

Environmental and Social Impact Assessment (ESIA) Report for Bishoftu International Airport Project

Environmental and Social Impact Assessment (ESIA) Report for Bishoftu International Airport Project

Issue and Revision Record

Revision	Document Type	Prepared by	Reviewed by	Approved By	Issue Date
0	Draft Inception Report	All Team Members	Dr.Yared Girma	DAR	24/11/2024
01	Final Inception Report	All Team Members	Dr.Yared Girma	DAR	9/12/2024
02	Final Screeing Report	All Team Members	Dr.Yared Girma	DAR	1/01/2025
03	Screeing Report Approval			EPA	11/02/2025
04	Draft Report	All Team Members	Dr.Yared Girma	DAR	31/03/2025
05	Final Report	All Team Members	Dr.Yared Girma	DAR	25/04/2025
06	Revised Final Report	All Team Members	Dr.Yared Girma	DAR	15/07/2025
07	Revised Final Report	All Team Members	Dr.Yared Girma	DAR	25/08/2025

Declaration

Environmental and Social Impact Assessment (ESIA) of Bishoftu International Airport

Project Location: Bishoftu, Ethiopia

Project Proponent: Ethiopian Airlines Group

Consultant Name: ETG Designers and Consultants Sh.Co.

Declaration of the Proponent

Ethiopian Airlines Group confirm that the content of this report is a true representation of the Environmental and Social Impact Assessment of Bishoftu International Airport Project.

Signature

Date

Declaration of the Consultant

ETG Designers and Consultants Sh.Co confirms that the contents of this report was compiled independently and with no financial interest in the project. The facts presented here are a true representation of the findings for Environmental and Social Impact Assessment of Bishoftu International Airport Project.

Signature

Date

10/08/2025


የአካባቢ ጤናና ጥበቃ ዘርፍ (ዶ/ር)
አካባቢ ጤናና ጥበቃ ዘርፍ
Yared Girma (Dr.)
Environment, Water Supply and
Sanitation Directorate Director

TABLE OF CONTENTS

LIST OF TABLES	xvii
LIST OF FIGURES	xxi
ACRONYMS.....	xxv
EXECUTIVE SUMMARY	xxviii
1. INTRODUCTION.....	1
1.1. Background	1
1.2. Project objective	2
1.3. ESIA study objectives	3
1.4. Scopes of Service for ESIA Study	4
1.5. Team in Charge Of the ESIA Study.....	8
2. APPROACHES AND METHODOLOGY	10
2.1. Approach	10
2.2. Methodology	12
2.1.1. Review of relevant documents, policies and guidelines	12
2.1.2. Screening.....	14
2.1.3. Scoping	14
2.1.4. Baseline Assessment.....	16
2.1.5. Stakeholder and Public Consultations	22
2.1.6. Identification and Analysis of Environmental and Socioeconomic Impacts	25
3. DESCRIPTION OF THE PROJECT	28
3.1. Project Location	28
3.2. Traffic Forecast	29
3.3. Runway.....	32
3.4. Passenger Terminal Building and Facilities.....	34
3.5. Cargo Facilities	37

3.6. Airport Support Facilities.....	39
3.7. Utilities Requirements.....	43
3.7.1. Electrical Requirements	43
3.7.2. Water Requirements.....	46
3.7.3. Drainage and Stormwater Management.....	46
3.7.4. Solid and Liquid Waste Generation and Management	48
3.7.5. ICT/Telecommunication Networks	54
3.8. Fuel Farm	55
3.9. Potential of the Project Area for Solar and Other Renewable Energy Sources	58
3.9.1. Solar Energy Potential	59
3.9.2. Wind Energy Potential.....	59
3.10. Airport City	59
3.11. Transportation Strategy	62
3.12. Implementation Plan	65
3.13. Cost Estimate.....	72
3.14. Proposed Project Activities	73
3.14.1. Pre-Planning/Mobilization Phase	73
3.14.2. Construction Phase	73
3.14.3. Operation Phase	74
3.15. Work Schedule and Manpower	74
3.16. Construction Equipment and Materials.....	78
3.16.1. Construction Equipment.....	78
3.16.2. Construction Materials	80
3.17. Borrow Pits / Quarries.....	80
3.18. Land Acquisition and Resettlement	82
4. LEGAL AND INSTITUTIONAL FRAMEWORK.....	84
4.1. Constitution of the Federal Democratic Republic of Ethiopia.....	84

4.2. National Policies	85
4.2.1. Environmental Policy of Ethiopia (1997)	85
4.2.2. Water Resource Policy (1998)	87
4.2.3. National Policy on Women (1993)	88
4.2.4. National Social Protection Policy of Ethiopia (1994).....	89
4.2.5. National Health Policy (1993)	90
4.2.6. National HIV/AIDS Policy (1998)	91
4.2.7. Wildlife Policy (2006)	93
4.3. Strategies and Programs	93
4.3.1. Climate Resilient Green Economy Strategy (2011).....	93
4.3.2. Conservation Strategies (1990).....	96
4.4. Pertinent Proclamations and Regulations.....	96
4.4.1. Environmental Impact Assessment Proclamation (No.299/2002).....	96
4.4.2. Environmental Pollution Control Proclamation (No.300/2002).....	97
4.4.3. Solid Waste Management Proclamation (No. 513/2007)	98
4.4.4. Industrial Pollution Regulation (No.159/2008)	99
4.4.5. Research and Conservation of Cultural Heritage (No 209/2000).....	99
4.4.6. Ethiopian Water Resources Management Proclamation (197/2000).....	100
4.4.7. Proclamation on Public Health	101
4.4.8. Labor Proclamation No 1156/2019.....	102
4.4.9. Proclamation on Establishment of Environmental Protection Organs (No. 295/2002)	104
4.4.10. Legislation on Expropriation of Land and Compensation Proclamation No. 1161/2019	105
4.4.11. FDRE Council of Ministers Regulation (472/2020)	107
4.4.12. Proclamation on Ethiopian Airlines Group Establishment	109
4.4.13. Ethiopian Airlines Group Environmental Policy	110

4.4.14.	Ethiopian Airlines Group Environmental Management System (EMS) Manual	111
4.4.15.	Ethiopian Airlines Solid Waste Management Procedure	113
4.5.	Environmental Guidelines and Standards	116
4.5.1.	Environmental Impact Assessment Guideline (2000)	116
4.5.2.	EIA Procedural Guideline (2003)	117
4.5.3.	Environmental and Social Management Plan Preparation Guideline (2004) ..	118
4.5.4.	Environmental Impact Assessment Directive (1/2008)	119
4.5.5.	Guideline Air Quality Standards for Ethiopia (2003).....	119
4.5.6.	Ambient Noise Standards and Vibration Limits for Ethiopia (2003)	120
4.5.7.	Surface Water Quality Standards for Ethiopia (2003).....	121
4.6.	Environmental and Social Safeguard Policies and Procedures of African Development Bank.....	122
4.6.1.	The Integrated Safeguards Systems (ISS) of the AfDB.....	122
4.6.2.	The AfDB Integrated Safeguards System (ISS)	125
4.6.2.1.	E&S OS 1 (OS1): Assessment and Management of Environmental and Social Risks and Impacts.....	125
4.6.2.2.	E&S OS 2 (OS2): Labour and Working Conditions	127
4.6.2.3.	E&S OS 3 (OS3): Resource Efficiency and Pollution Prevention and Management	129
4.6.2.4.	E&S OS 4 (OS4): Community Health, Safety and Security	130
4.6.2.5.	E&S OS 5 (OS5): Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement	132
4.6.2.6.	E&S OS 6 (OS6): Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources.....	134
4.6.2.7.	E&S OS 7 (OS7): Vulnerable Groups.....	135
4.6.2.8.	E&S OS 8 (OS8): Cultural Heritage.....	137

4.6.2.9. E&S O 10 (OS10): Stakeholder Engagement and Information Disclosure	139
4.7. Comparison of the National legislations and the AfDB's Operational Standards ..	140
4.8. IFC Performance Standards	142
4.8.1. IFC PS 1: Assessment and Management of Environmental and Social Risks and Impacts	143
4.8.2. IFC PS 2: Labor and Working Conditions.....	143
4.8.3. IFC PS 3: Resource Efficiency and Pollution Prevention	144
4.8.4. IFC PS 4: Community Health, Safety, and Security.....	145
4.8.5. IFC PS 5: Land Acquisition and Involuntary Resettlement.....	145
4.8.6. IFC PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	146
4.8.7. IFC PS 7: Indigenous Peoples.....	146
4.8.8. IFC PS 8: Cultural Heritage	147
4.9. World Bank's Environmental and Social Policy Framework	148
4.10. World Bank Environmental, Health and Safety (EHS) Guidelines for Airports	149
4.11. Environment Related International Agreements Signed by Ethiopia	151
4.12. International Environmental Standards in the Aviation Sector.....	154
4.12.1. Guidance on the Balanced Approach to Aircraft Noise Management	154
4.12.2. ICAO Standards on Aircraft Engine Emissions (Annex 16, Vol. III)	155
4.12.3. International Air Transport Association Environmental Assessment Program	156
4.13. Required Permits, Licenses, and Authorizations in Ethiopia.....	156
4.14. Institutional Context.....	158
5. BASELINE CONDITION OF THE PROJECT AREA.....	161
5.1. Socio-Economic Environment	161
5.1.1. Population size of the project area	161
5.1.2. Economic Activity	162

5.1.3.	Land User Pattern	166
5.1.4.	Household's land ownership status.....	167
5.1.5.	Housing Conditions and ownership	168
5.1.6.	Existing Social Services.....	168
5.1.6.1.	Education facilities	168
5.1.6.2.	Health Facilities	170
5.1.6.3.	Telecommunication Service	170
5.1.6.4.	Electric Power Supply	171
5.1.6.5.	Road Network and Transport	171
5.1.6.6.	Religion	172
5.1.6.7.	Mutual Help Organization	173
5.1.7.	Vulnerable Groups	175
5.1.8.	Water Supply and Sanitation	176
5.1.9.	Employment and Labor Market	177
5.2.	Physical Environment	178
5.2.1.	Climate.....	178
5.2.1.1.	Rainfall Trends	178
5.2.1.2.	Temperature Trends.....	179
5.2.1.3.	Humidity Trends.....	181
5.2.1.4.	Wind Speed Trends	181
5.2.1.5.	Sunshine hours.....	182
5.2.1.6.	Evapotranspiration.....	183
5.2.2.	Ambient Air quality	183
5.2.3.	Noise quality	189
5.2.4.	Topography	192
5.2.5.	Soil	193
5.2.6.	Geology.....	197

4.1.6.1 Local Lithological Units.....	198
5.2.7. Hydrology and Drainage pattern.....	200
5.2.8. Water Resource	202
5.2.9. Water quality.....	205
5.2.10. Land Use Land Cover Analysis	211
5.2.11. Climate Change Vulnerability Assessment.....	213
5.2.11.1. Historical Analysis of Climate-Related Weather Hazards	213
5.2.11.2. Future Climate Projections and Scenarios within the Project Area.....	213
5.2.11.3. Exposure of the Project Area to Climate Hazards	214
5.2.11.4. Sensitivity Assessment	215
5.2.11.5. Prioritized Risks	216
5.2.11.6. Adaptive Capacity	216
5.3. Biological Environment	217
5.3.1. Vegetation and Flora.....	217
5.3.2. Species Abundance and Dominance	221
5.3.3. Agricultural Biodiversity	223
5.3.4. Habitats and Fauna.....	224
5.3.4.1. Domestic animals	224
5.3.4.2. Wild animals.....	225
5.3.4.3. Birds.....	226
5.3.4.4. Sensitive Sites in the Area	228
5.3.4.5. Habitat Classification	228
6. PROJECT ALTERNATIVES	230
6.1. Introduction	230
6.2. The Need for a New Airport	231
6.3. Considerations for Expanding Bole International Airport	232
6.4. Alternative Considered for Site Selection.....	233

6.4.1 Initial Site Identification.....	233
6.4.2 Enhanced Multi-Criteria Analysis (MCA) Framework	236
6.4.2.1. Clarification of Evaluation Criteria and Definitions	236
6.4.2.2. Transparent Weighting and Scoring System	237
6.4.2.3. Systematic Combination of Scores for Overall Performance	240
6.4.3. Integrated Environmental and Social Impact Assessment in Alternatives Analysis	241
6.4.3.1. Application of the Mitigation Hierarchy (Avoid, Minimize, Mitigate, Offset) for Each Alternative	241
6.4.3.2 Detailed E&S Impact Assessment for Shortlisted Sites (Sites 1, 3, 6, 7, 8) ..	243
6.4.4. Comparative Analysis of Shortlisted Sites (Sites 1, 3, 6, 7, 8)	248
6.4.4.1. Operational and Economic Factors	248
6.4.4.2. Integrated Performance Assessment (MCA Results).....	252
6.4.5. Final Site Selection and Justification	254
6.5. Alternative Designs	256
6.5.1 Runway Orientation Alternatives.....	256
6.5.2 Runway Length Alternatives.....	257
6.5.3 Runway Capacity and Configuration Alternatives.....	258
6.6. Alternative Access Road	258
6.7. Alternative Modes of Transportation	260
6.8. No Doing Alternative	261
6.9. With and Without Project Scenario.....	261
7. STAKEHOLDER ENGAGEMENT	265
7.1. Purpose and Aims of Stakeholder Engagement	265
7.2. Stakeholder Identification Mapping, and Analysis	266
7.2.1. Principles of Systematic Stakeholder Identification	266
7.2.2. Methodology for Stakeholder Mapping and Analysis	266
7.2.3. Specific Strategies for Engaging with Different Stakeholder Groups	269

7.3.	Stakeholder Consultation Process & Documentation	270
7.3.1.	Overview of Consultation Phases	270
7.3.2.	Federal and Regional Government and Authorities Consulted	270
7.3.2.1.	Consultation with Ethiopian Airlines Group	272
7.3.2.2.	Consultation with Federal Environmental Protection Authority	274
7.3.2.3.	Consultation with Oromia Urban Planning Institute	275
7.3.3.	Local Administration and Communities Consulted.....	277
7.3.3.1.	Consultation with Bishoftu City Administration Sector Offices.....	279
7.3.3.2.	Consultation with Dukam City Administration Sector Offices.....	281
7.3.3.3.	Consultation with Project Affected Peoples (PAPs)	283
7.3.3.4.	Consultations with Vulnerable Groups.....	288
7.4.	Key Issues Identified, Feedback Incorporation, and Project Responses.....	289
7.5.	Project Disclosure	294
7.6.	Stakeholders Engagement Plan (SEP)	295
7.6.1.	Operational Framework for the Stakeholder Engagement Plan.....	297
7.6.1.1.	Specific Activities	297
7.6.1.2.	Indicative Timelines	298
7.6.1.3.	Responsibilities	298
7.6.1.4.	Allocated Resources	299
8.	IMPACT ANALYSIS	304
8.1.	Scope of Impact Coverage	304
8.2.	Project Impact Zone	304
8.3.	Impact Characterization	311
8.4.	Positive Impacts and Enhancement Measures	316
8.4.1.	Job Creation	316
8.4.2.	Skill Transfer	317
8.4.3.	Local Economic Growth and Investment	319

8.4.4.	Improving the Aviation Capacity of the Country	320
8.4.5.	Improved Transportation and International Connectivity.....	321
8.4.6.	Tourism Sector Development	322
8.4.7.	Cargo and Logistics Hub Development.....	322
8.4.8.	Urban Development and Infrastructure Expansion.....	323
8.4.9.	Improved Passenger Experience and Smart Airport Technologies	325
8.4.10.	Renewable Energy Integration	326
8.5.	Assessment of Potential Negative Impacts and Mitigation Measures	328
8.5.1.	Adverse Impacts during Mobilization Phase	328
8.5.1.1.	Land Acquisition and Displacement.....	328
8.5.1.2.	Loss of Livelihoods	333
8.5.1.3.	Cultural and Social Disruption	335
8.5.1.4.	Impact on Social Infrastructure	338
8.5.1.5.	Impacts on Ambient Air Quality	339
8.5.1.6.	Noise Pollution	340
8.5.1.7.	Soil Compaction and Pollution.....	340
8.5.1.8.	Surface Water Pollution.....	341
8.5.1.9.	Impacts on Flora and Fauna.....	341
8.5.1.10.	Health and Safety Issues.....	341
8.5.1.11.	Traffic Congestion and Accident.....	342
8.5.1.12.	Gender and Gender Based Violence/SH Risks.....	342
8.5.1.13.	Exposure to HIV/AIDS and Other Sexually Transmitted Infections (STIs)	343
8.5.2.	Adverse Impacts during Construction	344
8.5.2.1.	Air Pollution	344
8.5.2.2.	Noise Pollution	348
8.5.2.3.	Impact from Quarry Sites, Borrow Areas and Access Roads.....	352

8.5.2.4.	Solid Waste Generation	355
8.5.2.5.	Effect of the project on land use modification and runoff generation	358
8.5.2.6.	Impacts on Soil	359
8.5.2.7.	Pollution of Water bodies	360
8.5.2.8.	Occupational Health and Safety Hazards	362
8.5.2.9.	Risk to Traffic Accidents and Traffic Congestion.....	366
8.5.2.11.	Spread of HIV/AIDS and other STD.....	370
8.5.2.12.	Project impact on tangible and/or intangible cultural heritage	371
8.5.2.13.	Impact on vulnerable groups	372
8.5.2.14.	Concern with GBV/SEA and Child Labor Abuse	372
8.5.2.15.	Cultural Conflict, Culture Dilution and Drug Abuse	373
8.5.2.16.	Impact on vegetation	374
8.5.2.17.	Impacts on Agricultural crops diversity	376
8.5.2.18.	Habitat, Wildlife and Birds.....	377
8.5.3.	Adverse Impacts during Operation Phase.....	379
8.5.3.1.	Air Pollution	379
8.5.3.2.	Noise Pollution	389
8.5.3.3.	Solid Waste Generation	393
8.5.3.4.	Fire and Explosion Hazards.....	396
8.5.3.5.	Hazardous Materials	398
8.5.3.6.	Liquid Waste Generation.....	399
8.5.3.7.	Increased Traffic Congestions	402
8.5.3.8.	Community Health and Safety	404
8.5.3.9.	Occupational Health and Safety	407
8.5.3.10.	Fire and Explosion Hazard	409
8.5.3.11.	Soil contamination.....	411
8.5.3.12.	Surface and groundwater Contamination	412

8.5.3.14.	Vegetation and Flora	416
8.5.3.15.	Habitat and Wildlife	417
8.5.3.16.	Migratory Birds	419
8.5.3.17.	Urban Heat Island Effect (UHIE)	421
8.5.3.18.	Flooding.....	422
8.5.3.19.	Unplanned Urbanization.....	424
8.5.3.20.	Impacts of the District Cooling Plant during Operation Phase	425
9.	CUMULATIVE IMPACTS	427
9.1.	Introduction	427
9.2.	Definitions.....	427
9.3.	CIA Methodology	427
9.4.	Scoping Phase I: VECs, Temporal and Spatial Boundaries.....	428
9.4.1.	Valued Ecosystem Components (VECs)	428
9.4.2.	Spatial Boundaries of the Cumulative Impact Assessment	430
9.4.3.	Temporal Boundaries of the Cumulative Impact Assessment.....	431
9.5.	Scoping Phase II: Other Activities and Environmental Drivers	431
9.5.1.	Existing Regional Development and Infrastructure.....	432
9.5.2.	Ongoing Environmental Stressors and Trends	433
9.5.3.	Reasonably Foreseeable Future Developments	434
9.6.	Establishing Information on the Baseline Status of VECs.....	437
9.7.	Assessing Cumulative Impacts on VECs	437
9.7.1.	Cumulative Impacts on Land Use and Livelihoods.....	437
9.7.2.	Cumulative Impacts on Water Resources (Surface and Groundwater)	438
9.7.3.	Cumulative Impacts on Air Quality	439
9.7.4.	Cumulative Impacts on Noise Environment.....	440
9.7.5.	Cumulative Impacts on Biodiversity and Ecosystems.....	441
9.7.6.	Cumulative Impacts on Social and Cultural Fabric	442

9.7.7. Cumulative Impacts on Public Health and Safety	443
9.8. Assessing Significance of Predicted Cumulative Impacts	446
9.9. Management of Cumulative Impacts	449
9.9.1. General Considerations for Cumulative Impact Management.....	449
9.9.2. Mitigation at Project Level	450
9.9.3. Mitigation at a Local/Regional Level	450
9.10. Residual Impacts	451
9.10.1. Land Use and Livelihoods Disruption	451
9.10.2. Water Resources Strain	452
9.10.3. Air Quality Degradation.....	452
9.10.4. Noise Pollution.....	452
10. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP).....	454
10.1. Environmental and Social Management Plan	454
10.1.1. Environmental and Social Management Plan for Detailed Sub-Component of the Airport.....	483
10.1.2. Emergency Preparedness and Response Plans for Airport-Specific Emergencies	519
10.1.3. Biodiversity Management Plan (BMP).....	524
10.1.4. Pesticide Use and Integrated Pest Management (IPM).....	528
10.1.5. Occupational Health and Safety Plan	530
10.1.6. Community Health and Safety Plan.....	534
10.1.7. Hazardous waste management plan.....	539
10.1.8. Air Quality and Dust Management Plan.....	542
10.1.9. Noise Management Plan.....	545
10.1.10. Soil and Groundwater Management Plans.....	548
10.2. Environmental and Social Monitoring Plan	552
10.3. Institutions Responsible for the Implementation of ESMP.....	565

10.3.1.	Existing Institutional Capacity for ESMP Implementation.....	572
10.3.2.	Identification of Technical and Financial Resource Requirements for Key ESMP Roles	574
10.3.3.	3. Detailed Capacity Building Plan	576
10.3.4.	Enhanced Organizational Structures, Reporting Lines, and Accountability Mechanisms.....	577
10.4.	Environmental Audit	583
10.5.	Training Need and Capacity Building.....	586
10.5.1.	Training Needs Assessment and Target Audiences	588
10.5.2.	Specific Training Programs and Modules.....	589
10.5.3.	Training Modalities and Resources.....	595
10.5.4.	Implementation Plan, Timelines, and Budget	596
10.6.	Budget for Socio-Environmental Mitigation, Management and Monitoring.....	603
10.7.	Grievances Redress Mechanism.....	604
10.7.1.	Objectives and Guiding Principles	604
10.7.2.	GRM Structure and Tiers	605
10.7.3.	Procedures for Grievance Submission, Processing, Resolution, and Monitoring.....	607
10.7.4.	Roles and Responsibilities for GRM Implementation	611
10.7.5.	Ensuring Accessibility for All Stakeholder Groups, including Vulnerable Populations	614
10.7.6.	Specialized Grievance Redress Mechanisms	615
10.7.7.	GRM for Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Violence Against Children (VAC).....	618
10.7.8.	Monitoring and Evaluation of the GRM	620
10.7.8.1.	Key Performance Indicators (KPIs) for GRM Effectiveness	620
10.7.8.2.	Reporting and Learning Framework	623
10.7.8.3.	Auditing Procedures for GRM Compliance and Effectiveness.....	623

10.7.9. Capacity Building and Training for GRCs.....	624
10.7.10. Financial Resources and Cost Estimates for GRM Implementation.....	627
10.8. Code of Conduct.....	629
11. CONCLUSIONS AND RECOMMENDATIONS.....	631
10.1. Conclusion.....	631
10.2 Recommendations	632
REFERENCES	636
ANNEX 1: APPROVED SCREENING LETTER.....	639
ANNEX 2: SCOPING REPORT FOR ESIA OF BISHOFTU INTERNATIONAL AIRPORT DEVELOPMENT	640
ANNEX 3: LIST OF FLORA SPECIES RECORDED FROM ETHIOPIAN NEW INTERNATIONAL AIRPORT	651
Annex 4: LIST OF BIRDS IN BISHOFTU LAKE AROUND AREAS.....	657
ANNEX 5: LIST OF BIRD SPECIES RECORDED FROM THE AKAKI-ABA SAMUEL RIVERS AND RESERVOIRS	659
ANNEX 6: LABORATORY WATER QUALITY RESULT	662
ANNEX 7: SOIL TEST RESULT	670
ANNEX 8: MINUTES OF CONSULTATION.....	685
ANNEX 10: ENVIRONMENTAL AND SOCIAL CLAUSES TO BE CONSIDERED IN THE CONSTRUCTION CONTRACTOR DOCUMENT	736
ANNEX 11: SEXUAL EXPLOITATION, ABUSE AND HARASSMENT (SEAH) PREVENTION AND RESPONSE ACTION PLAN	749
ANNEX 12: RAP AND LIVELIHOOD RESTORATION PLAN	756
ANNEX 14: ASSESSMENT OF FEASIBLE DISPOSAL SITES FOR EXCAVATED SOILS FROM BISHOFTU INTERNATIONAL AIRPORT CONSTRUCTION PHASE ..	770
ANNEX 15: PRELIMINARY ASSESSMENT OF PROSPECTIVE QUARRY SITES FOR CONSTRUCTION MATERIALS.....	783
ANNEX 16: COMPANY COMPETENCY CERTIFICATE.....	798

ANNEX 17: EXPERTS COMPETENCY CERTIFICATES	801
ANNEX 18: LEGAL DOCUMENTS OF ETG DESIGNERS AND CONSULTANTS S.C808	
ANNEX 19: INFRASTRUCTURE CONCEPT DESIGN	812

LIST OF TABLES

Table 1-1: Team composition and position.....	9
Table 3-1: Annual Passenger Volumes Projected for BIA	30
Table 3-2: Air Cargo Tonnages Projected for BIA.....	31
Table 3-3: Based on IATA recommendations, the following is the estimated footprint for the four (4) PALs.	38
Table 3-4: Based on IATA recommendations, the following is the estimated footprint for the four (4) PALs.	44
Table 3-5: Water demand and storage volumes for different phases.....	46
Table 3-6: The calculated average wastewater flows.	52
Table 3-7: Fuel Farm Dimensions and Storage Capacity Phasing Based on Passenger Growth	57
Table 3-8: Land Use Distribution	61
Table 3-9: Cost Estimate for the Airport Facilities and Construction	72
Table 3-10: Construction equipment required for each activity based on the construction schedule.....	78
Table 3-11: Construction Material Volumes	80
Table 3-12: New identified and existing quarry site for construction materials around the project area.....	80
Table 4-1: The AfDB Environmental Safeguards applicable to the Bishoftu International Airpority Project	124
Table 5-1: Population size and number of households of the project site.....	161
Table 5-2: Average Productivity by Type of Crops	164
Table 5-3: Livestock population in the project area.....	165
Table 5-4: Land Use Patterns of the Kebeles	167
Table 5-5: Land ownership status of households	167
Table 5-6: Number of School, students & Teachers	169
Table 5-7: Disability Status in the project area	175
Table 5-8: Water and Sanitation Infrastructure	176
Table 5-9: Local Skills Inventory.....	177
Table 5-10: Monthly Average Rainfall (RF) of the Project Area	179
Table 5-11: Monthly Maximum Temperature of Project Area	180

Table 5-12: Monthly Minimum Temperature of Project Area	180
Table 5-13: Air quality data collected from five samples of Project Area.....	184
Table 5-14: Air quality of the project site compared with international and national standards	185
Table 5-15: Air quality of the Bishoftu city compared with international and national standards	187
Table 5-16: Noise Quality Data from Proposed Bishoftu Airport Area	191
Table 5-17: Ethiopia EPA Noise Level Standards.....	191
Table 5-18: IFC Noise Level Guidelines	192
Table 5-19: Soil test result of field collected samples.....	194
Table 5-20: Borehole log data from secondary collected geotechnical investigation.....	195
Table 5-21: Monthly river discharge of Awash River	202
Table 5-22: Hydro-stratigraphic of one deep well near to Airport boundary	204
Table 5-23: River water sample locations (UTM, Zone 37, WGS1984)	206
Table 5-24: Borehole water sample locations (UTM, Zone 37, WGS1984)	208
Table 5-25: LULC analysis	212
Table 5-26: The most common woody tree species Abundance and Dominance.....	221
Table 5-27: Family of the dominant species in the project site.....	222
Table 5-28: Crop biodiversity in project site.....	223
Table 5-29: Wild animals recorded in the project site and their IUCN conservation status ..	225
Table 6-1: MCA Evaluation Criteria, Weights, and Scoring Definitions	238
Table 6-2: Detailed Multi-Criteria Analysis (MCA) Grading and Ranking for Shortlisted Sites (Sites 1, 3, 6, 7, 8) Across Scenarios	252
Table 6-3: Recommended Runway Length	258
Table 6-4: With and Without Project Scenario.....	262
Table 7-1: Stakeholder Mapping – Power/Interest Grid.....	268
Table 7-2: Key Federal and Regional Government and Authorities Consulted	271
Table 7-3: Local Administration and Communities consulted	277
Table 7-4: Summary of Key Stakeholder Concerns and Project Responses	289
Table 7-5: Overview of Stakeholder Engagement Activities and Responsibilities throughout the Project Lifecycle	300
Table 7-6: Proposed Consultation Strategy	302
Table 8-1: Categorization of impact type, magnitude, duration and scope	311

Table 8-2: Prediction and Evaluation of Potential Impacts of Bishoftu International Airport	313
Table 8-3: Land requirement for the airport project	328
Table 8-4: Construction equipment noise emission levels.....	349
Table 8-5: Construction Material Volumes	353
Table 8-6: Daily Truck Trip Volume through the construction period.....	366
Table 8-7: Key material type flows (Peak Year 2 - 34,753 Trips/Day).....	368
Table 8-8: various scheduling of the work and its Impact	368
Table 8-9: List of aircraft types and their share of operations	380
Table 8-10: Take-off and landing volume forecast.....	381
Table 8-11: Aircraft APU and Engine Configuration.....	382
Table 8-12: Total Average Daily Emissions by Aircraft Operation Modes	382
Table 8-13: Total Daily Emissions by Aircraft Type & Category.....	383
Table 8-14: Annual Emissions by Aircraft Type and Fuel	384
Table 8-15: APU Emissions Calculation (2030)	386
Table 8-16: Total Annual APU Emissions (2030).....	387
Table 8-17: Noise contour levels and areas (2030 Forecast).....	390
Table 8-18: Solid Waste Sources & Quantities	393
Table 8-19: Wastewater flows at different phases of airport development	400
Table 8-20: Estimated Traffic Impact (Peak Hour)	403
Table 8-21: Water demand in m ³ /day for each phase	414
Table 9-1: Cumulative Impact Matrix	444
Table 10-1: ESMP for Enhancing Beneficial Impacts of the proposed Bishoftu international airport (Common ESMP for All Components).....	457
Table 10-2: ESMP for the adverse impacts of the proposed new airport (Common ESMP for All Components).....	458
Table 10-3 ESMP for Passenger Terminal Sub-component.....	485
Table 10-4 ESMP for Cargo Facility Terminal Sub-component.....	495
Table 10-5 ESMP for Runways Sub-components	500
Table 10-6 ESMP for Airport City Sub-component.....	504
Table 10-7 ESMP for Fuel Farm Sub-component	513
Table 10-8: Environmental and Social Monitoring plan	554
Table 10-9: Institutions Responsible for the Implementation of ESMP	566
Table 10-10: Key Auditing Responsibilities.....	584

Table 10-11: Financial estimation for the comprehensive environmental auditing.....	585
Table 10-12: Cost Estimate for Capacity Building and Institutional Strengthening	599
Table 10-13: Summary of Budget Estimate for Environmental Mitigation, Management and Monitoring	603
Table 10-14: GRM Procedures and Timelines.....	609
Table 10-15: GRM Roles and Responsibilities.....	612
Table 10-16: Key Performance Indicators (KPIs) for GRM Monitoring	622
Table 10-17: GRM Training Modules and Content.....	626
Table 10-18: Estimated Annual Budget for GRM Implementation (in Ethiopian Birr).....	627

LIST OF FIGURES

Figure 2-1: Field visit Photos at the project Area (Source: Site visit 07/11/2024).....	18
Figure 2-2: Sampling points for noise measurement	20
Figure 2-3: Sampling points for air quality measurement	21
Figure 3-1: Location Map of the Project Area	28
Figure 3-2: Kebeles included in the project site.....	29
Figure 3-3 Site plan for the runways to be constructed at Bishoftu International Airport	33
Figure 3-4 Location of Airport Maintenance Facilities	41
Figure 3-5 Location of Airport 132/15kv Primary Substations, Emergency Power Plants, and District Cooling Plants.....	45
Figure 3-6 Catchment Delineation.....	47
Figure 3-7 Proposed Storm Drainage Network for 110map.....	48
Figure 3-8: Identified Solid Waste Dumping Site	50
Figure 3-9: Identified construction waste disposal site.....	51
Figure 3-10 Sewage Treatment Plant.....	53
Figure 3-11 Fuel farm area	56
Figure 3-12 Proposed Location of Airport City.....	61
Figure 3-13: Airport city land use.....	62
Figure 3-14 Phase 1 Airport Layout Plan	68
Figure 3-15 Ultimate Phase Airport Layout Plan (ultimate phase layout is Work In progress (WIP))	71
Figure 3-16: Works Schedule	76
Figure 3-17: Man Power per day	77
Figure 3-18: Location map of prospective quarry sites for geological construction materials	82
Figure 4-1 the four principal elements of the Balanced Approach to Aircraft Noise Management.....	155
Figure 5-1: Crops in the project site (Source: Site visit 07/11/2024)	163
Figure 5-2: Livestock in the project area (Source: Site visit 07/11/2024)	165
Figure 5-3: Settlement Pattern and House Typology of Project area.....	168
Figure 5-4: School in the project area (Source: Site visit).....	170
Figure 5-5: Gravel Road from Abusera to Addis Ababa (Source: Site visit 07/11/2024)	172
Figure 5-6: Potable Water Reservoir and distribution point in Abu Gerbi	177

Figure 5-7: Monthly Average precipitation/RF/ of Project Area.....	179
Figure 5-8: Mean Monthly Temperature of Project Area	180
Figure 5-9: Average Monthly Relative Humidity of Project Area	181
Figure 5-10: Wind speed (Source: Bishoftu Meteorological Station)	182
Figure 5-11: Average Monthly Sun Shine Hours of Project Area	182
Figure 5-12: Potential Evapotranspiration (Source: Bishoftu Meteorological Station).....	183
Figure 5-13: Air quality sample location	184
Figure 5-14: Air quality of the Bishoftu city compared with international and national standards	187
Figure 5-15: Noise Sample Location	190
Figure 5-16: Digital Elevation Model of the Project Area (Source: ESIA Consultant).....	192
Figure 5-17: Slope and Topographic feature of the project site (Source: Site visit 07/11/2024).....	193
Figure 5-18: Soil sample collection from the new proposed airport area	194
Figure 5-19: Soil Sample Location	195
Figure 5-20: Soil types observed in the Project Area	196
Figure 5-21: Soil Map of Project Area (source: made by consultant)	197
Figure 5-22: Unwelded Pyroclastic Deposits exposed across rivers and gullies within the Airport boundary.....	198
Figure 5-23: Quaternary Surficial Deposits (Eluvium and Alluvium deposits)	199
Figure 5-24: Geological Map of Project Area (source: made by consultant)	200
Figure 5-25:- Hydrology and Drainage pattern of the Project Area	201
Figure 5-26: Sub-catchments of Project Area.....	201
Figure 5-27: Seasonal or dry streams in the site that collects surface runoff during rainy season (Source: Site visit 07/11/2024).....	202
Figure 5-28: Groundwater depth and flow direction of Project Area	205
Figure 5-29: In situ (field) water quality measurements of nearby rivers.....	206
Figure 5-30 River water and Borehole water sample locations	207
Figure 5-31: Electrical Conductivity (EC) of Groundwater in Project Area	209
Figure 5-32: Fluoride ion concentration of Groundwater in Project Area.....	210
Figure 5-33: Nitrate ion concentration of Groundwater in Project Area	211
Figure 5-34 LULC analysis of the proposed Bishoftu International Airport site, including the surrounding Bishoftu city area.....	212
Figure 5-35 Vegetation in cultivated land, religion compound, and residence areas	219

Figure 5-36: Plant species (<i>Ficus sycomorus</i>) in project Site (Source: Site visit 07/11/2024)	219
Figure 5-37: Different trees around agricultural land	220
Figure 5-38: Different shrub species the community used as fence	221
Figure 5-39 Wheat agricultural land in project area during field visit	224
Figure 5-40: The whole view of project site agricultural areas, vegetation and residence during field visit.	224
Figure 5-41: Domestic Animals Observed During Field Visit	225
Figure 5-42: Bishoftu lakes Left Black-winged lovebird(near endemic) center Ethiopian Boubou (near endemic), right Wattled Ibis (Endemic) eater (Source; https://ebird.org/hotspot/L1550648/bird-list?yr=cur)	226
Figure 5-43: top (Left) Laughing dove , (Center) African Sacred Ibis, (right)Ethiopian Bee eater Lower (left) Hadada Ibis (Center)Little Grebe (right) Common Bulbul (Source; https://ebird.org/hotspot/L1550648/bird-list?yr=cur)	226
Figure 5-44: The three Vulnerable bird species: Greater spotted Eagle (left), Wattled Crane (middle) and Black crowned Crane (right) recorded from the Akaki Floodplain and Aba-Samuel reservoir area (source: Previous ESIA Studies on “Environmental and Social Impact Assessment (ESIA) of South Akaki Sub-Catchment WWTPs and Sewer Lines Project” By ETG Designers and Consultants Sh.Co.)	227
Figure 6-1 Location of the Eight Potential Sites	234
Figure 6-2: Final Selected Site Location	255
Figure 6-3: Potential 05-23 Orientation	256
Figure 6-4: Potential 07-25 Orientation	257
Figure 6-5: Airport Access Road Alternatives	259
Figure 7-1: Online Meeting with the Ethiopian Airline Group and Feasibility and Design Consultant, 2025	273
Figure 7-2: Discussion with EPA	275
Figure 7-3: Discussion with Oromia Urban Planning Institute, 2024	277
Figure 7-4: Consultation with Bishoftu city Administration Higher officials	281
Figure 7-5: Consultation with Dukem sub city Administration Higher official, February 10, 2025	282
Figure 7-6: Consultation with Dukem sub city Administration Higher officials	283
Figure 7-7: Discussion with Representative of Project Affected Community, 2024	284
Figure 7-8: Discussion with Representative of Project Affected Community, 28/05/2025	285

Figure 7-9: Discussion with Representative of Project Affected Community, 11/07/2024 ..	286
Figure 7-10: Discussion with Representative of Project Affected Community, 11/05/2025	286
Figure 7-11: Discussion with Representative of Project Affected Community, 11/05/2025	287
Figure 7-12: Discussion with Representative of Project Affected Community, March, 2025	287
Figure 7-13: Discussion with Representative of Project Affected Community, March, 2025	288
7-14: Discussion with Representative of Female-Headed Households	289
Figure 8-1: Environmental Sensitive Receptors (schools, health centers, church and other critical public services)	308
Figure 8-2: Map of Environmental Sensitive Receptors (Water bodies).....	309
Figure 8-3: Environmental Sensitive Receptors (Settlements).....	309
Figure 8-4: Environmental Sensitive Receptors (migratory bird site).....	310
Figure 8-5: Impacted Kebeles	329
Figure 8-6: Impacted Households	330
Figure 8-7: Impacted agricultural land and other land uses.....	331
Figure 8-8: Orthodox Church within the project cite.....	335
Figure 8-9: Cemetery within the project cite	336
Figure 8-10: Impacted Religious Institution	337
Figure 8-11: Impacted schools, healthcare facilities and other utilities.....	339
Figure 8-12: Gullies easily exposed to soil erosion found within the Airport boundary	360
Figure 8-13: nearby and recipient rivers and ponds around the project area.....	361
Figure 8-14: source area distributions of the key construction materials	367
Figure 8-15 Vegetation Impacted by the project	375
Figure 8-16: Amount of Air pollutant contributions by aircraft type	385
Figure 8-17 Noise pollution exposure map.....	391
Figure 8-18: Color-coded bins for organic, recyclable, and residual waste in terminal buildings and support facilities	395
Figure 9-1: Land use of Geda Economic Zone	435
Figure 9-2: Future Growth and Transformation in the Surrounding Region of Airport.....	436

ACRONYMS

AAWSA: Addis Ababa Water and Sewerage Authority

AfDB: African Development Bank

BIA: Bishoftu International Airport

BMP: Biodiversity Management Plan

CIA: Cumulative Impact Assessment

CLOs: Community Liaison Officers

CRGE: Climate Resilient Green Economy Strategy

CSA: Central Statistical Agency

E&S: Environmental and Social

EAG: Ethiopian Airlines Group

EHS: Environmental, Health and Safety

EIA: Environmental Impact Assessment

EMP: Environmental Management Plan

EPA: Environmental Protection Agency

ESAP: Environmental & Social Assessment Procedures

ESIA: Environmental and Social Impact Assessment

ESMMP: Environmental and Social Management and Monitoring Plan

ESMP: Environmental and Social Management Plan

FDRE: Federal Democratic Republic of Ethiopia

FGDs: Focus Group Discussions

FPIC: Free, Prior, and Informed Consent

GBV: Gender-Based Violence

GRC: Grievance Redress Committee

GRM: Grievance Redress Mechanism

GTP: Growth and Transformation Plan

HVRM: Highly Vulnerable Rural Minorities

ICAO: International Civil Aviation Organization

ICT: Information and Communication Technologies

IFC: International Finance Corporation

ILO: International Labour Organization

IPM: Integrated Pest Management

ISS: Integrated Safeguards Systems

KIIs: Key Informant Interviews

KPIs: Key Performance Indicators

MCA: Multi-Criteria Analysis

MoWE: Ministry of Water, Energy

NGOs: Non-Governmental Organizations

OS: Operational Standard

PAPs: Project Affected Persons

PMU: Project Management Unit

PS: Performance Standards

RAP: Resettlement Action Plan

SEA: Sexual Exploitation and Abuse

SEAH: Sexual Exploitation, Abuse and Harassment

SEP: Stakeholder Engagement Plan

STIs: Sexually Transmitted Infections

TMP: Traffic Management Plan

TSS: Total Suspended Solids

VAC: Violence Against Children

VECs: Valued Ecosystem Components

VGP: Vulnerable Groups Plan

WB: World Bank

WGRM: Workers' Grievance Redress Mechanism

WHO: World Health Organization

WLAN: Wireless LAN

EXECUTIVE SUMMARY

Ethiopia has been a pioneer in African aviation, with significant advancements in the sector since the establishment of Addis Ababa Bole International Airport in 1962. However, the growing limitations of Bole Airport have necessitated the development of a new international airport at Abusera, located 40 km south of Addis Ababa. The Bishoftu International Airport project, spearheaded by the Ethiopian Airlines Group (EAG), aims to address capacity constraints, stimulate socio-economic development, and reinforce Ethiopia's position as a regional aviation hub.

This Environmental and Social Impact Assessment evaluates the potential impacts of the Bishoftu International Airport project on the biophysical and socio-economic environment. The assessment aligns with Ethiopian environmental laws, Bank's Integrated Safeguards System (AfDB ISS), and international best practices to ensure sustainable development.

The overall objective of the ESIA is to identify, predict and evaluate the potential beneficial and adverse impacts of the proposed project on the biophysical and socio-economic environment in and around the project area in terms of magnitude, spatial extent, duration and significance. The study is also aimed to provide recommendations for enhancing the beneficial impacts and mitigation measures for the adverse impacts as well as environment and social management and monitoring plans that would help implementation of the recommended enhancement and mitigation measures. The ESIA gives particular emphasis to the quality of life of nearby communities, the health and safety of construction and operational workers, and the protection of the natural and human environment.

The scope of the ESIA study includes:

- Identification and analysis of the national and the IFC environmental safeguard policies and regulations that will be triggered by the project activities;
- Describe the views and concerns of the public and stakeholders towards the implementation of the project;
- Establish baseline features of the biophysical, socio-economic and cultural attributes of the project area;
- Identify and evaluate the significant impacts (both beneficial and adverse) associated with project implementation and subsequent operation;

- Propose specific mitigation for inclusion in the project detail design and management plan to reduce or avoid significant adverse environmental and social impacts; and
- Prepare Environmental and Social Management and Monitoring Plans for the recommended measures that will minimize adverse impacts and enhance beneficial impacts during the planning, construction and operation of the proposed project.

Approach and Methodology

The ESIA adopts a participatory approach, combining desk reviews, field surveys, stakeholder consultations, and expert analysis. Key methodologies include:

- **Baseline Data Collection:** Assessment of climate, hydrology, soil, air quality, noise levels, biodiversity, and socio-economic conditions.
- **Stakeholder Consultations:** Engagement with local communities, government agencies, and other stakeholders to gather feedback and address concerns.
- **Impact Assessment:** Use of matrices and checklists to evaluate impacts based on magnitude, duration, and significance.
- **Mitigation Planning:** Development of measures to avoid, minimize, or compensate for adverse impacts.

Description of the Proposed Project

The overarching goal of the Bishoftu International Airport project is to establish a world-class international airport capable of accommodating Ethiopia's rapidly growing aviation demands, thereby alleviating existing capacity constraints at Addis Ababa Bole International Airport. This initiative is poised to support broader socio-economic development and reinforce Ethiopia's strategic position as a leading regional aviation hub.

The project is designed to achieve several key objectives. These include effectively handling increasing passenger and cargo traffic, boosting tourism, trade, and regional connectivity, and providing state-of-the-art airport facilities that meet international standards for comfort, safety, and efficiency. A core commitment involves promoting the use of sustainable and renewable energy sources, such as solar power, to minimize environmental impact, alongside implementing effective waste management, water conservation, and nature-based solutions. Furthermore, the project aims to create employment opportunities and improve livelihoods for

local communities during both construction and operation phases, ultimately enhancing Ethiopia's capacity as a regional air transport hub in a sustainable and inclusive manner.

Passenger traffic is projected to grow significantly, from 30.3 million in 2030 to over 105 million by 2060, with international travelers making up more than 98% of the total. Cargo operations will also expand, handling both domestic and international freight, with tonnage expected to increase substantially over the same period.

The airport will feature four parallel runways, including two central runways (4,800 meters each), one southern (4,250 meters), and one northern (3,800 meters). The initial phase will include the two central runways, equipped with advanced navigation systems such as CAT III approach technology and Doppler VOR (DVOR) for enhanced safety and efficiency.

The passenger terminal will offer comprehensive facilities, including check-in lobbies, baggage handling systems, security screening, airline spaces, retail concessions, and government inspection zones. An Automated People Mover (APM) will connect the main terminal to satellite concourses, while the total terminal area is expected to reach 1,292,605 m² by the final phase, accommodating 110 million annual passengers.

For cargo operations, BIA will incorporate a multi-level design to handle bulk cargo, Unit Load Devices (ULDs), and freighter operations, with varying levels of automation. The airport support facilities will include an Air Traffic Control Tower (ATCT), Aircraft Rescue and Fire Fighting (ARFF) stations, maintenance complexes, and a fuel farm with a hydrant system for efficient operations.

Utility infrastructure will meet substantial demands, including an estimated 302 MVA electrical load at full capacity, along with robust water supply and waste management systems. The transportation strategy emphasizes a mix of private vehicles (57% for international, 42% for domestic passengers) and rail connectivity, including a dedicated rail link to Addis Ababa. A Ground Transportation Center (GTC) will integrate various transport modes for seamless passenger and cargo movement.

The total estimated cost for the 60 million annual passenger (MAP) phase is 7.9billion \$, rising to 13.9\$ billion for the 110 MAP phase, covering facilities (terminals, runways) and infrastructure (utilities, roads, rail connections).

The project implementation is structured into distinct phases. The Pre Planning/Mobilization Phase involves the formal contract award, detailed design finalization, site preparation, temporary facility setup, initial procurement, and securing all necessary permitting and regulatory approvals. The Construction Phase includes early works such as foundational works, initial earthworks for runways, and perimeter fencing, followed by piling works for major structures. Large-scale infrastructure development, including offsite road and rail connections (notably a 7 km tunnel), airfield components, and landside mobility infrastructure, will also be undertaken. This phase further encompasses the construction of terminal and concourse buildings, and the development of support facilities and cargo terminals, culminating in finalization and commissioning. The Operation Phase involves the ongoing management of passenger, air, and cargo traffic movement, and continuous operation and maintenance of all utilities, runways, taxiways, aprons, and associated plant and equipment.

Alternatives to the Project

A thorough evaluation of project alternatives was conducted to ensure the most sustainable and efficient development path. The "No Doing" Alternative was assessed but deemed unfeasible and detrimental to Ethiopia's strategic development. The existing Addis Ababa Bole International Airport, established in 1962, faces growing capacity limitations that necessitate the development of a new international airport. Without the BIA project, Ethiopia's aspirations to remain a leading regional aviation hub and to support its socio-economic growth through increased air transport would be significantly hindered. This highlights a compelling national strategic imperative for economic growth and enhanced global connectivity. The project's classification as a "Schedule 1 project" under Ethiopian guidelines and "Category 1" by the African Development Bank (AfDB), indicating "significant adverse environmental and social impacts", immediately signals that this strategic growth comes with substantial environmental and social costs. The decision to proceed, despite these known impacts, implies a strategic calculation that the economic and connectivity benefits outweigh the costs, provided these costs are effectively managed. This frames the entire ESIA as an attempt to reconcile a powerful development imperative with the principles of environmental and social sustainability.

The ESIA process involved a rigorous analysis of Site Selection Alternatives. Initially, eight potential sites were identified and subjected to an Enhanced Multi-Criteria Analysis (MCA) Framework. This framework involved clarifying evaluation criteria, implementing a transparent weighting and scoring system, and systematically combining scores to assess

overall performance. A detailed Environmental and Social Impact Assessment was conducted for shortlisted sites (Sites 1, 3, 6, 7, 8), applying the mitigation hierarchy (avoid, minimize, mitigate, offset) to each alternative. After comprehensive evaluation, Site 6 (Abusera) was identified and reaffirmed as the most suitable location for the new major hub airport. This decision was driven by a strategic balance of critical advantages, and the manageability of its associated challenges through planned interventions and further studies. Key Reasons for Selecting Site 6:

1. Strategic Balance of Core Advantages:

- Proximity to Addis Ababa: At approximately 38 km, Site 6 is the nearest option to the capital, which is crucial for attracting Origin & Destination (O&D) passenger traffic and ensuring strong connectivity.
- Optimal Altitude for Aircraft Performance: With an altitude of 1,910m, Site 6 strikes a good balance for aircraft operational efficiency and range, comfortably permitting long-range flights, which is vital for a major hub airport.
- Compatibility with Bole International Airport: Its location and runway orientation ensure full compatibility with Bole International Airport's traffic management, enabling efficient tandem operations and seamless passenger transfers.
- Lowest Estimated Development Cost: Site 6 presents the lowest estimated total development cost among the shortlisted sites, at approximately USD 5.27 billion.

2. Minimized Social Impacts: Site 6 demonstrates a significantly lower social impact compared to other viable alternatives. It is projected to have the least total population displacement (13,309 people) and fewer noise-affected populations (4,880 people) when compared to Sites 3 and 7. This aligns with the project's commitment to minimizing adverse social effects.

3. Manageable Environmental Challenges: While initial assessments might have placed Site 6 lower in environmental resilience, a deeper analysis revealed that its specific environmental impacts (on soil, water, air, flora, fauna, and the presence of volcanic cones) are well-understood and, crucially, manageable. This will be addressed through a robust Environmental Impact Assessment process in Phase 3 and the implementation of standard mitigation measures, including protecting river valleys and investigating potential settlement risks from lineaments.

4. Feasible Military Airspace Mitigation: Site 6 presents constraints on Hame Air Force Base (AFB) operations, as the AFB is within the new airport's Control Zone (CTR). However, feasible and cost-effective solutions have been identified. These include the proposed construction of a new reoriented parallel AFB runway (estimated at approximately 40 MUSD) and the establishment of detailed coordination procedures between civil and military air traffic control. This mitigation cost is considerably lower than the additional access road costs associated with other sites (e.g., approximately 100-110 MUSD for Site 7), making the military impact manageable within the project's financial framework. The encroachment on military airspace is also minimal in the initial development phase.

The selection process was systematically guided by an Enhanced Multi-Criteria Analysis (MCA) framework, which evaluated each site against ten core criteria under three different strategic weighting scenarios: "Airline," "Low CAPEX," and "Passenger." Each site was graded on a scale of 0 (worst) to 5 (best). The table below, extracted from the document, illustrates the detailed grading and ranking for the shortlisted sites:

Criteria	Weight (S1)	Weight (S2)	Weight (S3)	Site 1 Grade	Site 3 Grade	Site 6 Grade	Site 7 Grade	Site 8 Grade
1. Capacity to accommodate 7km x 5km airport site	1	1	1	5	5	4	4	5
2. Visibility	1	1	1	3	3	3	3	3
3. Obstacles - OLS and ILS Basic Surfaces	2	2	2	4	4	2	4	4
4.1 Air Traffic Management - Bole	1	2	2	1	3	5	5	5
4.2 Air Traffic Management - HAME	3	0	2	4	5	2	2	3
5. Distance to Addis Ababa	2	3	4	4	3	5	2	1
6. Site altitude permitting 6000 NM	4	3	2	1	1	5	5	5

stages (WB) & 3000 NM (NB)								
7. Moderate population to be relocated	1	1	1	2	2	5	3	5
8. Environmental resilience	2	2	2	2	3	4	4	5
9. Closeness with an existing or future support city	1	1	1	3	2	5	5	1
10. Cost investments	2	4	2	3	3	4	2	1
TOTAL SCORE (out of 100)				S1: 56	S1: 60	S1: 78	S1: 70	S1: 70
				S2: 54	S2: 56	S2: 85	S2: 70	S2: 64
				S3: 59	S3: 62	S3: 81	S3: 67	S3: 64
RANKING				S1: 5	S1: 4	S1: 1	S1: 2	S1: 2
				S2: 5	S2: 4	S2: 1	S2: 2	S2: 3
				S3: 5	S3: 4	S3: 1	S3: 2	S3: 3

Beyond site selection, various Design Alternatives were considered to optimize the project's environmental and operational performance. This included evaluating different runway orientation alternatives (e.g., 05-23, 07-25), runway length alternatives (with 4,800m being recommended), and various runway capacity and configuration alternatives. Alternative access road designs and modes of transportation, such as rail connectivity and potential metro integration, were also explored to enhance accessibility and minimize road traffic impacts. This integrated planning for sustainable growth extends beyond the airport itself to include an "Airport City" and a strategic transportation strategy. The inclusion of an "Airport City" and a comprehensive transportation plan that emphasizes multi-modal transport (private vehicles, rail, and potential metro integration) indicates a forward-thinking approach to urban development. This suggests that the project is not merely an airport but a catalyst for broader regional transformation, aiming to create a self-sustaining ecosystem of commercial, hospitality, and office spaces, while also addressing future mobility challenges. This integrated approach, encompassing both the airport and its surrounding urban and transport infrastructure,

reflects a commitment to maximizing economic benefits and managing the induced development that will inevitably follow such a large-scale project. The project's proponents recognize that the airport will not exist in isolation but will profoundly shape the regional landscape, necessitating a holistic planning approach to ensure sustainable growth and minimize unintended consequences like unplanned urbanization or traffic bottlenecks.

Relevant Policies, Legislations, and Institutional Framework

The Constitution of the Federal Democratic Republic of Ethiopia (FDRE), adopted in 1995, serves as the supreme legal framework, embedding principles of sustainable development and environmental rights. Article 43 guarantees the right to development, ensuring improved living standards and sustainable socio-economic progress. Article 44 explicitly recognizes the right of all citizens to a clean and healthy environment and mandates compensation for those displaced or adversely affected by state programs. Furthermore, Article 35 upholds gender equality, ensuring women's equal rights in economic, social, and political spheres, including participation in development initiatives. The Environmental Policy of Ethiopia (1997) provides the foundation for environmental management, aiming to enhance public health and sustainable development through responsible resource utilization. This policy emphasizes Environmental Impact Assessment as an essential tool for integrating environmental considerations into project planning, with a focus on public participation, impact mitigation, and capacity-building at all administrative levels.

Other key policies include the Water Resources Policy (1998), which promotes equitable and sustainable water use while prioritizing water supply and sanitation, and the Wildlife Policy (2006), which focuses on biodiversity conservation and sustainable wildlife management. The National Policy on Women (1993) ensures gender equality in development initiatives, while the National Health Policy (1993) prioritizes public health, occupational safety, and disease control. Additionally, the National HIV/AIDS Policy (1998) mandates a multi-sectoral approach to combating HIV/AIDS, emphasizing awareness and prevention. Strategies such as the Climate Resilient Green Economy (CRGE) Strategy (2011) aim to reduce greenhouse gas emissions while fostering sustainable growth, while the Conservation Strategy of Ethiopia provides a framework for integrating environmental planning into national development policies.

To support environmental protection and sustainable development, Ethiopia has enacted various legislative frameworks. The Proclamation on Establishment of Environmental Protection Organs (No. 295/2002) establishes institutional frameworks for environmental governance, including the Environmental Protection Authority (EPA) at the federal level and regional environmental agencies. The Environmental Impact Assessment Proclamation (No. 299/2002) mandates EIAs for public and private projects with significant environmental risks, ensuring public consultation, impact mitigation, and compliance monitoring. Similarly, the Environmental Pollution Control Proclamation (No. 300/2002) sets standards for air, water, and soil pollution control, enforcing the "polluter pays" principle and mandating pollution prevention measures. The Solid Waste Management Proclamation (No. 513/2007) regulates waste disposal while promoting recycling and sustainable waste management practices. Additionally, the Expropriation of Land and Compensation Proclamation (No. 1161/2019) ensures fair compensation and livelihood restoration for displaced persons, requiring consultation with affected communities and prioritizing vulnerable groups such as women, the elderly, and persons with disabilities. Other relevant laws include the Labor Proclamation (No. 1156/2019), which protects workers' rights by ensuring occupational safety, gender equality, and prohibiting child labor, and the Public Health Proclamation (No. 200/2000), which regulates sanitation, waste management, and water quality to safeguard public health. The Industrial Pollution Regulation (No. 159/2008) imposes emission controls and waste management requirements on industries to minimize environmental degradation.

Ethiopia is also a signatory to multiple international environmental conventions, including the Convention on Biological Diversity (1994), which promotes biodiversity conservation and sustainable resource use; the United Nations Framework Convention on Climate Change (1994), which commits to climate change mitigation; the Stockholm Convention on Persistent Organic Pollutants (2002), which bans hazardous chemicals; and the Basel Convention (2002), which regulates transboundary hazardous waste movement.

At the institutional level, the Environmental Protection Authority (EPA) is responsible for policy formulation, EIA oversight, and the enforcement of environmental laws at the federal level. The Ethiopian Airlines Group (EAG), as the project proponent, ensures compliance with aviation regulations, environmental standards, and social safeguards. The Oromia Regional Environmental Agency plays a crucial role in implementing regional environmental policies and ensuring compliance with federal regulations. The Ministry of Water and Energy oversees

water resource management and hydropower development in alignment with national policies, while the Ministry of Health ensures that public health standards are met during project implementation.

The Environmental and Social Impact Assessment for the Bishoftu International Airport project explicitly incorporates the African Development Bank's Integrated Safeguards System (ISS), ensuring that all applicable Operational Safeguards (OSs) are addressed. The ESIA provides a thorough assessment of environmental and social risks and outlines a structured Environmental and Social Management Plan (ESMP) based on the mitigation hierarchy. It ensures compliance with OS1 through a systematic evaluation of project impacts and appropriate mitigation measures. OS2 is addressed through provisions for fair labor practices, occupational health and safety, and a worker grievance mechanism. Under OS3, the ESIA promotes efficient use of resources and includes detailed pollution prevention strategies. OS4 covers community health, safety, and security with measures such as traffic control and emergency response planning. In compliance with OS5, a Resettlement Action Plan (RAP) has been prepared to guide land acquisition and ensure fair compensation and livelihood restoration. OS6 focuses on biodiversity protection, with measures to avoid ecological disruption and support habitat rehabilitation. OS7 ensures that vulnerable groups are identified and protected from disproportionate impacts, while OS8 provides for the safeguarding of cultural heritage resources during project implementation. Finally, OS10 emphasizes inclusive stakeholder engagement and transparent information disclosure, which have been central to the ESIA process, enabling the integration of local concerns into project planning and design.

Description of the Project Area

Physical Environment

The physical environment of the project area presents a diverse set of characteristics crucial for understanding the potential impacts and baseline conditions.

Climate and Meteorology: The region experiences a moderate climate. Meteorological data from nearby stations (Akaki, Debrezeit, Alem Tena) for a 31-year period (1993-2023) indicate consistent climatic trends. The area receives effective sunshine hours of more than 7 hours per day for the majority of the year (October-June), suggesting high solar energy potential. Average monthly rainfall varies, with higher humidity typically observed during the Ethiopian Summer (June-September), reaching up to 76% in August. Wind speeds are generally moderate,

influencing evaporation rates and air saturation, which are important for airport operations. Potential evapotranspiration rates are also considered for water management in future greening initiatives.

Topography and Geology: The project site lies within the central axial zone of the Main Ethiopian Rift Valley (MER), characterized by an extensive plain land with gentle slopes. The proposed airport is primarily on flat terrain, gently sloping from approximately 1900 meters in the central part towards eastern and western boundaries, where elevations decrease to 1850 meters. Slope analysis reveals that 99% of the total area has a slope of 0-8%, making it predominantly flat to gently sloping. Geologically, the area is underlain by Quaternary surficial deposits, including unwelded pyroclastic deposits (exposed across rivers and gullies) and alluvium/eluvium deposits. No extreme geological risks such as landslides or major seismic hazards have been identified, making the topography suitable for airport development.

Soil Characteristics: Two dominant soil types have been identified:

- **Black Cotton Soil (Eutric Vertisols):** Covering large parts of the central and eastern sections, this soil is characterized by low drainage, high montmorillonite clay content, and shrink-swell properties.
- **Silt and Sandy Loam (Flavisols):** Found in the western periphery towards the Akaki River, these are weakly developed, light-textured soils predominantly associated with water-borne sediments of floodplains and rivers. Soil samples collected from six localities within the proposed airport boundary indicate varied compositions (e.g., 9% sand, 91% fine in one sample; 20% sand in another).

Hydrology and Water Resources: The project area features seasonal streams that collect surface runoff during the rainy season, draining into nearby major rivers such as the Akaki/Gerbi River and the Dukem River, both part of the Awash River basin. The Awash River's monthly discharge contributes to the regional hydrological balance. Groundwater resources are present, with boreholes showing varying characteristics. For instance, a borehole in Abusera Town (BH-1) registered hot water (58.7°C), slightly alkaline pH (8.87), and a fluoride ion concentration of 2.6 mg/l. The presence of elevated temperatures and fluoride in some boreholes is attributed to local geology and tectonic activities. Overall, nitrate concentrations in groundwater are within WHO standard limits, indicating less pollution from intensive agricultural activities compared to some urban areas.

Ambient Air Quality: Baseline air quality data from five strategic locations indicate variations in pollutant concentrations. While agricultural activities are minimal contributors, the proximity to Bishoftu city and regional industrial emissions means that PM_{2.5}, PM₁₀, SO₂, and NO₂ levels sometimes exceed both WHO and Ethiopian EPA standards. This indicates a pre-existing air quality challenge that will need to be considered with new airport operations.

Noise Quality: Baseline noise surveys at five strategic locations show a mix of noise levels. While some areas are within acceptable residential limits (e.g., 45-47 dBA), others, particularly Station 1 (55-75 dBA) and Station 5 (70 dBA), exceed residential standards, though they may be acceptable for industrial/commercial zones. This suggests existing noise burdens from ongoing urban development and traffic, which will be amplified by airport operations.

Biological Environment

The biological environment of the project area has been significantly modified by human activities over time, resulting in a mosaic of disturbed natural habitats and agricultural landscapes.

Vegetation and Flora: The project area falls within the Acacia-Commiphora woodland vegetation zone, characterized by drought-resistant evergreen or deciduous trees and shrubs. However, this ecosystem is under significant stress from agricultural expansion, fuelwood extraction, and settlement growth. Field surveys indicate that much of the original natural vegetation has been replaced by agricultural crops and planted trees, predominantly Eucalyptus and Ficus sycomorus. Remnants of indigenous trees and shrubs are found along field boundaries, roadsides, and in religious/school compounds. A total of 124 plant species (indigenous and exotic) were recorded, comprising trees (26 species), shrubs (23 species), herbs (55 species), grasses (19 species), and one climber. The dominant plant families are Poaceae and Fabaceae, with Acacia bussei being the most abundant woody tree species.

Agricultural Biodiversity: Agricultural crop biodiversity is common and vital for local livelihoods, with diverse crops such as teff, wheat, barley, beans, and other staple crops being cultivated under rain-fed conditions. This crop diversity is essential for food security and the economic well-being of the local community.

Habitats and Fauna: The project area primarily supports domestic animals (cattle, sheep, goats, donkeys, mules, horses) which are integral to the local economy. Wild animals observed include hyenas, foxes, rabbits, and monkeys, utilizing the available vegetation for shelter and sustenance.

Avifauna (Birds) and Protected Areas: A total of 48 bird species were recorded in and around the Bishoftu lakes, with the Wattled Ibis being endemic to Ethiopia and the Ethiopian Boubou classified as near-endemic. All 49 recorded species are currently categorized as "Least Concern" by the IUCN. While no officially critical habitats, endangered species, or protected areas are directly within the project footprint, the broader region, including the Akaki-Aba Samuel reservoir and floodplain, supports a richer bird diversity (73 species recorded) including globally threatened species such as the Greater Spotted Eagle, Wattled Crane, and Black Crowned Crane (all Vulnerable), and the Lesser Flamingo (Near Threatened). Bird movement, especially migratory birds between Lake Bishoftu and Akaki-Aba Samuel, is prevalent during winter (October-March), posing potential bird strike risks to aircraft and requiring careful consideration. The project area itself does not encompass any environmentally sensitive or officially protected areas such as wetlands or critical wildlife habitats.

Socio-economic Environment

The project area is characterized by a predominantly agrarian society, with unique social and cultural dynamics.

Demographics and Settlements: The project site encompasses eight *kebeles* (Abu Achiro, Abu Garbi, Abu Luguna, Abu Serkema, Ammuye Sera, Abu Loyya, Kombolcha, and Dere Shoki) with a total population of 15,320 individuals across 2,731 households. The population has a relatively balanced gender distribution (49% male, 51% female). Abu Loyya and Abu Luguna are the most populous *kebeles*. Housing conditions show a mix of corrugated iron sheet structures (48%) and traditional huts (52%).

Economic Activities and Land Use: The local economy is heavily reliant on rain-fed agriculture and livestock rearing. Common crops include teff, wheat, barley, maize, and various legumes (e.g., chickpea, beans, soya bean, peas). Livestock, including cattle, sheep, goats, donkeys, mules, and horses, play a vital role, providing milk, meat, hides, and draught power, and serving

as insurance during droughts. Land use is predominantly agricultural, covering approximately 2,310 hectares, followed by grazing areas, settlements, and communal spaces. Non-farm activities like petty trade are limited but contribute to household income. A significant challenge identified is land ownership, with 2,215 households holding legal land titles, while 516 are landless, residing on family-owned land.

Social Services and Infrastructure: Access to modern infrastructure and social services is relatively limited.

- **Education:** There are seven primary schools and one secondary school in the project area.
- **Healthcare:** Six health posts and one health center serve the communities.
- **Utilities:** Most households rely on firewood for energy, indicating limited access to electricity.
- **Telecommunication:** Service is available but details on penetration are not specified.
- **Transport:** Gravel roads connect the *kebeles* to Bishoftu City, Addis Ababa, and Dukem, but public transport is irregular.
- **Water Supply and Sanitation:** The area has various potable water supply schemes (surface water from dams and groundwater from boreholes, shallow wells, hand-dug wells, and springs). Sanitation infrastructure details are limited, but nitrate levels in groundwater suggest relatively low contamination from human waste.

Cultural and Religious Aspects: The communities are predominantly Orthodox and Protestant Christian. The project area contains culturally significant sites, including Orthodox, Protestant, Mechereyesus, and Full Gospel churches, along with associated cemeteries. These sites hold deep historical, spiritual, and communal significance, and their potential disturbance is a key social concern. The presence of mutual help organizations like Iddir and Iqub highlights strong community ties and traditional support systems.

Valued Ecosystem Components (VECs)

The Valued Ecosystem Components (VECs) identified for this cumulative impact assessment, which are susceptible to potential impacts from the project and other regional activities, include:

- **Surface Water Bodies and Drainage Systems:** Akaki/Gerbi River and Dukem River, and seasonal/dry streams like Ululo Sera and Ululo Birke.

- Wetlands and Riverine Ecosystems: Riverine forests along the Akaki and Dukem rivers.
- Acacia-Commiphora Woodland Ecosystem: The semi-arid woodland vegetation.
- Biodiversity and Wildlife Habitat: Localized biodiversity, particularly bird species (including migratory and endemic birds) and small mammals.
- Groundwater Resources: Local aquifers.
- Soil and Agricultural Land: Black cotton soil, sandy loam areas, and fertile agricultural land.
- Human and Cultural Receptors: Local communities in the eight kebeles, social infrastructure (schools, health institutions), grave sites, and religious/cultural heritage.

Potential Impacts and Enhancement/ Mitigation Measures

The development of the Bishoftu International Airport is expected to result in both high and medium-significance environmental and social impacts. These impacts are not isolated but compound existing vulnerabilities, highlighting the urgent need for effective mitigation and adaptive management strategies.

Major Impacts (High Significance): Land acquisition for the project will affect approximately 3,979 hectares and displace 2,731 households (15,320 individuals), 9% of whom are female-headed. Of these, 2,215 households hold legal land titles, while 516 are landless. About 80.3% of agricultural land (2,518.6 ha) will be lost, impacting staple crops like teff, wheat, and barley. Residential land loss affects all households (272.74 ha), with an additional 163.1 ha of grazing land impacted. Annual income loss from off-farm activities is estimated at ETB 92.9 million. Public infrastructure losses include schools, health posts, roads, water facilities, and community institutions. Cultural and religious sites such as Orthodox, Protestant, Mechereyesus, and Full Gospel churches, along with cemeteries, will also be affected. The project will disrupt the livelihoods of Kereyu Oromo pastoralists due to loss of seasonal grazing lands. These land demands—combined with pressures from the Geda Economic Zone and Mojo Dry Port—will intensify socio-economic vulnerabilities and disrupt social networks.

During operations, noise pollution is projected to affect around 14,376 hectares. Forecasts for 2030 show 9,405 hectares exposed to 45–50 dB and 4,971 hectares to 50–55 dB, exceeding residential night-time limits. Commercial thresholds will be breached across 2,326 hectares, with 68 hectares exposed to over 70 dB, and smaller areas exceeding 75–90 dB. Noise will mainly affect northern farmlands and eastern suburbs, with narrow-body aircraft (e.g., B737

MAX) contributing to mid-range noise and wide-body aircraft (e.g., B777/B787) to higher levels. Combined with existing ambient noise and urbanization, this will elevate health risks like sleep disturbance and stress, necessitating stringent noise management and land-use planning.

Air pollution from airport operations will add significantly to an already compromised environment. By 2030, daily emissions are projected at 21,618 kg of NO_x, 2,716 tons of CO₂, and 144 kg of PM. Aircraft like the B777-300ER will be major contributors, while APU operations will generate large volumes of CO, NO_x, and PM. These emissions, when added to existing industrial and traffic pollution, are expected to worsen public health risks, calling for strong emissions controls and continuous air quality monitoring.

Water resource pressures will also be substantial. Daily water demand will rise from 6,596 m³ (Phase I) to 18,111 m³ (Ultimate Phase), with wastewater volumes reaching up to 15,390 m³/day. Risks include groundwater and surface water contamination from spills and discharges. Local rivers like the Akaki and Dukem are already severely polluted, and even treated wastewater may exacerbate their degradation. Given the poor water quality baseline, advanced wastewater treatment and integrated water resource management are critical.

Traffic-related impacts include an estimated 34,753 daily truck trips during peak construction and significant peak-hour passenger movement during operations. This will overwhelm unpaved local road networks, raising accident risks, dust pollution, and long-term infrastructure strain. Combined with traffic from nearby industrial and urban developments, these issues will amplify urban sprawl and road safety challenges.

The project will lead to the loss of approximately 105 hectares of Acacia-Commiphora woodlands and other indigenous and plantation vegetation within the total airport boundary area of 3,900 hectares. This vegetation is sparsely distributed across the site, and its removal will result in habitat fragmentation and a reduction in local biodiversity. Although no permanent resident wildlife populations of conservation concern were identified within the project footprint, occasional movements of species such as rabbits, monkeys, and various bird species do occur. Potential impacts are therefore limited to transient species rather than established wildlife populations, with possible effects including temporary habitat disturbance, risk of collisions, and disruption of movement paths. This necessitates targeted biodiversity management and habitat restoration efforts.

Public health risks include occupational hazards for workers and the spread of communicable diseases such as HIV/AIDS due to an influx of workers and associated social changes. These risks are magnified by pre-existing weaknesses in local health infrastructure, underlining the need for robust health and safety programs and coordination with health authorities.

Moderate Impacts (Medium Significance): During mobilization, moderate impacts include dust emissions, machinery noise, soil compaction, surface water pollution, and traffic congestion. Gender-based violence (GBV) risks and the potential spread of HIV/STIs are present, although relatively low due to the short duration and limited workforce.

In the construction phase, moderate to high impacts include fugitive dust emissions, high noise levels from heavy equipment, and significant material extraction from local quarries and rivers, leading to soil erosion, habitat disruption, and aesthetic degradation. Solid waste generation (over 41 million m³ of unsuitable soil and other wastes) presents contamination and health risks. Changes in land use will increase surface runoff and flood potential, while soil removal and heavy machinery use may lead to topsoil loss and erosion. Water body pollution is likely from accidental releases and waste disposal. Occupational health risks include accidents, chemical exposure, and fatigue, while social risks include employment-related conflict, cultural tensions, and GBV/SEA issues.

During operations, the district cooling plant may contribute to greenhouse gas emissions, water use, noise, and chemical discharges. Operational soil and water contamination may occur from leaks and spills, rated moderate to low depending on mitigation. Energy and water demand will increase significantly, and vegetation and wildlife will continue to be impacted by pollution, habitat loss, and light/noise disturbances. Finally, the airport may drive unplanned urbanization, with risks of informal settlement development, farmland loss, and infrastructure pressure, emphasizing the importance of proactive urban planning and land-use control.

Stakeholder Consultation

Consultation meetings were conducted with more than 52 key stakeholders and 449 Project Affected Persons representative from November 2024 to May 2025 to present the proposed Bishoftu International Airport (BIA) project and gather feedback on its potential impacts.

Key Stakeholders Consulted

- Federal & Regional Authorities: Federal Environmental Protection Authority (FEPA), Ethiopian Airlines Group, Ministry of Transport, Oromia Urban Planning Institute.
- Local Administrations: Bishoftu City, Dukem Sub-City, and Abusera Woreda offices (Land, Agriculture, Health, Environment, etc.).Project Affected Persons (PAPs): Representatives from seven kebeles, including women, youth, and vulnerable groups.

Key Issues & Recommendations Raised

1. Land Compensation & Resettlement

- PAPs raised concerns over inaccurate land measurements and low compensation rates (322 birr/m²), demanding a revised valuation.
- Youth land allocation (105 m² per person) was criticized for lacking construction support, risking homelessness.
- Requests for resettlement near the project site to reduce transportation costs and enable employment opportunities.

2. Livelihood & Employment

- Displaced farming communities require skill development programs to adapt to urban livelihoods.
- Priority employment for PAPs and their youth during construction and operational phases.

3. Environmental & Social Concerns

- FEPA emphasized strict adherence to ESIA guidelines, including mitigation measures for noise, air quality, and biodiversity.
- Local communities requested cultural preservation (e.g., naming airport facilities after affected kebeles).

4. Project Support & Transparency

- Stakeholders endorsed the project but stressed the need for continuous consultations to address unresolved issues.
- Public disclosure of ESIA reports through newspapers, government offices, and digital platforms to ensure transparency.

5. Urban & Economic Integration

Oromia Urban Planning Institute highlighted alignment with Bishoftu's structural plan, focusing on tourism, transport links, and smart city development.

Environmental and Social Management and Monitoring Plan

The Environmental and Social Management Plan (ESMP) for the Bishoftu International Airport project presents a robust framework for addressing environmental and social risks throughout the entire project lifecycle—from design and construction to operations and decommissioning. This structured plan ensures that both negative impacts are mitigated and positive impacts are enhanced. Rather than offering general guidelines, the ESMP includes specific, actionable, and verifiable measures aimed at compliance with national regulations and international standards, thereby improving safeguard performance and stakeholder confidence.

a) Measures Addressing Significant and Moderate Impacts

During the Mobilization Phase, key measures include a comprehensive Resettlement Action Plan aligned with Proclamation No. 1161/2019 and AfDB OS 5. This includes compensation (land-for-land or cash), construction of replacement housing, and grievance redress mechanisms. Avoidance strategies focus on identifying sensitive areas and re-aligning infrastructure to prevent displacement, while minimization efforts reduce the footprint of land acquisition. Restoration activities involve restoring livelihoods via agricultural inputs and vocational training, while compensation ensures full replacement cost for lost assets and gender-sensitive support mechanisms.

For Loss of Livelihoods, the ESMP emphasizes implementing diverse restoration programs—irrigated farming, dairy production, trade, and microfinance—alongside temporary cash support and training. Impacts on Social Infrastructure are managed by constructing temporary schools and health facilities, deploying mobile services, and rebuilding religious institutions. Ambient Air Quality is protected by regular water spraying and speed limits, while Noise Pollution is controlled through restricted machinery operation hours and use of screened equipment. Soil Compaction and Surface Water Pollution are minimized through designated routes, fuel station zoning, and no vehicle washing near water sources. Biodiversity is protected by selecting camp locations away from vegetated areas and replanting trees. Health and safety risks are managed with PPE, safety training, and secure work zones. Traffic Risks are minimized through traffic management plans, and GBV/SEA concerns are addressed by

providing gender-sensitive facilities and strict codes of conduct. Exposure to STIs including HIV/AIDS is addressed via awareness campaigns and subsidized condom distribution.

During the Construction Phase, air pollution is reduced by spraying water, using Euro IV+ equipment, and covering stockpiles, while planning avoids adverse weather and population centers. Noise Pollution is controlled through daytime limits, acoustic barriers, PPE, and traffic design, with equipment located away from sensitive areas. Solid Waste Management includes segregation, on-site reuse, and regulated disposal. Land-use change and increased runoff are managed through efficient design and local drainage systems. Soil Erosion is mitigated through demarcation and spill control, and Water Pollution is prevented via spill response and sediment control. Vegetation Loss is reduced by green belts and replanting native species; compensation is provided per national law.

Wildlife and Habitat Conservation is strengthened through preserving corridors, relocating species, and restoring habitats. Occupational health and safety (OHS) is addressed through PPE, training, and emergency planning. Traffic Management includes road signage and speed limits. Employment-related conflicts are addressed through local hiring and stakeholder engagement. Cultural Heritage Protection is ensured through training and reporting protocols. Vulnerable groups are prioritized in hiring and support, and strong safeguards are implemented to prevent GBV, SEA, and child labor. Cultural Conflicts and Drug Abuse are managed via worker orientation and strict enforcement in collaboration with local authorities.

During the Operation Phase, air pollution is mitigated by using electric vehicles and regularly monitoring emissions. Avoidance strategies include optimized airport layout and routing. Noise pollution is minimized through nighttime flight restrictions, quieter aircraft, and ICAO-compliant designs. Solid waste is managed through three-stream segregation, recycling, and hazardous waste partnerships. Advanced liquid waste treatment systems are used, and water reuse is practiced. Traffic congestion is tackled by promoting rail transport, smart traffic signals, and shared-ride lanes. Soil and Water Contamination are monitored through storage protocols and drainage plans. Increased water demand is managed through water-saving technologies and artificial recharge.

Biodiversity continues to be protected through vegetation monitoring, invasive species control, and wildlife corridor maintenance. Migratory birds are protected via designated no-go zones, rehabilitation efforts, and bird-strike monitoring systems. Urbanization Risks are mitigated

through zoning enforcement, affordable housing, and transport investments. District Cooling Plant Impacts are addressed with renewable energy use, noise control, chemical handling protocols, and HSE management systems.

