implement the mitigation measures suggested by the Environmental and Social Impact Management Plan (ESMP).

10.2 Implementation of the Management Plan

The environmental and social mitigation measures incorporated in the detailed engineering design shall be handed over to the contractor during construction period. The Contractor shall take stock of the contents of the Environmental and Social Management Plan of the Project. The contractor shall implement the ESMP during the construction period under close supervision of TAA Management. During the Operation Phase, TAA Management and the real estate firm that will manage the building will implement the ESMP.

10.3 Environmental and Social Cost

The principal environmental and social cost includes the cost for implementing the mitigation measures proposed. These costs are indicated in Table 10.1 TAA shall cover all the costs proposed in the ESMP.

Table 10.1: Environmental and Social Impact Management Plan for the proposed Msalato Airport in Dodoma
(Note: ESMP implementation cost are indicated with * and monitoring and capacity building cost are indicated with # mark)

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation	Monitoring frequency	Relative cost (TZS)
Preparatory phase					
Land acquisition and population displacement	<ul style="list-style-type: none"> ○ The proponent shall determine project affected people(PAP) with land rights or properties or crops ○ Compensation calculation and payment shall be guided by Land Acquisition and Compensation plan/Resettlement action plan (RAP) that takes into considerations of applicable laws of land acquisition and compensation ○ Compensation shall be done before the commencement of the project. 	Contractor/ TAA	Preparatory phase		200, 000,000
Disruption of Economic and Social Activities and Services	<ul style="list-style-type: none"> ○ Tanzania Airport Authority shall strive to obtain legal rights to its land (Land right of Occupancy-Title Deed) ○ Enforcement of national and international laws ○ Awareness rising to community within the project core area ○ Inclusion of local leaders (Ward/sub-ward chairpersons/executive officers or /and councilors in the airport security and safety committee. 	Contractor/ TAA	Preparatory phase		

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
Impacts on the cultural, archaeological and historical heritage	<ul style="list-style-type: none"> ○ The contract shall use Change Finds Procedure. The main objective of the Change Finds Procedure is to ensure correct action and minimize damage or loss in case unknown features/objects are encountered during programme activities. In case unknown features or objects are encountered especially during ground breaking works, the procedure should stop the work and require investigation by an archaeologist. ○ Upon discovery of features or objects that may be of archaeological or historical interest, the responsible contractor shall stop any work that may damage or alter the position of the observed feature or object., and report to TAA for further action 	Contractor/ TAA	Preparatory phase		
Exploitation of borrow pits/quarries and other natural resources	<ul style="list-style-type: none"> ○ Exploitation of construction materials will be from the authorized source only ○ Restoration of the borrow pits/quarries after use constituting leveling the area and seeding or planting of trees and/or grasses will done in association with local government (natural resources department) and local environmental NGOs. If appropriate the leveled area will be left for 	Contractor/ TAA	Preparatory phase	Daily	5,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> natural re-vegetation. ○ Maintain construction equipment's in good running condition and refuel restriction at the at the working site. ○ Re-use of the excavated soils and demolition rubbles as part of the sub base material. ○ Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc. ○ Construction of underground water reserve tank and introducing rainwater harvest system. ○ Extraction of underground water resources. 				
Contamination and Impaired Quality of Receiving Body-Land and Water	<ul style="list-style-type: none"> ○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport. ○ To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required. ○ Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly 	Contractor/ TAA	Preparatory phase	Daily	15,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>disposed municipal waste at Mbanga damp site. Alternatively, in consultation with municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling.</p> <ul style="list-style-type: none"> ○ Introduction of waste disposal bins, warning notices, posted at strategic points, through the airport area. ○ No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system. ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed contractor as appropriate. ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process. ○ Waste management training for all personnel, operators and services providers at the airport. 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Liquid waste will be collected using a cesspit tanks system at the proposed airport area. When full Tanzania Airport Authority will make use of the existing municipal council/urban water supply and sewerage authority cesspit emptying services 				
Deteriorated / Impairment of Local Air Quality due to Emission Generated from Equipment's	<ul style="list-style-type: none"> ○ Maintain equipment in good running condition, no equipment to be used that generates excessive black smoke. ○ Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switch off engines when not in use. ○ Routine Inspection of equipment 	Contractor/ TAA	Preparatory phase	Daily	10,000,000*
Construction Phase					
Impacts on air quality	<ul style="list-style-type: none"> ○ Equipment shall be maintained in good running condition, no equipment to be used that generates excessive black smoke. ○ Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use. ○ There will be routine inspection of equipment ○ Trucks transporting materials shall be fully covered 	TAA/ Contractor	Construction phase	Daily	20,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Turn off engines to reduce idling ○ Protect stockpiles of friable material subject to wind through wetting. ○ Cover loads with of friable material during transportation. ○ Restrict speed on loose surface roads to 30Km/hr during dry or dusty conditions. ○ Douse with water of roadways and work sites to reduce dust when necessary. 				
Impacts through noise and vibrations	<ul style="list-style-type: none"> ○ Vehicles carrying construction materials shall be restricted to work during day time only. ○ Machine operators in various sections with significant noise levels shall be provided with noise protective gear. ○ Construction equipments shall be selected, operated and maintained to minimize noise ○ Impact pile driving shall be avoided where possible in vibration sensitive areas ○ Vibratory rollers and packers shall be avoided 	Contractor/TAA	Construction phase	Daily	2,000,000#
Disadvantages related to the management of wastewater, garbage	<ul style="list-style-type: none"> ○ Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site and then finally to the leveling d logons in Dodoma 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	50,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
and yard waste	<ul style="list-style-type: none"> ○ municipality ○ TAA to enforce procedures to implement mitigation measures for management of non-hazardous solid wastes; transportation, use, storage and disposal of hazardous materials; and management of fuels and hydrocarbons (oils, petroleum, lubricants) including Spill Prevention and Control Plan / Response and Contingency Plan. ○ Much of the excavated soil and rubble materials will be reused as initial filling materials where leveling is required. ○ Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste ○ Training on waste management shall be done to all personnel, operators and services providers 				
Erosion of Exposed Surfaces	<ul style="list-style-type: none"> ○ The construction will be as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant. ○ Runway water shall be diverted away from 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	7,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>construction field</p> <ul style="list-style-type: none"> ○ Maintain gravel fill and/or re-vegetate around the structures ○ Unnecessary ground clearance and sensitive re-alignments shall be avoided. ○ Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. ○ The discharge points shall be carefully chosen to avoid erosion of arable land and creation of gullies. ○ Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil. ○ Directing flow to properly designated channels. ○ All excavation works shall be properly backfilled and compacted. ○ Sufficient ground cover will be added to protect the topsoil from rain, wind and other natural elements that gradually erodes the top layer of the soil. ○ Most of construction activities will be done during dry weather ○ Exploitation of construction materials will be from the authorized source only 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ The borrow pits/quarries shall be restored after use constituting levelling the area and seeding or planting of trees and/or grasses will done in association with local government (natural resources department). If appropriate the levelled area will be left for natural re-vegetation. ○ Construction equipments shall be maintained in good running condition and refuel restriction onsite. 				
Contamination and Impaired Quality of Receiving Body-Land and Water Bodies from Fuel, Oils, Lubricates Spillages/Leakages	<ul style="list-style-type: none"> ○ Routine maintenance and checks of contractor's equipment and trucks. ○ Training of site personnel in proper handling, storage and cleanup of contaminating material into the environment. ○ Storage and routine handling of fuels, lubricants, oils and other potentially contaminating materials to occur in weather protected areas equipped with secondary containment systems for spills as appropriate. ○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	10,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ To reduce the cost of the project, much of the excavated soil and rubble materials will be reused as initial filling materials where leveling of runway, taxiway and apron is required. ○ Cleared vegetation, top soil and rubble from demolished buildings at the airport area will be used to cover haphazardly disposed municipal waste at Mbanga damp site. Alternatively, in consultation with municipal council, the waste will be used to fill up any other infrastructures (roads, pits etc) that needs filling. ○ Introduction of waste disposal bins, warning notices, posted at strategic points, through the airport area. ○ No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system. ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g. Batteries, plastics, rubbers, tyres, etc) shall be removed from the airport for recycling, treatment, and/or disposal by licensed 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> contractor as appropriate. ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process. ○ Waste management training for all personnel, operators and services providers at the airport. 				
Destruction of Vegetation Cover / Loss Local Biodiversity from Vegetation Clearance	<ul style="list-style-type: none"> ○ Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed. ○ Rehabilitation by seeding or planting grasses to all areas that will not be occupied by runway, taxiway, apron, buildings and other airport facilities on the project site. ○ Avoid planting non-native and exotic species on the site as well as those that constitute obstacles according to the airport regulations. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	10,000,000*
Visual Impacts / Public Health Hazards from Waste	<ul style="list-style-type: none"> ○ Light pollution can be reduced by keeping lighting (e.g. of parking lots) to the minimum levels needed for safety, and through the careful choice of light fixtures 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification	20,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>such as the use of flat-glass lanterns in car parks.</p> <ul style="list-style-type: none"> Other measures may include landscape engineering, tree planting and ground modeling. Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at the airport No, on site burial or open burning of solid waste shall be permitted at the airport. Tanzania Airport Authority will make use of the existing municipal council solid waste disposal and collection system. Waste management training for all personnel, operators and services providers at the airport. Locating parts of the development further away from viewers 			Report	
Potential Impacts on the human health and safety	<ul style="list-style-type: none"> Awareness campaigns /Education on HIV and STDs shall be provided to workers Appropriate working gear (such as nose, ear mask and clothing) and good 	TAA/Contractor	Construction phase	Quarterly monitoring and number of complaints on	8,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>construction site management shall be provided.</p> <ul style="list-style-type: none"> ○ During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. ○ A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce. ○ Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation; ○ Incident recording and reporting protocols shall be in place ○ Emergency contact details in the event of an accident shall be provided ○ Develop and implement an emergency plan including spill response ○ Training all contractor staff in emergency 			health issues	

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> planning and spill response Developing a detailed health and safety plan and training all contractor staff on the plan 				
Jobs creation	<ul style="list-style-type: none"> The contractor shall be encouraged to employ local, unemployed yet willing to work hard, manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project. Employment should be on equal opportunities for both gender Contractor shall provide on job skills and training Local communities shall be encouraged to produce quality goods and services in at the project site. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	5,000,000*
Increase of Wastewater generation	<ul style="list-style-type: none"> Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak away Pit within the site and then finally to the authorised logons in Dodoma municipality. 	TAA	Construction phase	Weekly	9,000,000*
Income to Local Suppliers and Service Providers	<ul style="list-style-type: none"> Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers. Municipal council in collaboration with 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification	1,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	Tanzania Airport Authority institute good revenue collection system from the Airport.			Report	
Health hazards	<ul style="list-style-type: none"> ○ Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphics programs in schools and communities. ○ Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transpiration law and standards. ○ Inform community of airport construction activities and schedules. ○ Noise generating equipments, operational for short periods or during the times which they will cause less disturbances. ○ Awareness campaigns /Education on HIV and STDs shall be provided to workers ○ Appropriate working gear (such as nose, ear mask and clothing) and good 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	20,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>construction site management shall be provided.</p> <ul style="list-style-type: none"> ○ During construction the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. ○ A well-stocked First Aid kit (administered by medical personnel) shall be maintained at construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce. ○ Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation; ○ Incident recording and reporting protocols shall be in place ○ Emergency contact details in the event of an accident shall be provided ○ Develop and implement an emergency plan including spill response ○ Training all contractor staff in emergency 				