ESMP for the adverse impacts of the proposed new airport

Code	Socio-Environmental Component	Risk	Potential Environmental and Social Impact	Proposed Mitigation measures	Mitigation Schedule	Responsibility		Cost estimation	
						Implementation	Supervision	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
A	Mobilization Phase								
A1	Land Acquisition & Displacement	Involuntary physical and economic displacement of households and loss of land.	-Physical displacement of 2,731 households (15,320 individuals), across 8 kebeles. -Loss of 3,979 hectares of land, comprising 2,518.6 ha (80.3%) of agricultural land, 272.74 ha (8.7%) of residential land, and 163.1 ha (5.2%) of grazing land.	- Fully implement the Livelihood Restoration Plan for Bishoftu International Airport Development Displaced Households- Provide land-for-land compensation or monetary compensation at full replacement cost. - Construct replacement housing for all physically displaced households	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and rehabilitation committee	14,699,999,999ETB	
A2	Loss of Livelihoods	Significant disruption and loss of primary income sources for project-affected households.	-Economic displacement affecting 91.7% of households reliant on farming. -Loss of livelihood from 31,432 cattle, 7,764 goats and sheep, 2,102 equines, 63,179 poultry, and 1,225 beehives. -Estimated annual income loss of ETB 92,875,911 from off-farm activities.	- Implement livelihood restoration programs (irrigated farming, dairy, agro-processing, trade and transport, and construction sector.) - Provide vocational training and job linkages to airport-related employment. - Offer temporary cash assistance for 12 months.	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and rehabilitation committee	7,298,687,275 ETB	
A3	Cultural and Social Disruption	Loss of social cohesion, destruction of religious/cultural sites, and disruption of	-Destruction of four Orthodox churches, five Protestant church, one Mechereyesus Church, and one Full Gospel Church, along with their associated cemeteries	-reroute project infrastructure to avoid known cultural, spiritual, and communal heritage sites, including cemeteries and ritual grounds	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and	The cost are already included in A4	

		traditional practices.	- Disruption of traditional mutual aid systems (Iddir, Iqub, Gadaa system) and seasonal grazing lands for Kereyu Oromo pastoralists	- Design resettlement areas to reflect the original spatial and social organization of the community, including access to communal spaces - Rebuild affected religious institutions and culturally significant structures within or near the resettlement areas in coordination with affected communities. -Allocate suitable land for the reconstruction of cemeteries and ensure traditional rites can be performed in alignment with community practices.			rehabilitation committee		
A4	Impact on Social Infrastructure	Demolition and disruption of essential public services and utilities.	-Loss of 4 first-cycle schools and 2 primary schools (affecting 2,540 students). -Closure of 5 health posts (serving 10,417 residents). -Disruption of 37 km of gravel roads, -demolition of 2 water reservoirs, and loss of 73 piped water connections. -Loss of 5 Farmers Training Centers (FTCs), 5 kebele offices, and 5 cooperative	- Construct temporary schools and health posts in resettlement areas. - Deploy mobile health units and temporary classrooms. - Reassign displaced government staff to new facilities. -Rebuild religious institutions and cemeteries in resettlement areas. - build social infrastructures including schools, health center, religious institutions;	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and rehabilitation committee	7,889,241,200.00 ETB	

			warehouses.	building water supply and electric power supply at the resettlement site					
A5	Deterioration of Ambient Air Quality	Increased dust and exhaust emissions from vehicular movement and land clearing.	Increased fugitive dust emissions (PM2.5, PM10) from unpaved roads and land clearing; localized increase in vehicle exhaust emissions (NOx, CO) from machinery transport. Impact is significant during dry weather conditions.	- Implement daily water spraying on all unpaved roads, active construction areas, and exposed soil surfaces, particularly during dry and windy conditions. - Cover all stockpiles of soil, sand, and other construction materials with tarpaulins or other suitable covers. Seal or enclose materials prone to dust generation. - Limit vehicle speed to 30 km/h in residential areas and on unpaved access roads.	While moving machineries and vehicles along unpaved access roads	Construction Contractors	Bishoftu city Administration Environmental Protection Authority and consultant	40,000,000	4,000,000
A6	Increased Noise Levels	Elevated noise from construction machinery affecting nearby communities and workers.	Localized noise levels potentially exceeding Ethiopian standards (45dB night, 55dB day for residential areas) during machinery movement and camp establishment. Impact is low due to short duration of mobilization.	- Restrict noisy machinery use at night (maintain ≤ 45dB). - Screen noisy equipment and enforce daytime-only operations. - Install acoustic barriers or sound-insulating screens around active construction zones - Use modern, quieter construction equipment - Mandate the use of Personal Protective Equipment (PPE)	During mobilization and camp establishment	Construction contractor	Supervision consultant	40,000,000	4,000,000
A7	Soil Compaction & Contamination	Compaction and pollution	Compaction of soil along access roads and open spaces;	- Use existing roads for machinery transport.	During mobilization and camp	Construction contractor	Supervision consultant	4,000,000	400,000

		of soil from heavy machinery movement and accidental spills.	potential contamination from leakage/spill of oil/fuel from vehicles and machinery. Impact is low due to short duration.	- Avoid driving on farmland; construct designated access roads.	establishment				
A8	Surface Water Contamination	Pollution of surface water bodies from fuel/oil spills and improper vehicle washing.	Potential release of fuel/oil pollutants into nearby water bodies, contributing to water quality deterioration.	- Prohibit vehicle washing near water bodies. - Designate fuel stations and maintenance zones.	During mobilization of construction machineries and vehicles	Construction contractor	Supervision consultant	2,000,000	200,000
A9	Flora & Fauna Disturbance	Minor disturbance to local flora and fauna from site activities.	Low impact anticipated as no protected or natural habitats are along access roads/project sites.	- Select storage/camp sites in non-vegetated areas. - Avoid unnecessary tree removal; - replant shade trees post-construction.	During mobilization and camp establishment	Construction contractor	Supervision consultant	2,500,000	250,000
A10	Occupational Health & Safety Risks	Health and accident risks to workers and commuters from vehicular/equipment movements, loading/unloading, and dust emissions.	Limited health and accident risks due to short duration and minimal workforce during mobilization.	-Implement Occupational Health & Safety Plan -Provide PPE and safety training for workers. - Isolate work zones from public areas. -Integrate mitigation strategies—through robust Safety Management Systems, staff training, advanced technology, and continual risk monitoring	During mobilization and camp establishment	Construction contractor	Supervision consultant	10,000,000	1,000,000
A11	Traffic Congestion and Accident Risk	Increased traffic congestion and accident	Moderate impact from increased vehicular and machinery movement to the project site.	- Implement a Traffic Management Plan (TMP).	During mobilization and camp establishment	Construction contractor	Supervision consultant	2,000,000	200,000

		potential due to vehicle and machinery movement.							
A12	Gender-Based Violence (GBV) Risks	Potential for GBV and sexual harassment against female workers due to lack of awareness and understanding .	Low impact due to minimum number of workers and short duration of mobilization.	- Provide separate sanitation facilities for women. - Enforce a strict anti-harassment code of conduct.	During mobilization and camp establishment	Construction contractor	Supervision consultant	1,500,000	150,000
B	Construction Phase								
B1	Air Pollution (Deterioration of Ambient Air Quality)	Significant fugitive dust emissions and exhaust from construction activities and machinery.	High impact from dust (PM 2.5, PM10) from excavation, material transport, and vehicle exhaust (NOx, CO) from diesel powered equipment. Exacerbates existing air quality issues in Bishoftu town.	-Locate emission-intensive activities (e.g., aggregate processing, batching plants, and quarrying) away from densely populated areas and sensitive receptors such as schools, hospitals, and natural habitats. -Preserve vegetation cover where possible to act as a natural dust and pollutant barrier. - Water spraying on unpaved roads and exposed soil. - Apply dust suppressants or soil binders on haul roads and open stockpiles. - Cover stockpiles with tarpaulins. - Use low-emission (Euro	Throughout the construction Phase	Contractor	Bishoftu city Administration Environmental Protection Authority /Consultant	150,000,000	15,000,000

				IV+) machinery. - Prohibit open burning of waste. -Use update technology or modern equipment in excavation works that will minimize dust generation from earthen materials; -Regular vehicle inspections and maintenance of equipment and vehicles to reduce excessive exhaust emissions; - Install dust extraction units (e.g., bag filters or wet scrubbers) at plants. -Minimize excavation and earth moving to only what is required for the specific nature and type of construction; - Use controlled and pre-wetted blasting techniques. • Operate only during favorable weather to minimize dispersion. -Use dust suppression systems (e.g., mists or water sprays).					
B2	Noise Pollution (Elevated Noise Levels)	High noise levels from heavy construction equipment impacting nearby	High impact from machinery noise (e.g., excavators, bulldozers, dump trucks, piling rigs) potentially exceeding Ethiopian EPA (55 dB day, 45 dB night) and IFC (70 dB day, 55 dB night for	- Limit noisy activities to daytime (7 AM–6 PM). - Use acoustic barriers for DG sets. - Install soundproof enclosures for diesel	Throughout the construction Phase	Contractor	Supervision Consultant	7,000,000	700,000

		communities and workers.	residential) standards.	generator sets in compliance with CPCB and international standards to suppress noise emissions at source. - Mandate PPE (earplugs) for workers in >85 dB zones. - Enforce 30 km/h speed limit near residential areas. - Use update technology or modern equipment in excavation works that will minimize noise emissions and vibration					
B3	Solid Waste Generation	Generation of large volumes of solid waste (unsuitable soil, construction debris, domestic waste) posing contamination and health risks.	Generation of approximately 73,132,110 m ³ of unsuitable excavated soil. Significant volumes of municipal solid waste from labor camps and construction debris.	- Implement a waste minimization strategy by optimizing material use and reducing excess procurement. -Establish on-site segregation bins for different categories (organic, recyclable, hazardous, non-hazardous) to reduce cross-contamination - Dispose of hazardous waste via licensed facilities. - Provide sealed waste bins at labor camps. - Transport non-recyclable waste to authorized disposal sites with proper waste tracking. - Store chemicals in labeled, sealed containers; implement spill prevention using drip	Throughout the construction Phase	Contractor	Bishoftu city Administration Environmental Protection Authority /Consultant	20,000,000	2,000,000

				trays and absorbents					
B4	Land Use Modification	Changes in land cover leading to increased surface runoff and flood potential.	Significant modification of the project site's land cover (from predominantly agricultural to impervious surfaces), increasing surface runoff potential and leading to frequent local flooding.	-Reduce land requirement by utilizing effectively and only required size for the intended use. -Drainage work should not only be limited to airport facility but also should incorporate local drainage system considering near future urbanization of the area.	Throughout the construction Phase	Constructioncontractor	Supervision consultant	10,000,000	1,000,000
B5	Soil Erosion & Compaction	Loss of topsoil, increased erosion, and soil compaction from site clearing, excavation, and heavy machinery.	Potential for soil disturbance and loss of topsoil resources. Aggravation of gully formations in soft geological formations. Soil compaction from heavy-duty vehicles affecting soil structure and water infiltration.	-Demarcate the area to be stripped clearly, so that the contractor does not strip beyond the demarcated boundary. - In case of spillage the Contractor should isolate the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by the Resident Engineer; -Pre-defined, essential road access routes should be clearly demarcated and adhered-to on site to restrict soil compaction in the project area	Throughout the construction Phase	Constructioncontractor	Supervision consultant	9,000,000	900,000
B6	Pollution of Water Bodies	Contamination of surface and groundwater from inadequate	Increased silt loading of Akaki-Gerbi and Dukem Rivers. Potential pollution from fuel/oil/paint spills and solid/liquid waste from construction camps,	-Construction materials and other debris (aggregate, cement and fresh concrete, etc.) shall be prevented from	Throughout the construction Phase	Construction contractor	Supervision consultant	20,000,000	2,000,000

		handling/spillage of pollutants and increased siltation.	exacerbating existing severe pollution.	entering existing drainage infrastructure. -Ensure protection of the water body ecosystem by preventing the washing away of construction materials, soil, silt or debris into nearby rivers. -Develop and display emergency response work instructions for accidental oil and chemical spills and debris into the rivers. in other manner approved by the Supervision consultant					
B7	Vegetation and Flora Loss	Loss of vegetation and fragmentation of habitats.	Loss of 105 hectare land covered with Acacia-Commiphora woodlands and other indigenous/plantation vegetation.	• Design infrastructure to minimize impact on sensitive vegetation zones. • Avoid unnecessary clearing and preserve key plant species. • Establish green belts around the site to enhance ecological balance. • Implement erosion control measures to protect plant roots and prevent land degradation. • Replant 2x the cleared trees (native species).	Throughout the Construction and construction completion phase	Contractor, EAG, Bishoftu city environmental protection offices	Supervision consultant, Bishoftu city environmental protection	10,000,000	1,000,000

				• Preserve Acacia-Commiphora woodlands.					
B8	Habitat and Fauna Disturbance	Habitat fragmentation, disturbance to wildlife, and potential for bird strikes.	-Habitat loss/fragmentation for wildlife (hyenas, rabbits, monkeys) and bird species -Increased risk of bird strikes.	• Conservation of important habitat and Key plant species including the remnant secondary growth trees and shrubs for nesting and food sources, • Preserve existing vegetation where possible and avoid unnecessary clearing. • Maintain natural corridors to allow fauna movement.	Throughout the construction Phase	Construction contractor	Supervision consultant	40,000,000	4,000,000
B9	Occupational Health & Safety Hazards	Physical injuries, chemical exposure, noise exposure, fatigue, and human error for construction workers.	-High potential for accidents, chemical exposure, noise-induced hearing loss, and fatigue-related incidents among workers.	• Implement Occupational Health and Safety Plan • Contractor has to take maximum care and minimize accident risks by applying internationally accepted standards and recognized occupational health and safety guidelines; • The contractor to take appropriate care in storing and using hazardous chemicals and explosives and provide training to workers in handling hazardous chemicals;	Throughout the construction phase	Construction Contractor	Supervision consultant, EAG and Bishoftu City Health office	80,000,000	8,000,000

				• Provide workers with protective clothing and equipment and create awareness on safety issues; • Provide awareness creation among the local community on the hazardous nature of chemicals, explosives if it is used during the construction works; • Provide first aid kits at workshops, construction worksites, and inside vehicles; • Provided workers with appropriate PPE such as hand gloves, eye goggles, safety shoes, reflective vests, helmets, etc., based on their work condition as much as possible and strictly inspect proper use of the same throughout the construction phase; • Avail equipped ambulance at construction site for any emergency cases; • Conduct general medical check-ups for recruits and subsequently, conduct periodic medical check for all employees and take					
--	--	--	--	--	--	--	--	--	--

				appropriate action and keep all records; • Hung-up fire extinguisher bearing detailed information about its status at appropriate places; • All personnel, vehicles, and machinery should be covered under an appropriate Insurance System; • Carefully record and keep all incidence of injuries and accidents including date, time, and place of occurrence, level of injuries, resources damage, people injured/dead, major causes for the accident, etc.; • Provide awareness creation on safety procedures and HIV/AIDS and avail healthcare services; • Regularly spray water in dusty roads and work areas; and; • Introduce a traffic management plan with speed and traffic regulation through the neighboring areas by					
--	--	--	--	---	--	--	--	--	--

				using appropriate traffic signs.					
B10	Traffic Accident and Congestion	Increased traffic accidents and congestion on local roads due to construction vehicle movements.	-Estimated 34,753 daily truck trips during peak construction period (Year 2), overwhelming unpaved local road networks. -Increased accident risks, dust pollution, and long-term infrastructure strain.	• Implement Traffic Management Plan • Avoid parking construction vehicles and equipment at road sides instead provide temporary parking areas within the construction compound or in camp sites; • Post proper and clearly visible signs, barricades, reflectors at appropriate locations; • Delineate or fence work zone esp. risky areas and provide sufficient information about the site through posting of clearly visible signs; • Set and enforce speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area; • Minimize the duration of construction works through arrangement of capable and professionally trustful contractors and supervision consultants; • Reinstate the damaged sections of roads as soon	Throughout the construction phase	Construction contractor	Client/Supervision consultant, Oromia and Bishoftu city traffic management offices	10,000,000	1,000,000

				as the construction works is completed;					
B11	Conflict on Employment Opportunity	Potential for conflicts between local communities and migrant workers over employment opportunities.	Risk of social tension and conflict if local employment expectations are not met.	• Implement Labor Management Procedure Plan • Provide priority of job opportunity for the local people and particular attention for women; • Involve local authority in the process of labor recruiting; • Create a smooth relationship with community members.	Throughout the construction phase	Construction Contractor in cooperation with, Bishoftu city labour offices	Supervision consultant, Bishoftu city	1,000,000	100,000
B12	Impacts on Vulnerable People	Disproportionate negative impacts on vulnerable groups (e.g., elderly, disabled, female-headed households).	Vulnerable groups (as identified in baseline) may face increased hardship if not specifically supported.	• Ensure that women and vulnerable groups will equally get job opportunities during the project construction processes and the benefits of the Project implementation; • Aware local governments and community members to solicit their assistance for the project affected vulnerable groups; • Ensure all project vulnerable groups are identified and eligible for the government's special support.	Throughout the construction phase	Contractor in cooperation with Bishoftu city administration office	Consultant	2,000,000	200,000

B13	Gender Equity and Sexual Harassment	Potential for gender inequality, sexual harassment, and gender-based violence (GBV) in the workforce and community.	Risk of GBV/SEA and child labor abuse due to influx of male workers and associated social changes.	• Create awareness among workers on gender and sexual harassment issues; • Issue a strong Workers Code of Conduct (CoC) that sufficiently addresses gender and sexual harassment issues; • Take appropriate actions on workers violating the CoC; • Provide women workers with appropriate type of safety equipment and protective materials; • Include in the employment contract for the construction workers that any GBV and sexual harassment against women workers will lead to administrative measures and also legal actions; • The Contractor is required to design gender core labour standards and employment and contract procedures; and also design gender responsive workers' manuals; • The Contractor should ensure that women are paid equal pay for equal work with their male counterparts;	Throughout the construction Phase	Contractor	Consultant, and; Office of Women, Children and Youth Affairs.	4,800,000	480,000
-----	-------------------------------------	---	--	---	-----------------------------------	------------	---	-----------	---------

				• Provision of gender disaggregated bathing, cloth changing areas & sanitation facilities; • Include gender expert among the consultant's team to follow up Gender mainstreaming activities.					
B14	HIV/AIDS and other STI Spread	Increased risk of HIV/AIDS and other STIs due to influx of workers.	Increased risk of communicable disease transmission, including HIV/AIDS, due to large, transient workforce.	• Contractors should assign experienced HIV/AIDS sub consultant to handle the issues related to HIV/AIDS awareness and prevention; • Launch awareness and education campaigns about HIV/AIDS among the construction workers and community to make them informed. This has to be done on the one hand by the contractor's sub consultant and on the other hand by the local health institutes around the project area targeting especially women and sex workers; • Condoms shall be provided at a subsidized rate or for free to construction workers and health facilities must be supported with a supply of condoms.	Starting from mobilization to end of construction phase	Construction contractor through HIV/AIDS sub consultant to be hired under the contractor	Supervision consultant, Bishoftu City Administration	2,000,000	200,000

				- To prevent young and school age people, schools within the direct influence area of the project should include information campaigns and/or special awareness creation activities; - City administrations and city health offices, HIV/AIDS Prevention and Control Office, Elders, and NGOs operating in the area need to work jointly to create positive impact and bring major attitudinal and behavioral changes. The contractor should understand the culture of people/community of the project area.					
B15	Cultural Conflict, Culture Dilution and Drug Abuse	Potential for cultural conflicts, dilution of local culture, and increased drug/alcohol abuse.	Risk of social friction, cultural clashes, and increased drug/alcohol abuse due to interaction between local communities and migrant workers.	- Contractor shall aware of his workforce to not involve in any sexual, alcohol and drug abuse. - If workers committed sexual and drug abuse, the case should be taken to court. - If the worker committed sexual abuse and escaped from the project area, the contractor has to be responsible to bring him to court.	Throughout the construction phase	Contractor in cooperation with project woreda administration office	Consultant, Bishoftu city Administration	5,000,000	500,000

				The Abusera Woreda authorities should control and shut any shop involved in drug business if any.					
C	Operation Phase								
C1	Air Pollution (Deterioration of Ambient Air Quality)	Emissions from aircraft operations, ground support equipment (GSE), and increased vehicular traffic.	By 2030, daily emissions projected at 21,618 kg of NO _x , 2,716 tons of CO ₂ , and 144 kg of PM. Aircraft like B777-300ER and APU operations are major contributors. Exacerbates existing air quality issues in Bishoftu town (PM _{2.5} , PM ₁₀ , NO ₂ , SO ₂ often exceed standards).	- Discourage high-emission aircraft -Transition airport Ground operations to electric or hybrid systems (e.g., electric Ground Support Equipment, electric shuttle buses). -Install electric vehicle (EV) charging infrastructure for airport vehicles and service fleets. -Promote public transport, carpooling, and non-motorized transport for employees and passengers to reduce vehicular emissions. -Implement runway and taxiway optimization to reduce aircraft Taxiing time and idle emissions. -Introduce operational limits on APU use through airport policy and monitoring. - Develop green buffer zones around airport boundaries to improve local air quality and aesthetics.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu City Administration	50,000,000	7,500,000
C2	Noise Pollution (Chronic Noise Burden)	High noise levels from aircraft operations and ground activities affecting nearby communities.	By 2030, noise projected to affect around 14,376 hectares: 9,405 ha exposed to 45–50 dB, and 4,971 ha to 50–55 dB (exceeding residential night-time limits of 45 dB). Commercial thresholds (70 dB) breached across 2,326 hectares, with 68 hectares exposed to	-Avoid scheduling non-essential night flights during the most sensitive hours (e.g., 23:00–06:00). -Reduce the operation of high-noise aircraft models at the airport during planning and licensing stages. -Transition to electric or hybrid ground support	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	30,000,000	4,500,000

			over 70 dB, and smaller areas exceeding 75–90 dB.	equipment to minimize ground noise emissions. -Design airport infrastructure (runways, taxiways, holding areas) to reduce aircraft idling and unnecessary engine use. -Restrict noisy maintenance and fueling operations to daytime hours only. - Use sound-absorbing materials in airport terminals and perimeter structures to reduce ambient noise propagation. -Construct vegetative noise buffers and embankments around high-noise operational zones to reduce sound travel. -Restore and enhance natural barriers (e.g., Tree lines) between the airport and residential communities.					
C3	Fire and Explosion Hazards	Risk of fire and explosion from fuel and hazardous materials.	Loss of life or serious injury to personnel, extensive damage to infrastructure, interruption of operations, and environmental contamination from burning fuel and firefighting residues.	-Fire Detection and Alarm Systems; -Fixed and Mobile Fire Suppression Systems (foam-water, deluge, extinguishers); -Explosion-Proof Equipment and Zoning (ATEX/IECEX); -Static Electricity Control (grounding/bonding); -Emergency Response Plan (ERP, drills); Fuel Vapor Control (closed-loop, flame arrestors);	During the operation phase	Client (Airline Group)	Federal fire and emergency prepared Agency, Project Management Unit, Regulatory Authorities	40,000,000	6,000,000
C4	Solid Waste Generation	Continuous generation of various solid wastes from airport operations.	Significant generation of municipal solid waste from terminal buildings (0.5 kg/passenger/day), in-flight cabin waste (0.4 kg/passenger/day), and packaging waste from cargo facilities (2 kg/ton cargo).	- Deploy 3-stream waste segregation (organic, recyclable, residual). - Establish an on-site recycling plant. - Partner with certified hazardous waste disposal firms.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection.	60,000,000	9,000,000

C5	Liquid Waste Generation	Discharge of wastewater and potential contamination of water bodies.	Wastewater volumes reaching up to 15,390 m ³ /day (at 110MAP). Risk of groundwater and surface water contamination from spills and discharges, exacerbating existing severe pollution in Akaki and Dukem Rivers.	- Install advanced wastewater treatment (MBR/RO systems). - Reuse treated water for landscaping. - Monitor effluent quality monthly.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	80,000,000	12,000,000
C6	Hazardous Materials		-Exposure to toxic chemicals (fuels, biocides, degreasers, solvents) can cause acute or chronic health effects such as respiratory irritation, skin burns, eye damage, or long-term organ toxicity. -Risk of chemical burns or poisoning due to accidental spills, leaks, or improper handling. -Potential inhalation of harmful vapors in confined spaces. -Contamination of soil and water bodies from chemical spills or improper disposal.	-Implement Hazardous Waste management Plan -Properly label and secure all chemical containers. -Strengthen waste collection, storage, and disposal systems. -Conduct regular inspections and audits of storage and handling. -Maintain records of waste generation and disposal. -Cover containers during storage and transport. -Set fixed routes and schedules for hazardous waste transport. -Ensure emergency preparedness and response plans. -Provide PPE and training for all handling and transport staff.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	3,750,000	
C7	Traffic Congestion	Increased vehicular traffic leading to congestion on surrounding road networks.	Significant peak-hour passenger movement (e.g., 5,330 departing and 5,230 arriving passengers during Phase 1 peak hours). This will overwhelm unpaved local road networks, raising accident risks and amplifying urban sprawl.	- Implement Traffic Management Plan	During the operation phase	Airlines Group	-Ethiopian Roads Authority. - Bishoftu city Administration	30,000,000	4,500,000
C8	Community Health and Safety	Air pollution, noise disturbance, bird strikes, and public safety concerns from traffic and hazardous	Exacerbation of respiratory and cardiovascular health issues from air pollution; sleep disturbance and stress from noise; risk of aircraft bird strikes; public safety concerns	-Design flight paths to minimize noise over communities. -Avoid wetlands and bird migratory routes to reduce bird strikes. -Use low-emission aircraft and electrify ground vehicles.	During the operation phase	Airlines Group	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	70,000,000	10,500,000

		materials impacting communities.	from increased traffic and hazardous material transport.	-Enforce noise curfews and build sound barriers. -Manage habitat and install bird deterrents. -Implement strict waste control to prevent attracting birds. -Secure airport perimeter with fencing and surveillance.					
C9	Occupational Health and Safety	Continuous physical, chemical, and ergonomic risks for airport staff	-Physical injury -Noise exposure -Ergonomic hazards -Fatigue -Human error -Exposure to air pollution -Handling hazardous and non-hazardous waste -Traffic congestion and related accidents	-Implement Operational Health and Safety Plan -Provide personal protective equipment (PPE) to all workers. -Implement regular OHS training and awareness programs. -Enforce strict handling and disposal procedures for hazardous and non-hazardous waste. -Monitor and control air quality and noise levels at the workplace. -Manage work schedules to reduce fatigue and ergonomic risks. -Maintain clear and safe traffic management to minimize congestion and accidents. -Conduct regular health and safety audits during operation. -Establish emergency response plans and first aid facilities onsite.	During the operation phase	Airlines Group	-Federal Health office -Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	50,000,000	7,500,000
C10	Soil contamination	Soil contamination from spills and leaks of oil, fuel, and other chemicals.	Potential for localized soil contamination from spills of oil/grease in maintenance rooms, workshops, and parking areas.	-In case of spillage it should isolated the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by environmental specialist. -Frequent monitoring of garages or plane maintenance rooms, workshops, parking area and others to check any	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	10,000,000	1,500,000

				leakage and if in compliance with the design					
C11	Contamination of water bodies	Contamination of surface and groundwater from improper storage/disposal of hazardous chemicals and materials.	Potential for water body contamination from improper storage/disposal of oil/fuel/lubricants and hazardous chemicals.	-All drums, containers or bags containing oil/fuel/lubricating materials and other hazardous chemicals shall be stored at special designated disposal sites on a sealed and/or bonded area in order to contain potential spillage. -All waste containers shall be collected and disposed off at designated disposal sites in line with the Ethiopian government waste management regulations. -Incorporate implementation of surface water drainage infrastructure management plan in the design document.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	20,000,000	3,000,000
C12	Increased water demand	Strain on local water resources due to increased airport water consumption.	Daily water demand rising from 6,596 m3 (Phase I) to 18,111 m3 (Ultimate Phase), placing substantial pressure on local groundwater and surface water resources.	- Limit pumping of water beyond the optimum well yield. -Conduct watershed management and soil-water conservation practice in and around the project area. -Introduce use of available precipitation (rain harvesting). - Practice artificial groundwater recharge mechanism.	During the operation phase	Client (Airline Group)	Federal EPA -Oromia Regional Bureau of Environment Protection. -Oromia Regional Bureau of Water Resource - Bishoftu city Administration	15,000,000	2,250,000
C13	Vegetation and flora	Continued impact on vegetation from airport operations (pollution, maintenance).	Ongoing loss of Acacia-Commiphora woodlands and other vegetation; habitat fragmentation.	- Regularly assess the health and growth of vegetation around the airport site. - Maintenance of Green Spaces – Ensure the upkeep of planted trees, shrubs, and grasslands to support biodiversity.	During the operation phase	Client (Airline Group) and Biodiversity Institute	Ethiopian Biodiversity Institute and Bishoftu city Administration	8,000,000	1,600,000

				• Continue monitoring and controlling invasive plant species to protect native flora. • Maintain wildlife corridors and green belts to ensure continued movement of fauna and flora. • Promote awareness of the importance of vegetation and flora protection within the local community and airport staff.					
C14	Habitat and Fauna			➤ Regularly monitor wildlife populations and behaviors around the airport to assess the impact of operations. ➤ Maintain and enhance wildlife corridors to ensure safe movement of fauna between habitats. ➤ Protect existing vegetation and implement ongoing restoration efforts to support fauna habitat. ➤ Set up wildlife rescue programs to respond to animals in distress or danger due to airport activities. ➤ Install barriers or fences where necessary to prevent wildlife from	During the operation phase	Client (Airline Group) and Biodiversity Institute	Ethiopian Biodiversity Institute and Bishoftu city Administration	12,000,000	2,400,000

				accessing dangerous areas.					
C15	Migratory birds			➤ Avoid critical bird habitats; establish No-Go zones. ➤ Control bird attractants; apply visual and acoustic deterrents. ➤ Rehabilitate disturbed areas with native vegetation. ➤ Support regional bird conservation programs. ➤ Implement Bird Strike Monitoring and adjust measures as needed.	During the operation phase	Client (Airline Group) and Biodiversity Institute	Ethiopian Biodiversity Institute, Ethiopian Wildlife Conservation Authority and Bishoftu city Administration	15,000,000	3,000,000
C16	Urban Heat Island Effect		- increasing operational costs and greenhouse gas emissions. -Higher temperatures may strain building systems and infrastructure durability. -reduces outdoor thermal comfort, -exacerbates local air pollution and heat-related illnesses.	➤ Allocate ≥30% area for green spaces to cool surroundings. ➤ Use cool roofing and paving materials with high reflectance. ➤ Install green roofs and vertical gardens on buildings. ➤ Plant tree-lined boulevards and shaded pedestrian corridors. ➤ Design building orientation and spacing for natural ventilation. ➤ Integrate energy-efficient HVAC and passive cooling features.	During the operation phase	Client (Airline Group)	Federal Environmental Protection Authority and Bishoftu city Administration	10,000,000	2,000,000

				➤ Monitor temperatures and energy use to adapt strategies.					
C17	Flooding		- Erosion, pollution, and strain on local drainage systems. -disrupts airport business activities, access, and safety. -damages buildings, roads, and other airport infrastructure.	• Design integrated stormwater management system based on site conditions. • Install properly sized drainage channels, culverts, and pipes. • Construct retention and detention ponds to reduce peak runoff. • Use green infrastructure: permeable pavements, green roofs, rain gardens, bioswales. • Implement routine inspection and maintenance of all stormwater facilities. • Clear drains and sediment traps regularly, especially before rainy seasons.	During the operation phase	Client (Airline Group)	Federal EPA -Oromia Regional Bureau of Environment Protection. -Oromia Regional Bureau of Water Resource - Bishoftu city Administration	25,000,000	3,750,000
C18	Unplanned Urbanization			➤ Enforce zoning laws (Airport City masterplan). ➤ Expand public transit to reduce sprawl.	During the operation phase	Client (Airline Group), Oriomia Planning Institute and Urban Development & Housing Agency	Ministry of Urban Development, Oriomia Planning Institute and Bishoftu City Admistration	150,000,000	15,000,000
Total Cost								1,151,550,000 without the cost included under code A1, A2, A3 and A4	179,280,000 without the cost included under code A1, A2, A3 and A4

b) EOHS Clauses in Works Contracts

The ESMP will be embedded into contract documents to ensure implementation. General hygiene and health measures include accident insurance, hazard signage, base-camp medical clinics, PPE provision, and assignment of safety officers. Waste management includes proper sanitation, solid and hazardous waste segregation, and pollution prevention at camp sites. Hazardous waste protocols require proper storage, PPE use, spill reporting, and health safety practices such as washing before meals and avoiding chemical exposure.

In regard to HIV/AIDS and STIs, contractors must employ specialized consultants, provide awareness programs, and distribute free or subsidized condoms. Community Relations provisions prioritize local hiring, especially women and vulnerable groups, with government collaboration and cultural sensitivity training. In addressing Gender Equity and GBV, separate sanitation, fair labor practices, and codes of conduct are mandated. Violations will be reported and monitored through a gender specialist. The code of conduct will be translated and displayed on-site.

The Chance Find Procedure ensures that cultural heritage discoveries are managed responsibly. Contractors must stop work, secure the site, and notify relevant authorities for joint decision-making and documentation before resuming.

c) Capacity Building

Capacity building is a core component of effective ESMP implementation. The objective is to equip all stakeholders with the knowledge, tools, and skills to monitor and enforce safeguards. A training needs assessment will be conducted, targeting EAG staff, consultants, contractors, local experts, and community representatives. Programs will include construction-phase and operations-phase training, with modules on ESMP, occupational safety, stakeholder engagement, and biodiversity management.

Training will be delivered via short-term workshops, medium-term certifications, and ongoing professional development. Implementation will occur in four phases: pre-construction, construction, pre-operation, and long-term operation. Activities will include specialist recruitment, technical assistance committee (TAC) setup, equipment procurement, policy

development, and refresher trainings. The total estimated budget for capacity building is 41,380,000 ETB.

d) Environmental and Social Monitoring Plan

The monitoring component of the ESMP spans across the mobilization, construction, and operational phases of the project. It tracks key environmental and social indicators such as air and noise pollution levels, effectiveness of waste segregation, water quality, traffic and safety compliance, and grievance resolution. Monitoring methodologies include regular site audits, laboratory analyses, real-time monitoring systems, and stakeholder feedback mechanisms to ensure adaptive management throughout the project lifecycle.

Code	Safeguard Area/Key Impact	Risk	Specific, Measurable Indicator(s)	Monitoring Methodology	Frequency	Monitoring Party (Implementation)	Monitoring Party (Oversight/Reporting)	Estimated Direct Monitoring Cost (ETB)	Associated Management & Overhead Costs (ETB)	Contingency (15%) (ETB)	Total Cost per Indicator/Area (ETB)
AA Mobilization Phase											
AA1	Land Acquisition & Displacement	Involuntary physical and economic displacement of households and loss of land	- Percentage of physically displaced households receiving replacement housing. - Number of households receiving monetary compensation at full replacement cost. - Total area of land acquired vs. compensation disbursed.	- Review of compensation records, land deeds, and official disbursement documents. - RAP compliance audits & monthly reports, compensation logs - Field verification of replacement housing construction. - Sample surveys and interviews with project-affected households.	- Monthly record review. - Quarterly field verification & surveys.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Bishoftu city Administration, Supervision Consultant, EAG	1,500,000	150,000	247,500	1,897,500
AA2	Loss of Livelihoods	Significant disruption and loss of primary income sources	- Number of displaced households enrolled in livelihood restoration programs. - Percentage of vocational training participants placed in employment. - Verification of temporary cash assistance for 12 months.	- Review of program enrollment lists and training certificates. - Tracking of cash disbursement records. - Follow-up interviews with program participants.	- Monthly review of records. - Bi-annual follow-up with participants.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Bishoftu city Administration, Supervision Consultant, EAG	2,000,000	200,000	330,000	2,530,000
AA3	Cultural and Social Disruption	Loss of social cohesion, destruction of religious/cultural sites	Completion status of rerouting infrastructure to avoid cultural sites (Yes/No).	- Number of new religious institutions and cemeteries rebuilt in resettlement areas. - Documentation of community consultations on the design of resettlement areas. - Site verification using GPS and design plans. - Community consultation records and meeting minutes. - Photographic and video evidence of rebuilt structures.	- Pre-construction site audit. - Bi-monthly consultations.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Supervision Consultant	1,200,000	120,000	198,000	1,518,000
AA4	Impact on Social Infrastructure	Demolition and disruption of essential public services	Number of temporary schools and health posts constructed.	- Percentage of displaced students and residents served by new facilities. - Status of rebuilding	Quarterly inspection of facilities.	Resettlement & Rehabilitation Committee,	Oromia Regional State, Bishoftu city Administration,	1,800,000	180,000	297,000	2,277,000

				permanent social infrastructure. • Inventory and visual inspection of temporary facilities. • Review of school and health post enrollment/service records. • Inspection of reconstruction progress.	• Monthly review of records.	Construction Contractor	Supervision Consultant				
AA5	Deterioration of Ambient Air Quality	Increased dust and exhaust emissions	• PM10, PM2.5, NOx, SO2, CO levels at sensitive receptors ($\mu\text{g}/\text{m}^3$). • Number of water spraying applications logged per day vs. project requirements. • Percentage of stockpiles covered with tarpaulins.	• Handheld and fixed ambient air quality monitoring. • Review of contractor's daily activity logs. • Visual site inspections.	• Monthly at sensitive receptors.	Construction Contractors	Bishoftu city Admin. Environmental Protection Authority, Consultant	1,000,000	100,000	165,000	1,265,000
AA6	Increased Noise Levels	Elevated noise from construction machinery	• Weekly average and peak noise levels (dB) at nearest residential areas. • Number of noisy activities performed during restricted hours (23:00-06:00). • Compliance with PPE usage for workers in high-noise zones.	• Handheld noise level monitoring at designated points. • Site surveillance during off-hours. • Contractor safety audit and worker interviews.	• Weekly at sensitive receptors. • Monthly safety audits.	Construction contractor	Supervision consultant	800,000	80,000	132,000	1,012,000
AA7	Soil Compaction & Contamination	Compaction and pollution of soil	• Number of designated access roads constructed and utilized. • Number of soil compaction incidents on farmlands. • Number of verified fuel/oil spills.	• Site inspections and GPS tracking of machinery movements. • Review of incident reports and spill logs. • Periodic soil sampling and analysis.	• Bi-weekly site inspections. • As-needed for incidents. • Quarterly soil sampling.	Construction contractor	Supervision consultant	500,000	50,000	82,500	632,500
AA8	Surface Water Contamination	Pollution of surface water bodies	• Total Petroleum Hydrocarbons (TPH) and other pollutant levels (e.g., pH) in nearby water bodies. • Verification of designated fuel stations and maintenance zones.	• Number of unauthorized vehicle washing incidents near water bodies. • Water quality sampling and laboratory analysis. • Site inspections of fuel/maintenance zones. • Visual surveillance of water bodies	• Monthly water quality sampling. • Bi-weekly site inspections.	Construction contractor	Supervision consultant	600,000	60,000	99,000	759,000

AA9	Flora & Fauna Disturbance	Minor disturbance to local flora and fauna	• Location of storage/camp sites relative to vegetated areas. • Number of unnecessary trees removed. • Documentation of post-construction tree replanting.1	• Review of site plans and land clearing permits. • Site inspections and photographic documentation. • Tree inventory counts.	• Pre-construction audit. • Monthly site inspections.	Construction contractor	Supervision consultant	300,000	30,000	49,500	379,500
AA10	Occupational Health & Safety	Health and accident risks to workers and commuters	• Availability and proper use of PPE. • Number of workers who have received safety training. • Number of work zone isolation measures implemented.	• Site safety audits and worker interviews. • Review of training records and PPE distribution logs. • Inspection of safety signage and barriers.	• Weekly site audits. • Monthly training record reviews.	Construction contractor	Supervision consultant	500,000	50,000	82,500	632,500
AA11	Traffic Congestion	Increased traffic congestion and accident potential	• Implementation status of a Traffic Management Plan (TMP) (Yes/No). • Number of traffic-related incidents reported. • Observation of traffic flow and congestion at key junctions.	• Review of the TMP document. • Review of incident logs. • Visual observation and traffic counts.	• Pre-construction review. • Monthly review of logs. • Weekly site observation.	Construction contractor	Supervision consultant	350,000	35,000	57,750	442,750
AA12	Gender-Based Violence (GBV) Risks	Potential for GBV and sexual harassment	• Availability of separate sanitation facilities for women. • Awareness of anti-harassment code of conduct among female workers. • Number of GBV-related incidents reported via GRM.1	• Site inspections of facilities. • Worker surveys and confidential interviews. • Review of GRM logs.	• Monthly site inspections. • Quarterly worker surveys. • Continuous GRM monitoring.	Construction contractor	Supervision consultant	300,000	30,000	49,500	379,500
BB	Construction Phase										
BB1	Air Pollution	Significant fugitive dust emissions and exhaust	• Monthly average PM10 and PM2.5 concentrations ($\mu\text{g}/\text{m}^3$). • Frequency of water spraying on unpaved roads and stockpiles.	• Monthly ambient air quality monitoring at 10 stations. • Review of contractor's daily logs and visual inspections. • Regular vehicle inspections and	• Monthly for fixed monitors. • Daily logs and inspections. • Quarterly vehicle inspections.	Contractor's EHS team	Bishoftu city Admin. Environmental Protection Authority, Supervision Consultant	3,000,000	300,000	495,000	3,795,000

			• Number of vehicle emissions tests passed by construction fleet.	maintenance records review.							
BB2	Noise Pollution	High noise levels from heavy construction equipment	• Monthly average and peak noise levels (dB) at 10 station. • Number of hours of noisy activities outside of 7 AM–6 PM. • Mandated PPE (earplugs) usage compliance for workers.	• Monthly noise level monitoring at perimeter. • Review of contractor's daily activity logs. • Site safety audits.	• Continuous with hourly reporting. • Daily log review. • Monthly audits.	Contractor's EHS team	Supervision Consultant	1,500,000	150,000	247,500	1,897,500
BB3	Solid Waste Generation	Generation of large volumes of solid waste	• Volume and type of waste generated (m³) per week. • Percentage of waste segregated into different bins (organic, recyclable, hazardous). • Number of off-site waste disposal receipts from licensed facilities.	• Waste audits and visual inspections of segregation bins. • Review of contractor's waste tracking and disposal manifests. • On-site storage inspections.	• Weekly waste audits. • Monthly manifest review.	Contractor's EHS team	Bishoftu city Admin. Environmental Protection Authority, Supervision Consultant	2,500,000	250,000	412,500	3,162,500
BB4	Land Use Modification	Increased surface runoff and flood potential	• Area of impervious surface vs. vegetated cover (ha). • Functional status of local drainage systems (Yes/No). • Number of localized flood events during the rainy season.1	• GIS and drone mapping of the project site. • Visual inspection of drainage channels and culverts. • Review of community and contractor incident reports.	• Quarterly aerial mapping. • Bi-weekly inspections. • As-needed during weather events.	Construction contractor	Supervision consultant	2,000,000	200,000	330,000	2,530,000
BB5	Soil Erosion & Compaction	Loss of topsoil, increased erosion, and soil compaction	• Area of demarcated stripped zones vs. area actually stripped (m²). • Number of verified spills of oil and grease contained. • Adherence to pre-defined access routes for heavy machinery.	• Site inspections using GPS. • Spill incident report review and verification. • Soil sampling and analysis to check for compaction.	• Bi-weekly site inspections. • As-needed for incidents. • Bi-annual soil sampling.	Construction contractor	Supervision consultant	1,500,000	150,000	247,500	1,897,500
BB6	Pollution of Water Bodies	Contamination of surface and groundwater from inadequate handling/spillage	• Water quality parameters (e.g., pH, TSS, TPH) in Akaki-Gerbi and Dukem Rivers.	• Water sampling and laboratory analysis. • Review of emergency drill reports.	• Monthly water sampling. • Quarterly drills. • Weekly site inspections.	Construction contractor	Supervision consultant	2,500,000	250,000	412,500	3,162,500

			• Number of emergency response drills conducted. • Number of incidents of construction materials entering drainage systems.	• Visual inspections during and after rain events.							
BB7	Vegetation and Flora Loss	Loss of vegetation and fragmentation of habitats	• Area of Acacia-Commiphora woodlands and other vegetation cleared (ha). • Number of trees replanted vs. number cleared. • Survival rate of replanted trees after one year. • Area of green belts established.	• Pre- and post-clearing site surveys and GIS mapping. • Tree counting and photographic evidence. • Survival rate assessments.	• Pre-construction survey. • Quarterly counts and surveys. • Annual survival assessment.	Contractor, EAG, Bishoftu city environmental protection offices	Supervision consultant, Bishoftu city environmental protection	1,500,000	150,000	247,500	1,897,500
BB8	Habitat and Fauna Disturbance	Habitat fragmentation and disturbance to wildlife	• Presence of natural corridors and avoidance of unnecessary clearing. • Number of reported wildlife encounters or incidents. • Efficacy of bird strike mitigation measures.	• Site inspections and wildlife surveys. • Review of incident reports. • Monitoring of vegetation preservation efforts.	• Monthly wildlife surveys. • Continuous incident reporting.	Construction contractor	Supervision consultant	2,000,000	200,000	330,000	2,530,000
BB9	Occupational Health & Safety	Physical injuries, chemical exposure, noise exposure, fatigue	• Number of OHS trainings conducted. • Availability of first aid kits, ambulance, and fire extinguishers. • Lost Time Incident Rate (LTIR) and Total Recordable Incident Rate (TRIR). • Periodic medical check-up records for all employees.	• Review of OHS Plan and training records. • Site safety audits and inspections of equipment. • Analysis of incident reports and medical check-up records.	• Weekly safety audits. • Continuous incident tracking. • Annual review of medical records.	Construction Contractor	Supervision consultant, EAG, Bishoftu City Health office	4,000,000	400,000	660,000	5,060,000
BB10	Traffic Congestion and Accident	Increased traffic accidents and congestion	• Implementation status of a Traffic	• Review of the TMP. • Review of police reports and incident logs. • Site inspections of traffic signs	• Bi-weekly inspections. • Monthly review of logs.	Construction contractor	Supervision consultant, Oromia and Bishoftu city traffic offices	1,500,000	150,000	247,500	1,897,500

			Management Plan (TMP) (Yes/No). • Number of traffic accidents involving construction vehicles. • Availability of proper signs, barricades, and speed limits.	and speed limit compliance.							
BB11	Conflict on Employment Opportunity	Potential for conflicts over employment opportunities	• Percentage of local people employed in the project. • Number of women hired vs. project targets. • Documentation of local authority involvement in labor recruitment.1	• Review of employment contracts and payroll data. • Interviews with local community leaders. • Review of labor recruitment records.	• Quarterly review of employment data. • Quarterly interviews.	Construction Contractor in cooperation with Bishoftu city labour offices	Supervision consultant, Bishoftu city labor office	500,000	50,000	82,500	632,500
BB12	Impacts on Vulnerable People	Disproportionate negative impacts on vulnerable groups	• Number of identified vulnerable groups receiving special support. • Documentation of assistance provided (e.g., job opportunities, financial aid). • Number of grievances submitted by vulnerable groups via GRM.	• Review of support records and disbursement logs. • Interviews with representatives of vulnerable groups. • Review of GRM logs.	• Monthly record review. • Bi-annual interviews. • Continuous GRM monitoring.	Contractor in cooperation with Bishoftu city administration office	Consultant	600,000	60,000	99,000	759,000
BB13	Gender Equity and Sexual Harassment	Potential for gender inequality, sexual harassment, GBV	• Availability of a Workers Code of Conduct (CoC). • Number of CoC trainings conducted for all workers. • Number of female workers with access to separate sanitation facilities. • Number of sexual harassment cases reported and resolved.	• Review of CoC and training records. • Worker surveys and confidential interviews. • Site audits of facilities.	• Monthly CoC verification. • Quarterly worker surveys. • Continuous GRM monitoring.	Contractor	Consultant, Office of Women, Children and Youth Affairs	700,000	70,000	115,500	885,500
BB14	HIV/AIDS and other STI Spread	Increased risk of HIV/AIDS and other STIs	• Number of HIV/AIDS and STI	• Review of campaign schedules and attendance records. • Inspection of health facilities and	• Monthly campaign tracking. • Bi-	Construction contractor via HIV/AIDS sub-consultant	Supervision consultant, Bishoftu City Administration	600,000	60,000	99,000	759,000

			awareness campaigns conducted. • Availability of subsidized or free condoms at construction camps. • Collaboration records with local health institutions and NGOs.	condom supply logs. • Meeting minutes and joint work plans.	weekly inspections.						
BB15	Cultural Conflict, Culture Dilution and Drug Abuse	Potential for cultural conflicts, drug/alcohol abuse	• Number of awareness sessions conducted on cultural sensitivity and drug/alcohol abuse. • Number of cases of drug/alcohol abuse reported or prosecuted. • Closure status of illegal drug businesses in the area.	• Review of training records. • Review of incident logs and court documents. • Collaboration records with local authorities.	• Bi-monthly training sessions. • Continuous incident tracking.	Contractor in cooperation with project woreda administration office	Consultant, Bishoftu city Administration	800,000	80,000	132,000	1,012,000
CC	Operation Phase										
CC1	Air Pollution	Emissions from aircraft, GSE, and vehicular traffic	• Daily average NOx, CO2, PM2.5, PM10 concentrations (kg/day) at airport boundaries. • Percentage of Ground Support Equipment (GSE) transitioned to electric/hybrid systems.1	• Average aircraft taxiing time per flight. Continuous air quality monitoring at multiple stations. • Inventory and audit of GSE fleet. • Review of flight data logs.	• Continuous monitoring with daily data analysis. • Bi-annual fleet audit. • Monthly flight log review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	3,500,000	350,000	577,500	4,427,500
CC2	Noise Pollution	High noise levels from aircraft affecting communities ¹	• Average and peak noise levels (dB) at designated community monitoring points. • Number of noise-related community complaints per quarter.1	• Percentage of night-time flights by high-noise aircraft. • Continuous noise monitoring with fixed-site monitors. • Review of quarterly complaint logs from GRM. • Analysis of flight data logs.	• Continuous monitoring with quarterly reporting. • Quarterly review of complaint logs. • Monthly flight data analysis.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	2,500,000	250,000	412,500	3,162,500
CC3	Fire and Explosion Hazards	Risk of fire and explosion from fuel and hazardous materials	• Number of fire detection and suppression systems tested. • Number of emergency response drills conducted per year.	• Review of maintenance and testing records. • Observation of drills and drill reports. • Annual third-party safety audit.	• Monthly system checks. • Bi-annual drills. • Annual third-party audit.	Client (Airline Group)	Federal Fire and Emergency Preparedness Agency, Regulatory Authorities	2,000,000	200,000	330,000	2,530,000

			• Audits of fuel vapor control and static electricity control systems.								
CC4	Solid Waste Generation	Continuous generation of solid wastes	• Volume of municipal and in-flight waste generated (kg/passenger). • Percentage of waste segregated and recycled on-site. • Number of off-site disposal receipts from licensed firms.	• Waste audits and weighing of segregated waste streams. • Review of recycling plant operational logs. • Review of disposal manifests.	• Monthly waste audits. • Bi-monthly manifest review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection	3,500,000	350,000	577,500	4,427,500
CC5	Liquid Waste Generation	Discharge of wastewater and potential contamination	• Volume of wastewater generated (m³/day). • Effluent quality (e.g., BOD, COD, TPH, pH) from wastewater treatment plant. • Verification of reuse of treated water for landscaping.	• Flow meter readings and operational logs of the treatment plant. • Monthly effluent sampling and laboratory analysis. • Inspection of irrigation systems.	• Daily for flow meter readings. • Monthly for effluent sampling. • Quarterly inspections.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	4,000,000	400,000	660,000	5,060,000
CC6	Hazardous Materials	Exposure to toxic chemicals and contamination	• Number of spill incidents and their containment status. • Compliance with labeling and storage protocols for chemicals.	• Number of staff trained in hazardous material handling. • Review of incident reports and spill logs. • Regular inspections and audits of storage facilities • Review of training records.	• Continuous incident tracking. • Monthly audits. • Quarterly training review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC7	Traffic Congestion	Increased vehicular traffic on road networks	• Implementation status of Traffic Management Plan (TMP). • Traffic flow rates and congestion levels at key access points. • Number of passenger journeys by public vs. private transport.	• Review of the TMP. • Traffic counts and flow analysis. • Surveys of employees and passengers.	• Bi-annual TMP review. • Quarterly traffic surveys.	Client (Airline Group)	Ethiopian Roads Authority, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC8	Community Health and Safety	Air pollution, noise disturbance, bird strikes, public safety	• Number of noise and air pollution-related community health complaints. • Number of reported bird strikes per 10,000 movements.	• Review of GRM logs. • Bird strike data analysis. • Regular site inspections of perimeter.	• Quarterly GRM log review. • Monthly data analysis. • Weekly inspections.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	3,000,000	300,000	495,000	3,795,000

			Integrity of airport perimeter fencing and surveillance.								
CC9	Occupational Health & Safety	Continuous physical, chemical, and ergonomic risks for staff	- Lost Time Incident Rate (LTIR) for airport staff. - Compliance with PPE usage and OHS procedures. - Number of OHS trainings and health check-ups conducted.1	- Analysis of incident reports. - Regular OHS audits. - Review of training and health record logs.	- Monthly incident review. - Quarterly audits. - Annual record review.	Client (Airline Group)	Federal Health office, Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	2,500,000	250,000	412,500	3,162,500
CC10	Soil contamination	Soil contamination from spills and leaks	- Number of verified spills in maintenance areas and workshops. - Integrity and functionality of spill containment measures (e.g., sealed floors, drip trays).	- Regular soil sampling and analysis for TPH. - Review of incident logs. - Regular inspections and audits of maintenance areas. - Bi-annual soil sampling.	- Continuous incident tracking. - Monthly inspections. - Bi-annual sampling.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	1,000,000	100,000	165,000	1,265,000
CC11	Contamination of water bodies	Improper storage/disposal of hazardous materials	- Water quality parameters (e.g., pH, TSS, TPH) in surface and groundwater. - Compliance with storage protocols for hazardous chemicals. - Implementation of surface water drainage infrastructure plan.	- Monthly water sampling and laboratory analysis. - Regular audits of hazardous material storage areas. - Review of drainage management plan.	- Monthly sampling. - Bi-monthly audits.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	2,000,000	200,000	330,000	2,530,000
CC12	Increased water demand	Strain on local water resources	- Volume of water consumed (m³/day) from various sources. - Volume of rainwater harvested and reused. - Status of watershed management and groundwater recharge practices.	- Water meter readings and operational logs. - Review of rain harvesting and recharge project reports. - Site inspections.	- Daily for meter readings. - Quarterly report review. - Bi-annual inspections.	Client (Airline Group)	Federal EPA, Oromia Bureau of Water Resource, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC13	Vegetation and flora	Continued impact on vegetation from operations	- Health and growth of vegetation around the airport. - Presence of invasive plant species. - Maintenance of green spaces and wildlife corridors.	- Regular ecological surveys and visual assessments. - Monitoring of invasive species spread. - Review of landscape maintenance records.	- Bi-annual ecological surveys. - Monthly inspections.	Client (Airline Group), Biodiversity Institute	Ethiopian Biodiversity Institute, Bishoftu city Administration	800,000	80,000	132,000	1,012,000

CC14	Habitat and Fauna	Habitat fragmentation and disturbance to wildlife	• Population and behavior of key wildlife species (e.g., hyenas, rabbits, monkeys). • Integrity of wildlife corridors. • Number of animals rescued or injured due to airport activities.	• Bi-annual wildlife population surveys. • Site inspections and drone footage of corridors. • Review of wildlife rescue program reports.	• Bi-annual surveys. • Quarterly corridor inspections.	Client (Airline Group), Biodiversity Institute	Ethiopian Biodiversity Institute, Bishoftu city Administration	1,200,000	120,000	198,000	1,518,000
CC15	Migratory birds	Risk of bird strikes from migratory birds	• Bird strike incident rate per 10,000 aircraft movements. • Presence of bird attractants (e.g., standing water, waste) on the airfield. • Effectiveness of visual and acoustic deterrents.	• Review of bird strike reports. • Regular airfield inspections. • Efficacy audits of deterrent systems.	• Continuous tracking. • Daily airfield inspections. • Quarterly audits.	Client (Airline Group), Biodiversity Institute	Ethiopian Biodiversity Institute, Ethiopian Wildlife Conservation Authority, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC16	Urban Heat Island Effect (C16)	Increased local temperatures and operational costs ¹	• Percentage of airport area dedicated to green spaces. • Surface temperatures of roofing and paving materials (C). • Energy consumption vs. ambient temperature.	• GIS analysis of land use and green cover. • Regular thermal imaging surveys. • Review of energy consumption and weather data.	• Annual GIS analysis. • Quarterly thermal surveys. • Monthly data analysis.	Client (Airline Group)	Federal Environmental Protection Authority, Bishoftu city Administration	1,000,000	100,000	165,000	1,265,000
CC17	Flooding	Erosion, pollution, and strain on drainage systems	• Functionality of stormwater management systems (e.g., drains, culverts). • Number of flood incidents on airport property. • Regularity of inspection and maintenance of drainage infrastructure.	• Visual inspections of drainage infrastructure. • Review of incident logs. • Review of maintenance records.	• Weekly inspections, especially during rainy seasons. • Continuous incident tracking. • Monthly record review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Oromia Regional Bureau of Water Resource, Bishoftu city Administration	2,000,000	200,000	330,000	2,530,000
CC18	Unplanned Urbanization	Uncontrolled urban sprawl around the airport	• Adherence to the Airport City masterplan and zoning laws.	• Review of zoning maps and planning documents. • Satellite imagery analysis and field verification. • Review of public transit project reports.	• Quarterly review of urban development. • Bi-annual satellite imagery analysis.	Client (Airline Group), Oromia Planning Institute, Urban Development & Housing Agency	Ministry of Urban Development, Oromia Planning Institute, Bishoftu City Administration	2,000,000	200,000	330,000	2,530,000

			• Rate of urban growth in the airport vicinity (ha/year). • Implementation of public transit expansion.								
Total											92,408,250 ETB

e) Total E&S implementation cost

The total estimated cost for implementing the ESMP and associated monitoring activities is ETB 1,495,992,630, excluding the Resettlement Action Plan (RAP), which is separately estimated at approximately ETB 39,612, 233,318.9 ETB. Although most mitigation and enhancement measures requiring engineering interventions will be embedded in the construction contract and technical designs, costs related to specific environmental and social safeguards have been separately itemized. These include ETB 1,330,830,000 (88.96%) allocated for ESMP mitigation and enhancement, ETB 92,408,250 (6.18%) for environmental and social monitoring, ETB 41,380,000 (2.77%) for capacity building and institutional strengthening, ETB 6,233,380 (0.42%) for annual environmental audits, ETB 21,691,000 (1.45%) for grievance redress mechanism (GRM) implementation, and ETB 3,450,000 (0.23%) for the stakeholder engagement plan. These investments reflect the project's commitment to minimizing risks and maximizing sustainable development benefits through proactive and well-resourced environmental and social management.

f) Institutional Arrangements

The primary responsibility for the implementation of the Environmental and Social Management Plan lies with the Ethiopian Airlines Group through its Environmental and Social Impact Assessment and Monitoring & Evaluation unit. EAG is tasked with overall project implementation and ensuring ESMP compliance in all tender and contract documents. The group is also responsible for strengthening environmental and social monitoring capacity, establishing a technical advisory committee, and allocating necessary budget. To enhance its capacity, EAG requires a dedicated ESMP Implementation Unit, fully staffed with Environmental, Social, Occupational Health and Safety, and Gender Specialists, as well as a dedicated financial allocation for ESMP activities.

The Oromia Regional Administration plays a vital role by allocating the budget for the Resettlement Action Plan, coordinating with local administrations, and overseeing the resettlement and compensation processes. To effectively discharge these responsibilities, the administration requires enhanced technical capacity in social safeguards and dedicated financial resources to support RAP oversight and community engagement.

The Bishoftu City Administration is responsible for monitoring the project's implementation within its jurisdiction. It coordinates with local stakeholders and manages resettlement and compensation efforts. The administration's capacity needs include strengthening technical skills in land acquisition and grievance management, along with securing financial resources to support staffing and logistical operations.

The Ethiopian Environmental Protection Authority provides technical guidance to ensure environmental compliance, and it conducts periodic audits and monitoring. To increase its effectiveness, the EPA requires additional financial resources to increase the frequency and depth of its audits and training for staff to better understand environmental impacts related to large-scale airport projects, as well as international safeguard standards.

The Ministry of Transport ensures the project aligns with national aviation policies and monitors potential impacts on the transportation infrastructure. The ministry's capacity enhancement needs involve training for staff on environmental and social impacts specific to aviation infrastructure development and establishing clear protocols for information sharing with other agencies.

The Ethiopian Electric Utility and Ethio-telecom are responsible for supplying power and telecommunications infrastructure to support airport operations. Both agencies must coordinate closely to prevent conflicts with existing infrastructure. Their capacity can be improved through enhanced coordination mechanisms and staff training on ESMP requirements related to the protection of utility infrastructure.

The Ethiopian Roads Authority plays a key role in reinstating roads affected by airport construction and providing advice on integrating road and airport infrastructure. Its capacity needs include improved coordination mechanisms and staff training on ESMP requirements, particularly in relation to road construction and traffic management.

Contractors are directly responsible for preparing and implementing the Construction Environmental and Social Management Plan (C-ESMP). They must mobilize environmental, social, and safety experts on-site. However, their capacity needs are substantial and include the contractual requirement for dedicated, qualified Environmental, Social, Health, and Safety (ESHS) Managers and support teams. They also need sufficient resources, specialized training, and clearly defined budget lines dedicated to ESMP implementation.

Consultants are tasked with monitoring compliance with the ESIA and ESMP, as well as advising contractors on appropriate mitigation measures. To carry out these duties effectively, consultants must ensure that the Project Management Consultant or Supervision Engineer teams include qualified ESHS specialists, along with adequate financial support to maintain consistent and effective supervision throughout the project lifecycle.

Lastly, affected communities and NGOs play an important role in engaging with grievance redress mechanisms and providing feedback on social and environmental impacts. Their effective participation requires proactive support, including access to information in local languages, facilitation of community meetings, and training to help them understand their rights and how to engage in the Grievance Redress Mechanism process.

This institutional framework has been designed to ensure that the Bishoftu International Airport project is implemented in an environmentally and socially sustainable manner. It supports robust monitoring, effective grievance resolution, and strong collaboration among all stakeholders involved.

h) Grievances redress mechanism

The project establishes a comprehensive Grievance Redress Mechanism (GRM) to efficiently and effectively address project-related complaints from Project-Affected Persons (PAPs) and other stakeholders. The GRM prioritizes amicable settlement to save time and resources, ensuring it is accessible, transparent, and fair, and tailored to the local context.

The GRM operates on a multi-tiered structure, beginning with Community-Level Grievance Redress Committees (GRCs) that include PAPs and local leaders, ensuring local understanding and cultural appropriateness with at least 30% female representation. Unresolved issues escalate to a Project-Level Management Unit (PMU) GRC, and finally, to an Appeals Level.

Multiple channels for grievance submission (written, verbal, phone, anonymous) are provided, with clear procedures for registration, investigation, and resolution within specified timelines (e.g., 30 working days for GRC decisions).

Beyond general grievances, the project implements specialized GRMs:

- A Workers' Grievance Redress Mechanism (WGRM) addresses labor issues, aligning with ILO standards and promoting informal resolution before formal processes.
- A separate, confidential, and survivor-centered GRM is established for Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Violence Against Children (VAC), emphasizing a zero-tolerance policy, immediate referral to specialized support services, and strict confidentiality.

Overall, the GRM aims to foster trust, mitigate risks, and ensure inclusivity, particularly for vulnerable populations, by proactively engaging communities and providing tailored, culturally sensitive mechanisms.

Conclusion and Recommendations

The Bishoftu International Airport project is a crucial infrastructure development aimed at enhancing Ethiopia's aviation capacity and contributing to socio-economic growth. While the project offers significant benefits, it is important to implement effective mitigation measures to address potential environmental and social risks. Key recommendations for the successful execution of the project include prioritizing local employment by ensuring job opportunities for affected communities, and strengthening resettlement plans by providing fair compensation and livelihood support for those displaced. Additionally, regular monitoring of environmental impacts is necessary to assess pollution and biodiversity effects. It is also essential to enhance community engagement through transparent communication with stakeholders, ensuring their concerns and feedback are integrated into the project. Lastly, adopting sustainable practices, such as integrating renewable energy solutions and effective waste management, will support the project's long-term success. By following these recommendations, the Bishoftu International Airport project can achieve its objectives while protecting the environment and improving the quality of life for local communities.

1. INTRODUCTION

1.1. Background

Ethiopia is among the first countries in Africa to establish aviation services. The nation's first airport was constructed in the Lideta area, now known as the "Old Airport." This facility featured a single 1,723-meter runway, a passenger terminal spanning approximately 640 m², and a freight terminal covering 1,425 m² (Endris Argaw, 2018). However, the completion of the current Addis Ababa Bole International Airport in 1962 marked a significant leap forward in the country's aviation capabilities.

In recent years, the Ethiopian Airlines Group (EAG) has made remarkable strides in positioning Addis Ababa as a key East African cargo hub. Concurrently, Ethiopia has undertaken substantial investments in airport infrastructure to support its socio-economic growth. This effort is critical for the nation's sustainable development and inclusive economic progress. As a result, demand drivers for passenger and cargo services are expected to remain robust, solidifying Ethiopia's role as the leading regional hub for air transport.

Recognizing the capacity limitations of Bole International Airport, the Ethiopian Airlines Group has initiated a strategic project to develop a new major hub airport near Addis Ababa. This greenfield airport, located in Bishoftu town Abusera Wereda, 40 km south of the capital, will complement Bole International Airport by alleviating capacity constraints and enhancing Ethiopia's aviation infrastructure.

While the proposed airport offers considerable potential for economic and infrastructural growth, it is essential to acknowledge the possible negative biophysical and social impacts associated with its construction and operation. Large-scale construction projects, including airport development, often contribute to environmental degradation, making it imperative to address such challenges proactively. Globally, the need to mitigate the environmental impacts of development projects has driven calls for rigorous environmental assessments, and airport construction is no exception.

Similarly, the Ethiopian Airlines Group's new airport hub project may lead to undesirable social and environmental consequences. To promote sustainable development, it is crucial to make informed decisions that balance economic progress with environmental stewardship. This

requires implementing effective environmental assessment and management practices, in alignment with Ethiopia's environmental policies, regulations, and international best practices. By doing so, the proposed airport can be developed responsibly while minimizing adverse impacts on the environment and local communities.

In order to assess the potential environmental and social impacts of the Bishoftu International Airport, Dar Al-Handasah Shair and Partners signed sub-consultancy service contracts with ETG Designers and Consultants S.C. The ESIA study has identified and mitigated any potential impacts, ensuring that the project can be implemented in an environmentally and socially sustainable way.

In accordance with the Environmental Impact Assessment Proclamation No. 299/2002 of Ethiopia, the Bishoftu International Airport project is classified as a Schedule 1 project, indicating that it may have significant adverse environmental and social impacts and therefore requires a full ESIA. Additionally, based on the African Development Bank's Integrated Safeguards System (AfDB ISS), the project is categorized as Category 1, which applies to projects likely to induce significant and irreversible environmental and/or social impacts that are sensitive, diverse, or unprecedented. As such, the project requires a comprehensive Environmental and Social Impact Assessment and the development of an Environmental and Social Management Plan.

1.2. Project objective

The overall objective of the project is to establish a world-class international airport at Bishoftu to accommodate Ethiopia's growing aviation demands, support socio-economic development, and improve aviation infrastructure to ensure long-term capacity for both passenger and cargo traffic.

Specifically, the project aims to:

- Alleviate capacity constraints at Bole International Airport by developing Bishoftu International Airport to handle increasing passenger and cargo traffic effectively;
- Support Ethiopia's socio-economic development by creating a new aviation hub that boosts tourism, trade, and regional connectivity;
- Provide state-of-the-art airport facilities to meet international standards for passenger comfort, safety, and efficiency;

- Promote the use of sustainable and renewable energy sources, such as solar power, to minimize environmental impact;
- Implement effective waste management, water conservation, and nature-based solutions (NBS) to ensure the project aligns with global environmental best practices;
- Create employment opportunities and improve livelihoods for local communities through the construction, operation, and associated services of the airport;
- Enhance Ethiopia's capacity as a regional air transport hub, facilitating international and domestic traffic growth in a sustainable and inclusive manner.

1.3.ESIA study objectives

The overall objective of the Environmental and Social Impact Assessment is to comprehensively evaluate the potential environmental and social impacts of developing Bishoftu International Airport on both the biophysical and socioeconomic environments in and around the project area. This assessment will consider direct and indirect impacts in accordance with Ethiopian environmental laws and regulations, the African Development Bank (AfDB) Integrated Safeguards System (ISS) and its Operational Safeguards, the International Finance Corporation (IFC) Performance Standards, and international best practices. Specifically, the ESIA aims to:

- Conduct a thorough review and analysis of applicable environmental policies, legislation, and regulatory frameworks, ensuring full alignment with Ethiopian environmental laws and regulations, the AfDB ISS requirements, and IFC Performance Standards related to environmental and social assessment and management.
- Identify and analyze the biophysical and socio-economic characteristics of the project area, highlighting key constraints and challenges that need to be addressed throughout the project lifecycle, in compliance with Ethiopian laws, AfDB ISS, and IFC Performance Standards.
- Develop an environmental and social screening and scoping process tailored to the project, ensuring that all relevant environmental and social aspects are comprehensively considered in line with Ethiopian environmental laws, AfDB ISS, and IFC Performance Standards.
- Describe the views, concerns, and expectations of the public and stakeholders regarding the project, in accordance with Ethiopian environmental regulations, AfDB ISS, and

IFC Performance Standards, to ensure meaningful stakeholder engagement and incorporation of feedback into project planning.

- Collaborate closely with the design team to identify and evaluate all feasible project alternatives, using a practical and credible set of criteria. The alternatives analysis is designed to guide decision-making by maximizing positive impacts while minimizing negative impacts, aligned with Ethiopian laws, AfDB ISS, and IFC Performance Standards.
- Identify all relevant stakeholders and implement a comprehensive stakeholder consultation process to raise awareness of the project's objectives and potential impacts. This process will engage potentially affected persons, beneficiaries, relevant institutions, and other parties, ensuring their views are integrated appropriately into the project design, as emphasized by Ethiopian regulations, AfDB ISS, and IFC Performance Standards.
- Identify, predict, and evaluate the potential positive and negative impacts of the project on the physical, biological, and socio-economic environments, including gender considerations and potential Gender-Based Violence (GBV) risks. Impacts will be assessed in terms of magnitude, extent, and duration, and cost-effective mitigation measures will be recommended to alleviate negative impacts and enhance positive outcomes, in line with Ethiopian environmental laws, AfDB ISS, and IFC Performance Standards.
- Prepare a detailed Environmental and Social Management and Monitoring Plan (ESMMP) with clear monitoring indicators, ensuring effective implementation and compliance with Ethiopian laws, AfDB ISS, and IFC Performance Standards.
- Estimate the costs associated with each proposed mitigation and monitoring measure, ensuring that budgetary considerations support the project's environmental and social management objectives.

1.4.Scopes of Service for ESIA Study

The scope of services for the ESIA study covered the areas affected by the proposed project infrastructure. Additionally, the ESIA considered the impact caused by ancillary areas needed for the project, such as the quarry production area, dumping sites for soil and debris, camp areas, storage areas, and the impacts on the proposed area and hosting community. The study,

guided by both National Guidelines and IFC Performance Standards, included but was not limited to the following tasks:

Task 1: Environmental & Social Screening

- Environmental and social screening was prepared based on the screening checklist and regulations of the country.

Task 2: Determining Environmental and Social Scoping; the Environmental and Social Scoping Report addressed the following issues:

- Identified the overall project area of influence.
- Identified, prioritized, and validated beneficial/adverse and direct/indirect environmental and social issues, both short- and long-term.
- Summarized findings on key social and environmental baseline aspects and potential impacts, including an indicative assessment of scale and severity for further detailed study in the ESIA.
- Determined cumulative impacts by considering combined effects of the project along with existing and planned developments within the area of influence.
- Assessed residual impacts expected after the application of mitigation measures.
- Confirmed applicable national legislation (permits), AfDB Integrated Safeguards System (ISS), IFC Performance Standards, Ethiopian EIA Proclamation 299/2022, and other relevant national standards and regulations.
- Reviewed relevant international standards applicable to the project, including the environmental and social standards of the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA).
- Identified primary stakeholders and their roles.

Task 3: Legislative, Regulatory, and Policy Review

- Identified, reviewed, and analyzed relevant national policies, laws, regulations, and standards applicable to the development of the new international airport, including those issued by Addis Ababa City and Oromia Regional State.

- Ensured compliance with the African Development Bank's Integrated Safeguards System (AfDB ISS), IFC Performance Standards, and other applicable international best practices.
- Specifically reviewed and integrated environmental and social standards and requirements of ICAO and IATA relevant to aviation infrastructure projects.
- Identified gaps between local regulatory requirements and international standards and proposed measures to align project implementation accordingly.

Task 4: Description of the Proposed Project

- Described major components of the project, including major ancillary activities.
- Detailed activities performed during pre-construction, construction, and operation phases and their environmental and social impacts.

Task 5: Baseline Surveys to Identify and Analyze Existing Environmental and Socio-Economic Conditions

The baseline assessment addressed:

- Physical and bio-physical environment, including climate conditions, topography, hydrology, drainage pattern, soil type, geological setting, surface and groundwater resources, erosion sensitivity, flora, fauna, and protected areas.
- Land tenure and land use in the project area and vicinity.
- Human environment, including neighboring communities, demographics, socio-political organization, livelihoods, access to public services, water uses, living standards, economic status, poverty levels, employment, and transportation patterns.
- Existing infrastructure services and utilities in and around the project area.
- Ongoing and planned activities that could affect project implementation.
- Environmentally sensitive receptors, including health centers, schools, and other public and private facilities.
- Health data, prevalence of diseases such as COVID-19 and HIV/AIDS, and available health services.
- Gender issues, including gender equity, division of labor, access to resources, women's participation in society, environmental management, and support programs for women.

Task 6: Stakeholders and Public Consultation

- Identified stakeholders based on their influence, relevance, and impact.
- Conducted consultations with local communities, regulatory bodies, NGOs, and civil society organizations.
- Used various consultation methods, including public meetings, focus group discussions, key informant interviews, and written submissions.
- Ensured consultations at different stages: scoping, impact assessment, mitigation development, and draft ESIA review.
- Documented consultation outcomes, including stakeholder feedback and concerns.

Task 7: Analysis of Alternatives

- Conducted an analysis of alternatives, including site, technology, design, and operation options.
- Evaluated the "do-nothing" scenario and alternative development plans.

Task 8: Identification and Evaluation of Environmental and Social Risks and Impacts

- Identified and analyzed potential environmental and social risks across all project phases.
- Assessed impact significance based on stakeholder concerns, environmental sensitivity, and regulatory standards.
- Conducted a thorough cumulative impact analysis considering direct, indirect, and induced effects over various temporal and spatial scales.
- Evaluated residual impacts expected after mitigation measures have been applied.
- Developed mitigation and enhancement measures, forming an Environmental and Social Management Plan (ESMP).

Task 9: Environmental and Social Management Plan (ESMP)

- Prepared a comprehensive ESMP.
- Identified potential positive and adverse impacts, recommended mitigation measures, proposed monitoring indicators and implementation schedules, and estimated the required budget.

Task 10: Environmental and Social Monitoring Plan

- Developed an Environmental and Social Monitoring Plan.
- Included a description of environmental factors, monitoring methods, indicators, locations, responsibilities, schedules, cost estimates, and residual impact assessments.

The ESIA study adhered to national and international best practices, ensuring environmental and social sustainability for the proposed project.

1.5.Team in Charge Of the ESIA Study

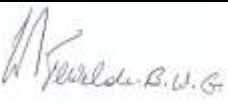
This ESIA report was prepared for Bishoftu International Airport Project by ETG Designers and Consultants S.C. ETG Designers & Consultants SC, Architects, Engineers, Planners & Associates since its establishment in 1995, has designed a number of buildings for health facilities including hospitals, educational institutions, government, private, civic and international organizations, shopping centers, airport terminals, sport facilities, real-estate and residential buildings which are scattered all over the country. Currently, it is managing contract administration and supervision of huge construction projects which comprise government's mega projects.

The company is registered as Grade 1 Consulting Architects and Engineers Level and it is being executing a number of different types of projects all over the country. It has also planned to participate in international architectural and engineering business starting from neighboring countries. In addition, ETG designers and consultants Share Company has established a Directorate for Environment Water Supply and Sanitation starting from 2016 and consequently received grade one certification from both the Ministry of Environment Forest and Climate Change the Ministry of Water, Irrigation and Electricity in the area of environmental studies and water supply and Sanitation respectively. The directorate for Environment, Water supply and Sanitation has carried out a number of Environmental and Social Impact Assessment studies and Resettlement Action plan for Master plan and Design Projects for Universities, Water Supply and Sanitation Projects, Manufacturing, hospitals, Industrial Parks, High Rise Buildings, Airport and other Mega Projects.

The study team has been composed of multidisciplinary experts almost all of them possessing certificate of competency from the Environmental Protection Authority in category of senior

consultant in the areas of their specialization as shown in table 1-1 on Team Composition and Task assignments below.

Table 1-1: Team composition and position

N o	Name	Position	Education Qualification	Signature
1	Teweldebirhan W/gerima	Team Leader/ Senior Environmentalist	MSc. in Management of Natural Resources	
2	Dr.Yared Girma	Project Coordinator/ Environmental Pollution and Climate Change Expert	PhD in Environmental Planning	
3	Dr.Asfaw Mohammed	Senior Sociologist and Transport Planning Experts	PhD in Urban and Regional Planning	
4	Hassen Bahiru	Senior Sociologist	BSc in Sociology	
5	Getachew Abrha	Water Resources Use expert / Environmental Geologist	MSc. Hydrogeology	
6	Dr. Tesfaye Bogale	Biodiversity Expert	PhD in Environmental Science	
7	Diriba Tadesse	Environmental Health Expert	M.Sc. in Environmental Health	
8	Dr.Silesi Azagew	Air Quality and Noise Pollution Expert	PhD in Environmental Planning	
9	Mr. Abu Wube	Air and Noise Quality Analysis		

2. APPROACHES AND METHODOLOGY

2.1. Approach

This section outlines the approach for acquiring, analyzing, and presenting data necessary to identify potential biophysical and socio-economic impacts of the development of Bishoftu international airport. The approach included detailed consideration of the National Guideline, the IFC Performance Standards, and the African Development Bank's Integrated Safeguards System (AfDB ISS), ensuring alignment with global and regional environmental and social sustainability frameworks. The approach also covered necessary mitigation and enhancement measures.

The assessment was participatory and multi-disciplinary, involving stakeholders to incorporate a broad spectrum of perspectives into impact identification, analysis, and management. Each step was aligned not only with the ESIA requirements and the IFC's Performance Standards but also explicitly integrated the AfDB ISS and its ten Operational Safeguards (OSs) throughout the ESIA process.

The following alignment with the AfDB Operational Safeguards was ensured in the study:

1. OS1: Assessment and Management of Environmental and Social Risks and Impacts: In addition to the ESIA, the project prepared or is in the process of preparing other Environmental and Social Assessment (ESA) instruments in line with OS1, including a Livelihood Restoration Plan (LRP), a Stakeholder Engagement Plan (SEP), an Emergency Preparedness and Response Plan (EPRP), and a Hazardous Waste Management Plan (HWMP). These complement the ESIA to comprehensively identify, assess, and manage all E&S risks and impacts at the planning stage.
2. OS2: Labour and Working Condition: The assessment reviewed labor policies and working conditions, ensuring that worker rights, occupational health and safety, and grievance redress mechanisms were aligned with both national labor laws and OS2 standards.
3. OS3: Resource Efficiency and Pollution Prevention and Management: Resource consumption (energy, water) and pollution management (waste, air emissions, noise) were evaluated, with climate change adaptation and greenhouse gas emissions integrated into the resource efficiency analysis.

4. OS4: Community Health, Safety, and Security: Risks and impacts on surrounding communities, including construction-related hazards, potential accidents, and security issues, were assessed. The study proposed appropriate mitigation measures, such as buffer zones and traffic safety measures.
5. OS5: Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement: The study assessed potential land acquisition and displacement issues. A preliminary framework for livelihood restoration and fair compensation was developed, with further elaboration planned in the LRP.
6. OS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: The ESIA included a biodiversity baseline assessment and proposed conservation and mitigation measures to manage risks to natural habitats, particularly those of ecological importance.
7. OS7: Vulnerable Groups: Unlike IFC PS7, which focuses on Indigenous Peoples, AfDB OS7 extends protection to all vulnerable and marginalized groups. The project incorporated social analyses to identify such groups and ensure they are meaningfully consulted and not disproportionately impacted by the project.
- OS8: Cultural Heritage: The ESIA included a Cultural Heritage Impact Assessment, with recommendations for managing both tangible and intangible heritage assets.
8. OS9: Financial Intermediaries: This OS is not directly applicable to this project as it does not involve financial intermediaries.
9. OS10: Stakeholder Engagement and Information Disclosure: The ESIA process incorporated robust stakeholder engagement procedures, including consultation meetings, community discussions, and disclosures, in alignment with OS10. The Stakeholder Engagement Plan (SEP) outlines continuous engagement and disclosure mechanisms for the project's lifecycle.

The approach to conducting the ESIA was designed to be as participatory as possible to take advantage of views and opinions from all stakeholders regarding the identification of both positive and negative impacts on the biophysical and socio-economic aspects of the proposed project and the surrounding environment, as well as to enhance positive impacts and mitigate negative ones.

The study approach was also designed to utilize and maximize ideas and opinions from different disciplines involved in the design work. The consultative and participatory approach

was important for utilizing the ESIA Standard Analysis Procedures in a way that ensured the ESIA process followed the required steps of screening and scoping impacts.

The ESIA study followed all necessary processes, including pre-screening, screening, scoping, detailed data gathering and review, review/assessment of baseline data or existing environmental conditions, examination of project alternatives, stakeholder consultations, determination and analysis of potential impacts (identification, prediction, and evaluation), recommendation of enhancement and mitigation measures for positive and negative impacts, respectively, and the final preparation of the Environmental Management Plan (EMP).

This was done with the aim of:

- Improving the environmental design of the project;
- Ensuring that resources were used appropriately and efficiently;
- Identifying appropriate measures for mitigating the potential impacts of the proposed construction; and
- Facilitating informed decision-making, including setting the environmental terms and conditions for implementing the Environmental Management and Monitoring Plan to be recommended.

2.2.Methodology

The methodologies used for identifying, predicting and evaluating of the impacts (both positive and negative), alternatives, mitigating measures and public participation are described as follows.

2.1.1. Review of relevant documents, policies and guidelines

A comprehensive review of applicable policies, laws, and regulations was conducted to ensure compliance with Ethiopian and IFC standards. The review covered environmental and social risk management, labor conditions, pollution prevention, community health and safety, land acquisition, biodiversity conservation, and cultural heritage protection. This ensured the project adhered to national and international guidelines throughout its lifecycle. The following are some of the key laws, policies, and reference documents reviewed during the preparation of this study:

- Bishoftu International Airport Final Master Plan Report (2024).

- Bishoftu International Airport Infrastructure - Concept Design Report (Report No. ET24167-0102D) (2025).
- Bishoftu International Airport Sitewide Utilities - Concept Design Report (2025).
- Bishoftu International Airport Sitewide Special Airport Systems & Security Report – Concept Design (2025).
- Bishoftu International Airport Airside Traffic Study Report (2025).
- Bishoftu International Airport Concept Design Report (2025).
- Bishoftu International Airport Architecture & Engineering Report (2025).
- Bishoftu International Airport Landside Traffic Study (2025)
- Bishoftu International Airport Façade Design Report (2025)
- Bishoft City Master Plan (2024)
- Environmental Policy of Ethiopia (1997)
- Water Resources Policy (1998)
- National Policy on Women (1993)
- National Social Protection Policy of Ethiopia
- National Health Policy (1993)
- Climate Resilient Green Economy (CRGE) Strategy (2011)
- Conservation Strategy of Ethiopia
- Environmental Impact Assessment Proclamation (No. 299/2002)
- Environmental Pollution Control Proclamation (No. 300/2002)
- Solid Waste Management Proclamation (No. 513/2007)
- Expropriation of Land and Compensation Proclamation (No. 1161/2019)
- Labor Proclamation (No. 1156/2019)
- Public Health Proclamation (No. 200/2000)
- Ethiopian Airlines Group Establishment Proclamation (No. 406/2017)
- African Development Bank Group. (2023). Integrated Safeguards System: Policy statement and operational safeguards. Abidjan, Côte d’Ivoire: AfDB.
- International Finance Corporation. (2012). IFC performance standards on environmental and social sustainability. Washington, DC: World Bank Group.
- ICAO Annex 16 – Environmental Protection
- ICAO Doc 9829 – Guidance on Environmental Assessment of Aviation Projects
- World Bank Environmental, Health and Safety (EHS) Guidelines for Airports

2.1.2. Screening

The screening phase was conducted to determine the level of Environmental and Social Impact Assessment (ESIA) required for the Bishoftu International Airport project. The project, located in the Oromia National Regional State, Bishoftu City, was classified as a Schedule 1 project under Ethiopian ESIA guidelines due to its significant environmental and socio-economic impacts. The screening process involved reviewing Ethiopia's ESIA Technical Guideline (2000), ESIA Procedural Guideline (2003), and IFC Performance Standards. The project's runway length exceeding 2,100 meters and its anticipated impacts at local, regional, and national levels necessitated a full ESIA. The screening report has been approved by the Environmental Protection Authority, and the approval letter is included as Annex 1.

2.1.3. Scoping

Environmental and social scoping was conducted to identify valued environmental and social components (VECs) relevant to the Bishoftu International Airport project, determine the areas most likely to be influenced by the project, and assess the significance of both beneficial and adverse impacts. The scoping process aimed to define the key environmental and social issues that must be addressed in the ESIA, in accordance with Ethiopian EIA Proclamation No. 299/2022 and the African Development Bank's Integrated Safeguards System (ISS).

The scoping exercise involved a detailed review of the proposed airport design, multiple site observations, consultations with the project design team, and a comprehensive literature review of the project's biophysical and socio-economic context. These inputs enabled identification and definition of the VECs most likely to be affected by the project across all phases—mobilization, construction, operation, and decommissioning.

The assessment confirmed that the project area does not encompass environmentally sensitive or protected areas such as wetlands, forests, or critical wildlife habitats. However, agricultural land, human settlements, social infrastructure (e.g., schools, churches, health facilities), and existing utilities within and adjacent to the project site are expected to be affected. The project's area of influence is categorized into:

- **Direct Impact Zone:** Encompasses the immediate project footprint and a buffer zone of up to 5 km surrounding the proposed airport boundaries. This zone is expected to experience localized physical, ecological, and social impacts.

- Indirect Impact Zone: Extends beyond the 5 km buffer up to 15 km, covering areas that may experience secondary impacts from increased air traffic, economic activities, land-use change, and induced development.
- Cumulative Impact Zone: Includes areas beyond the indirect impact zone where combined effects of the airport project with other existing or planned developments (e.g., road networks, industrial parks, urban expansion) may generate cumulative impacts on shared environmental and social receptors, including air quality, water resources, biodiversity, and community health.

To ensure alignment with the African Development Bank's 2023 Integrated Safeguards System (ISS), the scoping exercise included a safeguard scoping matrix that maps project activities against the following ten Operational Safeguards (see Annex 2):

- OS1: Environmental and Social Assessment
- OS2: Labour and Working Conditions
- OS3: Resource Efficiency and Pollution Prevention
- OS4: Community Health, Safety, and Security
- OS5: Land Acquisition, Restrictions on Land Use, Involuntary Resettlement, and Livelihoods
- OS6: Biodiversity and Ecosystem Services
- OS7: Indigenous Peoples
- OS8: Cultural Heritage
- OS9: Financial Intermediaries
- OS10: Stakeholder Engagement and Information Disclosure

The matrix ensures that all relevant safeguard areas are covered, with particular attention given to the methodology for assessing cumulative impacts, which includes stakeholder input, review

of past, ongoing, and planned developments in the area, and spatial and temporal impact mapping.

The identification of key stakeholders and Project-Affected Persons (PAPs) was integral to the scoping process. Stakeholders include the Environmental Protection Authority, Bishoftu City Administration, sectoral offices, civil society organizations, and community representatives. PAPs include individuals and households residing within the direct impact zone who may be exposed to impacts or require resettlement and livelihood restoration.

The scoping findings provide a sound foundation for the detailed ESIA by focusing on the most significant risks and opportunities. The full scoping report, including the safeguard scoping matrix and cumulative impact framework, is attached as Annex 2.

2.1.4. Baseline Assessment

The baseline environmental and socio-economic conditions of the project area were assessed through the collection and analysis of both primary and secondary data. Standard tools and methodologies, including physical observations, key informant interviews, stakeholder consultations, and remote sensing, were employed to investigate the physical, biological, and social environment. Environmental parameters were collected, measured, and presented in accordance with applicable environmental standards, norms, and national requirements. Secondary data were used to gain a comprehensive understanding of the study area, while primary data were collected to verify and supplement the findings. The synthesis of environmental and socio-economic data was achieved through the following tasks:

- **Literature Review**

Existing literature on the environmental and socio-economic conditions of the project area was reviewed to provide insights into the current state of the environment and society. This helped identify potential areas of concern and establish a foundation for the baseline assessment.

- **Key Informant Interviews**

Key individuals with knowledge of the environmental and socio-economic conditions of the project area were interviewed. These interviews provided first-hand accounts of the issues facing the community and identified the groups most affected by the Bishoftu International Airport project.

- **Focus Group Discussions**

Focus group discussions were conducted with community members to gain a deeper understanding of the environmental and socio-economic conditions of the area. These discussions helped identify diverse perspectives on the project and highlighted key concerns and expectations.

- **Remote Sensing**

Satellite imagery and remote sensing technologies were used to collect data on land use, land cover, and other environmental features. This provided a broad overview of the project area and identified areas requiring further investigation.

- **Filed survey**

Field visits were conducted to observe the on-the-ground conditions and better understand the environmental and socio-economic context of the project area. During these visits, direct interactions with local communities, infrastructure, and surrounding ecosystems were carried out. The visits helped to identify potential impacts and gather insights on how the project might affect the area's natural resources, livelihoods, and community dynamics.





Figure 2-1: Field visit Photos at the project Area (Source: Site visit 07/11/2024)

A. Physical Environment

1. **Land Use and Land Cover:** Land use and land cover data were collected from the Oromia Urban Planning Institute and Bishoftu City Municipality. Secondary data were verified through field observations and consultations with local officials and residents at the woreda and kebele levels. This information helped identify sites, structures, and natural features within the project area.
2. **Geology:** Regional geological data, including seismicity information, were obtained from reputable sources such as the Geological Survey of Ethiopia. Topographical data were sourced from the Geological Survey of Ethiopia and the Mapping Agency of Ethiopia. Geological units, including soils, rocks, and discontinuities, were mapped at an appropriate scale. Potential geological hazards, such as landslide-prone areas, were identified, and remedial measures were proposed.

3. **Climate and Meteorological Data:** Meteorological data, including precipitation, temperature, humidity, sunshine hours, cloud coverage, wind flow and direction, and evaporation rates, were collected from three meteorological stations near the project site (Akaki, Debrezeit and Alem Tena). A reference period of 31 years (1993-2023) was used to establish climatic trends, ensuring accurate and relevant data for impact assessment and mitigation planning.
4. **Soil:** Soil samples were collected to assess soil characteristics. The soil map was obtained from the Ministry of Water Resources using the FAO classification system. Field assessments provided detailed descriptions of geomorphology, lithostratigraphic units, and lineaments, which were essential for geological and hydrogeological mapping.
5. **Surface Water Hydrology and Water Availability;** Historical and existing water resource data were collected to assess surface and groundwater systems. Water bodies, including rivers, lakes, ponds, and reservoirs, were mapped using GIS software. Water quality samples were collected from upstream and downstream points of the Akaki/Gerbi and Dukem Rivers. Parameters such as nitrates, ammonia, phosphates, pH, turbidity, and total dissolved solids (TDS) were analyzed and compared against WHO and Ethiopian EPA standards. Groundwater resources were also evaluated using well data and borehole samples.
6. **Noise:** Baseline noise surveys were conducted at five strategic locations around the project area. Noise levels were measured and compared with Ethiopian EPA and IFC standards. Noise modeling using GIS tools was employed to predict future noise levels from airport operations and identify high-noise zones requiring mitigation. The five locations were chosen based on their proximity to the proposed airport site and the existing land uses. The reason why each location was selected as a sampling point was to capture representative noise levels in the area, particularly where sensitive receptors might be affected. Based on the site visit we conducted, the project area consisted of relatively similar land uses and minimal topographical variations. However, only two location was identified as having sensitive receptors, including schools, health centers, and offices. Therefore, selecting five sampling points for noise measurement was considered more than sufficient to accurately assess the noise levels in the area (Figure 2.2).

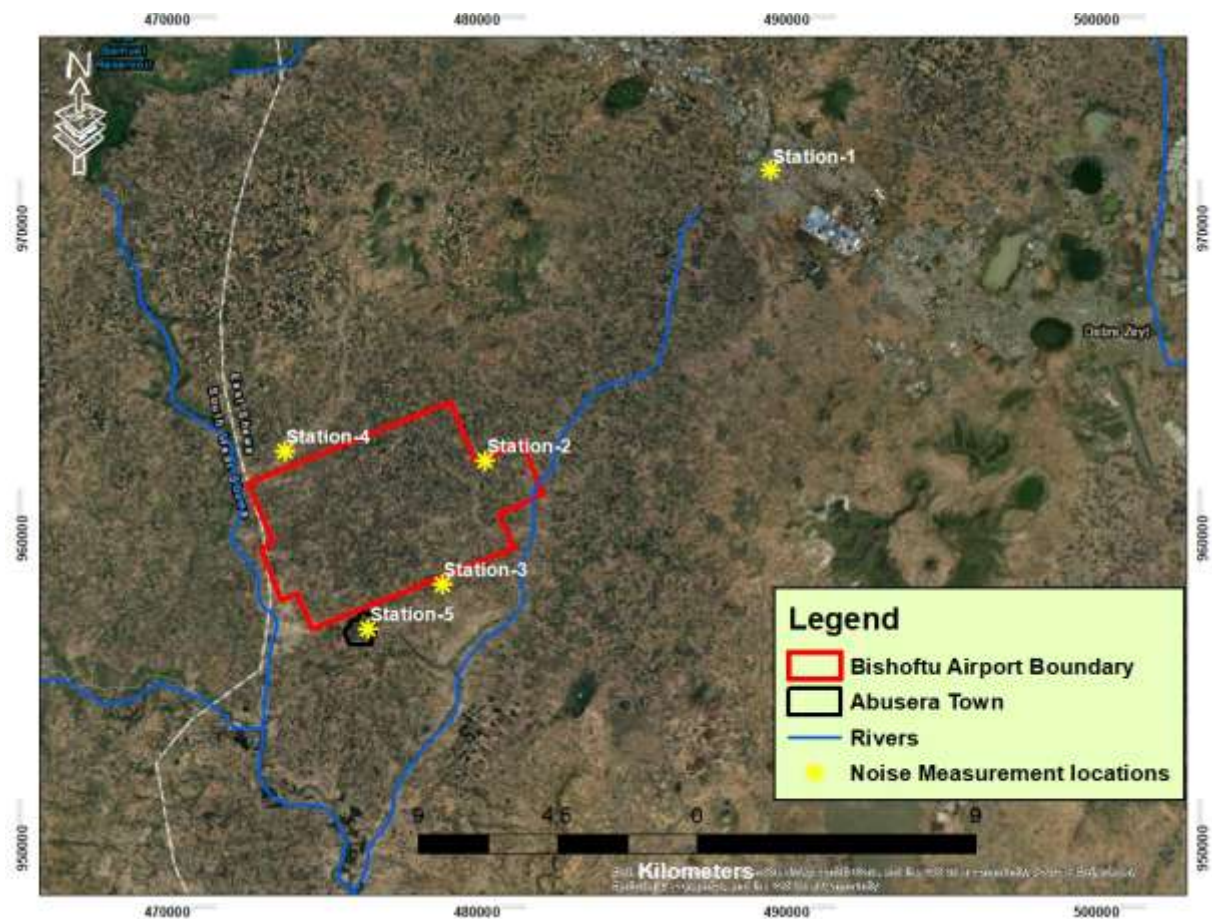


Figure 2-2: Sampling points for noise measurement

7. **Air Quality:** Air quality samples were collected from five strategically selected locations within the project area to measure parameters including PM_{2.5}, PM₁₀, SO₂, NO₂, and CO. The selection of these five sites was based on the rationale that the project site is situated predominantly in an agricultural zone, where local sources of air pollution were minimal. Agricultural activities were not expected to contribute significantly to air pollution compared to urban or industrial areas. Moreover, the surrounding environment lacked major industrial facilities, transportation hubs, or other significant sources of air contamination that would have required a broader distribution of monitoring points. Therefore, the limited number of monitoring sites was deemed sufficient to represent the ambient air quality during the baseline assessment. Volatile Organic Compounds (VOCs) were not included in the air quality measurements, as the primary anticipated pollutants were particulate matter and gaseous emissions typically associated with construction activities and traffic, which were considered more relevant

in this context. The collected data were compared against the World Health Organization (WHO) and Ethiopian Environmental Protection Authority (EPA) air quality standards. Additionally, ambient air quality modeling was conducted to predict potential impacts from the construction and operational phases of the project. Based on these findings, mitigation measures were developed to ensure compliance with all applicable regulatory standards and to minimize potential adverse effects on local air quality.



Figure 2-3: Sampling points for air quality measurement

B. Biological Environment

1. **Field Survey:** Field survey was conducted to identify bio-ecological zones, key flora and fauna species, and habitats within the project area. Local stakeholders and community members were consulted to gather qualitative insights into ecological trends and environmental changes.

2. **Secondary Data Collection;** Existing literature, government reports, and environmental assessments were reviewed to identify previous biological surveys, habitat types, and species population trends. Land use and land cover (LULC) classification was conducted using Google Earth Engine to analyze spatial distribution and changes over time.
3. **Flora and Fauna Data Collection;** Systematic sampling methods, including strip line transects and plot counts, were used to collect vegetation data across the project area. Home garden vegetation was assessed through random sampling of households in six kebeles. Crop biodiversity was evaluated through interviews with local farmers and field surveys. Fauna data, including livestock, wild animals, birds, reptiles, and amphibians, were collected through direct observations and community interviews.
4. **Data Processing and Analysis:** Quantitative data analysis included calculating species richness, abundance, and ecological indices (e.g., Shannon-Wiener diversity index). Qualitative data from interviews and focus group discussions were analyzed using thematic and content analysis methods to identify key themes and community perceptions.

C. Socio-Cultural Environment

Socio-economic data, including demographics, gender, religion, occupation, education, health, and land ownership patterns, were collected from primary and secondary sources. Health data, such as the prevalence of diseases like COVID-19 and HIV/AIDS, were assessed based on available secondary data. Environmental sensitive receptors, including schools, health centers, and cultural sites, were mapped using GIS to identify their proximity to potential project impacts.

2.1.5. Stakeholder and Public Consultations

Consultation meetings were conducted with key stakeholders and Project Affected Persons (PAPs) from November 2024 to May 2025. During this period, approximately 52 stakeholders—including community leaders, local authorities, and relevant organizations—were engaged, along with 449 PAP representatives. The public and stakeholder consultations aimed to collect comprehensive information on the environmental and social baseline of the project area and to understand community perspectives, concerns, and expectations regarding the proposed Bishoftu International Airport (BIA) project. These consultations were designed

to support transparent decision-making, minimize potential adverse impacts, and enhance positive project outcomes..

Objectives of the Consultation

- To inform stakeholders and the public about the proposed project, its objectives, and potential environmental and social impacts.
- To gather site-specific knowledge, concerns, and suggestions from local communities and institutions.
- To ensure inclusive participation, with a focus on engaging women, youth, and vulnerable groups (including persons with disabilities, elderly individuals, and low-income households).
- To build trust, foster collaboration, and reduce the risk of conflict or misinformation.
- To incorporate community feedback into the planning and mitigation strategies of the project.

Consultation Methodologies

The stakeholder engagement followed a structured methodology based on principles of inclusivity, transparency, and cultural appropriateness:

- **Stakeholder Mapping and Identification:** A stakeholder analysis was conducted to identify and categorize individuals and institutions likely to be affected or have interest in the project. Particular attention was given to identifying vulnerable groups who might be disproportionately affected or have limited capacity to voice their concerns.
- **Awareness Creation and Mobilization:** Local leaders, community facilitators, and women's and youth associations were engaged in advance to mobilize participants and ensure representation from all segments of the population, including hard-to-reach or marginalized groups.
- **Focus Group Discussions (FGDs):** FGDs were organized with specific community segments to capture targeted feedback:
 - Separate FGDs were held with women-only groups, youth, elderly community members, and persons with disabilities to ensure a safe and open environment for expression.

- Discussions covered project awareness, potential benefits and risks, environmental concerns, land use issues, and expectations for compensation or mitigation.
- **Key Informant Interviews (KIIs):** In-depth interviews were held with officials from:
 - Community or project-affected populations
 - Relevant officials of the Bishoftu city Administration
 - Dukem sub city Administration
 - Dukem sub city Land Administration
 - Dukem sub city Environment Protection offices
 - Abusera Wereda Administration
 - Federal Environmental Protection Authority
 - Oromia Urban Planning and Development Commission
 - Engineering Corporation of Oromia
 - Ethiopian Civil Aviation Authority (ECAA).
 - Ethiopian Airports Enterprise.
 - Ethiopian Airlines Group (project developer).
 - Ministry of Transport and Logistics
 - Ethiopian Electric Utility
 - Ethiopian Telecommunication Corporation
 - Abusera International Airport Design Consultant (DAR Group)
 - Representative form Women, youth and vulnerable group; etc.