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	planning and spill response <ul style="list-style-type: none"> Developing a detailed health and safety plan and training all contractor staff on the plan 				
Impact on housing availability due to Influx of temporary workers and associated Occupational Health, safety and compromised security due to social interaction	<ul style="list-style-type: none"> Contractor shall develop housing plan that will be approved by client prior to commencement of construction activities, and the plan shall be continually improved to meet the housing demand over time. Contractor may wish to provide transport to workers who will decide to reside in nearby town Workers shall receive training and sign a labour code of conduct, in order not to create conflicts with the local environment. Tanzania Airport Authority and contractor shall comply with relevant Tanzania (OSHA, 18001 becomes ISO 45001) and International Finance Cooperation's Performance Standards and regulations on health and safety requirements including the provision of Personal Protective equipment's (PPE), reasonable working hours and good working conditions and facilities. 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	30,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Develop and implement in-house manual/guard lines on Health and Safety (H&S) ○ Outer boundary fence shall be constructed as part of this construction project and shall be scheduled as one of the first activities during the implementation of the project. ○ Only key construction personnel to be accommodated at the site. ○ Enforcement of site security. ○ Screening of security personnel. ○ Prohibition of alcohol and drugs within the site. 				
Operational Phase					
Impacts on air quality and its contribution to climate change	<ul style="list-style-type: none"> ○ In preparation of Airport Master Plan, Contractor will model aircraft movements (including ground support equipment) to determine baseline and future conditions using an atmospheric dispersion model, such as, the Emissions and Dispersion Modelling System (EDMS) recommended by the relevant authority. EDMS uses information such as the number of flights per day, types of aircraft, taxi length, idling duration, numbers and type of support vehicles and refueling duration and frequency. The EDMS is designed to assess 	TAA/CDA/Municipal council	Operation phase	Quarterly monitoring and Verification Report	8,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	the air quality impacts of airport emission sources, and contains the latest aircraft engine emission factors from the International Civil Aviation Organization (ICAO) Engine Exhaust Emissions Data Bank. The FAA continues to enhance the model under the guidance of its government/industry advisory board to more effectively determine emission levels and concentrations generated by typical airport emission sources.				
Risk of pollution and degradation of water quality	<ul style="list-style-type: none"> ○ The developed Surface Water Quality Program and a Spill Prevention and Response Plan will be used to manage and mitigate the pollution of surface and ground water on the proposed project site at Msalato. The ESMP describes the measuring and monitoring activities and tracks actions taken to manage surface and ground water discharges. ○ Constructed wetland, septic tank and soak away shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorized logons in Dodoma municipality via sewerage system to be constructed 	TAA	Operation phase	Quarterly monitoring and Verification Report	7,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<ul style="list-style-type: none"> ○ Minimize oil spillage ○ Discharge and treat foul drainage and sewage ○ Pass run off through oil interceptors 				
Animals and Birds Disturbance and safety	<ul style="list-style-type: none"> ○ Perimeter fencing ○ Habitat modification ○ Draining out rainwater impoundment ○ Use constructed wetland and septic and soak pit ○ Putting strict regulatory constraints on the amount of noise that can be generated by aircrafts and on the flight paths to be followed ○ Refusing planning permission where noise levels exceed 66dB(A) Leq at daytime and 57 dB(A)Leq at nighttime ○ Making technical adjustments to thrusts, angle of flight decent/ take-off, speed of aircraft accent etc. 	TAA	Operation phase	Quarterly monitoring and Verification Report	10,000,000*
Stormwater generation and Overflows	<ul style="list-style-type: none"> ○ The design storm water drainage will be given a high priority, with the limitation of gradient (slope) required for the runway, taxiway and apron. ○ Proper hydrology analysis will be carried out, considering the airport topographical features, amount of rainfall and catchments 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	10,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>area as the major factors of design of storm water channel. Channel with the capacity of accommodating the amount of water found will be provided/designed.</p> <ul style="list-style-type: none"> ○ Rainwater harvesting will be used at the proposed airport ○ The design shall consider enough greeneries in the project site 				
Noise pollutions related to road and air traffic	<ul style="list-style-type: none"> ○ The design shall accommodate multiple runways so as to provide a room for noise-preferential runway to be used to change noise exposure patterns. Runways will be utilized based on the noise impact the aircraft generates, along with other environmental factors such as wind direction. ○ Special flight tracks/runways shall be considered to be part of design to minimize noise impacts ○ Noise Abatement flight procedures like steepest climb procedure and proposer orientation of runway (taking off-landing side) shall be encourage to avoid noise problem ○ Passengers waiting lounge and boarding room will have noise proof-walls to reduce exposure to noise due to aircraft landing and 	TAA	Operation phase	Quarterly monitoring and Verification Report	25,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	take-off.				
Olfactif nuance and disrupted airport operations due to inadequacies in operation and maintenance	<ul style="list-style-type: none"> ○ The proponent shall use constructed wetland to avoid several nuances from wildlife, complaints from the discharge of partial treated wastewater and related health effect ○ Water reserve tank of not less than 10,000 m³ shall be constructed at the airport ○ Monitoring and reporting for routine maintenance, repairs, replacements, of all environmental sensitive areas e.g. storm water channels, waste collections and storage. ○ Enforcements of all regulations instituted by the airport e.g. Warning notice ○ Availability of adequate resource particularly money for maintenance ○ Regular maintenance schedule of structures should be put in place ○ Proper operational and monitoring procedures should be put in place 	TAA	Operation phase	Quarterly monitoring and Verification Report	60,000,000#

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
Jobs creation	<ul style="list-style-type: none"> ○ Employment should be on equal opportunities for both gender 				
Increased Commercial and Social Activities (Induced Development)	<ul style="list-style-type: none"> ○ Efficient airport operation will be in place ○ Good security within the airport area and area of influence ○ Undertakes Strategic Environmental Assessment (SEA) and include in the region investment strategies and plans 	TAA/Contractor	Construction phase	Quarterly monitoring and Verification Report	40,000,000*
Health and Safety Risks Due to Fire Hazards	<ul style="list-style-type: none"> ○ Adequate number of portable fire extinguishers shall be placed at strategic locations. ○ Good housekeeping shall be maintained at all sites to reduce the fire risk. ○ The design of the airport shall strictly adhere to the Fire Safety Standards ○ Fire detectors and sprinkler system shall be installed in the airport ○ The proponent shall insure the airport against fire Hazards 	TAA	Operation phase	Quarterly monitoring and Verification Report	20,000,000*
Increased Pressure on Social Services and Utilities	<ul style="list-style-type: none"> ○ Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc. ○ Construction of underground water reserve tank and introducing rainwater harvest system ○ Extraction of underground water resources. ○ Alternative measures like use of solar power, drilling a borehole at site, water recycling shall 	TAA	Operation phase	Quarterly monitoring and Verification Report	10,000,000*

Identified Impact	Mitigation Measure	Responsible Institution	Time mitigation of	Monitoring frequency	Relative cost (TZS)
	<p>be explored and implemented if found feasible. For instance, use of energy savers bulbs shall be given high priority</p> <ul style="list-style-type: none"> ○ Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using natural ventilation system shall be strongly explored during the design process. 				
Total cost of mitigation measure (TZS)					412,000,000
ESMP Implementation					271,000,000
ESMP Monitoring cost					105,000,000
HIV/AIDS awareness and capacity building					36,000,000

CHAPTER ELEVEN

11.0 CONCLUSION

It is quite evident that the construction and operation of the proposed new airport in Dodoma will improve aircraft movement in the area and hence bringing positive effects in the study area including creation of employment, availability of social amenities and facilities, improved infrastructure, and increase in revenue among others. With Dodoma becoming centrally placed, the justification for this project cannot be emphasized.

Although the project will come with various positive impacts, negative impacts will also be experienced hence the need to also critically examine them. The project as such, is likely to have some adverse environmental impacts of which adequate mitigation measures have to be proposed and incorporated in the project design. As a result, the Consultant is of the opinion that the activities of mobilisation, construction and the operation phase should be well mitigated the views of which are shared by the proponent who is committed to implementing the proposed mitigation measures. Hence, the Environmental Management plan provides a way forward for implementation of the appropriate mitigation measures to eliminate or minimize the negative impacts. In addition, it is expected that the proposed monitoring programmes would be implemented to ensure that the project operates within a framework of environmental sustainability and social acceptance.

It is advised that the Tanzania Airport Authority should establish an environmental control unit to be responsible for monitoring the application of the environmental management plan and the monitoring plan which need to be mitigated for effective and efficient management of the project.

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34. peroxide/barium perchlorate/Thorin method
35. TZS 837: 6: 2004 – Sampling and test methods – Determination of carbon monoxide
36. carbon dioxide and oxygen Performance characteristics and calibration of automated

37. measuring systems.
38. TZA 837: 5: 2004 – Air Quality - Sampling and test methods – Determination of the
39. mass concentration of nitrogen oxides; Naphthylmethylenediamine photometric method.
40. TZA 837: 3: 2004 – Air Quality - Sampling and test methods – Stationary source
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APPENDICES

Appendix 1: List of Stakeholders: Post consultation

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF MSALATO
INTERNATIONAL AIRPORT IN DODOMA MUNICIPALITY, TANZANIA

S/N	DATE	NAME	INSTITUTION	POSITION/DESIGNATION	PHONE NO.	SIGNATURE
1	08/02/18	William Affayo	DMC	Town Planner	0659719184 0659719184	
2	—	ALLY M. MOHAMED	KATA MSALATO	ZIWANI	0715213585	
3	08-2-12	ELIAS C. SARAGA	KATA MSALATO	VDO-MSALATO	0713420751	
4		NASSOON B. CHIMYA	MIKITI WA MTAA.		0719-337188	
5	8/2/2018	EMANUEL R. MARENGO	MIKITI WA MTAA MSALATO	MIKITI MTAA MSALATO	0759646925	

NAME	INSTITUTION	POSITION/DESIGNATION	PHONE NO.	SIGNATURE
FATUMA M. DOOW	KILIMO KATA MSALATO	KILIMO KATA	0789 850750	
JULIUS S. MASHSE	MSALATO	AFISA MSHENDELEO	0756 313470	
MUHAMMAD FERUJ	SEDOJE	KATIBU BARAZA	0756 204886	
ELIZABETH MURENDA	MSALATO	MSUMBE	0742559820	
EDUARDO JOTA MUGUJI	MSALATO	MJUMBE KATA	—	
MALIKI B. PANJA	MSALATO	MJUMBE	0762433691	
WILSONI MSHAKA	MSALATO	MJUMBE	0755 094889	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF MSALATO INTERNATIONAL AIRPORT IN DODOMA MUNICIPALITY TANZANIA REGION