These interviews explored institutional perspectives on regulatory compliance, land use planning, environmental risks, and strategies for inclusive development.

- **Community Consultation Meetings:** Public consultation meetings were held in accessible venues within the project area, with facilitation in local languages and appropriate materials to aid comprehension. Attendance sheets were signed, and feedback was documented in detail.

Participation and Inclusion of Vulnerable Groups

Efforts were made to ensure meaningful participation of vulnerable and underrepresented groups by:

- Scheduling meetings at convenient times and locations.
- Providing gender-sensitive facilitators and translators.
- Conducting separate sessions where needed to avoid power imbalances.
- Engaging community-based organizations and religious leaders to reach marginalized populations.

Key Issues Raised and How They Were Addressed

The consultations identified several major themes:

- Concerns about land acquisition and compensation, especially for female-headed households and elderly farmers.
- Potential employment opportunities for youth and local communities.
- Environmental concerns, particularly related to noise, waste management, and water resource protection.
- Access to information and the need for continued engagement throughout the project lifecycle.

Feedback from these consultations informed the project's mitigation strategies and Environmental and Social Management Plan (ESMP). For instance:

- The project adopted additional provisions for livelihood restoration support targeting vulnerable households.
- A grievance redress mechanism was tailored to allow anonymous and gender-sensitive complaint handling.

Documentation

- Minutes of all meetings and participant lists, and photographic evidence are included in Annex 8.
- A summary of stakeholder concerns and how they were incorporated into the project design is presented in Section 7.

2.1.6. Identification and Analysis of Environmental and Socioeconomic Impacts

The impact assessment was based primarily on the selected valued environmental and social components. Field investigation, public consultation, literature survey and expert judgment

were applied for screening the valued environmental and social components. Impacts and their depth and significance were outlined with reference to environmental and social settings on a temporal and spatial basis. The following stepwise approach was followed:

- **Identification-** This includes description of the existing environment, determination of the project components and definition of the environment that will be modified by the project.
- **Prediction-** Forecasting of the quality and/or spatial dimensions of the changes and estimation of the probability that the impact will occur.
- **Evaluation-** Determination of the incidence or magnitude and significance of the impact before mitigation.

Key, potentially beneficial as well as adverse impacts on the physical, biological and socio-economic environment associated with the project operation were identified with the help of checklist and matrices method.

The analysis of impacts as relevant to the project and its location in an urban and rural setting include, among other things

- a) Air, water, noise, solid and liquid waste generation and pollution with identified permissible limits and management as per the national and international environmental guidelines, procedures and regulations of the country and management plans.
- b) Hazardous wastes (e.g. toxic emissions and their controls)
- c) Loss of land settlement and livelihood and the potential for social disruption/displacement, resettlement, etc.
- d) Drainage, storm drainage and surface water/rivers and downstream pollution.
- e) Disruption of religious and cultural activities
- f) Traffic and movement of people
- g) Health and safety of project construction workers and neighborhood communities
- h) Impacts anticipated during operation such as sludge disposal, emission of gasses, pollution of surface and ground water resources, odour nuisances, etc.

The impacts of the proposed project has been analyzed along the following parameters:

- Probability of occurrence
- Extension in space

- Duration in time
- Magnitude
- Significance

The predicted environmental and social impacts are characterized as follows:

- Nature of Impact: Direct, indirect or cumulative;
- Type of impact: Positive, negative or both
- Duration of impact: Short term, medium term or long term;
- Spatial scale of impact: Local, regional, National, International
- Significance of impact: Low, Medium, High or Very High

A combination of these parameters were summarized in an all-encompassing measures of significance which is the basis for identifying and prioritizing major significant impacts and recommending mitigating measures. Finally, the magnitude and significance level of the identified impacts were evaluated as minor, moderate or major significance impacts.

3. DESCRIPTION OF THE PROJECT

3.1. Project Location

Bishoftu international airport is proposed in Oromia regional state, Bishoftu City, Dukem sub city, Abusera Wereda (Figure 3.1.). The site is approximately 34km far to the South East of Addis Ababa. The project site is located within an approximate geographical coordinates of 8041'51.70"N-8039'15.93"N latitude and 38044'49.09"E-38048'27.43"E longitude. The proposed project covers an area of approximately 3900 ha. The project site is fertile agricultural areas which produce different crops.

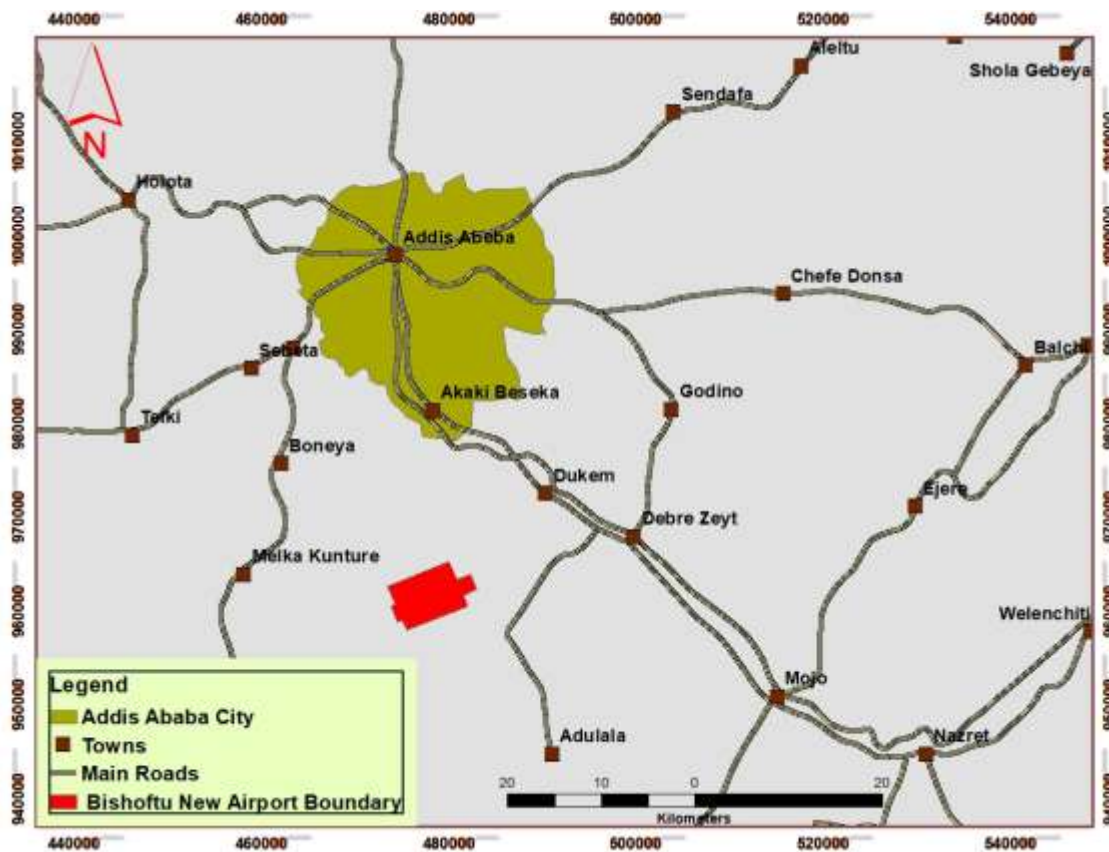


Figure 3-1: Location Map of the Project Area

The project site falls in 8 Kebele administration of Dukem sub city (Figure 3-2) which includes:

- i) Abu Lugun
- ii) Abu Kobo
- iii) Abu Gerbi
- iv) Abu Sera

- v) Abu Serkema
- vi) Koftu Kombolcha
- vii) Dere Shoki

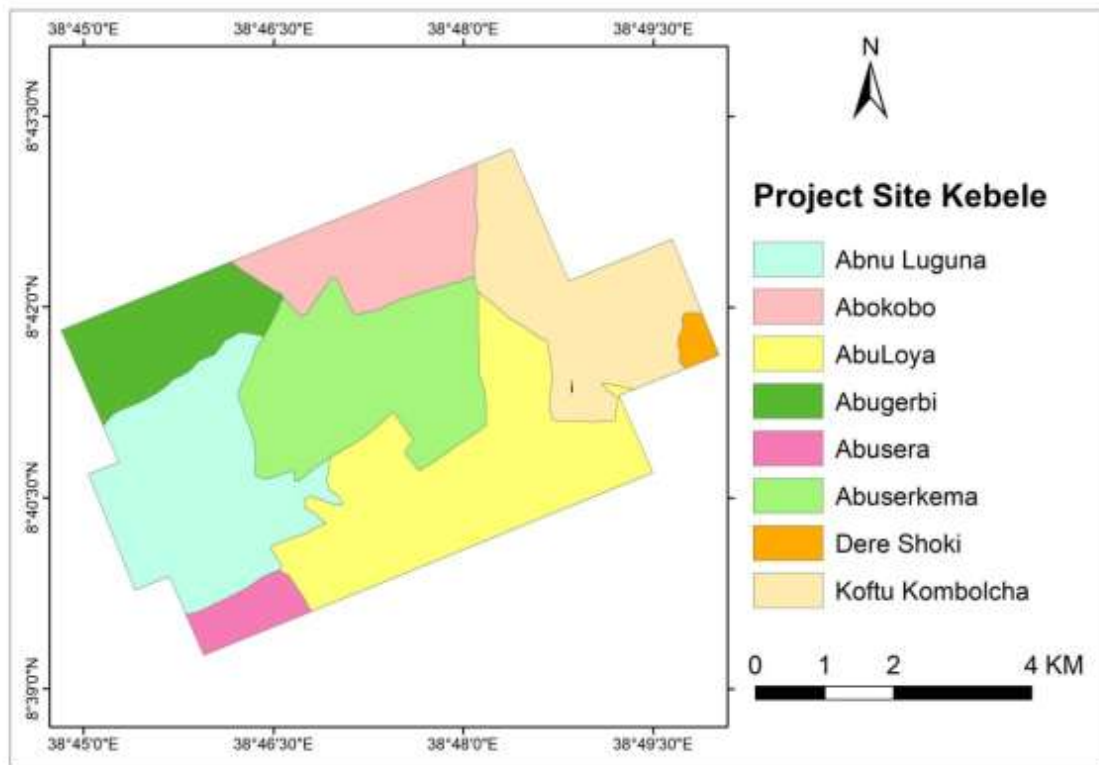


Figure 3-2: Kebeles included in the project site

3.2. Traffic Forecast

The proposed new airport, Bishoftu International Airport (BIA), is poised to become Ethiopia's largest international airport, representing a transformative leap in the country's aviation infrastructure. Scheduled to commence operations as early as 2029, BIA is expected to play a pivotal role in meeting Ethiopia's rapidly growing air traffic demand. This state-of-the-art facility will not only enhance the country's connectivity but also solidify its position as a key aviation hub in Africa.

To better understand the anticipated growth and the airport's future role, Table 3.1 provides a detailed projection of passenger traffic at BIA from 2030 to 2060. The data is categorized into domestic, international, and total passenger volumes, offering valuable insights into future trends and demands.

Table 3-1: Annual Passenger Volumes Projected for BIA

Year	Domestic	International	Total
2030	292,000	30,048,000	30,340,000
2040	509,000	59,813,000	60,322,000
2050	989,000	81,195,000	82,184,000
2060	1,835,000	103,316,000	105,151,000

Sources: - DAR

The table reveals significant growth trends across domestic and international passenger volumes. Domestic traffic is projected to increase from 292,000 in 2030 to 1,835,000 by 2060, reflecting an 85% surge between 2050 and 2060 alone. This growth is likely driven by factors such as economic expansion, urbanization, and improved connectivity within Ethiopia.

International passenger traffic, however, dominates the total volumes. Starting at 30,048,000 in 2030, it is expected to exceed 103 million by 2060, accounting for over 98% of total passenger traffic. This underscores BIA's role as a global aviation hub, connecting Ethiopia to the rest of the world.

Total passenger volumes are projected to grow from 30,340,000 in 2030 to over 105 million by 2060, highlighting the airport's critical role in accommodating Ethiopia's aviation needs. The growth trends suggest that domestic travel will accelerate significantly, while international traffic will continue to grow steadily, albeit at a slightly slower pace as the airport approaches capacity.

The implications of this growth are profound. The surge in passenger volumes, particularly international traffic, will require substantial investments in infrastructure, including expanded terminals, runways, and support facilities. Additionally, the increase in passenger numbers is expected to boost the local and national economy through tourism, trade, and business activities. However, managing such high volumes will also pose operational challenges, necessitating advanced strategies for efficient passenger processing, baggage handling, and air traffic management.

The implications of this growth are significant. The increase in passenger volumes, particularly international traffic, will necessitate substantial investments in airport infrastructure, including terminals, runways, and support facilities. The rise in passenger numbers, especially

international travelers, is likely to boost the local and national economy through tourism, trade, and business activities. However, managing such high volumes will also present operational challenges, requiring advanced strategies for efficient passenger processing, baggage handling, and air traffic management.

To manage the rapid growth in air traffic and accommodate different types of traffic—including international, domestic, and transfer passengers—a strategic distribution plan has been implemented. Under this plan, 90-95% of domestic traffic will continue to be handled by Bole International Airport, while 5-10% of domestic traffic will be assigned to Bishoftu International Airport.

Additionally, 100% of international passenger traffic will be directed to Bishoftu International Airport. This includes the majority of transfer traffic, which primarily consists of international-to-international connections. By allocating international and transfer traffic to Bishoftu International Airport, the plan aims to optimize operations and reduce congestion at Bole International Airport, ensuring efficient handling of the growing passenger demand.

In terms of cargo operations, domestic belly tonnage in the Addis Ababa region will be divided between the two airports based on the passenger traffic split. However, all international belly tonnage will be managed exclusively at Bishoftu International Airport. Furthermore, freighter air cargo tonnage operations will be fully allocated to Bishoftu International Airport. This distribution aims to optimize capacity and efficiency across both airports to meet future demand.

Table 3-2: Air Cargo Tonnages Projected for BIA

Year	Domestic Belly	Domestic Freight	Domestic Total	International Belly	International Freight	International Total	Total Belly	Total Freight	Total Cargo
2030	400	2,500	2,900	444,600	700,900	1,145,500	445,000	703,400	1,148,400
2040	700	5,400	6,100	876,200	1,218,300	2,094,500	876,900	1,223,700	2,100,600
2050	1,200	7,400	8,600	1,255,100	1,627,100	2,882,200	1,256,300	1,634,500	2,890,800
2060	2,100	8,700	10,800	1,685,000	2,035,700	3,720,700	1,687,100	2,044,400	3,731,500

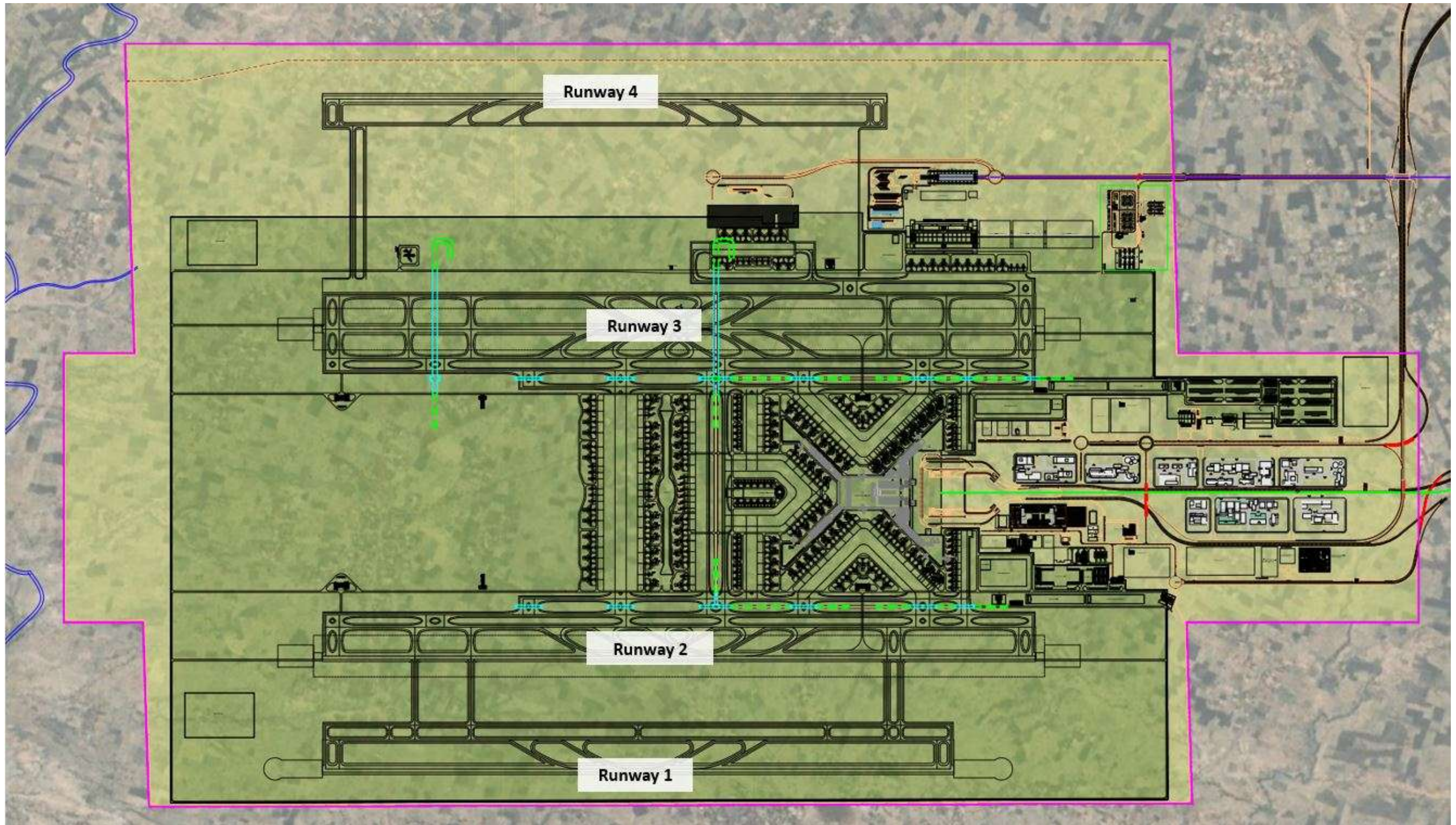
Sources: - DAR

3.3.Runway

Bishoftu International Airport (BIA) is designed to be a state-of-the-art facility with a focus on high capacity and operational efficiency. The airport will ultimately feature four parallel runways, each designed to accommodate large wide body aircraft. These runways are strategically separated to maximize capacity and ensure smooth operations. Among the four runways, the two central runways will be 4,800 meters long, providing ample space for the largest aircraft. The southernmost runway will be slightly shorter at 4,250 meters, while the northernmost runway will be 3,800 meters long. Notably, only the two central runways will be constructed during the first development phase, with the remaining runways to be added as part of future expansions.

All runways at BIA are classified as Precision Approach Instrument runways, ensuring safe and accurate landings even in challenging weather conditions. Each runway will be equipped with Category III (CAT III) approach systems, which are among the most advanced landing systems available. These systems include localizer antennas, glide slopes, and Distance Measuring Equipment (DME) collocated with the glide slope, providing precise guidance to pilots during approach and landing. Additionally, the runways will feature advanced visual aids such as Runway Visual Range (RVR) systems, approach lighting systems, and airfield ground lighting, all of which enhance visibility and safety during low-visibility conditions.

To further support navigation and operational efficiency, BIA will be equipped with a range of advanced systems and facilities. These include a Doppler VOR (DVOR) collocated with DME for accurate navigation, an airport beacon to aid in aircraft identification, and a Precision Approach Path Indicator (PAPI) system to assist pilots in maintaining the correct approach angle. The airport will also feature an Automated Weather Observation Station (AWOS) and a Meteorological Garden to provide real-time weather data, ensuring safe operations under varying weather conditions. Additionally, a Secondary Surveillance Radar will be installed to enhance air traffic control and monitoring capabilities.



Source: DAR

Figure 3-3 Site plan for the runways to be constructed at Bishoftu International Airport

3.4. Passenger Terminal Building and Facilities

The section provides a comprehensive overview of the Passenger Terminal Building Requirements for the new Bishoftu International Airport in Ethiopia. It outlines the space requirements, design considerations, and operational needs for various facilities within the terminal, including passenger processing, baggage handling, airline operations, public spaces, concessions, and government inspection areas. Below is a summarized analysis of the key components and their proposed square meter requirements:

A. Passenger Terminal Facilities

The terminal is designed to efficiently handle both domestic and international passengers, with distinct flows for arrivals, departures, and transfers. Key areas include the check-in lobby, which features check-in counters, baggage drop-off points, and queuing areas. The Baggage Handling System (BHS) is a critical component, managing domestic and international baggage through processes such as early baggage storage, sorting, and make-up systems. Additionally, the terminal includes separate security screening areas for departing, arriving, and transfer passengers, ensuring smooth and secure processing. Passenger flows are carefully segregated, with dedicated corridors and processing areas for domestic and international travelers.

Proposed Space Requirements (m²):

- Check-in Lobby: 6,760 m² (economy) + 1,020 m² (business/first class).
- Baggage Handling System (BHS): 54,567 m² (make-up) + 23,400 m² (early baggage storage).
- Security Screening: 10,700 m² (international) + 600 m² (domestic).

B. Airline Spaces

The terminal's airline spaces are designed to support both full-service and self-service check-in options, with dedicated areas for business and first-class passengers. These spaces include check-in counters, baggage handling facilities, and operational areas to ensure efficient airline operations.

Proposed Space Requirements (m²):

- Check-in Counters: 5,670 m² (full-service) + 620 m² (bag drop).

- Airline Operations: 105,700 m².
- Line Maintenance: 16,120 m².

C. Public Spaces

Public spaces within the terminal are designed to ensure smooth passenger flow and comfort. These areas include circulation corridors, restrooms, and passenger waiting areas, all tailored to enhance the overall travel experience.

Proposed Space Requirements (m²):

- Concourse Circulation: 17,250 m² (international) + 1,030 m² (domestic).
- Restrooms: 1,540 m².
- Arrivals Hall: 5,878 m² (international) + 464 m² (domestic).

D. Concessions

The terminal will feature a variety of retail, food & beverage, and service concessions to cater to passenger needs. Additionally, a transit hotel is proposed to accommodate passengers with long layovers, providing a comfortable and convenient option for rest and relaxation.

Proposed Space Requirements (m²):

- Retail and Food & Beverage: 36,500 m² (international) + 500 m² (domestic).
- Transit Hotel: 14,687 m² (110 MAP)

E. Government Inspection Spaces

Government inspection areas are a critical part of the terminal, encompassing passport control, customs, and health screening facilities. These areas are strategically designed to efficiently manage high passenger volumes, ensuring smooth and secure processing for both departing and arriving travelers.

The proposed space requirements for these facilities are as follows:

- Passport Control: Approximately 6,320 m² for departures and 6,250 m² for arrivals.
- Customs & Health: Around 3,420 m² for X-ray screening and 500 m² for red lane inspection areas.

These allocations ensure that the terminal can handle the expected passenger traffic while maintaining high standards of security and efficiency.

F. Support Spaces

Support spaces are essential for the smooth operation of the terminal and include operational control centers, maintenance areas, and mechanical/electrical rooms. These facilities ensure the terminal functions efficiently and can handle the demands of daily operations.

The proposed space requirements for these support areas are as follows:

- Airport Operational Control Center (APOC): 10,000 m², serving as the central hub for managing airport operations.
- Maintenance Areas: 21,460 m², dedicated to the upkeep and repair of terminal infrastructure and equipment.
- Mechanical/Electrical Rooms: 139,450 m², housing critical systems for power distribution, HVAC, and other utilities necessary for terminal operations.

These spaces are designed to support the terminal's long-term functionality and ensure a seamless experience for passengers and staff alike.

G. Automated People Mover (APM)

An Automated People Mover (APM) system will be implemented to connect the main terminal with satellite concourses, ensuring efficient passenger movement across the airport. The system will include passenger stations, guideways, and maintenance facilities to support its operations.

In terms of space requirements, each APM station is projected to occupy approximately 2,880 m², providing adequate space for passenger boarding, deboarding, and circulation. Additionally, the Maintenance & Storage Facility (M&SF) will require around 250 m² for Traction Power Substations, with additional space allocated for central control rooms and maintenance operations to ensure the system's reliability and functionality. This infrastructure will play a crucial role in enhancing connectivity and operational efficiency within the airport.

H. Greeting and Farewell Facility

A dedicated area located outside the terminal will provide a space for passengers and visitors to greet or farewell each other. This facility will feature public gathering spaces, retail outlets, and food & beverage options, creating a welcoming environment for travelers and their guests.

The proposed space requirement for this Greeting & Farewell Facility is 42,392 m² by the 110 MAP planning period. This area is designed to enhance the overall passenger experience by offering a convenient and comfortable space for interactions before entering or after exiting the terminal.

The total building area for the terminal is projected to grow significantly over the planning periods, reaching 1,292,605 m² by 110 MAP. Key components of the terminal include airline spaces (315,675 m²), public spaces (256,082 m²), concessions (148,215 m²), government inspection areas (22,410 m²), support spaces (315,675 m²), and APM and greeting facilities (42,392 m²). These allocations ensure a comprehensive and efficient terminal design capable of handling both domestic and international passenger flows.

Several key observations highlight the terminal's design priorities. First, the majority of the space is allocated to international passengers, reflecting BIA's role as a global hub. Second, the Baggage Handling System (BHS) is a critical component, with significant space dedicated to sorting, storage, and screening to ensure smooth operations. Third, the terminal emphasizes passenger comfort, with ample public spaces, restrooms, and concessions designed to enhance the travel experience. Finally, the design accommodates future expansion, with phased development of facilities such as the Automated People Mover (APM) and transit hotel, ensuring the terminal can scale to meet growing demand.

3.5.Cargo Facilities

The cargo terminal is designed to manage a wide range of cargo operations, including bulk cargo, Unit Load Devices (ULDs), and freighter operations. The facility will incorporate storage areas, workstations, docks, and automated systems to ensure efficient cargo handling. The design is based on IATA guidelines and global benchmarking, with flexibility to adapt to future operational needs. The cargo facility is sized to handle the following projected annual tonnage across the four PALs:

- 40 MAP: 1.4 million tons per annum (MTPA)
- 60 MAP: 2.1 MTPA
- 80 MAP: 2.8 MTPA
- 110 MAP: 3.9 MTPA

The cargo tonnage is divided into domestic and international categories, with further breakdowns for belly cargo (transported in passenger aircraft) and freighter cargo (transported in dedicated cargo planes).

The size of the cargo terminal is determined by the level of automation, as per IATA guidelines:

- Low Automation (mostly manual): 5 tons per square meter
- Automated (average): 10 tons per square meter
- Highly Automated: 17 tons per square meter

Based on these guidelines, the estimated footprint for the cargo terminal at each PAL is as follows:

Table 3-3: Based on IATA recommendations, the following is the estimated footprint for the four (4) PALs.

Automation Level	40 MAP	60 MAP	80 MAP	110 MAP
Low Automation	280,000 m ²	420,000 m ²	560,000 m ²	780,000 m ²
Automated (Average)	140,000 m ²	210,000 m ²	280,000 m ²	390,000 m ²
Highly Automated	83,000 m ²	124,000 m ²	165,000 m ²	230,000 m ²

The above table (3.3) shows the estimated footprint requirements for cargo terminal facilities at different levels of automation and throughput capacities. It illustrates how the terminal space needed varies depending on the degree of automation and the projected annual cargo volumes, providing guidance for planning and sizing cargo facilities accordingly.

The cargo terminal is designed as a multi-level facility to maximize space efficiency. The initial 40 MAP facility will have the following dimensions and space allocations:

- Building Length: 390 meters
- Building Width: 185 meters
- Building Height: 48 meters (for ULD storage) and 12 meters (for workstations and build/break areas)
- Gross Floor Area (GFA): 125,700 m²
-

This includes:

- ULD Building: 11,700 m²
- Build and Break Ground Level: 64,600 m²
- Build and Break Level 1 and ASRS: 39,000 m²

The cargo terminal is designed to accommodate future growth, with space allocated for expansion up to 110 MAP. The facility can be expanded either by adding side-by-side buildings or by integrating additional levels into the existing structure. The estimated space requirements for future expansions are as follows:

- 60 MAP: Additional 45,893 m²
- 80 MAP: Additional 47,373 m²
- 110 MAP: Additional 73,913 m²

The cargo terminal is designed to minimize internal travel distances and cross-flows, with zoning to handle cargo from different regions separately. The facility will incorporate automated systems for cargo handling, storage, and sorting, ensuring high efficiency and throughput.

3.6. Airport Support Facilities

This section provides a comprehensive overview of the Airport Support Facilities and their requirements for a new international airport in Ethiopia. These facilities are essential for ensuring the efficient, safe, and secure operation of the airport. Below is an analysis of the key airport support facilities and their requirements:

1. Air Traffic Control Tower (ATCT)

- Primary and Secondary ATCTs: The airport will have a primary ATCT located near the passenger terminal building, capable of serving the central and southern areas. A secondary ATCT will be located near cargo facilities to support the northern area if developed.
- Functionality: The primary ATCT will integrate various navigation aids (NAVAIDs) into the air traffic management (ATM) system, including electrical ATM systems. It

will also have air traffic control positions for approach, departure, landing, and ground control.

- Secondary ATCT: The secondary tower will be equipped to perform all primary tower functions if needed, ensuring redundancy and operational continuity.

2. Aircraft Rescue and Fire Fighting (ARFF) Stations

- Primary Function: ARFF stations are critical for responding to aircraft incidents or accidents within the airport. Their objectives include establishing serviceable conditions, focusing on passenger rescue, and assisting in the evacuation of occupants.
- Response Time: ARFF stations must comply with ICAO Annex 14 standards, which require a response time of no more than 3 minutes to any point on operational runways and 3 minutes to other parts of the movement area under optimal conditions.
- Facility Requirements: The ARFF stations will be developed in phases, with four primary stations in Phase 1 (40 million annual passengers) and two additional secondary stations in Phase 2 (60 million annual passengers). Each primary station will have a building area of 2,500 square meters, while secondary stations will have a reduced footprint.

3. ARFF Training Facility

- Training Requirements: The ARFF training facility will include an aircraft mock-up, burn tanks, and areas for maneuvering vehicles. It will be designed to accommodate the largest aircraft in the fleet, such as the Boeing 777-8.
- Location: The facility will be located airside, with consideration given to wind direction to minimize smoke impact on the terminal and runway areas.

4. Airport Maintenance Complex

- Function: The maintenance complex will support the repair and upkeep of airport infrastructure, including runways, taxiways, hangars, and parking structures. It will also provide storage for materials and flammable items.
- Requirements: The facility will be developed in phases, with a total plot area of 30,000 square meters in Phase 1, expanding to 65,500 square meters in the ultimate phase. The complex will include workshops, storage areas, and office spaces.

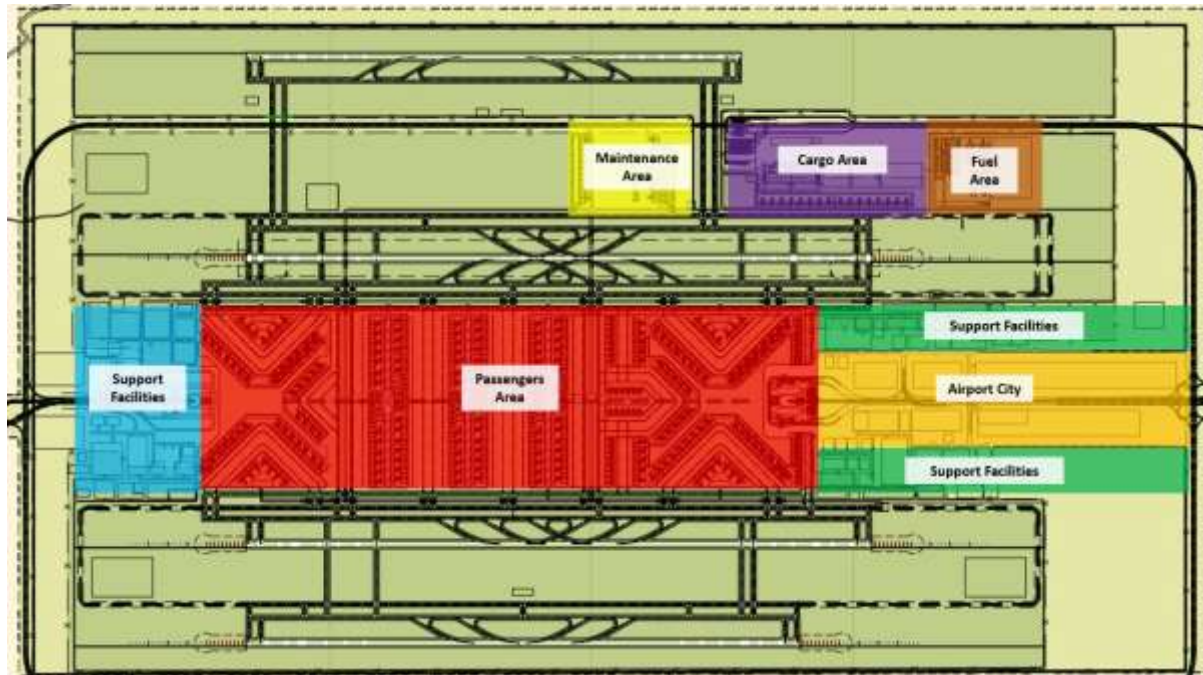


Figure 3-4 Location of Airport Maintenance Facilities

5. Ground Service Equipment (GSE) Storage/Staging Area

- Function: GSE includes vehicles and machinery used to service aircraft between flights. The staging areas must be located near aircraft parking regions for operational efficiency.
- Requirements: The GSE storage areas will be developed in phases, with a total plot area of 82,625 square meters in Phase 1, expanding to 174,134 square meters in the ultimate phase. The facility will accommodate various GSE vehicles, including baggage loaders, ground power units, and tractors.

6. GSE Maintenance Area

- Function: The GSE maintenance area will ensure the readiness and reliability of GSE vehicles and equipment. It will include workshops, storage areas, and administrative offices.
- Requirements: The facility will accommodate 10% of the GSE fleet for maintenance at any given time. The total plot area will be 43,800 square meters in Phase 1, expanding to 91,600 square meters in the ultimate phase.
-

7. Flight Catering Facilities

- **Function:** Flight catering facilities prepare in-flight meals for departing flights. The design and location of these facilities are critical for efficient meal delivery to aircraft.
- **Requirements:** The facility will be sized based on peak daily meal demand, with a total plot area of 48,375 square meters in Phase 1, expanding to 130,125 square meters in the ultimate phase.

8. Aircraft Cleaning Facilities

- **Function:** These facilities ensure that aircraft meet cleanliness standards set by civil aviation authorities. They will be equipped with tools, vehicles, and supplies for aircraft cleaning.
- **Requirements:** The facility will be sized based on peak hour demand, with a total plot area of 6,956 square meters in Phase 1, expanding to 12,212 square meters in the ultimate phase.

9. Aircraft Maintenance Hangar and Line Maintenance

- **Function:** The aircraft maintenance facilities will support the maintenance, repair, and overhaul (MRO) of aircraft. The complex will include hangars, workshops, and storage areas.
- **Requirements:** The facility will be developed in phases, with a total hangar area of 29,600 square meters in Phase 1, expanding to 81,100 square meters in the ultimate phase.

10. Fuel Farm and Hydrant System

- **Function:** The fuel farm will store and distribute jet fuel to aircraft via a hydrant network. The system includes storage tanks, hydrant pumps, and fire protection facilities.
- **Requirements:** The fuel depot will have a total storage capacity of 40,000 tons, with six hydrant pumps installed in the ultimate phase. The hydrant network will supply fuel to aircraft stands, with emergency shutdown systems and leak detection in place.

11. Other Facilities

- **Consolidation Center:** This facility will screen goods entering secure areas of the airport, reducing traffic volume on the road network.

- **Airport Operational Control Center (APOC):** The APOC will serve as the central communication hub for airport operations, including security and emergency management.
- **Medical Center:** The airport will have a 30-bed hospital to provide emergency care and routine medical services for passengers and staff.
- **Bomb Disposal Area:** A dedicated area will be provided for the disposal of explosive devices, located airside with blast containment facilities.

The airport support facilities outlined in the document are designed to ensure the safe, efficient, and secure operation of the airport. Each facility has been carefully planned to meet international standards (e.g., ICAO Annex 14) and to accommodate future growth in passenger and cargo traffic. The phased development approach ensures that the airport can scale its operations as demand increases, while maintaining high levels of safety and service quality.

3.7. Utilities Requirements

The section provides a detailed overview of the Utilities Requirements for the new international airport in Ethiopia, covering Electrical Requirements, Water Requirements, Stormwater Drainage, and Solid and Liquid Waste Generation and Management. Below is an analysis of each section, including relevant tables and key points:

3.7.1. Electrical Requirements

The electrical system is designed to meet the power demands of the airport, including the terminal building, airfield ground systems, and other support facilities. Coordination with Ethiopian power authorities is essential to establish dedicated 132/15 kV substations to minimize power losses and ensure reliable power supply.

The electrical load is estimated based on the built-up areas and load densities for various facilities. The total connected and demand loads are calculated for different phases of airport development (40 MAP, 60 MAP, 80 MAP, and 110 MAP). The load densities for different facilities are provided in Table 3.4.

Table 3-4: Based on IATA recommendations, the following is the estimated footprint for the four (4) PALs.

Area	Load Density (VA/m ²)	AC Load Density (VA/m ²)	Total Load Density (VA/m ²)
Air Traffic Control Tower	250	100	350
Passenger Terminal Building	40	40	80
APM Maintenance and Storage Facility	40	40	80
Cargo Terminal Building	80	40	120
Freight Forwarder Facility	160	0	160
Consolidation Center	120	80	200
Airport Operational Control Center (APOC) & Emergency Operations and Control Center (EOCC)	120	80	200
Airport Maintenance Complex	80	40	120
Airport Authority Facilities	80	80	160
Civil Aviation Offices	80	80	160
State Police Offices	80	80	160
Customs	80	80	160
Medical Center	80	80	160
Fuel Hydrant Dispenser Storage Area	160	0	160
Fuel Farm Facilities	40	0	40
GSE Maintenance Area	80	40	120
GSE Fuel Station	160	0	160
GSE Operations Center	80	40	120
Airside Bus Facilities	80	40	120
Flight Catering Facilities	250	80	330
Aircraft Cleaning Facilities	80	40	120
Aircraft Maintenance Hangar + Line Maintenance	80	40	120
Aircraft Maintenance Workshop	80	40	120
Airline Operation Center	120	80	200
Airline Offices (Ethiopian Airline HQ)	120	80	200

The airport will be supplied by 132 kV substations, with a total of four substations planned to support the full load of 302 MVA. The substations will be strategically located near the center of the load and close to district cooling plants to minimize losses.

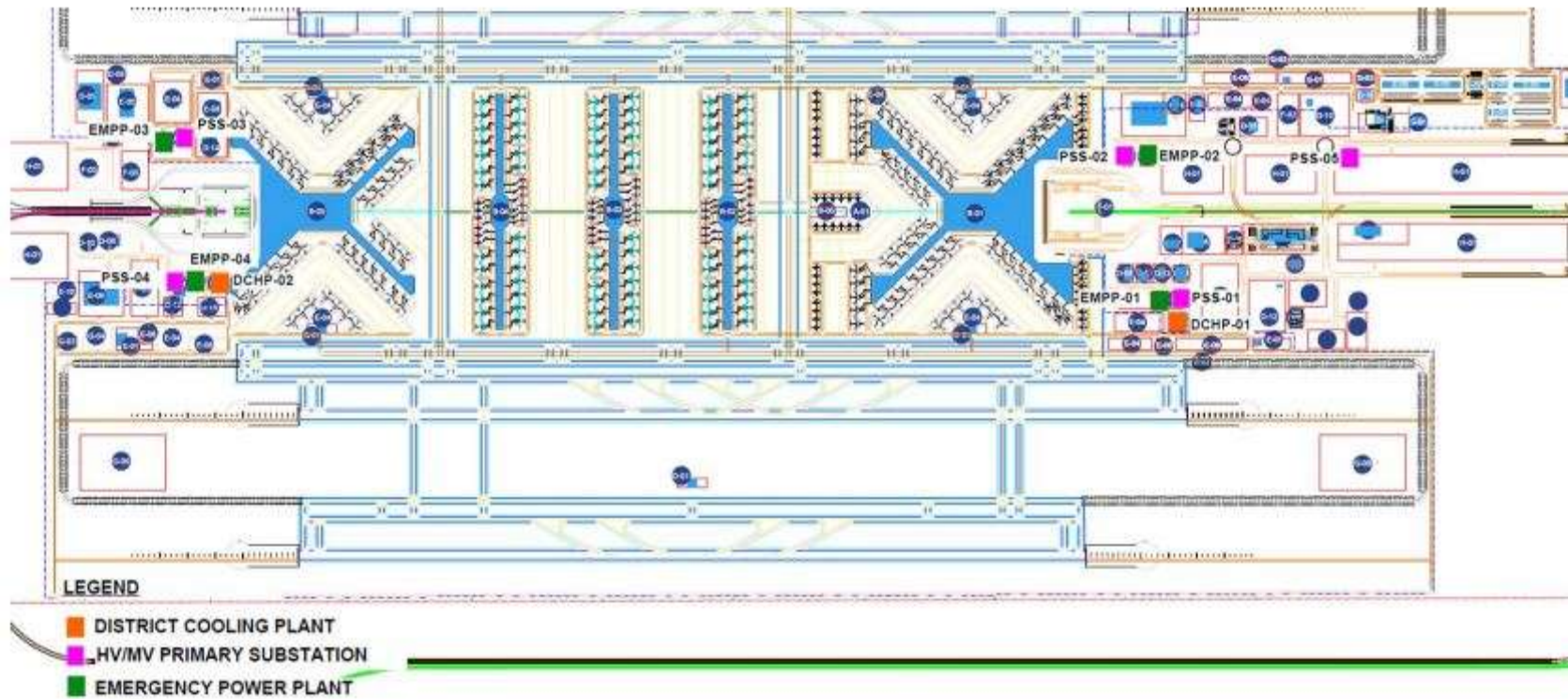


FIGURE 2.24: LOCATION OF AIRPORT 132/15KV PRIMARY SUBSTATIONS, EMERGENCY POWER PLANTS, AND DISTRICT COOLING PLANTS

Source: DAR

Figure 3-5 Location of Airport 132/15kv Primary Substations, Emergency Power Plants, and District Cooling Plants

3.7.2. Water Requirements

The airport's water supply system is designed to cater to domestic consumption, firefighting requirements, and operational needs. It comprises storage tanks, pumps, and distinct distribution networks for potable water and firefighting. Water consumption rates are set at 20 liters per capita per day for passengers and 60 liters per capita per day for employees. To ensure reliability, the water tanks are designed to store two days' worth of supply for Phase 1, with planned expansions for future phases. Additionally, a fire reserve of 650 m³ is allocated for internal building systems, while 680 m³ is designated for fire hydrants. As the airport expands, the total water demand increases from 6,596 m³ per day in Phase 1 (serving 40 million annual passengers) to 18,111 m³ per day in the ultimate phase, accommodating 110 million annual passengers.

Table 3-5: Water demand and storage volumes for different phases.

Airport Phasing	Average Water Demand (m ³ /day)
40MAP	5,996
60MAP	8,791
80MAP	11,780
110MAP	18,111

The area around Abusera International Airport has several potable water supply schemes such as surface water from the Gefersa-I/II, Gefersa-III, Legedadi and Dire Dams or ground water from boreholes, shallow wells, hand dug wells and springs. Surface water from several dams is treated at Gefersa and Legedadi Water Treatment Plants before being supplied to Addis Ababa city's drinking water supply network. The Akaki wellfield located south of the project site could also be a potential source of potable water supply to the airport. There are various other sources of water supply located around the airport site (Legedadi Deep Wells Phase I Works, old AAWSA wells, the Fanta wells, Koye Feche Works, etc.).

3.7.3. Drainage and Stormwater Management

The proposed stormwater drainage system will include gravity main pipes, culverts, channels, manholes, oil separators, gullies, and detention ponds. Water will be temporarily stored in the detention ponds and gradually released into the nearby natural stream, ensuring the pond empties within 48 hours to comply with FAA regulations, preventing bird attraction and

avoiding operational issues at the airport. The apron drainage design will feature grated channels with fire stops in accordance with NFPA 415. The ponds will be designed for a 1 in 50-year storm, with checks for a 1 in 100-year storm event. Additionally, culverts discharging outside the airport will be equipped with security barriers as per guidelines.

Four strategically located ponds are proposed to collect stormwater from the project area through the planned storm drainage network. The temporarily stored water will then be gradually released into nearby natural streams on either side of the airport. The proposed storm drainage network along with the proposed ponds is shown in below images.

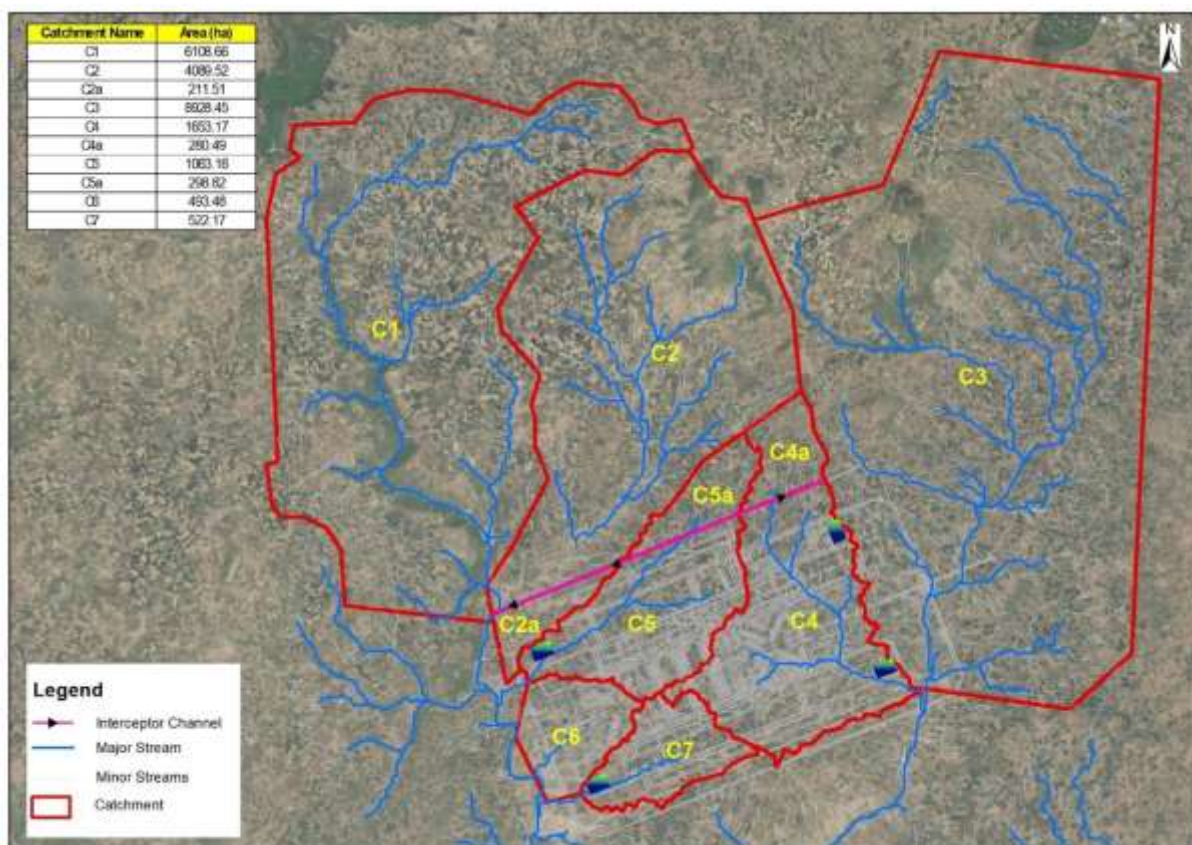


Figure 3-6 Catchment Delineation

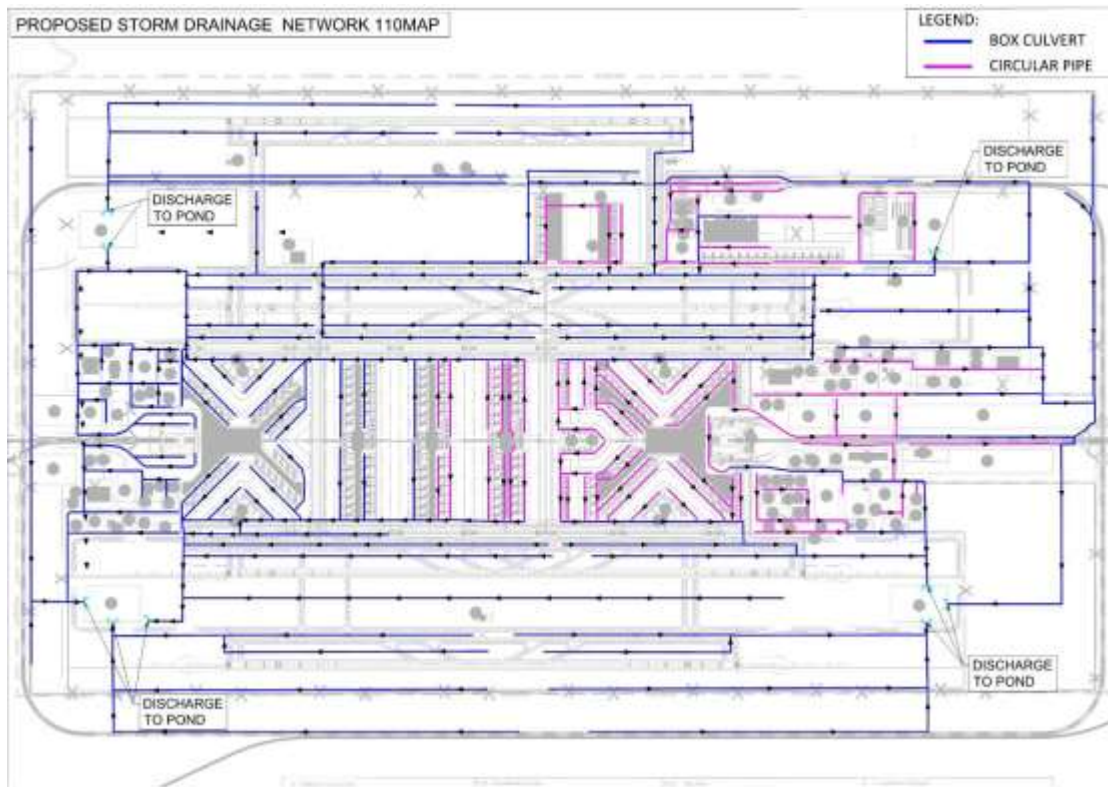


Figure 3-7 Proposed Storm Drainage Network for 110map

3.7.4. Solid and Liquid Waste Generation and Management

The airport will generate both solid and liquid waste from multiple sources, including terminal buildings, aircraft, cargo facilities, and various support facilities. To manage this effectively, a waste minimization policy will be implemented, emphasizing reduction, reuse, and recycling. This approach aims to promote sustainable waste management practices while minimizing environmental impact.

A. Solid Waste Types and Sources

Solid waste at the airport originates from various sources. Terminal buildings primarily generate municipal solid waste (MSW), including paper, plastics, and food waste. Aircraft contribute in-flight cabin waste, consisting of dry materials and galley waste. Cargo facilities produce packaging waste such as cardboard, plastic films, and wood pallets. Additionally, support facilities generate potentially hazardous waste from maintenance activities, including used oil, batteries, and filters.

Waste will be sorted into three main streams: organic waste, dry recyclables, and residual waste. Hazardous waste, however, will be stored separately and handled by specialized service providers to ensure proper disposal and environmental safety.

The estimated waste generation rates vary based on the source. Terminal buildings are expected to produce 0.5 kg of waste per passenger per day, while in-flight cabin waste is estimated at 0.4 kg per passenger per day. Cargo facilities, on the other hand, generate approximately 2 kg of waste per ton of cargo.

Waste will be temporarily stored in designated containers before being transferred to two solid waste consolidation centers—one located on the landside and the other on the airside—to effectively manage the quantities generated throughout the airport. To enhance waste management efficiency, compactors will be deployed, with their number increasing in line with projected passenger growth—from 5 compactors in Phase 1 (serving 40 million annual passengers) to 13 compactors at the ultimate phase (110 million annual passengers).

Compacted waste from both consolidation centers will be transported offsite to designated treatment and disposal facilities. A preliminary solid waste dumping site has been identified approximately 800 meters northeast of the airport boundary and less than 100 meters from the gravel road connecting Abusera to Dukemm. This site will serve as the initial disposal location pending further evaluation and confirmation of its environmental suitability and regulatory approval (Figure 3.8).



Figure 3-8: Identified Solid Waste Dumping Site

During the construction of the Bishoftu International Airport including components such as the cargo facility, runways, access roads, the Airport City, and related infrastructure various categories of construction waste will be generated. One of the major waste streams is excavated soil deemed unsuitable for reuse. According to the design documentation, approximately 73,132,110 cubic meters of such material is estimated to be generated.

To manage this significant volume of excavated soil, two disposal sites have been identified based on field assessments and recommendations from local government authorities (Annex

Site-1, located approximately 1.4 km south of the airport boundary, covers an area of 760,000 square meters. This site will be used primarily during the initial construction period. It will serve as a temporary holding area where excavated soils can be stored until their final use is determined. Site-1 will also support temporary stockpiling of materials, allowing flexibility for potential reuse.

However, due to the volume of soil exceeding the capacity of a single location, Site-2 has also been proposed. This site is part of a large area of active and abandoned quarry pits located approximately 9 km east of the airport boundary. Site-2 will be used for the long-term, controlled backfilling of these quarry sites, accompanied by landscaping efforts as part of a comprehensive land rehabilitation program.

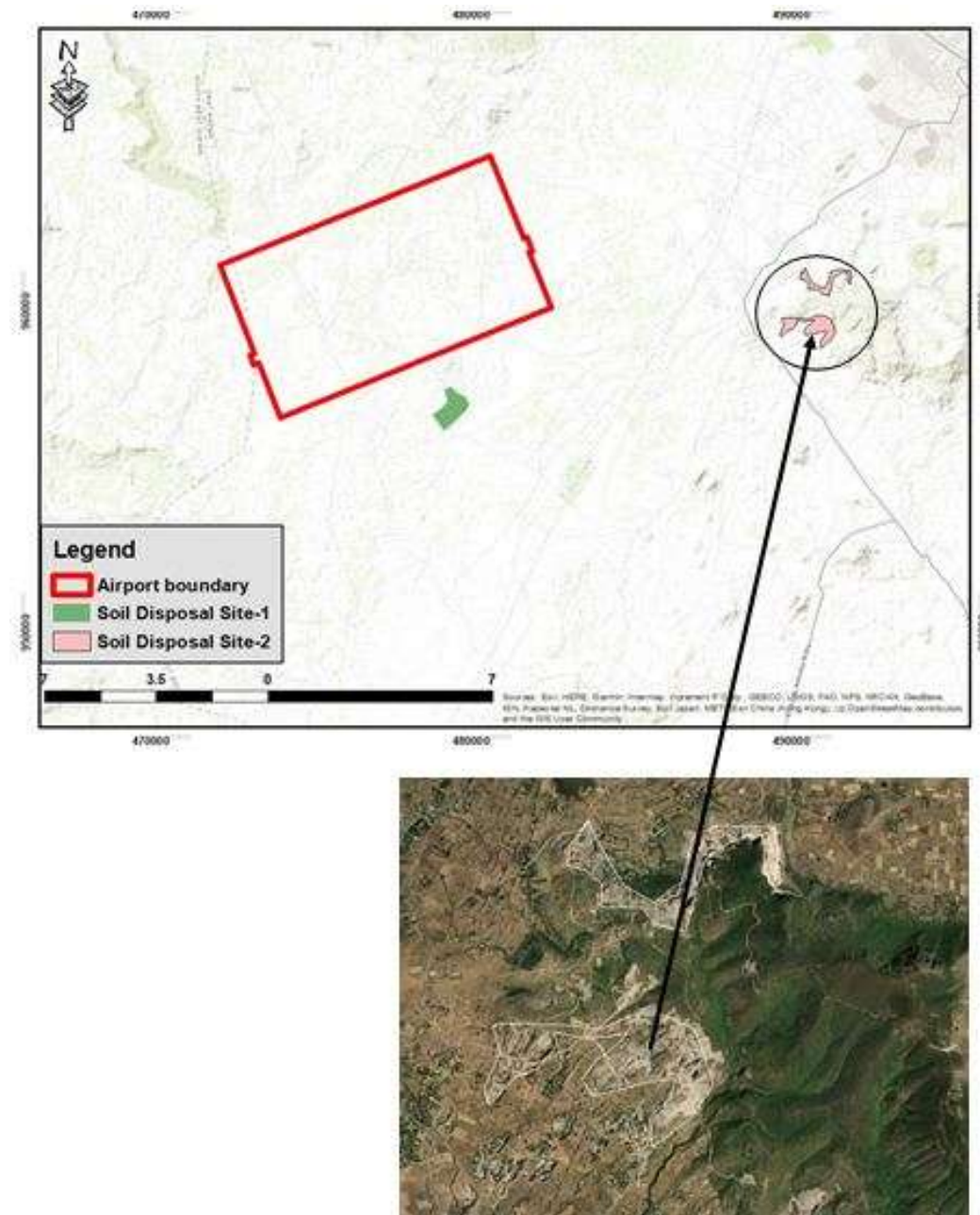


Figure 3-9: Identified construction waste disposal site

The project's approach to excavated soil management extends beyond disposal. In line with sustainable construction and circular economy principles, efforts will be made to reuse clean

and uncontaminated soil as fill material for other sections of the project or for other construction and landscaping initiatives in the surrounding areas. This minimizes waste generation and reduces the need for virgin materials. In collaboration with the project owner, contractors, and local authorities, surplus soil may also be utilized for reclamation projects or public green space development.

By incorporating these strategies, the project aims not only to manage construction waste responsibly but also to serve as a model for environmentally sound rehabilitation of degraded quarry sites, which are often left without proper closure or restoration measures.

B. Liquid Waste Management

The wastewater system for Bishoftu International Airport will include a pipeline network to collect and convey wastewater from various facilities to a proposed wastewater treatment plant, as no public network is available nearby. This treatment plant will serve as both a disposal solution and a source for landscape irrigation. Wastewater generation rates are estimated at 85% of water demand, with projected average sewage flows increasing as the airport expands (e.g., 5,097 m³/day at 40MAP to 15,390 m³/day at 110MAP).

Table 3-6: The calculated average wastewater flows.

Airport Phasing	Average Water Demand (m³/day)	Average Sewage Flow (m³/day)
40MAP	5,996	5,097
60MAP	8,791	7,472
80MAP	11,780	10,013
110MAP	18,111	15,390

The sewage network consists of gravity and force mains systems in order to collect the waste water from all the buildings and discharge it into the proposed waste water treatment plant. Lift stations are needed along the network due to the level difference throughout the project area and in order to avoid deep system and huge quantity of excavation. The system will be discharged into the waste water treatment plant.

Aircrafts waste management includes the vacuum toilet waste or wastewater from airplane lavatories that must be discharged into waste water disposal manhole/pits that will be located

in the airside area. These pits will be connected into the nearby proposed sewer manhole and the generated waste water flow will be discharged into the waste water treatment plant.

Watch towers or several small facilities that are located far at the periphery of the Airport will have sewage holding tanks in order to collect the generated sewage flow from each building, this scenario is more economical than extending the sewage network to provide connections to these towers that are located far away at the boundary limit of the project. And since the generated flows from these buildings are considered negligible, it is worth thinking of having holding tank dedicated for each tower that will be emptied through tankers that can discharge these sewage flows ultimately into the proposed wastewater treatment plant. Below a figure that shows the proposed sewage treatment plants of the airport



Figure 3-10 Sewage Treatment Plant

For irrigation, a fully automated system will be implemented, consisting of a storage tank, pump station, and irrigation networks with solenoid valves and control systems. The peak daily irrigation demand is estimated at 2,000 m³, covering approximately 480,000 m² of planted areas (2% of the total 24 km² site). Water for irrigation will primarily come from the wastewater treatment plant, with a backup supply from the water network.

3.7.5. ICT/Telecommunication Networks

The telecommunication infrastructure for Bishoftu International Airport (BIA) is designed to ensure high reliability, redundancy, and scalability across both Phase 1 (60 MAP) and the Ultimate Phase (110 MAP). The system integrates ICT networks, fire alarm systems, radio communications, and stakeholder-specific networks into a unified framework compliant with international standards (e.g., NFPA, IEC) and local regulations.

Key Components:

1. Network Architecture:

- Core Layer: High-capacity routers/switches in dual data centers (DCs) for redundancy.
- Distribution Layer: Building Distributor Rooms (BDRs) with dual fiber-optic links to DCs.
- Access Layer: Floor Distributor Rooms (FDRs) connect end-user devices via fiber/copper.

2. Stakeholder Networks:

- Group 1 (Airport ICT): Converged operational/security network.
- Group 2 (Service Providers): Telecom/cellular (2G–5G) infrastructure.
- Group 4 (Fire Alarm): Fiber-optic rings (Class A NFPA 72) linking fire panels to command centers.
- Group 5 (Radio): TETRA/LTE for ground operations, with remote antenna units (5000 m² coverage each).

3. Redundancy & Resilience:

- Dual fiber paths (288-core cables) between DCs and BDRs.
- Physical/logical separation of critical systems (e.g., fire alarm rings independent of ICT).
- Cyber Security: UL-listed firewalls and encrypted protocols for fire/radio networks.

4. Outside Plant Infrastructure:

- Airside: 20-way duct banks (110 mm) with concrete encasement; 50% spare capacity.
- Landside: 16-way ducts for external service providers.
- Manholes rated for 40-ton loads, waterproofed and detectable.

5. Phased Implementation:

- Phase 1 establishes core BDRs/FDRs; Ultimate Phase adds zones (e.g., concourses, terminals).
- Fire alarm and radio systems scale via modular fiber rings (12-core SMF) and additional BDRs.

Compliance & Standards:

- Fire Alarm: NFPA 72 (Class A pathways), UL-listed equipment.
- Radio: TETRA/LTE coverage for 100+ remote units (Phase 1), expandable to 300+.
- Cabling: BICSI/IEC-compliant fiber/copper, with Hazen-Williams calculations for hydraulic efficiency.

3.8.Fuel Farm

The fuel farm at Bishoftu International Airport is a large-scale, strategically planned facility designed to efficiently receive, store, manage, and distribute Jet A-1 and Sustainable Aviation Fuel (SAF). Aligned with international standards (JIG, API, Shell DEP, etc.), the facility supports the airport's phased growth from 40 million annual passengers (MAP) in 2035 to 110 MAP by 2070 ensuring fuel supply continuity, operational efficiency, and environmental safety. The fuel farm is situated within a dedicated footprint measuring 455 meters in length and 570 meters in width, accommodating all necessary infrastructure for fuel handling and safety. It is located directly adjacent to the Cargo Area and is situated towards the upper-right corner of the overall airport layout (Figure 3.11).

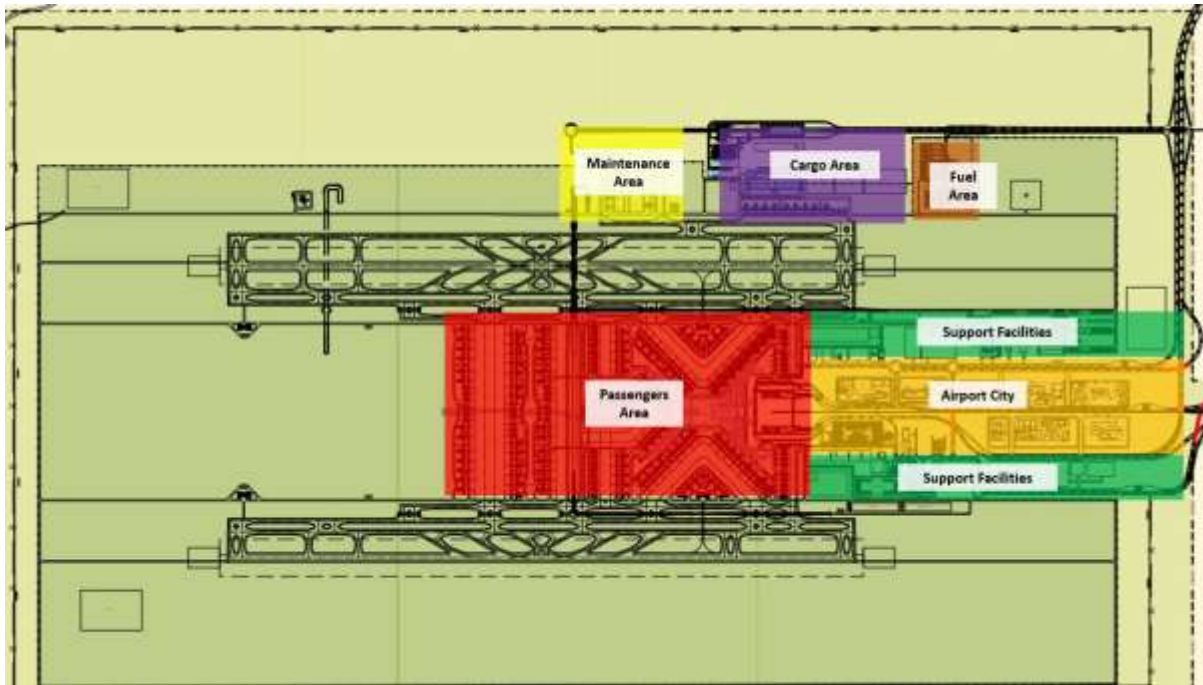


Figure 3-11 Fuel farm area

A. Fuel Receipt Facility

Fuel will initially be delivered via road tank bridgers (capacity: 40,000 liters or 40 m³). The facility includes:

- 37 offloading stations, allowing simultaneous unloading of up to 1,480 m³
- A peak delivery capacity of 261 trucks per day

Each station is equipped with:

- Bottom loading systems with dry break couplings
- Earthing controllers
- Unloading pumps (37 units, 120 m³/hr each)
- Filter Water Separators (FWS) (145 m³/hr each)

The offloading area is protected with reinforced concrete trays and steel canopy roofing, directing oily water runoff to the Oily Water Separator (OWS).

B. Fuel Storage Tanks (Fuel Farm)

The storage system is designed to scale in line with increasing airport demand. Jet A-1 fuel is stored in aboveground fixed-roof tanks, each with a 12,000 m³ capacity. The number of tanks increases across the airport's phased development:

Table 3-7: Fuel Farm Dimensions and Storage Capacity Phasing Based on Passenger Growth

Year	MAP (Million Annual Passengers)	Quantity of Tanks	Capacity per Tank (m ³)	Total Storage Capacity (m ³)	Reserve (Days)
2035	40	8	12,000	96,000	5.4
2045	60	8	12,000	96,000	3.4
2065	100	12	12,000	144,000	3.0

Each tank includes:

- Internal floating suction
- Breathing valves and fire-fused vents
- Automatic intake and shut-off valves
- Level sensors and temperature monitoring
- Sampling jars and flush tanks

The tanks will be enclosed by a bund wall capable of containing the contents of a fully filled tank plus a 10% safety margin. Drainage is directed to OWS or storm drains based on visual inspection.

C. Intertank Transfer System (Tank Recirculation)

To maintain fuel quality and facilitate tank maintenance, the fuel farm is equipped with:

- 4 intertank pumps (3 duty + 1 standby), 170 m³/hr each
- 4 FWS units (3 duty + 1 standby), 205 m³/hr each

Drainage from the system is routed to both the OWS (open drains) and the Product Recovery Tanks (PRT) (closed drains).

D. Hydrant Pumping Station

Jet A-1 is distributed to aircraft via the hydrant network, supported by:

- 13 hydrant transfer pumps (12 duty + 1 standby), 350 m³/hr each
- 13 FWS units, 420 m³/hr each
- 2 ultrasonic flowmeters (range: 350–4200 m³/hr)

Open drains go to the OWS; closed drains are directed to the PRT system.

E. Product Recovery Tanks (PRT)

Two underground PRTs (each 25 m³) collect off-spec or drained fuel from various sources including storage tanks, pumps, and sampling systems. They include:

- 2 submersible transfer pumps (25 m³/hr, 1 duty + 1 standby)
- 2 sampling pumps (2 m³/hr)

Recovered fuel that meets Jet A-1 standards is filtered and returned to the storage tanks; otherwise, it is trucked offsite for disposal.

F. Oily Water Separator (OWS)

To handle wastewater:

- 2 OWS units will be installed: one at the Fuel Receipt Facility, and one at the Fuel Farm
- These separate hydrocarbons from water before routing treated water to the future Water Treatment Plant
- Collected oil is trucked to licensed disposal facilities

3.9. Potential of the Project Area for Solar and Other Renewable Energy Sources

Given that the project is currently at a conceptual design stage, the assessment of renewable energy potential should be viewed as preliminary. Further detailed technical and economic feasibility studies are recommended during the detailed design phase to validate and inform potential integration of renewable energy technologies.

3.9.1. Solar Energy Potential

The project area receives significant sunshine throughout the year, with effective sunshine hours exceeding 7 hours per day from October to June. This duration of solar exposure is substantial and provides a strong foundation for solar photovoltaic (PV) energy generation. The relatively consistent and prolonged solar radiation supports the deployment of solar panels on airport buildings, open land within the airport compound, and potentially nearby community infrastructure. The climatic data, including low cloud cover and adequate solar radiation, makes the area particularly suitable for both on-grid and off-grid solar applications. Given the flat terrain of the region, installation of large-scale solar farms would also be technically feasible with minimal site preparation.

3.9.2. Wind Energy Potential

Preliminary wind data from the Bishoftu Meteorological Station indicates moderate wind conditions that may support small to medium-scale wind power generation. These could potentially power auxiliary facilities or remote monitoring systems within the airport area. However, it is important to note that the implementation of wind energy infrastructure in airport settings involves multiple operational constraints.

In particular, the height and positioning of wind turbines may interfere with airport navigation systems and impact Obstacle Limitation Surfaces (OLS), posing potential aviation safety risks. Due to these constraints, wind energy is not currently recommended as a primary renewable energy option for the airport.

If wind energy is to be considered in the future, it would require a standalone, site-specific feasibility study including aviation safety assessments, obstacle mapping, and stakeholder consultations with civil aviation authorities to determine its technical, operational, and regulatory viability.

3.10. Airport City

In order to boost non-aeronautical revenues, transform the airport into a dynamic and engaging space, and ultimately enhance the overall passenger experience, an Airport City is planned at the entrance to the airport, spanning both the east and west sides. This Airport City will be strategically developed along the main access road, close to the site entrance, ensuring that passengers are immediately immersed in a high-quality, attractive urban environment as soon

as they arrive. The development will feature a mix of commercial, hospitality, and office spaces, including hotels, restaurants, retail outlets, and office buildings, all designed to promote real estate growth and stimulate economic activity in the area.

One of the key components of the Airport City will be the inclusion of hotels, which are intended to provide convenience for travelers, particularly those with early morning or late-night flights. By offering on-site accommodation, the Airport City will eliminate the need for long commutes to and from the airport, reducing the risk of missed flights and providing a seamless travel experience. Additionally, passengers with short layovers will have the opportunity to rest, work, or refresh without needing to leave the airport premises, further enhancing their overall experience.

The Airport City will also serve as a hub for airport support facilities, including office buildings that will house key administrative and operational functions. These facilities will include offices for airlines, civil aviation authorities, and airport administration, ensuring that essential services are located within close proximity to the airport, thereby improving operational efficiency and coordination.

Drawing on extensive international benchmarking of successful Airport Cities, the proposed development has been carefully planned to align with global best practices. The tentative budget for the Core Airport City commercial facilities is set at 520,000 square meters for the initial phase (40 million annual passengers, or 40 MAP) and 780,000 square meters for the subsequent phase (60 MAP). The development will adhere to an average Floor Area Ratio (FAR) of 1.3, with a maximum height restriction of 48 meters to ensure a balanced and aesthetically pleasing urban landscape.

To accommodate this ambitious project, the master plan has reserved 60 hectares of land at the airport entrance, specifically designated for the Airport City. This land will be utilized to create a vibrant, mixed-use development that not only supports the airport's operations but also serves as a destination in its own right, attracting both travelers and local visitors. The detailed plans, schedules, and spatial arrangements for the Airport City, including the appropriate Gross Floor Area (GFA) and functionality, are comprehensively outlined in the Airport City Brief document, which provides a roadmap for the phased development of this transformative project.

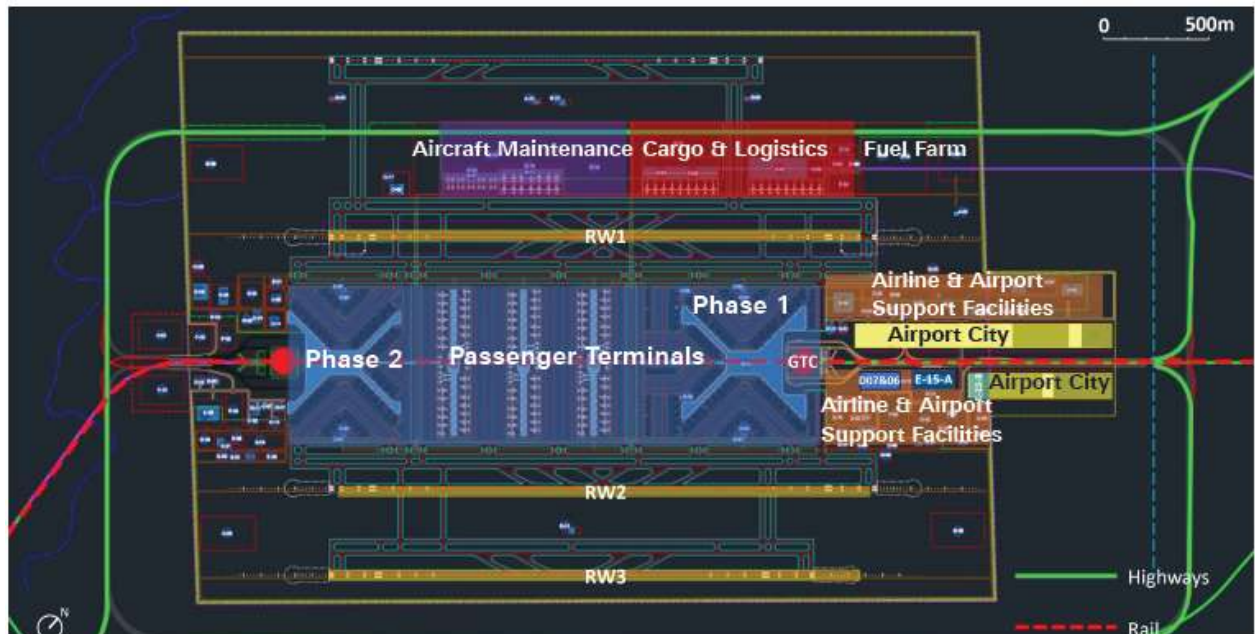


Figure 3-12 Proposed Location of Airport City

The Airport City is divided into three development phases (2029–2040), aligning with BIA’s passenger growth:

Table 3-8: Land Use Distribution

Land Use Category	Phase 0 (2029, 25MAP)	Phase 1A (2034, 45MAP)	Phase 1B (2040, 60MAP)	Total (60 Ha)
Hotel, MICE, Hospitality	4 Ha (20%)	5.5 Ha (13.7%)	1.5 Ha (2.5%)	11 Ha (18.3%)
Retail, F&B	3.5 Ha (17.5%)	2.7 Ha (6.7%)	3 Ha (5%)	9.2 Ha (15.3%)
Office, Commercial	7.5 Ha (37.5%)	4.3 Ha (10.7%)	3 Ha (5%)	14.8 Ha (24.7%)
Living Accommodation	2 Ha (10%)	-	1 Ha (1.7%)	3 Ha (5%)
Tourism, Culture, ENT	-	2 Ha (5%)	4 Ha (6.7%)	6 Ha (10%)
Industrial, Innovation	-	3 Ha (7.5%)	2 Ha (3.3%)	5 Ha (8.3%)
Public Amenities	2 Ha (10%)	-	1 Ha (1.7%)	3 Ha (5%)
Open Space	1 Ha (5%)	2.5 Ha (6.2%)	4.5 Ha (7.5%)	8 Ha (13.3%)

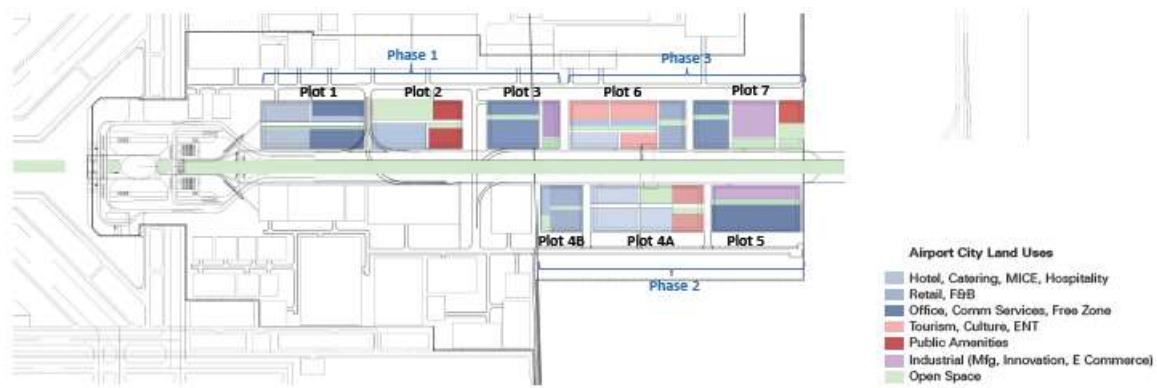


Figure 3-13: Airport city land use

The planning parameters for the Airport City are intentionally designed to accommodate flexibility in response to future growth and varying user demand scenarios. A central parameter is the Gross Floor Area (GFA), which for Phase 2—corresponding to a 60 million annual passenger (MAP) capacity—is estimated to range between 720,000 and 780,000 square meters. The updated master plan allows for a maximum GFA of 795,000 square meters across the entire Airport City area.

In terms of density, the Floor Area Ratio (FAR) is proposed to range from 1.2 to 1.3 under high growth scenarios, providing room for adaptive planning. An overall FAR of up to 1.3 is considered acceptable for the entire AC, ensuring that future development can be aligned with spatial efficiency and demand fluctuations.

Height restrictions within the Airport City are guided by aviation safety requirements, with a recommended maximum building height of 45 meters. However, flexibility is maintained, permitting variations in height between 17 meters and 48 meters depending on flight path constraints and zoning regulations.

To support phased and efficient development, the entire Airport City land area is divided into three development phases and further subdivided into seven land plots or sub-parcels. This subdivision strategy enables detailed regulation of individual plot attributes, including FAR, site coverage, maximum GFA, building height, and setback requirements, thus supporting a structured yet adaptable growth framework.

3.11. Transportation Strategy

The transportation strategy for the Bishoftu International Airport in Ethiopia is designed to provide efficient and well-organized ground access, ensuring seamless movement for

passengers, employees, and cargo operators while minimizing congestion. This strategy encompasses multiple key components, including modal split, road network design, vehicular traffic management, curbside operations, parking facilities, rail access, employee transportation, and the integration of multimodal transport hubs.

A key aspect of the strategy is the modal split analysis, which identifies the different transportation modes used by passengers and employees to access the airport. Private cars remain the dominant mode, accounting for 57% of international and 42% of domestic passengers. Taxis are widely used, serving 19% of international and 33% of domestic passengers. Additionally, hotel vans and minibuses accommodate 20% of international and 19% of domestic passengers, while buses contribute a smaller share of 1-3%. Rail transport is expected to play a vital role, with 7% of both international and domestic travelers utilizing it. This modal distribution guides infrastructure planning to accommodate expected vehicle volumes and ensure smooth operations.

The road network is designed to enhance airport accessibility through two interconnected systems: a primary and a secondary network. The primary network includes a motorway with two main routes: the Disposal Route, which distributes traffic within the airport and connects to major exit roads, and the Ring Route, which encircles the runways, linking support functions and terminals. Complementing this, the secondary road network provides additional access points and supports efficient traffic circulation. The long-term plan also envisions a new road linking Addis Ababa and the old airport with the new facility, running parallel to the rail system.

To manage traffic effectively, a vehicular traffic study assesses peak-hour passenger flows and the capacity of the road network. Initial projections indicate that during Phase 1, peak hour departures will reach 5,320 passengers, while arrivals will total 5,230. The study evaluates key infrastructure such as passenger terminal curbside areas, short-term and long-term parking, and other landside roads. The findings will be validated through detailed traffic analysis, ensuring that the road design accommodates the highest traffic volumes, with private cars contributing the most to vehicular congestion.

A crucial part of the strategy is the passenger terminal curbside, which is designed to efficiently handle vehicle drop-offs and pick-ups. To streamline operations, dedicated zones will be allocated for departing and arriving passengers, while separate maneuvering lanes will regulate entry and exit flows. Additional circulating lanes will allow vehicles to bypass congestion,

while landscaped sidewalks will enhance the passenger experience. The curbside will accommodate private vehicles, taxis, buses, and rental cars, each with designated spaces for efficient operations.

Parking facilities are also a key component, with provisions for both short-term and long-term parking. Short-term parking, located near the terminal, caters to greeters and passengers making brief visits, while long-term parking, situated farther away, serves travelers leaving their vehicles for extended durations. To optimize space and traffic flow, a three-story parking structure will be developed, featuring dedicated sections for taxis, buses, and rental cars. The facility is designed to accommodate peak-hour demand, with multiple entry and exit points to prevent bottlenecks.

Recognizing the importance of rail access, the transportation plan incorporates a dedicated rail link connecting the new airport with the existing Bole Addis Ababa International Airport. This system will serve both passenger and cargo transport needs. The passenger rail service will provide a fast, reliable mode of transport, reducing reliance on road traffic, while the freight rail will support logistics and cargo operations, reinforcing the airport's role as a major transport hub. Various alignment options have been evaluated based on topography, urban development, and operational speed. The final alignment will be selected based on a multi-criteria analysis considering cost efficiency, minimal urban disruption, and hydrological impacts.

To facilitate smooth employee transportation, the strategy incorporates a combination of private vehicles, buses, and rail services. A centralized parking facility near the terminals will be allocated for employee use, while a shuttle service will connect workers arriving via bus or train to their workplaces. This approach prevents conflicts between employee and passenger transport, ensuring an efficient allocation of parking and movement spaces.

Another crucial component is the Ground Transportation Center (GTC), a major transport hub situated in front of the passenger terminal. The GTC is designed to integrate various transportation modes, serving passengers, employees, and visitors. It will include dedicated parking for short-term and long-term stays, staging areas for buses and taxis, and a rail station that provides direct connectivity to the airport's automated people mover (APM) system. The GTC is planned as a high-capacity facility that will streamline transfers between different modes of transport.

Looking ahead, the transportation strategy also anticipates the integration of a metro system, which would connect the airport to Addis Ababa's existing Light Rail Transit (LRT) network. This metro extension will enhance urban connectivity, reduce traffic congestion, and promote transit-oriented development along the corridor, improving accessibility for passengers and airport employees alike.

To support rail operations, a railway depot will be established near either the new or existing airport, depending on the final rail alignment. The depot will house essential maintenance facilities, including tracks for train servicing, stabling areas, and infrastructure for daily upkeep of rolling stock. Designed for future scalability, the depot will ensure efficient fleet management and facilitate future growth in airport rail operations.

Overall, the transportation strategy for the new Bishoftu International Airport is a comprehensive and forward-thinking plan aimed at optimizing accessibility, minimizing congestion, and integrating multimodal transport options. By balancing road, rail, and public transit solutions, the strategy ensures the airport becomes a central hub that seamlessly connects to the broader transportation network, supporting the long-term growth and efficiency of Ethiopia's aviation sector.

3.12. Implementation Plan

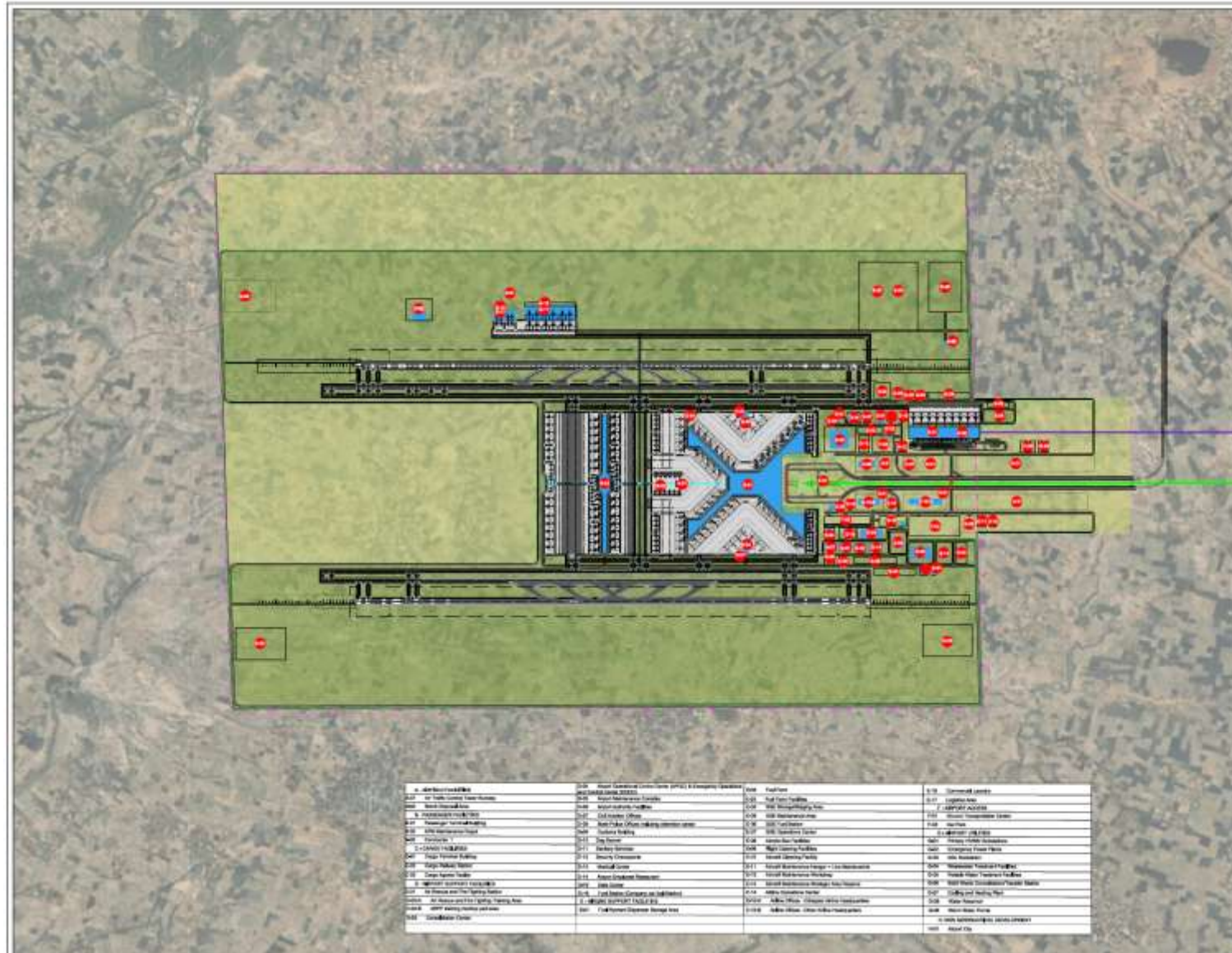
The Implementation Plan for the Bishoftu International Airport outlines a phased approach to the development of the airport, ensuring that it meets projected growth in passenger and cargo demand while maintaining operational efficiency and financial viability. The plan is divided into two main phases: Phase 1 (2040) and the Ultimate Phase (2060+), with incremental upgrades and expansions planned in between. Below is a detailed analysis of the implementation plan:

In Phase 1 (2040), the Bishoftu International Airport will be developed to handle 60 million annual passengers (60MAP). This initial phase focuses on constructing essential infrastructure, including runways, terminals, cargo facilities, and support services. Two central parallel runways will be built, designed to handle the projected air traffic movements efficiently. These runways will be spaced to allow independent aircraft approaches, and high-speed taxiways will be constructed to enhance operational efficiency and reduce runway occupancy times.

The East Terminal Building will be developed with a single concourse, capable of handling both international and domestic passengers. The terminal will be equipped with essential facilities such as baggage handling systems, check-in areas, and security zones to ensure smooth passenger processing. Additionally, the Airport People Mover (APM) system will be integrated to connect the terminal with other key facilities, improving passenger flow and convenience. For cargo operations, the first phase will focus on developing the middle cargo zone, located close to the main airport development. This phase will include the construction of a cargo terminal building, cargo apron, and freight forwarding facilities to support the growing demand for freight services.

To ensure efficient ground access, in the first phase a 20-kilometer airport link road will be constructed, connecting the new airport with the Addis-Adama Expressway. A parallel road will also be built to link the new airport with the existing Bole International Airport, facilitating seamless transportation between the two airports. Furthermore, the Ground Transportation Center (GTC) will be established, featuring a rail station to support both passenger and cargo transport, enhancing connectivity and operational efficiency.

Overall, Phase 1 lays the foundation for the airport's operations, ensuring it is equipped to handle significant passenger and cargo volumes while providing a high level of service and efficiency.



Legend

A - AIRFIELD FACILITIES:	D-02-B ARFF training mockup pad area	E-02 Fuel Farm	E-16 Commercial Laundry
A-01 Air Traffic Control Tower Runway	D-03 Consolidation Center	E-03 Fuel Farm Facilities	E-17 Logistics Area
A-02 Bomb Disposal Area	D-04 Airport Operational Control Center (APOC) & Emergency Operations and Control Center (EOCC)	E-04 GSE Storage/Staging Area	F - AIRPORT ACCESS
B - PASSENGER FACILITIES	D-05 Airport Maintenance Complex	E-05 GSE Maintenance Area	F-01 Ground Transportation Center
B-01 Passenger Terminal Building East	D-06 Airport Authority Facilities	E-06 GSE Fuel Station	F-02 Car Park
B-02 APM Maintenance Depot	D-07 Civil Aviation Offices	E-07 GSE Operations Center	G - AIRPORT UTILITIES
B-03 Concourse 1	D-08 State Police Offices including detention center	E-08 Airside Bus Facilities	G-01 Primary HV/MV Substations
B-04 Concourse 2	D-09 Customs Building	E-09 Flight Catering Facilities	G-02 Emergency Power Plants
B-05 Concourse 3	D-10 Dog Kennel	E-10 Aircraft Cleaning Facility	G-03 AGL Substation
B-06 Passenger Terminal Building West	D-11 Sanitary Services	E-11 Aircraft Maintenance Hangar + Line Maintenance	G-04 Wastewater Treatment Facilities
C - CARGO FACILITIES	D-12 Security Checkpoints	E-12 Aircraft Maintenance Workshop	G-05 Potable Water Treatment Facilities
C-01 Cargo Terminal Building	D-13 Medical Center	E-13 Aircraft Maintenance Strategic Area Reserve	G-06 Solid Waste Consolidation/Transfer Station
C-02 Cargo Railway Station	D-14 Airport Employee Restaurant	E-14 Airline Operations Center	G-07 Cooling and Heating Plant
C-03 Cargo Agents Facility	D-15 Data Center	E-15-A Airline Offices - Ethiopian Airline Headquarters	G-08 Water Reservoir
D - AIRPORT SUPPORT FACILITIES	D-16 Fuel Station (Company car fuel Station)	E-15-B Airline Offices - Other Airline Headquarters	G-09 Storm Water Ponds
D-01 Air Rescue and Fire Fighting Station	E - AIRLINE SUPPORT FACILITIES		H- NON AERONAUTICAL DEVELOPMENT
D-02-A Air Rescue and Fire Fighting Training Area	E-01 Fuel Hydrant Dispenser Storage Area		H-01 Airport City

Figure 3-14 Phase 1 Airport Layout Plan

For further details related to the project description, please refer to the Infrastructure Presentation provided in Appendix 19.

In the Ultimate Phase (2060+), the Bishoftu International Airport will undergo significant expansion to accommodate 110 million annual passengers (110MAP), ensuring it can handle the projected increase in passenger and cargo demand. This phase will involve the construction of two additional parallel runways, one on each outer side of the airfield, enabling triple simultaneous independent arrivals. This expansion will significantly enhance the airport's capacity to manage higher traffic volumes and improve operational efficiency. Additionally, a second terminal (West Terminal Building) will be constructed to handle demand beyond 60MAP. The Airport People Mover (APM) system will be expanded to connect both the East and West Terminals, as well as satellite concourses, ensuring seamless passenger transfers and improved connectivity. A third satellite concourse will also be built to increase the number of contact stands, further enhancing the level of service for passengers.

On the cargo side, the northern cargo area will be developed to support future expansion. This phase will include the construction of additional cargo terminals, logistics areas, and maintenance, repair, and overhaul (MRO) facilities, ensuring the airport can meet the growing demand for freight services. To improve ground transportation, a new airport access road will be built to reduce travel distance and time between the new airport and the existing Bole International Airport. Furthermore, the railway network will be expanded to connect the East Terminal with the West Terminal, facilitating efficient passenger and cargo transfers. These developments will ensure that the airport remains a key hub for both passenger and cargo operations, capable of supporting the region's growing aviation needs.



Legend

A - AIRFIELD FACILITIES	D-02-B ARFF training mockup pad area	E-02 Fuel Farm	E-16 Commercial Laundry
A-01 Air Traffic Control Tower Runway	D-03 Consolidation Center	E-03 Fuel Farm Facilities	E-17 Logistics Area
A-02 Bomb Disposal Area	D-04 Airport Operational Control Center (APOC) & Emergency Operations and Control Center (EOCC)	E-04 GSE Storage/Staging Area	F - AIRPORT ACCESS
B - PASSENGER FACILITIES	D-05 Airport Maintenance Complex	E-05 GSE Maintenance Area	F-01 Ground Transportation Center
B-01 Passenger Terminal Building East	D-06 Airport Authority Facilities	E-06 GSE Fuel Station	F-02 Car Park
B-02 APM Maintenance Depot	D-07 Civil Aviation Offices	E-07 GSE Operations Center	G - AIRPORT UTILITIES
B-03 Concourse 1	D-08 State Police Offices including detention center	E-08 Airside Bus Facilities	G-01 Primary HV/MV Substations
B-04 Concourse 2	D-09 Customs Building	E-09 Flight Catering Facilities	G-02 Emergency Power Plants
B-05 Concourse 3	D-10 Dog Kennel	E-10 Aircraft Cleaning Facility	G-03 AGL Substation
B-06 Passenger Terminal Building West	D-11 Sanitary Services	E-11 Aircraft Maintenance Hangar + Line Maintenance	G-04 Wastewater Treatment Facilities
C - CARGO FACILITIES	D-12 Security Checkpoints	E-12 Aircraft Maintenance Workshop	G-05 Potable Water Treatment Facilities
C-01 Cargo Terminal Building	D-13 Medical Center	E-13 Aircraft Maintenance Strategic Area Reserve	G-06 Solid Waste Consolidation/Transfer Station
C-02 Cargo Railway Station	D-14 Airport Employee Restaurant	E-14 Airline Operations Center	G-07 Cooling and Heating Plant
C-03 Cargo Agents Facility	D-15 Data Center	E-15-A Airline Offices - Ethiopian Airline Headquarters	G-08 Water Reservoir
D - AIRPORT SUPPORT FACILITIES	D-16 Fuel Station (Company car fuel Station)	E-15-B Airline Offices - Other Airline Headquarters	G-09 Storm Water Ponds
D-01 Air Rescue and Fire Fighting Station	E - AIRLINE SUPPORT FACILITIES		H- NON AERONAUTICAL DEVELOPMENT
D-02-A Air Rescue and Fire Fighting Training Area	E-01 Fuel Hydrant Dispenser Storage Area		H-01 Airport City

Figure 3-15 Ultimate Phase Airport Layout Plan (ultimate phase layout is Work In progress (WIP))

3.13. Cost Estimate

According to the master plan, the total estimated cost for the development of the Bishoftu International Airport at the 60 million annual passengers (60MAP) level is \$7,915,657,544. This comprehensive cost estimate includes expenses for essential infrastructure such as nav aids, radars, meteorological equipment, fuel farms, and offsite links (including rail and road connections).

The cost estimate primarily covers the construction of new facilities at the airport. This includes the development of new buildings, runways, taxiways, aprons, Ground Support Equipment (GSE) roads, tunnels, and landside access roads and tunnels. Additionally, the estimate accounts for the cost of utilities required to support the airport's operations, ensuring that all necessary infrastructure is in place to handle the projected passenger and cargo volumes efficiently.

Table 3-9: Cost Estimate for the Airport Facilities and Construction

Category	60 MAP (USD)	110 MAP (USD)	Cumulative Cost at 110MAP (USD)
Facilities	\$5,403,532,350	\$3,702,831,250	\$9,106,363,600
Infrastructure	\$2,513,726,194	\$2,252,274,079	\$4,766,000,273
Total	\$7,915,657,544	\$5,955,105,329	\$13,870,762,873

This detailed cost breakdown reflects the extensive scope of the project, encompassing both airside and landside developments, as well as critical support systems to ensure the airport's functionality and long-term sustainability. The estimate also includes provisions for future expansions, with the total cost for the ultimate phase reaching \$13,870,762,873, which includes additional facilities and infrastructure required to handle higher passenger and cargo volumes.

For further details related to the project description, please refer to the Infrastructure Presentation provided in Appendix 19.

3.14. Proposed Project Activities

3.14.1. Pre-Planning/Mobilization Phase

The pre-planning and mobilization phase serves as a foundational stage for the successful execution of the Bishoftu International Airport project. This phase begins with the formal award of the construction contract and the establishment of project governance structures. The project management team and key stakeholders are mobilized to initiate and oversee early activities. Detailed design finalization is a crucial component of this phase, involving collaboration among architects, engineers, and consultants to ensure regulatory and operational compliance. Concurrently, early works mobilization activities include site preparation, temporary facility setup, procurement of initial materials and equipment, and the establishment of safety and environmental management systems.

Permitting and regulatory approvals are also obtained during this phase. This involves securing the necessary permissions for land use, environmental compliance, and construction operations through coordination with relevant authorities. Simultaneously, logistics and supply chain frameworks are established by identifying reliable local and international suppliers for materials like steel, concrete, and specialized equipment. Transportation and logistics plans are also developed to guarantee the timely delivery of materials to the construction site.

3.14.2. Construction Phase

The construction phase comprises several major components, each addressing specific areas of development. The early works packages are the first to commence, including foundational works for the central terminal area, initial earthworks and paving for the runway, and the installation of perimeter fencing and property access roads.

Piling works are carried out next, focusing on the installation of deep foundations for essential structures such as the Passenger Terminal Building, Concourse 1, and the Ground Transport Center. Following this, large-scale infrastructure works are undertaken, including the construction of offsite road and rail connections—most notably, a 7 km tunnel—as well as the development of airfield components like paving, lighting, and navigational aids. Landside mobility infrastructure is also built to facilitate smooth passenger and cargo movements through roads, parking areas, and public transport facilities.

Terminal and concourse construction is a major part of the project, involving the erection of the Main Terminal Building with its structural and interior fit-out works. The air traffic control tower is constructed, followed by equipment installation. Simultaneously, Concourse 1 is built in parallel. Additional support facilities are developed, including airline maintenance hangars, administrative buildings, and utility plants. The cargo terminal and station are also constructed to accommodate the growing logistics and freight handling needs of the airport.

The finalization and commissioning stage includes the installation of navigational aids (NAVAIDS), fuel farm systems, and comprehensive testing and commissioning of all systems such as air traffic control equipment. This stage culminates in final inspections and the official handover of the airport to the client.

3.14.3. Operation Phase

Operation of airport includes all matters connected with operation and maintenance of airports.

Regular O&M activities of airport includes:

- Management of Passenger traffic movement
- Management of Air traffic movement
- Management of Cargo movement
- Operation and maintenance of utilities
- Operation and maintenance – Runway/Taxiways/Apron
- Operation and maintenance Plant and Equipment

3.15. Work Schedule and Manpower

The Bishoftu International Airport construction project is a large-scale endeavor with a total budget of approximately \$7.89 billion and a scheduled completion date of November 20, 2029. The project is divided into several key phases and work packages, each with specific timelines and budgets.

The project begins with the Construction Contract Award on October 25, 2025, followed by design activities, which are split into two timelines: the baseline design (January 12 to May 20, 2026) and an updated schedule (December 15, 2025, to May 20, 2026). Early works packages are a significant focus, starting concurrently with the contract award and spanning until May 2028. These include central works, runways, and property road and fences, with a combined budget of around \$749 million.

Piling works, critical for foundational support, commence in August 2026 and continue until May 2028, costing approximately \$212 million. Infrastructure works, which include offsite links, rail, tunnels, airfield, and landside mobility, begin in January 2027 and run through the project's completion, with a budget of \$1.73 billion. The terminal building and concourse construction are major components, starting in September 2026 and September 2027, respectively, and concluding by November 2029, with budgets of \$2.78 billion and \$803 million.

Support facilities, cargo terminals, and ancillary structures like the control tower are also integral, with staggered start dates and completion aligned with the overall project timeline. The schedule reflects a phased approach, ensuring critical path activities like early works and piling are prioritized to facilitate subsequent construction phases. The project's complexity is managed through detailed planning and milestone tracking, aiming for timely and budget-compliant delivery.

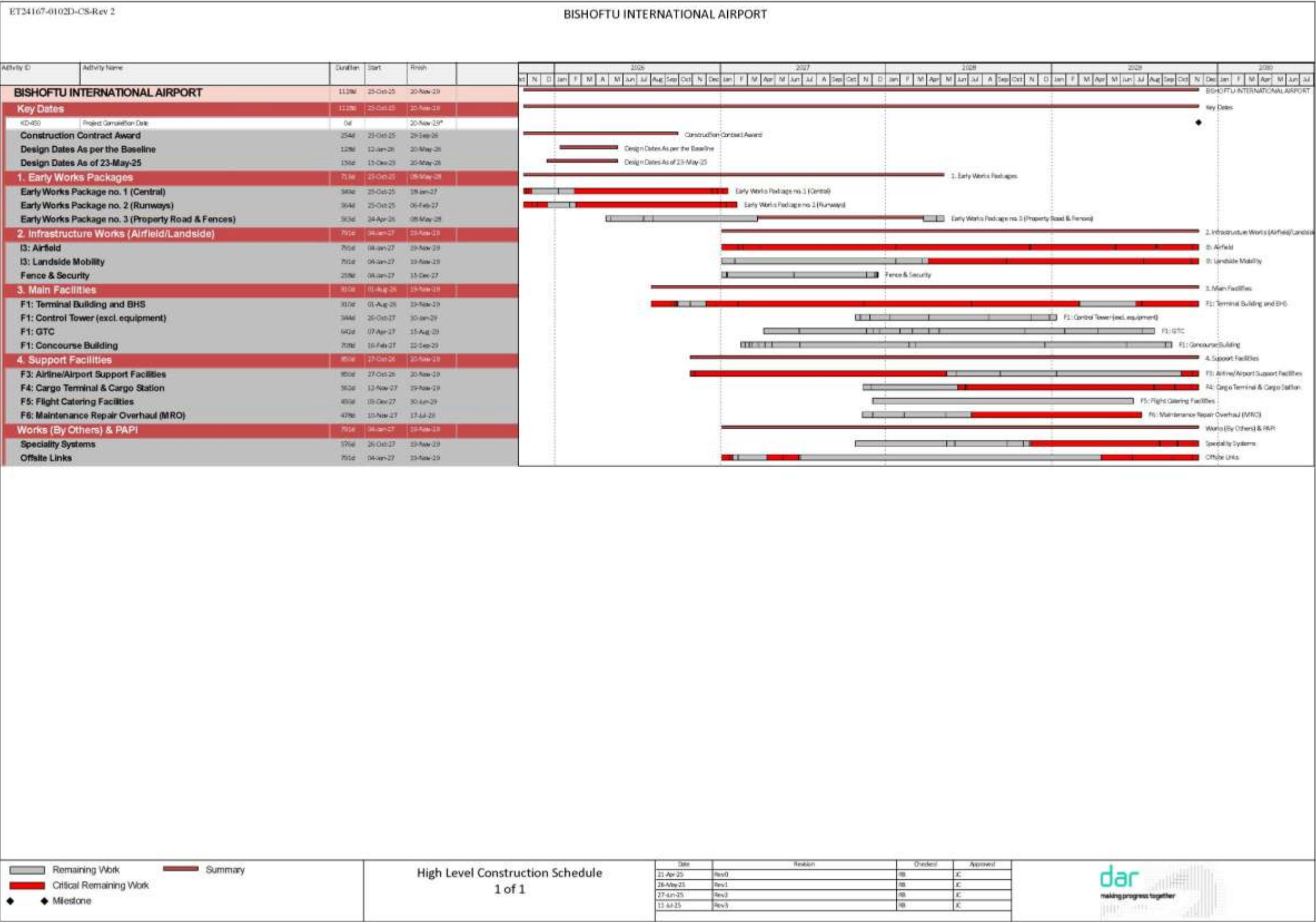


Figure 3-16: Works Schedule

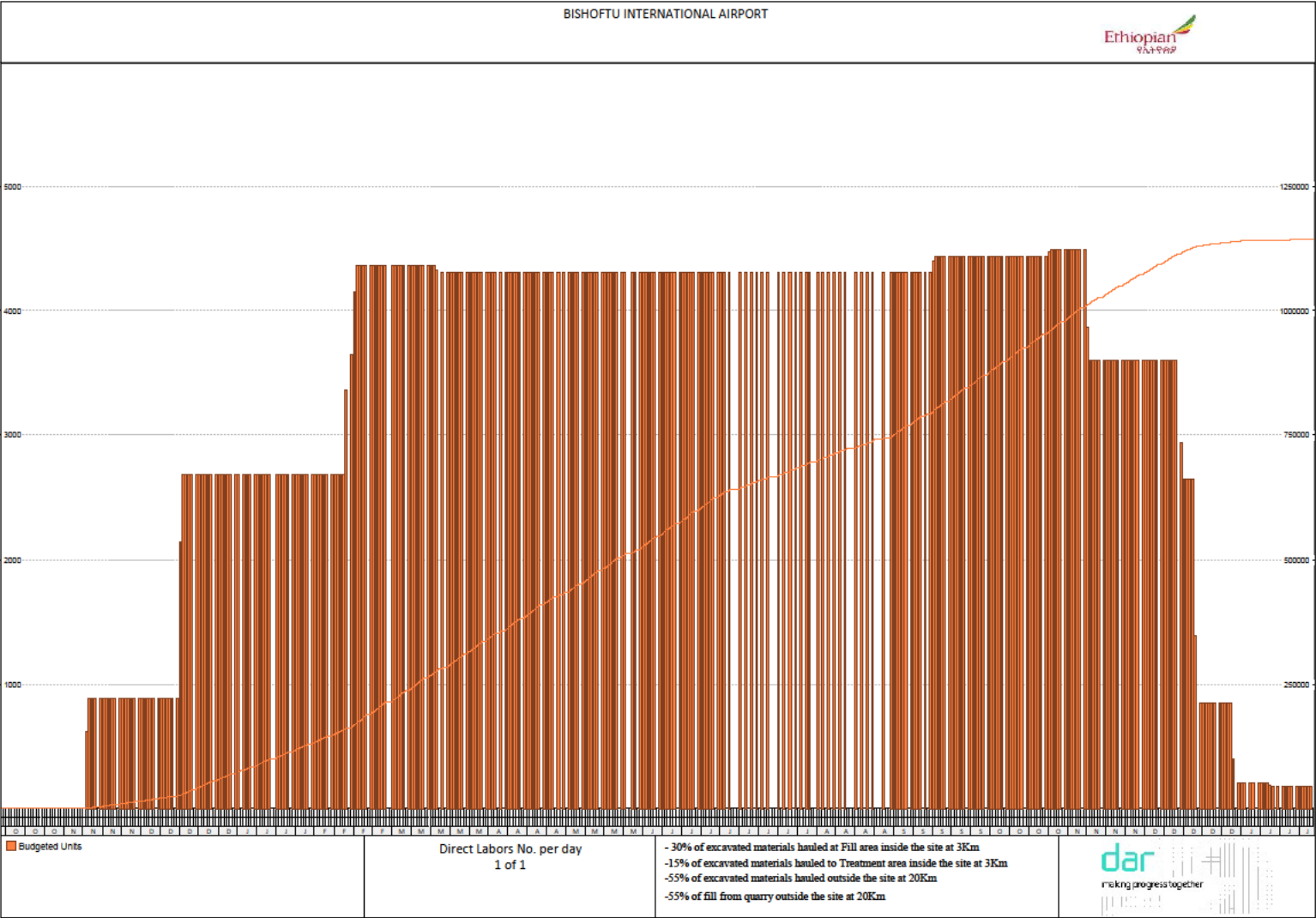


Figure 3-17: Man Power per day

3.16. Construction Equipment and Materials

3.16.1. Construction Equipment

The following table indicates the machinery that will be required for on-site works. In addition, a number of trucks will be required to transport fill materials as well as potentially asphalt and concrete to the site. The exact number of trucks will be determined by the Contractor.

Table 3-10: Construction equipment required for each activity based on the construction schedule

Activity Name	Construction Equipment Required
Early Works Package no. 1 (Central)	Excavators, bulldozers, loaders, dump trucks, compactors, graders, cranes
Early Works Package no. 2 (Runways)	Pavers, rollers, asphalt plants, graders, excavators, loaders, dump trucks
Early Works Package no. 3 (Property Road & Fences)	Excavators, graders, compactors, fencing equipment, concrete mixers, dump trucks
Piling Works	Piling rigs, cranes, concrete pumps, excavators, vibratory hammers, drilling equipment
Under Passenger Terminal Building Central	Piling rigs, cranes, excavators, concrete pumps, vibratory compactors, scaffolding
Under Concourse 1	Piling rigs, cranes, excavators, concrete pumps, scaffolding, formwork systems
Under Ground Transport Center (GTC)	Piling rigs, cranes, excavators, concrete pumps, scaffolding, compactors
Under other Buildings	Piling rigs, cranes, excavators, concrete pumps, scaffolding, formwork systems
Infrastructure Works (I1: Offsite Links)	Excavators, graders, compactors, asphalt pavers, rollers, dump trucks, cranes
Infrastructure Works (I2: Offsite Rail)	Rail laying equipment, excavators, cranes, compactors, graders, dump trucks
Infrastructure Works (I2: Offsite Links - Tunnel)	Tunnel boring machines, excavators, cranes, concrete pumps, scaffolding, ventilation systems

Infrastructure Works (I3: Airfield)	Pavers, rollers, asphalt plants, graders, excavators, loaders, dump trucks
Infrastructure Works (I4: Landside Mobility)	Excavators, pavers, rollers, graders, cranes, concrete mixers, dump trucks
Infrastructure Works (I5: Fence & Security)	Fencing equipment, excavators, compactors, concrete mixers, cranes
Infrastructure Works (I6: Airside)	Pavers, rollers, graders, excavators, loaders, dump trucks, cranes
Terminal Building and BHS	Tower cranes, concrete pumps, excavators, scaffolding, formwork systems, welding equipment
Control Tower (excl. equipment)	Tower cranes, concrete pumps, scaffolding, formwork systems, welding equipment
Facilities (By Others) & PAPI	Light equipment, hand tools, surveying instruments, electrical testing equipment
Fuel Farm	Excavators, tanks, piping equipment, welding machines, cranes
NAVAIDS	Surveying equipment, electrical installation tools, cranes
Air Traffic Control Tower Equipment	Cranes, lifting equipment, electrical and communication tools, testing instruments
Concourse Building (Concourse 1)	Tower cranes, concrete pumps, scaffolding, formwork systems, welding equipment
Support Facilities (F2)	Excavators, cranes, concrete mixers, scaffolding, electrical tools, HVAC equipment
Airline Support Facilities	Excavators, cranes, concrete mixers, scaffolding, electrical tools, HVAC equipment
Airport Support Facilities	Excavators, cranes, concrete mixers, scaffolding, electrical tools, HVAC equipment
Cargo Terminal and Cargo Station	Tower cranes, concrete pumps, scaffolding, formwork systems, forklifts, conveyor systems

This table provides a high-level overview of the equipment required for each major activity in the Bishoftu International Airport construction project. The specific equipment may vary based on detailed engineering conditions.

3.16.2. Construction Materials

Construction of the airport demands huge amount of construction raw materials such as sand, natural gravel, crushed aggregate, selected material for sub base, masonry and dimension stones and etc. Based on information obtained from the Livelihood Restoration Plan for Bishoftu International Airport Development Displaced Households report, prepared by ECO in 2024, the construction material needed during construction is summarized below.

Table 3-11: Construction Material Volumes

No.	Types construction raw material	Estimated total amount (in M ³)
1	Sand	90,000,000
2	Crushed aggregate	140,000,000
3	Gravel (natural)	168,320,000
4	Stone	3,150,000
5	Selected soil	120.000,000

(Source: ECO, 2024)

3.17. Borrow Pits / Quarries

Construction materials will be sourced from local quarry sites and/or riverbeds. A preliminary assessment of potential quarry sites within a 40 km radius of the project area has been conducted and annexed under annexe 12 and 13. The materials are expected to be obtained from the following locations, although the final selection will be determined by the contractor.

Table 3-12: New identified and existing quarry site for construction materials around the project area

Target No	UTM (WGS1984)		Approximate distance from Airport boundary	Lithological Unit	Type of Construction Material to be mined	Remark	Surface area of exposed rock
	Easting	Northing					
T-1	474090	964850	3.5km	-Massive basalt -Vesicular basalt	-Crushed aggregate -Sub base	New identified	2970m ²
T-2	484048	970412	7.2km	-Massive basalt -Scoraceous basalt	-Crushed aggregate -Sub base	New identified	3230m ²
T-3	472448	969455	8.2km	-Massive basalt	-Crushed	New	2083m ²

				-Vesicular basalt	aggregate -Sub base	identified	
T-4	476484	988090	35km	-Massive basalt	-Crushed aggregate	Existing	3520m ²
T-5	477009	986209	34.3km	-Massive basalt	-Crushed aggregate	Existing	4750m ²
T-6	476570	986509	34.1km	-Massive basalt	-Crushed aggregate	Existing	3980m ²
T-7	482604	989463	36.3km	-Massive basalt	-Crushed aggregate	Existing	2827m ²
T-8	482029	989869	36.6km	-Massive basalt	-Crushed aggregate	Existing	3435m ²
T-9	491590	964500	10.3km	-Scoria	-Red ash/selected material for road	Existing	138,108m ²
T-10	474250	964820	3.4km	-Scoria	-Red ash/selected material for road	Existing	36,186m ²
T-11	475800	972790	12.7km	-Scoria -Scoraceous basalt	-Red ash/selected material for road	New identified	19,793m ²
T-12	478732	958400	70m	-Trachite	-Dimension stones	New identified	10,585m ²
T-13	478087	957786	400m	-Trachyte	-Dimension stones	New identified	13,409m ²
T-14	473192	965362	4.3km	-Ignimbrite	-Dimension stones	New identified	6111m ²
T-15	516625	948015	39km	-River sand	-Concrete	Existing	Unlimited
T-16	520223	945434	42.4km	-River sand	-Concrete	Existing	Unlimited

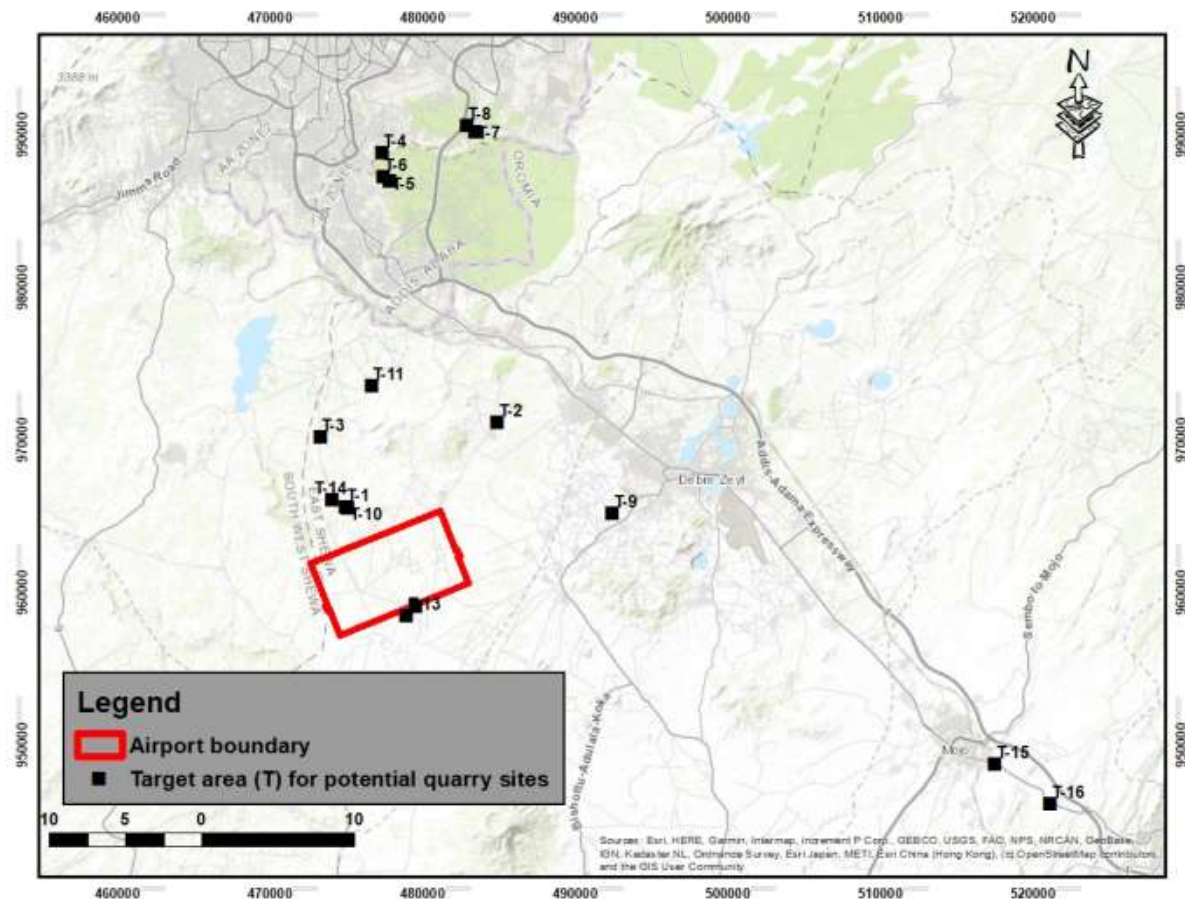


Figure 3-18: Location map of prospective quarry sites for geological construction materials

3.18. Land Acquisition and Resettlement

The Bishoftu International Airport development requires approximately 3,900 hectares of land, encompassing both public and privately held areas. This includes agricultural land, residential properties, communal grazing areas, and natural vegetation. As a result, the project will lead to the displacement of approximately 2,731 households, affecting both landowners and land users, and causing physical and/or economic displacement across 8 kebeles within the project footprint.

To manage these impacts responsibly and in compliance with both Ethiopian legal frameworks and international standards particularly those of the African Development Bank (AfDB) a dedicated Resettlement Action Plan has been prepared. The RAP, titled *"Livelihood Restoration Plan for Bishoftu International Airport Development Displaced Households"*, was developed by ECO in 2024. It provides comprehensive details on the identification of affected persons and households, entitlement frameworks, asset valuation methods, compensation

packages, livelihood restoration strategies, institutional responsibilities, implementation arrangements, grievance redress mechanisms, and monitoring and evaluation plans.

The RAP ensures that all project-affected persons are compensated fairly and supported in restoring or improving their livelihoods and living standards. The RAP was developed through an inclusive process involving stakeholder consultation and community engagement. This Environmental and Social Impact Assessment report refers to the RAP as a key complementary document that addresses all aspects of land acquisition and involuntary resettlement in a transparent, equitable, and sustainable manner.

4. LEGAL AND INSTITUTIONAL FRAMEWORK

Ethiopia has different levels of policy and legislative frameworks that cover various aspects of environmental and social management and sustainable development issues. At the same time, Ethiopia is also signatory to different international agreements with respect to environmental and social management and sustainable development requirements. The following sections describe the policies, laws, guidelines, and institutional framework that are most relevant to the proposed Environmental and Social Impact Assessment of the Bishoftu International Airport project.

4.1. Constitution of the Federal Democratic Republic of Ethiopia

The constitution of the Federal Democratic Republic of Ethiopia provides the overriding principles and legislative frameworks in the country. The concept of sustainable development and the environmental rights of the people are enshrined in the constitution by the following articles that stipulate the rights of people.

Article 43: The Rights of Development states that

- The Peoples of Ethiopia as a whole, and each Nation, Nationality and People in Ethiopia in particular have the right to improved living standards and to sustainable development;
- Nationals have the right to participate in national development and, in particular, to be consulted with respect to policies and projects affecting their community;
- All international agreements and relations concluded, established or conducted by the State shall protect and ensure Ethiopia's right to sustainable development; and
- The basic aim of development activities shall be to enhance the capacity of citizens for development and to meet their basic needs.

Article 44: Environmental Rights

- All persons have the right to live in a clean and healthy environment.
- All persons who have been displaced or whose livelihoods have been adversely affected as a result of State programs have the right to commensurate monetary or alternative means of compensation, including relocation with adequate State assistance.

The Rights of Women (Article 35):

Article 35 provides a foundation for the recognition and protection of women's rights and guarantee women an equal right with men.

Article 41: Economic, social and cultural rights

The rights recognized by this article include, the right to

- freely engage in economic activity and pursue a livelihood (occupation, profession) of his/her choice anywhere within the national territory;

These constitutional provisions have served as the guiding principle of all activities that are related to policy formulation, strategy development and the formulation of legislative and institutional framework for environmental and social protection.

In conclusion, the constitution of Ethiopia has adequately considered the protection of environment and right of the people to live in a clean and healthy environment and ensures right of people to participate in national development and right to be consulted during the preparation of policies and projects affecting them and confirmed the equal right of women and men

4.2.National Policies

4.2.1. Environmental Policy of Ethiopia (1997)

The major policy framework document with respect to environmental management in the country is the Environmental Policy of Ethiopia (EPE) of the FDRE approved by the Council of Ministers in April 1997. Its overall goal is to improve and to enhance health and the quality of life for the people of Ethiopia, and to promote sustainable social and economic development through the adoption of sound environmental management principles. The policy sets out specific objectives and key guiding principles, contains sectorial and cross-sectorial policies and the necessary provisions for its appropriate implementation. The policy inspires engagement and participation of individuals and communities at all levels and to raise public awareness and promote understanding of the essential linkage between environment and development.

The policy also aims at increasing the sense of ownership for development projects and encourages the sustainable exploitation of natural resources at national and local levels.

Environmental Impact Assessment (EIA) is the core of the environmental policy of Ethiopia. Article 4.9 of EPE covers the policy directive on EIA. The Article contains eleven sub-articles covering different aspects of ESIA and the conditions under which EIA must be performed. Article 4.9.g (EPA 1997, 23) provides a provision to create a by law on EIA process which requires appropriate Environmental impact statements and environmental audits for private and state development projects.

The policy highlights the precautionary principle of minimizing and where possible preventing discharges of substances, biological materials or their fragments from industrial plants and personal or communal appliances or any other external sources into environment and promote adoption of "polluter pays" principle and adopt a system for monitoring compliance with land, air and water pollution control standards and regulations, the handling and storage of hazardous and dangerous materials, mining operations, public and industrial hygiene, waste disposal, and water quality.

Regarding atmospheric pollution and climate change, the environmental policy among others promote a climate monitoring program as the country is highly sensitive to climatic variability and recognizes that Ethiopia's environmental and long-term economic interests and its energy prospect coincide with the need to minimize atmospheric inputs of greenhouse gases as it has a large potential for harnessing hydro-, geothermal and solar energy, none of which produce pollutant gases in significant amounts and to develop its energy sector accordingly.

Moreover, the policy ensures that environmental impact assessments is not only physical and biological impacts but also address social, socioeconomic, political and cultural conditions; and ensures that public and private sector development programs and projects recognize any environmental impacts early and incorporate their containment into the development design process and recognize that public consultation is an integral part of ESIA.

The policy addresses social and gender issues with emphasis on

- Ensuring that formal and informal training in environmental and resources management include methodologies and tools for analysis and elimination of inequalities
- Environmental awareness and public education programmes for both men and women in all social, economic, and cultural groupings,

- Impact assessment of all policies, programmes, and projects in order to maximize equity for economic, ethnic, social, cultural, gender and age groups, especially the socially disadvantaged,
- Facilitating the participation of women across all sections of the society in training, public awareness campaigns, formal and informal educations and decision making in environment and resource management

The Bishoftu International Airport project complies with the Environmental Policy of Ethiopia by undertaking a full Environmental and Social Impact Assessment (ESIA), which incorporates environmental, social, and economic dimensions. The ESIA process includes public consultation, adopts the precautionary and polluter pays principles, and proposes mitigation measures to minimize pollution, promote sustainability, and ensure safe handling of hazardous materials. The project will implement environmental monitoring and audit plans aligned with Article 4.9 of the Policy.

4.2.2. Water Resource Policy (1998)

The then Ministry of Water Resources formulated the Federal Water Resource Policy in 1998 for a comprehensive and integrated water resource management. The overall goal of the policy is to enable and promote all national efforts towards the efficient, equitable and optimum utilization of the available water resources of Ethiopia for significant socioeconomic development on sustainable basis. The policy ensures that water allocation gives the highest priority to water supply and sanitation while apportioning the rest for uses and services that result the highest socio-economic benefits.

The detail objectives of the water resources management policy are:

- Development of the water resources of the country for economic and social benefits of the people, on equitable and sustainable basis;
- Allocation and apportionment of water based on a comprehensive and integrated plans and optimum allocation principles that incorporate efficiency of use, equity of access and sustainability of the resources;
- Managing and combating drought as well as other associated slow on-set disasters through efficient allocation, redistribution, transfer, storage and efficient use of water resources;

- Combating and regulating floods through sustainable mitigation, prevention, rehabilitation and other practical measures;
- Conserving, protecting and enhancing water resources and the overall aquatic environment on sustainable basis.

The project aligns with the Water Resource Policy by integrating sustainable water management practices. Priority is given to the provision of safe water supply and sanitation services within the airport design. Drainage systems and stormwater management plans are developed to prevent waterlogging and flooding. Construction activities will include water conservation measures and avoid polluting nearby water bodies, ensuring protection of aquatic environments.

4.2.3. National Policy on Women (1993)

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

Consistent with the above policy, Article 25 of the constitution guarantees all people's equality before the law, and prohibit any discrimination on grounds of gender. In addition, Article 35 reiterates principles of equality of access to economic opportunities, including the right of equality in employment and land ownership. The democratization process, the new constitution, the women's policy and the institutional set up have created conducive atmosphere for the promotion and the advancement of women and the implementation of the plan of action.

The project ensures compliance with the National Policy on Women by promoting gender equity in employment and community engagement. The ESIA identifies gender-specific risks and proposes gender-inclusive consultation and grievance redress mechanisms. Women will be actively involved in public consultations and awareness activities, and equal opportunity in employment will be ensured during construction and operation phases.

4.2.4. National Social Protection Policy of Ethiopia (1994)

National social protection policy of Ethiopia given special attention to segments of the society vulnerable to different social and economic problems, especially, children, women, persons with disabilities, elderly, labour constrained unable to make earnings, and the unemployed who are living under difficult circumstances. The policy serves as a framework for collaboration and coordination system of social protection in order to provide different services. The main objectives of the National Social Protection Policy of Ethiopia are the following:

- Protect the poor and vulnerable individuals, households, and communities from different natural and manmade adverse effects of shocks,
- Establish social insurance system and increase its scope,
- Increase access to equitable and quality health, education, and social welfare services to build human capital.
- Expand and guarantee employment for the vulnerable to unemployment.
- Enhance employment guarantee for the segments of society under social problems through
- promoting employment opportunities,
- Ensure that the society at all levels play roles for the implementation of the policy.

The following target groups are given due emphasis in the policy:

- Children under difficult circumstances,
- Vulnerable pregnant and lactating women,
- Vulnerable people with disabilities and people with mental health problems,
- Elderly with no care and support,
- Labor constrained citizens unable to get basic social and economic services,
- victims of social problems such as beggars, commercial sex workers, drug and medicine addicted,
- Citizens affected by HIV and AIDS and other chronic diseases that constrain their ability to work,
- Segments of the society vulnerable to violence and abuse,
- Segments of the society vulnerable to natural and manmade risks,
- Unemployed citizens,

- Citizens engaged in the informal sector and who have not social insurance coverage,
- Victims of human trafficking and repatriated emigrants.

The project supports this policy by identifying and addressing potential impacts on vulnerable groups through the ESIA. Measures are in place to avoid adverse effects on communities and to promote employment opportunities for labor-constrained and unemployed individuals in the project area. Special attention is given to ensure safety, fair working conditions, and social inclusion during implementation.

4.2.5. National Health Policy (1993)

Ethiopia's health policy was issued in 1993, with the aim of giving special attention to women and children, to neglected regions and segments of the population, and to victims of manmade disasters.

The priority areas of the policy are in the field of Information Education and Communication (IEC) of health to create awareness and behavioral change of the society towards health issues, emphasis on the control of communicable disease, epidemics, and on diseases that are related to malnutrition and poor living condition, promotion of occupational health and safety, the development of environmental health, rehabilitation of health infrastructures, appropriate health service management system, attention to traditional medicines, carrying out applied health research, provision of essential medicines, and expansion of frontline and middle level health professionals.

The Government in its Growth and Transformation Plan has reaffirmed its commitment to accelerate progress on maternal and child health and to reduce in child and maternal mortality rates by expanding the provision of essential health and nutrition services to the poor.

To translate the health policy into action the Ministry of Health has developed every five years a Health Sector Development Program (HSDP). Currently it is implementing HSDP IV. HSDP lays an emphasis on service delivery and the quality of service, health facility rehabilitation and expansion, human resource development, pharmaceutical services; Information, Education and Communication (IEC), strengthening health sector management and management information system, monitoring, evaluation and research.

The project complies with the National Health Policy by incorporating occupational health and safety measures, ensuring availability of first aid and medical services on-site, and providing health education to workers. The project also includes environmental health measures such as

waste management, vector control, and water quality monitoring to prevent disease and promote well-being in nearby communities.

4.2.6. National HIV/AIDS Policy (1998)

The HIV/AIDS pandemic is spreading worldwide and heating hard poor countries mainly. Sub Saharan Africa, with only 10% of the world population is having 80% of the world HIV infection and AIDS cases.

Among the Sub Saharan African countries, Ethiopia is one of the countries that is facing HIV/AIDS pandemics, and HIV/AIDS is no more a health problem alone, it is now a challenge to the socio- economic development of the country.

HIV/AIDS surveillance reports also show a steady increase in HIV infections among rural communities in Ethiopia. The movement of people from place to place, either voluntarily or involuntarily contributes to the spread of HIV/AIDS. HIV/AIDS now is no more health or clinical problem only; it has now become a major social and economic problem of a country.

Having understood the magnitude of the problem as well as the huge resource needed to combat HIV/AIDS, the Ethiopian Government issued a policy, which calls for an integrated effort of multi-sectoral response to control the epidemic. The Federal Democratic Republic of Ethiopia published a Policy on HIV/AIDS in 1998. The National HIV/AIDS Policy urges communities at large, including government ministries, local governments and the civil society to assume responsibility for carrying out HIV/AIDS awareness and prevention campaigns.

The general objective of the policy is “to provide an enabling environment for the prevention and control of HIV/AIDS in the country”.

Specific Objectives

The specific objectives of the policy are stated as follows:

- To establish effective HIV/AIDS preventative and control strategies in order to curb the spread of the epidemic
- To promote a broad multi-sectoral response to HIV/AIDS epidemic, coordination of the activities of different sectors and the mobilization of resources for the control of the epidemic

- To encourage government sectors, non-governmental organizations, the private sector and communities to take measures in order to alleviate the social and economic impact of HIV/AIDS
- To promote proper institutional, home and community-based health care and psychological support for people living with HIV/AIDS, orphans and surviving dependents
- To safeguard the human rights of people living with HIV/AIDS and avoid discrimination against them
- To promote and encourage researches and studies on HIV/AIDS and make use of the outcomes for preventative, curative and rehabilitative purposes.

In 2000, National AIDS Council was established under the Chairmanship of the FDRE President; and in 2002 HIV/AIDS Prevention and Control Office (HAPCO) was established to address the problem.

The policy introduces and outlines the large social, psychological, demographic and economic impact that HIV/AIDS will be having and introduces a number of issues relating to HIV/AIDS. These are:

- That HIV/AIDS is not only a health problem but also a developmental problem,
- That gender inequality contributes to the further spread of HIV/AIDS,
- That women, including women living with HIV/AIDS, need access to information and services regarding HIV/AIDS and to family planning provision to help them make reproductive choices and decisions,
- That the magnitude of the problem will need considerable resources and a multi-sectoral effort to control the HIV/AIDS epidemic,
- That there is a need for a holistic approach in the provision of care to people living with HIV/AIDS,
- That the human rights of people living with HIV/AIDS needs to be recognized,
- That HIV/AIDS has the potential for catastrophic impact.

The project will adhere to the HIV/AIDS Policy by implementing HIV/AIDS awareness and prevention programs for construction workers and surrounding communities. Collaboration

with health institutions will ensure dissemination of IEC materials and provision of voluntary counseling and testing services. Anti-discrimination provisions will be enforced at all project sites, and support will be provided to individuals affected by HIV/AIDS.

4.2.7. Wildlife Policy (2006)

The Wildlife Policy was developed in 2006 by the Ministry of Agriculture and Rural Development. The prime objective of the policy is to create conducive environment for the preservation, development and sustainable utilization of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere/ biodiversity. It covers a wide range of policies and strategies relating, amongst others, to wildlife conservation and protected areas with four categories from the highest protection ranking 'National Park', followed by 'Game Reserve' and 'Sanctuary' to 'Controlled Hunting Area'.

However, the proposed project vicinity is completely laid in the Dukem sub city, where there is no any national park, Game Reserve and Sanctuary directly affected. Therefore, the project can not cause any visible impact on the wildlife thus far. That means the project is does not have any violating activity of the national and international wildlife policy.

Although the project area is not within or near a designated wildlife protection zone, it complies with the Wildlife Policy by ensuring no adverse impacts on biodiversity. The ESIA confirmed that there are no protected species or habitats affected, and the construction plan includes general biodiversity safeguards in line with the policy.

4.3.Strategies and Programs

4.3.1. Climate Resilient Green Economy Strategy (2011)

Ethiopia is experiencing the effects of climate change. Some studies indicate that by 2050 the temperature of the country could increase in the range of 1.7 to 2.1 degree Celsius unless appropriate mitigation measures are taken. This incidence would aggravate food insecurity, spread transmitted diseases in the form of epidemic, and cause degradation of land resources and destruction of infrastructures. Besides the direct effects such as an increase in average temperature or a change in rainfall patterns, climate change also presents the necessity and opportunity to switch to a new, sustainable development model. The Government of the Federal Democratic Republic of Ethiopia therefore issued the Climate-Resilient Green Economy strategy in 2011 to protect the country from the adverse effects of climate change and to build

a green economy that will help to realize its ambition of reaching middle income status before 2025. In the long term, if climate change is not tackled, growth itself will be at risk.

Ethiopia is currently in a very strong position of having very low emissions per capita, huge renewable heat and electricity resources and the opportunity to address climate risks into the short term that result from outdated fossil fuel technology and seek clean and renewable alternatives. The Government has recognized this and plays a leading role in driving the climate resilient green economy agenda.

Target of the Plan

The Green Economy (GE) Strategy sets out the plans for developing a low carbon economy in Ethiopia. Detailed analysis showed that GHG emissions in Ethiopia would rise from 150 MtCO₂e per year in 2010 to 400 MtCO₂e in 2030 under a conventional development path ('business as usual'). The GE Strategy identified and prioritized more than 60 initiatives, which together enable the country to achieve the envisaged development goals while limiting GHG emissions in 2030 to 2010's levels. These initiatives would save 250 MtCO₂e per year.

Pillars of the Plan

The green economy plan is based on four pillars:

1. Improving crop and livestock production practices for higher food security and farmer income while reducing emissions;
2. Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks;
3. Expanding electricity generation from renewable sources of energy for domestic and regional markets; and
4. Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings.

The agriculture sector (including livestock farming, crop cultivation and forestry activities) in 2010 was the highest contributor to emissions, amounting to about 88% of total greenhouses gases (GHG) emissions. The sector presents the highest abatement potential for GHG emissions reduction; hence was identified as a priority area that needs to be developed resiliently. The other sectors including Transport, Energy, Industry and Buildings each accounted for 3% of GHG emissions in 2010.

In 2010, the transport sector produced 5 MtCO₂e representing 3% of total GHG emissions. Emissions from the transport is projected to reach 70 MtCO₂e by 2030 under the business-as-usual scenario. To reduce emissions from the sector, Ethiopia intends to expand its investments in improved transport systems such as rail transport that depends on clean and renewable energy sources; this measure is expected to contribute to a reduction of 10 MtCO₂e emissions by 2030 (14% reduction to BAU). In addition, the country is making efforts to remove subsidies on fossil fuels thereby discouraging excessive consumption of fossil fuel in the transport sector. Ethiopia also plans to implement urban planning that prioritizes accessibility; hence minimizing emissions from motorized transport.

In the energy sector, the Ethiopian government commits to promoting the use of modern energy sources (such as Liquefied Petroleum Gas and electricity) for cooking; and reducing emissions from electricity generation by cutting down on fossil fuel usage and resorting to more renewable sources such as hydroelectric, geothermal, wind and solar sources.

Recognizing that aviation contributes approximately 3.5% to global warming and considering the Bishoftu International Airport is a large-scale infrastructure project with potential significant GHG emissions during construction and operation phases, the ESIA takes into account the principles of the CRGE Strategy. The project aligns with the national vision of building climate-resilient infrastructure and reducing emissions from the transport sector.

Specifically:

- The design of the airport incorporates energy-efficient technologies in buildings and systems (e.g., lighting, HVAC, and water systems) to minimize operational carbon footprints.
- Renewable energy sources, such as solar energy, are being evaluated for powering ground operations and auxiliary services.
- The airport layout supports multimodal transport integration and is planned to connect to electric-powered rail infrastructure to reduce road traffic emissions.
- Measures will be explored to enable future compliance with carbon offset programs or regional green airport initiatives.

4.3.2. Conservation Strategies (1990)

Since the early 1990s, the Federal Government has undertaken a number of initiatives to develop regional, national and sectoral strategies to ensure better environmental conservation and protection. Paramount amongst these was Conservation strategy of Ethiopia (CSE), approved by the council of ministers, which provided a strategic framework for integrating environmental planning into new and existing policies, programs and projects. The CSE is an important strategy document which views environmental management from several perspectives. The CSE itself provides a comprehensive and rational approach to environmental management in a very broad sense, covering national and regional strategies, sectoral and cross-sectoral strategy, action plans and programs, as well as providing the basis for development of appropriate institutional and legal frameworks for implementation.

The plan comprehensively presented the exiting situation within the country and gave a plan of priority actions on the short and medium term. In particular, it recognizes the importance of incorporating environmental factors into development activities from the outset, so that planners may take into account environmental protection as an essential component of economic, social and cultural development.

4.4. Pertinent Proclamations and Regulations

4.4.1. Environmental Impact Assessment Proclamation (No.299/2002)

This proclamation requires an environmental impact study before a development project is implemented. The law stipulate project proponent must develop an impact study on its investment activities and submit it to the Commission of Environment, Forest, and Climate Change and/or the regional environmental authority for approval. The body will then analyze the study through experts as well as through public inputs by those in the vicinity of the proposed project (public consultation and disclosure).

The proclamation provides the legal basis for the ESIA process conducted for the Bishoftu International Airport. It ensures that environmental risks are identified and mitigated during the planning and construction stages of the airport.

The ESIA for the Bishoftu International Airport project has been prepared in line with this proclamation. Public consultations were conducted, and the report will be submitted to the appropriate environmental authority for review and approval. The project will implement all the recommendations and mitigation measures specified in the approved ESIA report.

Gap

While Proclamation No. 299/2002 provides the legal basis for EIA in Ethiopia, its effectiveness depends heavily on Directive No. 1/2008. However, challenges remain in implementation, enforcement capacity, and public participation, especially at regional levels. Moreover, the directive is outdated and may not fully reflect international best practices or emerging environmental risks like climate change.

4.4.2. Environmental Pollution Control Proclamation (No.300/2002)

This proclamation aims to realize the effective implementation of the environmental objectives and goals incorporated in the Environmental Policy. It sets hierarchy of objectives focusing on prevention, reuse, or recycling, sound management, and environmental sound disposal of wastes.

The proclamation provides policy regulatory requirements such as:

- Refraining from polluting, administrative measures on polluters, and obligation to have sound environmental management plans.
- Providing mitigation measures for some of the socioeconomic and infrastructural development endeavors with potential to cause environmental impacts detrimental to the development process itself.
- The need to protect the environment and safeguard human health and well-being, preserve the biota, and maintain an untainted aesthetic is the duty and responsibility of all; and
- The need to prevent or minimize undesirable pollution resulting from development projects through appropriate measures.

Furthermore, it empowers the EPA or the regional environmental office to assign environmental inspectors to follow up and ensure the implementation of environmental standards.

Construction and operational phases of the airport may generate significant air, noise, liquid, and solid waste pollution. The proclamation justifies the need for pollution control plans and air quality monitoring during construction and operation.

The project has developed a site-specific Environmental and Social Management Plan (ESMP) that incorporates pollution prevention, waste management, and monitoring measures. These will be implemented during all project phases, and environmental inspectors will be granted access to monitor compliance.

Gap

There were nowhere in the document where strategies is outlined on how national or regional, ministries and agencies will translate existing policies, legal provisions, or guidelines into practical programs.

4.4.3. Solid Waste Management Proclamation (No. 513/2007)

The proclamation sets the objective of preventing the possible adverse impacts and to creating the economically and socially beneficial assets out of solid waste. It sets additional obligations on solid waste management planning and obligation on urban administrations for following up its implementation. It requires that construction and demolition wastes should be disposed in accordance with relevant federal environmental standards. It also provides for preparation of Solid Waste Management Plans by urban local governments and mandate that urban Administration ensure the participation of lowest levels and their local communities in the designing and implementation of solid waste management plans.

The construction and operation of the airport will generate solid and demolition waste. The proclamation guides proper collection, segregation, disposal, and recycling efforts that must be integrated into the airport's environmental management plan.

A Waste Management Plan will be developed and implemented for construction and operation phases of the airport. The project will coordinate with local authorities to ensure appropriate collection, transportation, and disposal of waste, in line with federal standards.

Gap

Sustainable solid waste management strategies, such as waste prevention and reduction, solid waste segregation at source, and waste collection fee systems are lacking in the document. Also, there is no mention of supporting guidelines, which is highly important to implement solid waste management laws and proclamations.

4.4.4. Industrial Pollution Regulation (No.159/2008)

The provisions of the regulation apply to factories and industries that are determined by the competent environmental organ to take appropriate measures to eliminate any risk that might emanate from its operations (Article 4).

The regulation requires industries to meet the environmental standards set under the regulation. It also has a reporting obligation on the industries to ensure the operations of factories from handling of raw materials to the transportation of final products will not cause damage to human health and the environment.

While primarily targeting factories, the regulation is relevant for airport-associated industrial facilities (e.g., maintenance yards, fuel storage, cargo handling zones), requiring pollution mitigation and monitoring systems.

All construction and operation activities at the airport will follow environmental quality standards. Periodic reporting and environmental audits will be conducted, and any identified pollution will be addressed promptly as per the regulation.

Gap

Although the regulation has provision for preventive and punitive measures to prevent pollutant factory release of pollutant into the environment, it is silent on the redress mechanism to restoring the environment and by who, in case where pollutant with adverse impacts is disposed into the environment either intentional or inadvertently.

4.4.5. Research and Conservation of Cultural Heritage (No 209/2000)

The proclamation contains provision for the conservation and restoration, preservation, and removal of cultural heritages. It also includes condition under which a cultural heritage may be expropriated. It provides that

- An immovable Cultural Heritage may not be removed from its original site without the prior written approval of the Authority.
- Any person shall notify the Authority before removing registered movable Cultural Heritage from its original site.

It also provides that any area may be declared as and reserved and publish same in the Negarit Gazeta, where an assemblage of immovable cultural heritage is situated or where such an area is deemed to be an archaeological site. And that unless otherwise specifically decided by the

Council of Ministers, no person may, without a permit issued by the Authority, carry out building or road construction, excavations of any type or any operation that may cause ground disturbance in an area declared reserved for archaeological or cultural sites. Any person who holds permit to conduct construction works in reserved area and who discovers cultural heritage in the course of construction activities shall stop construction and shall forthwith report same in writing to the authority.

Airport construction involves extensive earthworks that may uncover cultural or archaeological artifacts. The project must adhere to the "chance find procedure" and consult the Authority for Research and Conservation of Cultural Heritage (ARCCH) where necessary.

A chance-find procedure will be developed and integrated into the construction contracts. If any heritage is discovered, work will be halted, and the relevant authority will be informed in accordance with this proclamation.

4.4.6. Ethiopian Water Resources Management Proclamation (197/2000)

The Proclamation requires that water resources be protected and utilized for the highest social and economic benefits of the people. It promotes the conservation and sustainable management of water resources. The Ministry of Water and Energy is the mandated office, in collaboration and in consultation with the appropriate public and regional offices; for implementing the proclamation.

The airport's water demand, stormwater management, and wastewater discharge fall under the scope of this proclamation. It mandates water conservation and pollution control during both construction and operation.

The project will implement water-saving technologies, manage runoff responsibly, and ensure that groundwater and surface water abstraction complies with permitting procedures and water conservation measures.

Gap

It lacks integrated water resources management approach. And there is no provisions addressing inter-sectoral coordination and linkages. Does not clearly address the adoption of a River Basin Approach. Centralization vs Decentralization not clearly addressed.

4.4.7. Proclamation on Public Health

The Ethiopian Public Health Proclamation (No. 200/2000) Article 12 states that “no person shall dispose solid, liquid or and other waste in a manner which contaminates the environment or affects the health of the society”. The article number 13 of this proclamation also states that city administrations are responsible to provide public toilets and ensure their cleanliness.

The proclamation among others prohibits:

- Providing water supply services from springs, wells or through pipes unless its quality is verified by health Authority,
- To import, produce or distribute to the society bottled mineral water or plane water unless its quality is verified, and
- To discharge untreated liquid waste generated from septic tanks, seepage-pits, and industries into water bodies, or water convergences.

When it comes to the handling and disposal of waste, the proclamation underlines that:

- Any person shall collect waste in especially designated place and in a manner which does not affect the health of the society,
- No person shall dispose solid, liquid or any other waste in a manner which contaminates the environment or affects the health of the society,
- Solid, liquid and other waste generated from hospitals should meet the standards set by the public health authorities,
- Any institution or organization providing public service has the obligation to organize clean, adequate and accessible toilet facilities for its customers,
- Any city administration is responsible to provide public toilet and ensure its cleanliness, and
- No person shall provide a natural stream bathing or hot spring service unless authorized by the appropriate health authority.

Therefore, the proposed ESIA should be aware of these laws and work in accordance to the laws. It should be understood that violation of the proclamation would lead to the degradation of environment and health of the society and eventually leads to legal punishment of the doer.

The airport must prevent contamination of water sources and ensure adequate sanitation infrastructure. It informs the project's health and safety protocols regarding waste handling and occupational hygiene.

The project will ensure all wastewater is treated before disposal and will provide workers and users with clean water and adequate toilet facilities. All water sources will be tested and verified by the competent authority.

4.4.8. Labor Proclamation No 1156/2019

As per the Constitution of the FDRE, Sub-Article 1 and 3 of Article 55, the Ethiopian Government issued the Labour Proclamation (Proc. No. 1156/2019) on 05 September 2019 with the following umbrella objectives. The main aim of the proclamation includes, among others:

- To ensure that worker-employer relations are governed by the basic principles of rights and obligations with a view to enabling workers and employers to maintain industrial peace and work in the spirit of harmony and cooperation towards the all-round development of the country.
- To guarantee the right of workers and employers to form their respective associations and to engage, through their lawfully elected representative, in collective bargaining as well as to lay down the procedure for the expeditious settlement of labour disputes that may arise between workers and employers.
- To strengthen and define by law the powers and duties of the organs charged with the responsibility of inspecting, in accordance with the law, labour administration, particularly labour conditions, occupational safety, health and work environment.
- To revise the existing labour law providing for the basic principles which govern worker-employer relations and for labour condition taking in to the political, economic, and social policies of the government and in conformity with the international conventions and other legal commitments to which Ethiopia is a party with a view to translating in to practice the underlining objectives of the labour proclamation

The preamble of this Proclamation states that it is essential to ensure that worker-employer relation is governed by the basic principles of rights and obligations with a view to enabling workers and employers to maintain industrial peace and work in the spirit of harmony and cooperation towards the all-round development of the Country.

The Proclamation has strong relevance to the SCTDP project under consideration. Especially, articles related to women and young employment has to be considered while employing these

categories of people into the Project. Part six, chapter 1 and 2 need to be heeded strongly while engaging women and young force. The provisions listed in these two chapters of the Proclamation emphasis women's specific needs which should be given utmost consideration as below:

- Women shall not be discriminated against in all respects on the basis of their sex.
- Priority shall be given to women if they get equal result with men when competing for employment, promotion of any other benefit.
- Women should not be assigned on works that may be listed to be particularly dangerous or hazardous to their health.
- Pregnant women shall not be assigned to work night work between 10 p.m. and 6 a.m. or be assigned on overtime work.
- Employer shall not terminate the contract of employment of women during her pregnancy and until four months after her confinement.
- An employer shall grant leave to a pregnant worker with pay, for medical examination connected with her pregnancy.
- A pregnant worker shall, upon the recommendation of a physician, be entitled to a leave with pay.
- A pregnant worker shall be granted period of 30 consecutive days pre-natal and 90 consecutive days of post-natal leave with pay. And where a pregnant does not deliver within the 30 days of her pre-natal leave, she is entire to additional leave until her confinement. However, if the birth takes place before the expiration of her pre-natal leave, the 90-day post-natal leave shall commence.

The law also make provision for young workers; people who have attained the age of 15 but below the age of 18 years. It prohibits employing persons less than 15 years of age. And that young worker shall not be assigned under a condition of work that can endanger their lives or health. It also defines the normal hour of work for young workers not to exceed seven hours a day and prohibit employing young workers on night work between 10 p.m. and 6 a.m. and overtime work, weekly rest day or on public holidays.

Applies to all employment aspects during airport construction and operation. Particular focus is needed on provisions for women, young workers, and occupational safety standards relevant to construction and aviation services.

The project will adhere to labor standards on working conditions, occupational health and safety, equal employment opportunities for women and youth, and legal working hours. Workers under 18 will not be engaged in hazardous tasks.

Gap

The Proclamation is applicable to all sectors across board and does not consider industry specific labour needs and requirements and the different labour dynamics that should be subject to different regulatory considerations e.g., different labour rules are adopted elsewhere in the world for industrial undertakings and for service sectors.

Also, it offers contractual freedom to the parties and flexibility to allow an employer and employee to an agreed terms different from what is stipulated under the law.

4.4.9. Proclamation on Establishment of Environmental Protection Organs (No. 295/2002)

Establishment of Environmental Protection Organs is stipulated by the Proclamation No. 295/2002. The major objective of this Proclamation is to formally lay down the institutional arrangements necessary to ensure environmentally sustainable management and development at Federal, Sectoral and Regional levels. The proclamation therefore re-establishes the Environmental Protection Authority (EPA was upgraded and reorganized as Commission for Environment, Forest and Climate Change whereby the rights and obligations of the EPA, which was stated under proclamation No. 295/2002, is transferred to the EFCCC), But, recently the EFCCC is again renamed as EPA.

Accordingly, EPA is responsible for environmental issues associated with projects implemented by Federal Government or under the licenses given by the Federal Government. By the same saying, Sectoral Environmental Units are responsible for projects implemented by the Ministries/Authorities themselves or projects implemented by proponents acquiring the implementation license from the Ministry while Regional Environmental Agencies are responsible for all the rest environmental issues within the boundaries of the respective Regions. The environmental issues associated with the current assignment are mainly the responsibility of the Federal EPA.

The project will collaborate with the Federal EPA for project-level environmental oversight. Coordination with regional and sectoral environmental units will be maintained to ensure compliance throughout the project lifecycle.

4.4.10. Legislation on Expropriation of Land and Compensation Proclamation No. 1161/2019

The FDRE has recently issued a revised Legislation on Expropriation of Land and Compensation (Procl. No 1161/2019) to replace the earlier (Proclamation No. 455/2005). The latest proclamation has already been ratified and gazette while its regulation not yet finalized and is still in the draft form. The two legal documents are expected to be followed by the enactment of guidance by regions or other executive bodies. The legal provisions stated in the newly enacted proclamation, regulation and guidance are mainly meant to rectify the gaps seen in the replaced ones. The new proclamation has gone beyond compensation to Project Affected Persons (PAP) and includes new provisions to address the psychological and social capital issues (e.g., like impact of relocation on social networks, moral etc) which was not considered under the earlier proclamation and regulation.

Regarding compensation for rural landholdings, the proclamation states that where there is alternative land to relocate the PAP, one year landholding compensation income which is equivalent to the highest income he/she annually used to generate in the last three years preceding the expropriation of the land shall be paid. Where equivalent land is not available and the land is going to be expropriated permanently, the landholder shall be paid displacement compensation which is equivalent to 15 times the highest annual income he generated during the last three years preceding the expropriation of the land.

Where urban land holder is permanently displaced, he/she shall be provided with substitute land for building house, or an arrangement shall be made to let him purchase housing units. Where suitable land is provided, a residential house shall be given to the displaced for two years, free of charge until he constructs his residential housing or displacement compensation equal to two years housing rentals estimated on the basis of the rental market comparable to the house of the displaced shall be paid. Where a substitute house is provided, the displaced shall be paid a one-year displacement compensation equivalent to current rental price of the demolished house.

The proclamation regarding the illegal occupants' states that illegal occupant shall evacuate without claim for compensation within 30 (thirty) days of notice.

The proclamation requires that the land requiring body shall submit to the City or Woreda Administration the decision that shows the size and exact location of the land to be expropriated at least one year before the commencement of the project.

After the payment of compensation, the land holder may be forced to handover the land within 120 (one hundred and twenty) days of the payment in cash or in kind or after the cash is deposited in the bank. However, if there is no permanent property or crop on the expropriated land, the land holder shall hand over his landholding within 30 days of the payment of compensation to the City or Woreda Administration.

Regarding the relocation of utilities, the organization that has utility lines on the land to be expropriated shall estimate the value of the utility line to be affected and send it with evidence to the City or Woreda Administration within 30 days of receiving the request; and the city or Woreda Administration shall pay the compensation within 30 days of receiving the estimated cost of the utility lines to the owner organization. After the receiving of compensation, the utility line owner shall remove utility lines and clear the land within 60(sixty) days. But if the utility is complex, the utility line owner shall remove complex utility lines and clear the land within 120 (one hundred and twenty) days after the payment has been made.

The proclamation has also considered paying compensation for the breakup of social ties and moral damage suffered by the displaced as result of the expropriation. The detail as to how this issue be implemented is determined by the regulation issued to implement this Proclamation.

The appropriate federal Authority or a regional, Addis Ababa, Direedawa cabinet shall decide based on an approved land use plan or structure plan where to expropriate land directly or indirectly to bring about better development and benefit to the public. Cabinet may delegate a woreda or city administration to decide on the land expropriation for public purpose.

Directly applies to land acquisition and relocation of residents and infrastructure in the airport project area. It ensures fair compensation and livelihood restoration for Project-Affected Persons (PAPs).

All land acquisition will follow the principles of full replacement cost compensation. Vulnerable groups will be protected, and compensation for loss of income, housing, and social ties will be handled in line with the law. A Resettlement Action Plan (RAP) will be prepared and implemented if required.

Gaps

There is gap regarding valuation of improvements on the land (such as buildings) to be compensated. According to the proclamation Article 2 (8), it considers use of a common valuation method (assessment value) to calculate the value of a property on expropriated land. For the reason that most houses of the smallholder households are dilapidated structures, in

that case, the assessed value may not replace the construction of a habitable house. Replacement cost may need to be used as it is the estimated cost to construct, at current prices, a building with an equal utility to the building being appraised.

The other issue of a concern is that the law states that landholder shall be paid displacement compensation which is equivalent to fifteen times the highest annual income he generated during the last three years preceding the expropriation of the land. However, such payments do not consider changes in inflation rate which may be higher at such a time. Therefore, the income estimation should, therefore, consider the potential of the land to produce than the annual income in the past. The regulation does set a clear standard for restoring the livelihoods of project affected households.

4.4.11. FDRE Council of Ministers Regulation (472/2020)

FDRE Council of ministers issued regulation No. 472/2020, which deals about the payment of compensation for property situated on land holdings expropriated for public purposes. The regulation provides the basis for compensation of affected properties and assistance to the displaced or affected persons to restore their livelihood.

The draft regulation, organized under seven sections and 50 articles, deals with the general rules and steps to be followed during the expropriation of land, properties and utilities and contains the need for consultation with PAPs before effecting expropriation. It gives landholder the priority to develop the land under expropriation but under conditions and mentions the methodologies for estimating compensation under an establishment compensation implementation body. In addition, the document shows procedures to be followed while replacing the affected land and house as well as rehabilitation of displaced people. The regulation considered giving priorities to the project affected women household heads, old ages, and people with disabilities in assigning suitable and accessible areas. Under article 35, it states the livelihood restoration program. Section six deals with the procedures to be followed that will involve displaced people as shareholders in the investment to be established on the land for expropriation. The last section (section seven) describes other related issues including grievance redressing, establishment of grievance appeal procedures, etc.

Section 4 - Compensation and Valuation Method: This section contains establishes the basis and method of payment of compensation on different types of assets and how it affects the nature of displacement (whether temporary or permanent) under the following articles:

- Article 13 of section 4 states that compensation estimation shall be conducted by certified organization or individual. Where there is no certified organization or individuals, it shall be done by the property valuers woredas. And where there is no licensed valuers or government body, Woreda and city administrations shall establish valuation committees
- Article 15 of section 4 describes the methodology for payment of compensations. Its mandate that compensation for expropriated property shall be displayed first to the public before paid, and that approval for payment shall be five days after such a display. It also includes the various compensation categories - residential houses and planted crops. And the compensation that is available, based on concession, if just some part of the property is affected.
- Article 16 of section 4 describes the basis for the evaluation of compensation.
- Article 17 describes the computation of compensation in cases where fences are involved
- Article 18 describes how compensation shall be determined where its affect movable property
- Article 19 describes how compensation shall be determined for planted crops and vegetables
- Article 20 describes how compensation shall be determined in case of perennial crops
- Article 21 describes how compensation shall be determined in case of non-fruit bearing trees
- Article 22 describes how compensation shall be determined in case of grass
- Article 23 describes how compensation shall be determined where a mining land is involved
- Article 24 describes how compensation shall be determined for relocation of burial grounds
- Article 25 discusses the various consideration for compensation for rural land. Article 27 to 28 are ad joinders that determined the condition how the compensation shall be determined where permanent and temporary displacement are involved

The RAP usually prepared with broad legal provisions lacking specific formal guideline (like woreda level formal compensation calculation/unit rates) to guide the entire compensation

process. It can be summarized that a grass root procedural and implementation issue at the woreda level needs to address in terms of guidelines for effective implementations.

This regulation provides the legal basis and procedures for compensating properties, utilities, and landholdings expropriated for public purposes. It outlines the methodology for asset valuation, compensation categories, livelihood restoration, and grievance redress mechanisms. It also prioritizes support for vulnerable groups such as women-headed households, the elderly, and persons with disabilities.

The Bishoftu International Airport development will require land acquisition and the displacement of residents, properties, and potentially public utilities. Regulation No. 472/2020 directly governs how these processes must be handled, including stakeholder consultation, fair and transparent compensation, and resettlement support. It mandates that compensation be based on clear valuation standards and involves public disclosure and grievance appeal systems. This regulation is therefore essential in ensuring that land acquisition and resettlement for the project are carried out in a lawful, equitable, and socially responsible manner.

The regulation informs the preparation of the Resettlement Action Plan, which is an integral part of the ESIA. It provides the framework for identifying Project Affected Persons (PAPs), valuing affected assets, and establishing procedures for livelihood restoration and compensation. In addition, the grievance redress mechanisms detailed in the regulation align with the ESIA's requirements for stakeholder engagement and social risk mitigation. Incorporating these provisions ensures legal compliance and enhances the social acceptability of the project.

Gap:

Although, the regulation contains compensation and resettlement assistance for expropriated land to the displaced person, it does not emphasize the requirements for avoidance and minimization of involuntary resettlement

4.4.12. Proclamation on Ethiopian Airlines Group Establishment

This Regulation may be cited as the “Ethiopian Airlines Group Establishment Council of Ministers Regulation No. 406/2017” Establishment 1/ The Ethiopian Airlines Group is hereby established as a federal public enterprise. 2/ The Ethiopian Airlines Group shall be governed by the Public Enterprises Proclamation No. 25/1992.

The purposes for which the Ethiopian Airlines Group is established are:

- To provide domestic and international air transport services as well as general aviation services;
- to manufacture and repair aircraft and aircraft parts;
- to construct, expand, maintain and administer airports;
- to provide airport services, other aeronautical services and non-aeronautical services; provide services to air operators without discrimination;
- where necessary, cause the provision of some of its services by other parties on the basis of outsourcing contracts; ensure the quality standards of such services through mechanisms set in the outsourcing contracts;
- without prejudice to the powers and duties of the concerned bodies, organize airport service security to ascertain reliable, safe and secured service in the airport premises;
- to provide aviation training services;
- to invest in other carriers, aircraft manufactures and aviation services through equity participation;
- to provide hotel, recreational and other tourism services related to the aviation industry or invest in such services through equity participation;
- to sell and pledge bonds and to negotiate and sign loan agreements with local and international financing sources; and
- to engage in other related activities necessary for the attainment of its purposes

4.4.13. Ethiopian Airlines Group Environmental Policy

- Environmental Protection: Commitment to reducing adverse environmental impacts through advanced aircraft technology, waste minimization, recycling, optimized flight operations, sustainable aviation fuels, and proper chemical management.
- Compliance: Adherence to national and international environmental laws and regulations, with programs in place to meet legal requirements.
- Communication: Transparent sharing of environmental commitments and information with employees, customers, stakeholders, and the public.
- Risk Reduction: Focus on minimizing environmental risks and ensuring preparedness for emergencies like fires or chemical spills.

- **Sustainable Resource Management:** Efficient use of natural and man-made resources, promotion of sustainable products/services, and reduction of waste across operations.
- **Continual Improvement:** Ongoing efforts to enhance environmental performance through training, stakeholder engagement, research, innovation, and performance monitoring.

The Ethiopian Airlines Group (EAG) Environmental Policy outlines the Group's commitment to minimizing environmental harm throughout its operations. For the Bishoftu International Airport project, this policy provides a strong foundation to ensure that the design, construction, and operation of the airport will be guided by principles of pollution prevention, energy efficiency, waste reduction, and sustainable use of resources. The policy's emphasis on risk reduction and emergency preparedness is particularly relevant to aviation infrastructure where fuel handling, chemical storage, and potential fire hazards are critical concerns.

The policy directly supports the objectives of the ESIA by:

- Ensuring compliance with both national (e.g., EIA Proclamation 299/2002) and international environmental standards.
- Reinforcing the ESIA's mitigation hierarchy through waste minimization, emissions control, and resource efficiency.
- Facilitating stakeholder engagement and public transparency—core principles of the ESIA process.
- Providing an institutional commitment to implement, monitor, and continuously improve upon the environmental management measures proposed in the ESIA report.

4.4.14. Ethiopian Airlines Group Environmental Management System (EMS) Manual

1. Purpose and Scope

The manual outlines Ethiopian Airlines Group's Environmental Management System (EMS), aligned with ISO 14001:2015 and national regulations. The EMS aims to:

- Enhance environmental performance.
- Ensure compliance with legal and corporate obligations.
- Achieve environmental objectives through continual improvement.

Scope: Applies to Ethiopian Airlines' operations at Addis Ababa Bole International Airport, including MRO, cargo, flight operations, catering, and facility maintenance. Excludes subsidiaries like hotels and airport operations.

2. Key Definitions

- **Environmental Aspect:** Elements of activities affecting the environment (e.g., emissions, waste).
- **Significant Environmental Aspect:** Aspects with major impacts, assessed by severity and likelihood.
- **Green Procurement:** Purchasing decisions balancing environmental/social criteria with cost/performance.
- **Continual Improvement:** Recurring efforts to enhance environmental performance.

3. Organizational Context

Ethiopian Airlines considers internal (e.g., culture, processes), external (e.g., legal, economic), and environmental (e.g., climate, biodiversity) factors influencing its EMS. Regular reviews ensure alignment with business strategy.

4. EMS Framework

- **Plan-Do-Check-Act (PDCA):** Core methodology for EMS processes.
- **Key Components:**
 - Identification of environmental aspects and impacts.
 - Operational controls for significant aspects.
 - Monitoring via KPIs, audits, and compliance data.
 - Management reviews to drive decisions and improvements.

5. Compliance and Performance

- **Compliance Obligations:** Legal and voluntary requirements are tracked and met.
- **Performance Measurement:** Uses indicators like audit results, non-conformities, and objective progress.

The EMS Manual, aligned with ISO 14001:2015, outlines how Ethiopian Airlines identifies, evaluates, manages, and monitors environmental risks and impacts in its operations. For the Bishoftu International Airport, this manual provides a ready-to-apply environmental management framework that can be extended to the new facility. This ensures that

environmental performance at the new airport will be consistent with international best practices from the outset.

Key practices like identifying significant environmental aspects (e.g., fuel use, waste, air emissions), operational controls, and periodic audits are directly relevant to the airport's construction and operational phases.

The EMS enhances the ESIA process by:

- Providing a structured system (PDCA cycle) to implement the ESMP (Environmental and Social Management Plan).
- Offering mechanisms for compliance monitoring, performance evaluation, and continuous improvement, which are required components of a sound ESIA.
- Supporting the institutional capacity of the project proponent to implement the ESIA's mitigation and monitoring plans effectively.
- Facilitating integration of ESIA recommendations into operational practices through EMS tools like KPIs, audits, and management reviews.

4.4.15. Ethiopian Airlines Solid Waste Management Procedure

Ethiopian Airlines Group (EAG) has developed a comprehensive Solid Waste Management Procedure to ensure systematic, safe, and environmentally responsible handling of all waste streams across its operations. The procedure outlines a clear hierarchy—Avoid, Reduce, Reuse, Recycle, and Discard—and promotes a “zero landfill” target, demonstrating the Group's commitment to sustainable waste practices.

1. Purpose

To establish a systematic approach for the proper collection, transportation, segregation, and disposal of solid waste, aiming to minimize environmental impact through reduction, reuse, and recycling.

2. Scope

Applies to all solid waste-generating activities within Ethiopian Airlines' operations.

3. Policy Commitments

- Follow the waste hierarchy: Avoid → Reduce → Reuse → Recycle → Discard.

- Aim for "zero landfill" and exceed legal compliance.
- Minimize waste at the source and promote recycling.
- Assign clear roles/responsibilities for waste management.
- Maximize resource recovery and minimize health/environmental risks.

4. Key Definitions

- Waste: Any discarded material (solid/liquid, hazardous/non-hazardous).
- Surplus/Scrap: Usable materials with economic value (e.g., furniture, metals).
- Hazardous Waste: Poses threats to health/environment (e.g., chemicals, medical waste).
- Waste Handling: Includes collection, segregation, transport, and disposal.

5. Responsibilities

- Leadership (CEO, VPs): Ensure compliance and allocate resources.
- Manager Group Business Sustainability: Oversee policy implementation, training, and regulatory compliance.
- Departmental Managers: Enforce waste segregation and staff awareness.
- General Services: Handle collection, transport, and facility maintenance.
- Warehouse/Inventory Management: Manage scrap sales and disposal records.
- All Employees: Segregate waste, report issues, and support reduction initiatives.

6. Waste Segregation & Disposal

Color-Coded Bins:

- Red: Hazardous waste (e.g., chemicals, contaminated materials).
- Blue: Recyclables (plastics, metals, glass).
- Green: Non-recyclables (food waste, soiled items).
- Gray: Paper/cardboard.
- Yellow: Infectious/medical waste.

Three-Tier Segregation: Primary (source), secondary (collection points), tertiary (final sorting).

7. Special Waste Procedures

- Lead-Acid Batteries: Discharge, remove electrolyte, and label for disposal.
- Fluorescent Lamps: Store securely for safe transport.
- Sludge/Toner Cartridges: Dry, label, and dispose in approved landfills or recycle.

- Construction Waste: Separate materials (e.g., metal, wood) and handle hazardous items (e.g., asbestos) with expert consultation.

8. Reporting & Compliance

- Daily waste measurements and periodic reporting to ensure accountability.
- Documentation of scrap sales and disposal records.

The Bishoftu International Airport project, being a large-scale infrastructure initiative under EAG, will generate significant quantities of solid waste during both construction and operational phases, including:

- Construction debris (e.g., concrete, metals, wood, packaging).
- Municipal waste from staff and passengers.
- Hazardous waste such as lead-acid batteries, sludge, toners, and contaminated materials.

This procedure provides a standardized framework for managing such wastes efficiently and in compliance with national regulations and best industry practices. It ensures the following:

- Waste is properly segregated, stored, and disposed using color-coded systems and three-tier segregation.
- Special handling procedures are in place for hazardous and construction waste, aligning with occupational health and safety protocols.
- Roles and responsibilities are clearly defined—from leadership to frontline staff—ensuring accountability and effective implementation.
- Waste-related data (e.g., volumes, disposal records) are documented and monitored, supporting transparency and performance tracking.

The ESIA process requires the identification and management of environmental risks, including those related to solid and hazardous waste generation, handling, and disposal. EAG's waste management procedure:

- Supports the mitigation measures outlined in the ESIA by detailing specific operational practices to minimize environmental impacts.

- Demonstrates institutional capacity and readiness, satisfying key requirements of the ESIA legal framework (EIA Proclamation No. 299/2002) and international environmental standards (e.g., AfDB, IFC).
- Enhances the waste management plan (WMP) section of the ESIA, providing a ready-to-implement mechanism that aligns with both national and international obligations.
- Addresses social risks by reducing pollution, health hazards, and potential community grievances associated with improper waste handling.

4.5.Environmental Guidelines and Standards

Environmental guidelines and standards are essential tools that facilitate the integration of environmental and social considerations into development planning and implementation. For the Bishoftu International Airport Project, relevant national and international guidelines have been reviewed and applied, and the ESIA process has been carried out in accordance with applicable procedures. The following subsections highlight the key guidelines and standards relevant to the ESIA process and how they were contextualized to this project.

4.5.1. Environmental Impact Assessment Guideline (2000)

The guideline provides guidance to project proponents, regional governments and other parties involved to participate in the EIA process in a meaningful manner. The guideline indicates that EIA, strategic environmental assessment, social impact assessment, and project environmental assessment can be carried out in conjunction with each other.

The ESIA guideline covers sectors including agriculture, industry, transport, mining, dams and reservoirs, tanneries, textiles, hydropower generation, irrigation projects and resettlement. The Guideline focuses on the implementation of the following principles:

- The application of the EIA process at an early-stage investment planning.
- The participation of all interested and affected parties in the process.
- The consideration of all feasible alternatives for the project; and
- The application of an operational system that ensures transparency and accountability.

It also provides for the principles and process for engaging the public and other parties that could be potentially impacted by the project. Hence public consultation is recognized as an

important element of the planning and implementation of all development project as it helps to ascertain the public's views opinions and concerns.

The social and gender-related issue covers, among others, include:

- Women shall be treated equally with men and empowered to be totally involved in policy, programme, and project design, decision-making and implementation.
- Resettlement must ensure equal rights to women, children and indigenous populations and other vulnerable groups

This guideline provides overarching principles and operational guidance for implementing EIA in Ethiopia. For the Bishoftu International Airport, this guideline was used to:

- Ensure early integration of EIA during project conceptualization;
- Facilitate meaningful stakeholder and community participation, including through public consultation meetings and feedback integration;
- Evaluate feasible project alternatives, including siting and design options;
- Address gender and social inclusion, particularly with respect to impacts on women, vulnerable groups, and local communities.

The ESIA for this project aligns with these principles, ensuring transparency, inclusivity, and environmental sustainability.

The guideline's emphasis on gender inclusion was applied through assessment of the differentiated impacts on women and other vulnerable populations, especially regarding land acquisition and resettlement, in line with national gender policy and AfDB's ISS.

4.5.2. EIA Procedural Guideline (2003)

This guideline outlines the screening, review, and approval process for development projects in Ethiopia and the guideline defines the criteria for the ESIA. The EIA sets three categories:

- Schedule 1: This category includes projects that may have adverse and significant environmental impacts thus requiring a full EIA study.
- Schedule 2: Projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but are not likely to warrant a full EIA study fall under this group.

- Schedule 3: Projects which would have no impact and do not require an EIA.

The guideline, however, also specifies particular circumstances under which mandatory and full EIA study would be required, irrespective of the nature of the project. The projects defined as mandatory under Schedule 1 include those sited on land prone to erosion; desertification; areas of historic or archaeological interest; important landscape; and areas of religiously importance.

Based on the nature, scale, and potential impacts of the Bishoftu International Airport Project, the project was categorized under Schedule 1, requiring a full Environmental and Social Impact Assessment due to its significant and wide-ranging impacts on land, air quality, water resources, biodiversity, and local communities. Similarly, as per the AfDB Integrated Safeguards System (ISS), the project is classified as Category 1, indicating it is likely to have significant adverse environmental and/or social impacts that are diverse, irreversible, or unprecedented. This necessitated the preparation of a comprehensive ESIA and Environmental and Social Management Plan (ESMP), which were developed in compliance with both Ethiopian and AfDB procedures.

In accordance with this guideline, the full ESIA process was followed, including:

- Screening preparation and approval
- Scoping with Terms of Reference (ToR) preparation,
- Baseline data collection and stakeholder engagement,
- Impact assessment and development of mitigation measures,
- Preparation of ESMP and final submission for review and approval.

4.5.3. Environmental and Social Management Plan Preparation Guideline (2004)

This guideline provides the essential components to be covered in any environmental and social management plan (ESMP), including identifying impacts, mitigation measures and monitoring procedures to be followed by the project. The guideline also provides institutional arrangements for implementation.

This guideline was applied in developing the ESMP for the Bishoftu International Airport Project. This guideline specifies the structure and content required for an effective ESMP. The project's ESMP includes:

- Identified impacts and specific mitigation measures;
- Monitoring and reporting mechanisms;
- Institutional roles and responsibilities for implementation;
- Capacity building and budget provisions.

The ESMP has been tailored to the unique needs and risks of the Bishoftu International Airport Project and is consistent with both national and AfDB requirements.

4.5.4. Environmental Impact Assessment Directive (1/2008)

This directive identifies investment projects requiring mandatory ESIA. Airport construction is explicitly listed under this directive due to its potential to cause major environmental and social impacts. Accordingly, the Bishoftu International Airport Project was formally classified as a Schedule I project (equivalent to Category 1 under the African Development Bank's Integrated Safeguards System (ISS)), triggering the requirement for a comprehensive ESIA. This classification was confirmed through EPA's screening process. The directive was also used as a reference in preparing a full ESIA report and in ensuring that all mandatory steps—including stakeholder consultations and ESMP development—were conducted according to legal requirements. The regions are entitled to issue a similar directive to their own specific cases based on Directive 1/2008 and Environmental Framework Legislations.

4.5.5. Guideline Air Quality Standards for Ethiopia (2003)

The Guideline Air Quality Standards are part of the Ambient Environmental Quality Standards set by the Federal EPA with the goal of safeguarding public health and protecting the environment. The standards provide guideline values for priority ambient atmospheric pollutants, namely sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}) and lead (Pb). The guideline values are as per table below:

Guideline standards for priority ambient atmospheric pollutants

Compound	Guideline Value [$\mu\text{g}/\text{m}^3$]	Averaging time
Sulphur dioxide	500	10 minutes
	125	24 hours
	50	1 year
Nitrogen dioxide	200	1 hour
	40	1 year
Carbon monoxide	100 000	15 minutes
	60 000	30 minutes
	30 000	1 hour
	10 000	8 hours
Ozone	120	8 hours
Suspended Particulate Matter		
PM ₁₀	50	1 year
	150	24 hours
PM _{2.5}	15	1 year
	65	24 hours
Lead	0.5	1 year

4.5.6. Ambient Noise Standards and Vibration Limits for Ethiopia (2003)

The objective of these guidelines is to minimize the amount of noise to which people, living or working in sensitive locations, are exposed. Examples of such areas include domestic dwellings, hospitals, schools, places of worship, or areas of high amenity.

The sensitivity to noise is usually greater at night-time than it is during the day, by about 10 dB(A). Ideally, if the total noise level from all sources is taken into account, the noise level at sensitive locations should be kept within the following values:

Limits in dB(A) Leq

Area Code	Category of Area	Day time (6:00 am – 9:00 pm)	Night time (9:00 pm – 6:00 am)
A	Industrial area	75 dB(A)	70 dB(A)
B	Commercial area	65 dB(A)	55 dB(A)
C	Residential area	55 dB(A)	45 dB(A)

In some particularly quiet areas, such as pastoral, rural settings, where the background noise levels are very low, lower noise limits may be more appropriate. Audible tones and impulsive noise at sensitive locations at night should be avoided, irrespective of the noise level. Because of the variability in sensitivity to noise from one area to the next, it may be desirable to establish formal noise zoning criteria under the planning code.

In the case of quarrying and mining operations, the vibration levels from blasting should not exceed a peak particle velocity of 12 mm/sec, measured in any three mutually orthogonal directions at a receiving location when blasting occurs at a frequency of once per week, or less. For more frequent blasting the peak particle velocity should not exceed 8 mm/sec. These levels are for low frequency vibration, i.e., less than 40 Hertz. Blasting should not give rise to air overpressure values at sensitive locations which are in excess of 125 dB (Lin) max peak.

4.5.7. Surface Water Quality Standards for Ethiopia (2003)

Guideline standards for priority surface water pollutants with regard to protection of aquatic species are given below.

Parameter	Standard Value
Aluminium (Al)	200 µg/l
Ammonia (NH ₃)	Game Fish: 0.02 mg/l (un-ionized)
Arsenic (As)	50 µg/l
BOD ₅	≤ 5 mg/l O ₂
Cadmium (Cd)	5 µg/l
Chloride (Cl ⁻)	250 mg/l
Chromium (Cr)	50 µg/l
Copper (Cu)	5–112 µg/l (varies with hardness)
Cyanide (CN ⁻)	50 µg/l
Dissolved Oxygen (DO)	Game Fish: ≥ 6 mg/l (min), ≥ 9 mg/l (50%)
Fluoride (F ⁻)	1 mg/l
Lead (Pb)	50 µg/l
Mercury (Hg)	1 µg/l
Nickel (Ni)	100 µg/l
Nitrate (NO ₃ ⁻)	50 mg/l

Nitrite (NO ₂ ⁻)	Game Fish: 200 µg/l; Coarse Fish: 400 µg/l
pH	6–9
Phenols	0.5 µg/l
Suspended Solids (TSS)	≤ 25 mg/l (annual mean); ≤ 50 mg/l (max)
Zinc (Zn)	30–500 µg/l (varies with hardness)

4.6.Environmental and Social Safeguard Policies and Procedures of African Development Bank

Adopted in August 2000, this policy outlines AfDB's commitment to environmentally sustainable development across Africa. It emphasizes the assessments and mitigation of environmental impacts in every project. As part of its strategic approach to inclusive and green growth, the AfDB has set a policy of commitment through its operations to supporting Borrowers in the development and implementation of projects, other activities, and initiatives that are environmentally and socially sustainable. Again, as a policy, the Bank is committed to enhancing the capacity of member countries' and Borrowers' Environmental and Social Frameworks to assess and manage the environmental and social (E&S) risks and impacts of their projects.

To this end, the Bank has defined the E&S Operational Safeguards (OSs), which are designed to maximize positive impacts and to avoid, minimize, reduce, mitigate or compensate for the adverse E&S risks and impacts of projects, including those related to climate change. The Bank will assist Borrowers in their application of the OSs to projects, in accordance with this Environmental and Social Policy (AfDB ISS 2023).

4.6.1. The Integrated Safeguards Systems (ISS) of the AfDB

The African Development Bank adopted the 2013 Integrated Safeguards System (ISS) in 2013 to align Operational Safeguards with new policies, adopt Good International Industry Practice, adapt to evolving lending and investment products, harmonize safeguards with other multilateral finance institutions, and improve internal processes and resource allocation. The updated ISS (2023) focuses on mainstreaming safeguards in Bank-supported operations, providing appropriate safeguard approaches for new policies and financing mechanisms, and integrating Environmental and Social (ES) risks into operations. It improves convergence with other MFIs, aligns with key thematic

issues, and broadens coverage of E&S risks. The ISS also differentiates roles and responsibilities between the Bank and its Borrowers, provides more direction on E&S requirements for projects, and supports regional member countries in achieving Sustainable Development Goals. It also assists in strengthening safeguards systems and managing E&S risks.