SN	DATE	NAME	INSTITUTION	POSITION	PHONE NUMBER	SIGNATURE
01	9/02/18	HAPPINESS P. KARUGABA	DMC	ENO	0764041639	
2	10/2/2018	HAKUSI S. JUMA	WEO KATA NZUGUNI	WEO	0767566633	
3	10/2/2018	DANI NJAMASI	NZUGUNIA	M/KITI	0756284205	
4	10/2/2018	SIWAZURI D. KALIKULE	NZUGUNIB	MEO	0753168133	
5	10/02/2018	JOEL K. LAISSER	NZUGUNIKATA	FA	0713066251	
6	10/2/2018	CHARLES M. MAGUN	N-KUGUNIB	M/KITI	0753578980	
7	10/7/2018	STEPHEN MASINE	KITELEDA	M/KITI	0757090143	
8	10/7/2018	EDGAR A. FUNGO	MEO MATHAM	MEO	0652 626219	
9	04/10/2018	ASHA-H. CHOGHE	NZUGUNI Almaendeleo	Almaendeleo	0657849455	

S/N	DATE	NAME	INSTITUTION	POSITION/DESIGNATION	PHONE NO.	SIGNATURE
01	23/02/17	Aeme Musingu	OTHA	1H1	072519240	

STAKEHOLDERS CONSULTATION FOR THE CONSULTANCY SERVICES FOR REVIEW OF FEASIBILITY STUDY AND DETAILED ENGINEERING DESIGN OF MSALATO AIRPORT IN DODOMA MUNICIPAL COUNCIL

S/N	NAME	INSTITUTION	POSITION	ADDRESS/PHONE NO	SIGNATURE
1	CAPTAIN M/NJA W. A.	WILDLIFE DIVISION	PRINCIPAL GAME OFFICER	MNRT, BOX 9372, DAR 0754370751	
2	Deograsias J. Mdamu	Tourism Division (MNRT)	Assistant Director Licensing & Quality Control	MNRT, MPANGO HSE 15472, DSM (9372) 0754815618	
3	YUSUF H. SELENGE	MALF (LIVESTOCK)	ENVIRONMENTAL SPECIALIST	0754586095 0789238761	
4	CONRAD J. NDOMBA	MALF (LIVESTOCK)	PRINCIPAL ENVIRONMENTAL SCIENTIST	0755000622 0655-000622	
5	Philip Chitangwa	TTB	Tourism Service Manager	Ufalili House D'salaam 0784806252	

7/2/2017	ELIKI C. KATISA	MSALATO	MED	0753420751	
7/8/2017	Mufungo B. NANKAMU	ATISA	ATISA	0756480156	
4/08/2017	IRENE F. MUILE	TANZANIA TOURIST BOARD	ATISA	0782318324	
9/08/2017	Focus J. Kadeshe	TANZANIA AIRPORTS AUTHORITY	ENGINEER	0764-459540	
09/08/2017	JOYCE A. KASEBELE	TANZANIA AIRPORTS AUTHORITY	ENVIRONMENTAL OFFICER	0716647675	
09/02/2017	Jefta Timanywa	TAA	Environment Officer	0759 334220	

MUHTASARI WA KIKAO CHA DHARULA CHA WDC
KILICHOFANYIKA TAREHE 08/02/ 2018.

MADA

1. KUFUNGUA KIKAO
2. UFAHAMU WA MRADI WA UJENZI WA UWANJA WA NDEGE WA KIMATAIFA KATA YA MSALATO.
3. FAIDA NA HASARA ZA UWEPO WA MRADI WA UJENZI WA UWANJA WA NDEGE KWA JAMII NAMAZINGIRA.
4. MENGINEYO
5. KUFUNGA KIKAO

MADA/1/2018 KUFUNGUA KIKAO

Mwenyekiti wa kikao Mh: Diwani alifungua kikao muda wa saa 4:30 asubuhi kwa kuwakaribisha wajumbe kwenye kikao,wajumbe walijitambulisha pia mwenyekiti alimuomba mtoa mada BI NURU MWANTIMWA aweze kujitambulisha na kuwasalimia wajumbe.

MADA /2/2018 UFAHAMU WA MRADI WA UJENZI WA UWANJA WA NDEGE WA KIMATAIFA -MSALATO.

- Mtoa mada aliwauliza wajumbe iwapo wanafahamu kuwa katika kata yao kuna mradi mkubwa , unasubiri kutekelezwa kuhusiana na ujenzi wa uwanja wa ndege wa kimataifa. Kwa pamoja wajumbe walijibu mradi wanaufahamu vizuri ili kuna baadhi ya changamoto ambazo zitahitaji ufumbuzi kabla ya mradi kuanza
 - (a) Kuna baadhi ya wananchi hawa kulipwa kabisa fidia zao
 - (b) Kuna baadhi ya wananchi walipunjwa fidia zao
- Mtoa mada alitaka kufahamu kutoka kwa wajumbe awali eneo lililotengwa la uwanja wa ndege lilikuwa likitumika kwa shughuli gani? Majibu kutoka kwa

mjumbe mmoja eneo hili lilitumika kwa shughuli za makazi pamoja na kilimo (makazi na shughuli za kibinadamu) (i.e. Kilimo, ufugaji).

- Mtoa mada alitakakujua ndani ya eneo la uwanja wa ndege kuna makaburi ya jumuiya? Jibu kutoka kwa mjumbe mmoja kweli ndani ya eneo lilotengwa kulikuwa na makaburi ya jumuiya na baadhi ya wananchi walizikwa katika mashamba yao. Ivyo makaburi yapo na hayajalipwa

MADA 3/2018 FAIDA NA HASARA ZA UWEPO WA MRADI WA UJENZI WA UWANJA WA NDEGE KWA JAMII NA MAZINGIRA .

- Mtoa mada alitakafahamu kutoka kwa wajumbe kuwa uwepo wa mradi huu hapa Msalato utakuwa na faida au hasara yoyote kwa jamii . jibu lililotoka kwa mjumbe mmoja ni kweli faida na hasara zitakuwepo kutokana na ujenzi wa uwanja wa ndege katika kata yetu. Mtoa mada akatakawajumbe waanze kuchangia faida za uwepo wa uwanja wa ndege na baada ya faida tuone hasara zake.

(a) FAIDA

- (i) Kukuwa kwa biashara ndani ya kata yetu hoteli za kisasa, pamoja na nyumba za wageni zitajengwa.
- (ii) Uwepo wa uwanja utarahisisha usafiri ndani na nje ya nchi yetu pamoja na Mkoa wetu.
- (iii) Uwepo wa uwanja wa ndege utaboresha mazingira kwani miti na maua itapandwa kuzunguka uwanja na viunga vyake.
- (iv) Uwepo wa uwanja wa ndege ni fursa ya ajira kwa watu wa msalato na mkoa wote wa Dodoma .
- (v) Uwepo wa uwanja wa ndege utasababisha ongezeko la watu ndani ya kata hii ni fursa ya kibiashara ndani ya kata na Mkoa pia.
- (vi) Uwepo wa uwanja wa ndege utazidi kuimarisha upatikanaji wa huduma kwa jamii mfano benki mbalimbali .zitajengwa katika eneo la uwanja wa ndege.

- (vii) Uwepo wa uwanja wa ndege utaimarisha suala la usalama ndani ya kata yetu kutokana na vyombo mbalimbali vya ulinzi/ usalama kujengwa.

(b) HASARA ZITOKANAZO NA UWEPO WAKE

- (i) uharibifu wa mazingira pamoja na makazi ya viumbe hai wakati wa utekelezaji wa ujenzi wa uwanja wa ndege, miti itakatwa na baadhi ya vilima, mabwawa kuondolewa.
- (ii) Uwepo wa uwanja utasabisha ongozeko la uhalifu kwasababu kutakuwa na wageni wengi wanaingia na kutoka katika kata yetu.
- (iii) Ongezeko la Magonjwa mfano HIV/AIDS ndani ya kata kwasababu ya ongezeko la watu na hasa wageni na yale ya mlipuko mfano kipindupindu.
- (iv) Ongezeko la watoto wa mitaani kwasababu wakati wa ujenzi kutokuwa na mahusiano yatakayojengeka na baadhi ya wanawake wataachiwa watoto pamoja na mimba zisizotarajiwa na mafundi ujenzi au vibarua.
- (v) Watu watakaohama / waliokwesha hama kupisha ujenzi wa uwanja wa ndege awali walikuwa wa ekari 2 sasa hawana hata ekari bali wanakiwanja cha kujenga nyumba tu
- (vi) Uwanja baada ya kukamilika na ndege kuanza kutua na kuruka zitazalisha makelele kwa jamii (Noise pollution) pia moshi utaweza kuathiri afya za jamii.

MADA 4/2018 MENGINEYO

➤ Mtoa mada alitaka kujua kama wajumbe wana maoni ya ziada yeyote kuhusiana na ujenzi wa uwanja wa ndege. Wajumbe walitoa maoni yao kama ifuatavyo:-

- (i) Kwa makapuni yatakayotekeleza huu mradi yatoe kipaumbele cha ajira kwa jamii ya wakazi wa msalato wa kata za jirani.
- (ii) Kwa marekebisho yoyote kuhusiana na upanuzi au chochote kile kinachohusu uwanja wa ndege ofisi ya kata wapate taarifa kisha jamii ihabadirishwe.

- (iii) Baada ya kukamilisha ujenzi eneo lililochuliwa au kuchimbwa kifusi lifukiwe kuzuia hathari zinazoweza kujitokeza kwa kuwapo kwa mashimo makubwa. Pia miti ipandwe kwa wingi .
- (iv) Mamlaka ya viwanja vya ndege ifyeke pori kubwa ndani ya eneo lililotengwa la uwanja wa ndege kwani linatumika kwa maovu na uhalifu vyakati zote usiku hata mchana kwa kipindi hiki mradi haujaanza.

MADA5/2018 KUFUNGA KIKAO

Mwenyekiti MH: Diwani alifunga kikao muda wa saa 8:20 mchana kwa kumshukuru mtoa mada pamoja wajumbe wote kwa mawazo yao mazuri katika uchangiaji wa mada.

Imethibitishwa

.....
MH: ALLY M. MOHAMED

MWENYEKITI

.....
[Signature]

KATIBU

**ALISA MTENDAJI WA MTI
MSALATO KATA YA MSA
MANIPAA YA DODOW**
08/2/2017

**MUHTASARI WA KIKAO CHA PAMOJA KATI YA VIONGOZI WA KATA
NZUGUNI NA MTAALAMU WA MAZINGIRA TOKA DAR – ES- SALAAM**

TAREHE 10/02/2018

WALIOHUDHURIA

Majina ya wajumbe waliohudhuria katika kikao hicho yameambatanishwa katika muhtasari huu.

AGENDA ZA KIKAO

1. Kufungua kikao
2. Utafiti wa Mazingira katika eneo linalotarajiwa kujengwa uwanja wa ndege Msalato – Dodoma
3. Kufunga kikao

AGENDA NA. 1: KUFUNGUA KIKAO

Kikao kilifunguliwa mnamo saa 2:30 asubuhi na mwenyekiti wa kikao hicho ambaye ni mwenyekiti wa mtaa wa Nzuguni "A" kwa kuwashukuru wajumbe wote waliohudhuria katika kikao hicho na kuwaomba wajumbe wa kikao kutokuwa na wasiwasi katika kuchangia maoni yao ili kufanikisha au kufikia malengo ya kikao.