The updated ISS includes the African Development Bank Group's Vision for Sustainable Development, Environmental and Social Policy, ten Operating Standards (OSs), and ISS Guidance Notes. These guidelines provide technical guidance on methodological approaches, Good International Industry Practice (GIIP), and standards for meeting OSs requirements. They are supplemented by World Bank Group Environmental, Health and Safety (EHS) Guidelines, providing advisory information. The ten Environmental and Social (E&S) Operating Standards (OSs) outline requirements for Borrowers to identify and manage E&S risks, aiming to protect communities, reduce poverty, and increase prosperity. The updated AfDB OS relevant to the project are as follows:

- E&S OS 1 (OS1): Assessment and Management of Environmental and Social Risks and Impacts
- E&S OS 2 (OS2): Labour and Working Conditions
- E&S OS 3 (OS3): Resource Efficiency and Pollution Prevention and Management
- E&S OS 4 (OS4): Community Health, Safety and Security
- E&S OS 5 (OS5): Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement
- E&S OS 6 (OS6): Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources
- E&S OS 7 (OS7): Vulnerable Groups
- E&S OS 8 (OS8): Cultural Heritage
- E&S O 10 (OS10): Stakeholder Engagement and Information Disclosure.

Therefore, within the parameters of a project, the Bank seeks that the proposed project needs to incorporate all actions and activities that would

- avoid or mitigate adverse impacts on people and the environment;
- conserve biodiversity and habitats that support it, and promote the efficient and equitable use of natural resources and ecosystem services;
- promote worker and community health and safety;

- ensure that there is no prejudice or discrimination against project-affected individuals or communities, and give particular consideration to vulnerable groups, including highly vulnerable rural minorities (HVRM) groups, especially where adverse impacts may arise or development benefits are to be shared;
- address project-level impacts on climate change and consider the impacts of climate change on the selection, siting, planning, design, implementation, and decommissioning of operations; and
- enhance stakeholder engagement through meaningful consultation, participation, and accountability.

Accordingly, the 10 Updated Operational Safeguards except that of OS9 on Financial Intermediaries which set out the mandatory requirements that apply to the projects, activities, and initiatives of Borrowers are assessed as relevant to the proposed Bishoftu International Airport in such a way that adverse environmental issues are either avoided, reduced or mitigated.

Table 4-1: The AfDB Environmental Safeguards applicable to the Bishoftu International Airpoty Project

E&S OSs	FOCUS	APPLICATION TO THE PROJECT	
OS 1	Assessment and Management of Environmental and Social Risks and Impacts	→ Legal and Institutional Framework, → Environmental and Social Risks and Impacts, → Analysis of Alternatives, → Design Measures, → Stakeholder Consultations and Record of meetings, consultations and surveys.	Applicable
OS 2	Labour and Working Conditions	→ Working conditions and management of worker relationships, → Protecting the work force, → Grievance mechanism, → Occupational Health and Safety (OHS)	Applicable
OS 3	Resource Efficiency and Pollution Prevention and Management	→ Resource efficiency (Energy use, water use, and raw material use), → Pollution prevention and management, → Management of hazardous and non-hazardous wastes, → Management of pesticides.	Applicable

OS 4	Community Health and Safety	→ Community exposure to health issues, → Management and safety of hazardous materials, → Traffic and road safety, → Emergency preparedness and response	Applicable
OS 5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	→ Displacement, → Collaboration with other responsible agencies or sub-national jurisdictions, → Technical and financial assistance, → Involuntary resettlement instruments.	Applicable
OS 6	Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources	→ Assessment of risks and impacts, → Conservation of biodiversity and habitats, → Sustainable management of living natural resource	Applicable
OS 7	Vulnerable Groups	→ Ensure that there is no prejudice or discrimination against project-affected individuals or communities, and give particular consideration to vulnerable groups, including highly vulnerable rural minorities (HVRM) groups, especially where adverse impacts may arise or development benefits are to be shared;	Applicable
OS 8	Cultural Heritage	→ Avoidance of adverse impacts, → Mitigation and development benefits → Proper protection and utilization of tangible and intangible resources	Applicable
OS 9	Financial Intermediaries		Not Applicable
OS 10	Stakeholder Engagement and Information Disclosure	→ Engagement during project preparation, implementation and operation → Proper reporting and evaluation, → Grievance mechanism, → Organizational capacity and commitment.	Applicable

4.6.2. The AfDB Integrated Safeguards System (ISS)

4.6.2.1.E&S OS 1 (OS1): Assessment and Management of Environmental and Social Risks and Impacts

Operational Safeguard 1 (OS1) serves as the overarching safeguard standard that governs the categorization of a project's environmental and social (E&S) risks and determines the type and scope of environmental and social assessments required. The primary objective of OS1 is to

ensure that African Development Bank (AfDB)-financed operations, such as the Bishoftu International Airport Project, are environmentally and socially sustainable, contributing meaningfully to broader development goals, including those related to climate change resilience, pollution control, and inclusive economic growth.

This safeguard has been triggered for the Bishoftu International Airport Project as the project is classified as Category 1, implying that it is likely to have significant adverse environmental and social risks and impacts within its area of influence. These impacts span across various domains including physical environment (land, water, air, and climate), biological and ecological resources, and socio-economic and cultural aspects (occupational health and safety, gender, community well-being, and cultural heritage).

To comply with OS1, a comprehensive Environmental and Social Impact Assessment (ESIA) has been undertaken. The ESIA process included:

- Scoping of all project components and activities;
- Detailed baseline analysis of the physical, biological, and socio-economic environment;
- Identification and analysis of potential risks and impacts—including cumulative and transboundary impacts;
- Consideration of project alternatives;
- Active stakeholder engagement throughout the assessment process;
- Integration of climate change risk and vulnerability considerations, particularly regarding infrastructure resilience and greenhouse gas (GHG) emissions.

The ESIA process confirmed that while the Bishoftu International Airport Project presents potential adverse impacts, these can be effectively mitigated through a structured and well-resourced Environmental and Social Management Plan (ESMP).

The ESMP developed as part of the ESIA includes:

- Specific mitigation measures tailored to each identified impact;
- Clear monitoring indicators and schedules;
- Institutional responsibilities and capacity-building requirements;
- A budget for implementation and monitoring;

- A grievance redress mechanism to ensure community concerns are heard and addressed in a timely manner.

During the project implementation phase, the ESMP will serve as the primary tool for managing E&S risks. The implementing agency will ensure:

- Deployment of qualified E&S personnel at site level;
- Monthly reporting to AfDB on ESMP implementation progress;
- Coordination with national regulatory authorities to ensure compliance with Ethiopian environmental laws;
- Continuous stakeholder consultation and disclosure of relevant E&S information.

In conclusion, the Bishoftu International Airport Project has fully complied with AfDB OS1 during the project preparation phase through the conduct of a participatory and in-depth ESIA. The project will continue to align with OS1 during implementation via the ESMP, ensuring that environmental and social risks are managed proactively and sustainably. This positions the project to not only meet AfDB requirements but also contribute to Ethiopia's sustainable development and climate adaptation efforts.

4.6.2.2.E&S OS 2 (OS2): Labour and Working Conditions

E&S Operating Standard 2 (OS2) of the African Development Bank's Integrated Safeguards System (ISS) recognizes the crucial role of employment creation and income generation in reducing poverty and promoting inclusive economic growth. It emphasizes that Borrowers, by ensuring fair treatment of workers and providing safe and healthy working conditions, can strengthen worker-management relationships and maximize the development benefits of a project. Respecting workers' rights is foundational for building a strong, productive, and motivated workforce.

OS2 is guided by international frameworks such as the International Labour Organization's (ILO) Declaration on Fundamental Principles and Rights at Work and the United Nations Guiding Principles on Business and Human Rights. It seeks to:

- Protect workers' rights
- Promote health and safety in the workplace

- Ensure fair treatment, non-discrimination, and equal opportunity for all workers, including vulnerable groups such as women, persons with disabilities, migrant workers, and youth
- Prohibit child labor and forced labor
- Support workers' rights to freedom of association and collective bargaining
- Provide accessible grievance mechanisms for labor-related complaints
- Ensure timely communication of potential labor-related risks and impacts

The minimum age for employment in Ethiopia, under the Federal Labour Proclamation (No. 1156/2019), is fifteen (15) years, which aligns with AfDB and ILO standards.

The construction and operation of the Bishoftu International Airport involve a large and diverse workforce, both skilled and unskilled. Ensuring decent working conditions is essential not only for the wellbeing of workers but also for minimizing risks related to labor disputes, accidents, and reputational damage. Labor and working condition standards are particularly important in major infrastructure projects where subcontractors are involved, and where there may be a risk of exploitation, unsafe working environments, or discrimination.

The Environmental and Social Impact Assessment (ESIA) conducted for the Bishoftu International Airport Project has identified labor-related risks and proposed mitigation measures aligned with the AfDB OS2 requirements. These include:

- Assessing labor supply chains and potential risks of child labor, forced labor, or unsafe conditions
- Recommending adherence to national labor laws and international conventions during contractor hiring
- Identifying the need for occupational health and safety (OHS) plans during construction and operation

The Environmental and Social Management Plan will ensure continued compliance during implementation through the following measures:

- Development and implementation of a Labor Management Plan (LMP), including clear procedures for recruitment, contracts, worker induction, and termination

- Establishment of a Worker Grievance Redress Mechanism (GRM) to allow safe, confidential, and accessible reporting of labor grievances
- Enforcement of Occupational Health and Safety (OHS) protocols, including PPE provision, safety training, and regular site inspections
- Monitoring compliance with minimum age and prohibition of forced labor in all tiers of subcontracting
- Requiring contractors to sign a Code of Conduct committing to fair labor practices, non-discrimination, and respect for workers' rights

These actions will be monitored by the project's Environmental and Social Management Unit (ESMU), and regular reports will be submitted to AfDB to ensure OS2 compliance throughout the project lifecycle.

4.6.2.3.E&S OS 3 (OS3): Resource Efficiency and Pollution Prevention and Management

The African Development Bank's Operational Safeguard 3 (OS3) acknowledges that economic activities—such as those associated with large-scale infrastructure projects like the Bishoftu International Airport—can result in significant environmental and social impacts, including air, water, and land pollution. These impacts can pose threats to human health, ecosystems, and the climate, particularly given the current and projected concentrations of greenhouse gases.

OS3 sets out clear requirements for promoting resource efficiency and pollution prevention across all phases of a project's lifecycle. Under this safeguard, Borrowers are obligated to assess and adopt the most technically and financially feasible and cost-effective options for enhancing resource efficiency and minimizing pollution.

For the Bishoftu International Airport Project, the ESIA has already incorporated a comprehensive assessment of potential pollutant discharges and their implications on local and regional environmental carrying capacities, ecosystem services, land use, soil quality, agriculture, water resources (both surface and groundwater), and the surrounding communities. The assessment has also considered cumulative impacts and the proximity of the project site to sensitive ecosystems and water bodies.

To ensure alignment with OS3, the ESIA has identified key sources of emissions and waste, and proposed mitigation measures to address them. These include strategies to:

- Promote sustainable use of energy, water, and raw materials;
- Reduce pollution from construction and operational activities;
- Prevent and manage the use of hazardous substances (e.g., fuels, lubricants, cleaning agents);
- Minimize both short-lived and long-lived climate pollutants;
- Address the generation and disposal of both hazardous and non-hazardous wastes.

During project implementation, the Environmental and Social Management Plan (ESMP) will operationalize these commitments by:

- Requiring the contractor to implement a Pollution Prevention and Management Plan, which outlines protocols for emissions, discharges, solid and liquid waste management, and handling of hazardous materials;
- Establishing clear monitoring and reporting mechanisms to track resource consumption, waste generation, and pollution levels in compliance with Ethiopian national regulations and AfDB ISS (2023);
- Incorporating training programs for workers on resource efficiency and pollution control practices;
- Setting up a waste segregation, recycling, and disposal system at both the construction and operational stages.

By complying with OS3, the Bishoftu International Airport Project aims to reduce its environmental footprint, safeguard public health, and contribute to climate resilience while supporting the region's economic development goals in a sustainable manner.

4.6.2.4.E&S OS 4 (OS4): Community Health, Safety and Security

This Operational Safeguard (OS4) recognizes that development projects, including large-scale infrastructure such as international airports, can significantly increase community exposure to environmental, health, safety, and security risks. Such risks can arise from construction activities, increased traffic, introduction of hazardous materials, or operational hazards. In regions already affected by climate change impacts, such projects may further intensify vulnerabilities, making risk mitigation a critical component of project planning and implementation.

For the Bishoftu International Airport Project, OS4 is highly relevant due to the potential health and safety risks posed to the surrounding communities during both the construction and operation phases. These include risks from construction-related noise and dust emissions, increased vehicle traffic, communicable disease transmission, and safety hazards associated with the movement of heavy machinery and materials.

OS4 aims to:

- Prevent adverse health and safety impacts on project-affected communities throughout the project lifecycle.
- Promote public health and safety by ensuring robust design and construction standards, reducing exposure to project-related traffic accidents, pollution, and hazardous materials.
- Address climate-related impacts and emergency preparedness.
- Safeguard against the risk of sexual exploitation, abuse, and harassment (SEAH) by project workers.
- Ensure the conduct of security personnel is in line with international human rights standards.

The Environmental and Social Impact Assessment (ESIA) conducted for the Bishoftu International Airport Project has already incorporated the key requirements of OS4. The ESIA includes:

- Identification and assessment of community health and safety risks related to air quality, traffic, noise, labor influx, disease transmission, and emergency scenarios.
- Climate risk assessment that considers potential exacerbation of health vulnerabilities due to extreme weather events or temperature rise.
- Evaluation of security risks and the potential need for private or public security personnel during construction.

The Environmental and Social Management Plan (ESMP) developed alongside the ESIA ensures future compliance with OS4 during the implementation phase by:

- Including a detailed Community Health and Safety Management Plan to address identified risks.

- Defining measures for emergency preparedness and response, including training of workers and community awareness programs.
- Establishing a Traffic Management Plan to reduce accidents and ensure safe access for local communities.
- Incorporating occupational and public health protocols, especially concerning communicable diseases.
- Requiring that all security personnel deployed for the project receive training on human rights and community engagement, in line with OS4 guidelines.
- Setting up a Grievance Redress Mechanism (GRM) to ensure affected communities can raise concerns and receive timely responses, fostering transparency and trust.

In summary, OS4 is critical to safeguarding the health and safety of local communities around the Bishoftu International Airport. The project's ESIA has addressed these issues comprehensively, and the ESMP outlines robust implementation measures aligned with the African Development Bank's ISS 2023 to ensure ongoing compliance throughout the project lifecycle.

4.6.2.5.E&S OS 5 (OS5): Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement

Environmental and Social Operational Safeguard (OS) 5 of the African Development Bank (AfDB) recognizes that project-related land acquisition, restrictions on land access, and loss of property can lead to significant adverse impacts on individuals and communities. These impacts may include both physical displacement (loss of shelter) and economic displacement (loss of income sources or access to resources), which in turn can cause severe economic, social, and environmental risks if not properly managed.

According to OS5, resettlement is deemed involuntary when affected people do not have the legal right to refuse displacement due to land acquisition or restrictions. In such cases, the safeguard emphasizes that involuntary resettlement must be avoided whenever possible. If it is unavoidable, impacts should be minimized, and comprehensive mitigation measures must be carefully designed and implemented.

The safeguard mandates that physical investments supported by the Bank, such as the Bishoftu International Airport project, shall only proceed when the land in question is free from conflict,

encumbrances, or unresolved tenure issues. OS5 also emphasizes that any resettlement activities should be treated as sustainable development programs that improve or at least restore the livelihoods and living standards of the displaced people. This includes proper planning, implementation, consultation, disclosure, and establishment of a monitoring mechanism to track resettlement outcomes.

The construction of the Bishoftu International Airport involves land acquisition and may potentially affect individuals and communities in the project area through displacement or restrictions on land use. In alignment with AfDB OS5, the ESIA process for this project has:

- Identified and assessed the potential environmental and social impacts associated with land acquisition and displacement.
- Recommended the preparation of a comprehensive Resettlement Action Plan (RAP) in accordance with AfDB standards, including detailed strategies for compensation, relocation, and livelihood restoration.
- Ensured the meaningful engagement of affected persons through inclusive consultation and information disclosure processes.

The ESIA for the Bishoftu International Airport project has fully complied with the requirements of OS5 by:

- Conducting a baseline survey and impact assessment to understand the nature and extent of land acquisition and displacement.
- Recommending mitigation measures and institutional responsibilities for RAP preparation and implementation.
- Proposing grievance redress mechanisms to ensure affected communities have access to a transparent and effective complaint-handling system.

During the implementation phase, the Environmental and Social Management Plan (ESMP) will ensure continued compliance with OS5 through the following actions:

- Timely implementation of the RAP, including fair and prompt compensation for lost assets and assistance for livelihood restoration.
- Monitoring and reporting of resettlement activities to assess effectiveness and make necessary adjustments.

- Capacity building for implementing agencies to manage resettlement activities in line with good international practices.
- Ensuring the rights of vulnerable groups are protected, and that no forced eviction takes place without due process.

By adhering to OS5, the Bishoftu International Airport project aims to not only minimize social harm but also contribute to improved social and economic outcomes for project-affected persons, thus supporting Ethiopia's broader sustainable development goals.

4.6.2.6.E&S OS 6 (OS6): Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources

Operational Safeguard 6 (OS6) of the African Development Bank (AfDB) focuses on biodiversity and habitat conservation as well as the sustainable management of living natural resources. It sets out mandatory requirements for borrowers to conserve biodiversity, maintain the integrity of natural habitats, and ensure the sustainable use of ecosystem services. OS6 aligns with key international environmental agreements such as the Convention on Biological Diversity, Ramsar Convention on Wetlands, Convention on the Conservation of Migratory Species, and others. The safeguard underscores the importance of maintaining core ecological functions and supporting the livelihoods of local and vulnerable communities, especially under the pressures of a changing climate.

In the context of the Bishoftu International Airport Project, OS6 is particularly relevant due to the project's potential footprint on local ecosystems, land cover, and natural resources within and surrounding the project area. The area includes environmentally sensitive zones and serves as a habitat for various species, possibly including migratory birds and aquatic ecosystems given its proximity to lakes and wetlands.

The Environmental and Social Impact Assessment (ESIA) for the Bishoftu International Airport Project has fully integrated the principles of OS6 by:

- Conducting a detailed ecological and biodiversity baseline assessment of the project influence area, identifying sensitive habitats, species of concern, and ecosystem services.
- Screening and scoping for biodiversity risks and potential cumulative impacts, with particular attention to priority conservation areas and ecosystem connectivity.

To comply with OS6 during the implementation phase, the Environmental and Social Management Plan (ESMP) includes specific and enforceable actions such as:

- Development and implementation of a Biodiversity Management Plan (BMP) to avoid, minimize, and offset biodiversity impacts. This includes strategies for habitat restoration, mitigation of fragmentation, and protection of ecologically significant zones.
- Application of the mitigation hierarchy (avoid, minimize, restore, offset) and the precautionary approach to manage biodiversity risks.
- Integration of biodiversity-friendly practices into construction and operation activities, such as scheduling works to avoid breeding seasons or migration periods.
- Ongoing monitoring of habitats and key species, with adaptive management measures in case unexpected biodiversity impacts arise.
- Engagement with local communities, particularly those who rely on natural resources, to promote sustainable practices and ensure that livelihood strategies are not compromised by the project.

Through these commitments, the project aims to achieve "no net loss and preferably net gain" in biodiversity, in full alignment with the objectives of OS6. The measures outlined in the ESMP will also support the protection of local and global ecosystem services and contribute to inclusive and sustainable economic development in the Bishoftu area.

4.6.2.7.E&S OS 7 (OS7): Vulnerable Groups

The African Development Bank (AfDB) recognizes economic and social rights as integral to human rights and urges its borrowers to adhere to international norms and good practices. Vulnerable individuals and groups—such as female-headed households, landless persons, the elderly, youth, children, persons with disabilities, marginalized communities, and highly vulnerable rural minorities (HVRM)—are often more exposed to and less capable of coping with project-related risks and adverse impacts.

Operational Safeguard 7 (OS7) of the AfDB Integrated Safeguards System (ISS, 2023) is particularly relevant to the Bishoftu International Airport Project, as the project's area of influence may include diverse vulnerable groups who require special consideration to ensure inclusive and equitable development. OS7 aims to ensure that projects not only avoid harm but

also promote opportunities for vulnerable groups while respecting their rights and cultural identities. It promotes a gender-responsive approach, taking into account the differentiated needs and interests of women, men, girls, and boys.

For the Bishoftu International Airport development, OS7 is critical to ensuring that the voices and needs of potentially affected vulnerable populations are incorporated into all stages of project planning, implementation, and monitoring. The airport project, due to its scale and regional impact, has the potential to affect access to land, local livelihoods, and social cohesion. Therefore, proactively addressing the concerns of vulnerable groups is essential to reducing risks, enhancing development outcomes, and securing local support.

The Environmental and Social Impact Assessment (ESIA) for the project has incorporated OS7 principles by:

- Identifying vulnerable groups during baseline socio-economic surveys.
- Conducting inclusive stakeholder engagement and public consultations, including with women, persons with disabilities, youth, and elderly members of the community.
- Assessing project impacts on vulnerable groups and proposing targeted mitigation measures.

During implementation, the Environmental and Social Management Plan (ESMP) will ensure continued compliance with OS7 through the following actions:

- Development of a Vulnerable Groups Plan (VGP): The ESMP will include a standalone or integrated VGP to outline strategies for protecting the rights of vulnerable populations, ensuring their participation in decision-making, and promoting equitable access to benefits such as employment, compensation, and community infrastructure.
- Free, Prior, and Informed Consent (FPIC): For any groups meeting FPIC criteria, the project will ensure meaningful engagement, consent, and culturally appropriate benefit-sharing mechanisms.
- Capacity-building and livelihood support: Tailored livelihood restoration, skills training, and economic inclusion initiatives will be implemented for vulnerable groups, including women and youth.

- Accessible grievance mechanisms: The project will establish and operationalize a grievance redress mechanism (GRM) that is culturally sensitive, inclusive, and easy to access for all, including illiterate or physically challenged individuals.
- Monitoring and adaptive management: The ESMP includes indicators and monitoring tools to track the effectiveness of mitigation measures for vulnerable groups and to adapt interventions based on community feedback.

In summary, OS7 is a cornerstone for ensuring that the Bishoftu International Airport Project is socially inclusive, promotes equitable development, and avoids exacerbating existing vulnerabilities. The ESIA and ESMP fully align with the AfDB's safeguard requirements, laying the foundation for a project that is both sustainable and socially responsible.

4.6.2.8.E&S OS 8 (OS8): Cultural Heritage

The African Development Bank (AfDB) recognizes that cultural heritage is an inherent and essential component of people's self-identity and a vital link between the past, present, and future. Cultural heritage encompasses both tangible and intangible assets—such as historic structures, archaeological sites, traditional practices, rituals, languages, and art forms—that reflect the values, beliefs, knowledge, and traditions of a community. These resources are critical not only for preserving identity and continuity but also as valuable scientific, historical, economic, and social assets that contribute to sustainable development.

Operational Standard 8 (OS8) under AfDB's Integrated Safeguards System (ISS 2023) sets forth requirements to protect cultural heritage throughout the project life cycle. The main objectives of OS8 are to:

- Safeguard cultural heritage from the adverse impacts of development projects,
- Promote its preservation and sustainable use,
- Facilitate meaningful stakeholder consultation,
- Ensure that communities benefit equitably from any use of cultural heritage,
- And incorporate traditional knowledge systems into project planning.

The construction and operation of the Bishoftu International Airport, due to its large-scale earthworks, infrastructure development, and potential for land acquisition, may have direct or indirect impacts on local cultural heritage assets—both known and previously unrecorded. The project is being implemented in an area with potential cultural, historical, or spiritual

significance to local communities. Therefore, integrating OS8 requirements is crucial for preserving these values and mitigating potential risks to heritage resources.

During the Environmental and Social Impact Assessment (ESIA) for the Bishoftu International Airport:

- A comprehensive cultural heritage screening and assessment was conducted within the project's area of influence.
- Consultations with local authorities, community elders, and cultural institutions were carried out to identify and document existing cultural heritage resources, including sites of spiritual, historical, or community value.
- The ESIA report includes an initial inventory of cultural resources and an assessment of the potential impacts from project activities.
- A "Chance Finds Procedure" was developed and included as part of the ESIA to guide contractors and workers on proper steps to take if previously unidentified cultural heritage materials are discovered during construction.

The Environmental and Social Management Plan (ESMP) includes specific measures aligned with OS8 to ensure cultural heritage protection during the construction and operational phases:

- Implementation of the Chance Finds Procedure: Construction personnel will be trained on the procedure, which ensures that any unexpected discoveries are properly documented, protected, and reported to the relevant cultural authorities before proceeding.
- Stakeholder engagement: The project will continue to engage local communities and cultural experts to respect and integrate cultural knowledge and values into construction plans, particularly in areas near sensitive heritage zones.
- Avoidance and minimization of impacts: Where feasible, the design and construction activities will be adjusted to avoid disturbance to heritage sites. In cases where avoidance is not possible, appropriate relocation, documentation, or conservation measures will be implemented in collaboration with competent authorities.

In line with AfDB OS8, the Bishoftu International Airport Project has taken proactive steps through its ESIA process to assess and protect cultural heritage. The ESMP ensures that these efforts will be translated into practical measures during project implementation. This approach

not only mitigates risks but also fosters sustainable development by valuing and preserving Ethiopia's rich cultural heritage.

4.6.2.9.E&S O 10 (OS10): Stakeholder Engagement and Information Disclosure

The African Development Bank (AfDB) recognizes that inclusive and transparent stakeholder participation is fundamental to achieving socially just and sustainable development. Operational Safeguard 10 (OS10) emphasizes the importance of meaningful stakeholder engagement and effective information disclosure throughout the project life cycle. This is particularly relevant to the Bishoftu International Airport project, which involves significant land use, environmental, and social considerations with potential impacts on surrounding communities.

OS10 promotes open, early, and continuous engagement between the Borrower and project-affected stakeholders to ensure that community concerns, particularly those of vulnerable groups and women, are integrated into project design and implementation. It supports inclusive dialogue, enhances project acceptance, contributes to better environmental and social performance, and helps to mitigate potential risks.

In compliance with OS10, the Environmental and Social Impact Assessment conducted for the Bishoftu International Airport project included a thorough stakeholder analysis and a participatory consultation process. Stakeholders consulted included local community members, local government authorities, civil society organizations, and vulnerable and marginalized groups. These consultations helped in identifying key environmental and social risks, community concerns, and development priorities. The outcomes were integrated into the design of project components and the formulation of mitigation measures.

A Stakeholder Engagement Plan (SEP) has been prepared in line with OS10, detailing the identification of key stakeholders, engagement methods, information disclosure protocols, and grievance redress mechanisms. This SEP will continue to guide stakeholder interactions during project implementation, ensuring that the process remains inclusive, transparent, and culturally appropriate. Special attention is given to incorporating the perspectives of women, youth, and other vulnerable populations.

Furthermore, to ensure transparency and adherence to OS10 requirements, the ESIA report will be publicly disclosed for at least 120 days prior to AfDB Board appraisal, following clearance

from both the Bank and the Ethiopian Environmental Protection Authority (EPA). The SEP is disclosed as a standalone document, accessible to all stakeholders, with printed copies available at local administration offices.

During project implementation, the Environmental and Social Management Plan will operationalize the SEP through continuous community engagement, regular project updates, and an accessible grievance redress mechanism (GRM). This system allows project-affected persons to raise concerns or complaints and receive timely and fair resolution.

By aligning with the AfDB ISS (2023), particularly OS10, the Bishoftu International Airport project strengthens the transparency, inclusiveness, and accountability of its environmental and social performance—ultimately contributing to enhanced local benefits, reduced risks, and successful project delivery.

4.7. Comparison of the National legislations and the AfDB's Operational Standards

Key Area	National Legislation (e.g., Ethiopian Context)	AfDB Operational Safeguards (OS)	Comparison / Remarks
Environmental Assessment Requirement	Environmental Impact Assessment (EIA) is mandatory for projects with potential significant impacts under the EIA Proclamation No. 299/2002.	OS1: Environmental and Social Assessment requires comprehensive ESIA/ESMP for category 1 projects.	Both frameworks require environmental assessments, but AfDB emphasizes broader social impacts and cumulative impacts. In this case AfDB OS1 takes precedence.
Categorization of Projects	Projects are categorized by MoWE/EPA into three levels (Schedule I, II, III) based on expected impact.	Projects are classified into Category 1, 2, or 3 based on significance of environmental and social risks.	Similar approach, but AfDB uses more detailed screening criteria and integrates social dimensions more explicitly. Accordingly, AfDB OS1 takes precedence

Public Consultation and Disclosure	Mandatory public consultation is required during the EIA process, particularly with affected communities.	OS1 and OS10 (Disclosure) require meaningful consultation throughout the project cycle and free, prior, and informed consultation (FPIC) for indigenous peoples.	AfDB standards are more comprehensive in terms of timing, depth, and inclusivity of consultation. Accordingly, AfDB OS1 takes precedence
Resettlement and Compensation	Governed by Proclamation No. 1161/2019 (expropriation, compensation, and resettlement). Compensation is based on landholding and improvements.	OS5: Involuntary Resettlement requires a Resettlement Action Plan (RAP), livelihood restoration, and improved living standards.	AfDB places stronger emphasis on livelihood restoration and full replacement cost, exceeding national requirements. Accordingly, AfDB OS5 takes precedence
Biodiversity and Ecosystems	Protected under the Environmental Policy of Ethiopia, Wildlife Development Proclamation, and Forestry Laws.	OS6: Biodiversity and Ecosystem Services calls for avoiding critical habitats and implementing offset measures.	National laws protect biodiversity, but AfDB explicitly requires no net loss and biodiversity offsets.
Pollution Prevention and Resource Efficiency	The EIA Guidelines require pollution control measures; effluent standards are provided by MoWE.	OS3: Pollution Prevention and Resource Efficiency focuses on best practices, GHG reduction, and efficient resource use.	AfDB's requirements are more detailed and aligned with international standards (e.g., WHO, IFC). Accordingly, AfDB OS3 takes precedence
Labor and Working	Covered under the Labour Proclamation	OS2: Labor Conditions, Health and Safety	National law and AfDB align well; AfDB

Conditions	No. 1156/2019, including occupational safety, wages, and working hours.	addresses core labor rights, child labor, grievance mechanisms, and OHS.	provides stronger monitoring and grievance mechanisms. Accordingly, AfDB OS2 takes precedence
Vulnerable Groups and Gender	National law promotes gender equality (e.g., Constitution Art. 35), but implementation is limited.	All OSs, especially OS1 and OS7, stress inclusion of vulnerable groups, gender analysis, and mitigation of GBV.	AfDB requires more structured vulnerability and gender assessments and responsive actions. Accordingly, AfDB OS1 takes precedence
Grievance Redress Mechanism (GRM)	No national legal requirement for GRM in EIA, though some institutions adopt informal mechanisms.	Required under OS1 and OS5 to establish accessible, culturally appropriate GRMs for stakeholders.	AfDB has mandatory GRM systems; national frameworks often lack formal enforcement.

4.8. IFC Performance Standards

IFC adopted eight Performance Standards on Social and Environmental Sustainability (IFC, 2012) in order to manage social and environmental risks and impacts and to enhance development opportunities.

Performance Standard 1 establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project.

Performance Standards 2 to 8 establish objectives and requirements to avoid, minimize, and where residual impacts remain, to compensate/ offset for risks and impacts to workers, affected communities, and the environment. While all relevant environmental and social risks and potential impacts should be considered as part of the assessment, Performance Standards 2 to 8 describe potential environmental and social risks and impacts that require particular attention. Where environmental or social risks and impacts are identified, the client is required to manage

them through its Environmental and Social Management System (ESMS) consistent with Performance Standard 1.

A number of cross-cutting topics such as climate change, gender, human rights, and water, are addressed across multiple Performance Standards.

4.8.1. IFC PS 1: Assessment and Management of Environmental and Social Risks and Impacts

Performance Standard PS 1 applies to all projects that have environmental and social risks and impacts. It underscores the importance of managing environmental and social performance throughout the life of a project.

Its objectives are:

- To identify and evaluate environmental and social risks and impacts of the project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/ offset for risks and impacts to workers, affected communities, and the environment.
- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from affected communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

4.8.2. IFC PS 2: Labor and Working Conditions

Performance Standard PS 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The requirements set out in PS 2 have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).

Its objectives are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.

- To establish, maintain and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labor.

Workers will be employed especially during the construction phase of the Project, thus triggering this Performance Standard.

4.8.3. IFC PS 3: Resource Efficiency and Pollution Prevention

Performance Standard PS 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. PS 3 outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. In addition, it promotes the ability of private sector companies to adopt such technologies and practices as far as their use is feasible in the context of a project that relies on commercially available skills and resources.

Its objectives are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce Project-related GHG emissions.

As the project will have certain amounts of waste water and different types of waste will be produced during construction and operation of the plant, this Performance Standard is triggered.

4.8.4. IFC PS 4: Community Health, Safety, and Security

Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, PS 4 addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.

Its objectives are:

- To anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected communities.

Community health, safety and security will be a topic during all phases of the Project.

4.8.5. IFC PS 5: Land Acquisition and Involuntary Resettlement

Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/ or restrictions on land use.

Its objectives are:

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.

- To improve, or restore, the livelihoods and standards of living of displaced persons
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

This Performance Standard will be triggered by the Project, will leads physical displacement (relocation or loss of shelter) and economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood).

4.8.6. IFC PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in PS 6 have been guided by the Convention on Biological Diversity.

Its objectives are:

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Due to air emissions during construction stage as well as due to the production of waste water and wastes during construction and operation, this Performance Standard is triggered by the Project.

4.8.7. IFC PS 7: Indigenous Peoples

Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.

Its objectives are:

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.
- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.

This Performance Standard will not be triggered by the Project as no groups of Indigenous People are living in the Project Area.

4.8.8. IFC PS 8: Cultural Heritage

Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, PS 8 aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this PS on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Its objectives are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

There is no cultural heritage known to be located in the Project Area. Thus, this Performance Standard would only be triggered if any unexpected cultural or archeological goods were found during construction.

4.9. World Bank's Environmental and Social Policy Framework

The World Bank's Environmental and Social Framework, which became effective in October 2018, sets out the Bank's commitment to sustainable development through a risk-based approach that promotes environmental and social sustainability in project design and implementation. The ESF is applicable to all investment project financing (IPF) supported by the Bank and is particularly relevant for infrastructure projects such as the Bishoftu International Airport.

The ESF is anchored by ten Environmental and Social Standards, which define the requirements that borrowers must meet in the preparation and implementation of projects. These standards are:

1. ESS1: Assessment and Management of Environmental and Social Risks and Impacts: Requires a comprehensive assessment of environmental and social risks and impacts, including mitigation measures, monitoring, and stakeholder engagement.
2. ESS2: Labor and Working Conditions: Ensures fair treatment, non-discrimination, and protection of workers, including occupational health and safety provisions.
3. ESS3: Resource Efficiency and Pollution Prevention and Management: Addresses the sustainable use of resources, energy efficiency, and control of pollution (air, water, noise, hazardous materials, etc.).
4. ESS4: Community Health and Safety: Seeks to protect local communities from project-related risks such as traffic safety, exposure to hazardous materials, and emergency preparedness.
5. ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement: Provides guidelines for avoiding or minimizing displacement and ensuring compensation and livelihood restoration when unavoidable.
6. ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Promotes the protection and sustainable management of biodiversity and ecosystems.

7. ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities: Ensures respect for the rights, dignity, and culture of indigenous and underserved communities, where relevant.
8. ESS8: Cultural Heritage: Requires the identification and protection of tangible and intangible cultural heritage affected by the project.
9. ESS9: Financial Intermediaries: Applies to projects where financing is channeled through financial intermediaries.
10. ESS10: Stakeholder Engagement and Information Disclosure: Emphasizes meaningful consultation, stakeholder participation, and public disclosure throughout the project life cycle.

The implementation of the ESF in the Bishoftu International Airport project ensures that the environmental and social risks are appropriately managed and mitigated in accordance with international best practices.

4.10. World Bank Environmental, Health and Safety (EHS) Guidelines for Airports

The World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Airports provide international best practice standards for managing environmental, occupational health and safety, and community impacts associated with the development and operation of airport infrastructure. These guidelines are part of the broader EHS General and Industry-Specific Guidelines and are widely used for assessing and managing risks in airport projects financed by international financial institutions, such as the African Development Bank (AfDB) and the World Bank.

In contexts where national regulations are absent, outdated, or less stringent, these guidelines offer a benchmark for ensuring compliance with Good International Industry Practice (GIIP) and enhancing project sustainability.

Key Areas Covered in the EHS Guidelines for Airports

1. Air Emissions and Energy Management

- Control of emissions from aircraft engines, auxiliary power units (APUs), ground support equipment (GSE), and vehicles.
- Promotion of energy efficiency in terminal buildings, hangars, and other facilities.

Application to Project: The Bishoftu International Airport ESIA incorporates emission source identification and proposes mitigation measures in line with these guidelines. The ESMP includes provisions for fuel efficiency, reduced idling times, and adoption of clean energy sources.

2. Noise Management

- Assessment of aircraft and ground operation noise levels.
- Implementation of noise abatement procedures and land-use planning to reduce exposure of nearby communities.

Application to Project: Noise modeling and buffer zone design are guided by these standards, with mitigation measures such as sound barriers, operational scheduling, and routing protocols integrated into the ESMP.

3. Water and Wastewater Management

- Prevention of contamination from fuel, de-icing chemicals, and fire suppression systems.
- Design of proper drainage, oil-water separators, and treatment systems.

Application to Project: The ESIA assesses risks to water resources and recommends stormwater and wastewater management practices in accordance with EHS standards.

4. Hazardous Materials and Waste Management

- Safe handling, storage, and disposal of hazardous materials such as jet fuel, lubricants, chemicals, and firefighting foam (e.g., PFAS).
- Management of solid waste from terminals, runways, and aircraft operations.

Application to Project: The ESMP outlines procedures for hazardous waste segregation, storage, and disposal based on EHS guidelines, with special attention to emergency response and spill containment.

5. Occupational Health and Safety (OHS)

- Protection of workers from noise, vibration, heat, chemical exposure, and fall hazards.

- Provision of personal protective equipment (PPE), emergency training, and regular health monitoring.

Application to Project: Construction and operational phase OHS plans for Bishoftu International Airport follow EHS-recommended protocols for risk assessment, site supervision, and contractor management.

6. Community Health and Safety

- Management of traffic safety, public exposure to emissions and noise, and risks from aircraft operations.
- Emergency preparedness and stakeholder engagement mechanisms.

Application to Project: The ESIA includes a Community Health and Safety Plan in alignment with EHS guidelines, addressing risks to nearby settlements and including a grievance redress mechanism.

The World Bank EHS Guidelines for Airports serve as a critical reference for environmental and safety management throughout the lifecycle of the Bishoftu International Airport Project. Their adoption ensures that the project not only meets international expectations but also fills gaps where local environmental, health, and safety standards may be insufficient. The guidelines are fully integrated into the Environmental and Social Impact Assessment and the Environmental and Social Management Plan to guide implementation, monitoring, and continuous improvement.

4.11. Environment Related International Agreements Signed by Ethiopia

Ethiopia is a member of the League of Nations and joined the United Nations on 13 November 1945. Ethiopia is party to the following international environmental agreements (with date of ratification):

- **Convention on Biological Diversity**

The Convention on Biological Diversity was adopted at the Earth Summit in Rio de Janeiro, Brazil in June 1992, and entered into force in December 1993. As the first treaty to provide a legal framework for biodiversity conservation, the convention established three main goals: -

- The conservation of biological diversity.

- The sustainable use of its components and
- The fair and equitable sharing of the benefits arising from the use of genetic resources.

The Convention was ratified by the FDRE in May 1994 by proclamation number 98/1994. The Convention on Biological Diversity takes a proactive approach to ensure biodiversity, while providing for human needs through sustainable development and utilization. The Convention also highlights the importance of indigenous peoples on conservation and sustainable developments, in addition to recognizing the need for fair and equitable sharing of benefits from use of genetic resources (UNEP 1999).

Ethiopia has also ratified the Cartagena Protocol on Bio-safety to the Convention on Biological Diversity by Proclamation No. 362/2003.

- **United Nations Convention to Combat Desertification (CCD)**

The objective of this Convention is to combat desertification and mitigate the effects of droughts in countries experiencing serious drought and/or desertification, particularly for countries in Africa including Ethiopia. Ethiopia has ratified the Convention through its Proclamation No. 80/1997. One of the tools to combat desertification is conserving the vegetation cover of a given area and planting more trees and grasses to sequester carbon dioxide, which is one of the major greenhouse gases responsible for climate change. Moreover, use of green energy sources as well as clean industrial production methods/technologies is also considered as one of the major intervention to reduce emission of carbon dioxide. It is also expected that major polluters should finance the efforts of countries engaged on green development.

During the implementation of the SASC project, maximum care will be taken to minimize the loss of shrubberies and any other vegetation while excavating sewer lines and constructing sanitary infrastructures as much as it is possible. Moreover, attempts will be made to plant trees and grasses at least equivalent in amount or area coverage to what is to be lost.

- **United Nations Framework Convention on Climate Change (FCCC, 1992)**

Ethiopia ratified this convention through Proclamation No. 97/1994 on May 2/1994. This convention takes into account the fact that climate change has trans-boundary impacts. The basic objective of this convention is to provide for agreed limits on the release of greenhouse gases into the atmosphere so as to prevent the occurrence of climate change. It also aims to prepare countries to minimize the impact of climate change as much as practicable through a number of interventions.

- **The Stockholm Convention**

In the year 2002, Ethiopia fully accepted and ratified the Stockholm Convention on Persistent Organic Pollutants by proclamation No. 279/2002 designed to ban the use of Persistent Organic Pollutants (POPS). The Environmental Protection Authority has the full mandate to implement the Convention at the national level.

- **Convention on the protection of World Cultural and Natural Heritage**

Each state which is party to this convention recognizes that the duty of ensuring the identification, protection, conservation, preservation and transmission to future generation of the culture and natural heritage situated on its territory, belongs primarily to the state. Ethiopia has ratified this convention in 1997.

- **The Vienna Convention on the Protection of the Ozone Layer**

The basic objective of the Convention is to combat the negative impact on the environment and human beings resulting from ozone depleting substances by reducing the amounts released and eventually banning their commercial use through internationally agreed measures. The Montreal Protocol entered into force in 1989 to facilitate the implementation of the convention.

Ethiopia ratified and become party to the Vienna Convention and the Montreal Protocol in January 1996. The National Meteorological Services Agency has been mandated for the coordination and supervision of implementation of this convention.

- **The Basel convention**

The objective of the Basel Convention is to control and regulate the trans- boundary movement of hazardous wastes. The Bamako Convention of 1991 plays a similar role at the level of the African continent. Ethiopia ratified the Basel Convention through its Proclamation No. 357/2002. Its amendment was ratified through Proclamation No. 356/2002. The country has also ratified the Bamako Convention through Proclamation No. 355/2002.

- **Convention on International Trade in Endangered Species of Fauna and Flora**

The objectives of the convention are to control international trade in endangered species and to ensure that international trade in non-endangered species is carried out in a manner which ensures stable markets and economic benefits for the exporting countries as well as to control and regulate illegal trade in such non endangered species, fossils and/ or their derivatives.

Ethiopia ratified the convention through Proclamation 14/1970. The mandate to implement the convention at federal level is the responsibility of the Ethiopian Wildlife Protection and Development Organization.

In the preparation of ESIA, the international agreements that Ethiopia signed will be considered when it deems necessary.

4.12. International Environmental Standards in the Aviation Sector

The aviation sector is governed by a range of international environmental standards and guidelines developed to ensure sustainable development, minimize environmental and health risks, and align with global climate goals. These standards are especially critical for projects in countries where national environmental regulations may not provide specific thresholds or comprehensive guidance. The following summarizes key international standards applicable to the aviation sector and their relevance to the Bishoftu International Airport Project.

4.12.1. Guidance on the Balanced Approach to Aircraft Noise Management

ICAO's Balanced Approach provides a globally recognized framework for managing noise pollution around airports. The Balanced Approach consists of identifying the noise problem at a specific airport and analyzing various measures available to reduce noise through the exploration of various measures which can be classified into four principal elements, described in Figure 4.1. The goal is to address noise problems on an individual airport basis and to identify the noise-related measures that achieve maximum environmental benefit most cost-effectively using objective and measurable criteria.

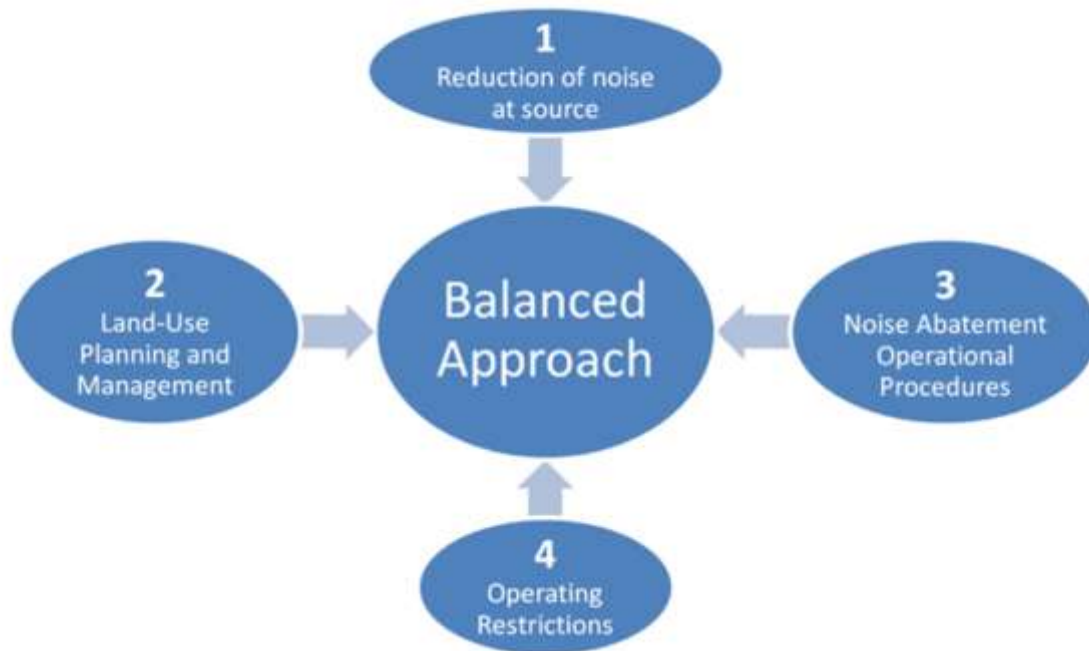


Figure 4-1 the four principal elements of the Balanced Approach to Aircraft Noise Management

4.12.2. ICAO Standards on Aircraft Engine Emissions (Annex 16, Vol. III)

The International Civil Aviation Organization (ICAO) has established comprehensive standards for controlling environmental impacts associated with civil aviation activities. Specifically, Annex 16, Volume III of the ICAO Convention addresses the Certification of Aircraft Engine Emissions, focusing on CO₂ emissions from aeroplanes. These standards are a part of ICAO's broader environmental protection strategy aimed at reducing the aviation sector's contribution to global climate change.

Key Features of ICAO Annex 16, Volume III:

- Introduced to regulate carbon dioxide (CO₂) emissions from new aircraft designs.
- Applies to subsonic jet aircraft and large turboprops with a maximum take-off weight (MTOW) greater than 5,700 kg.
- Establishes a CO₂ metric system, which combines aircraft weight, fuel burn, and range performance to evaluate fuel efficiency and emission levels.
- Imposes mandatory compliance on:
 - New aircraft type designs from 2020 onwards.

- Aircraft currently in production from 2023.
- In-service aircraft designs not meeting minimum requirements by 2028 are subject to production cutoffs unless exemptions apply.

Although the project itself does not manufacture aircraft, it is expected to host domestic and international airline operations. The ICAO standards on aircraft engine emissions are therefore indirectly relevant, as they influence the types of aircraft allowed to operate and shape the airport's environmental performance profile.

- The Environmental and Social Impact Assessment (ESIA) has considered potential emissions from aircraft as part of the air quality and climate change assessment.
- The Environmental and Social Management Plan (ESMP) encourages the use of modern, fuel-efficient aircraft that comply with ICAO emission standards.
- Future airport operational policies may prioritize or incentivize the use of low-emission aircraft, consistent with ICAO Annex 16 guidelines and international climate commitments.

ICAO's CO₂ standards align with the United Nations' Sustainable Development Goals (SDGs), particularly SDG 13: Climate Action. By referencing and applying these standards, the Bishoftu International Airport supports Ethiopia's national climate strategies and contributes to the global decarbonization of the aviation sector.

4.12.3. International Air Transport Association Environmental Assessment Program

The IATA Environmental Assessment (IEnvA) is a globally recognized environmental management system (EMS) developed specifically for the aviation industry. It is aligned with ISO 14001 and provides a comprehensive framework for:

- Assessing environmental performance of airlines and airports
- Ensuring compliance with international best practices
- Improving resource efficiency and reducing emissions

4.13. Required Permits, Licenses, and Authorizations in Ethiopia

To ensure legal compliance, safeguard public interest, and meet national and international environmental and social standards, the Bishoftu International Airport Project must obtain

several permits, licenses, and authorizations from various Ethiopian regulatory institutions. These approvals span across environmental protection, land acquisition, construction, aviation operations and utility services. The table below lists the key regulatory requirements and the corresponding authorities responsible for their issuance:

No.	Permit/License/Authorization	Issuing Authority	Purpose
1	Environmental Clearance Certificate (ESIA Approval)	Ethiopian Environmental Protection Authority	Required before project implementation to approve the Environmental and Social Impact Assessment (ESIA).
2	Construction Permit	Ethiopian Construction Authority and/or Bishoftu City Administration	Authorizes civil works, structural construction, and ensures compliance with national building codes.
3	Land Use and Expropriation Authorization	Oromia Regional Land Administration Bureau and Bishoftu City Administration	Legalizes land acquisition and resettlement activities, in accordance with expropriation laws.
4	Aviation Development Authorization	Ethiopian Civil Aviation Authority (ECAA)	Required for approval of airport layout, airspace integration, and navigational systems.
5	Quarry Site Authorization	Bishoftu City Administration	Approval for temporary facilities such as material sites, and disposal areas.
6	Electrical and Telecommunication Utility Clearance	Ethiopian Electric Utility (EEU) and Ethio Telecom	Ensures safe relocation or protection of existing infrastructure.

Compliance with the permitting and licensing requirements listed above is essential for the successful implementation of the Bishoftu International Airport Project. Coordination with respective federal, regional, and local authorities will be maintained throughout the project cycle to ensure timely acquisition of approvals and full legal conformity. The Environmental

and Social Management Plan (ESMP) will include a permitting schedule and compliance monitoring framework to track and report on the status of each required authorization.

4.14. Institutional Context

Review of existing relevant institution is important to understand the role and responsibility of each institute and to see the level of integrity as well as to identify gaps if any. In the following section, major institutes relevant to the study at hand are reviewed and summarized.

- ***The Environmental Protection Authority***

The federal Environmental Protection Authority (EPA) was established by Proclamation 9/1995 as an autonomous government body reporting directly to the Prime Minister. It has a broad mandate covering environmental matters at Federal level. The main responsibilities are:

To reach its current existence, the Environmental Protection Authority (EPA) has passed through different institutional restructuring and changes in its legal formation. The Environmental Protection Authority, Ministry of Environment and Forest, Ministry of Environment, Forest and Climate Change and Environment, Forest and Climate Change commission were key stepping institutions for the establishment of the Environmental Protection Authority.

In 2021, the Environment and Forest and Climate Change Commission was renamed and restructured to the Ethiopian Environmental Protection Authority

- Preparation of environmental protection policies and laws and to ensure that these are implemented.
- Preparation of directives and implementation of systems necessary for the evaluation of the impact of projects on the environment.
- Preparation of environmental protection standards and implementation of directives concerning soil, water, and air.
- The conduct of studies on desertification and the co-ordination of efforts to combat it.
- Preparation of recommendations regarding measures needed to protect the environment.
- Enhancement of environmental awareness programmes.
- Implementation of international treaties concerning the environment to which Ethiopia is a signatory.

- Provision of advice and technical support to the regions on environmental matters.

The Women Affairs Department was established under the Environmental Protection Authority in 1999, as a gender focal point in the ministry to mainstream gender in the action plan and in the assessment of environmental impact.

Capacity Assessment: The EPA has well-established legal and institutional frameworks for environmental management, including ESIA review and approval. However, like many regulatory institutions in developing contexts, the EPA faces challenges such as limited human resources, high staff turnover, and constrained monitoring and enforcement capacity, particularly for large-scale infrastructure projects in fast-growing regions. Continued capacity strengthening and donor-supported technical assistance are often needed

- ***Ethiopian Airlines Group (EAG)***

Ethiopian Airlines Group (EAG) serves as the national carrier of Ethiopia and a major aviation hub in Africa. EAG is responsible for providing air transport services for passengers and cargo while also managing various auxiliary services related to aviation operations. Mandates of Ethiopian Airlines Group includes:

- **Provision of Aviation Services:** EAG oversees the operations at Abusera International Airport, ensuring the delivery of high-quality passenger and cargo services.
- **Infrastructure Development and Management:** The airport is equipped with modern facilities for passenger handling, cargo storage, and aircraft maintenance to meet international standards.
- **Compliance and Safety:** EAG ensures that all airport operations comply with International Civil Aviation Organization (ICAO) standards, Ethiopian civil aviation laws, and environmental regulations.
- **Autonomy and Financial Operations:** As a state-owned enterprise, EAG operates autonomously, with its own legal personality, to manage Abusera International Airport's financial and operational activities. This includes investment in airport expansions and modernization efforts.
- **Innovation and Sustainability:** The airport integrates sustainable practices, including energy-efficient operations, waste management systems, and water conservation measures, to minimize environmental impact.

Capacity Assessment: EAG has strong institutional capacity in aviation management, infrastructure development, and compliance with international safety and operational standards. The organization has experience implementing large-scale aviation projects and integrating modern environmental practices. However, while it has a robust technical and operational framework, EAG may benefit from targeted support in fully aligning with AfDB and World Bank environmental and social safeguard requirements, particularly around community engagement, gender inclusion, and long-term E&S monitoring.

- ***Oromia Regional State Environmental Agency***

Following the principles of government decentralization and the Proclamation no. 295/2002, each national regional state shall establish an independent Regional Environmental Agency or designate an existing agency that shall, based on the Ethiopian Environmental Policy and Conservation Strategy and ensuring public participation in the decision-making process, be responsible for:

- Coordinating the formulation, implementation, review, and revision of regional conservation strategies; and
- Environmental monitoring, protection, and regulation.

The Proclamation also states that regional environmental agencies shall ensure the implementation of federal environmental standards or as may be appropriate, issue and implement their own no less stringent standards. Finally, the Proclamation states that regional environmental agencies shall prepare reports on the respective state of the environment and sustainable development of their respective states and submit them to the EPA.

Capacity Assessment: The Oromia Regional EPA plays a critical role in environmental permitting and monitoring at the sub-national level. It has a moderate level of capacity, particularly in regulatory enforcement and coordination with local governments. However, it often faces logistical and technical challenges such as shortage of field monitoring tools, limited access to data, and staff training gaps. Capacity building support—especially in monitoring E&S performance during implementation—will be vital for effective project oversight.

5. BASELINE CONDITION OF THE PROJECT AREA

5.1.Socio-Economic Environment

5.1.1. Population size of the project area

According to the Livelihood Restoration Plan prepared by the Engineering Corporation of Oromia (2024), the total population within the proposed Abusera International Airport project site is 15,320 individuals, residing across 2,731 households. A detailed socioeconomic study of the area reveals that the population is relatively balanced in terms of gender distribution, with 49% of the population being male and 51% female. The population of Abusera is spread across seven kebeles, namely Abu Achiro, Abu Garbi, Abu Luguna, Abu Serkema, Ammuye Sera, Abu Loyya, and Kombolcha. These kebeles collectively house the entire population, with each area contributing a varying share to the total population. The population size and number of households of the project site is summarized and presented in the following table.

Table 5-1: Population size and number of households of the project site

No	Kebele	Area	Number of households			Total population			% Share of Total Population
			Male	Female	Total	Male	Female	Total	
1	Abu Achiro	415.2	174	95	269	860	1083	1943	12.69%
2	Abu Garbi	359.01	177	37	214	685	562	1247	8.14%
3	Abu Luguna	760.79	416	121	537	1276	1363	2639	17.23%
4	Abu Serkema	737.76	297	110	407	1043	1091	2134	13.93%
5	Ammuye Sera	108	80	26	106	301	342	643	4.20%
6	Abu Loyya	942.24	448	218	666	1806	1852	3658	23.89%
7	Kombolcha	624.1	226	63	289	879	962	1841	12.02%
8	Dere Shoki	32.65	191	52	243	729	486	1215	7.93%
	Total	3979.75	2009	722	2731	7579	7741	15320	12.69%

Source: Livelihood Restoration Plan (2024)

Among the eight kebeles, Abu Loyya holds the largest share of the population, accounting for 23.89% with 3,658 individuals, consisting of 1,806 males and 1,852 females. It also has the highest number of households, totaling 666. Abu Luguna ranks second in population size with 2,639 people (17.23%), showing a fairly balanced gender distribution of 1,276 males and 1,363 females. Other notable kebeles include Abu Achiro with 1,943 residents (12.69%), comprising 860 males and 1,083 females; Abu Serkema with 2,134 people (13.93%), nearly evenly split between 1,043 males and 1,091 females; and Kombolcha with 1,841 individuals (12.02%), having 879 males and 962 females. Abu Garbi, with a population of 1,247 (8.14%), shows a noticeable male predominance with 685 males compared to 562 females. The smallest kebeles in terms of population are Ammuye Sera, with 643 people (4.20%), including 301 males and 342 females, and Dere Shoki with 1,215 individuals (7.93%), comprising 729 males and 486 females. In summary, the population distribution across the project site is diverse, with Abu Loyya and Abu Luguna being the most populous kebeles, while Ammuye Sera and Dere Shoki are the least populated. Most kebeles exhibit a balanced gender ratio, though Abu Garbi and Dere Shoki have a higher male-to-female ratio, whereas Kombolcha and Abu Luguna have a slightly higher female population. Overall, the gender distribution in the project area is generally balanced.

5.1.2. Economic Activity

The livelihoods of the households in the project site are largely dependent on both crop production and livestock rearing. The populations of the study kebeles primarily rely on rain-fed agriculture for their food and income. Additionally, non-farm activities such as petty trade are commonly practiced in many parts of the area to meet household needs. While crop production in all kebeles is predominantly rain-fed, agricultural productivity is generally higher in certain parts of the project site compared to others.

The crops grown in the area include Teff, Wheat, Barley, Chickpea, Soya Bean, Maize, Sorghum, Peas, and Beans. Most of the crops are traditional local varieties, with only a few households utilizing improved seeds of wheat and Teff. Land preparation is done using basic, locally available hand tools, which limits the scale and efficiency of farming practices. In terms of land size, it is uncommon for a household to cultivate more than 2 hectares, indicating small-scale farming operations.

The project site holds significant development potential, both for crop production and livestock rearing. Land remains the most crucial resource for the local communities, supporting their

agricultural activities such as crop cultivation, livestock husbandry, small-scale fattening, traditional poultry farming, and supplementary income-generating activities like petty trade and the sale of local drinks. These activities are essential for the economic survival of households in the area.



Figure 5-1: Crops in the project site (Source: Site visit 07/11/2024)

The following table presents the average crop productivity for eight major crop varieties in the study area, as obtained from the Akaki Woreda Agriculture & Rural Development Office. This

data reflects the current state of agricultural production and provides a baseline for understanding the potential impacts of the airport project on local farming and livelihoods.

Table 5-2: Average Productivity by Type of Crops

No	Type of crops	Average Productivity/hector
1	Maize	36.8
2	Horse /Foba Beans	22.29
3	Barely	24.94
4	Teff	26.278
5	Wheat	36.29
6	Beans	19.5
7	Lentils	19.4
8	Chick Peas	30.52

Source: Akakai Woreda Agriculture & Rural Development Office (2022)

In addition to crop cultivation, the local community in the impacted kebeles also raises various types of livestock, including cattle, sheep, goats, and donkeys. Livestock farming is an essential part of the community's livelihood, but it faces numerous challenges. One of the primary issues is the prevalence of animal diseases, including anthrax, blackleg, foot-and-mouth disease, and avian diseases, which regularly affect livestock populations. These health problems often result in significant losses, and the community lacks sufficient veterinary services to adequately address them.

Another major challenge for livestock production is the scarcity of feed. The animals primarily rely on open grazing and crop residues, which are insufficient to sustain them throughout the year. The lack of proper nutrition leads to poor livestock productivity and low reproductive rates, further exacerbating the situation. Additionally, there is a lack of access to improved animal breeds, which limits the potential for enhancing livestock output.



Figure 5-2: Livestock in the project area (Source: Site visit 07/11/2024)

In the affected kebeles, the livestock population is large, but it is heavily dependent on traditional methods of grazing and crop-based feeding. These practices are not sustainable, especially during dry seasons when grazing land becomes limited. As a result, the domestication of livestock is constrained by inadequate feed resources, low productivity, and widespread animal diseases. These challenges present significant obstacles to improving the welfare of the community and the overall sustainability of livestock farming in the region.

Table 5-3: Livestock population in the project area

No.	Kebele	Number of Livestock					
		Cattle	Sheep	Goat	Horse	Mule	Donkey
1	Abu Luguna	4690	300	1690	400	70	500
2	Abu Achiro	4565	380	1600	212	87	840
3	Abusera	5160	277	1912	465	92	991
4	Abu Gerbi	4045	300	1712	367	70	510
5	Koftu	4950	250	1000	369	69	1000
6	Kombolcha	3500	325	1012	495	65	892
7	Dere Shoki	450	123	53	83	97	647

Source: Akakai Woreda Agriculture & Rural Development Office (2022)

5.1.3. Land User Pattern

Land use in the project area of Abusera International Airport is primarily characterized by agricultural activities, communal building areas, grazing land, forests, and small-scale commercial enterprises. These land uses are accompanied by essential infrastructure such as roads, utilities, and other public facilities that support the local economy and community functions. However, a key issue faced by the local population is the lack of available land, which is becoming increasingly scarce due to several factors.

One of the major challenges is the insufficient land availability to accommodate the rapidly growing population in the area. As the population increases, there is mounting pressure on the existing land resources, making it difficult to meet the needs for housing, agriculture, and other livelihood activities. This shortage of land creates competition among local residents, often leading to disputes over land use and ownership.

Another significant issue is the accelerating process of gentrification, which can result in the displacement of lower-income residents as property values rise in response to increased demand for land. This trend can disrupt local communities, pushing long-established residents out of the area while attracting wealthier individuals or investors who can afford higher rents or land prices. Gentrification further exacerbates the issue of limited land availability by transforming the area into a more commercialized or upscale zone, which may not be conducive to the needs of existing residents.

Furthermore, there is a widespread perception among all stakeholders that land is the most viable means of economic self-actualization. For many people in the area, land is seen as a critical asset that provides not only a place to live but also a livelihood through agriculture, grazing, and small-scale commercial activities. This perception makes land a highly valued resource, often leading to intense competition and conflicts over its allocation, especially as the airport development project proceeds and land use in the area changes.

These challenges underscore the complex relationship between land use, economic opportunities, and social dynamics in the Abusera project area. Addressing these land-related issues will be essential in ensuring that the airport development is implemented in a socially responsible manner, with adequate measures to mitigate displacement and support the needs of the local community.

Table 5-4: Land Use Patterns of the Kebeles

No.	Kebele Name	Land use Pattern in Hectare						
		Agriculture	Grazing	Buildings	Different Purpose	Communal	Forest	Others
1	Abu Luguna	596	11.26	28.2	11.065	29	-	5.797
2	Abu Achiro	836.16	8.683	66.45	0.5	0.813	-	59.35
3	Abusera	1666.89	13.688	80.85	32.45	42.5	15.03	-
4	Abu Gerbi	885.125	6.375	23.5	2.55	15.5	-	-
5	Koftu	669.688	31.63	28.1	12	13.25	15.865	-
6	Kombolcha	664.063	8.625	137.5	2.375	13.744	181.256	-
	Total	5317.926	80.261	364.6	60.94	114.807	212.151	65.147

Source: Akakai Woreda Agriculture & Rural Development Office (2022)

5.1.4. Household's land ownership status

According to the Livelihood Restoration Plan, there are a total of 2,488 households within the project site. Of these, 1,982 households, which represent 79.7% of the total, hold legal ownership rights in the form of title deeds. This indicates that the majority of households in the area have formal, legally recognized ownership of their properties. However, the remaining 506 households, making up 20.3% of the total, do not possess legal ownership rights or title deeds for their properties. This distinction between legally titled and untitled households is crucial for planning and implementing any resettlement or compensation measures associated with the project. The distribution of households with legal ownership rights and those without is summarized and presented in the following table.

Table 5-5: Land ownership status of households

Area	Description	Above 5Ha	2-5Ha	0.1-2Ha	Total titled
Previous Kebeles	Percent	9.16	23.91	46.58	79.65
	Number of HHs	228	595	1159	1982

Source: Livelihood Restoration Plan (2024)

5.1.5. Housing Conditions and ownership

The Livelihood Restoration Plan indicates that there are a total of 3,210 houses of various types within the project site. Of these, 1,569 houses (48.9%) are constructed using corrugated iron sheets, while the remaining 1,641 houses (51.1%) are traditional huts made from local materials. The majority of the houses in the study area feature corrugated iron roofing and are constructed with walls made from a combination of wood and mud.

This mixed housing structure reflects the varying levels of development in the area, with a significant portion still relying on traditional building methods that may not provide the same durability or comfort as modern construction materials.

To address the current housing conditions, the plan emphasizes the need to enhance the economic capacity of individual households. Improving household income and economic opportunities will be crucial in enabling residents to gradually upgrade their living standards. In addition, raising awareness about the benefits of improved housing and promoting sustainable building practices are essential for making long-term progress in the area. These efforts will contribute to the gradual transformation of the housing conditions and support the broader goals of social and economic development in the project area.



Figure 5-3: Settlement Pattern and House Typology of Project area

5.1.6. Existing Social Services

5.1.6.1. Education facilities

Quality education is a key priority for the community. The educational services in the study area include seven primary schools (grades 1-8) and one secondary school. In the current year, there are 2,139 male students and 1,699 female students, with a total of 3,714 students enrolled.

The teaching staff consists of 88 male and 43 female teachers, totaling 131. As indicated in the table below, while the gender gap in enrolment has decreased, boys still outnumber girls. The table presents the enrolment ratio by gender and the types of schools. The following Table shows the type and enrolment ratio between male and female.

Table 5-6: Number of School, students & Teachers

No.	School Name	Level	Number of Student			Number of Teachers		
			Male	Female	Total	Male	Female	Total
1	Abu Luguna	1-8	347	273	625	8	7	15
2	Abu Achiro	1-8	202	117	319	8	4	12
3	Abusera	1-8	468	408	876	18	3	21
4	Abusera	9-12	231	278	380	24	3	27
5	Abu Gerbi	1-8	139	107	246	5	4	9
6	Abu Kobo	1-9	368	213	581	11	14	25
7	Kombolcha	1-10	159	129	288	3	4	7
8	Abusera	1-11	33	23	56	1	2	3
9	Abu Kombolcha	1-6	192	151	343	10	2	12
Total			2,139	1,699	3,714	88	43	131

Source: Akakai Woreda Agriculture & Rural Development Office (2020)





Figure 5-4: School in the project area (Source: Site visit)

5.1.6.2. Health Facilities

The impacted Kebeles are served by six health posts and one health center. Although health facilities are located nearby, there is a shortage of both medical equipment and personnel, in terms of both quantity and quality. The ten most common diseases in the area are: *Diarrhea, Typhoid Fever, Pneumonia, Tonsillitis, Dyspepsia, Helminthiasis, Typhus fever, Cough, Scabies, and the Common cold*. Thus, during the construction of the Abusera Airport Project, it is essential to enhance local health infrastructure by expanding health posts and the nearby health center to accommodate the increased demand for services. Given the prevalence of communicable and other diseases, measures like, improving water and sanitation facilities, and implementing disease surveillance systems are crucial.

5.1.6.3. Telecommunication Service

Telecom services play a crucial role in facilitating communication both within and outside the kebeles for a variety of purposes, including personal interaction, business activities, and access to services. In these kebeles, mobile telephone services are available, allowing residents to connect with others in the local area and beyond. However, members of the impacted community have reported frequent interruptions in the telephone service, which affects the reliability and consistency of communication. Despite these challenges, the existing local and international communication infrastructure is still considered vital for supporting business operations and development activities within the kebeles. These services are seen as essential tools for economic growth and community engagement, enabling the flow of information necessary for both everyday interactions and larger-scale projects.

5.1.6.4. Electric Power Supply

The kebeles in the Abusera International Airport project area currently lack adequate access to electric power from the national grid, which is primarily supplied by hydropower. At present, the Ethiopian Electric Power (EEP) has no plans to extend the power grid to these kebeles as part of the country's Universal Access Plan. As a result, the local communities rely heavily on traditional energy sources, such as firewood, for cooking and lighting. This reliance on biomass fuel not only affects the environment due to deforestation but also poses health risks associated with indoor air pollution from the use of firewood. The lack of reliable electricity access significantly limits the socio-economic development potential of the area, impacting residents' quality of life and their access to modern energy services.

5.1.6.5. Road Network and Transport

The presence of an access road plays a crucial role in reducing isolation and fostering social and economic development by providing better connectivity for local communities. Based on a recent site visit, it was observed that there is a gravel road connecting Abusera town to Addis Ababa city, as well as another gravel road linking Abusera to Dukem Sub City. These roads are essential in serving the community, enabling movement between the towns and facilitating access to key services and markets.

However, despite their importance, the roads are not paved, and there are no asphalt roads in the area, which limits the ease of travel and transportation. The lack of proper road infrastructure can hinder the efficiency of transportation, especially during the rainy season when gravel roads are prone to becoming muddy and difficult to navigate. Furthermore, there is a noticeable absence of regular public transport services along these roads, making it challenging for residents to rely on consistent transportation options. The absence of reliable transport services further isolates the community, limiting access to education, healthcare, and other critical services, and impeding overall economic growth. Improving the road infrastructure and establishing regular transport services would significantly enhance the connectivity of the area, promote economic activities, and improve the quality of life.



Figure 5-5: Gravel Road from Abusera to Addis Ababa (Source: Site visit 07/11/2024)

5.1.6.6. Religion

The community in the project area predominantly follows Orthodox and Protestant Christianity, interwoven with elements of Oromo traditional beliefs and practices. These indigenous spiritual traditions include Ayana, Atete, Adbar, Irreechaa, and Hamachisa. The Oromo traditional religion, Waaqeffannaa, which is believed to date back to mythical times and is indigenous to the local population, has significantly declined as nearly all community members have embraced Christianity. However, as Bartels (1995) noted, converting to

Christianity or Islam has not entirely prevented the Oromo from continuing to worship Waaqaa through ritual ceremonies inherited from their ancestors. In their belief system, Waaqaa is the ultimate creator, the source of all life, omnipotent, infinite, and incomprehensible. He is perceived as pure, intolerant of injustice, crime, sin, and falsehood (Bartels, 1995).

Despite the persistence of some traditional beliefs, indigenous rituals and spiritual practices have been gradually undermined due to continuous alienation from church services, including baptism, mutual aid organizations, funeral rites, and Christian teachings and preaching.

The local population also holds deep spiritual and emotional connections to sacred sites, particularly cemeteries located within church compounds. In the project vicinity, there are four Orthodox churches, each with its own cemetery. The transfer of human remains from these cemeteries is not a common practice, as families maintain strong psychological and spiritual ties to the burial sites of their deceased relatives. These cemeteries often feature structures made of masonry and corrugated iron, built as commemorative spaces, which are continuously maintained and rehabilitated by the families of the deceased as an expression of reverence.

However, the proposed project may obstruct access to these sacred sites and, in some cases, result in the demolition of churches and cemeteries due to mining activities and associated infrastructure development. One key informant emphasized the community's profound connection to the land, not only as their source of livelihood but also as the final resting place of their ancestors. They expressed a strong spiritual duty to honor the Dekera (spirit of the dead). Unfortunately, due to the project's intervention, access to these significant religious and cultural sites may be severely restricted, or the sites themselves may be lost entirely.

5.1.6.7. Mutual Help Organization

A. Daboo/Jigie

Daboo is a traditional, task-oriented social structure designed to mobilize collective labor for various community activities that may be difficult to accomplish individually. It is one of the most recognized indigenous voluntary associations through which rural communities collaborate to achieve social and economic objectives (Tadesse, 2000:2). In the study community, Daboo is commonly practiced for agricultural tasks such as plowing, weeding, and harvesting. Beyond agriculture, it also plays a crucial role in non-agricultural activities,

including house construction and fencing. Hosting a Daboo event typically involves providing food and drinks for the laborers who participate.

Unlike many traditional labor-sharing systems that operate on the principle of reciprocity, Daboo does not always require members to return the favor. As noted by Taddesse (2000), certain groups within the community—such as the physically disabled, widows, the elderly, and the sick—receive support from Daboo without the expectation of repayment.

Beyond its practical function, Daboo fosters strong social bonds among participants, serving as a platform for knowledge exchange. It provides opportunities to share experiences related to agricultural practices, market conditions, and weather patterns. Additionally, it acts as an informal forum for disseminating important social information, including awareness about pressing issues such as HIV/AIDS. This role in information-sharing makes Daboo an invaluable community structure that enhances social cohesion and peer education.

However, external interventions and modernization efforts have raised concerns about the potential disruption of Daboo as a mutual aid system. There is a growing fear that such changes may weaken this traditional support network, leading to a decline in community solidarity and the informal education processes it fosters.

B. Iddir

Iddir is the most common type of community-based mutual aid organization in local Ethiopian communities. It is an indigenous voluntary association that fosters intercultural collaboration, primarily in urban areas (Taddesse, 2000:4). The primary purpose of Iddir is to provide financial and labor support to families who have lost a member. Upon the death of a member, the bereaved family receives monetary assistance and practical aid from the organization.

The financial resources of Iddir come from monthly contributions made by its members. The amount each member contributes varies depending on the specific Iddir and the range of services it offers. Generally, all members are required to contribute an equal amount. Some Iddirs, which require lower contributions, provide only funeral support, while those that collect larger sums may extend additional assistance, such as support during illness or cases of robbery. However, such extended services are not common among most Iddirs.

- ✓ Membership in an Iddir is open to individuals who meet the following requirements:
- ✓ Payment of an entrance fee set by the members.

- ✓ Commitment to making a monthly financial contribution to sustain the organization.
- ✓ Agreement to abide by the by-laws governing the Iddir.
- ✓ Willingness to attend monthly meetings, typically held on Sunday mornings.

According to Taddesse (2000), community Iddirs are inclusive and open to all individuals, regardless of ethnicity, religion, gender, or economic status. Even the poorest members of society are not necessarily excluded, as alternative arrangements, such as offering services like grave digging, are sometimes made in place of monetary contributions. However, in the studied community, membership eligibility is determined by specific by-laws. Iddirs are typically managed by committees elected through a majority vote by members.

While the project is expected to weaken Daboo, Iddirs are not anticipated to be significantly affected, as the communities will continue to reside in close proximity, preserving their social cohesion.

5.1.7. Vulnerable Groups

As part of the social baseline assessment, it is important to identify and describe groups that may be particularly vulnerable to the impacts of the proposed Bishoftu International Airport development. Among these are persons with disabilities, who may face increased risks related to displacement, access to services, livelihood disruptions, and participation in stakeholder consultation processes.

The table 5.7. below presents the disability status of individuals residing in the project area. The data highlights the presence of various forms of disability, including blindness, visual and hearing impairments, physical disabilities (such as amputations), mental disorders, and other conditions. A total of 141 individuals (75 males and 66 females) were identified as living with disabilities, representing a significant share of the affected population who may require targeted support measures during project planning and implementation.

Table 5-7: Disability Status in the project area

S.No	Description	Male	Female	Total
1	Blind	15	23	38
2	Sight problem	10	10	20
3	Deaf	10	6	16
4	Limp amputated	3	4	7

5	Leg amputated	16	5	21
6	Mental disorder	13	13	26
7	Others	8	5	13
Total		75	66	141

The above information is crucial for ensuring that the project design incorporates inclusive development principles, avoids exacerbating existing vulnerabilities, and aligns with the African Development Bank standards and national social protection policies.

5.1.8. Water Supply and Sanitation

Supply of safe drinking water is a crucial prerequisite for human beings. According to data obtained from the wereda and project's kebele level, the major sources of water for various purposes are traditional wells and ponds. In most cases, the availability of water from ponds depends on rainfall and the materials used in pond construction.

Even though the problem of drinking water is significant, there are only a few water points in the project kebeles. In Abbu Loyya kebele, there is a source, a 1 km pipeline, and a reservoir supplying the community. In Abbu Sarkama kebele, there is also a pipe water point serving the area. Similarly, in Abbu Garbi kebele, a pipe water point is present to provide water to the local population. Only 73 households have piped water connections, and 563 private toilets were recorded (Table 5.8). The following table summarizes infrastructure gaps:

Table 5-8: Water and Sanitation Infrastructure

Indicator	Status	Project Impact
Piped Water	73 connected households	Increased demand from workforce
Sanitation	563 toilets (22.7% coverage)	Risk of overcrowding in resettlement



Figure 5-6: Potable Water Reservoir and distribution point in Abu Gerbi

5.1.9. Employment and Labor Market

The project area's workforce is characterized by a mix of traditional agrarian livelihoods and artisanal skills, with limited formal employment. As shown in Table 5.9, the local population possesses diverse skills that could be leveraged during project implementation:

Table 5-9: Local Skills Inventory

S.No	Skill Type	Frequency (No.)	Percentage (%)
1	Handicrafts	872	60.10
2	Weaving	161	11.10
3	Driving	83	5.72
4	Security	77	5.31
5	Masonry	69	4.76
6	Sewing	53	3.65
7	Carpentry	45	3.10

8	Electric Installation	20	1.38
9	Painting	18	1.24
10	Woodwork	16	1.10
11	Plastering	15	1.03
12	Metalwork	10	0.69
13	Plumbing	10	0.69
14	Welding	2	0.14
	Total	1451	100.00

The socioeconomic survey reveals significant underutilization of local skills, with 60.1% of the population possessing handicraft abilities (Table 5.9) but only 1.07% currently deriving income from these skills, highlighting substantial untapped economic potential. Notably, existing construction relevant skills including masonry (4.8%) and carpentry (3.1%) - directly align with the airport project's labor needs. Gender disparities are evident in occupational distribution, with women predominantly engaged in low-income activities like petty trade while men disproportionately hold construction-related skills, suggesting the need for targeted gender-inclusive employment strategies during project implementation.

5.2. Physical Environment

5.2.1. Climate

Thirty-one years (1993–2023) of meteorological data were obtained from the Ethiopian National Meteorological Agency. The data were collected from three stations—Akaki, Debre Zeit, and Alem Tena—which are the closest to the new airport site. The meteorological parameters considered in this study include precipitation, temperature, relative humidity (R.H.), wind speed, and relative sunshine hours. The average monthly values of these parameters, along with the corresponding averaging periods, are presented in the following tables.

5.2.1.1. Rainfall Trends

The precipitation amount at a place combined with other factors is the major indicator of the water potential of an area, both ground and surface water potential. The amount is variable depending on the season of the year and is highly determined by the relative location and altitude. The rainfall follows a uni-modal feature with peak rainfall occurring during the

Ethiopia Kiremt (Jun-Sep), where 75% of the annual rainfall occurring during this period. The minimum rainfall occurs in December, which could be taken as a month of almost null rainfall. The average rainfall of the area from 31 years data is 854.7 mm.

Table 5-10: Monthly Average Rainfall (RF) of the Project Area

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual RF (mm)
Akaki	8.7	17.2	48.3	78.0	67.4	109.3	231.0	225.4	113.3	29.1	6.7	3.6	938.0
Debrezeit	12.7	13.7	63.1	61.3	65.4	79.6	222.8	157.1	105.5	25.4	14.5	2.5	823.6
Alem Tena	10.7	13.0	46.7	52.5	40.3	104.9	209.1	198.6	91.8	22.4	6.5	6.0	802.4
Average	10.7	14.6	52.7	63.9	57.7	97.9	221.0	193.7	103.5	25.6	9.2	4.0	854.7

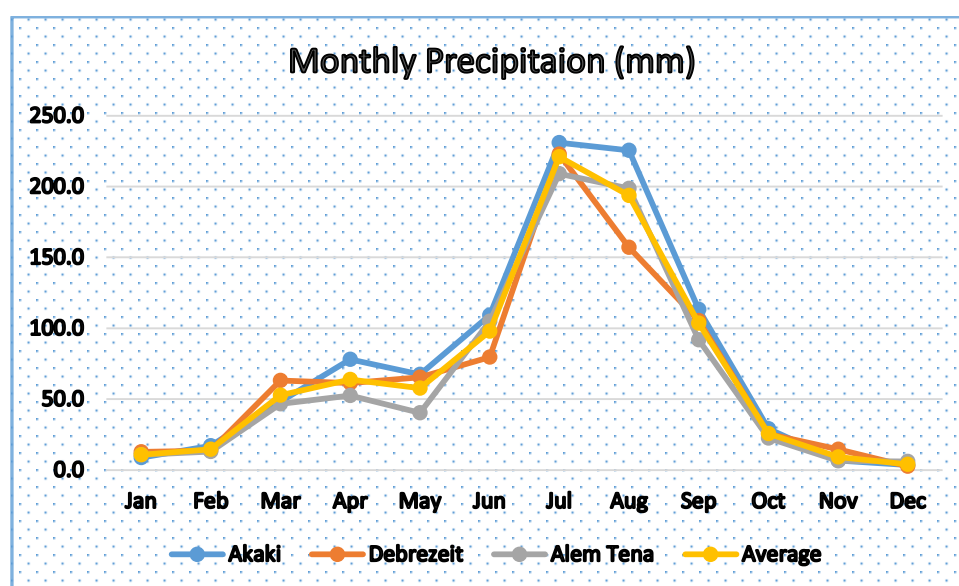


Figure 5-7: Monthly Average precipitation/RF/ of Project Area

5.2.1.2. Temperature Trends

Temperature of an area is usually determined by several factors including solar radiation the area receives, the relative humidity, and the altitude of the place among others. It is primarily indicated by the minimum and the maximum temperature, which are usually recorded during the day and the night time respectively.

The average maximum temperature is around 26.4 °C, with a maximum temperature records occur around March. On the other hand, the average minimum temperature occurs around

December and January with an average of 9.3⁰C. The variability in temperature is as depicted in the table and charts below.

Table 5-11: Monthly Maximum Temperature of Project Area

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Akaki	26.7	27.7	28.4	28.0	27.0	26.7	24.2	24.0	25.2	26.1	26.1	25.9
DebreZeit	26.7	28.4	28.6	28.7	29.2	27.6	24.5	24.1	25.4	26.3	26.0	25.8
Alem Tena	28.4	30.1	31.5	31.2	30.7	29.8	26.4	26.5	27.5	28.3	28.0	27.4
Mean	27.3	28.7	29.5	29.3	29.0	28.1	25.0	24.9	26.0	26.9	26.7	26.4

Table 5-12: Monthly Minimum Temperature of Project Area

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Akaki	10.7	11.8	13.3	14.1	14.1	13.8	13.8	13.6	13.5	12.3	11.3	10.4
DebreZeit	9.0	10.4	12.4	13.5	13.1	13.1	13.6	13.6	12.4	10.0	8.9	8.4
Alem Tena	10.8	12.7	14.2	15.5	16.1	15.9	14.7	14.7	14.5	12.4	10.3	9.1
Mean	10.2	11.6	13.3	14.4	14.4	14.3	14.0	14.0	13.5	11.6	10.2	9.3

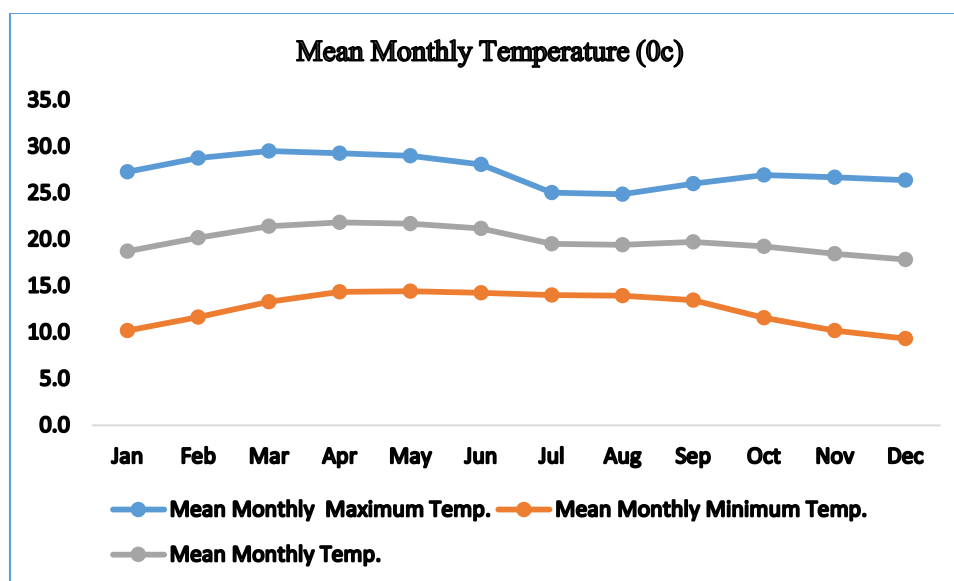


Figure 5-8: Mean Monthly Temperature of Project Area

5.2.1.3. Humidity Trends

The relative humidity of an area is a measure of the average amount of water vapour in the air compared to the maximum the air can carry at a given temperature. Relative humidity is an important factor that determines transpiration and loss of heat from our bodies. A higher relative humidity causes unpleasantness and discomfort indoors and outdoors. The humidity usually increases during the Ethiopian Summer (Jun-Sep) reaching up to 76% during August month.

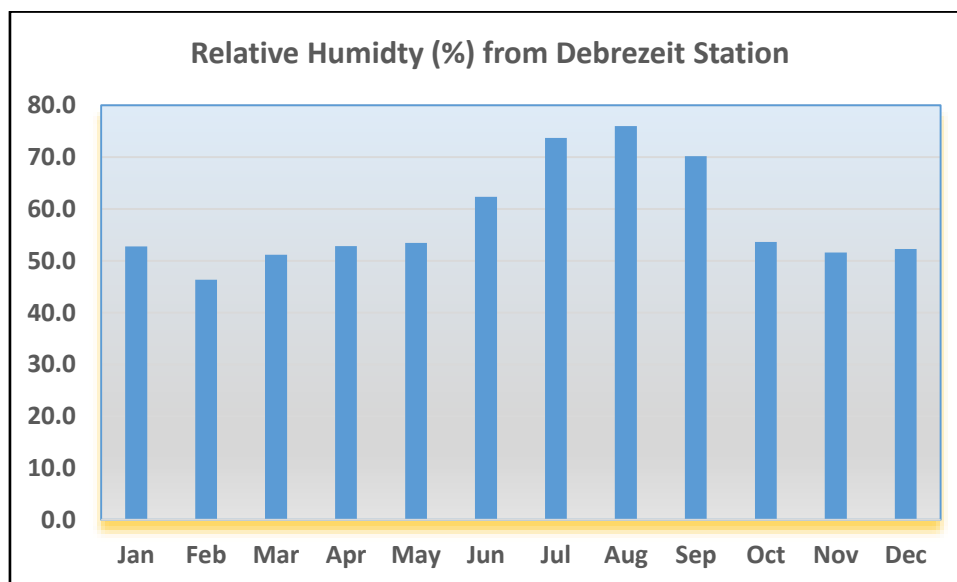


Figure 5-9: Average Monthly Relative Humidity of Project Area

In much of the literature reviewed, the frequency of extremely high humidity events (above 90%) is potentially linked to climate change and rising local temperatures. Elevated humidity can influence the construction schedule, as it affects the curing times for materials such as concrete and increases the risk of mold and mildew development. Ecologically, higher humidity can promote vegetation growth in some areas while causing degradation in others, particularly affecting plant species sensitive to changes in moisture levels.

5.2.1.4. Wind Speed Trends

The wind speed of an area is a determinant of the location of the airport as it consequently influences the overall operation. Moreover, the wind speed highly determines evaporation rates and air saturation, which are also other factors which are at play in Aircraft operation. The wind speed variability around the airport is shown in the chart below, based on information obtained from the Bishoftu Meteorological Station.

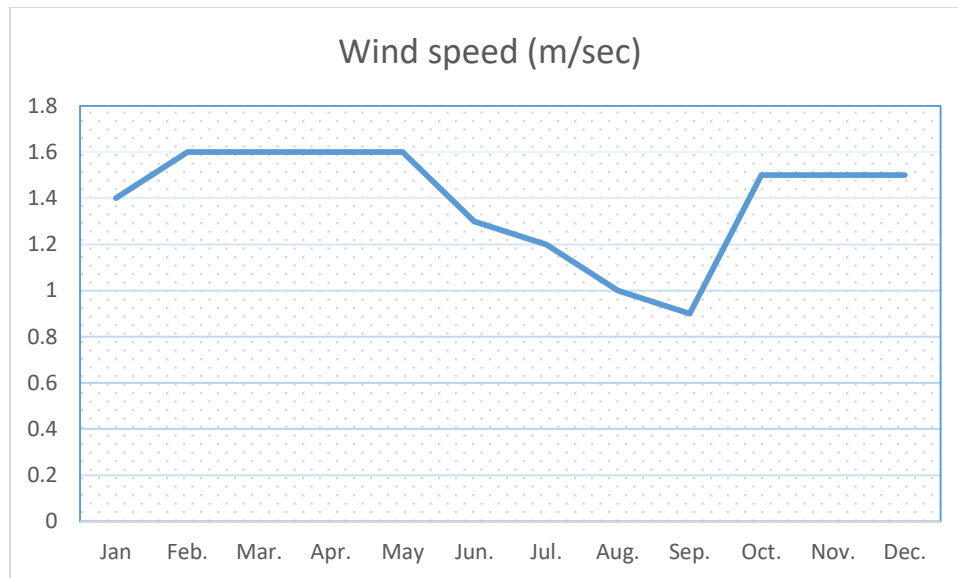


Figure 5-10: Wind speed (Source: Bishoftu Meteorological Station)

5.2.1.5. Sunshine hours

The sun is the major source of energy to our planet. The sunshine hours and the radiation an area receives are variable across different parts of the earth mainly depending on location and the time of the year. The sunshine hours and the radiation the area receives can also be a good indicator of use of solar energy for energy consumption. The area receives effective sunshine hours of more than 7 hours for the majority of the year (Oct-Jun).