**AGENDA NA. 2: UTAFITI WA MAZINGIRA KATIKA ENEO LINALOTARAJIWA
KUJENGWA UWANJA WA NDEGE MSALATO DODOMA**

Mwenyekiti wa kikao alimwomba mtaalamu toka ofisi ya utafiti wa mazingira Dar – es – Salaam kuwaeleza wajumbe wa kikao nini lengo lake hasa.

Mtaalamu huyo wa utafiti wa mazingira alianza kuwaeleza wajumbe wa kikao kuwa, serikali inatarajia au inakusudia kujenga uwanja wa ndege katika eneo lililopo Msalato mkoani Dodoma, lakini tangu wananchi wa eneo hilo kufanyiwa uthamini wa maeneo yao ni miaka saba imeshapita sheria ya mazingira inasema kuwa, sehemu yoyote ikifanyiwa uthamini lakini ikapita miaka mitatu (3) bila mradi kusudiwa kufanyika, inatakiwa utafiti wa mazingira ufanyike upya ili kujua athari, faida na changamoto mbalimbali katika eneo la mradi, hivyo mtaalamu huyo aliwaomba wajumbe wa kikao kuelezea hivyo vitu vitatu wakianza na faida za mradi, athari za mradi na changamoto za mradi.

FAIDA ZA MRADI

- Watu mbalimbali watapata fursa ya kufanya biashara kwa kipindi cha utekelezaji wa mradi
- Wakazi wa mtaa wa kitelela ambapo mradi unapita karibu watapata huduma ya usafiri kwani kwa sasa ili mtu wa mtaa huo aweze kufika mjini ni lazima akodi bodaboda mpaka Msalato ndipo apate usafiri wa gari.
- Watu mbalimbali watapata ajira kwa kufanya vibarua mbalimbali kama vile kazi zinazohitaji ufundi na kazi ambazo hazihitaji ufundi.

ATHARI ZA MRADI

- Kuwa na msongamano wa watu wengi watakaokuja kwa ajili ya kufanya kazi/vibarua
- Maambukizi ya **HIV** na **VVU** yatajitokeza kwani kutakuwa na watu wengi ukichukulia wanafanya kazi na kupata fedha.
- Uharibifu wa mazingira utakaotokana na utekelezaji wa mradi husika kama vile uchimbaji wa mchanga, kifusi n.k. na kusababisha kuwepo kwa makorongo na mashimo mbalimbali, pia mabaki mbalimbali yatakayotokana na shughuli za mradi

CHANGAMOTO ZILIZOPO


Wajumbe wa kikao walimweleza mtaalamu huyo wa mazingira kuwa, changamoto iliyopo kwa sasa ni moja tu nayo ni ya baadhi ya watu waliofanyiwa uthamini wa maeneo yao kutolipwa fidia ya maeneo yao; suala hili limekuwa likileta shida kweli kwani hakuna kiongozi yeyote ambaye amekuwa na majibu sahihi juu ya changamoto hiyo.

Baada ya vitu vyote hivyo kuanishwa na wajumbe mtaalamu huyo alisema amevipokea na kuahidi kuvifikisha katika mamlaka zinazohusika.

AGENDA NA. 3: KUFUNGA KIKAO

Kikao kilifungwa mnamo saa 3:20 asubuhi na mwenyekiti wa kikao hicho ambaye ni mwenyekiti wa mtaa wa Nzuguni "A"

Danny Njamasi
Mwenyekiti wa Kikao








Hamisi S. Jigwa
Katibu wa Kikao
AFISA MTENDAJI
KATA YA NZUGUNI

Appendix 2: List of Stakeholders: Pre-consultation










PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY

LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
1.	ELIJAH SIAPENDA	GEREZA MSALATO	0757802647 0785275927		24.04.2014
2.	Rev. Can. Yusuf Mwanika	DODOMA Theod. Cdg.	0754769583	Yusuf Mwanika 	24.04.2014
3	Sr. Dr. Genina Mwanza	N.I.C. ST. GENINA HOSP	0754753183	Genina Mwanza 	25-04-2014
4	Sr. Avelina M. Solaya	M. MUKU	0755417619	Avelina M. Solaya 	25-04-2014
5	Sr. MACKANDA THOMAS	H/SECRETARY	0758953045	Mackanda Thomas 	25/04/2014









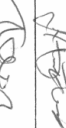


PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY

LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
1.	ISAYA ANTON	Mkulima	0657255823		25/11/2014
2.	Yohana Matayo	Mkulima	0767945583		25/11/2014
3.	Emmanuel Chitini	Mkulima	0763035513		25/11/2014
4.	ABUBAKAR Hamad	Mfalme/Baridiana	0754078402		25/11/2014
5.	Mohamed SATTARAH	Mkulima	0756405588		25/11/2014
6.	MUSGODHA Mohamed	Mkulima	0755802271		25/11/2014
7.	SAMUEL MLEMETA	Mkulima	-		25/11/2013
8.	SAFARIKIMBOWE.N.	Mkulima	0719=4014944 0767=231061		25/11/2014
9.	CHRISTOPHER LEBARA	Mkulima	0756355278		25/11/2014
10.	DICKSON Mwakinda	Fundi	0753159015		25/11/2014
11.	Lalbert Mwakinda	Technician	0759469072		25/11/2014

PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY












LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
12	Hamsi Omeri	BISTARA	0754-291340		29/4/2014
13	Hasid Said Kasim	Funda	0752014885		25/4/2014
14	Mika Mtem	Mkulima	0756875476		25/4/2014
15	Emmanuel	Mkulima	0755117453		25/4/2014
16	ENEST MUEE	Mkulima	0766879869		25/4/2014
17	Simon JACKSON	Mkulima	07645569585		25/4/2014
18	Abraham Mbatia	BISTARA	0755247507		25/04/2014
19	Hariri Kuremy	Mkulima	0764526794		25/4/2014
20	FURAHIA	UHGILE	0757657318		25/04/2014
21	EUGENI BENEDICT	Fundi	0754-673437		25/4/2014
22	Amil Kamdhani	Fundi	0764-264716		25/4/2014

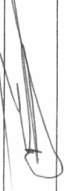







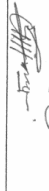
LIST OF STAKEHOLDERS

180

PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY
LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
1	MASAFIRI, E. KAKATI	NZUGUNI/NEO	0767-253148		25/04/2014
2	HENRI KASIM KENIA	M/KI TOROZO	0765821321		25/04/2014
3	ELIJAH MATHEAUS	M/KI TOROZO	—		25/04/2014
4	ASHONAN MAKANDI	BHO	0782-825625		25/04/2014
5	SUZANA NJAMBUJA	M/NYIKA	0716 9644502		25/04/2014
6	MODESTI CHISUMU	M/NYIKA	0765294083		25-4-2014
7	CHARISIDA CHITOTO	M/NYIKA	0766 902137		25/04/2014
8	JORAHU T-SAKYA	M/NYIKA	—		25/04-2014
9	MATTHEW CHITOTO	M/NYIKA	0762900255		25/04/2014
10	MANUEL L. WUMU	M/NYIKA	0754353709		25/04/2014
11	EMANUEL MANGE	M/NYIKA	0756175034		25/04/2014

PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY
LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
1.	MICHAEL LEO	WED-Mwanga	0766733186		25/4/2014
2.	PETER MSHAGASI	M/Kili S/Kuu M/Nyika	0766039062		" "
3.	Wilson Daus	" " Mzumbuni	0764-288468		" "
4.	Shebracu Maghail	Mwanga - M/Nyika			
5.	MOSSI' MACHEMBA	M/S/ Kisi. Mwanga	0756686274		25/4/2014
6.	ELIN BATHO	Mwanga			" "
7.	JULIUS B. MENDO	M/Kili Kiboko - Mwanga	0763 937894		25/4/2014
8.	AB KRUU MATHANEY	Mwanga S/K	0756-311535		25/04/2014
9.	MUSSEDA S. MACHAMBA	M/Kili S/K. Kiboko	0766039062		25/04/2014
10.	CHARLES M. MACHAMBA	M/Kili Kiboko	0763578980		25/04/2014
11.	MUSA PAUL	Mwanga			

PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY
LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
1.	SERASTIHI NIKOBA	MUKULIMA	0754769579	Stand.	28-04-2014
2.	MARIM JUMA	MUKULIMA	—		28-4-2014
3.	THANE HAJI SARD	MUKULIMA	0752050395	H. H. Sued	25-4-2014
4.	ELISABETH KASBEKA	RAKSHALA	0755778229	Mwambi	25-4-2014
5.	Mwancharusi Salim	Mukulima	0769896557	M.S	25-4-2014
6.	AMINA ISSA	Mukulima	0753399978	ISSA	25-4-2014
7.	CHIKU OMARI	Mukulima	0788-161107		25-4-2014
8.	ROSEMARY MUDHAMBWE	Mukulima	0765-399578	R. smwambi	25-4-2014
9.	CELINA Mwendu	Mukulima	—	C.M	25-4-2014
10.	PAULINA Mwendu	Mukulima	0765706388	P. Mwendu	25-4-2014
11.	JALILI HASANI	Mukulima	0754997548	J. HASANI	25-4-2014

PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY
LIST OF STAKEHOLDERS

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
12	ANNA MATHWA	MJUMBE	- - -	A. mathwa	25/04/2014
13	TELESIA MATHWA	MJUMBE	075343870	T. mathwa	25/04/2014
14	ATRIKA SEMA	MJUMBE KATA	0754686665		25/04/2014
15	VELIAN CHUBWA	MJUMBE S/MWANA	0762735608		25/04/2014
16	STANLEY C. MWIKWA	VEO - KITELEA	0756343499		26/04/2014
17	LIGA MUMUKO	MJUMBE/mw		L. Mumuko	25/04/2014

PROPOSED MSALATO AIRPORT, DODOMA MUNICIPALITY
LIST OF STAKEHOLDERS - MAYUTI (Mbaraka)

S/NO	JINA	OFISI/CHEO	SIMU/EMAIL	SAINI	TAREHE
1	WALLACE Lusinde	Dhambi - Mayuti	0757-920000	<i>Handwritten signature</i>	25.04.2014
2	ALBY M. MCHANGU	DURAZO BUSACDO	0715213585	<i>Handwritten signature</i>	— " —
3	MAREKIM JUMA	MUENYEHITI TIPATA	0752-423905	V. Juma	— " —
4	MARETTA LYMO	AFISA MTENDATI MIA	0769-900022	<i>Handwritten signature</i>	— " —
5	ZUTUMU MSITUMU	AFISA MTENDATI MIA	0719 261622	<i>Handwritten signature</i>	— " —
6	JACOB Mbatia	AFISA MTENDATI MIA	0713 529179	<i>Handwritten signature</i>	— " —
7	HARUNA Bwenda	AFISA MTENDATI MIA	0754-648514	<i>Handwritten signature</i>	— " —
8	HAJIBU MUSAFA	MJUMBE		119	— " —
9	GABRIEL EZEKELE	MJUMBE		<i>Handwritten signature</i>	25.11.14
10					
11					