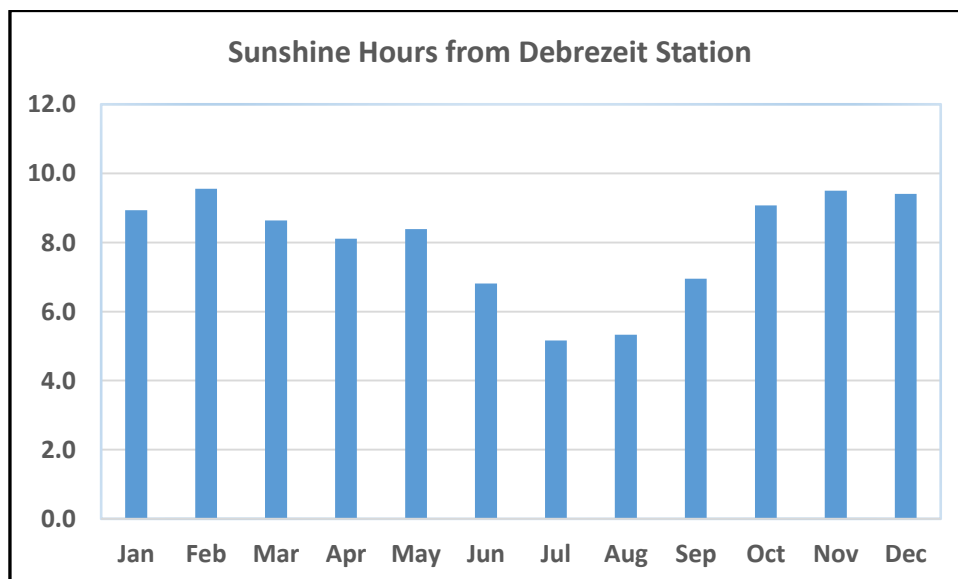


Figure 5-11: Average Monthly Sun Shine Hours of Project Area

5.2.1.6. Evapotranspiration

Evapotranspiration refers to the amount of water that is lost from the land surface and plants. Airports will have an extensive area dedicated for greenery and aesthetic purpose. The amount of water required for these plants will require the knowledge of the potential evapotranspiration which requires data on temperature, humidity, wind speed, solar radiation, and sunshine hour to calculate. The average monthly variation of potential evapotranspiration around the project area is shown in figure 5-10. The potential evapotranspiration (E_{to}) when multiplied by the crop factor (K_c) gives the Crop Evapotranspiration (E_{tc}) which is the single most determinant of the water requirement of the plants. The landscape development and the greenery projects on site could use the figures to determine the water requirement. In addition, with sustainability and water use efficiency, the airport's initiative of planting native and less-water using plants goes hand in hand with the evapotranspiration amounts.

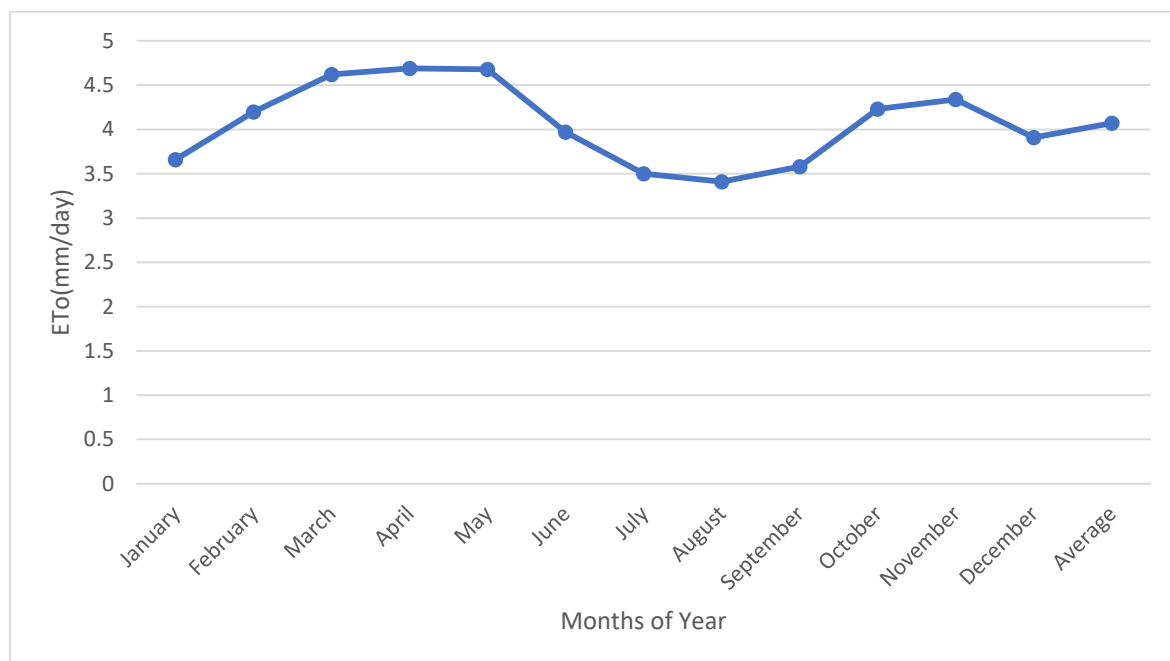


Figure 5-12: Potential Evapotranspiration (Source: Bishoftu Meteorological Station)

5.2.2. Ambient Air quality

Air quality is a critical factor in assessing environmental and public health conditions, particularly in areas designated for infrastructure development, such as airports. The presence of airborne pollutants, including particulate matter ($PM_{2.5}$ and PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), and carbon monoxide (CO), significantly influences respiratory health, visibility, and overall ecological balance. The International Finance

Corporation (IFC) Air Quality Standards (aligned with WHO Air Quality Guidelines) and the Federal Environmental Protection Authority (EPA) standards provide benchmark limits to evaluate air pollution levels and determine their acceptability for human exposure and environmental sustainability.

Air quality data collected from five monitoring stations at the proposed airport site in Bishoftu indicate variations in pollutant concentrations across different locations. The observed values are as follows:

Table 5-13: Air quality data collected from five samples of Project Area

Sample	Air Quality Index	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	CO (µg/m ³)
Sample 1	119	43	72	5	18	13	1181
Sample 2	108	38	66	5	22	13	1183
Sample 3	53	27	53	6	15	11	933
Sample 4	71	20	47	5	21	13	1309
Sample 5	81	25	51	7	18	13	917



Figure 5-13: Air quality sample location

To assess the environmental suitability of the site, the measured pollutant concentrations are compared with internationally recognized thresholds set by the IFC Air Quality Standards (WHO Air Quality Guidelines) and the Federal EPA Guideline Standards:

Table 5-14: Air quality of the project site compared with international and national standards

Pollutant	Unit	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	WHO Standard	EPA Standard	Exceeds Standards?
PM _{2.5}	µg/m ³	43	38	27	20	25	15	25	WHO: Samples 1-5 EPA: Samples 1-2
PM ₁₀	µg/m ³	72	66	53	47	51	45	50	WHO: Samples 1-5 EPA: Samples 1-3
SO ₂	µg/m ³	5	5	6	5	7	20	50	None
NO ₂	µg/m ³	18	22	15	21	18	25	40	None
O ₃	µg/m ³	13	13	11	13	13	100	120	None
CO	mg/m ³	1.181	1.183	0.933	1.309	0.917	10	10	None

The air quality assessment of the proposed Bishoftu Airport site reveals significant concerns, particularly regarding particulate matter concentrations. The recorded levels of PM_{2.5} exceed both WHO (15 µg/m³) and Federal EPA (25 µg/m³) limits at Stations 1, 2, and 3, indicating poor air quality and potential health risks. Additionally, PM₁₀ levels surpass the WHO threshold of 45 µg/m³ at all stations and exceed the Federal EPA limit of 50 µg/m³ at Stations 1, 2, and 3. This suggests high levels of airborne dust and fine particles, likely originating from vehicular emissions, construction activities, and natural dust resuspension. These elevated particulate concentrations can have severe implications for respiratory health, particularly for vulnerable populations such as children, the elderly, and individuals with pre-existing health conditions.

On the other hand, sulfur dioxide (SO₂) levels, ranging between 5 and 7 µg/m³, remain well below the WHO and Federal EPA 24-hour limits of 20 µg/m³ and 50 µg/m³, respectively. This indicates an absence of significant industrial or fossil fuel combustion sources contributing to sulfur emissions in the area. Similarly, nitrogen dioxide (NO₂) levels, recorded between 15 and 22 µg/m³, fall within the acceptable limits set by both WHO (25 µg/m³) and Federal EPA (40 µg/m³). This suggests moderate nitrogen oxide emissions, primarily from transportation sources such as vehicles and machinery.

The measured ozone (O_3) concentrations, ranging from 11 to 13 $\mu\text{g}/\text{m}^3$, are significantly lower than the WHO and Federal EPA limits of 100 $\mu\text{g}/\text{m}^3$ and 120 $\mu\text{g}/\text{m}^3$, respectively. This indicates that photochemical smog formation, which typically results from the interaction of pollutants with sunlight, is not a major concern in this region. Additionally, carbon monoxide (CO) levels, which range from 917 to 1309 $\mu\text{g}/\text{m}^3$, remain far below the WHO and Federal EPA standards of 10,000 $\mu\text{g}/\text{m}^3$. This suggests that CO pollution is not an immediate threat, as its sources—mainly incomplete combustion from vehicles—are not at alarming levels.

The primary air quality concern at the proposed Bishoftu Airport site is the elevated concentration of particulate matter (PM_{2.5} and PM₁₀), which exceeds both WHO and Federal EPA guidelines. This poses a potential health risk and warrants immediate attention. If the airport development proceeds, it is essential to implement mitigation strategies such as dust control measures, improved road paving, greenbelt development, and stricter vehicle emissions regulations to reduce particulate matter levels.

Other pollutants, including SO_2 , NO_2 , O_3 , and CO, remain within acceptable limits and do not pose significant health or environmental risks at this stage. However, regular air quality monitoring should be conducted to track variations over time and ensure continued compliance with international and national standards. By integrating these measures, the environmental impact of the proposed airport can be minimized, ensuring sustainable air quality standards for the region while supporting infrastructure development.

The following analysis presents air quality data collected from Bishoftu Town, approximately 40 km from the proposed Bishoftu Airport site. This data covers five years (2019–2024) and is compared with international air quality guidelines, including IFC Air Quality Standards (WHO Air Quality Guidelines) and Federal EPA Guideline Standards for Priority Ambient Atmospheric Pollutants to evaluate compliance and potential environmental concerns.

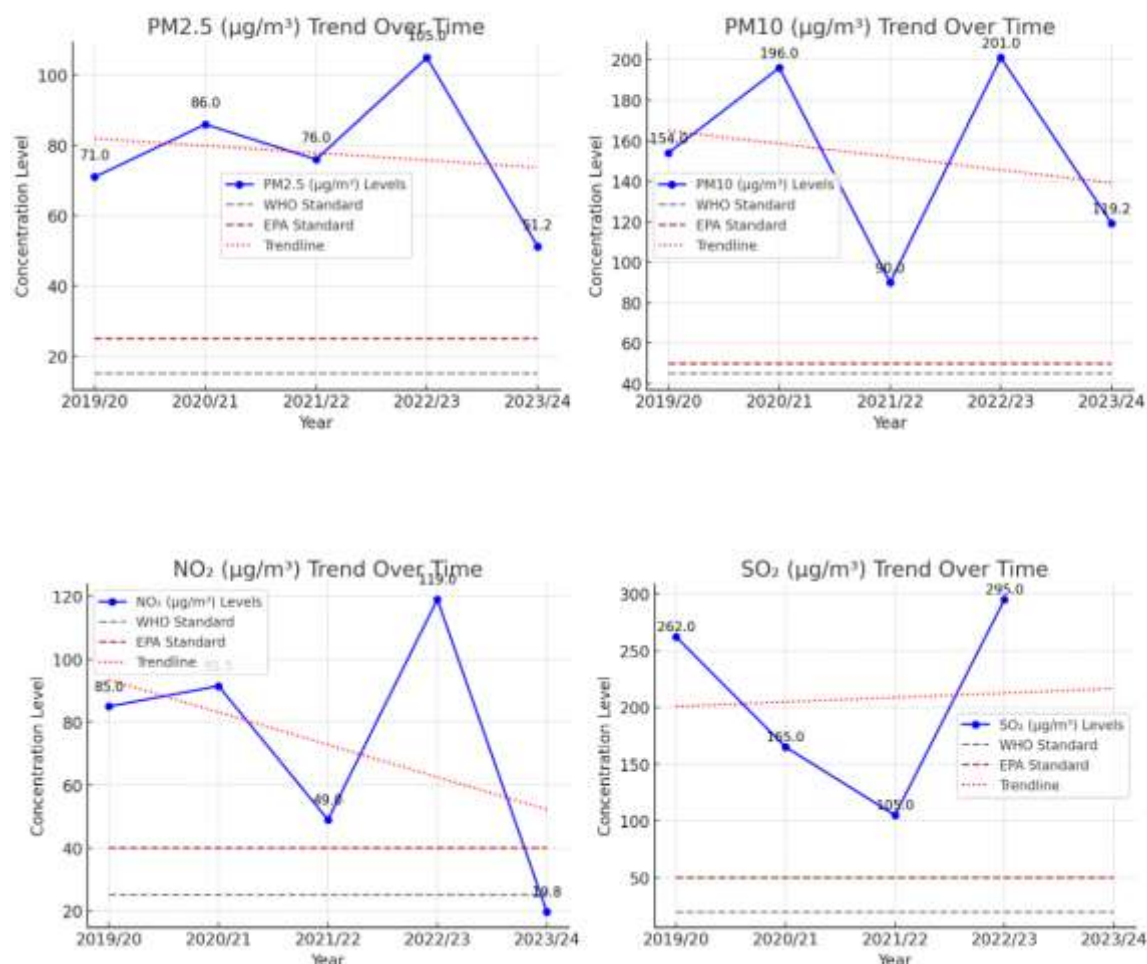


Figure 5-14: Air quality of the Bishoftu city compared with international and national standards

Table 5-15: Air quality of the Bishoftu city compared with international and national standards

Pollutant	2019/20	2020/21	2021/22	2022/23	2023/24	WHO Standard	Federal EPA Standard
PM2.5 ($\mu\text{g}/\text{m}^3$)	71 (Moderate)	86 (Satisfactory)	76 (Satisfactory)	105 (Moderate)	51.2 (Satisfactory)	15 $\mu\text{g}/\text{m}^3$	25 $\mu\text{g}/\text{m}^3$
PM10 ($\mu\text{g}/\text{m}^3$)	154 (Moderate)	196 (Moderate)	90 (Satisfactory)	201 (Moderate)	119.19 (Moderate)	45 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
NO ₂ ($\mu\text{g}/\text{m}^3$)	85 (Moderate)	91.5 (Moderate)	49 (Satisfactory)	119 (Moderate)	19.77 (Good)	25 $\mu\text{g}/\text{m}^3$	40 $\mu\text{g}/\text{m}^3$
SO ₂ ($\mu\text{g}/\text{m}^3$)	262 (Moderate)	165 (Moderate)	105 (Moderate)	295 (Moderate)	---	20 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
CO (mg/m ³)	5.75 (Moderate)	6.5 (Moderate)	---	---	---	10 mg/m ³	10 mg/m ³

Source: Federal Environmental Protection Authority

The analysis of air quality data over multiple years highlights significant variations in pollutant concentrations, with some exceeding internationally and nationally accepted limits. The primary pollutants of concern include Particulate Matter (PM_{2.5} and PM₁₀), Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), and Carbon Monoxide (CO).

The concentration of PM_{2.5} fluctuated between 51.2 µg/m³ (Satisfactory) and 105 µg/m³ (Moderately Polluted). The highest recorded level of 105 µg/m³ in 2022/23 significantly surpasses the WHO annual guideline of 15 µg/m³ and the Federal EPA limit of 25 µg/m³, indicating a severe deviation from safe air quality standards. Similarly, PM₁₀ concentrations ranged from 90 µg/m³ to 201 µg/m³, consistently exceeding both the WHO guideline of 45 µg/m³ and the Federal EPA limit of 50 µg/m³. The years 2019/20, 2020/21, and 2022/23 recorded particularly high particulate matter levels, suggesting that traffic congestion, ongoing construction projects, and wind-blown dust are the primary contributors to poor air quality.

The recorded NO₂ levels varied significantly, with the lowest being 19.77 µg/m³ (Good) in 2023/24 and the highest reaching 119 µg/m³ (Moderately Polluted) in 2022/23. The 2022/23 peak level far exceeds the WHO guideline of 25 µg/m³ and the Federal EPA limit of 40 µg/m³, indicating a severe nitrogen oxide pollution event, likely linked to vehicular emissions and industrial activities. However, a notable decline in NO₂ to 19.77 µg/m³ in 2023/24 suggests improved air quality, possibly due to effective emission control measures, industrial regulation, or a reduction in vehicular activity.

Sulfur dioxide concentrations consistently remained in the Moderately Polluted category, ranging from 105 µg/m³ to 295 µg/m³ across multiple years. These levels far exceed the WHO guideline of 20 µg/m³ and the Federal EPA limit of 50 µg/m³, indicating significant sulfur emissions. The persistently high levels suggest that fossil fuel combustion—likely from industrial operations, fuel-powered transportation, and power generation facilities—is a major source of SO₂ pollution. Given the hazardous nature of sulfur dioxide, which contributes to respiratory issues and acid rain formation, these high concentrations are a serious environmental and public health concern.

The CO levels recorded in 2019/20 and 2020/21 ranged between 5.75 mg/m³ and 6.5 mg/m³, placing them in the Moderately Polluted category. While the WHO and Federal EPA standard for CO is 10 mg/m³ (8-hour average), meaning these levels remain below harmful thresholds, they still indicate moderate pollution concerns. The presence of elevated CO concentrations

suggests that vehicular exhaust and combustion sources—such as industrial fuel burning and domestic heating—are major contributors. Unfortunately, data for later years is unavailable, making it difficult to assess whether pollution control efforts have led to a decline in CO levels.

The air quality data indicates that PM_{2.5}, PM₁₀, NO₂, and SO₂ levels frequently exceed recommended safety limits, posing significant risks to human health and environmental quality. The particularly high levels of particulate matter and nitrogen dioxide suggest that traffic congestion, industrial emissions, and construction activities are key pollution sources. The persistently elevated SO₂ levels highlight the impact of fossil fuel combustion, while the moderate CO concentrations point to transportation and combustion-related pollution.

5.2.3. Noise quality

Noise pollution is a significant environmental concern, particularly in areas proposed for large infrastructure projects, such as airports. Noise levels are typically measured in decibels (dBA), a unit that quantifies sound intensity. These measurements help to assess the potential impact of noise on human health and the environment. Exposure to high noise levels, especially over prolonged periods, can lead to various adverse health effects, including hearing impairment, sleep disturbances, cardiovascular problems, and impaired cognitive performance.

The noise quality data obtained from the proposed Bishoftu airport site across five monitoring stations show a range of sound levels. Station 1 records a variation in noise level between 55–75 dBA, indicating fluctuating sound intensity, which might be due to transient sources such as traffic or nearby activities. Station 2 shows a steady noise level of 47 dBA, while Station 3 measures 45 dBA, reflecting relatively quieter areas. Station 4 records 50 dBA, which is also moderate, and Station 5 shows a peak noise level of 70 dBA, suggesting a relatively louder environment, possibly influenced by local sources of noise such as road traffic or industrial activities.

Stations 1 and 5 recorded comparatively higher noise levels, ranging from 55–75 dBA and 70 dBA, respectively. This elevated noise environment can be attributed to several contributing factors specific to the nature and surrounding activities at these two sampling points. Station 1 is located in Dukem Sub-City, which is characterized by high urban activity. The major sources of noise pollution at this location include heavy vehicular traffic along the main transport corridors, proximity to industrial zones with several manufacturing and processing facilities,

and the presence of commercial establishments and hotels that attract significant human and vehicular movement. The overall urban setting, with its high population density and mixed land use, also contributes to the elevated baseline noise levels observed throughout the day. Station 5, on the other hand, is located in Abusera, a small but active town near the project boundary. Despite its smaller scale, Abusera shows notable localized noise due to its proximity to open markets where daily trading activities occur, as well as nearby hotels and service facilities that generate continuous sound emissions. The town's semi-urban nature, which blends rural calmness with increasing commercial activity, also contributes to occasional spikes in noise levels. These factors together explain the relatively higher decibel readings recorded at Stations 1 and 5 compared to other stations in the study area.

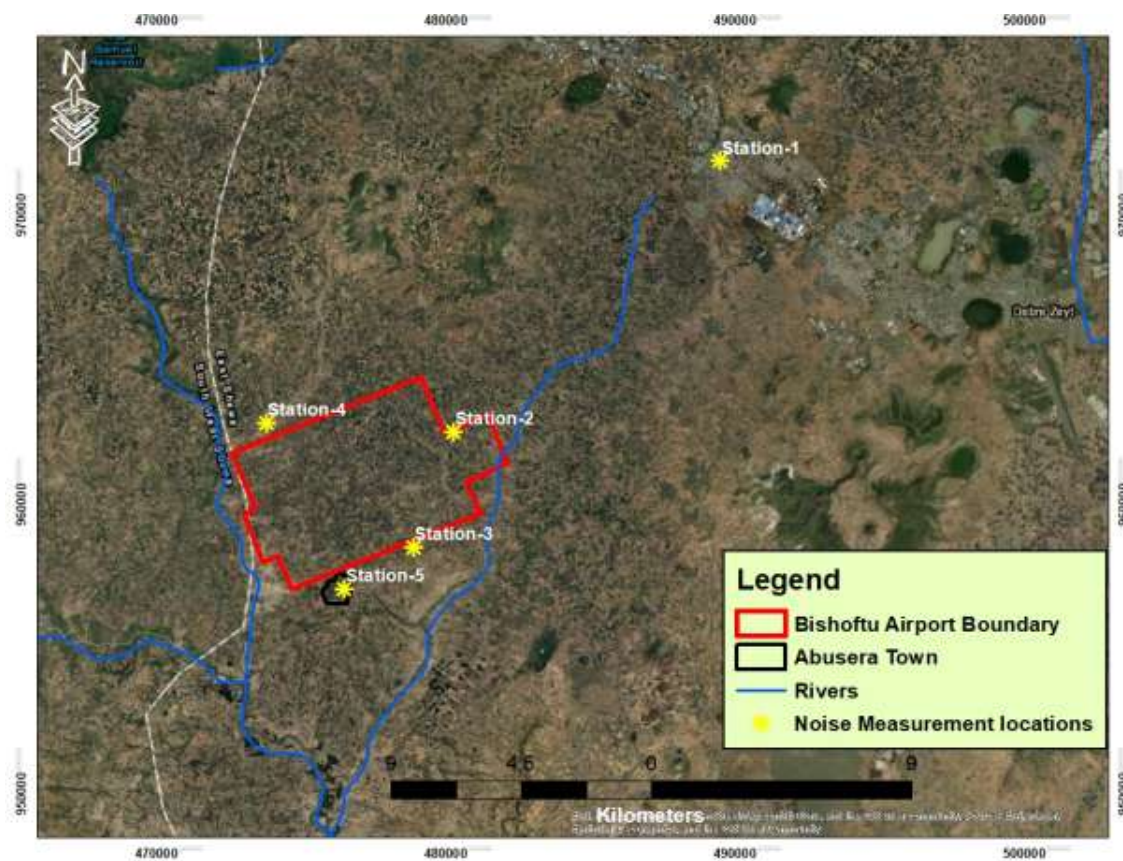


Figure 5-15: Noise Sample Location

In comparison with the relevant noise standards, we can assess the suitability of the proposed area for an airport. According to the Ethiopia EPA Noise Level Standards, for a Residential area, the acceptable daytime noise level is 55 dBA and 45 dBA at night. In Commercial areas, the standard is 65 dBA during the day and 55 dBA at night, while for Industrial areas, the allowable daytime noise level is 75 dBA, with a nighttime limit of 70 dBA.

When comparing the data from the Bishoftu airport proposal with the established noise standards, Station 1 shows noise levels ranging from 55 to 75 dBA, which could exceed the residential standard, particularly at the higher end of this range. This noise level is within acceptable limits for industrial areas, but it surpasses residential thresholds, especially during the day. Station 2 and Station 3 record noise levels of 47 dBA and 45 dBA, respectively, both of which fall within the acceptable range for residential areas. Station 4, with a measured noise level of 50 dBA, is acceptable for residential areas during the day, though it may approach the limit during nighttime. Lastly, Station 5, which shows a noise level of 70 dBA, meets the limits for industrial or commercial zones but exceeds the residential standards.

In comparison with the IFC Noise Level Guidelines, for Residential, Institutional, and Educational receptors, the acceptable daytime noise is 55 dBA, and 45 dBA at night. For Industrial and Commercial areas, the acceptable noise level is 70 dBA both day and night. Station 5 meets the industrial/commercial standard but exceeds the residential standard. The other stations show noise levels well within the acceptable residential daytime limit, with Station 1 reaching the maximum residential level during the day and exceeding the nighttime residential limit.

Table 5-16: Noise Quality Data from Proposed Bishoftu Airport Area

Station	Sound Level (dBA) Range
Station 1	55–75
Station 2	47
Station 3	45
Station 4	50
Station 5	70

Table 5-17: Ethiopia EPA Noise Level Standards

Category of Area	Daytime (dBA)	Nighttime (dBA)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Source: Ethiopia EPA Ambient Standards, August 2003		

Table 5-18: IFC Noise Level Guidelines

Receptor Type	Daytime (07:00 - 22:00) (dBA)	Nighttime (22:00 - 07:00) (dBA)
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

The proposed airport area in Bishoftu, based on the noise levels measured, shows a mix of acceptable levels for industrial and commercial zones but may require mitigation measures for areas that exceed residential noise limits. For a project of this scale, particularly in regions near residential areas, noise reduction strategies such as sound barriers, proper land use planning, and operational time management (e.g., limiting night flights) will be crucial to minimizing environmental and health impacts. Further studies should focus on the projected long-term noise impacts and the effectiveness of proposed mitigation measures.

5.2.4. Topography

The area is basically found in the central axial zone of the Main Ethiopian Rift valley (MER) and form an extensive plain land with open slopes and some central volcano cones scattered in the area. Specifically, the proposed Airport lies more or less in flat terrain gently sloping from 1900m at central part towards both eastern and western boundaries where elevation lowers to 1850m.

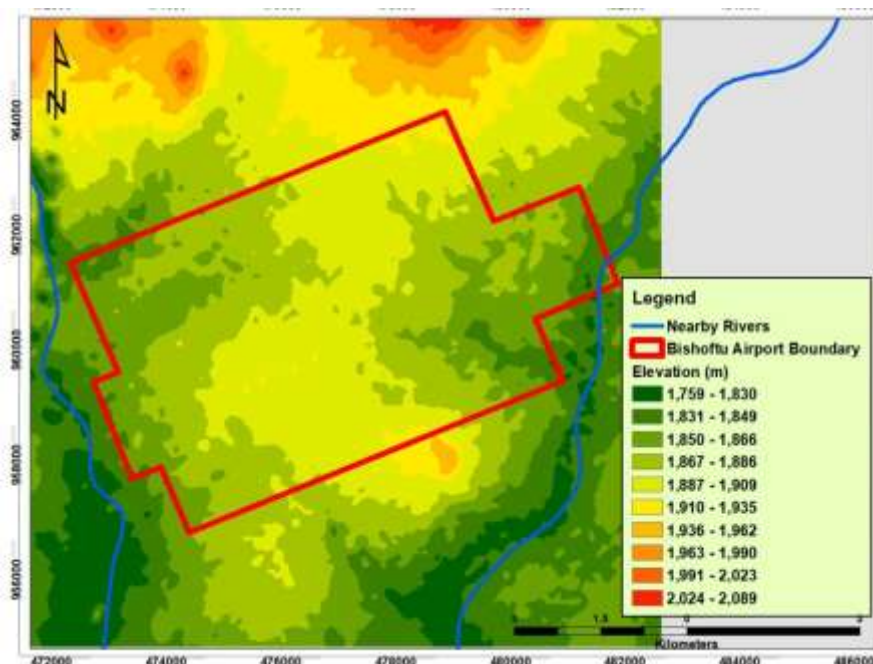


Figure 5-16: Digital Elevation Model of the Project Area (Source: ESIA Consultant)

Slope analysis of project site reveals that the majority of the projects site is flat. It has 99% of its total area is under slope of 0-8%, which is characterized mainly by flat and gently sloping (ECDSWC, 2020).

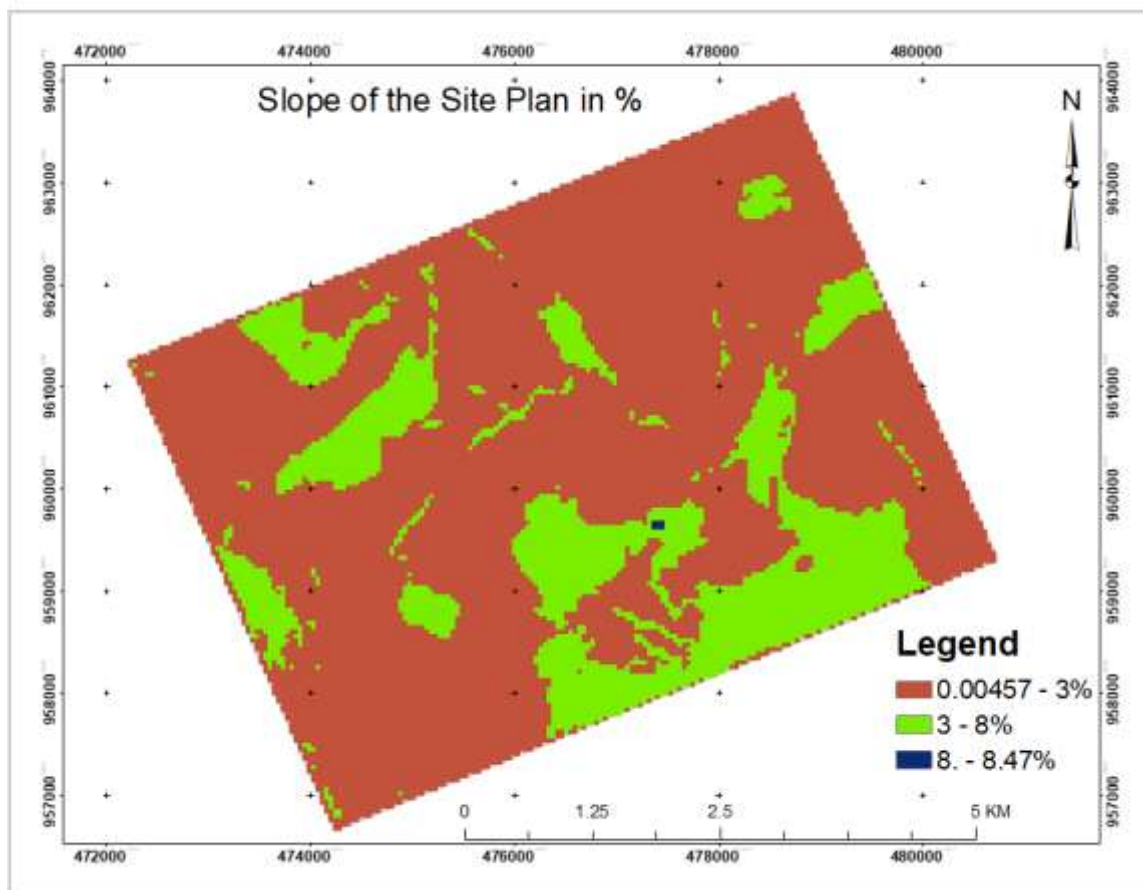


Figure 5-17: Slope and Topographic feature of the project site (Source: Site visit 07/11/2024)

5.2.5. Soil

Based on the preliminary site reconnaissance conducted, two dominant type of soils have been observed. Large part of central and eastern part is covered by black cotton soil or Eutric Vertisols according to FAO classification. This type of soil is characterized by low drainage, high montmorillonite clay and shrink-swell properties. Whereas the western periphery towards all along Akaki River is silt and sandy loam light texture or known as Flavisols. These soils are weakly developed soils, predominantly on the water borne sediments associated with the flood plains and rivers. During site survey, soil samples were collected from top soil at six localities within the proposed airport boundary and soil characteristics are summarized in Table- below.

Table 5-19: Soil test result of field collected samples

<i>Date collected</i>	<i>Sample-ID</i>	<i>Easting</i>	<i>Northing</i>	<i>Grain size</i>	<i>Liquid limit</i>	<i>Plastic limit</i>	<i>Specific Gravity</i>
30/01/2025	S-1	478635	962927	9% sand, 91% fine	69	28	2.49
30/01/2025	S-2	479270	961194	20% sand, 77% fine, 3% gravel	NP	NP	2.53
30/01/2025	S-3	478015	959047	2% sand, 98 % fine	60	25	2.52
30/01/2025	S-4	475222	958740	57% sand, 41% fine, 2% gravel	NP	NP	2.47
30/01/2025	S-5	474256	960942	3% sand, 97% fine	65	23	2.49
30/01/2025	S-6	476108	961696	3% sand, 97% fine	65	22	2.47

**Figure 5-18: Soil sample collection from the new proposed airport area**

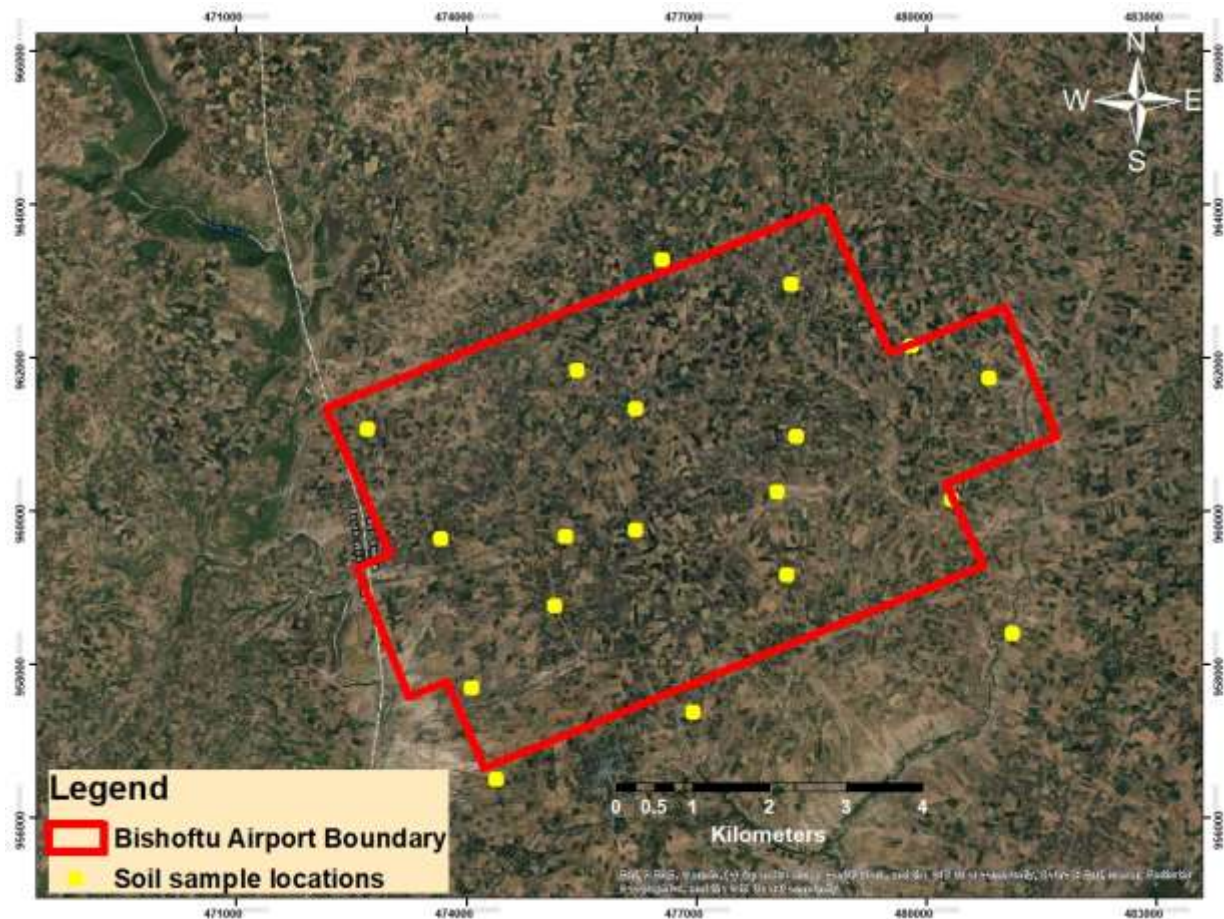


Figure 5-19: Soil Sample Location

In addition, as part of secondary data collection, 15 borehole log data were collected from geotechnical investigation conducted by another consultant. The boreholes are 10 to 25m deep and their characteristics are summarized below;

Table 5-20: Borehole log data from secondary collected geotechnical investigation

Depth (m)	Average thickness	Soil description
From 0 to minimum 1.5 and maximum 5m	3m	<i>Color and grain size:</i> Dark grey to black silty clay. <i>Description:</i> Highly plastic, moderate stiffness, dark gray color. <i>Significance:</i> This layer likely has low permeability and can be problematic for construction due to its high plasticity and potential for volume change with moisture content fluctuations (shrinkage and swelling).

From 1.5m to minimum 2.5m and maximum 15m	4m	• <i>Color and grain size:</i> Light brown, sandy clay • <i>Description:</i> Description: Low plasticity, moderate stiffness. • <i>Significance:</i> Less plastic than the layer above, potentially better suited for some construction activities.
The lower formation	Variable thickness	• <i>Color and Type:</i> Light gray color, completely decomposed rock (loose pyroclastic flows). • <i>Description:</i> Decomposed rock, non-plastic, moderate density. • <i>Significance:</i> This layer is significantly different. Weathered rock generally provides better drainage than clay silty sand, if adequately compacted, can offer good bearing capacity. The "moderate density" is important.



Figure 5-20: Soil types observed in the Project Area

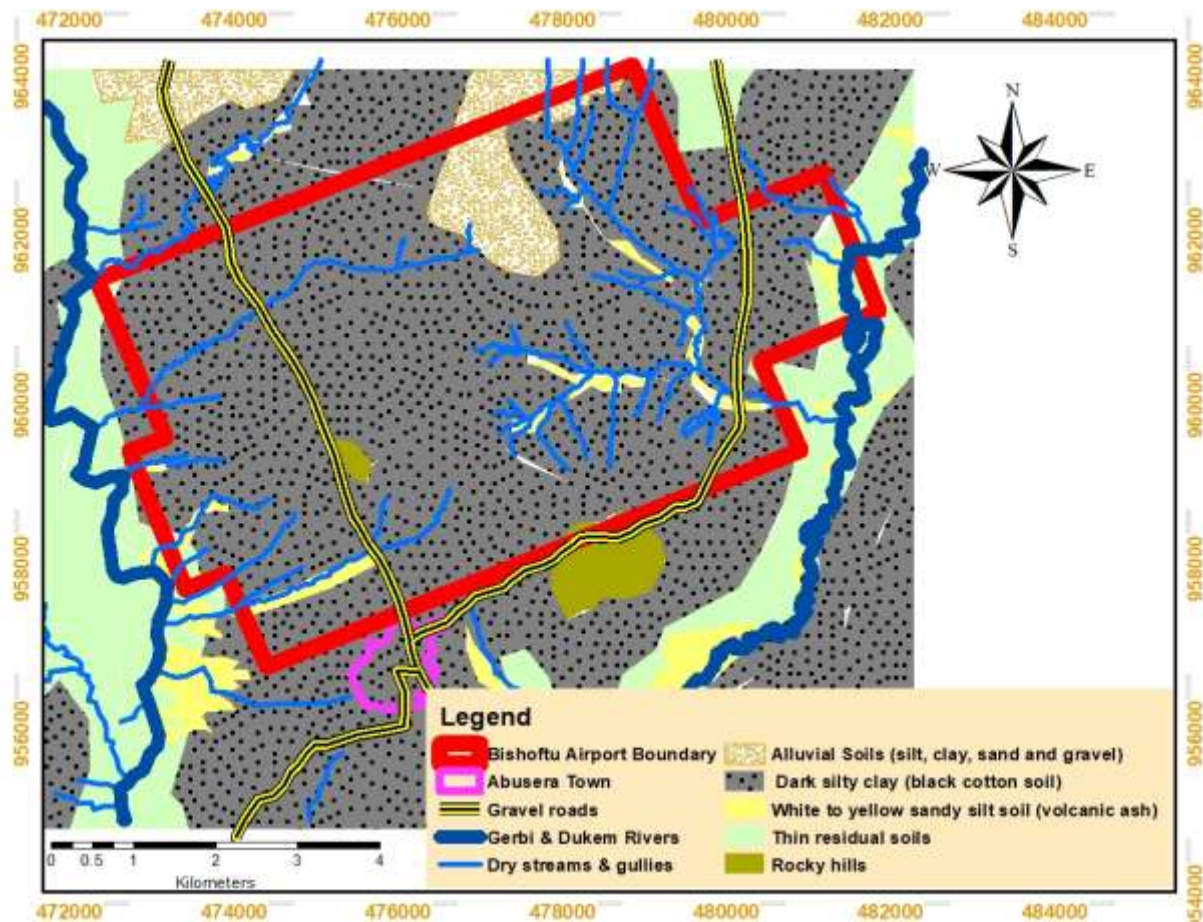


Figure 5-21: Soil Map of Project Area (source: made by consultant)

5.2.6. Geology

Generally, the Main Rift Valley (MER) is covered with Cenozoic volcanic rocks which are widespread in the whole region spanning from Early Miocene to recent lava flows resulted from rift formation. It comprised of thick of volcanic rocks erupted from fissures and/or central type of volcanoes at the escarpment and rift. Due to its geomorphological setting, the project area is dominantly eluvium deposit which is noted in the flat lying areas southwest of Dukem and along the escarpment and rift close to their origin as residual soil. The deposits are commonly grayish white and rarely reddish brown, silt, sand and gravel mixed in various proportions. The eluvium contains cobble and boulder sized rock fragments at places.

There are also isolated trachyte domes and cones common in the rift floor as well as isolated scoria fallout deposits with subordinate scoraceous basalt encountered outside the project area, at the margin of northwestern escarpment on the way to Akaki Area.

4.1.6.1 Local Lithological Units

Welded to poorly welded pyroclastic flows: Exposure of this units are found to southwestern and eastern part of the area outcropped in the lower section of Akaki-Gerbi and Dukem River cuts. It is part of Post-Trap pyroclastics which is widespread in the rift, escarpment and consisting of mainly welded to poorly welded tuff.

The poorly welded tuff is variegated greyish yellow to greyish white, medium grained, partially welded, horizontal layered, friable and containing fiamme and some lithic fragments interleaved with ash and paleosols.

Trachyte domes: exposure of this unit is found in eastern direction of Abusera Town. It forms unevenly distributed small domes and broad-based gentle sloping circular to elliptical hills. The trachyte is gray to grayish green, medium grained, locally vesicular and exhibiting flow banding.

Chefe Donsa pyroclastic deposits: these units are exposed in gully cut sections of the low lying of all airport area. They consist of volcanic fall deposits which are overlain by quaternary surficial deposits. They have light to dark grey colors, horizontal to sub-horizontal stratified unwelded tuff, fine volcanic ash and pumiceous deposits.

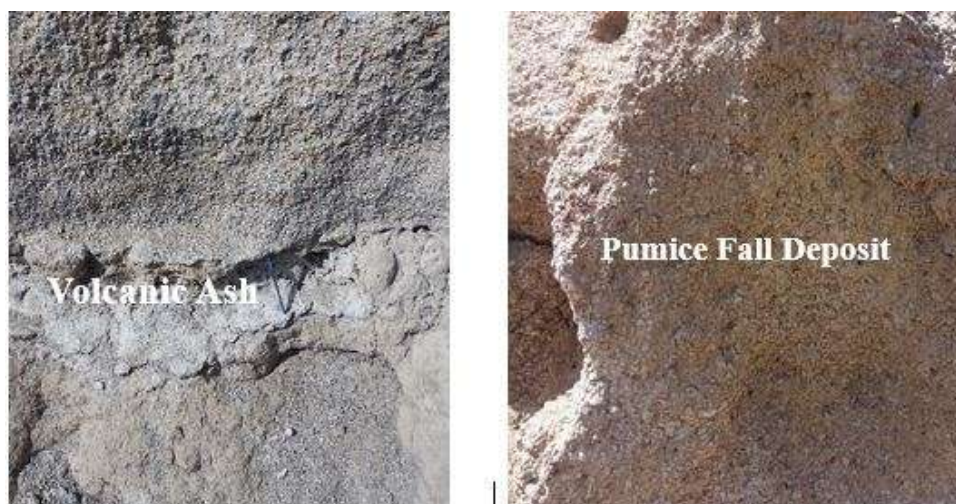


Figure 5-22: *Unwelded Pyroclastic Deposits exposed across rivers and gullies within the Airport boundary*

Quaternary surficial deposits; the surficial deposits are represented by eluvium, lacustrine and alluvial deposits which covered large part of the plain.

Eluvium soils are widely distributed on the flat plain including the airport area predominantly represented by black to dark grey silty clay with a thickness ranging from 2.5m to 15m as observed in gulley sections and results from geotechnical borehole log data conducted in the area. These surficial deposits are underlain by Chefe donsa pyroclastic deposits mainly volcanic ash, pumice and loose tuff. In north east part, on the way to Dukem, the black clay soil is underlain by yellowish to brown clay and silt mixed in various proportions with rock fragments reaching a thickness of 5 to 6m.



Figure 5-23: Quaternary Surficial Deposits (Eluvium and Alluvium deposits)

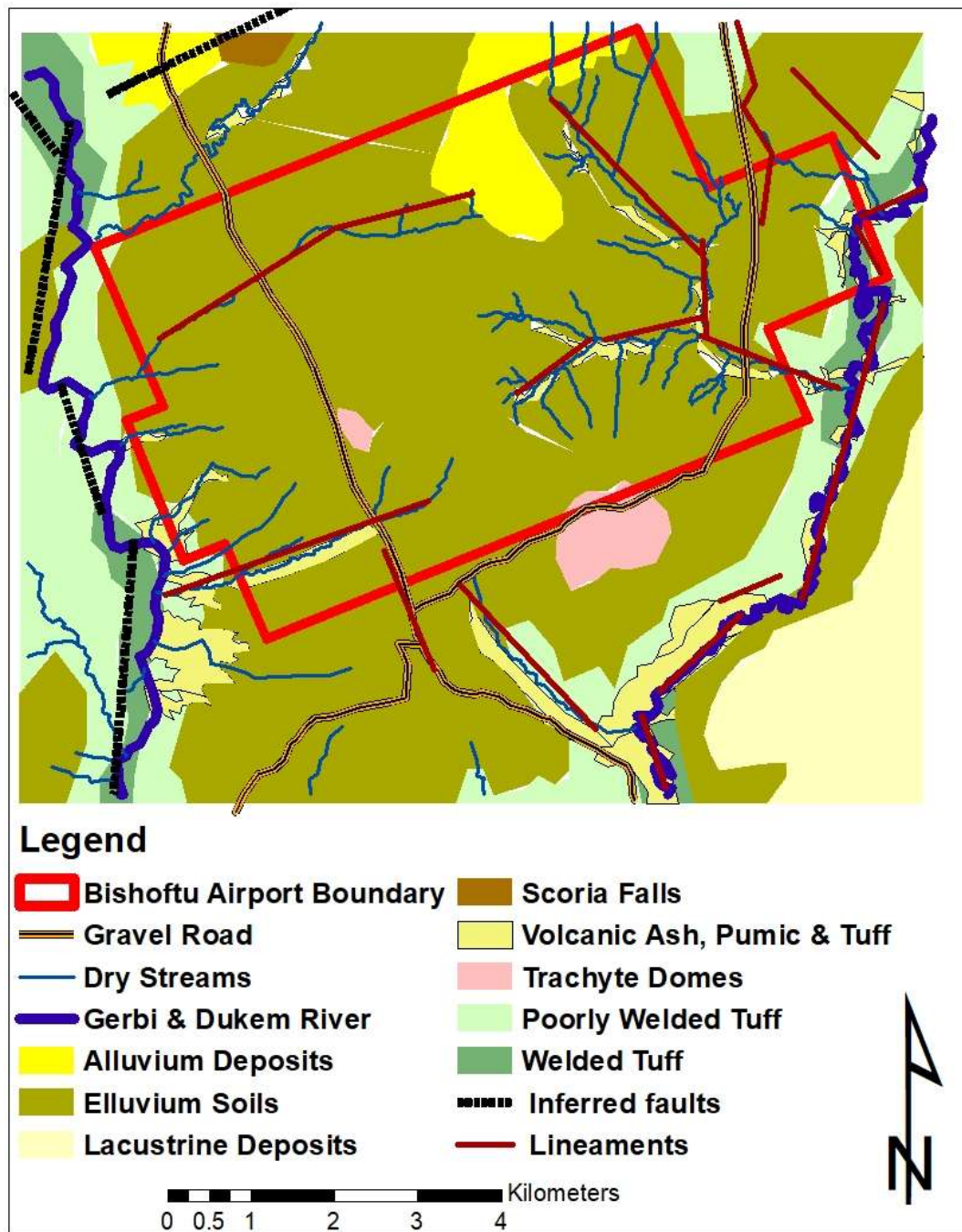


Figure 5-24: Geological Map of Project Area (source: made by consultant)

5.2.7. Hydrology and Drainage pattern

The new proposed airport is part of Upper Awash River sub-basin. Eastern part of the project is part of Dukem River Catchment whereas the western part is part of Akaki-Gerbi River Catchment. The Dukem Sub-catchment part of the airport covers about 15.45km² while the Akaki-Gerbi sub-catchment covers about 19.55km². Both Akaki-Gerbi and Dukem Rivers flow north-south direction and finally drained into Awash River far south from project

boundary. Almost all the small streams in and around the airport are seasonal and stay for short time after rainfall.

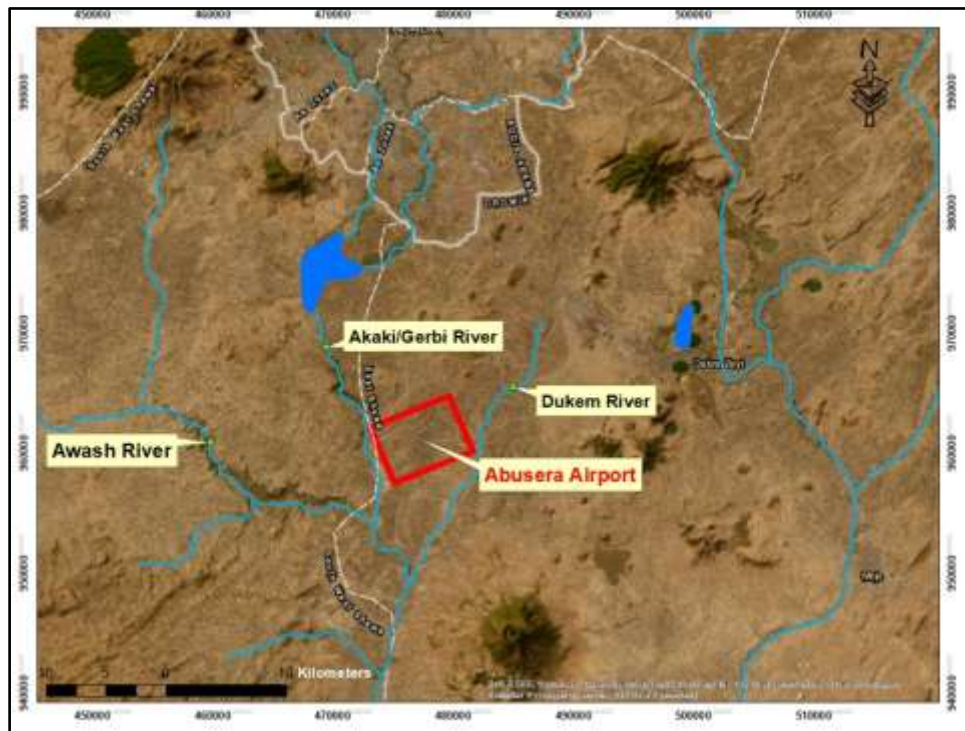


Figure 5-25:- Hydrology and Drainage pattern of the Project Area

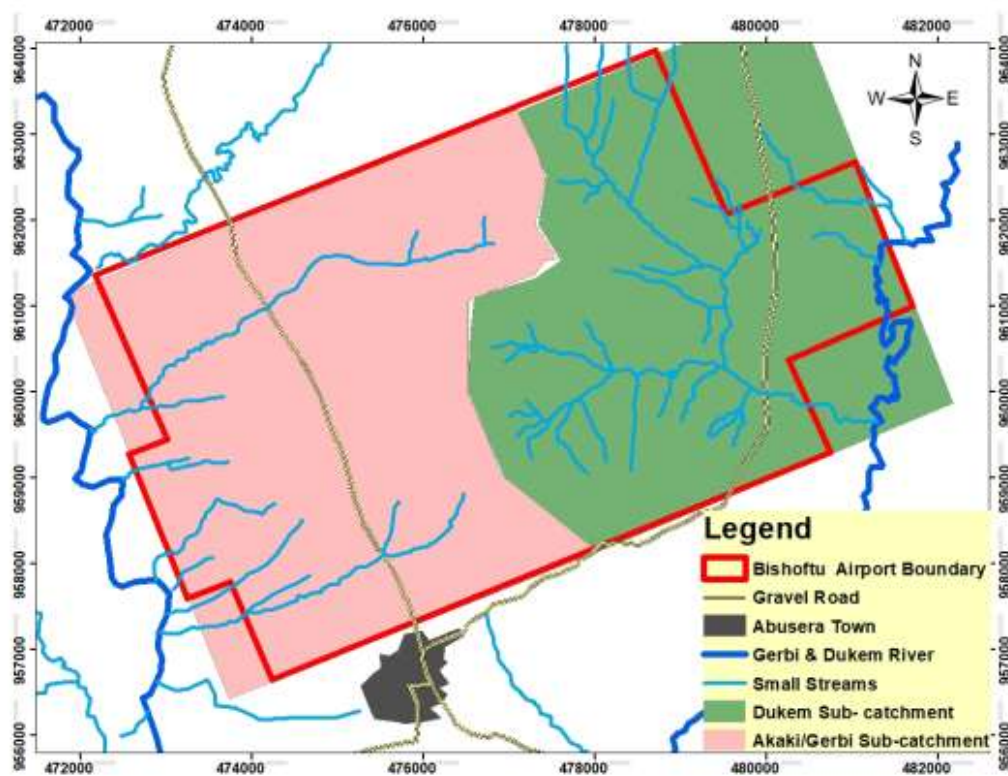


Figure 5-26: Sub-catchments of Project Area



Figure 5-27: Seasonal or dry streams in the site that collects surface runoff during rainy season
(Source: Site visit 07/11/2024)

5.2.8. Water Resource

Surface water: due to its proximity to western rift escarpment, the area is endowed with many all year and intermittent streams predominantly flows north-south direction. Awash River, one of the biggest river in the country, is the recipient of all rivers including Akaki-Gerbi and Dukem Rivers in the area.

The nearby Awash River which is located around 3 kms from the southern tip of proposed project area is one of the relatively well gauged rivers in Ethiopia. It has river discharge measuring stations at several points along its course. For this study, Melka Kunture Station which is relatively close to the project area was used for discharge analysis. The stream flow discharge of the station was collected from the Ministry of Water and Energy ((MoWE).

Table 5-21: Monthly river discharge of Awash River

Discharge (m ³ /sec)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	1.66	1.47	2.23	3.96	4.67	14.25	73.1	150.6	85.7	11.9	2.97	1.93
Max	21.47	22.97	56.15	65.62	120.10	122.8	458.1	555.1	452.0	117.4	31.2	6.50
Min	0.41	0.35	0.17	0.21	0.30	0.30	4.46	12.38	6.26	1.06	0.99	0.47
Standard dev.	0.96	1.31	3.66	6.07	8.09	16.55	55.4	69.26	59.36	14.89	1.84	0.59

Groundwater Resource: With respect to groundwater resource, the area is generally part of Ada'a plain groundwater system and its hydrogeological set up is governed by the lithologic stratigraphy and tectonic of the area.

To characterize the hydrogeology and groundwater system of the area, about 35 boreholes with well depth ranging from 85-508m were used. The boreholes are located within a radius of 30km from the proposed airport boundary.

The wells show variable yields from minimum 3 l/sec to maximum of more than 100 l/sec depending on the type and thickness/depth of the aquifer.

A 220m deep well located inside the proposed airport boundary gives 3 l/sec. Static water table and drawdown were measured 102.2m and 21.27m respectively during the well construction. Similarly, another 220m deep borehole drilled at Abusera Town has static water table of 104m and drawdown was measured 28.4 with pumping discharge of 7.3 l/sec.

Geological log data of 330m deep well drilled 2.7km from southern boundary of the airport shows that the top 148m is covered with tuff, volcanic ash and ignimbrite with no water bearing formations underlain by a fractured and water saturated basalt from 148-192m. The bottom layer from 192-330m is thick tuff and ignimbrite with less groundwater hydraulic conductivity and transmissivity.

Water yield significantly increases as one goes far to north and northeast direction. Akaki area in south Addis Ababa as well as Dukem and Debrezeit plains have high well yields reaching to more than 70 l/sec. Wells penetrated deep into lower fractured and scoraceous basalts have often high yields reaching up to 100 l/sec. 500m deep well in Chukala area, located 7.5km northeast of the airport boundary has a yield of 101 l/sec and static water table of 62m below ground level.

Generally, the new proposed airport is located in a thick pyroclastic flows mainly tuff, ash and ignimbrites up to a depth 148km characterized by low groundwater storage and transmissivity as shown in table below.

Table 5-22: Hydro-stratigraphic of one deep well near to Airport boundary

No	Average depth in m	Lithology	Hydraulic parameters	Remark
1	0-7m	Top soil		
2	7-148m	Tuff, volcanic ash and ignimbrite	Low groundwater storage and transmissivity	Low potential aquifer
3	148-192m	Fractured and weathered basalt	High groundwater storage and transmissivity	High Potential aquifer
4	192-330m	Tuff and ignimbrite	Low groundwater storage and transmissivity	Low potential aquifer

The recharge condition, groundwater flow and aquifer parameters is highly governed by regional tectonics and hydraulic properties of the different volcanic units that outcrops in the region. According to study by WWDSE in 2008, the area is recharged from three direction i.e. the recharge inflow between Mountains Yerer and Guji, between Bede Gebaba and Ziquala and from Mojo, Wedecha and Belebela catchment.

Groundwater table depth increases from 18m in northwestern rift escarpment to 135m far in southern part of Ada plain. The groundwater level in and around the airport is expected to be within 68 to 101m below ground level. Groundwater flow direction is also from east and north to south direction.

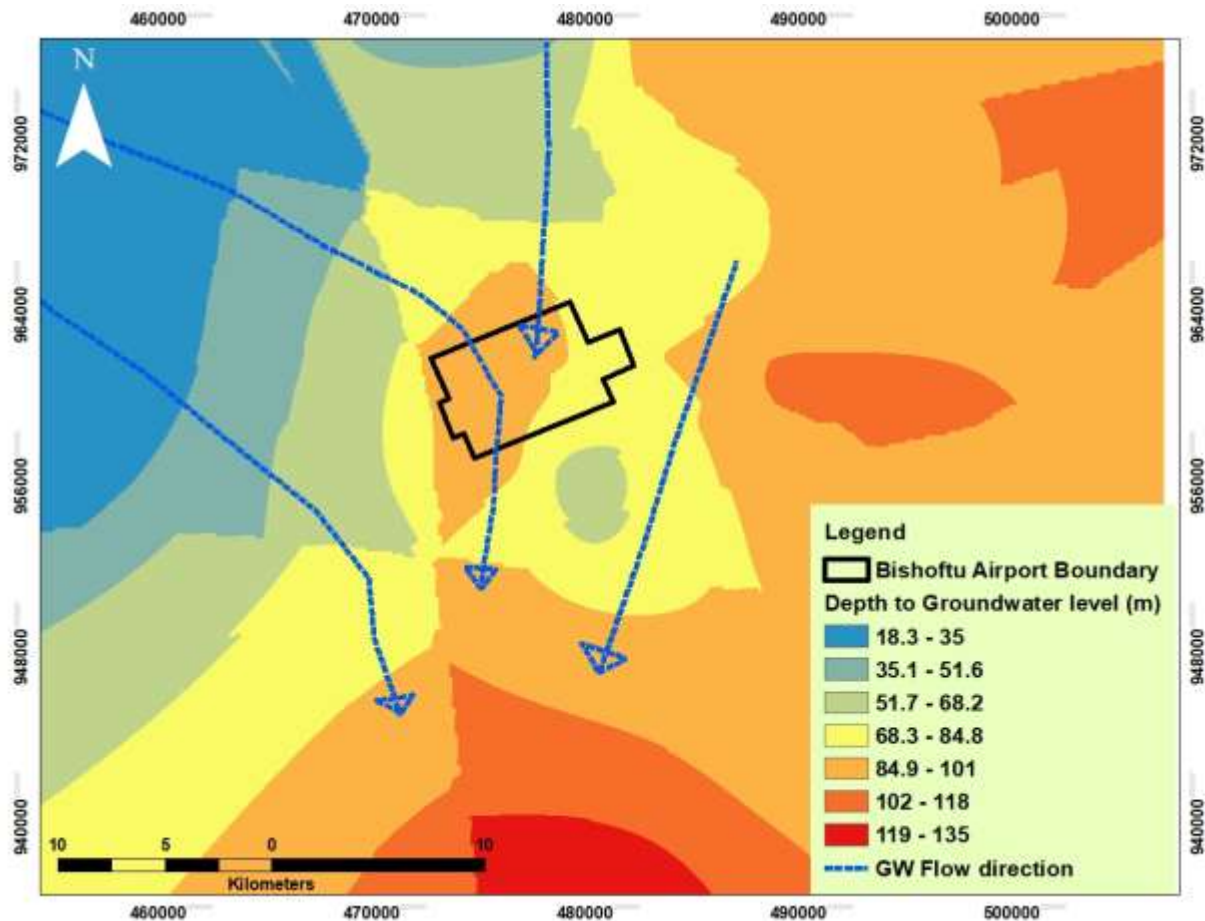


Figure 5-28: Groundwater depth and flow direction of Project Area

5.2.9. Water quality

a) Surface Water quality: the two most important rivers in the area are Akaki-Gerbi and Dukem Rivers which drain respectively western and eastern part of the airport. Both rivers are considered as one of the polluted rivers in the country due to the high pollution load from domestic and industrial wastewaters in Addis Ababa and its suburbs.

The Akaki River in Addis Ababa City before it joins Aba Samuel Lake is one of the highly polluted river in the country. One can find all sorts of solid and liquid wastes in the river. Many point and non-point pollution sources exist in and around Addis Ababa City. Nonetheless, the degree of pollution decreases at downstream of Aba Samuel Lake. This is due to the reason that Aba Samuel Lake, located south of Addis Ababa, serves as a pollutant sink for Small and Great Akaki Rivers, which are heavily polluted by industrial and domestic waste, and the reservoir itself is experiencing eutrophication due to high nutrient concentrations. Therefore,

downstream of Akaki River named as Gerbi River in Abusera area has lower pollutants when compared to the upstream of Akaki River in Addis Ababa Area.

During field site survey, two water samples; one from downstream of Akaki-Gerbi River and one from Dukem River were collected for all physio-chemical laboratory test. In-situ water quality test such as Temperature, Electrical Conductivity, Total Dissolved Solids and PH was also conducted for both rivers to see the current water quality status of the rivers. The water sample points are in the immediate vicinity of the new proposed airport boundary.

Table 5-23: River water sample locations (UTM, Zone 37, WGS1984)

Sample location	Easting	Northing	In-situ water quality measurement	All physio-chemical laboratory test
Downstream of Akaki-Gerbi River	472927E	957024N	✓	✓
Upstream of Akak-Gerbi River	471715E	960263N	✓	
Dukem River	481359E	961088N	✓	✓



Figure 5-29: In situ (field) water quality measurements of nearby rivers

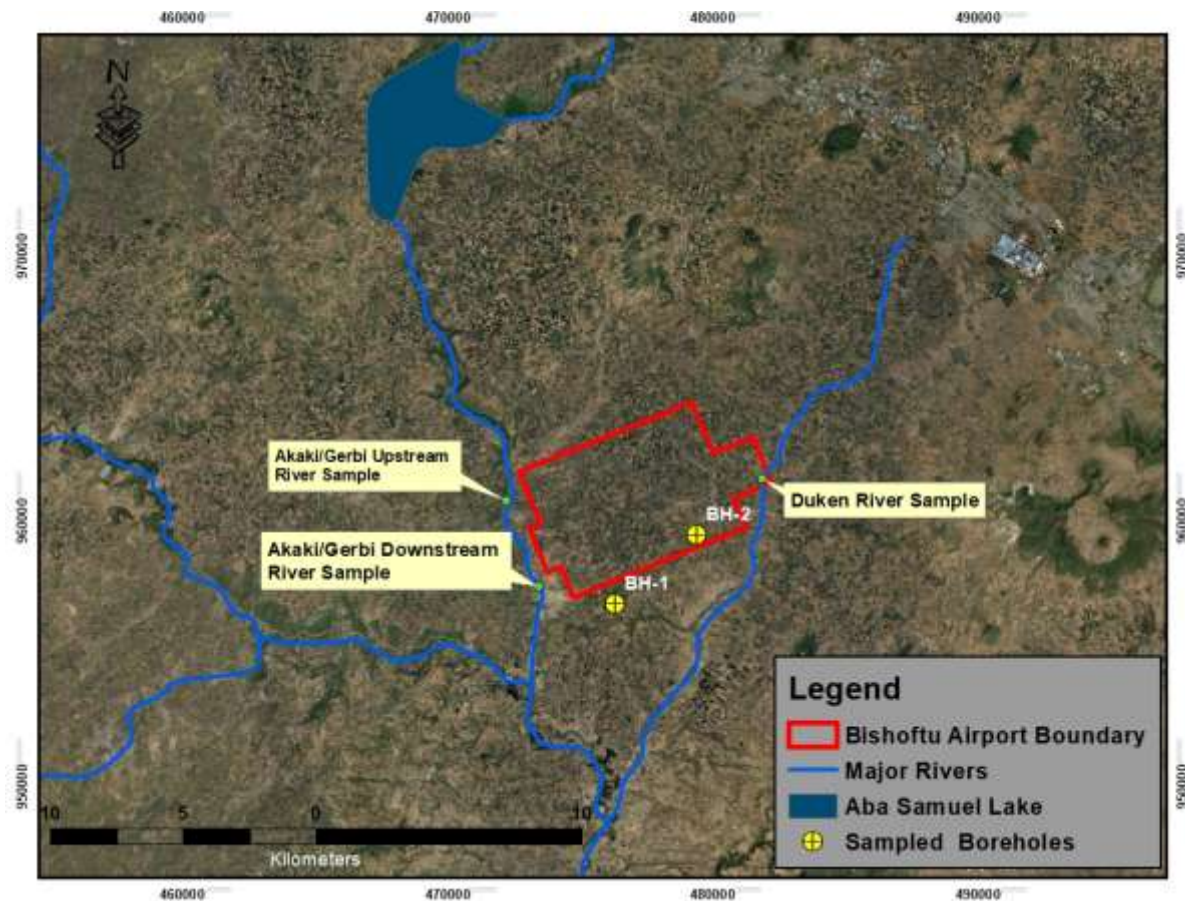


Figure 5-30 River water and Borehole water sample locations

Akaki-Gerbi River shows high nitrate and manganese ions above WHO standard limits. The rest parameters didn't exceed the WHO standard limit. This is likely due to the upstream Aba Samuel Lake which is serving as pollutant sink. On the contrary, water sample result from Dukem River shows alkaline water, relatively high EC and TDS, highly turbid and high concentration of Iron and Manganese ions. Particularly, PH, Turbidity, Iron and Manganese ions are higher than the maximum WHO allowable concentration for drinking (see annex attached).

The Ethiopian Environment Protection Authority (EPA) established a water quality monitoring program on Awash River Basin, the recipient river of both Akaki and Dukem Rivers, by selecting 22 sites that extends from upper course to its termination in Afambo Lake near Djibouti. Results of the River monitoring have shown that the water is polluted from industrial and domestic wastes as well as irrigation practices beyond the concentration range of the quality specification and the provisional ambient water quality standard developed by the Ethiopian EPA and other countries

b) Groundwater quality: Generally, areas in Ethiopia highlands covered with tertiary volcanic rocks have good groundwater quality whereas rift floor and some mesozoic sedimentary terrains have some water quality issues. Some boreholes in rift valley including the project area have high temperature and fluoride ions, supposed to be affected by local geology and tectonic structures which have connection with deep thermal activities.

As part of groundwater quality assessment of the project area, water samples were collected for in-situ and laboratory water quality test. The two boreholes (BH-1 and BH-2) are located respectively in Abusera Town and northeast part of the Airport boundary on the way to Dukem Town (Figure 5-28).

Table 5-24: Borehole water sample locations (UTM, Zone 37, WGS1984)

Sample Source	Sample ID	Easting (m)	Northing (m)	In-situ water quality measurement (Temp., EC, TDS, PH)	All physio-chemical laboratory test
Borehole	BH-1	475797E	956479N	✓	✓
Borehole	BH-2	480280E	963140N	✓	✓

The tested borehole in Abusera Town (BH-1) is hot water where temperature reaches 58.7 °C. The water is slightly alkaline with PH value of 8.87 and fluoride ion of 2.6 mg/l. The rest water quality parameters are within the maximum WHO allowable concentrations. The rise in temperature is associated with tectonic dynamism of the area where active faults contribute interaction of shallow aquifers with deep thermal waters where as dissolution and mixing of acidic rocks with groundwater may have played a role in increasing fluoride ion concentration. The temperature and fluoride concentration are relatively lower in BH-2 (see annex attached).

Generally, water quality result from 33 wells within 40km radius identified during water point inventory are analyzed for their chemical contents (annex attached). Total dissolved solids in the analyzed water quality results range from 232 to 578 mg/l, electrical conductivity ranges from 354 to 1,590 MS/cm, PH ranges from 6.8-8.87, fluoride in the analyzed samples range from 0.015 to 5.8 mg/l and temperature of the water ranges from 20 to 79°C.

With man-made effect on the groundwater system, chloride and nitrate values of the groundwater can be good indicators if potential contamination of groundwater exists. Increase in nitrate concentration is a result of poor system of pit latrines, waste disposals and fertilizers from agricultural farmlands.

The concentration of nitrate in natural water is less than 10 mg/L. Unlike some areas of Addis Ababa City with nitrate concentration reaches 25 mg/l due to poor sanitation and hygiene practice, the concentration of nitrate in groundwater in the new airport area is within WHO standard limits (0.17-3.7 mg/l); shows groundwater resource of the area is still not yet or less polluted from intensive agricultural activities practiced for centuries.

Electrical conductivity, fluoride and nitrate map of the airport and its surroundings is given in figures 5-29 – 5-31 below.

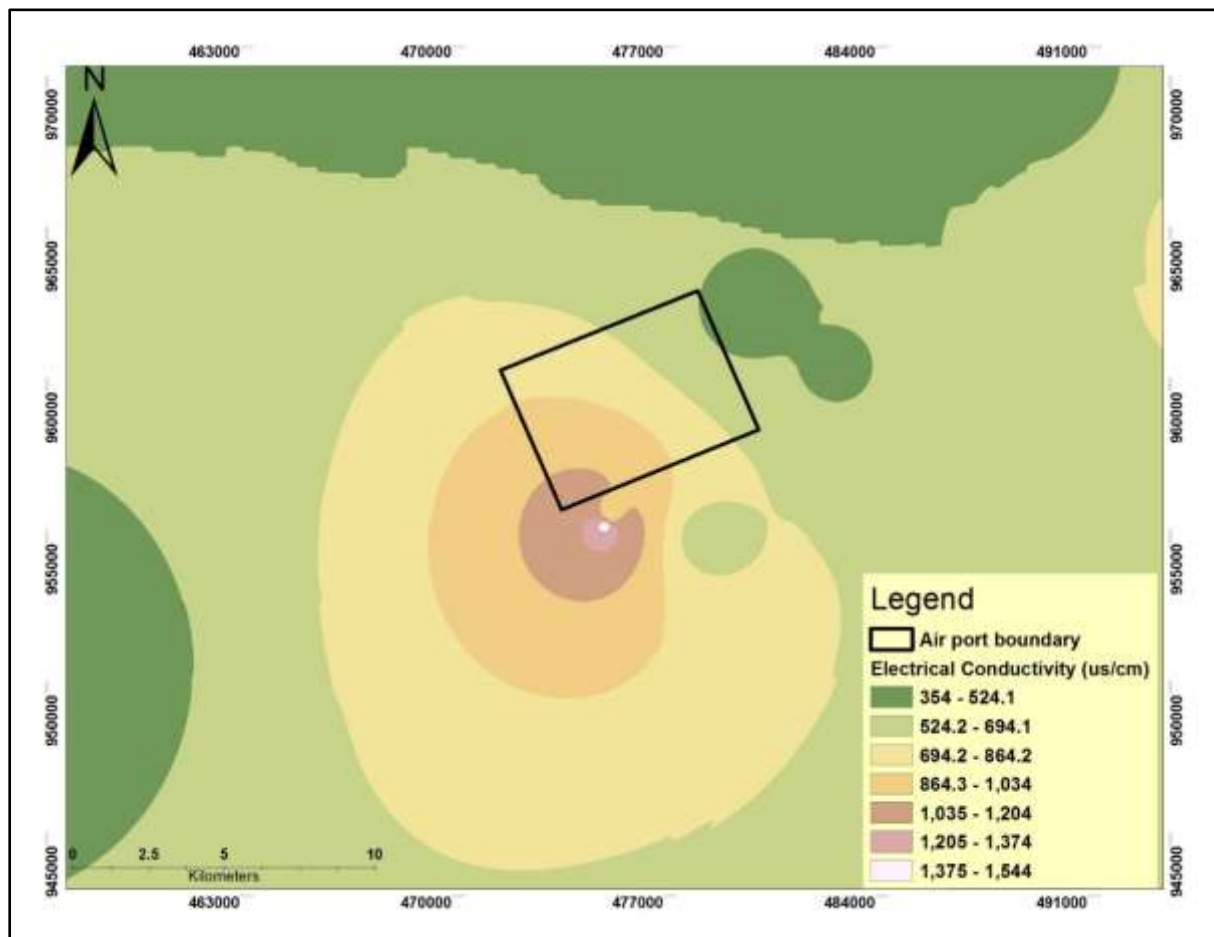


Figure 5-31: *Electrical Conductivity (EC) of Groundwater in Project Area*

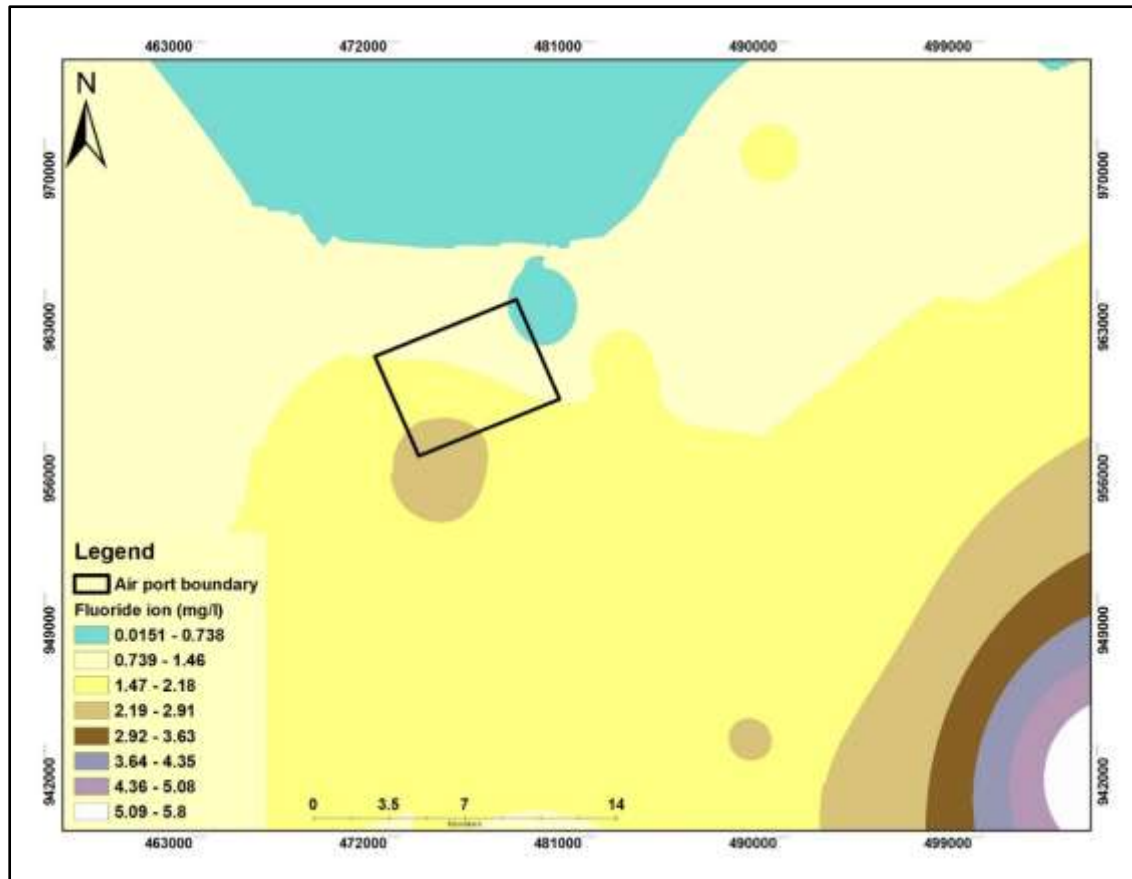


Figure 5-32: Fluoride ion concentration of Groundwater in Project Area

With anthropogenic effect on the groundwater system of the area, chloride and nitrate values of the groundwater can be good indicators if potential contamination of groundwater exists. Increase in nitrate concentration is a result of poor system of pit latrines, waste disposals and fertilizers from agricultural farmlands.

The concentration of nitrate in natural water is less than 10 mg/L. The ground water nitrate concentration in the area is within WHO standard limits which shows that the groundwater resource of the area is still not yet or less polluted from man-made activities.

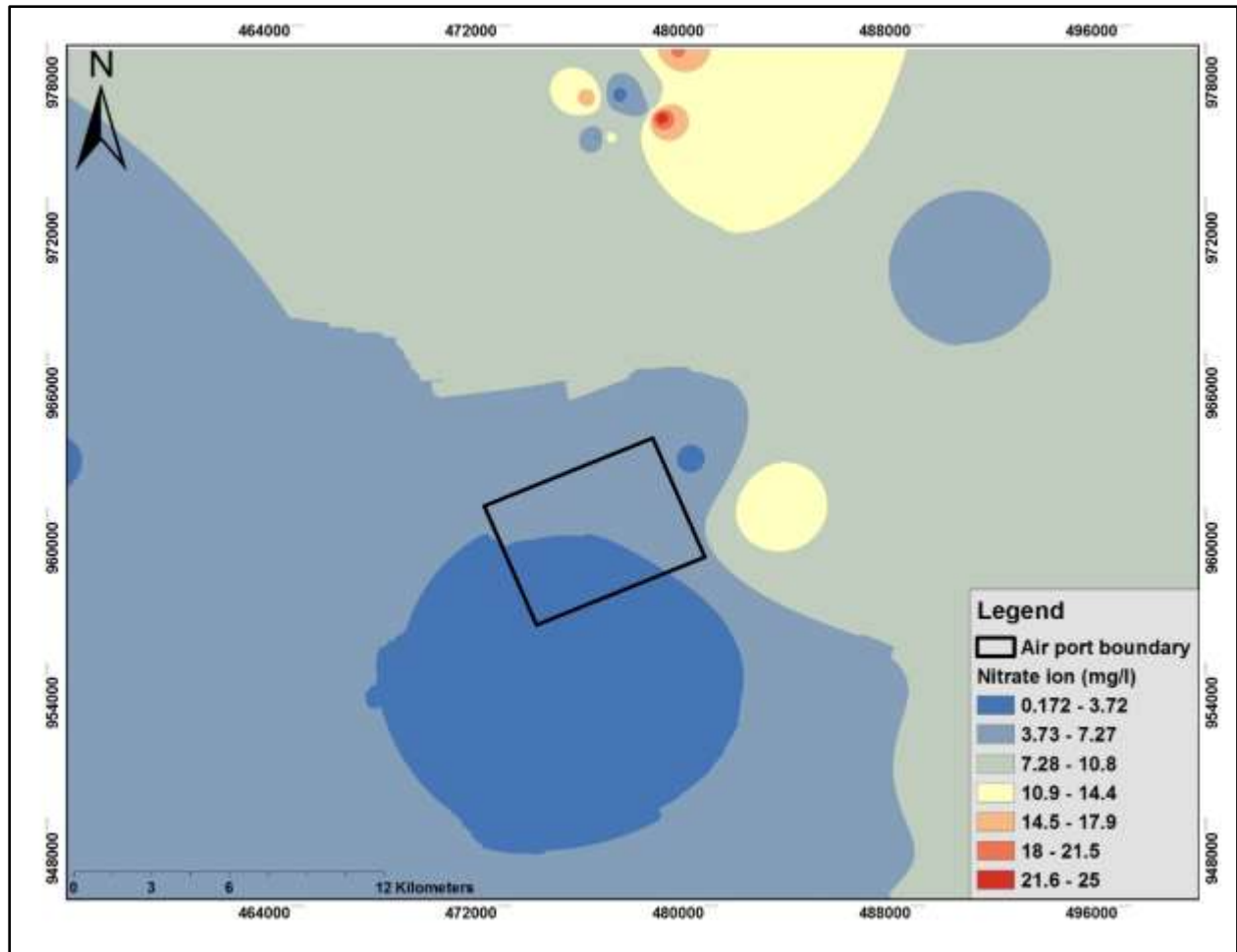


Figure 5-33: Nitrate ion concentration of Groundwater in Project Area

5.2.10. Land Use Land Cover Analysis

The Land Use Land Cover (LULC) analysis of the proposed Bishoftu International Airport site, including the surrounding Bishoftu city area, provides valuable insights into the existing land use and the potential impacts of the development. The LULC data highlights various land cover types within the region, offering a clearer understanding of how different areas are currently utilized and the distribution of land across different categories. The analysis covers several key classes, such as woodland, agricultural land, shrub land, settlement areas, and water bodies, each contributing differently to the overall land structure.

In the study, woodland occupies an area of 22.68 km² (2267.55 hectares), which signifies a significant portion of the landscape covered by natural vegetation. Agricultural land, which is the largest land use category in the area, spans 631.46 km² (63145.62 hectares), highlighting the region's reliance on farming for economic activities. Shrub land, with an area of 13.44 km² (1344.33 hectares), indicates the presence of semi-arid or less densely vegetated land, while

settlements cover 257.51 km² (25750.62 hectares), reflecting the extent of urban development in the area. Water bodies, such as lakes or rivers, account for 8.44 km² (844.2 hectares), contributing to the region's hydrological features.

Table 5-25: LULC analysis

LULC Class	Area km ²	Hectares
Woodland	22.67.55	2267.55
Agricultural land	631.4562	63145.62
Shrub land	13.4433	1344.33
Settlement	257.5062	25750.62
Waterbody	8.442	844.2

This LULC analysis is critical for understanding the current land use in the region and the potential impacts of the airport's development, helping to inform decision-making and mitigation strategies for sustainable development.

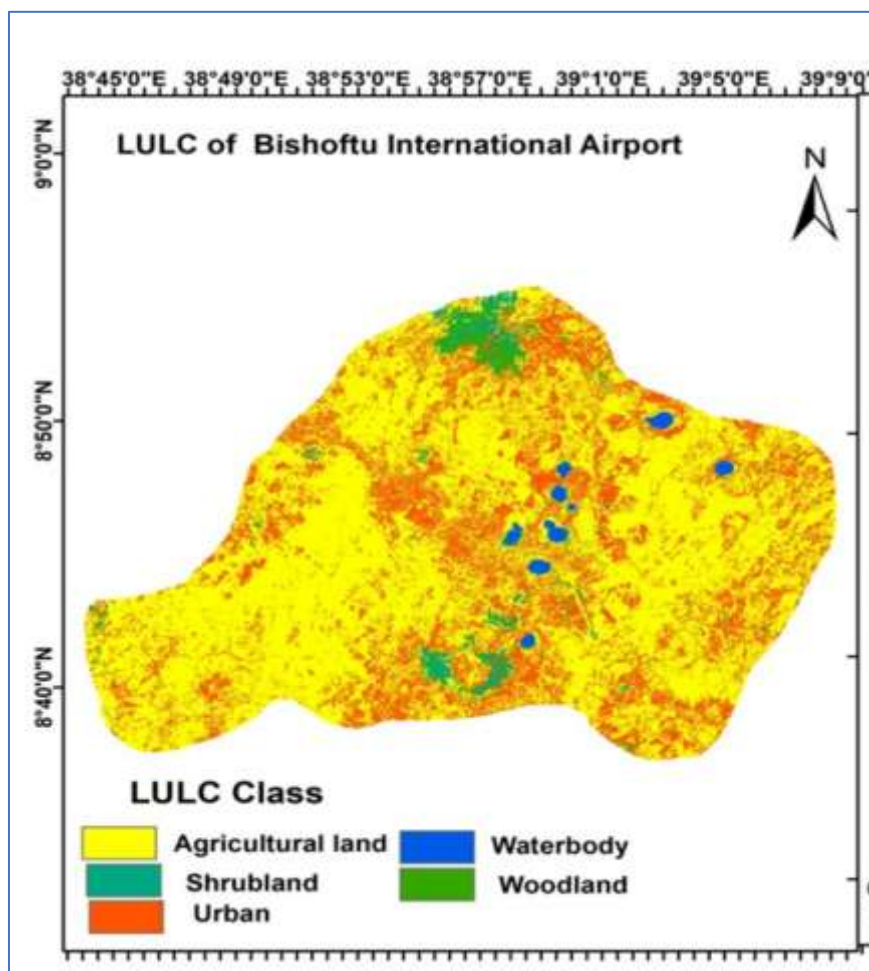


Figure 5-34 LULC analysis of the proposed Bishoftu International Airport site, including the surrounding Bishoftu city area

5.2.11. Climate Change Vulnerability Assessment

The Climate Change Vulnerability Assessment (CCVA) for Bishoftu International Airport (BIA) presents a comprehensive examination of how future climatic changes may affect the airport's infrastructure, operations, and workforce. Given the long-term nature of airport infrastructure, integrating climate resilience into the planning, design, and operation of BIA is essential. This assessment combines historical climate data, future climate projections, and vulnerability metrics to determine the exposure, sensitivity, and adaptive capacity of the project area. In doing so, the CCVA provides evidence-based insights into how Bishoftu International Airport can mitigate future disruptions and maintain operational safety, efficiency, and sustainability under changing climate conditions. The findings also support strategic planning, policy integration, and investment in adaptation measures to enhance resilience across all phases of the airport's development.

5.2.11.1. Historical Analysis of Climate-Related Weather Hazards

Historical climate trend analysis for the Bishoftu International Airport area, based on Akaki, Alem Tena, and Debre Zeit stations, reveals significant increases in temperature, though annual precipitation does not show a statistically significant trend. Precipitation data indicates variability rather than a clear trend, with extreme events recorded, such as 358.8 mm in Akaki in July 2023 and 397.1 mm in Alem Tena in July 2019, exceeding the 99th percentile. Maximum temperatures show a consistent increasing trend across all stations, with Akaki rising at 0.0385°C/year, Alem Tena at 0.0455°C/year, and Debre Zeit at 0.0480°C/year. Notable heat events include 34.8°C in Alem Tena during March 2016. Minimum temperature trends are mixed; Akaki shows a significant decline at -0.0909°C/year, while the other stations show no significant trends. Relative humidity is declining, particularly in Debre Zeit, with a decrease of -0.1905% per year. Sunshine hours exhibit no clear trend, though extreme highs and lows were observed, indicating potential implications for solar radiation exposure and heat stress.

5.2.11.2. Future Climate Projections and Scenarios within the Project Area

Future climate projections for BIA were developed under two emission scenarios: RCP 4.5 (moderate emissions) and RCP 8.5 (high emissions). These projections offer a lens into the likely climatic realities the airport will face across near-term (2030–2040), mid-term (2040–2060), and long-term (2060–2100) planning horizons.

Under RCP 8.5, temperature projections indicate that maximum temperatures could increase by up to 3.4°C by the end of the century. The frequency of days exceeding 35°C is projected to increase fivefold—from 5.6 days/year currently to 28.4 days/year by 2100. Such heat extremes have direct implications for aircraft performance, surface infrastructure, and worker safety.

Rainfall patterns under RCP 8.5 are expected to become more erratic. Although the total annual precipitation could increase by 12%, the intensity of five-day storm events is projected to rise by 27%, substantially elevating the risk of flash flooding and overburdening of drainage infrastructure. Such changes necessitate redesigning water management systems to accommodate higher peak flows.

Wind dynamics are also projected to shift. The prevailing wind direction is expected to change from east-northeast (ENE) to a more north-northeast (NNE) alignment, affecting runway orientation and aircraft maneuverability. In addition, the number of high-wind days (gusts >8 m/s) could reach 30 annually, requiring operational restrictions and reinforced building envelopes.

Under RCP 4.5, while the changes are less extreme, they are still significant. Maximum temperatures could increase by 1.9°C, and heavy rainfall events may increase by 12%. These trends reinforce the necessity of climate-informed planning even under more optimistic mitigation scenarios.

5.2.11.3. Exposure of the Project Area to Climate Hazards

The Bishoftu International Airport site is geographically and physically exposed to multiple climate hazards due to its location and land characteristics. Situated at an elevation of around 1,900 meters, the site spans both fertile agricultural lands and semi-urban fringes. The soil profile includes expansive Black Cotton Soils (Eutric Vertisols), which are prone to shrinking and swelling with changing moisture levels.

Runways and taxiways at BIA are directly exposed to thermal and hydrological stress. Prolonged heatwaves can cause thermal expansion of pavement materials, leading to surface buckling. In addition, heavy rains may lead to waterlogging and undermine the structural integrity of airfield surfaces. Crosswinds arising from shifting wind patterns present a hazard for both landing and departing aircraft.

Terminal buildings are vulnerable to a range of climate impacts. Floodwaters from intense rainfall events may damage lower-level infrastructure, while heatwaves place increased stress on HVAC systems and indoor air quality. Strong winds can cause damage to roofing systems and external cladding.

Electrical systems and air traffic control installations are also exposed. Overheating can cause failures in control rooms, communication links, and navigation aids. Floodwaters can short-circuit sensitive components or disrupt backup power systems.

The airport's stormwater infrastructure is particularly vulnerable. Current designs based on historical rainfall norms may be insufficient to manage the projected future intensity of 1-in-100-year rainfall events. This underlines the critical need for forward-looking engineering solutions.

5.2.11.4. Sensitivity Assessment

The sensitivity of airport components to climate hazards varies according to material properties, system redundancy, and functional importance.

Geotechnical conditions represent a core sensitivity. The expansive clay soils prevalent in the central and eastern portions of the site are especially vulnerable to alternating wet-dry cycles. During dry periods, these soils contract, causing surface depressions and potential runway deformation. In contrast, saturation during heavy rainfall leads to swelling, increasing the risk of structural cracking and subsidence.

Airport pavements—particularly asphalt—are sensitive to heat. Under extreme temperatures, asphalt softens, leading to rutting and surface deformation. Waterlogged pavements reduce aircraft braking efficiency and increase the likelihood of hydroplaning, which poses safety hazards during landing and taxiing.

Stormwater systems, already exposed to variable rainfall, exhibit moderate to high sensitivity. Many components are designed to accommodate 1-in-50-year events, which may become inadequate under future rainfall intensities. Backflow, overland flooding, and erosion of embankments are likely if upgrades are not implemented.

Human health and operational efficiency are also sensitive to climate variability. Ground crews working under extreme heat face an elevated risk of heatstroke, dehydration, and reduced

productivity. Cold extremes—though less frequent—can affect aviation fuel systems, battery efficiency, and equipment reliability.

5.2.11.5. Prioritized Risks

The risk assessment matrix ranks climate hazards based on their projected likelihood and potential impact on airport operations and safety. Under RCP 8.5 by 2100, three priority risks stand out:

- **Extreme heat (Extreme risk):** This includes risks such as pavement softening, reduced aircraft lift, and worker heat stress. Given the frequency and severity of projected hot days, this is the highest-priority hazard.
- **Heavy rainfall (High risk):** The combination of intense precipitation and limited infiltration capacity increases the likelihood of surface flooding, which can shut down critical infrastructure and delay flights.
- **Wind gusts (High risk):** Strong and shifting wind patterns present serious operational and structural challenges. Aircraft may face crosswind landings beyond acceptable thresholds, and terminal buildings may require wind-resistant designs.

These risk levels guide the prioritization of investment in resilience measures, ensuring that the most critical vulnerabilities are addressed first.

5.2.11.6. Adaptive Capacity

Despite these challenges, Bishoftu International Airport demonstrates emerging adaptive capacity across engineering, policy, and institutional dimensions.

From an engineering perspective, the airport's design includes provisions for heat-resistant pavement materials, reinforced subgrades, and elevated electrical systems that are less susceptible to flood-related failures. Additionally, stormwater infrastructure is designed with potential expansion in mind, allowing for future increases in drainage capacity.

At the policy level, climate resilience is embedded within the airport master plan and aligns with Ethiopia's Climate Resilient Green Economy (CRGE) strategy. This ensures institutional awareness and regulatory compliance regarding climate adaptation.

Institutionally, the airport benefits from proactive planning. The use of real-time ground monitoring tools such as InSAR (Interferometric Synthetic Aperture Radar) helps detect early signs of soil deformation. Emergency preparedness protocols, including heatwave response plans and flood evacuation procedures, are under development and will be institutionalized in future phases.

Moreover, the long-term phasing of the airport development allows for iterative adaptation. As projections become more accurate and resources become available, successive project phases can integrate new technologies, designs, and operational protocols that enhance resilience.

5.3. Biological Environment

This section outlines the existing biodiversity elements and key features, including typical flora and fauna, protected areas, and sensitive resources located within or near the project sites. The baseline conditions of the survey area have been established through field surveys, desk-based reviews of available data, and consultations with community during field surveys.

5.3.1. Vegetation and Flora

Ethiopia's diverse climate across various ecological regions has led to the establishment of a wide range of vegetation, from Afroalpine vegetation in the highlands to arid and semi-arid vegetation in the lowlands. The formation of Ethiopian vegetation is closely linked to the country's climate and geological history. Broadly, eight distinct vegetation types have been identified, primarily based on *elevation and climatic gradients*. These include: Afroalpine and sub-Afroalpine vegetation, Dry evergreen Afromontane Forest and grassland complex, Moist evergreen Afromontane Forest vegetation, *Acacia-Commiphora* woodland vegetation, *Combretum-Terminalia* woodland vegetation, Lowland semi-evergreen forest vegetation, Desert and semi-desert scrubland vegetation, and Aquatic vegetation. Further classification has refined these into 12 major vegetation types, incorporating sub-vegetation categories based on elevation and rainfall patterns (Friis et al., 2010).

Based on this classification, the Bishoftu International Airport project area falls within the *Acacia-Commiphora* woodland vegetation zone. This ecosystem, found in the north, east, central, and southern parts of Ethiopia including the Rift Valley occurs at elevations between 900 and 1900 meters. It is characterized by drought-resistant evergreen or deciduous trees and shrubs, predominantly growing in sandy soils (Friis et al., 2010). Common species in this

vegetation type include the endemic *Acacia prasinata*, along with *Acacia bussei*, *Commiphora alaticaulis*, *Commiphora boranensis*, and *Commiphora obovata*. Other frequently occurring plant families include Fabaceae, Burseraceae, Balanitaceae, and Combretaceae. However, the Acacia-Commiphora deciduous woodland is currently under significant environmental stress due to activities such as fuelwood and charcoal extraction, agricultural expansion (both rain-fed and irrigated), settlement growth, and other developmental pressures.

Field surveys indicate that the Bishoftu International Airport project area contains remnants of indigenous trees and shrubs, along with secondary growth in various parts of the study area. These trees and shrubs are primarily found in cultivated lands, along field boundaries, roadsides, residential areas, religious and school compounds, and sub-watershed regions. The vegetation is predominantly composed of *Acacia* species, playing a crucial role in both the local ecology and the livelihoods of the surrounding communities.

A total of 124 plant species, both indigenous and exotic, were recorded in the Bishoftu International Airport. These species comprise 26 tree species, 23 shrubs, 55 herbs, 19 grasses, and one climber. The dominant plant family are Poaceae and Fabaceae. Notable species include *Acacia abyssinica* (Laaftoo), *Faidherbia albida* (Garbii), *Cordia africana* (Waddessa), *Croton macrostachyus* (Bakaniisaa), *Ficus vasta* (Warka), *Ficus sur* (Sholla), *Afrocarpus gracilior*, *Olea europaea* (Ejjersaa), *Vernonia amygdalina* (Ebicha), *Millettia ferruginea* (Birbira), *Grevillea robusta*, *Jacaranda mimosifolia*, *Eucalyptus camaldulensis* (Bar-gamoo), and *Rosa abyssinica* Lindley (Goraa). The list of floral species recorded from the Ethiopian new National Airport is presented in Annex 3 Flora.



Figure 5-35 Vegetation in cultivated land, religion compound, and residence areas



Figure 5-36: Plant species (*Ficus sycomorus*) in project Site (Source: Site visit 07/11/2024)



Figure 5-37: Different trees around agricultural land





Figure 5-38: Different shrub species the community used as fence

5.3.2. Species Abundance and Dominance

The project site hosts a diverse range of plant species, with a particular emphasis on woody tree species, which contribute significantly to the ecological structure of the area. The table below provides an overview of the abundance and dominance of the most common woody tree species within the site.

Table 5-26: The most common woody tree species Abundance and Dominance

No.	Species	Abundance	Dominance
		(N ha ⁻¹)	m ² ha ⁻¹
1	<i>Acacia bussei</i>	6	0.01
2	<i>Acacia nilotica</i>	4	0.02
3	<i>Acacia seyal</i>	3	0.011
4	<i>Acacia tortilis</i>	2	0.03
5	<i>Acacia abyssinica</i>	1	0.04
6	<i>Cordia africana</i>	2	0.02
7	<i>Croton macrostachyus</i>	2	0.01

A total of 124 species were recorded in the project site, categorized into different plant families. The Fabaceae, Poaceae, and Asteraceae families were the most dominant, contributing significantly to the site's plant diversity. *Acacia bussei* is the most abundant species on the site, with 6 individuals per hectare, although it has relatively low dominance, occupying a smaller amount of space compared to other species, as indicated by its dominance value of 0.01 m² ha⁻¹. *Acacia nilotica* has a moderate presence with 4 individuals per hectare and a slightly higher dominance of 0.02 m² ha⁻¹, meaning it takes up a bit more space than *Acacia bussei*. In contrast,

Acacia seyal has a lower abundance (3 individuals per hectare) and a similarly low dominance of 0.011 m² ha⁻¹, suggesting that it is less common and occupies a smaller physical area. *Acacia tortilis*, with an abundance of 2 individuals per hectare, has a higher dominance of 0.03 m² ha⁻¹, indicating that it occupies a relatively larger area despite its low numbers. *Acacia abyssinica* is the least abundant species, with just 1 individual per hectare, but it has the highest dominance at 0.04 m² ha⁻¹, suggesting that while it is rare in terms of numbers, it covers a significant amount of space within the site. Lastly, *Cordia africana* and *Croton macrostachyus*, both with an abundance of 2 individuals per hectare, show moderate dominance values of 0.02 m² ha⁻¹ and 0.01 m² ha⁻¹, respectively, reflecting their modest presence in terms of both number and physical coverage.

Table 5.27 summarizes the number of species within each family. Fabaceae (20.2%) was the most dominant family, known for its nitrogen-fixing ability, which enhances soil fertility. Poaceae (14.5%) includes key grass species, indicating the presence of grassland or agricultural landscapes. Asteraceae (11.3%) is a diverse family often associated with ecological resilience and medicinal plants. Lamiaceae (8.1%) includes aromatic herbs, commonly used for medicinal and culinary purposes. Solanaceae (4.8%) is a smaller but important family, often including crop species like tomatoes and peppers. The ‘Other’ category (41.1%) represents a wide range of species across various families, indicating high overall biodiversity. The results highlight the ecological importance and functional diversity of plant species in the project site, which could have implications for conservation, land-use planning, and sustainable management.

Table 5-27: Family of the dominant species in the project site

No.	Family	Number of species	Percentage (%)
1	Fabaceae	25	20.2
2	Poaceae	18	14.5
3	Asteraceae	14	11.3
4	Lamiaceae	10	8.1
5	Solanaceae	6	4.8
6	other	51	41.1

5.3.3. Agricultural Biodiversity

Agricultural crop biodiversity in the project area is quite common, with a variety of crops being grown. The land is predominantly cultivated with crops such as teff, wheat, barley, beans, and other staple crops (Table 5-28). The local community heavily depends on agricultural activities for their livelihoods, making crop diversity an important aspect of their food security and economic well-being. The crop biodiversity present at the project site is outlined in Table 5.28 below.

Table 5-28: Crop biodiversity in project site

No	Scientific Name	Local name
1	<i>Trigonella Foenum-Graceum</i>	Habish
2	<i>Aloe Barbadensis</i>	Eert
3	<i>Linum Usitatissimum</i>	Talbaa
4	<i>Ocimum Basilicum</i>	Basobilaa
5	<i>Cicer Arietinum</i>	Shimbraa
6	<i>Phaseolus Vulgaris</i>	Baqqeela
7	<i>Helianthus annuus</i>	Sufii
8	<i>Hordeum vulgare</i>	Garbuu
9	<i>Zea mays</i>	Boqqoloo
10	<i>Triticum aestivum</i>	Qamaddi
11	<i>Pisum sativum</i>	Antra
12	<i>Eragrostis abyssinica</i>	Xaafii
13	<i>Lycopersicon esculentum</i>	Timatimaa
14	<i>Lens culinaris,</i>	Misiraa
15	<i>Solanum tuberosum</i>	Dincha





Figure 5-39 Wheat agricultural land in project area during field visit



Figure 5-40: The whole view of project site agricultural areas, vegetation and residence during field visit.

5.3.4. Habitats and Fauna

5.3.4.1. Domestic animals

Domestic animals such as cattle, goats, sheep, donkeys, mules, and horses play a vital role in the economic activities of the project site. These animals are integral to local livelihoods, providing essential products like milk, meat, and hides, which contribute significantly to the income of households. Cattle are often used for both dairy and agricultural purposes, while goats and sheep supply meat, and fiber. Donkeys and horse are valuable for transportation, especially in areas with difficult terrain, facilitating the movement of goods and resources. Mule, although less common, are sometimes used for transportation or agricultural work.

Collectively, these animals support agriculture, trade, and the overall economic sustainability of the community.



Figure 5-41: Domestic Animals Observed During Field Visit

5.3.4.2. Wild animals

During field visits and interviews with local elders, the presence of wild animals such as hyenas, foxes, rabbits, and monkeys was observed in the project area (Table 5-29). These species inhabit various parts of the landscape, utilizing the available vegetation and natural features for shelter and sustenance

Table 5-29: Wild animals recorded in the project site and their IUCN conservation status

Scientific name	English name	Local name	IUCN Status
<i>Canis aureus</i>	Fox	Geedala	LC
<i>Crocuta crocuta</i>	Hyena	Warabessaa	LC
<i>Lepus habessinicus</i>	Rabbit		LC
<i>Chlorocebus pygerythrus</i>	Monkey	Jaldesssa	LC
<i>Sylvicapra grimmia</i>	Common Duiker	Kurphee	LC
<i>Hystrix cristata</i>	Crested Porcupine	Xaddee	LC
<i>Genetta abyssinica</i>	Abyssinian Genet	Shelemtimat	DD

5.3.4.3. Birds

In this ESIA study, a total of 48 bird species were recorded in and around the Bishoftu lakes. However, the actual number of bird species present in the area is likely higher. A detailed list of these species is provided in Annex 4. Among them, the Wattled Ibis is endemic to Ethiopia, while the Ethiopian Boubou is classified as a near-endemic species. Additionally, all 49 recorded bird species fall under the Least Concern category by IUCIN status.



Figure 5-42: **Bishoftu lakes** Left Black-winged lovebird(near endemic) center Ethiopian Boubou (near endemic), right Wattled Ibis (Endemic) eater (Source; <https://ebird.org/hotspot/L1550648/bird-list?yr=cur>)



Figure 5-43: top (Left) Laughing dove , (Center) African Sacred Ibis, (right)Ethiopian Bee eater Lower (left) Hadada Ibis (Center)Little Grebe (right) Common Bulbul (Source; <https://ebird.org/hotspot/L1550648/bird-list?yr=cur>)

Studies reported 73 bird species in the South Akaki Sub-catchment, Akaki Floodplain, and Aba-Samuel reservoir. However, the actual number is likely higher (Annex 4). Among them,

three species—Wattled Ibis, Thick-billed Raven, and Abyssinian Lovebird—are endemic to Ethiopia and Eritrea, while the Ethiopian Boubou is a near-endemic species. IUCN Red List assessments identified four globally threatened species: three Vulnerable (Greater Spotted Eagle, Wattled Crane, and Black Crowned Crane) and one Near Threatened (Lesser Flamingo), all recorded in the Akaki Floodplain and Aba-Samuel reservoir. Additionally, the Critically Endangered Hooded Vulture and White-backed Vulture may occur in the area but were not observed. The remaining 69 species (94.5%) are categorized as Least Concern.

Bird movement between Lake Bishoftu and Akaki-Aba Samuel is most prevalent during the winter season, particularly between October and March. This period corresponds to the migratory season, when many Palearctic migratory birds arrive in Ethiopia to escape harsh winter conditions in Europe and Asia. Additionally, local bird species may also shift between water bodies in search of food and suitable habitats. Migration is generally influenced by climatic conditions, food availability, and breeding cycles, making this period critical for implementing mitigation measures to minimize impacts on bird populations and aviation safety



Figure 5-44: The three *Vulnerable bird species*: Greater spotted Eagle (left), Wattled Crane (middle) and Black crowned Crane (right) recorded from the Akaki Floodplain and Aba-Samuel reservoir area (source: Previous ESIA Studies on “Environmental and Social Impact Assessment (ESIA) of South Akaki Sub-Catchment WWTPs and Sewer Lines Project” By ETG Designers and Consultants Sh.Co.)

5.3.4.4.Sensitive Sites in the Area

The occurrence of threatened species including IUCN Red list flora and fauna, the presence of protected areas with the radius of 10km from the proposed project site and their status were assessed. Both the desktop review, and field survey together with consultation of stakeholders has identified that:

- No protected biodiversity sites within 20 km radius of the proposed project have found;
- No IUCN red list fauna and flora species are found in this proposed project site;
- No potential sensitive biodiversity resources are found on this proposed project site.
- There is no aquatic biodiversity in project site and around
- There is no archeological and cultural sites affected by project implementation, but religious sites like Orthodox Church, Full Gospel church, Protestant church, and Mekaneyesus church are effectuated.

5.3.4.5.Habitat Classification

As part of the environmental baseline assessment, detailed biodiversity surveys were conducted to inform impact identification, mitigation planning, and long-term ecological monitoring. A core component of this process involved habitat classification using internationally recognized ecological frameworks, alongside an evaluation of species composition, distribution patterns, and critical habitat potential particularly for species of conservation concern such as migratory birds. While the Bishoftu International Airport project area falls within the broader Acacia–Commiphora woodland vegetation zone, site-specific ecological investigations have revealed considerable internal variation in habitat structure, species assemblages, and ecological function. These findings demonstrate that the project area cannot be treated as a homogeneous ecological unit for the purposes of impact assessment or biodiversity management.

Field surveys identified three distinct functional habitat units, each characterized by varying levels of human influence, species diversity, and ecological importance:

Relatively Intact Acacia–Commiphora Woodlands: These habitats, located primarily in less disturbed sub-watersheds, retain much of their native vegetation composition and structural integrity. They serve as vital refuges for indigenous plant species such as *Acacia abyssinica*, *Faidherbia albida*, and *Croton macrostachyus*, and provide potential foraging, nesting, or stopover sites for migratory bird species and other sensitive fauna.

Modified Woodland–Shrubland Mosaic: These transitional zones occur along the interface of natural vegetation and agricultural landscapes, often within cultivated fields, fallow lands, or areas subjected to ongoing human disturbance. Despite their altered condition, these mosaics contribute to ecological connectivity by functioning as buffer zones and wildlife movement corridors.

Scattered Tree–Shrub Vegetation in Built-up Areas: This habitat type is primarily associated with settlements, roadside margins, religious institutions, and communal areas. Although highly fragmented, these vegetation remnants are often maintained for cultural, religious, or utilitarian purposes, such as shade provision, fencing, or ceremonial use. They contribute to urban biodiversity conservation and support important regulating ecosystem services, including microclimate control.

Biodiversity Significance: Across these habitat units, a total of 124 plant species were recorded, including 26 tree species and 23 shrub species, reflecting high habitat heterogeneity and ecological complexity within the project area. This diversity underscores the importance of considering these habitat classifications explicitly during impact assessments to guide biodiversity management and ensure the protection of Valued Ecosystem Components (VECs). In addition to their ecological value, these habitats provide essential provisioning services (e.g., native plant resources), regulating services (e.g., microclimate stabilization, soil conservation), supporting functions (e.g., maintaining biodiversity, facilitating ecological processes), and cultural services, such as traditional land use, spiritual significance, and contributions to the socio-cultural identity of the local communities.

6. PROJECT ALTERNATIVES

6.1.Introduction

The Ethiopian Environmental and Social Impact Assessment guidelines, along with the International Finance Corporation Performance Standards on Social and Environmental Sustainability, outline the necessary requirements for assessing feasible alternative configurations for a project. These guidelines emphasize that for larger scale developments or large-scale expansions involving significant physical components likely to generate substantial environmental or social impacts, a comprehensive Environmental and Social Impact Assessment must be conducted. This assessment should include an in-depth examination of project alternatives where applicable.

Specifically, for larger scale developments, the ESIA process necessitates a thorough evaluation of technically and financially viable alternatives to mitigate potential environmental and social impacts. The analysis should document the rationale behind selecting a particular course of action, ensuring that project design, construction, and operational decisions consider all feasible options. This approach allows for the integration of environmental and social criteria at an early stage of project development, fostering informed decision-making based on the comparative advantages and disadvantages of various alternatives.

The analysis of alternatives must be conducted as early as possible in the project planning process, considering multiple feasible options. These alternatives may include different project locations, design configurations, operational processes, or strategies for addressing potential environmental and social challenges. In line with this, the Ethiopian government follows a structured approach in both site selection and design selection alternatives. Key considerations in the analysis of alternatives include evaluating the potential for renovating and upgrading existing airports, identifying possible alternative locations for a new airport, exploring alternative design solutions, assessing other modes of transportation, and considering the no-action alternative. This approach ensures that the most sustainable and least impactful project configuration is selected, aligning with both national and international environmental and social standards.

6.2. The Need for a New Airport

Airports serve as critical international gateways for the movement of passengers, goods, and commodities across borders. These facilities generate extensive economic benefits that extend well beyond their physical boundaries, contributing significantly to both regional and national economies. As key infrastructure assets, airports create substantial direct and indirect economic value, including employment opportunities for surrounding communities and driving overall economic growth. The necessity for a new airport in Bishoftu is largely driven by Ethiopia's increasing demand for aviation services and the limited capacity of the existing Bole International Airport in Addis Ababa.

Bole International Airport, with a current passenger capacity of approximately 18.6 million annually, is forecasted to see passenger numbers rise to 30 million by 2030. According to different sources, this capacity is expected to be exceeded within three to four years. In its current state, Bole International Airport will be unable to meet the projected long-term growth in aviation demand, leaving a substantial portion of demand unmet. Without additional aviation capacity, this shortfall could have severe implications for Ethiopia's economic growth, productivity, and employment. The rising demand for aviation services in Ethiopia is driven by several key factors: rapid population growth, strong economic growth, increased competition in the aviation sector, and a growing demand for international tourism. Any failure to address the increasing capacity requirements could result in significant economic costs and adversely affect social amenities and values.

Efforts to expand Bole International Airport have been deemed unfeasible due to several constraints. The airport currently operates with only one runway, and the topography of the area makes it challenging to construct an additional one to accommodate growing passenger volumes. Furthermore, the physical limitations of the site restrict the airport's ability to support future passenger growth. These constraints are already evident during peak periods and are expected to worsen in the coming decades.

In addition to these physical limitations, Bole International Airport is located at an altitude of more than 2,325 meters above sea level. High elevations impose unique challenges for aviation, such as requiring longer runways and faster take-off speeds. This altitude also limits the carrying capacity of larger aircraft during take-off, affecting operational efficiency. While some large aircraft, such as the Boeing 747, currently operate from Bole, the challenges

associated with the altitude underscore the need for a new facility to accommodate all aircraft types effectively, including those with greater traffic demands.

The development of a new airport in Bishoftu is therefore essential to address these challenges and ensure Ethiopia's aviation infrastructure can support its growing economic ambitions. This airport is envisioned not only to alleviate the capacity issues at Bole but also to serve as a modern, sustainable hub capable of meeting the country's long-term aviation needs.

6.3.Considerations for Expanding Bole International Airport

While the need for a new airport in Bishoftu has been emphasized due to capacity constraints at Bole International Airport, exploring the possibility of expanding the existing facility remains an alternative consideration. However, several factors must be evaluated before determining the feasibility of such an expansion.

Bole International Airport currently handles approximately 18.6 million passengers annually, with projections indicating an increase to 30 million by 2025. Despite this anticipated growth, any expansion plans must address the airport's existing structural and operational constraints. The primary challenge is the airport's limited physical space. The surrounding urban environment restricts large-scale expansion, and the existing single-runway configuration poses significant limitations for accommodating increased air traffic. Developing a second runway would require overcoming considerable topographical barriers and substantial land acquisition, which could lead to high financial and social costs.

Additionally, the airport's high-altitude location (2,325 meters above sea level) presents operational challenges. Aircraft operating at such elevations require longer runways and experience reduced take-off efficiency, further complicating any expansion efforts. While certain aircraft types currently operate from Bole, the long-term sustainability of increasing air traffic under these conditions remains uncertain.

Moreover, congestion within the airport premises is already a growing concern, especially during peak hours. Expanding terminal facilities and ground infrastructure to accommodate rising passenger demand would require extensive redesigning of existing structures and major investments in logistics and air traffic management systems.

Given these constraints, while expansion may provide a short-term solution, it is unlikely to offer a sustainable long-term response to Ethiopia's growing aviation needs. The limitations in

land availability, operational efficiency, and infrastructural scalability suggest that a new airport in Bishoftu may provide a more viable option to ensure the long-term growth and competitiveness of Ethiopia's aviation sector.

6.4. Alternative Considered for Site Selection

As part of the feasibility study and master plan preparation for the new major hub airport in the environs of Addis Ababa, eight potential sites were initially identified and assessed through a multi-criteria analysis. These sites were evaluated based on factors such as land availability, wind conditions, visibility, distance to the capital, site altitude, population displacement, proximity to support cities, environmental resilience, cost investment, and impact on existing economic activities.

6.4.1 Initial Site Identification

Eight potential sites were initially identified for consideration, located within a 60-80 km range around Addis Ababa in the west (Tefki Plain) and the south-southwest (Dukem-Mojo direction). These sites were analyzed based on multiple criteria, including land availability, wind coverage, visibility, site altitude, population relocation requirements, environmental resilience, proximity to hazardous areas, cost investments, and compatibility with existing infrastructure.

Initial Eight Potential Sites:

1. **Site 1 (Tefki Plain)** – Close to Addis Ababa but constrained by high population density and weak soil conditions.
2. **Site 2** – Limited land available due to proximity to Mount Yerer and Bishoftu; quickly discarded.
3. **Site 3** – Located at higher altitude; feasible but less favorable due to aircraft performance limitations.
4. **Site 4** – Surrounded by obstacles, including Mount Zikwalla; discarded due to airspace constraints.
5. **Site 5** – Constrained by new highway, railway, and insufficient wind coverage; discarded.
6. **Site 6** – Closest to Addis Ababa, moderate altitude, and reasonable construction costs.

7. **Site 7** – Located at lower altitude, favorable for aircraft performance, but further from Addis Ababa.
8. **Site 8** – Similar to Site 7 but with greater environmental impact; not considered a priority.

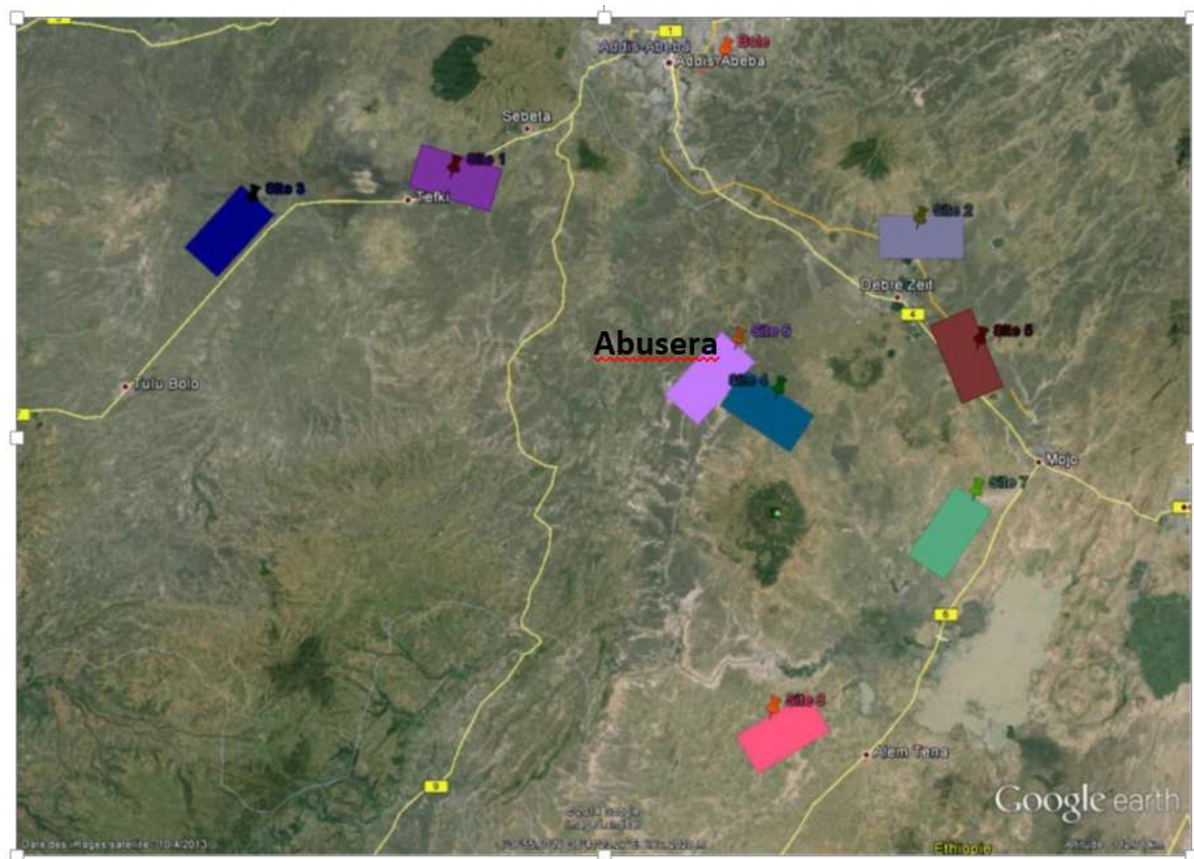


Figure 6-1 Location of the Eight Potential Sites

A preliminary screening phase was conducted to narrow down the initial eight sites. This involved a detailed examination of each site against fundamental operational and environmental/social constraints. The rationale for discarding three of the initial sites (Sites 2, 4, and 5) is elaborated below:

- **Site 2 (South Yerer / Godina):** This site was discarded primarily due to limited land availability for future expansion. Its close proximity to Mount Yerer and the urban area of Bishoftu imposed significant physical constraints. The inability to accommodate the required 7km x 5km airport footprint, along with provisions for future expansion, rendered it operationally infeasible. From an environmental and social perspective, the site's proximity to urban areas implied high population density. Pursuing this alternative would have necessitated large-scale, complex, and exceptionally costly population resettlement,

in addition to significant challenges in managing airport-related noise impacts on existing communities. The limited land also severely restricted options for noise abatement or buffer zones, making it an undesirable choice from an E&S standpoint.

- **Site 4 (North Zikwala / Dire):** This site was eliminated due to the presence of numerous surrounding obstacles, notably Mount Zikwala and Mount Sokoru, as well as the Bede Gebabe region. These topographical features created severe airspace constraints that would have significantly hindered safe and efficient air traffic management. Operationally, the site was deemed undesirable due to these limitations. From an E&S perspective, developing this site would have required extensive earthworks for obstacle clearance, leading to substantial landscape alteration and a significant environmental footprint. The inherent challenges posed by these natural obstacles made it an impractical choice, as it would have required disproportionate intervention with high environmental costs.
- **Site 5 (South East Bishoftu):** This site was discarded due to a combination of factors, including a constrained area, the presence of obstacles, and its proximity to new highway and railway developments. Furthermore, it exhibited insufficient wind coverage for small aircraft, which is a critical operational limitation impacting overall airport usability and safety. The constrained nature of the site, particularly its closeness to existing and planned infrastructure, presented significant environmental and social challenges related to noise, vibration, and potential conflicts with established land uses. The operational limitation of insufficient wind coverage, if ignored, could have led to increased fuel consumption for aircraft, resulting in indirect environmental implications.

This early screening phase, by identifying and eliminating sites with insurmountable operational infeasibilities, effectively served as an initial, high-level application of the "avoid" principle within the E&S mitigation hierarchy. By preventing the project from pursuing alternatives with inherently high and unmanageable E&S risks, this preliminary assessment proactively reduced potential adverse impacts, even before detailed E&S studies were conducted.

Following this initial screening, five sites Sites 1, 3, 6, 7, and 8 were retained for further detailed multi-criteria analysis.

6.4.2 Enhanced Multi-Criteria Analysis (MCA) Framework

The Multi-Criteria Analysis (MCA) is a well-established decision-making tool employed to assess complex problems, such as the selection of an airport site. This methodology provides a structured approach to achieve consensus on multidisciplinary issues by evaluating various alternatives against a defined set of criteria. To enhance the transparency and defensibility of the site selection process, the MCA framework has been meticulously clarified and refined.

6.4.2.1. Clarification of Evaluation Criteria and Definitions

The following ten (10) core evaluation criteria were systematically applied in the MCA:

1. Capacity to accommodate a 7 km x 5 km airport site and land availability for future expansion: This criterion assesses the physical capability of a site to accommodate the defined airport footprint (7km x 5km) and its potential for future expansion, taking into account surrounding land-use and any physical constraints.
2. Visibility: This criterion evaluates the meteorological conditions at each site, specifically the number of low-visibility days per year, and their potential impact on safe and efficient airport operations, particularly for Visual Flight Rules (VFR) approaches.
3. Obstacles – OLS and ILS Basic Surfaces: This criterion assesses the presence and impact of natural or man-made obstacles on the Obstacle Limitation Surfaces (OLS) and Instrument Landing System (ILS) Basic Surfaces. Compliance with these surfaces is critical for ensuring the safety of aircraft during take-off, landing, and instrument approach procedures.
4. Air Traffic Management (ATM): This criterion evaluates the compatibility of the proposed airport site with existing air traffic infrastructure and operations, encompassing two key sub-criteria:
 - Compatibility with Bole International Airport: This assesses the ability of the new airport to operate efficiently in tandem with the existing Bole International Airport, minimizing interference and ensuring seamless air traffic flow between the two facilities.
 - Compatibility with Hame Air Force Base (AFB): This evaluates the potential impact of the new airport on military operations and restricted airspace associated with the Hame Air Force Base, seeking solutions for efficient and safe coexistence.
5. Distance to Addis Ababa: This criterion measures the straight-line proximity of the proposed site to the capital city. It is a crucial factor for attracting Origin & Destination

(O&D) passenger traffic and supporting the overall economic and social development of the airport and its surrounding areas.

6. **Site altitude and maximum airplane range:** This criterion evaluates the site's elevation and its direct impact on aircraft performance, particularly the payload capacity and operational range for long-haul (6,000 NM) and regional (3,000 NM) flights. Lower altitudes are generally more favorable for aircraft performance.
7. **Moderate population to be relocated:** This criterion assesses the estimated number of people and households that would require displacement and resettlement due to the airport project. The objective is to minimize social impact and associated resettlement costs.
8. **Environmental resilience:** This criterion broadly assesses the potential impact of the airport development on natural habitats, ecosystems, and water resources. It also considers the site's inherent capacity to withstand environmental pressures and the extent of environmental interventions required.
9. **Closeness with an existing support city:** This criterion measures the proximity of the proposed site to existing urban centers. This is important for ensuring workforce availability, providing ancillary services, and fostering the potential development of an "airport city" with associated economic benefits.
10. **Cost investments:** This criterion provides a preliminary estimate of the overall capital expenditure required for the airport's construction, including land acquisition, infrastructure development, and associated facilities such as access roads and utilities.

6.4.2.2. Transparent Weighting and Scoring System

The MCA employs a transparent weighting process to assign relative importance to each criterion, reflecting different strategic priorities. A total of 20 weighting points is distributed among the 10 criteria, allowing for a total score out of 100 marks for each site. Three distinct weighting scenarios were developed to capture varying stakeholder viewpoints and strategic emphases:

- **Scenario 1 ("Airline" Scenario):** This scenario emphasizes the importance of site altitude, assigning it the highest weight (4 points). The rationale is to optimize aircraft range and fuel efficiency, which is a key operational and economic priority for Ethiopian Airlines (EAL) and its long-haul hub strategy.
- **Scenario 2 ("Low CAPEX" Scenario):** This scenario prioritizes minimizing capital investment costs, assigning the highest weight (4 points) to the "Cost investments"

criterion. It operates under the hypothesis that the Air Force Base (AFB) could be relocated or adapted with minimal impact on any site (hence a weight of 0 for HAME compatibility), allowing cost-effectiveness to be the dominant factor.

- **Scenario 3 ("Passenger" Scenario):** This scenario highlights the importance of the site's distance to Addis Ababa, assigning it the highest weight (4 points). The underlying principle is that proximity to the capital city has a major impact on the airport's capability to attract passenger traffic (Origin & Destination traffic) and, consequently, its overall success and revenue generation.

Each criterion is graded on a standardized scale of zero (0) to five (5). This scoring system is defined as follows:

- **Grade 0:** Denotes a critical, worst-case scenario for the considered criterion, indicating a severe impediment or insurmountable challenge.
- **Grade 1:** Characterizes the poorest site performance for that criterion, indicating significant limitations or adverse impacts.
- **Grade 3:** Assigned when a criterion is not decisive, cannot be precisely assessed at the current stage due to data limitations, or indicates a neutral impact across all sites.
- **Grade 5:** Represents the best performance for the criterion, indicating optimal conditions or minimal adverse impacts.

Sites can receive equal grades if their performance is deemed equivalent for a specific criterion.

The following table, Table 6-1: MCA Evaluation Criteria, Weights, and Scoring Definitions, consolidates this information.

Table 6-1: MCA Evaluation Criteria, Weights, and Scoring Definitions

Criteria	Definition	Scoring (0-5)	Weight (Scenario 1: Airline)	Weight (Scenario 2: Low CAPEX)	Weight (Scenario 3: Passenger)
1. Capacity to accommodate a 7 km x 5 km airport site and land availability	Ability to fit required footprint and expand.	0=Cannot accommodate ; 5=Ample space for expansion.	1	1	1

for future expansion					
2. Visibility	Number of low-visibility days and operational impact.	0=Frequent severe low visibility; 5=Minimal low visibility.	1	1	1
3. Obstacles – OLS and ILS Basic Surfaces	Presence of obstacles affecting safety surfaces.	0=Major unmanageable obstacles; 5=No significant obstacles.	2	2	2
4. Air Traffic Management (ATM): Compatibility with Bole International Airport	Efficiency of tandem operations with Bole.	0=Severe interference; 5=Full compatibility.	1	2	2
4. Air Traffic Management (ATM): Compatibility with Hame Air Force Base (AFB)	Impact on military operations and restricted airspace.	0=Major unresolvable conflict; 5=Full compatibility /minimal impact.	3	0	2
5. Distance to Addis Ababa	Proximity to the capital city.	0=Too far for O&D traffic; 5=Optimal proximity.	2	3	4
6. Site altitude and maximum airplane range	Altitude's impact on aircraft payload/range.	0=Severe range limitations; 5=Optimal altitude for long-haul.	4	3	2
7. Moderate population to be relocated	Number of people requiring displacement.	0=Very high displacement; 5=Minimal displacement.	1	1	1
8. Environment	Impact on natural	0=Severe unmitigable	2	2	2

al resilience	habitats, ecosystems, water resources.	impact; 5=Minimal impact.			
9. Closeness with an existing support city	Proximity to urban centers for workforce/services.	0=No support city; 5=Close to major support city.	1	1	1
10. Cost investments	Overall capital expenditure.	0=Extremely high cost; 5=Lowest cost.	2	4	2
Total Weighting Points			20	20	20

6.4.2.3. Systematic Combination of Scores for Overall Performance

The overall performance for each site under each scenario is systematically determined by combining the individual criterion grades with their assigned weights. This calculation process ensures a transparent and quantifiable derivation of the final scores.

For each site, the numerical grade obtained for a specific criterion is multiplied by the weight assigned to that criterion under the selected scenario. This yields a weighted score for that particular criterion. These weighted scores are then summed across all ten criteria to produce a total composite score for the site. The site with the highest total score within a given scenario is identified as the best-performing option for that specific strategic priority. For example, if a site receives a grade of 4 for "Distance to Addis Ababa" (which has a weight of 4 in Scenario 3), its contribution to the total score for that criterion would be 4 multiplied by 4, resulting in 16 points. This calculation is performed for every criterion, and the sum of these weighted scores provides the final overall performance assessment for the site, out of a maximum possible score of 100.

Explicitly detailing this calculation process transforms the MCA from a conceptual framework into a transparent and verifiable methodology. This level of detail allows for a complete understanding of how the final rankings are derived, enabling replication of the calculations and an assessment of the sensitivity of the results to different input parameters. This

transparency is fundamental for building confidence in the analytical rigor and robustness of the site selection process.

6.4.3. Integrated Environmental and Social Impact Assessment in Alternatives Analysis

Environmental and social considerations are paramount in the planning and execution of major infrastructure development projects. This section systematically applies the internationally recognized mitigation hierarchy Avoid, Minimize, Mitigate, Offset – to the analysis of project alternatives. This approach demonstrates a proactive commitment to E&S management, directly addressing the reviewer's request for enhanced E&S integration and explicit application of this hierarchy.

6.4.3.1. Application of the Mitigation Hierarchy (Avoid, Minimize, Mitigate, Offset) for Each Alternative

The mitigation hierarchy serves as a guiding framework for managing environmental and social impacts throughout the project lifecycle.

- **Avoidance:** The first and most desirable step in the hierarchy is to avoid impacts altogether.
 - **Initial Screening (Sites 2, 4, 5):** As detailed in Section 6.4.1, the early discarding of Sites 2, 4, and 5, while primarily driven by operational infeasibilities (limited land, insurmountable obstacles, constrained areas), inherently served as a critical "avoidance" step in the mitigation hierarchy. By eliminating these sites, the project successfully avoided locations that would have necessitated massive and complex population resettlement, extensive and environmentally damaging earthworks, or severe conflicts with existing critical infrastructure and associated E&S disturbances.
 - **Study Area Selection:** The initial definition of the study area (within 60-80km of Addis Ababa, below 2000-2100m altitude) implicitly avoided highly sensitive or densely populated urban cores and extremely high-altitude mountainous regions where E&S impacts would be disproportionately high or unmanageable.
 - **Runway Orientation:** For the shortlisted sites, runway orientations were carefully adjusted to avoid major obstacles such as Mount Yerer and Mount Gurage (particularly for Site 6). This strategic orientation also serves to avoid the associated E&S impacts of extreme noise or safety risks on nearby communities by directing flight paths away from sensitive receptors where feasible.

- **Minimization:** For impacts that cannot be entirely avoided, efforts were made to minimize their scale or intensity.
 - **Population Displacement:** The site selection process prioritized alternatives in rural areas with comparatively lower population densities (e.g., Site 6 and 7 compared to Sites 1 and 3). This approach directly minimized the number of people requiring relocation. Site 6, for instance, was identified as having the least overall population impact among the preferred sites.
 - **Noise Impacts:** Runway orientations were chosen to direct aircraft noise away from major settlements where possible. Site 6 was identified as the least impacting site in terms of noise exposure.
 - **Environmental Footprint:** The 7km x 5km airport footprint was designed to be efficient and optimized for operational needs, thereby minimizing the overall land take and direct environmental disturbance.
- **Mitigation:** For residual, unavoidable impacts, specific mitigation measures are proposed to reduce their severity or duration.
 - **Population Relocation:** For affected populations, comprehensive compensation and livelihood restoration programs are planned. These programs will be guided by national regulations (e.g., FDRE Constitution, Proclamation No. 455/2005, Regulations No. 135/2007) and will include options such as cash compensation (equivalent to ten years of earnings) or land replacement (with two years of production support). Detailed socio-economic baseline studies and continuous consultation with affected communities will be crucial for refining estimates and developing effective resettlement action plans.
 - **Military Airspace Impacts:** For Site 6, which presents significant operational constraints on the Hame Air Force Base, a range of mitigation measures are proposed. These include the potential construction of a new reoriented parallel AFB runway, implementation of higher climb gradients for departing aircraft, later turns, deviated trajectories to avoid direct overflight of the AFB, and specific arrival procedures. Furthermore, robust coordination protocols between civil and military air traffic control units will be established to ensure safe and efficient shared airspace.
 - **Environmental Impacts:** Detailed Environmental Impact Assessments (EIA) will be conducted during Phase 3 to identify specific adverse impacts on soil, water, air, flora, and fauna. These EIAs will inform the development of tailored mitigation measures, such as erosion control, wastewater treatment, habitat restoration, and comprehensive

bird strike management plans. For Site 6, specific geological mitigation includes protecting the Dukem River valley edge (e.g., with a retaining wall) and controlling excavation of the volcanic hills.

- **Offsetting:** For any significant residual impacts that cannot be fully avoided, minimized, or mitigated, offsetting strategies would be explored in subsequent project phases. This could include, for example, habitat creation or restoration in other areas to compensate for unavoidable habitat loss, or investment in cultural heritage preservation funds if specific sites are impacted. The current document outlines the need for further detailed studies, which would inform the development of such offsetting strategies.

The explicit and systematic application of the mitigation hierarchy throughout the alternatives analysis demonstrates a mature and responsible approach to E&S management. This framework ensures that E&S considerations are not merely a compliance checklist but an integral part of the decision-making process from the outset. It highlights the project's commitment to proactively preventing and reducing adverse impacts, thereby enhancing project sustainability and stakeholder acceptability.

6.4.3.2 Detailed E&S Impact Assessment for Shortlisted Sites (Sites 1, 3, 6, 7, 8)

A detailed comparative assessment of the environmental and social impacts for the shortlisted sites (with a primary focus on Sites 3, 6, and 7, as they emerged as the most viable alternatives for in-depth comparison) was conducted.

- **Population Relocation and Resettlement Strategies:**
 - **Comparative Analysis of Estimated Affected Populations:** The potential for population displacement is a critical social impact factor.
 - **Site 6:** The estimated total impact, encompassing both the airport site footprint and noise-impacted areas, is 13,309 people (2,678 households). This figure includes 8,429 people residing within the 5km x 7km site footprint, largely due to the location of most of Abu Sera town within this area, implying that all residents would be affected by livelihood disruption. An additional 4,880 people are estimated to be in noise-impacted zones. Site 6 is considered the **least impacted** in terms of total population relocation among the preferred sites.
 - **Site 7:** The estimated total impact is 15,398 people (3,208 households). This includes 8,242 people within the site footprint and 7,156 people in noise-impacted areas. Site 7 is more impacted by population displacement than Site 6.

- **Site 3:** The estimated total impact is the highest, at 21,282 people (4,173 households). This comprises 12,969 people within the site footprint (including Asgori town) and 8,313 people in noise-impacted areas. Site 3 is therefore the **most impacted** in terms of total population relocation.
- **Constitutional Rights and Compensation Framework:** Ethiopian law, specifically the Constitution of the FDRE, Proclamation No. 455/2005 (Expropriation of Land Holdings and Payment of Compensation), and Regulations No. 135/2007 (Payment of Compensation), guarantees the rights of landholders and mandates compensation for expropriated property and permanent improvements. Compensation scenarios considered include cash compensation (equivalent to ten years of earnings from the land) or land replacement (with two years of production support). To refine these estimates and develop effective Resettlement Action Plans, detailed socio-economic baseline data collection and continuous consultation with affected communities are indispensable.
- **Noise Compatibility and Management:**
 - **Comparative Analysis of Noise Impacts:** Aircraft noise is a significant environmental concern for nearby communities.
 - **Site 6:** Identified as the least impacting in terms of noise, with an estimated 4,880 people affected in noise-impacted areas. Current ambient noise levels are minimal, except for occasional, relatively low-volume vehicular traffic.
 - **Site 7:** Presents a higher noise impact than Site 6, with an estimated 7,156 people affected in noise-impacted areas. Ambient noise is currently minimal, mainly from low-volume agricultural transport.
 - **Site 3:** Identified as the most impacting in terms of noise, with an estimated 8,313 people affected in noise-impacted areas. This is partly attributed to existing moderate noise pollution from vehicular traffic on the Addis-Jimma main road, which includes heavy trucks and buses.
- **Cultural Heritage Protection:**
 - **Comparative Analysis of Identified Sites:** The presence of cultural heritage sites, particularly religious institutions and burial grounds, is a sensitive issue.
 - **Site 6:** Contains three churches (two Orthodox, one Protestant) and associated graveyards/cemeteries within the proposed site. No known historical, archaeological, or paleontological sites have been identified based on previous surveys, though site-specific archaeological surveys are recommended to confirm

this.

- **Site 7:** Contains approximately five churches (three Ethiopian Orthodox, two Protestant) and associated graveyards/cemeteries within the proposed site. Similar to Site 6, no known historical, archaeological, or paleontological sites have been identified based on existing information, but site-specific archaeological surveys are recommended.
- **Site 3:** Contains four Orthodox churches, two Protestant churches, and one mosque, along with associated burial yards, within the proposed site. No known historical, archaeological, or paleontological sites are within its immediate vicinity (the nearest known site is about 17km away), though site-specific surveys may be required.
- **Mitigation:** For all sites, consultation with user communities and religious leaders is essential to address the cultural sensitivity of these sites and determine appropriate relocation procedures if impacts are unavoidable, ensuring adherence to local traditions and beliefs.
- **Environmental Resilience and Ecosystem Impacts (Flora, Fauna, Wetlands):**
 - **Overall Environmental Preference:** The initial assessment in the original report indicated Site 8 as the most preferred environmentally, followed by Site 7, then Site 3, Site 1, and Site 6 as the least preferred environmentally. This initial ranking, however, does not fully account for the manageability of impacts, which is crucial for overall viability.
 - **Flora:**
 - **Site 6:** Characterized by cultivated lands and settlements, with remnant indigenous trees (e.g., Acacia species, fig trees, Cordia, Croton) and planted Eucalyptus species. Hills within the site are protected for environmental rehabilitation, with ongoing tree planting and regeneration efforts.
 - **Site 7:** Natural vegetation has largely been converted to intensive farmlands. However, traditional agro-forestry practices are prevalent, with retained indigenous trees (e.g., Acacia albida, A. tortilis, Ficus vasta) and exotic species (Eucalyptus). The site also contains two small areas of dense forest/woodland (approximately 17 ha) and permanent wetland spots (approximately 136 ha) with characteristic wetland vegetation.
 - **Site 3:** The former natural vegetation has been almost entirely transformed. It features sparsely distributed remnant or secondary growth indigenous trees (e.g.,

Acacia species, *Cordia africana*, *Croton macrostachyus*) and an abundance of exotic Eucalyptus plantations. Site 3 exhibits the least biodiversity among Sites 6 and 7.

- **Fauna (Birds and Wildlife):**
 - All three sites have limited natural habitats, resulting in a low diversity of larger mammals. Smaller and nocturnal animals adapted to human disturbances are generally present.
 - **Birds:** Farmlands, grazing areas, settlements, and wetlands support various bird species.
 - **Important Bird Areas (IBAs):**
 - **Site 3:** Located only approximately 7km (air distance) from the Dilu Meda IBA, which is critical for seasonal water-birds, including globally threatened species (e.g., Wattled Crane, Greater Spotted Eagle, Lesser Kestrel) and near-threatened species (e.g., Pallied Harrier, Abyssinian Longclaw). This proximity poses a higher bird strike hazard risk due to the presence of large and medium-sized birds.
 - **Site 6:** Located approximately 13km from the Akaki-Aba Samuel Wetlands IBA and 14km from the Mount Zuquala IBA.
 - **Site 7:** Located approximately 8.5km from the Koka Dam & Lake Gelila IBA (important for water-birds and globally threatened species) and 10km from the Mount Zuquala IBA.
 - **Bird Migration:** Existing information for all sites does not definitively indicate the presence or absence of specific bird migration routes, necessitating further site-specific ornithological surveys to assess potential bird strike hazards.
- **Geological and Hydrological Considerations (Hazardous Sites, Soil Conditions, Drainage):**
 - **Volcanic Hazards:** The risk of volcanic hazards is considered remote for all three sites. This is because nearby volcanic mountains are geologically old and inactive, and no geothermal manifestations have been reported in the airfield areas.
 - **Geological Hazards (Landslides, Fissures/Faults):**
 - **Site 3:** No anticipated landslide hazards due to its very flat terrain. The area exhibits very few or no tectonic features.
 - **Site 6:** Landslide hazards are not anticipated on the generally flat terrain. However, lineaments observed on the geological map require further geophysical

investigation to determine if they represent deep buried fissures or faults, which could potentially cause settlement. The edge of the Dukem River valley will also require protection, potentially through a retaining wall.

- **Site 7:** No anticipated landslide hazards on its flat terrain. Some localized flooding from streams occurs during the rainy season. Some tectonic features exist outside the immediate airport field.

- **Seismic Hazard:**

- **Site 3:** Exhibits a low seismic hazard, located in Seismic Zone 2 (corresponding to an acceleration of 0.05g for a 100-year probability). This is comparable to Addis Ababa and lower than Bishoftu.
- **Site 6:** Presents a moderate to high seismic hazard, located in Seismic Zone 3 (corresponding to an acceleration of 0.07g for a 100-year probability).
- **Site 7:** Shows a high seismic hazard, located in Seismic Zone 4 (corresponding to an acceleration of 0.10g for a 100-year probability). This is comparable to Bishoftu.

- **Hydrology and Drainage:**

- **Site 3:** Characterized by flat terrain with very low drainage density. A significant challenge is the Kelina River at its northwestern edge, which overflows during flood periods, causing inundation of large areas, including parts of the proposed site. This will necessitate protective measures such as dykes or longitudinal artificial channels. Groundwater is relatively shallow (4-20m depth).
- **Site 6:** Flat terrain, situated between the Dukem and Akaki rivers. Hills in the central part act as local watershed divides. The site will require a number of cross and longitudinal drainage structures. Groundwater is deeper (60-90m depth). The area experiences frequent fog due to nearby mountains.
- **Site 7:** Flat terrain, crossed by major rivers (Adele and Temele). It contains marshy areas and swamps at its southeastern edge, which are prone to flooding during the rainy season due to river backup from the Koka reservoir. Groundwater is shallow (5-10m depth). The site experiences very low fog conditions.

- **Soil Conditions:**

- **Site 3:** The predominant soil type is black cotton soil, which exhibits significant expansion when wet and contraction when dry. This property poses substantial engineering challenges for construction and will likely incur **high construction and long-term maintenance costs** for buildings and

infrastructure, including roads and runways.

6.4.4. Comparative Analysis of Shortlisted Sites (Sites 1, 3, 6, 7, 8)

This section provides a detailed comparative analysis of the five shortlisted sites (Sites 1, 3, 6, 7, and 8) across key operational, economic, social, and environmental factors. This comprehensive assessment, utilizing the enhanced Multi-Criteria Analysis (MCA) framework, offers a transparent basis for the final site selection.

6.4.4.1. Operational and Economic Factors

A. Site Altitude and Maximum Airplane Ranges

Altitude is a critical factor in airport site selection, significantly impacting aircraft payload and range performance. Higher altitudes reduce aircraft performance, with a 100m altitude reduction potentially adding 100-200 Nautical Miles (NM) to range or 1-4 tons to payload. The ability to support long-haul (6,000 NM) and regional (3,000 NM) flights is a key requirement for the new hub airport.

- **Site 7 (1,675m):** This site offers the best practical maximal ranges due to its lowest altitude among the shortlisted sites. For example, the Boeing 777-200LR (B772) could achieve 7,100 NM, and the Boeing 787-8 (B788) could reach 6,600 NM.
- **Site 6 (1,910m):** This site provides good practical maximal ranges, balancing altitude with other critical factors. The B772 could achieve 6,600 NM, and the B788 could reach 6,200 NM.
- **Site 3 (2,100m):** Due to its higher altitude, this site is only marginally feasible for the 6,000 NM long-haul target. The B772 could achieve 6,200 NM, and the B788 could reach 5,860 NM.

While Site 7's lower altitude offers a clear advantage in aircraft performance, this single metric does not dictate overall site selection. The decision-making process involves balancing this operational benefit against other critical factors such as distance to the capital, social impacts, and infrastructure costs. This highlights the complex trade-offs inherent in multi-criteria analysis, where no single site is universally superior across all metrics.

Distance to Addis Ababa and Accessibility

Proximity to Addis Ababa is crucial for attracting Origin & Destination (O&D) traffic, ensuring passenger convenience, and supporting the airport's economic and social development.

Benchmarks suggest that the "sweet spot" for acceptable sites is generally within 60 km of the city.

- **Comparative Data (Straight-line Distance to Addis Ababa):**

- **Site 6:** Located approximately 38 km from Addis Ababa, making it the nearest site.
- **Site 1:** Located approximately 45 km from Addis Ababa
- **Site 3:** Located approximately 53 km from Addis Ababa, which is feasible but at the limit of usual distances for optimal passenger convenience.
- **Site 7:** Located approximately 63 km from Addis Ababa, also at the limit of usual distances.
- **Site 8:** Located approximately 78 km from Addis Ababa, considered too far and a major disadvantage for attracting O&D traffic.

The "distance to Addis Ababa" criterion is not merely a geographical measurement; it is a critical indicator of market attractiveness for O&D traffic and a direct driver of infrastructure development costs. Greater distances (e.g., Site 7, 8) necessitate longer, more expensive new road and rail connections, increasing capital expenditure and potentially reducing passenger convenience, which can negatively impact the airport's long-term economic viability. This demonstrates how seemingly distinct criteria (distance, cost, economic performance) are deeply intertwined in the overall feasibility assessment.

- **Road Access:**

- **Site 6:** Most favorable in terms of road access, benefiting from proximity to the new Addis-Adama expressway and requiring a reasonably short new access road (approximately 20-25 km from the outer ring road).
- **Site 1 & 3:** Connected to the existing Addis-Jimma trunk road, but this would require significant upgrading or the construction of a new dedicated high-capacity road (approximately 30-40 km).
- **Site 7 & 8:** These sites would require dedicated new access roads of substantial length (approximately 50 km and 60 km respectively), incurring higher costs.

- **Train Access:**

- **Site 6:** Offers good potential for train access, with a feasible 15-20 km extension from the Addis Ababa–Djibouti National Railway line or a 25-30 km extension from the Addis Ababa Light Rail Transit (LRT) line (Akaki terminal).
- **Site 7:** Has the potential for a 5-7 km extension from the Modjo-Shashemene national

railway line.

- **Site 3:** Presents the potential for a 20-25 km extension from the Addis-Ijaji-Jimma national railway line or a 35 km extension from the Addis Ababa LRT line (Sebeta terminal).

Air Traffic Management (ATM) Compatibility

A new major hub airport requires a completely redesigned Terminal Management Area (TMA) to handle high traffic density, ensuring independent parallel approaches and departures, radar control, and adherence to Instrument Flight Rules (IFR).

- **Compatibility with Bole International Airport:**

- **Site 6:** Located approximately 33 km from Bole Airport with parallel runway alignments, ensuring full compatibility and optimal operational efficiency for tandem operations. This proximity allows for seamless passenger transfers and efficient traffic flow between the two airports.
- **Site 3:** Located about 53 km from Bole Airport. While further away, its distance allows for independent operational zones, making it possible to maintain various traffic types at Bole, though this solution is less preferable than Site 6 for seamless integration.
- **Site 7:** Located approximately 57 km from Bole Airport. Its greater distance makes it less preferable for efficient tandem operations and passenger transfers compared to Sites 6 and 3.

- **Compatibility with Hame Air Force Base (AFB) Operations and Military Restricted Airspace:**

- **Site 3:** Presents the minimum impact on both the Military Restricted Area and Hame AFB local activity due to its greater distance from the military zone, offering the best level of compatibility.
- **Site 6:** Brings significant constraints on AFB runway operations, as the AFB is located within the new airport's Control Zone (CTR). This necessitates military airfield adaptation, potentially including a new AFB runway alignment parallel to the new airport's axis. While challenging, this approach leaves greater flexibility to manage the military airspace to the South, and the encroachment of the TMA on military airspace is minimal in the first development phase. Feasible and cost-effective solutions, such as the construction of a new reoriented parallel AFB runway (estimated at approximately 40 MUSD) and detailed coordination procedures, have

been identified to mitigate this impact.

- **Site 7:** Has a greater impact on the restricted military airspace (requiring a larger reduction) and a significant impact on AFB operations. Although the AFB is not directly within the new airport's CTR, its local activity is very close to final approaches, and the site encroaches on a large portion of the military airspace.

The detailed analysis of ATM compatibility, particularly with military operations, highlights a critical project risk. The identification of specific mitigation measures (e.g., new AFB runway, detailed coordination procedures, phased airspace development) transforms a potentially project-halting conflict into a manageable challenge. This underscores the imperative for early and continuous engagement with key stakeholders, such as the Ministry of Defense, and the necessity of robust technical solutions to complex operational interfaces. The cost of such mitigation (e.g., \$40M for an AFB runway) becomes an integral part of the overall project viability and justification.

Cost Investments

The overall cost of the airport construction is a major factor in site selection, encompassing land acquisition, infrastructure development, and associated facilities.

- **Comparative Overview of Total Development Cost:**

- **Site 6:** Estimated at USD 5.27 billion, representing the lowest cost among the shortlisted sites.
- **Site 3:** Estimated at USD 5.34 billion.
- **Site 7:** Estimated at USD 5.499 billion, making it the highest among the shortlisted sites.

It is important to note that these cost differences between the three sites (approximately +/- 2-5%) are not significant at this preliminary stage and fall within the margin of accuracy of the estimates.

- **Major Cost Drivers:**

- **Site 1:** Presents potential for high relocation costs and requires significant upgrading of existing access roads. Weak soil conditions (nearby marshlands) could also impact construction costs.
- **Site 3:** May incur higher earthworks costs due to uneven terrain, and higher access road costs. Potentially high relocation costs are also a factor. Critically, the

predominance of black cotton soil will lead to significantly higher construction and long-term maintenance costs for all infrastructure.

- **Site 6:** May involve specific earthwork costs due to small volcanic cones. However, it benefits from proximity to a new highway for initial access. Mitigation for military impact, such as a new AFB runway, is estimated at approximately 40 MUSD.
- **Site 7 & 8:** These sites would require dedicated new access roads of 50 km and 60 km respectively, contributing to higher overall costs. The access road cost for Site 7 alone is estimated at approximately 100-110 MUSD.

The cost analysis extends beyond initial construction estimates to include the costs of mitigating identified impacts. For instance, the estimated cost of a new AFB runway for Site 6 (approximately 40 MUSD) is explicitly compared to the additional expressway access cost for Site 7 (approximately 100-110 MUSD). This demonstrates a holistic financial assessment where the cost of managing project impacts is integrated into the overall economic viability, providing a more realistic and defensible cost-benefit perspective.

6.4.4.2. Integrated Performance Assessment (MCA Results)

The detailed Multi-Criteria Analysis (MCA) results for all five shortlisted sites (Sites 1, 3, 6, 7, and 8) are presented in the table below. This table explicitly displays how each site performs under different strategic priorities (altitude, CAPEX, distance to Addis Ababa), providing a transparent basis for the final site selection. This comprehensive presentation is crucial for demonstrating the robustness and defensibility of the entire alternatives analysis process.

Table 6-2: Detailed Multi-Criteria Analysis (MCA) Grading and Ranking for Shortlisted Sites (Sites 1, 3, 6, 7, 8) Across Scenarios

Criteria	Weight (S1)	Weight (S2)	Weight (S3)	Site 1 Grade	Site 3 Grade	Site 6 Grade	Site 7 Grade	Site 8 Grade
1. Capacity to accommodate 7km x 5km airport site	1	1	1	5	5	4	4	5
2. Visibility	1	1	1	3	3	3	3	3
3. Obstacles - OLS and ILS Basic	2	2	2	4	4	2	4	4

Surfaces								
4.1 Air Traffic Management - Bole	1	2	2	1	3	5	5	5
4.2 Air Traffic Management - HAME	3	0	2	4	5	2	2	3
5. Distance to Addis Ababa	2	3	4	4	3	5	2	1
6. Site altitude permitting 6000 NM stages (WB) & 3000 NM (NB)	4	3	2	1	1	4	5	5
7. Moderate population to be relocated	1	1	1	2	2	3	3	5
8. Environmental resilience	2	2	2	2	3	1	4	5
9. Closeness with an existing or future support city	1	1	1	3	2	5	5	1
10. Cost investments	2	4	2	3	3	4	2	1
TOTAL SCORE (out of 100)				S1: 56	S1: 60	S1: 64	S1: 70	S1: 70
				S2: 54	S2: 56	S2: 74	S2: 70	S2: 64
				S3: 59	S3: 62	S3: 67	S3: 67	S3: 64
RANKING				S1: 5	S1: 4	S1: 3	S1: 1	S1: 1
				S2: 5	S2: 4	S2: 1	S2: 2	S2: 3
				S3: 5	S3: 4	S3: 1	S3: 1	S3: 3

6.4.5. Final Site Selection and Justification

Based on the comprehensive and enhanced alternatives analysis, which systematically considered operational, economic, social, and environmental factors, Site 6 (Abusera) is re-affirmed as the most suitable location for the new major hub airport development. This selection represents the optimal balance among competing criteria and is demonstrably the "least environmentally and socially damaging viable option" when all factors are considered holistically and robust mitigation measures are factored into the assessment.

The final selection of Site 6 is a testament to a sophisticated decision-making process that optimizes across a complex set of interdependent operational, economic, social, and environmental factors, rather than prioritizing perfection in any single criterion. This choice reflects a pragmatic approach where identified challenges, particularly E&S ones, are thoroughly understood, quantified, and deemed manageable through planned interventions and further studies. This demonstrates a robust and defensible project planning methodology in a constrained environment.

Detailed Rationale for Site 6's Selection

- **Strategic Balance of Core Advantages:** Site 6 offers a unique combination of critical advantages That are paramount for a major hub airport's success. It is the closest site to Addis Ababa (approximately 38 km), ensuring strong passenger demand and connectivity, which is vital for Origin & Destination (O&D) traffic. Its altitude of 1,910m strikes a good balance for aircraft operational efficiency and range, comfortably permitting long-range flights. Furthermore, its location and runway orientation ensure full compatibility with Bole International Airport's traffic management, enabling efficient tandem operations. It also presents the lowest estimated total development cost among the shortlisted sites (USD 5.27 billion).
- **Minimized Social Impacts:** A critical differentiator for Site 6 is its significantly lower social impact. It is the least impacting site in terms of total population relocation (13,309 people) and noise-affected populations (4,880 people) compared to Sites 3 and 7.¹ This aligns strongly with the project's commitment to minimizing adverse social effects and demonstrates effective application of the "minimize" principle of the mitigation hierarchy.
- **Manageable Environmental Challenges:** While the initial environmental resilience assessment placed Site 6 lower, a deeper analysis reveals that its specific environmental impacts (e.g., on soil, water, air, flora, fauna, and the presence of volcanic cones) are well-

understood and, crucially, are **manageable** through a robust Environmental Impact Assessment process in Phase 3 and the implementation of standard mitigation measures. This includes addressing potential settlement risks from lineaments through further investigation and protecting river valleys.

- **Feasible Military Airspace Mitigation:** The significant constraints posed by Site 6 on Hame Air Force Base operations, while a challenge, have identified **feasible and cost-effective solutions**. The proposed construction of a new reoriented parallel AFB runway (estimated at approximately 40 MUSD) and the establishment of detailed coordination procedures between civil and military air traffic control are viable strategies. This mitigation cost is considerably lower than the additional access road costs associated with other sites (e.g., approximately 100-110 MUSD for Site 7), making the military impact manageable within the overall project's financial framework. The encroachment on military airspace is also minimal in the initial development phase.



Figure 6-2: Final Selected Site Location

6.5. Alternative Designs

As part of the master planning process for the new Bishoftu International Airport, multiple runway system alternatives were evaluated. These alternatives were assessed based on various factors, including runway orientation, length requirements, operational efficiency, airspace compatibility, and potential environmental and land-use constraints. The objective was to identify the most suitable runway layout that ensures safe, efficient, and future-proof airfield operations.

6.5.1 Runway Orientation Alternatives

The orientation of the runway system plays a crucial role in determining the efficiency and safety of the airport. Two primary alternatives were evaluated, considering factors such as prevailing wind conditions, terrain limitations, and airspace management needs.

Alternative 1 proposed a 05-23 runway orientation, initially based on historical wind data from the 2015 site selection study. This orientation reduced crosswind exposure under certain operational conditions but encountered significant challenges due to the presence of Mount Yere to the northeast, which caused difficulties in the approach, particularly during west-flow operations (Figure 6-3).

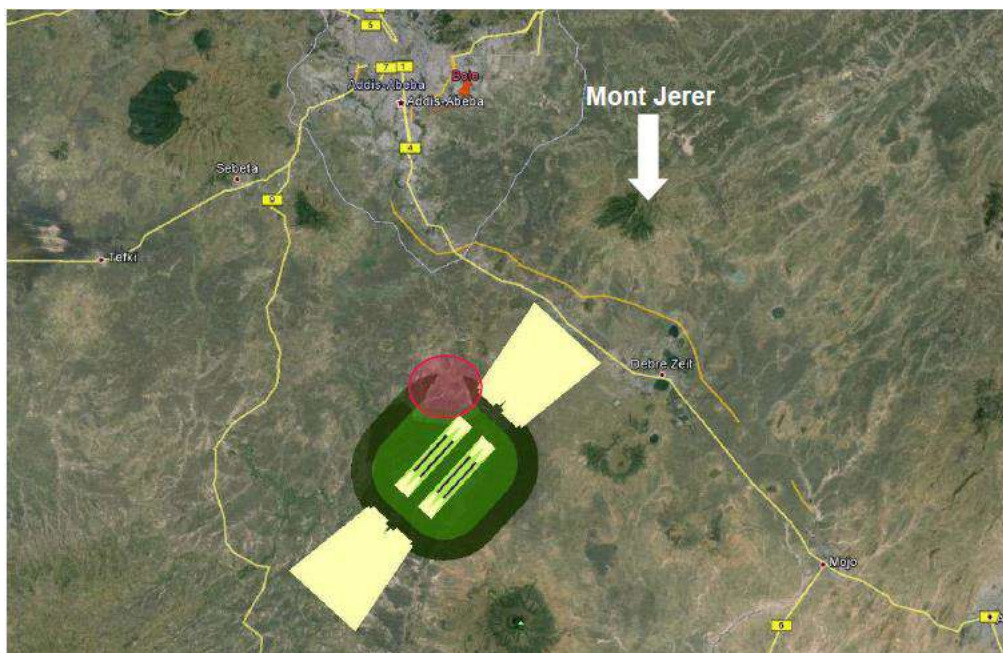


Figure 6-3: Potential 05-23 Orientation

Alternative 2, the 07-25 runway orientation, was reassessed using updated wind data from 2016 to 2024. This option offered a better alignment with the predominant eastward wind gusts, thereby minimizing crosswind effects. Additionally, it avoided the operational challenges presented by Mount Yerere, ensuring safer final approaches. Based on its superior safety and operational efficiency, Alternative 2 is recommended for further development.



Figure 6-4: Potential 07-25 Orientation

6.5.2 Runway Length Alternatives

The runway length was determined based on ICAO guidelines, aircraft performance characteristics, and altitude-related adjustments. Several alternatives were assessed:

- **Alternative 1: Standard ICAO Minimum Length (4,200m)**
 - Considered initially but found insufficient for ultra-long-haul widebody aircraft.
 - Limited operational capacity for transcontinental and intercontinental flights.
- **Alternative 2: 4,700m Length Based on Boeing Performance Analysis**
 - Recommended based on Boeing's take-off field length study.
 - Included temperature and elevation adjustments but did not consider slope corrections.
- **Alternative 3: 4,800m Length (Selected Alternative)**
 - Incorporated ICAO-recommended slope adjustments.
 - Ensured compatibility with ultra-long-haul aircraft operations.

- Provided additional redundancy for future demand growth and emergency contingencies.

Table 6-3: Recommended Runway Length

Aircraft Type	Runway Length (m)
Widebody Aircraft	4,800
Narrowbody Aircraft	4,250

6.5.3 Runway Capacity and Configuration Alternatives

Considering forecasted demand levels and air traffic projections, different runway configurations were analyzed:

- **Alternative 1: Single Runway System**
 - Capacity limitations would emerge at higher traffic levels.
 - Inadequate redundancy for operational disruptions.
- **Alternative 2: Dual Parallel Independent Runways (Selected Alternative)**
 - Sufficient to meet peak demand for the 60 MAP (million annual passengers) level.
 - Allowed independent operations for arrivals and departures, enhancing efficiency.
 - Reduced congestion and improved safety margins.
- **Alternative 3: Triple Parallel Runway System**
 - Considered for long-term expansion beyond 80 MAP.
 - Not immediately necessary for the initial phase of development.

6.6. Alternative Access Road

The design and connectivity of landside access roads are crucial for maintaining efficient traffic flow to and from Bishoftu International Airport. To achieve seamless transportation, two primary alignment options were assessed for Phase 1 of the airport's development, with additional considerations for future expansion under the "Ultimate Phase" plan. These evaluations focused on several key factors, including terrain constraints such as hills and existing settlements, total road length, construction complexity, and the potential for integration with planned rail networks.

The first proposed option, referred to as Alternative 1 (Red Alignment), spans a total length of 17.8 kilometers. This route presents several advantages in comparison to other alignments. One of its key benefits is its relatively shorter distance, which contributes to reduced travel time and lower construction costs. Additionally, this alignment encounters fewer elevation changes along its path, minimizing the need for extensive bridge and structural developments. Another significant advantage of Alternative 1 is that it strategically avoids areas designated for urban expansion. By steering clear of these planned developments, the alignment reduces the likelihood of future traffic congestion and conflicts, ensuring long-term efficiency and sustainability for airport access.

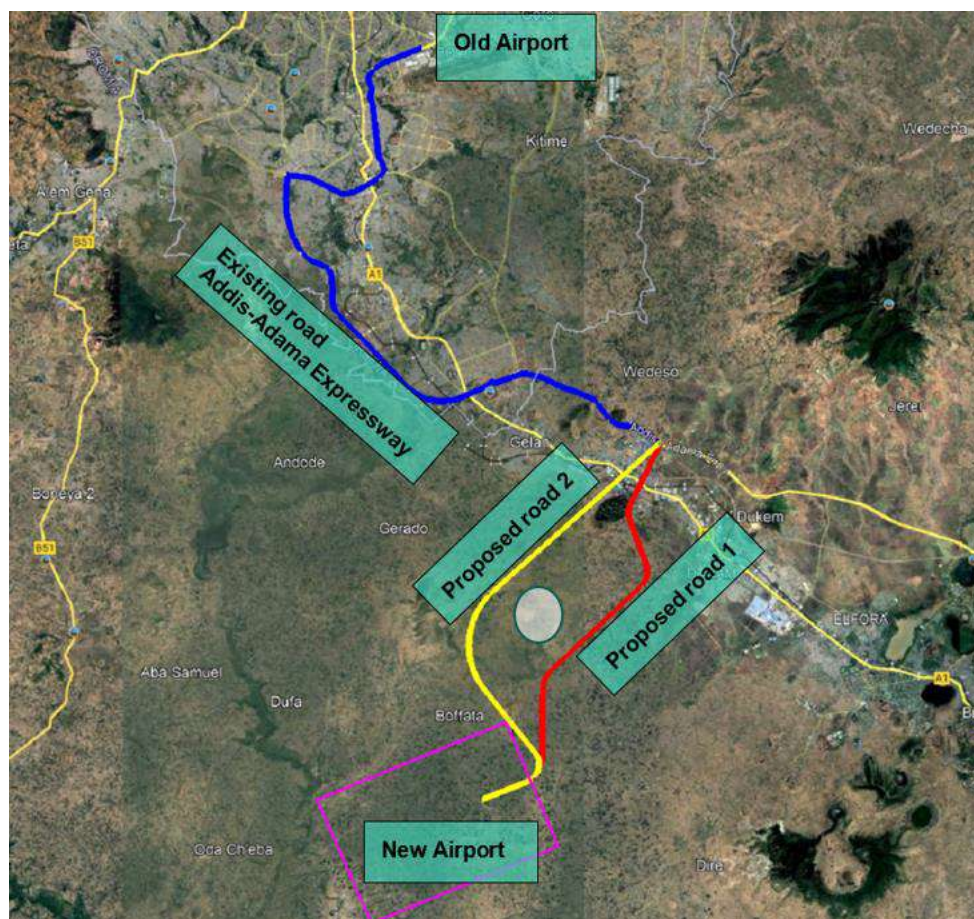


Figure 6-5: Airport Access Road Alternatives

Alternative 2, also known as the Yellow Alignment, extends for a total length of 19.9 kilometers. One of its key advantages is that it provides a more direct route, characterized by longer straight sections and fewer curves. This design can enhance travel efficiency by reducing the number of turns and improving vehicle movement, potentially leading to lower travel times and better road safety.

However, this alternative also presents several challenges. The route passes through areas with significant elevation differences, which would require extensive engineering interventions such as the construction of bridges, retaining walls, and additional grading work to ensure stability and accessibility. These structural requirements could increase both the cost and complexity of construction. Additionally, despite being a more direct route, this alignment is slightly longer than Alternative 1, which could contribute to marginally higher travel distances and associated costs.

After a thorough evaluation, the Red Alignment (Alternative 1) has been recommended as the preferred option. Its selection is based on several advantages, including a shorter overall length, lower construction complexity, and the ability to avoid urban encroachment. These factors make it a more practical and cost-effective choice for infrastructure development.

6.7. Alternative Modes of Transportation

In evaluating alternative modes of transportation, it is clear that none of the available options can fulfill the specific functions and advantages offered by the proposed airport project, particularly in providing relatively fast and cost-effective transportation.

Ethiopia, being a landlocked country, lacks access to any major water bodies that could serve as viable modes of transport. This eliminates the possibility of utilizing water transport, such as shipping or ferries, as an alternative to air travel.

Additionally, the railway transportation system in Ethiopia is limited in scope and capacity. While railways serve specific regions, they do not provide the extensive network required to efficiently transport passengers over long distances. The current railway infrastructure is underdeveloped and unable to offer a comprehensive alternative to air travel for rapid, long-distance movement.

Road transportation, although a major mode of transport within the country, presents significant challenges for long-distance travel. While it can be cost-effective for shorter trips, road transport is inefficient for covering large distances, especially when compared to air travel. It is slower, subject to traffic congestion, and requires more time, making it an inadequate substitute for the speed and convenience provided by an airport.

In conclusion, the proposed airport is indispensable for offering a mode of transportation that is both fast and relatively affordable, which road, rail, and water transport cannot provide given the country's current infrastructure and geographical limitations..

6.8.No Doing Alternative

The growing trend in air traffic passenger numbers arriving or transiting through Bole International Airport has been steadily increasing, reflecting the expanding role of the airport as a key hub in Ethiopia's connectivity to the rest of the world. However, due to its limited infrastructure and capacity, the airport is now operating beyond its intended capacity. The current space constraints hinder any significant expansion, preventing the airport from accommodating the rising demand for air travel. Without the proposed project, Bole International Airport will continue to be the primary gateway for the people of Ethiopia. This would significantly restrict the nation's air-traffic potential and hinder its global aviation connectivity, which is already seen as unsustainable.

The failure to develop a new international airport or expand existing facilities would result in a scenario where the country is unable to keep up with the growing number of passengers and flights. Such a situation is considered unfeasible in terms of long-term viability and competitiveness. Additionally, the increasing volume of air traffic at Bole International Airport raises serious safety concerns. The International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) have set strict safety standards for airports, and as passenger numbers continue to rise without proper upgrades to infrastructure, the potential for safety risks, incidents, and accidents increases. Without the necessary improvements, Bole International Airport could face heightened safety hazards, endangering both passengers and airport staff. This underscores the critical need for the proposed project to ensure that the airport can continue to serve its growing role while maintaining safety and efficiency.

6.9.With and Without Project Scenario

This analysis examines two distinct potential futures in the project study area: one where the project is implemented ("With Project Scenario") and one where it is not implemented ("Without Project Scenario"). The purpose of this comparison is to understand the potential impacts, both positive and negative, associated with the proposed international airport project.

The analysis takes into account various factors, including site conditions, the scope of development in the area, and the potential for economic, environmental, and social improvements. The "With Project Scenario" reflects the outcomes after the airport is established, while the "Without Project Scenario" represents the current conditions, where the project is not implemented and the status quo continues. Table 6.3 provides a side-by-side comparison of the two scenarios, highlighting key components that are affected by the implementation of the project.

Table 6-4: With and Without Project Scenario

Component	With Project Scenario	Without Project Scenario
Siting Location	The proposed location for the international airport is highly suitable due to its proximity to Ethiopia's capital city, Addis Ababa, and nearby industrial cities like Mojo, Dukem, Gelan, and Bishoftu. These areas will benefit from enhanced connectivity for both passenger and cargo handling.	The existing Bole International Airport is limited in capacity and struggles to meet the growing demand for air travel. The infrastructure will remain inadequate, hindering further growth in the region.
Economic Development and Employment Opportunity	The development of the airport will increase connectivity to surrounding areas, fostering economic growth in the region. This will stimulate various economic activities, including the growth of local industries, businesses, and the tourism sector. Additionally, the project will create significant employment opportunities, both during construction and throughout the operation of the airport.	Without the project, economic and employment conditions will remain stagnant. The existing infrastructure will continue to limit the growth of industries, businesses, and job creation, particularly in the transportation and logistics sectors.
Environmental Aspects	The project incorporates nature-based solutions designed to enhance the environmental quality of the area, such as sustainable drainage systems,	In the absence of the project, the environmental conditions of the area will remain unchanged. Current environmental

	green spaces, and energy-efficient technologies. These solutions aim to mitigate environmental impacts and improve the local ecosystem.	challenges, such as pollution, waste management issues, and insufficient green space, will persist.
Social Impact and Connectivity	The new international airport will improve social connectivity, facilitating better access to regional and international destinations. This will benefit local communities and businesses by improving transportation options and promoting socio-economic integration.	Without the airport, the region will continue to rely on the existing infrastructure, which may limit the ability of local communities to access broader economic opportunities. Social integration will be constrained by the lack of a modern transport hub.
Infrastructure and Accessibility	The airport will act as a central node for transportation, providing a modern, efficient transport network that supports both passenger and cargo services. This will help alleviate congestion at Bole International Airport and increase overall regional accessibility.	Without the new project, existing infrastructure will be stretched, and accessibility to and from the capital city and surrounding regions will remain limited. Bole International Airport will continue to be overburdened, which may lead to delays and inefficiencies.
Land Use and Urban Development	The establishment of the airport will encourage urban expansion and the development of nearby areas. The improved infrastructure will stimulate investments in real estate, commercial zones, and industrial parks.	Without the project, urban development in the surrounding areas will proceed at a slower pace. Existing land use patterns will remain unchanged, and the potential for economic expansion will be limited by the lack of advanced infrastructure.
Traffic and Congestion	The project will reduce traffic congestion at Bole International Airport by providing an additional	Traffic congestion will worsen without the new airport. Bole International Airport will remain

	major air transport hub. This will help alleviate pressure on existing roads and airports, ensuring smoother transportation for both passengers and cargo.	the primary hub, leading to overcrowded terminals, longer waiting times, and greater pressure on road networks, negatively affecting travel efficiency.
Tourism and International Connectivity	The airport's development will enhance international connectivity, attracting more tourists, international businesses, and investment. The improved transport infrastructure will help position Ethiopia as a key player in regional and global tourism markets.	Without the project, tourism and international connectivity will remain limited. Ethiopia will face challenges in attracting international tourists and investors due to its limited transportation infrastructure and lack of an expanded international airport.

This comparative analysis highlights how the proposed airport project can significantly transform the economic, environmental, and social landscape of the region. The "With Project Scenario" presents a vision of growth, improved connectivity, and sustainable development, whereas the "Without Project Scenario" underscores the limitations and challenges faced by the current infrastructure and economic conditions.

7. STAKEHOLDER ENGAGEMENT

This section summarizes the stakeholder engagement process conducted as part of the ESIA process for the proposed project and specifically the stakeholder consultation process that was followed. It is presented in the context of the ongoing process adopted in the ESIA process to engage with stakeholders affected by the proposed project activities. The section outlines the purpose and aims of stakeholder engagement and then describes the project stakeholder groups and gives an overview of the consultation process followed.

The requirements for stakeholder engagement during the ESIA process are defined within the EIA Proclamation and implementing guidelines. These require stakeholder engagement at the beginning of the ESIA process (referred to as scoping engagement) and at the end, after the ESIA report has been submitted for review and approval (referred to as feedback engagement). The Ethiopian EIA Guidelines define stakeholders as ‘interested and affected parties’, however more broadly stakeholders are defined as groups or individuals that are ‘directly or indirectly affected by a project or may have interests in a project and/or ability to influence its outcome either positively or negatively’.

7.1. Purpose and Aims of Stakeholder Engagement

Stakeholder engagement is a foundational element of the Environmental and Social Impact Assessment process, transcending mere procedural compliance to serve as a critical tool for identifying, understanding, and effectively addressing potential environmental and social impacts. This proactive approach is essential for enhancing project sustainability, securing its social license to operate, and ensuring long-term acceptability. The core objectives of the ESIA stakeholder engagement process for the Bishoftu International Airport project are multifaceted and include providing stakeholders with adequate and timely information on the proposed project, informing them about the ESIA process and their integral role within it, and offering opportunities to voice their opinions and concerns.

Beyond information dissemination and feedback collection, a primary aim is to empower stakeholders to influence the design of the project, for example, by providing input to decisions on alternatives and contributing to the formulation of management measures to be implemented. The process is designed to meticulously hear and record stakeholder concerns, ensuring these are thoroughly addressed within the ESIA report. Ultimately, the engagement process seeks to build and maintain constructive relationships with All stakeholders, fostering

a collaborative environment throughout the project's lifecycle. These objectives are firmly rooted in the Ethiopian EIA Guidelines, which broadly define stakeholders as 'interested and affected parties,' encompassing any groups or individuals directly or indirectly affected by a project, or those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

7.2. Stakeholder Identification Mapping, and Analysis

7.2.1. Principles of Systematic Stakeholder Identification

A systematic approach to stakeholder identification is fundamental to effective project planning and risk management. It moves beyond an ad-hoc or reactive compilation of an initial list towards a structured, proactive, and comprehensive methodology. The principles guiding this systematic methodology emphasize the necessity of continuous review and updating, acknowledging that stakeholder identification is an "ongoing aspect of engagement throughout the life of the project". This dynamic process ensures that as the project evolves, new stakeholders are identified, and the interests and influence of existing ones are re-evaluated.

7.2.2. Methodology for Stakeholder Mapping and Analysis

To address the need for a systematic methodology, a robust, multi-stage approach for comprehensive stakeholder identification, mapping, and analysis has been adopted and is detailed below. This methodology ensures a structured framework for identifying, categorizing, and understanding all relevant parties.

Step 1: Initial Stakeholder Brainstorming and Categorization

The process begins with an extensive brainstorming phase, informed by the project's scope, geographical footprint, relevant legal and regulatory frameworks, and the prevailing socio-economic and cultural context. This initial phase involves drawing upon existing knowledge, project documentation, and preliminary field observations to generate a broad list of potential stakeholders. The initial broad categories identified for this project included "Federal and Regional (Zonal) Government/ Ministries/ Institutes" And "Local Administration and Communities". This foundational step ensures that a wide net is cast before refining the list.

Step 2: Stakeholder Mapping and Analysis

Following initial identification, a recognized stakeholder analysis tool, such as a Power/Interest Grid, is applied to systematically map and analyze each identified stakeholder. This tool

categorizes stakeholders based on their power to influence the project and their interest in its outcomes (Power/Interest Grid).

- **Identification of Interests:** Through this methodology, the specific interests, concerns, and expectations of each identified stakeholder group are systematically documented. For instance, the Federal Environmental Protection Authority (FEPA) has a clear interest in ensuring "compliance with environmental regulations" and "mitigating adverse environmental and social impacts". Conversely, Project Affected Persons (PAPs) express interests related to "accurate land assessment," "sufficient compensation," and "job opportunities". Understanding these diverse interests is crucial for tailoring engagement strategies and addressing potential conflicts.
- **Assessment of Influence:** The process assesses the level of influence each stakeholder can exert on the project's outcomes. This includes evaluating formal authority, such as regulatory bodies like FEPA through their approval processes, and informal power, exemplified by local administrations acting as "gatekeepers" to communities. The potential for collective action, such as community support or opposition, is also considered.
- **Evaluation of Potential Impacts:** The methodology systematically evaluates the potential positive and negative impacts of the project on each stakeholder group. This encompasses both direct impacts, such as land displacement for PAPs, and indirect effects, like the broader economic development for the region and increased tourism potential for Bishoftu.
- **Categorization for Engagement Strategy:** The comprehensive analysis derived from this mapping process informs the categorization of stakeholders. This allows for the development of tailored and efficient engagement strategies, classifying stakeholders into groups such as "key players" requiring close management, those who need to be "kept informed," those to be "kept satisfied," or those requiring "minimal effort." This structured approach ensures that engagement efforts are proportional to the stakeholder's importance and potential impact.

Step 3: Validation and Refinement

The initial stakeholder list and analysis are validated through early consultations with key informants, including government officials, community leaders, and local experts. This iterative process ensures that the stakeholder mapping remains dynamic and responsive to evolving project contexts and community dynamics. Regular reviews and updates are

conducted throughout the project lifecycle to account for changes in stakeholder interests, influence, or the emergence of new parties.

Table 7-1: Stakeholder Mapping – Power/Interest Grid

Category	Stakeholder Groups	Engagement Strategy	Key Interests / Concerns
High Power / High Interest (Key Players)	- Federal Environmental Protection Authority (FEPA) - Ethiopian Airlines Group (EAG) - Bishoftu City Administration	- Manage closely - Involve in key decisions	- Regulatory compliance - Environmental & social safeguards - Strategic project justification - Naming rights & local identity
High Power / Low Interest (Keep Satisfied)	- Ministry of Transport - Oromia Regional Government - Urban Planning Institute (OUP)	Keep informed and satisfied	- Policy alignment - Regional development - Integration with urban plans
Low Power / High Interest (Keep Informed)	- Project Affected Persons (PAPs) - Local community leaders and farmers - Youth and women's groups	- Keep well informed - Engage regularly	- Land acquisition & compensation - Employment & livelihoods - Involuntary resettlement - Participation in decision-making
Low Power / Low Interest (Minimal Effort)	- General public (non-affected areas) - National media - General aviation observers	Monitor with minimal engagement	- General awareness - Updates on progress - Potential misinformation management

7.2.3. Specific Strategies for Engaging with Different Stakeholder Groups

Tailored engagement strategies are essential to effectively interact with diverse stakeholder groups, ensuring that communication is appropriate, accessible, and maximizes meaningful participation.

- **Government Authorities (Federal and Regional):** Engagement with federal and regional government bodies involves formal meetings, official correspondence, and high-level discussions. The purpose is to ensure regulatory compliance, secure necessary permits and approvals, align the project with national and regional development plans, and leverage their technical expertise and oversight. For instance, consultations with FEPA focused on ensuring "compliance with the applicable national and international environmental standards and best practices" and their readiness to offer "technical support and oversight".
- **Local Administration and Sector Offices (City, Sub-City, Woreda):** Engagement with local administrations includes formal meetings, collaborative planning sessions, and regular progress updates. These entities serve a crucial role as "gatekeepers" to local communities. The purpose is to facilitate effective community access, ensure project alignment with local development priorities, address local service provision issues, and mobilize local support for the project. Consultations with Bishoftu City and Dukem Sub-City administrations, for example, involved discussions on project benefits, local concerns, and their overall support for the initiative.
- **Affected Communities (Project Affected Persons - PAPs):** Engagement with PAPs requires multiple, consecutive community meetings, household-level visits, and the establishment of a dedicated Community Liaison Officer from the local community. The use of local languages and culturally appropriate communication methods is paramount to ensure clarity and build trust. The purpose is to provide comprehensive and timely information, facilitate effective grievance redress, gather invaluable local knowledge, ensure informed consent for land acquisition and resettlement, negotiate fair compensation, support livelihood restoration efforts, and foster a sense of ownership over project outcomes. The PAPs consultation explicitly aimed to "gather feedback from the project-affected population, address their concerns and discuss potential impacts," as well as to "gather local knowledge, promote ownership, enhance social acceptability, build trust, evaluate alternatives, seek solutions, and prevent conflicts".
- **Vulnerable Groups (Women, Youth, Elderly, Persons with Disabilities):** Strategies

include holding dedicated focus group discussions or separate meetings when necessary, utilizing visual aids for low-literacy participants, ensuring physically accessible meeting locations and convenient timings, and actively ensuring their proportional representation in broader community meetings. The purpose is to address specific barriers to participation that these groups may face, ensure their unique concerns and needs are heard (e.g., youth concerns regarding land allocation and job opportunities), and tailor mitigation measures and benefit-sharing mechanisms to their specific circumstances.

7.3. Stakeholder Consultation Process & Documentation

7.3.1. Overview of Consultation Phases

The stakeholder engagement process for the Bishoftu International Airport project has adopted a phased approach, commencing with initial scoping engagement at the beginning of the ESIA process and followed by feedback engagement after the ESIA report's submission for review and approval. This phased methodology is complemented by an ongoing commitment to continuous consultations throughout the project's construction and operational phases, as stipulated in the Stakeholder Engagement Plan. This iterative and continuous engagement ensures that emerging issues are addressed promptly and that communication channels remain open throughout the project's lifecycle.

7.3.2. Federal and Regional Government and Authorities Consulted

The Federal Environmental Protection Authority (FEPA), formerly the Ministry of Environment, Forestry and Climate Change, is the key environmental authority in Ethiopia. It plays a central role in the Environmental and Social Impact Assessment approval process by reviewing ESIA reports, ensuring compliance with environmental regulations, and issuing environmental clearance for projects. FEPA also provides guidance on environmental management and monitors project implementation to mitigate adverse environmental and social impacts. The key federal and regional government and other authorities that have been included in the engagement activities are listed below.

Table 7-2: Key Federal and Regional Government and Authorities Consulted

Group	Authority	Date	Location	Participant (Total)	Male	Female
Federal Government/ Ministries/ Institutes	Federal Environmental Protection Authority	November 2024	Addis Ababa	5	3	2
	Ethiopian Airlines Group	March 19, 2025	Online	5	5	
	Ministry of Transport and Logistics	February 2025	Addis Ababa	2	2	-
	Ethiopian Electric Utility	February 2025	Addis Ababa	4	3	1
	Ethiopian Biodiversity Research Institute	December 2024	Addis Ababa	2	2	
	Ministry of Water and Energy	December 2024	Addis Ababa	2	2	
Regional and Zonal Government	Oromia Urban Planning Institute	December, 2024	Addis Ababa	2	2	
	Engineering Corporation of Oromia	December, 2024	Addis Ababa	3	3	

Detailed records of consultations conducted with key federal and regional governmental authorities are presented below, incorporating all available information.

7.3.2.1.Consultation with Ethiopian Airlines Group

An online stakeholder consultation was conducted on March 19, 2025, with representatives from Ethiopian Airlines Group (EAG) to discuss key aspects of the new international airport project. The meeting was also attended by a representative from Oromia Engineering Corporation (OEC). The discussions covered various critical topics, including the justification for the project, site selection, budgetary considerations, community involvement, and the commencement timeline for construction. Additionally, the consultation addressed how EAG could obtain Resettlement Action Plan (RAP) data from the client to facilitate smooth project implementation.

One of the primary discussions focused on the justification for the new international airport. EAG emphasized the increasing demand for air travel and the need to accommodate larger aircraft, which have outgrown the capacity of Bole International Airport. The study for the new airport began in 2014 as part of a strategic initiative to ensure that Ethiopia remains a key aviation hub in Africa. Given the rapid growth in passenger numbers and the operational constraints at the existing airport, the development of a new airport was deemed essential to sustain the country's aviation sector and support national economic growth.

Another critical topic was site selection. The consultation addressed concerns regarding alternative sites considered for the project. Initially, eight potential locations were evaluated based on various technical, environmental, and socio-economic criteria. After careful analysis, the Abusera site was selected as the most suitable location due to its ability to meet key selection requirements, including geographical feasibility, land availability, and connectivity to existing transport infrastructure. Stakeholders reaffirmed the importance of selecting a site that minimizes environmental and social impacts while maximizing the airport's operational efficiency.

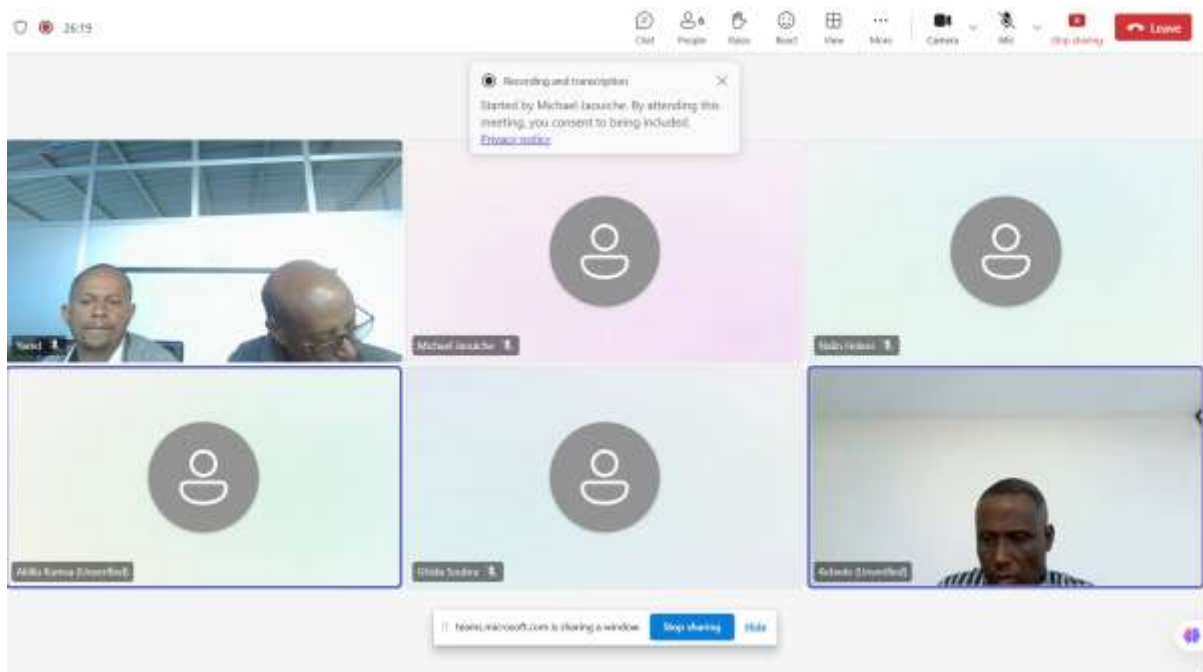


Figure 7-1: Online Meeting with the Ethiopian Airline Group and Feasibility and Design Consultant, 2025

The discussion also covered the Resettlement Action Plan (RAP) and community involvement. Representatives from the Engineering Corporation Oromia deliberated on how the resettlement process was conducted and the measures taken to engage affected communities. The meeting emphasized the necessity of ensuring that displaced individuals and communities are involved in both the construction and operational phases of the airport. This would include providing opportunities for employment and other socio-economic benefits to those affected by the project. The consultation underscored the importance of transparent communication and stakeholder engagement throughout the resettlement process to mitigate any negative impacts on local communities.

Additionally, the scope of the project was discussed, with stakeholders noting that the designated airport site has recently been expanded by an additional 1.4 square kilometers. This expansion is expected to accommodate essential infrastructure developments required for the airport's long-term functionality.

The meeting also addressed air traffic and passenger growth projections. Stakeholders examined future air traffic trends and the anticipated increase in passenger capacity, highlighting the need for a modern airport that can handle growing demand efficiently. The

discussion reinforced that the new airport would play a pivotal role in positioning Ethiopia as a major aviation hub in the region, further strengthening the country's global connectivity.

On budget and financial aspects, the consultation reviewed the financial feasibility report. Ethiopian Airlines confirmed that it would cover the costs related to resettlement, while the Bishoftu City Administration would be responsible for providing the required land. The discussion clarified the financial commitments of each stakeholder, ensuring that the project remains financially viable and progresses according to plan.

Finally, the consultation concluded with discussions on stakeholder support and the next steps. It was confirmed that most of the client's concerns have been addressed and that the project is moving forward as scheduled. The meeting reaffirmed the collective commitment to ensuring the successful execution of the airport project while addressing environmental, social, and economic considerations.

7.3.2.2.Consultation with Federal Environmental Protection Authority

A consultation was conducted with the Federal Environmental Protection Authority (FEPA) regarding the Environmental and Social Impact Assessment for the Bishoftu International Airport. During the consultation, FEPA expressed its appreciation for the project's execution and its potential positive impact on both the national and local levels. They emphasized that the airport project would provide substantial economic and social benefits, particularly in terms of boosting the country's connectivity, tourism, and overall development.

FEPA reaffirmed their commitment to closely collaborating with the project team throughout all stages of the project to ensure that the environmental and social considerations are effectively integrated and managed. The Authority highlighted their readiness to offer technical support and oversight to guarantee that the project complies with the applicable national and international environmental standards and best practices.

The Authority also underscored the importance of conducting a thorough assessment of potential impacts on the local communities and ecosystems surrounding the airport. They emphasized the need for proactive consultation with communities who may be affected by the project's development, particularly with regard to land acquisition, potential displacement, and relocation plans, if any. FEPA stressed that the concerns and interests of affected individuals should be taken into account, and that their informed consent must be obtained for any necessary interventions, compensation measures, or resettlement plans.



Figure 7-2: Discussion with EPA

Furthermore, FEPA raised the issue of ensuring that any mitigation measures related to environmental impacts, such as air quality, noise, and biodiversity, are clearly outlined and implemented effectively. They pointed out that the project should also include an effective monitoring plan to track and report on these aspects throughout its lifecycle.

Additionally, the FEPA confirmed that the Bishoftu International Airport project falls under Category One of the national environmental impact classification, which mandates the undertaking of a comprehensive Environmental and Social Impact Assessment. In conclusion, FEPA conveyed their continued support for the project and their dedication to ensuring that it aligns with both environmental sustainability goals and social responsibility standards.

7.3.2.3.Consultation with Oromia Urban Planning Institute

A stakeholder consultation was held with experts from the Oromia Urban Planning Institute (OUPI) to discuss the development of Bishoftu International Airport, focusing on its integration within the town's structural plan and its broader impact on urban development. The experts confirmed that the airport site falls within Bishoftu's structural plan, specifically in Dukem

Sub-City, Abusera Wereda. The plan is designed to ensure that the airport is seamlessly incorporated into the town's urban framework, preventing conflicts with existing and future land uses. The Oromia Urban Planning Institute is actively developing the Local Development Plan (LDP) for Bishoftu, taking into account the strategic significance of the airport. This plan addresses zoning regulations, infrastructure development, and connectivity enhancements to support both the airport and the town's urban expansion. Particular focus is being placed on transport corridors, access roads, and service provisions that will maximize the airport's efficiency and urban impact.

Given Bishoftu's rich tourism potential, bolstered by its lakes, resorts, and natural attractions, the airport is expected to play a key role in transforming the town into a major tourist hub. Stakeholders stressed the need for urban planning strategies to align with tourism development by incorporating hospitality, commercial, and recreational zones near the airport. Plans are being made for tourism-related infrastructure, such as hotels, resorts, cultural centers, and business districts, ensuring that they are strategically located to attract visitors while maintaining environmental sustainability. Additionally, the land surrounding the airport will be planned in a way that is compatible with aviation operations, minimizing environmental and social disruptions. Industrial and commercial developments will be carefully zoned to prevent conflicts with air traffic safety regulations. The importance of preserving buffer zones was emphasized, along with the need to avoid high-rise buildings, noise-sensitive establishments, or activities that might attract wildlife hazards, which could interfere with airport operations.

Infrastructure and connectivity were also key discussion points, with stakeholders highlighting the critical need for efficient road networks, public transportation options, and utility services to ensure the airport's success. Plans are underway to improve access roads linking the airport to the Addis Ababa-Djibouti corridor and other major transportation routes. Furthermore, the discussion included integrating smart city concepts into airport-adjacent developments, such as digital infrastructure, green spaces, and sustainable urban mobility solutions. The consultation reaffirmed the Oromia Urban Planning Institute's commitment to harmonizing the airport project with Bishoftu's long-term development goals. The ongoing Local Development Plan will serve as a roadmap for sustainable urban growth while leveraging the airport's economic and tourism potential. Moving forward, additional stakeholder engagements will be conducted to refine planning strategies, address community concerns, and ensure that development aligns with regional and national priorities.



Figure 7-3: Discussion with Oromia Urban Planning Institute, 2024

7.3.3. Local Administration and Communities Consulted

The Bishoftu International Airport is proposed within Bishoftu City, Dukem Sub-City, Abusera Woreda, where seven kebeles have been identified as potentially affected by the project, as outlined in Table 7-3 below. The city, sub-city, and woreda administrations are responsible for developing and implementing policies and programs within their respective jurisdictions. Consequently, officials at all levels from the city to the woreda are key stakeholders. Additionally, woreda officials serve as "gatekeepers" to the kebeles, facilitating direct engagement and influencing local perspectives.

Table 7-3: Local Administration and Communities consulted

Group	Sector Offices	Date	Location	Participant Total	Male	Female
Bishoftu City	Bishoftu city Administration	December 06, 2024	Bishoftu	9	7	2
	Bishoftu city Land Administration					
	Bishoftu city Agricultural					

	offices					
	Bishoftu city Health offices					
	Bishoftu City Environmental Protection Office					
	Bishoftu City Security Office					
Dukem Sub-City	Dukem sub city Administration	January 30, 2025	Dukem	10	9	1
	Dukem sub city Land Administration					
	Dukem sub city Agricultural offices	February 10, 2025	Dukem	1	1	-
	Dukem sub city Health offices					
	Dukem sub city Education offices					
	Dukem sub city Social affirms					
Abusera Woreda	Abusera Woreda Administration	14/01/2025	Abusera	7	5	2
	Abu Lugun Kebele Administration					
	Abbu Kobo Kebele Administration					
	Abu Gerbi Kebele Administration					

	Abu Sera Kebele Administration					
	Abu Serkema Kebele Administration					
	Koftu Kombolcha Kebele Administration					
Affected community	Representative from the affected communities Representative form Women, youth and vulnerable group; etc	07/11/2024 11/12/2024 14/01/2025 11/05/2025 28/05/2025	Abusera	228	191	37
Affected Community	Representative from Abbuu-Kombolcha, Abbuu-Loyyaa and Dirre Shoki local zone Community affected communities for RAP	25/02/2025	Abusera	70	66	4
Affected Community	Representative from the affected communities for RAP	03/03/2025	Abusera	151	140	11

Detailed records of consultations conducted with local administrations and affected communities are provided below and the minutes of the consultation are annexed in Annex 8.

7.3.3.1. Consultation with Bishoftu City Administration Sector Offices

The consultation with the relevant stakeholder institutions of Bishoftu city was held in the meeting hall of the city administration on (6/12/2024). Attendants of the meeting were Environmental Protection Office, Agriculture Office, Health office, Land Administration

office, Security office, Education offices, Abusera Wereda Administration office, Dukem sub city Administration office, and Bishoftu City Administration offices. During the consultation, participants conveyed their support for the project idea, pointing out that the nation, the city and the project area communities will greatly benefit from its implementation. Additionally, they said that they were prepared to work with the project team at every stage to ensure its effective completion. Additionally, they stressed how important it is to guarantee that the individuals who will be impacted by the project are fairly consulted and that their consent is obtained for the project compensation, and relocation plans. The major points raised at the consultation session are summarized as follows:

- The community is enthusiastic about the initiative and has great hopes that it will improve their quality of life, according to the participants in the stakeholder engagement. However, some individual farmers have expressed dissatisfaction, claiming that their land is not accurately assessed. Participants recommended that every complaint be handled promptly and appropriately. All commitments made to the farmers that would be displaced must be carried out in full and without delay.
- They suggested that the airport be renamed "Bishoftu Airport rather than Abusera Airport" arguing that this would assist the city become more internationally known and help them reach their vision of becoming a popular tourist destination throughout the world.
- Preservation of the impacted communities' cultural heritage should be given due attention. According to the participants, one method of accomplishing this is by designating the different units, components, facilities, sites, etc. of the airport after the names of the kebeles or villages that the project would demolish. Additionally, local cultural heritages could also be shown in a dedicated "cultural room."
- Being a rural farming community, majority of the relocated households have large family size and most family members are youth. Normally, the father gives his children a share of his farmland when they reach adulthood. Since this is no more possible due to the project, the participants recommended that the local youth be given priority for job opportunities during construction as well as operational phases of the airport.
- The project enjoys the full support of the city administration and all of its institutions from the start. We also want to reiterate our commitment and provide our unwavering support in every way. We believe that the airport will improve the economic and social development of our city and its citizens.



Figure 7-4: Consultation with Bishoftu city Administration Higher officials

7.3.3.2.Consultation with Dukam City Administration Sector Offices

The consultations with relevant stakeholder institutions in Dukam sub-city were held in the meeting hall of the city administration on (30/01/2025 and February 10, 2025). Attendants of the meeting were Dukam sub-city Environmental Protection Office, Agriculture Office, Health office, Land Administration office, Security office, Education offices, Water offices, Abusera Wereda Administration office and Dukem sub city Administration office. Consultation was undertaken with leaders and experts of the relevant institutions of the sub-city. After explaining the objectives of the project, its major characteristics and expected impacts, the consultant team invited the participants to share their views of the project, specifically on the effect of the airport construction on the livelihood of the impacted communities who entirely depend on farming. The discussion outcomes are summarized in the following bullet points.

- The stakeholder institutions in Dukm sub-city are very supportive of the airport project given its tremendous contribution to the development of Ethiopian aviation industry as well as the national economy. Particularly they appreciate its impact on livelihood improvement of the impacted farmer communities.



Figure 7-5: Consultation with Dukem sub city Administration Higher official, Feburay 10, 2025

- They have stressed that farmers are very much attached to their land they inherited from their ancestors and they hoped to pass it over to their children. Land is their means of subsistence and it is their only way of life the farmers know. It is difficult for them to adapt to the urban environment and they lack the skills required to cop up to the new way of life in towns. Therefor the participants suggested support in skill development and continuous follow up is essential to ensure successful livelihood development of the displaced people.





Figure 7-6: Consultation with Dukem sub city Administration Higher officials

- Prior to project implementation, there should be succession of discussions with the farmers is essential to win the farmers confidence and remove their doubts.
- It is very critical that the project should give priority to the children of the farmers in creating and allocating job opportunities. Since the farmers have given out their lands to the project and have nothing to pass over to their children, the project should be very serious in terms of providing long and short term jobs to youth members of the displaced community.

7.3.3.3.Consultation with Project Affected Peoples (PAPs)

Intense consultations were conducted with the communities affected by the airport project, located in Dukam Sub-City—specifically in the kebeles of Abu Luguna, Abu Achiro, Bishoftu, Abu Gerbi, Abu Kobo, Koftu, and Kombolcha—on multiple occasions (07/11/2024, 11/12/2024, 14/01/2025, 11/05/2025, and 28/05/2025) in the meeting halls of the Abusera Woreda Administration and the respective project-affected kebele administrations. These meetings aimed to gather feedback from the affected communities, address their concerns, and discuss potential project impacts. Additionally, the consultations were intended to incorporate local knowledge, promote community ownership, enhance social acceptability, build trust, assess alternatives, explore solutions, and prevent potential conflicts.

Outcomes of the discussions are summarized in the following bullet points:

- The participants began by sincerely endorsing it in view of the project's contribution to both the local economy and the nation's growth.

- The participants of the community discussion, who represented the project area residents, have said that they have been hearing about the project for approximately five years, but they were not sufficiently consulted and they remain unclear on a number of issues. Only a small number of community conversations have taken place thus far, and they recommend further consecutive consultations to generate enough understanding on how the project plans to benefit the local communities.

-



Figure 7-7: Discussion with Representative of Project Affected Community, 2024

- Most participants have raised that farmer's lands have not been measured accurately in most cases; there are so many disappointments in this regard. Moreover, there are lands that are partly in the project and partly outside the project area. Only those lands falling in the demarcated areas were included in the land measurement and the part lying outside were left out. Since the farmers are going to be relocated in farther location,

they cannot use the leftover lands and they want those lands to be included in the compensation plan.



Figure 7-8: Discussion with Representative of Project Affected Community, 28/05/2025

- The rate of land compensation (322 birr per square meter) was strongly criticized for being insufficient. Participants assert that other areas have far higher land rates for land compensation. As they were not consulted beforehand, they are unaware of the source of this pricing. The participants anticipate that the rate will be improved, especially in light of the recent price inflation.
- Another grave concern raised by the participants was about the amount of land allocated to youth family members that do not own their own land. The young people live in homes they build on property their parents have given them. The compensation plan

allocates 105 m² for each eligible young member of the family, but without any accompanying financial support for construction. This is very dangerously risky as the only option for the youth is to sell the land, waste the money and become homeless.

- Furthermore, the subject of how the common lands will be handled was raised. The farmers believe they need to receive compensation for that as well.



Figure 7-9: Discussion with Representative of Project Affected Community, 11/07/2024

- There is lots of natural vegetation in the project area which has been preserved by the community's careful and costly natural resource management. They enquired whether that is covered in the compensation scheme.
- They also want to know where the money for the multipurpose buildings that will be constructed to provide revenue for the relocated farmers will come from. Will that be paid for with their compensation? They would disagree if it were the case.



Figure 7-10: Discussion with Representative of Project Affected Community, 11/05/2025

- During the consultation meeting, the site of the settlement was another contentious topic. The participants conveyed their desire for the relocation place to be as near to their current location as possible. In this way they could be able to take part in the

project construction and operations. The distance between the construction site and the intended resettlement area in Bishoftu could result in significant transportation expenses for them.



Figure 7-11: Discussion with Representative of Project Affected Community, 11/05/2025



Figure 7-12: Discussion with Representative of Project Affected Community, March, 2025



Figure 7-13: Discussion with Representative of Project Affected Community, March, 2025

7.3.3.4. Consultations with Vulnerable Groups

Focused Group Discussions and Key Informant Interviews were conducted with representatives of vulnerable groups, including female-headed households, youth, and elderly community members. The key outcomes are as follows:

- **Female-Headed Households (FHHs):** Expressed concerns over the loss of agricultural land their primary livelihood source and the difficulty of finding alternative employment due to limited skills and resources. They stressed the need for fair valuation of both private and communal land, timely compensation to prevent hardship, and relocation sites close to their current location to maintain access to livelihoods.
- **Youth:** Raised concerns about unemployment, lack of training opportunities, and limited support for those residing on parents' land without formal ownership. The allocation of 105 m² per eligible youth without construction assistance was seen as a risk for forced land sales and potential homelessness. They requested priority in project-related job opportunities, capacity-building programs, and financial or material support for house construction.
- **Elderly:** Voiced fears over losing long-cultivated land and the impact on their food security. They highlighted challenges in adapting to new livelihoods due to age and physical limitations and requested relocation sites near their original homes, transport assistance, and continued access to healthcare and social services.



7-14: Discussion with Representative of Female-Headed Households

7.4. Key Issues Identified, Feedback Incorporation, and Project Responses

During the stakeholder engagement process, various concerns and priorities were raised by the consulted stakeholders, encompassing a wide range of perspectives from government authorities, local communities, and Project Affected Persons (PAPs). While the detailed minutes of these consultations are maintained and annexed (Annex 8), this section provides a thematic summary of the key issues identified and, crucially, details the project's explicit responses and how feedback has been incorporated into project design and decision-making.

Table 7-4: Summary of Key Stakeholder Concerns and Project Responses

Stakeholder Group	Key Concern/Issue Raised	Project Response/Action Taken
Project Affected Persons (PAPs)	Feeling insufficiently consulted over 5 years, lack of clarity on issues, need for further consecutive	The project acknowledges the perception of insufficient consultation and commits to a sustained, proactive, and

	consultations.	transparent engagement plan, including regular, consecutive community meetings. A Community Liaison Officer (CLO) will be appointed to facilitate continuous dialogue and information flow.
Project Affected Persons (PAPs)	Inaccurate land measurement; partial lands outside demarcated area left out of compensation.	The project proponent has initiated a re-verification process for land measurements in coordination with the Woreda Land Administration Office. Findings will be transparently shared with affected households, and a formal grievance mechanism is in place for individual appeals. All affected land, including partial plots, will be included in the compensation plan.
Project Affected Persons (PAPs)	Land compensation rate (322 birr/sqm) is insufficient and source is unclear; need for improvement due to inflation.	The Oromia regional state is actively reviewing the compensation rate in light of recent market conditions and inflation, engaging with relevant government authorities and independent valuers. Any adjustments will be communicated transparently to PAPs through community meetings and official notices. The methodology for rate calculation will be clearly explained.
Project Affected Persons (PAPs)	Inadequate land allocation (105 m ²) for eligible youth without financial support for construction, risking	While direct land allocation is subject to national policy, the project commits to prioritizing eligible youth

	homelessness.	from affected households for employment opportunities during both construction and operational phases. Furthermore, the project is exploring partnerships for vocational training and skill development programs to enhance youth employability in new sectors and will review options for livelihood support in relocation.
Project Affected Persons (PAPs)	Need for compensation for common lands and natural vegetation preserved by the community.	The project proponent confirms that common lands and natural vegetation areas managed by the community will be assessed for compensation in accordance with national regulations and international best practices. The compensation scheme will cover these assets.
Project Affected Persons (PAPs)	Concern about funding source for multipurpose buildings (ensuring it's not from their compensation).	The project proponent clarifies that funding for community multipurpose buildings, intended to provide revenue for relocated farmers, will be provided by the project as part of the livelihood restoration program and will not be deducted from individual compensation payments.
Project Affected Persons (PAPs)	Desire for relocation site to be as near to current location as possible to facilitate participation in project construction and operations, citing transportation expenses.	The project proponent acknowledges the strong desire for proximity to the current location. While the primary resettlement site is designated, the project will explore feasible options for facilitating access and transportation for PAPs to project-related employment

		opportunities, and will continue dialogue on livelihood support in the new location.
Bishoftu City Administration	Need for prompt handling of complaints and full, timely execution of commitments to farmers.	A formal Grievance Redress Mechanism (GRM) has been established to ensure prompt and transparent resolution of all complaints. The project commits to timely and full implementation of all compensation and resettlement commitments, with regular updates provided to affected communities and local administrations.
Bishoftu City Administration	Suggestion to rename the airport "Bishoftu Airport" for international recognition.	The project proponent has accepted the suggestion and officially adopted the name "Bishoftu International Airport" in recognition of the city's identity and to enhance its international visibility and branding.
Bishoftu City Administration	Preservation of cultural heritage; naming airport units after kebeles, establishing a "cultural room."	The project commits to incorporating local cultural elements into the airport's design, including exploring the designation of specific airport units or facilities with names of affected kebeles. A dedicated 'cultural room' within the airport premises will be established to showcase local heritage and traditions.
Bishoftu City Administration & Dukem Sub-City Administration	Prioritizing job opportunities for local youth during construction and operational phases.	The project has developed a local employment strategy that prioritizes eligible youth from project-affected households for both skilled and unskilled labor during

		construction and operational phases. Vocational training programs will be implemented to enhance their employability.
Dukem Sub-City Administration	Need for skill development and continuous follow-up for displaced farmers to adapt to urban environment.	The project will implement a comprehensive livelihood restoration program that includes skill development training tailored to urban employment opportunities and entrepreneurial ventures. Continuous follow-up and mentorship will be provided to support the successful transition and adaptation of displaced households.
Dukem Sub-City Administration	Importance of successive discussions to build farmer confidence and remove doubts.	The project acknowledges the need for continuous and successive discussions. The Stakeholder Engagement Plan (SEP) will include provisions for regular, accessible community meetings and individual consultations to ensure sustained dialogue, build trust, and address evolving concerns.
Federal Environmental Protection Authority (FEPA)	Emphasized need for full ESIA compliance, attention to community and environmental impacts, mitigation measures, and monitoring.	The project team reaffirmed its alignment with FEPA requirements, including conducting a full Category I ESIA, implementing mitigation measures (e.g., for air quality, biodiversity, noise), engaging affected communities, and ensuring FEPA oversight and technical support throughout project execution.
Oromia Urban Planning Institute (OUPi)	Integration of airport within Bishoftu structural plan;	The project is fully integrated into the town's

	urban compatibility; transport and infrastructure planning; smart city development.	structural and Local Development Plans (LDP). Urban zoning, access roads, buffer zones, and compatible land use have been planned. Smart city principles, including digital infrastructure, tourism zones, and sustainable mobility, will be integrated around the airport.
--	---	---

7.5. Project Disclosure

The initiation of the project study has been carried out in a transparent manner, ensuring that Project Affected Peoples (PAPs) and key stakeholders are well-informed about the project's scope and objectives. To achieve this, a series of comprehensive consultations were conducted across multiple administrative levels, including City, Sub-City, Woreda, and Kebele. These consultations provided a platform for disseminating essential information regarding the project's purpose, nature, and location. Additionally, the discussions outlined the requirements of the Environmental and Social Impact Assessment (ESIA), ensuring that all involved parties understood the environmental and social implications of the project. The engagement process allowed for the collection of valuable feedback from stakeholders and PAPs, helping to identify critical concerns that need to be addressed during the planning, construction, and implementation phases of the project.

In alignment with the policy on access to information, relevant project details will be published on the Ethiopian Airlines Group website. This approach is intended to facilitate wider participation by allowing civil societies, academics, and other professionals to review the project details and provide meaningful input and suggestions for its improvement. By leveraging digital platforms, the project aims to ensure that diverse perspectives contribute to its planning and execution, ultimately enhancing its social and environmental sustainability.

Furthermore, the ESIA's public disclosure process will extend to local communities through multiple channels to maximize accessibility and transparency. A summary of the ESIA report will be published in the Oromia Regional State and Bishoftu City Government Newspapers, ensuring that local residents are informed about the project's environmental and social

considerations. Additionally, hard copies of the ESIA document will be made available at key administrative offices, including City, Sub-City, and Woreda environmental offices, as well as Woreda administration offices. To ensure that affected communities and relevant stakeholders are fully aware of the disclosure process, formal notifications will be issued through existing administrative structures. These notifications will encourage PAPs and the general public to review the ESIA document and provide their comments and insights.

This comprehensive approach to project disclosure is designed to uphold principles of transparency and accountability. By making project information widely accessible and inviting feedback from diverse stakeholders, the process ensures that environmental and social considerations are thoroughly examined and addressed. Ultimately, this inclusive approach fosters a participatory decision-making process, strengthening the project's alignment with sustainable development goals and community interests.

7.6. Stakeholders Engagement Plan (SEP)

A Stakeholder Engagement Plan is essential for fostering successful and positive relationships between the project and its stakeholders, including communities affected by the project. The plan ensures that all relevant parties are engaged throughout the project lifecycle, from inception to completion. The project proponent is responsible for conducting continuous public and stakeholder consultations to address concerns, provide information, and promote transparency in decision-making.

Public consultations have already been conducted during the project identification, scoping, and Environmental and Social Impact Assessment (ESIA) phases. However, ongoing consultations will be necessary, particularly during the construction phase, to address any emerging issues related to construction activities and the interaction between the construction workforce and the local community. To enhance stakeholder engagement, it is recommended that a Community Liaison Officer (CLO) be appointed from the local community, preferably from the project Woreda or Kebele. The CLO will facilitate consultations, grievance redress mechanisms, and ensure continuous communication between the project and affected stakeholders. Public consultation sessions should include representatives from Woreda and Kebele administrations, community elders, women's groups, youth representatives, and NGOs, if available. Additionally, all consultation records must be documented, properly filed, and made accessible for reference.

Consultations conducted during the scoping and ESIA phases revealed that the Project-Affected Persons (PAPs) and other stakeholders at the project site generally support the proposed project. However, further engagement will be necessary, particularly with PAPs who feel that their compensation has not been adequately evaluated and those who claim that compensation has not been provided for their children above 18 years old. The primary social concerns raised by the community include delays in compensation payments after land measurements and the lack of land allocation for reconstructing residential houses for their adult children. Addressing these concerns through ongoing consultations will be crucial in maintaining positive relations between the project and the affected communities.

The objectives of the Stakeholder Engagement Plan include:

- Identifying and engaging relevant stakeholders throughout the project lifecycle.
- Establishing an open dialogue with affected communities and key stakeholders.
- Ensuring the inclusion of disadvantaged groups, understanding their perspectives, and actively encouraging their participation in discussions.
- Maximizing social benefits while mitigating potential negative social impacts of the project.
- Providing timely, clear, and accessible information to all stakeholders.
- Monitoring and addressing community concerns through continuous engagement.
- Facilitating open communication between the project owners, affected persons, and other stakeholders.
- Ensuring transparency in project implementation, progress updates, and decision-making processes.
- Encouraging participation of project-affected persons in consultation meetings and ensuring their voices are heard.
- Prioritizing local employment opportunities, giving preference to project-affected persons when hiring a workforce.
- Notifying the public in advance about planned interruptions or potential infrastructure damage during construction, and working with relevant institutions to resolve such issues as quickly as possible.

The Stakeholder Engagement Plan will play a vital role in documenting and addressing complaints, concerns, and feedback related to the project. It will ensure that grievances and disputes are resolved through a structured and transparent grievance redress mechanism.

Additionally, the SEP will help safeguard life and property during construction, ensuring the project maintains good relations with the local community.

As part of the construction phase, the contractor will be required to develop and implement a Stakeholder Engagement Plan tailored to the construction activities. This plan should align with the objectives outlined above and be regularly updated based on evolving project conditions and stakeholder interactions.

Whenever stakeholder consultations are required, they should be conducted through existing administrative structures, such as Woreda and Kebele administrations or project sub-city administrations. Future consultations may be initiated by the community, the project proponent, or other stakeholders, depending on the issues that arise. By maintaining an inclusive, transparent, and proactive approach to stakeholder engagement, the project can ensure smooth implementation and sustainable community relations throughout its duration.

7.6.1. Operational Framework for the Stakeholder Engagement Plan

To ensure the SEP is a dynamic and actionable document, the following operational framework outlines specific activities, indicative timelines, clear responsibilities, and allocated resources for ongoing stakeholder engagement throughout the project lifecycle. This framework will be further detailed in a standalone SEP document.

7.6.1.1. Specific Activities

The SEP will encompass a range of activities tailored to different phases and stakeholder groups:

- **Regular Community Meetings:** Scheduled quarterly during construction and annually during operations, or as needed based on emerging issues. These will be held in accessible community venues, utilizing local languages.
- **Grievance Redress Mechanism (GRM) Operation:** Continuous operation of the GRM, including dedicated intake points (e.g., CLO office, suggestion boxes), regular review meetings of grievances, and transparent communication of resolutions.
- **Information Disclosure Events:** Public notices, local radio announcements, and community bulletin board updates for key project milestones, potential disruptions, and environmental monitoring results.

- **Targeted Consultations:** Specific focus group discussions or individual meetings with vulnerable groups (women, youth, elderly, persons with disabilities) to address their unique concerns and ensure their inclusion in benefit-sharing.
- **Livelihood Restoration Program Consultations:** Ongoing discussions with PAPs regarding the implementation and effectiveness of livelihood restoration initiatives, including skill training and employment opportunities.
- **Contractor Engagement:** Regular meetings between the project proponent, CLO, and contractors to ensure adherence to social and environmental commitments, particularly regarding workforce conduct and local hiring.
- **Monitoring and Evaluation:** Periodic surveys and feedback mechanisms to assess the effectiveness of engagement activities and stakeholder satisfaction.

7.6.1.2. Indicative Timelines

The SEP will operate on a continuous basis, with specific activities scheduled according to project phases:

- **Pre-Construction Phase (Ongoing until construction commences):** Finalization of RAP/LRP consultations, establishment of GRM, appointment of CLO, initial community awareness campaigns.
- **Construction Phase (Duration of construction):** Weekly/bi-weekly meetings with local leaders, monthly community meetings, continuous GRM operation, regular contractor engagement meetings, targeted consultations as needed.
- **Operational Phase (Post-construction):** Quarterly meetings with key community representatives, annual public forums, continuous GRM operation, periodic surveys on community satisfaction and impact.

7.6.1.3. Responsibilities

Clear roles and responsibilities will be assigned to ensure effective implementation of the SEP:

- **Project Proponent (Ethiopian Airlines Group):** Overall responsibility for the SEP, ensuring adequate resources, strategic oversight, and ultimate accountability for addressing stakeholder concerns and commitments.
- **Community Liaison Officer (CLO):** Primary point of contact for communities, responsible for facilitating meetings, receiving grievances, disseminating information, and reporting community feedback to the project team.

- **ESIA Team/Social Experts:** Responsible for developing and updating the SEP, conducting stakeholder analysis, designing engagement strategies, and documenting consultation outcomes.
- **Contractors:** Responsible for implementing their specific SEP during construction, managing workforce conduct, and engaging with local communities on construction-related issues, under the oversight of the Project Proponent.
- **Local Administrations (Woreda, Kebele):** Facilitating meetings, assisting with information dissemination, and supporting grievance resolution within their jurisdictions.

7.6.1.4. Allocated Resources

Sufficient resources will be allocated to ensure the effective implementation of the SEP:

- **Personnel:** Dedicated budget for the CLO position, including salary, training, and operational expenses.
- **Financial Resources:** Budget for meeting logistics (venue, refreshments, transportation support for vulnerable participants), communication materials (printing, local media costs), and translation services.
- **Logistical Support:** Provision of vehicles for field visits, office space for the CLO, and necessary communication equipment.
- **Training and Capacity Building:** Funds for training project staff and local stakeholders on engagement best practices, GRM procedures, and conflict resolution.

Table 7-5: Overview of Stakeholder Engagement Activities and Responsibilities throughout the Project Lifecycle

Project Phase	Key Activities	Frequency	Responsible Parties	Outputs/Deliverables	KPIs/Targets	Budget Allocation (ETB)
Pre-Construction (Until construction)	• Finalize RAP/LRP consultations. • Establish GRM. • Appoint CLO. • Awareness campaigns.	• Monthly kebele meetings. • Ad-hoc PAP consultations.	• Project Proponent. • CLO. • Woreda Officials.	• Signed RAP agreements. • GRM manual. • Disclosure reports.	• 100% PAPs consulted. • GRM operational within 30 days.	• 500,000 (CLO salary). • 500,000 (meetings/logistics).
Construction (Active phase)	• Weekly leader meetings. • Monthly community forums. • GRM operation. • Contractor compliance checks. • Targeted	• Weekly: Contractor updates. • Monthly: Public meetings.	• Contractor • CLO. • ES Team.	• Grievance logs. • Meeting minutes. • Local hire reports.	• 90% grievances resolved in 30 days. • 40% local hires from PAPs.	• 2,000,000 (GRM operation). • 300,000 (surveys).

	mitigation consultations.					
Operation (Post-construction)	• Quarterly reviews. • Annual public forums. • GRM continuity. • Satisfaction surveys.	• Quarterly: Stakeholder reviews. • Annual: Disclosure.	• Airport Management. • CLO.	• Impact reports. • Survey results. • Adaptive plans.	• 80% community satisfaction. • Zero unresolved grievances.	• 600,000/year (forums/surveys).

Table 7-6: Proposed Consultation Strategy

Project Stage	Topic of Consultation	Method Used	Timetable / Location	Target Stakeholders	Responsibility
Pre-Construction	Finalize RAP and LRP consultations; Establish GRM; Awareness campaigns	Community meetings; Focus group discussions; Public notices	Ongoing until construction; Community venues	PAPs, vulnerable groups, local communities	Project Proponent, CLO, ESIA Team, Local Admins
Construction	Construction updates; GRM operation; Workforce conduct; Contractor compliance	Weekly/bi-weekly meetings; Monthly community meetings; Contractor engagement sessions	Throughout construction; Local community centers	Local leaders, communities, contractors	CLO, Contractors, Project Proponent, Local Admins
Construction	Targeted concerns of vulnerable groups	Focus group discussions; Individual meetings	As needed during construction; Community venues	Women, youth, elderly, persons with disabilities	CLO, Social Experts
Construction	Livelihood Restoration Program implementation and feedback	Consultations; Surveys	Continuous during construction; Field visits	PAPs, local communities	CLO, ESIA Team, Project Proponent
Operational	Project milestones; Environmental monitoring results	Public forums; Radio announcements; Bulletin boards	Quarterly meetings; Annual	Community representatives, general public	CLO, Project Proponent

			forums; Local venues		
Operational	GRM continuous operation and feedback assessment	Suggestion boxes; Surveys; Feedback sessions	Continuous; Community venues	All stakeholders	CLO, Project Proponent
Operational	Monitoring and evaluation of stakeholder satisfaction	Surveys; Interviews	Periodic; Community locations	Communities, vulnerable groups	ESIA Team, CLO
Throughout Project	Contractor adherence to social and environmental commitments	Coordination meetings between proponent, CLO, contractors	Regular intervals during construction	Contractors, project management	Project Proponent, CLO, Contractors

8. IMPACT ANALYSIS

8.1. Scope of Impact Coverage

The Environmental and Social Impact Assessment for the construction and operation of the proposed Bishoftu International Airport considers a comprehensive range of socio-environmental impacts. The key areas of impact assessment include:

- **Project Lifecycle Coverage:** The assessment encompasses all phases of the project cycle, including construction and operation
- **Comprehensive Infrastructure and Activity Analysis:** All components of the airport infrastructure, as well as associated activities—whether directly funded by the project or undertaken by third parties on which the project depends—are included in the assessment.
- **Environmental, Social, and Economic Considerations:** The assessment evaluates potential impacts on the physical and natural environment, as well as social, economic, and cultural aspects. This includes potential effects on the health and safety of local communities and project workers.
- **Assessment of Both Positive and Negative Impacts:** The study not only identifies adverse environmental and social effects but also highlights potential benefits. Measures to enhance positive impacts and mitigation strategies for adverse effects are proposed.

Impact analysis is conducted in the context of baseline environmental data, an appropriate description of the proposed project, and anticipated changes both positive and negative resulting from project implementation. A detailed description of the baseline environment and the project components is provided in the preceding chapters.

8.2. Project Impact Zone

The direct impact zone for the Environmental and Social Impact Assessment (ESIA) of the proposed Bishoftu International Airport covers both the construction and operational phases of the airport and associated infrastructure. This impact zone includes the areas directly affected by the construction activities, such as the airport site, runways, terminals, parking areas, and

associated infrastructure (e.g., roads, drainage systems). It also encompasses the operational phase impacts, including air traffic, noise pollution, water consumption, waste management, and emissions associated with airport operations. Additionally, the surrounding areas that may experience secondary impacts due to increased air traffic, infrastructure development, and population growth in the region are included in the impact zone.

The project area extends beyond the airport boundary, covering surrounding environmental and socio-economic components that could be affected by the airport's construction and ongoing operations. This includes areas that might be impacted by the development of transport networks connecting the airport, such as roads, railways, and utilities. It also covers sensitive environmental receptors, such as nearby water sources, land use activities, and community infrastructure.

Direct Impact Zone

1. Airport Site – The physical boundaries of the proposed airport, including runways, terminals, parking lots, cargo handling areas, and service zones.
2. Construction Sites – Areas allocated for temporary facilities, material storage, and worker accommodations.
3. Transport Networks – Roads, railways, and related infrastructure that will be developed or expanded to support airport connectivity.
4. Water Resources – Rivers, lakes, and groundwater sources that may be affected by drainage, pollution, and water consumption during airport operation.
5. Surrounding Communities – Residential, commercial, and industrial areas adjacent to the airport that may experience noise pollution, air quality degradation, and economic shifts.
6. Industrial and Economic Zones – Areas designated for airport-related businesses and industries that could emerge as part of the development process.

Indirect Impact Zone

7. Biodiversity and Ecosystem Areas – Surrounding natural habitats, wildlife migration corridors, and vegetation zones that could be disturbed by noise, pollution, or land conversion.
8. Agricultural Land – Farms near the airport that may face land use changes, dust pollution, and water resource competition.

9. Cultural and Religious Sites – Churches, mosques, and cemeteries that could be physically affected or experience restricted access due to project activities.
10. Public and Social Infrastructure – Health centers, schools, and water supply systems that might require adaptation to new environmental conditions.
11. Air Quality Impact Zone – Areas surrounding the airport that will experience higher emissions from aircraft operations, transport traffic, and industrial activities.
12. Noise Impact Zone – Zones that will experience elevated noise levels, particularly residential areas under flight paths.
13. Climate and Weather Impacts – The broader impact on local microclimate, including potential changes in temperature, humidity, and precipitation patterns due to urban heat island effects.

Based on initial assessments and site visits, the following environmental sensitive receptors within the impact zone have been identified:

❖ Surface Water Bodies and Drainage Systems

- Akaki/Gerbi River & Dukem River: These rivers are within the project's influence area and could be impacted by wastewater discharge, soil erosion, siltation, and potential chemical contamination.
- Seasonal and Dry Streams (e.g., Ululo Sera & Ululo Birke): These streams are essential for local hydrology and could be impacted by runoff and sedimentation from construction activities.

❖ Wetlands and Riverine Ecosystems

- Riverine forests along the Akaki and Dukem rivers are likely to be impacted by vegetation removal and potential habitat loss.

❖ Acacia-Commiphora Woodland Ecosystem

- The project site is part of a semi-arid woodland ecosystem, which has already been degraded by agricultural expansion. The remaining natural vegetation, including Acacia and Ficus species, may be at risk.
- Potential loss of trees and habitat fragmentation could affect biodiversity.

❖ Biodiversity and Wildlife Habitat

- Although no officially protected areas or IUCN Red List species have been identified, localized biodiversity (such as birds and small mammals) may be impacted.

❖ Groundwater Resources

- The project's high water demand for operations could deplete groundwater resources over time.
- Potential for groundwater contamination from hazardous materials, fuel storage, and wastewater discharge.

❖ Soil and Agricultural Land

- Black cotton soil and sandy loam areas are susceptible to erosion, compaction, and degradation from construction activities.
- Loss of fertile agricultural land will affect local farmers and ecosystems.

❖ Human and Cultural Receptors

- Local Communities: Several kebeles (Abu Achiro, Abu Garbi, Abu Luguna, Abu Serkema, Ammuye Sera, Abu Loyya, Dera shoki, and Kombolcha) are within the impact zone.
- Schools and Health Institutions: may require relocation and also will experience dust, noise, and air pollution from construction activities.
- Grave Sites and Cultural Heritage: Graves and religious sites within the project area may require relocation, leading to potential cultural and social impacts.

The locations of these environmental sensitive receptors are illustrated in the accompanying impact coverage maps. These maps highlight the proximity of the airport to these sensitive areas, providing a visual representation of potential impacts on various receptors.

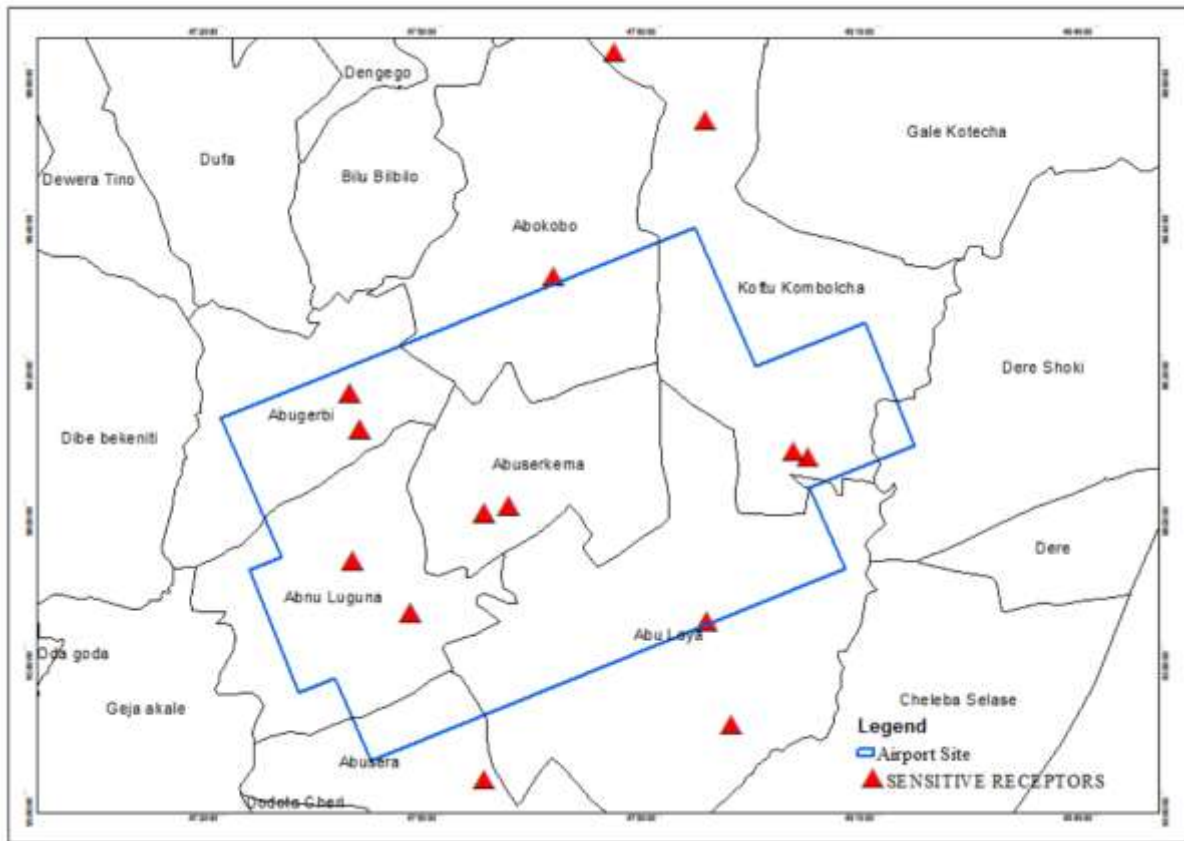


Figure 8-1: Environmental Sensitive Receptors (schools, health centers, church and other critical public services)

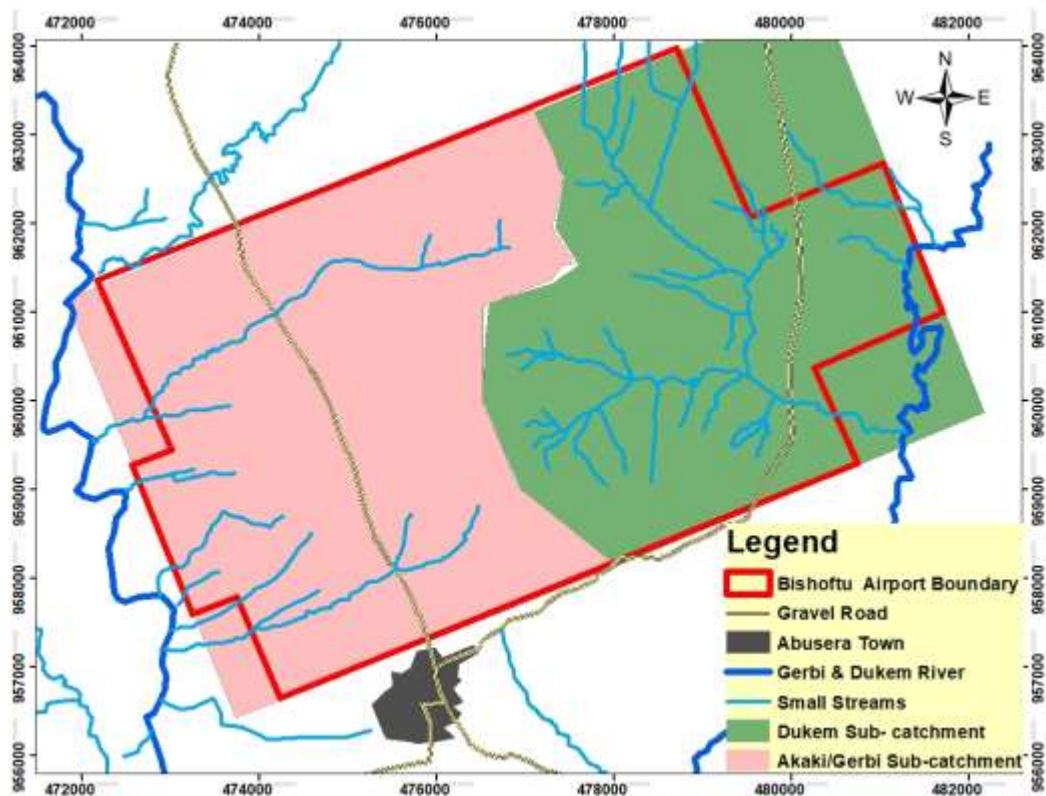


Figure 8-2: Map of Environmental Sensitive Receptors (Water bodies)

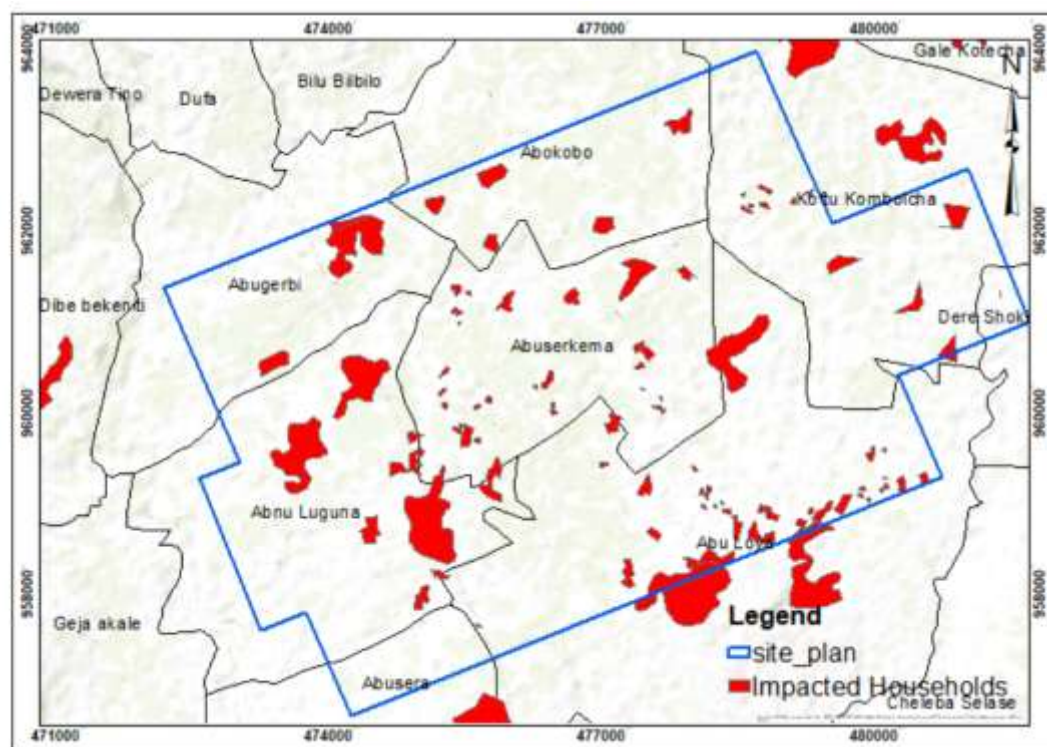


Figure 8-3: Environmental Sensitive Receptors (Settlements)

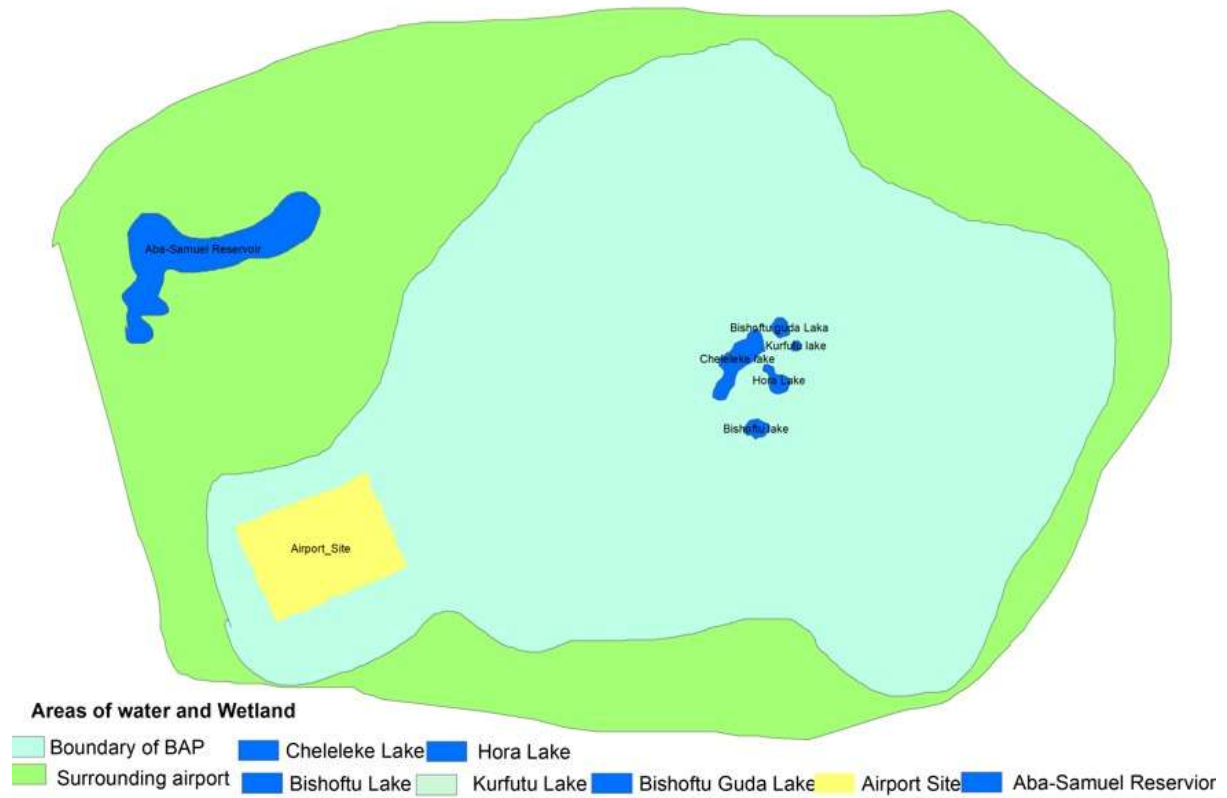
Mapping Water Bird Seasonal Migration for Food and Breeding across Lakes, Reservoir & Wetlands

Figure 8-4: Environmental Sensitive Receptors (migratory bird site)

8.3. Impact Characterization

Potential impacts of the proposed Bishoftu International Airport are categorized by type of impact, magnitude of impact, duration of impact and scope of impact as indicated in Table 8.1 below. The prediction and evaluation of identified potential impacts are presented in Tables 8-2 below.

Impact significances of each identified impacts was decided by experts judgment based on past experience, field observation and outcome of consultation with stakeholders and PAPs. Key experts involved in the impact assessment were assigned impact significance for each impact separately and finally each rating of experts combined into one significance rating (none, low, medium or high) for each impact. When there was difference among each professional's rating, the average of the three experts' judgment was taken as a final rate.

Table 8-1: Categorization of impact type, magnitude, duration and scope

S.N.	Terminology	Definition of Terminology
1	Type of Impact	
1.1	Positive Impacts	Useful/Beneficial Impacts
1.2	Negative Impacts	Harmful/Adverse Impacts
2	Duration of Impacts	
2.1	Short term	Impacts that are predicted to last only for a limited period (e.g. noise during the period of a certain construction activity that will occur only during a month period), but will cease either on completion of the activity or soon afterwards.
2.2	Medium term	Impacts that are predicted to last for a longer time period. Examples include impacts occurring during a period of extended construction activities which may occur over 2 or 3 years.
2.3	Long term	Impacts that are predicted to continue over an extended period, (e.g. noise from operation of a development, impacts from operational discharges or emissions). These include impacts that may be intermittent or repeated rather than continuous if they occur over an extended time period
3	Extent of Impacts	

S.N.	Terminology	Definition of Terminology
3.1	Local	Impacts that affect receptors in areas close to the source of impact, for example within a ‘radius’ of 5 km from a Project boundary.
3.2	Regional	Impacts that affect receptors beyond the defined local level, but are not experienced at the national level.
3.3	National	Impacts that affect receptors at a national scale.
3.4	Trans boundary	Impacts that affect receptors, beyond the boundaries of the country in which the project is located.
4	Reversibility	
4.1	Irreversible	Impacts that cause a permanent change in the affected receptor.
4.2	Reversible	Restoration of the pre-impact status of a receptor as a result of mitigation/ reinstatement measures and/or natural recovery. The time periods over which impacts may reverse link to the duration over which an impact is experienced
5	Significance of Impact	
5.1	None	No Impact
5.2	Low	Limited impacts which are: Extent: local Duration: short term Reversibility: reversible
5.3	Moderate	Noticeable impacts which are: Extent: regional Duration: medium term Reversibility: reversible
5.4	High	Prominent impacts which are: Extent: national or trans boundary Duration: long term Reversibility: irreversible

Table 8-2: Prediction and Evaluation of Potential Impacts of Bishoftu International Airport

No	Identified Potential Impacts	Impact Characterization											Impact Evaluation									
		Type of Impact		Reversibility		Extent of Impact				Duration of Impact			Impact significance without Mitigation/Enhancement Measures					Impact Significance After Mitigation// Enhancement Measures				
		Positive	Negative	Reversible	Irreversible	Local	Regional	National	Trans boundary	Short term	Medium term	Long term	None	Low	Medium	High	Very High	None	Low	Medium	High	Very High
		Impacts during Mobilization Phase																				
1	Job creation																					
2	Soil compaction																					
3	Air pollution from dust emissions																					
4	Noise pollution																					
5	Pollution of surface Water																					
6	Land Acquisition and Displacement																					
7	Loss of livelihood																					
8	Cultural and Social Disruption																					
9	Impact on Social Infrastructure																					
10	Traffic congestion																					
11	Traffic Accident																					
12	Impact on flora and fauna																					
13	Health and Safety Issues																					
14	HIV/AIDS																					
15	GBV/SA																					
16	High Water and Energy Demand																					
17	Conflict and Grievances																					

Impacts during Construction Phase																					
1	Job creation																				
2	Skill transfer to local workers																				
3	Indirect job opportunities for coffee and tea venders																				
4	Soil compaction																				
5	Air pollution from dust emissions																				
6	Noise pollution																				
7	Solid Waste generation																				
8	Pollution of surface water																				
9	Pollution of ground water																				
10	Traffic congestion																				
11	Traffic accidents																				
12	Impacts on flora																				
13	Impact on fauna																				
14	Occupational Health and safety of workers																				
15	Conflict on employment opportunity																				
16	Cultural conflict																				
17	Impact on vulnerable people																				
18	HIV/AIDS																				
19	GBV/SA																				
20	Risk of Child Labor																				
21	Landscape and Visual Intrusion																				
Impacts during Operation Phase																					
1	Job creation due to airport operation																				

[illegible]

8.4. Positive Impacts and Enhancement Measures

The impact analysis presented in section 8.3 above identified several positive impacts of the proposed Bishoftu International Airport. The positive impacts have been ranked as Low, Medium and High depending on their anticipated impacts during the mobilization, construction and operation phases. While some benefits, such as temporary job creation, will be realized during the early phases, the majority of positive impacts will emerge during the operation phase of the airport. The identified impacts are briefly described in the sections below.

8.4.1. Job Creation

One of the most significant benefits of the Bishoftu International Airport is the large-scale job creation that will result from its construction, operation, and associated economic activities. The construction and operational phases of the airport will generate thousands of direct and indirect employment opportunities, catering to different skill levels.

1. Short-term Jobs (Mobilization and Construction Phase)

- The construction phase will require a large workforce, including civil engineers, electricians, mechanics, safety officers, security personnel, and general laborers.
- The demand for construction materials will also create jobs in sectors such as cement production, metal fabrication, and transportation.
- Additional indirect jobs will be created for suppliers of construction equipment, logistics companies, and food service providers.

2. Long-term Jobs (Operational Phase)

- Once the airport becomes operational, thousands of permanent jobs will be available in aviation services, customer support, security, cargo handling, aircraft maintenance, airport management, and retail operations.
- Employment opportunities will also expand in airline offices, immigration services, customs, and airport administration.
- The growth of airport-linked businesses, including hotels, restaurants, car rental agencies, and transportation services, will further increase job opportunities.

3. Indirect Employment Opportunities

- The airport will stimulate informal sector employment, benefiting small-scale businesses such as coffee and tea vendors, taxi operators, street food vendors, and handicraft sellers.
- Increased air travel will drive growth in hospitality, tourism, and retail sectors, creating additional job opportunities.

Enhancement Measures

In order to enhance the positive impacts on job creation, the following strategies should be implemented:

- Prioritize local employment by ensuring that job opportunities, especially low-skilled and semi-skilled roles, are given to residents of Abusera Wereda, and nearby Weredas and towns.
- Establish transparent recruitment policies to ensure equal employment opportunities for women and marginalized groups.
- Implement labor rights and fair wage policies to prevent labor exploitation and ensure a safe working environment.
- Support small businesses and vendors by allocating designated areas within and around the airport for informal traders, food vendors, and artisans.
- Encourage public-private partnerships to create more job opportunities within the Airport City, hotels, and logistics services.

8.4.2. Skill Transfer

The construction and operation of the Bishoftu International Airport will facilitate skill transfer across various industries, ensuring that local workers gain technical knowledge and expertise in aviation, construction, and logistics. The Bishoftu International Airport project will serve as a vital platform for advanced aviation training, equipping Ethiopian professionals with specialized skills in air traffic management, aircraft maintenance, and ground handling operations. The introduction of state-of-the-art aviation technologies will necessitate comprehensive training programs for air traffic controllers, aircraft maintenance crews, and airport security personnel, ensuring that they gain hands-on experience in baggage handling, passenger processing, and emergency response management. This initiative will elevate the technical competency of the local workforce, aligning them with global aviation standards and enhancing the overall efficiency of airport operations.

In addition to aviation-specific skills, the construction of runways, passenger terminals, cargo facilities, and support infrastructure will foster technology transfer in construction and engineering. Local engineers, architects, and technicians will be exposed to international best practices in infrastructure development, enabling them to acquire expertise in modern construction techniques, sustainability practices, and large-scale project management. This knowledge transfer will significantly enhance the capabilities of Ethiopia's construction sector, equipping workers with the technical proficiency needed for future large-scale infrastructure projects.

The airport's role as an air cargo hub will also drive logistics and supply chain training, introducing new management strategies that will benefit workers in warehousing, freight forwarding, and customs operations. Through specialized training programs, local logistics firms and freight operators will enhance their efficiency and competitiveness, ensuring smoother cargo handling and timely delivery of goods. This will not only improve Ethiopia's trade and export capabilities but also create more employment opportunities in the logistics sector.

Furthermore, as Bishoftu International Airport is expected to attract millions of international travelers, employees in hospitality, tourism, and retail sectors will receive specialized training in multilingual communication, customer service, and international business practices. These skills will be crucial in ensuring high service standards across hotels, restaurants, duty-free shops, and other airport-related businesses, ultimately contributing to a world-class passenger experience.

Enhancement Measures

In order to enhance the positive impacts on skill transfer, the following measures should be implemented:

- Establish an Aviation Training Center:
 - Develop an aviation academy within the Airport City to train professionals in air traffic management, aircraft maintenance, and ground handling.
 - Partner with international aviation schools to provide certification programs for Ethiopian students.
- Provide On-the-Job Training:

- Ensure that local workers receive hands-on training from international experts during the construction and operational phases.
 - Encourage apprenticeship programs where experienced professionals can mentor young graduates.
- Encourage Collaboration with Technical and Vocational Training Institutions (TVETs):
 - Strengthen partnerships with polytechnic and technical colleges in Ethiopia to align their curricula with the airport's workforce needs.
 - Offer internship programs for students in engineering, logistics, and hospitality fields.
- Implement Gender-Inclusive Training Programs:
 - Encourage women's participation in aviation-related careers, including piloting, air traffic control, and airport operations.
 - Provide specialized scholarships and skill development programs for women in technical fields.

8.4.3. Local Economic Growth and Investment

The establishment of Bishoftu International Airport will serve as a catalyst for economic growth, attracting foreign direct investment in key sectors such as aviation, logistics, hospitality, retail, and commercial real estate. With the airport positioned as Ethiopia's largest aviation hub, international businesses will find it an ideal location to set up regional offices, warehouses, and logistics centers, further boosting economic activity. The Airport City will play a crucial role in real estate development, business incubation, and hospitality growth, creating numerous employment opportunities in hotel management, tourism services, and commercial enterprises. Additionally, local businesses, including transportation services, retail shops, restaurants, and cargo handlers, will benefit significantly from the influx of international visitors, business travelers, and increased cargo shipments, further stimulating the local economy.

To maximize these economic benefits, a strategic investment promotion plan should be developed to attract multinational companies and investors to establish their presence in the Airport City and surrounding business zones. Special incentives, such as tax breaks, reduced lease rates, and streamlined business registration processes, should be introduced to encourage local entrepreneurs to participate in airport-related industries. Additionally, the government

and private sector should collaborate to create Special Economic Zones and industrial parks near the airport to further enhance trade, manufacturing, and logistics activities. By implementing these enhancement measures, the Bishoftu International Airport will become a major economic hub, driving sustainable growth and investment in Ethiopia's aviation and business sectors.

8.4.4. Improving the Aviation Capacity of the Country

Ethiopia's aviation sector is experiencing rapid growth, with Bole International Airport in Addis Ababa currently handling approximately 18.6 million passengers annually. However, this capacity is expected to be exceeded within the next few years. By 2030, passenger traffic is projected to reach 30 million, surpassing the airport's ability to efficiently accommodate the increasing demand. Given this trend, Bole International Airport will soon face significant congestion, limiting the country's ability to maintain its position as a key aviation hub in Africa.

The proposed Bishoftu International Airport is designed to address this challenge by providing a long-term solution to Ethiopia's growing aviation needs. With a design capacity of 110 million passengers, the new airport is expected to significantly expand the country's aviation infrastructure and meet demand projections through 2060 and beyond. By offering state-of-the-art facilities, additional runways, and expanded terminal capacity, Bishoftu International Airport will ensure seamless air travel, improved passenger experience, and enhanced connectivity with major international destinations.

Enhancement Measures

To fully maximize the benefits of Bishoftu International Airport and enhance Ethiopia's aviation capacity, several strategic measures should be implemented:

1. **Efficient Phased Development:** The airport's construction should follow a phased expansion plan, ensuring that each phase meets current and future passenger demands. Early implementation of critical infrastructure such as runways, terminals, cargo facilities, and navigation systems will ensure a smooth transition from Bole International Airport.
2. **Strengthening Aviation Policies and Regulations:** The government should enhance aviation policies and regulatory frameworks to support investment in airport infrastructure, streamline air traffic management, and encourage airline expansion.

Strengthening partnerships with international aviation bodies such as ICAO and IATA will also facilitate global best practices in air traffic management.

3. **Developing Multimodal Transportation Links:** To improve passenger access and reduce travel time, the airport should be integrated with expressways, light rail, and bus transit systems. Developing dedicated airport access roads and railway lines will enhance connectivity between Bishoftu International Airport, Addis Ababa, and other key cities.
4. **Adopting Smart Airport Technologies:** The integration of advanced air traffic control systems, digital passenger processing, automated baggage handling, and smart security systems will improve airport efficiency and safety. Investing in biometric screening, AI-driven air traffic management, and self-check-in kiosks will further enhance operational effectiveness.
5. **Enhancing Airline Partnerships and Routes:** The expansion of aviation capacity should be accompanied by increased international airline partnerships and the development of new long-haul routes. Encouraging Ethiopian Airlines and other carriers to expand their networks will position BIA as a leading transit hub for Africa, Europe, Asia, and the Americas.
6. **Sustainable Energy Integration:** The airport should incorporate renewable energy sources such as solar and wind power to reduce operational costs and environmental impact. Developing energy-efficient terminals, LED lighting, and sustainable waste management systems will further enhance the airport's environmental sustainability.

8.4.5. Improved Transportation and International Connectivity

The development of Bishoftu International Airport will significantly enhance both national and international connectivity, positioning Ethiopia as a leading aviation hub in Africa. By serving as an alternative international gateway, Bishoftu International Airport will help alleviate congestion at Bole International Airport, ensuring smoother and more efficient air travel operations. The new airport will provide seamless air connections for passengers, businesses, and cargo logistics, fostering trade, investment, and economic growth. Additionally, the construction of modern road and rail infrastructure linking Addis Ababa to Bishoftu International Airport will reduce travel time and transportation costs, further improving accessibility and regional mobility.

To maximize these benefits, several enhancement measures should be implemented. The development of expressways and railway connections is crucial to ensuring easy access to the

airport for both domestic and international travelers. Establishing integrated public transport solutions, including bus networks, light rail systems, and taxi services, will facilitate efficient passenger movement to and from the airport. Moreover, deploying smart traffic management systems will help minimize congestion in and around the airport, improving overall travel efficiency. By implementing these measures, Bishoftu International Airport will not only enhance Ethiopia's air transport capacity but also contribute to the country's long-term economic development.

8.4.6. Tourism Sector Development

The development of Bishoftu International Airport is expected to play a transformative role in Ethiopia's tourism sector, with annual passenger volumes projected to exceed 105 million by 2060. This significant increase in air traffic will enhance Ethiopia's accessibility as a global travel destination, attracting a larger number of international visitors. The improved connectivity provided by the airport will facilitate easier access to Ethiopia's renowned historical and cultural sites, including Lalibela's rock-hewn churches, the ancient obelisks of Axum, and the scenic Rift Valley Lakes. As a result, tourism-related businesses, such as hotels, restaurants, travel agencies, and tour operators, will experience substantial growth, creating new economic opportunities and generating employment in the hospitality industry.

To maximize the benefits of increased tourism, several enhancement measures should be implemented. A visitor information center should be established within the airport to provide travelers with essential details on local attractions, guided tours, and cultural experiences. Additionally, strategic partnerships between airlines, hotel chains, and local tour operators should be developed to create integrated travel packages, making it easier for visitors to explore Ethiopia's diverse attractions. Furthermore, targeted marketing campaigns should be launched to position Ethiopia as a leading African travel destination, leveraging digital platforms, social media, and international tourism expos to showcase the country's unique heritage, landscapes, and adventure experiences. By implementing these measures, Bishoftu International Airport can become a gateway to Ethiopia's rich cultural and natural heritage, ensuring the sustainable growth of the tourism industry while boosting the nation's economy.

8.4.7. Cargo and Logistics Hub Development

The development of Bishoftu International Airport will position Ethiopia as a global logistics hub, facilitating the handling of significant volumes of air cargo, e-commerce shipments, and

perishable goods. The increased cargo capacity will have a transformative impact on key industries such as agriculture, floriculture, and manufacturing, allowing for faster and more cost-effective transportation of goods. This efficiency will boost Ethiopia's export competitiveness, particularly in coffee, horticultural products, and textiles, by enabling timely deliveries to international markets.

To fully maximize the potential of Bishoftu International Airport as a logistics hub, several enhancement measures must be implemented. First, the development of modern cargo handling and cold storage facilities is crucial to ensure the proper management of perishable goods, reducing spoilage and maintaining product quality during transit. Additionally, the establishment of a customs-free trade zone within the airport premises will attract international freight operators and logistics companies, making Bishoftu International Airport a preferred destination for cargo operations. To further enhance efficiency, the integration of digital cargo tracking systems will streamline supply chain operations, improve inventory management, and minimize delays in freight processing. By implementing these measures, Bishoftu International Airport can emerge as a world-class cargo hub, significantly contributing to Ethiopia's economic growth and global trade presence.

8.4.8. Urban Development and Infrastructure Expansion

The development of Bishoftu International Airport will serve as a catalyst for urban expansion and significantly improve the local infrastructure in Bishoftu and surrounding towns. As a large-scale infrastructure project, the airport will stimulate economic activities, leading to the growth of new residential, commercial, and industrial developments. The demand for improved transportation networks, real estate, and public utilities will result in long-term infrastructure upgrades, transforming the region into a modern, well-connected urban center.

One of the most significant impacts will be the enhancement of road and rail connectivity, which will facilitate efficient movement of people and goods. The planned highway and railway links connecting Bishoftu International Airport to Addis Ababa and other key economic hubs will improve regional mobility and unlock economic opportunities for nearby towns. These transportation improvements will reduce travel time, lower logistics costs, and support the expansion of trade, tourism, and industrial activities. Additionally, improved public transport options such as airport shuttles, light rail extensions, and express bus services will

provide seamless connectivity for passengers and airport employees, further enhancing accessibility.

Another critical impact of the airport's development is the growth of the real estate sector. The demand for hotels, business centers, office spaces, and residential developments will increase as businesses and investors seek to establish a presence near the airport. This will stimulate the construction industry, creating job opportunities for engineers, architects, real estate developers, and construction workers. The emergence of an Airport City, featuring mixed-use developments such as shopping malls, corporate offices, and entertainment centers, will further drive urbanization, making Bishoftu a more attractive destination for both businesses and residents.

The expansion of utility services will be another major benefit of the airport's development. To support the large-scale operations of Bishoftu International Airport, infrastructure for water supply, electricity, and sanitation will need to be upgraded. These improvements will not only enhance the efficiency of airport operations but also benefit local communities by providing them with better access to clean water, reliable electricity, and modern sanitation facilities. Additionally, investment in renewable energy sources, such as solar and wind power, can contribute to the sustainability of the airport and reduce its environmental footprint.

Enhancement Measures

To maximize the positive impacts of urban expansion and infrastructure development while mitigating potential challenges, the following enhancement measures should be implemented:

- **Sustainable Urban Planning:** Careful urban planning should be undertaken to prevent uncontrolled urban sprawl and ensure that development is orderly, well-coordinated, and environmentally sustainable. This includes zoning regulations, green space preservation, and the integration of public transport networks into urban design.
- **Affordable Housing Initiatives:** With the expected influx of workers and businesses, it is essential to develop affordable housing options for airport employees, local residents, and low-income groups. Housing projects should be designed to accommodate various income levels, preventing displacement and ensuring that communities can benefit from the economic growth brought by the airport.

- **Investment in Waste Management and Water Conservation:** The increased population and commercial activities in the airport region will lead to higher waste generation and water consumption. To mitigate environmental impacts, efficient waste management systems should be put in place, including recycling programs, proper waste disposal facilities, and sustainable water conservation measures. Additionally, the use of treated wastewater for irrigation and landscaping can reduce the strain on the local water supply.

8.4.9. Improved Passenger Experience and Smart Airport Technologies

Bishoftu International Airport is designed to be a state-of-the-art smart airport, incorporating cutting-edge technologies to enhance passenger experience, operational efficiency, and sustainability. With the growing demand for seamless travel, Bishoftu International Airport aims to integrate advanced digital solutions, automation, and AI-driven systems to optimize airport functions and provide a world-class travel experience. These innovations will ensure faster check-ins, efficient baggage handling, reduced wait times, and enhanced security protocols, making BIA a benchmark for modern airports in Africa.

One of the key technological advancements at Bishoftu International Airport is the Automated People Mover (APM) system. This system is designed to provide seamless connectivity between terminals, allowing passengers to transfer quickly and comfortably between different sections of the airport. The APM will minimize walking distances, reduce congestion, and enhance passenger mobility, ensuring an efficient and stress-free travel experience, particularly for those on tight layovers or international transfers.

In addition, Bishoftu International Airport will feature self-service technologies to streamline passenger processing. These include automated check-in kiosks, facial recognition for security clearance, biometric boarding gates, and mobile-based ticketing services. By reducing the reliance on manual processes, these technologies will significantly shorten waiting times at immigration, security checkpoints, and boarding gates, offering passengers a fast and convenient airport journey. The integration of AI-powered passenger flow management systems will further enhance operational efficiency by predicting peak traffic times, optimizing staffing levels, and reducing delays.

Furthermore, the airport will incorporate smart cargo handling technologies, ensuring that logistics and freight operations are fast, secure, and cost-efficient. The implementation of AI-powered cargo tracking and automated warehousing systems will enable real-time inventory management, reduce cargo handling errors, and improve overall logistics coordination. These advancements will position Bishoftu International Airport as a key cargo hub for East Africa, attracting major global logistics companies and boosting Ethiopia's export competitiveness.

To maximize the benefits of these smart airport technologies, several enhancement measures will be implemented. First, the airport will integrate Artificial Intelligence (AI) and Big Data analytics for intelligent airport management, allowing predictive maintenance, efficient resource allocation, and real-time decision-making for air traffic controllers, security teams, and ground staff. Additionally, high-speed digital connectivity, including Wi-Fi and 5G networks, will be made available throughout the airport, enabling passengers and businesses to stay connected at all times. Lastly, Bishoftu International Airport will ensure strict compliance with international aviation safety, cybersecurity, and sustainability standards, aligning with global best practices to maintain secure and environmentally responsible airport operations.

8.4.10. Renewable Energy Integration

The development of Bishoftu International Airport presents a significant opportunity to integrate renewable energy solutions, positioning the airport as a model for sustainable aviation infrastructure. Given the global shift toward green energy and carbon neutrality, incorporating solar, wind, and other renewable energy sources will not only reduce the airport's environmental footprint but also enhance its long-term operational efficiency and cost-effectiveness. The large-scale nature of the airport, with its expansive rooftops, terminal buildings, runways, and surrounding infrastructure, provides ample space to deploy renewable energy systems.

One of the most notable advantages of renewable energy integration is the reduction in the airport's dependence on fossil fuels, leading to lower carbon emissions and decreased energy costs. Airports are traditionally energy-intensive facilities, with continuous demand for lighting, heating, cooling, air traffic control systems, baggage handling, and passenger processing. By harnessing solar and wind energy, Bishoftu International Airport can significantly reduce its reliance on conventional power grids, ensuring a stable and self-

sufficient energy supply. This shift toward clean energy aligns with Ethiopia's broader sustainability goals and its commitment to reducing greenhouse gas emissions.

To maximize the benefits of renewable energy, the airport must adopt several enhancement measures to ensure efficient energy utilization and long-term sustainability. One of the key strategies is the installation of solar panels on the rooftops of terminal buildings, hangars, and other airport structures to generate clean and renewable electricity. The vast open spaces around the airport can also be utilized for large-scale solar farms, providing additional power to support airport operations. In addition to solar power, the integration of wind turbines in strategically selected locations will contribute to the airport's overall energy mix.

Beyond electricity generation, the airport should also focus on energy-efficient infrastructure and operational practices. Implementing LED lighting systems, smart heating, ventilation, and air conditioning (HVAC) technologies, and motion-activated sensors can significantly reduce energy consumption within the passenger terminals, cargo facilities, and control towers. The use of insulated building materials and passive cooling systems will further enhance energy efficiency while maintaining comfortable indoor environments for passengers and staff.

Another crucial aspect of sustainable airport management is the adoption of waste-to-energy initiatives. Airports generate substantial amounts of organic and inorganic waste, including food scraps, packaging materials, and industrial waste from aircraft maintenance activities. By developing waste-to-energy conversion projects, the airport can transform waste into bioenergy or biogas, reducing landfill dependency and ensuring a sustainable waste management system. These initiatives not only promote environmental conservation but also contribute to circular economy principles, where waste is repurposed as a valuable energy source.

By integrating these renewable energy and efficiency strategies, Bishoftu International Airport can establish itself as a global benchmark for green aviation infrastructure. The implementation of solar and wind energy systems, energy-efficient technologies, and waste-to-energy projects will ensure the airport operates in a sustainable, cost-effective, and environmentally responsible manner. These efforts will not only enhance operational resilience but also contribute to Ethiopia's long-term vision of sustainable development and climate action.

8.5. Assessment of Potential Negative Impacts and Mitigation Measures

A checklist has been used for the identification and assessment of potential negative impacts of the proposed project in terms of spatial extent, duration and level of significance, probability of occurrence, reversibility and adversity during the mobilization, construction and operation phases of the project. The assessment is made against each impact on physical elements that include water bodies (surface and ground), soils, ambient air and flora as well as the human or socio-economic elements that include the socio-economy, health, and safety, noise and vibration, traffic accidents referring to the impacts on the overall wellbeing. These impacts and their proposed mitigation measures are presented below:

8.5.1. Adverse Impacts during Mobilization Phase

8.5.1.1. Land Acquisition and Displacement

The Bishoftu International Airport project will require the acquisition of 3979 hectares of land, encompassing seven administrative kebeles in the Abusera District, Dukem Sub-City, Oromia National Regional State (table 8.3 and Figure 8.5). This large-scale land acquisition will lead to the displacement of 2731 households, affecting a total of 15320 individuals. Among these households, 9% are female-headed, highlighting the potential social and economic challenges associated with resettlement.

Table 8-3: Land requirement for the airport project

No	Kebele	Area (Ha)	Share (%)
1	Abu Achiro	415.2	11.79%
2	Abu Garbi	359.01	10.20%
3	Abu Luguna	760.79	21.61%
4	Abu Serkema	737.76	20.96%
5	Ammuye Sera	108	3.07%
6	Abu Loyya	942.24	26.76%
7	Kombolcha	624.1	17.73%
8	Dere Shoki	32.65	0.93%
	Total	3979.75	100%

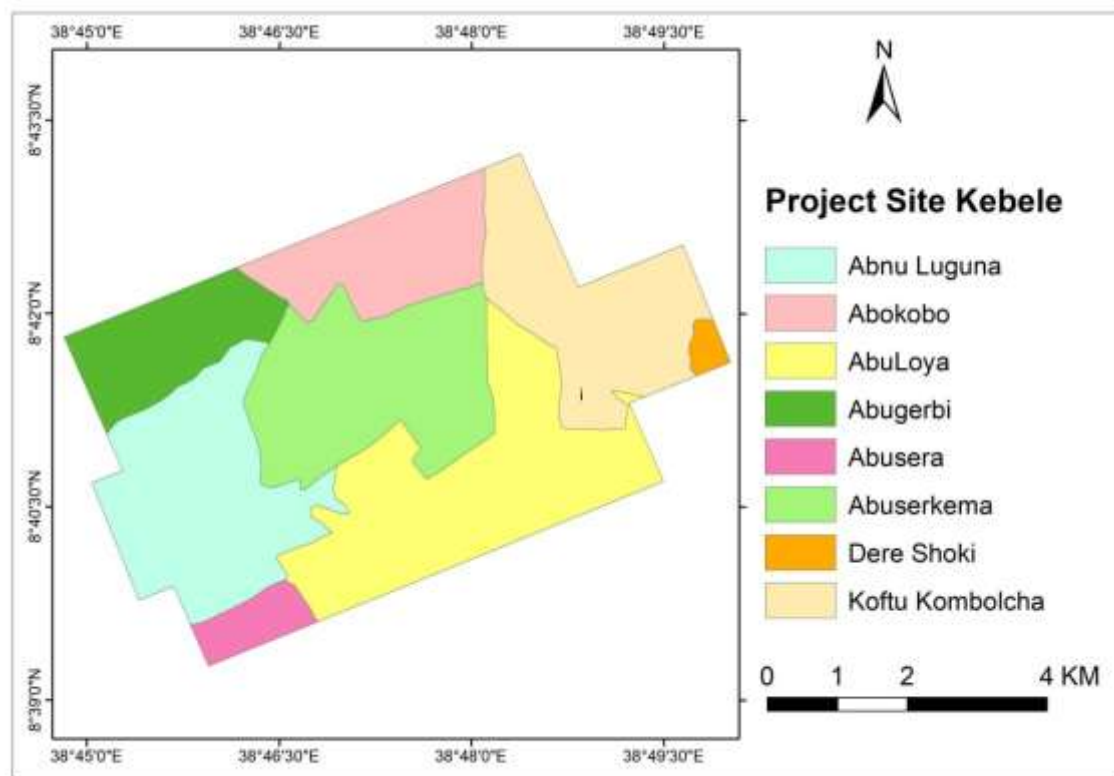


Figure 8-5: Impacted Kebeles

Of the displaced households, 2215 possess legal land ownership certificates, ensuring their formal recognition as landholders. In contrast, 516 households are landless and reside on family-owned land without official titles, making their compensation and resettlement process more complex.

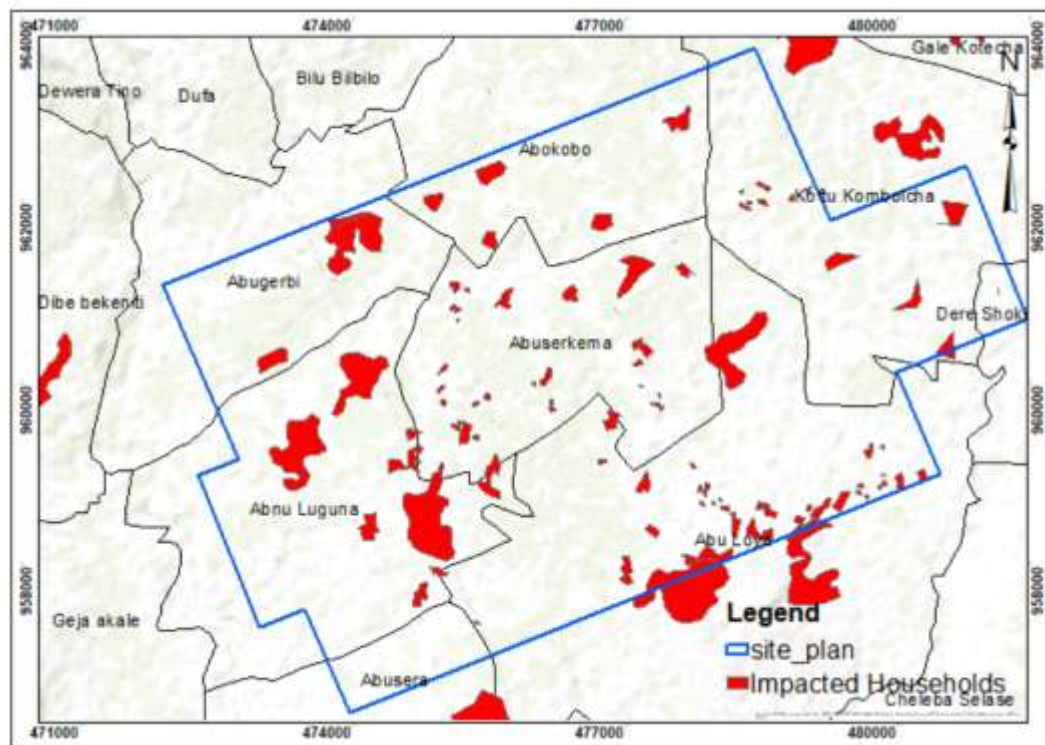


Figure 8-6: Impacted Households

The project's key impacts include the loss of agricultural land, residential displacement, and the reduction of grazing land. Approximately 2,518.6 hectares, accounting for 80.3% of the total landholdings, will be expropriated, directly affecting agricultural production, particularly staple crops such as teff, wheat, barley, chickpea, and lentils. Additionally, all 2,211 households will lose their residential land, amounting to 272.74 hectares or 8.7% of the total landholdings. Furthermore, 163.1 hectares (5.2%) of grazing land, crucial for livestock sustenance, will also be impacted, posing challenges for the livelihoods of affected pastoralists.

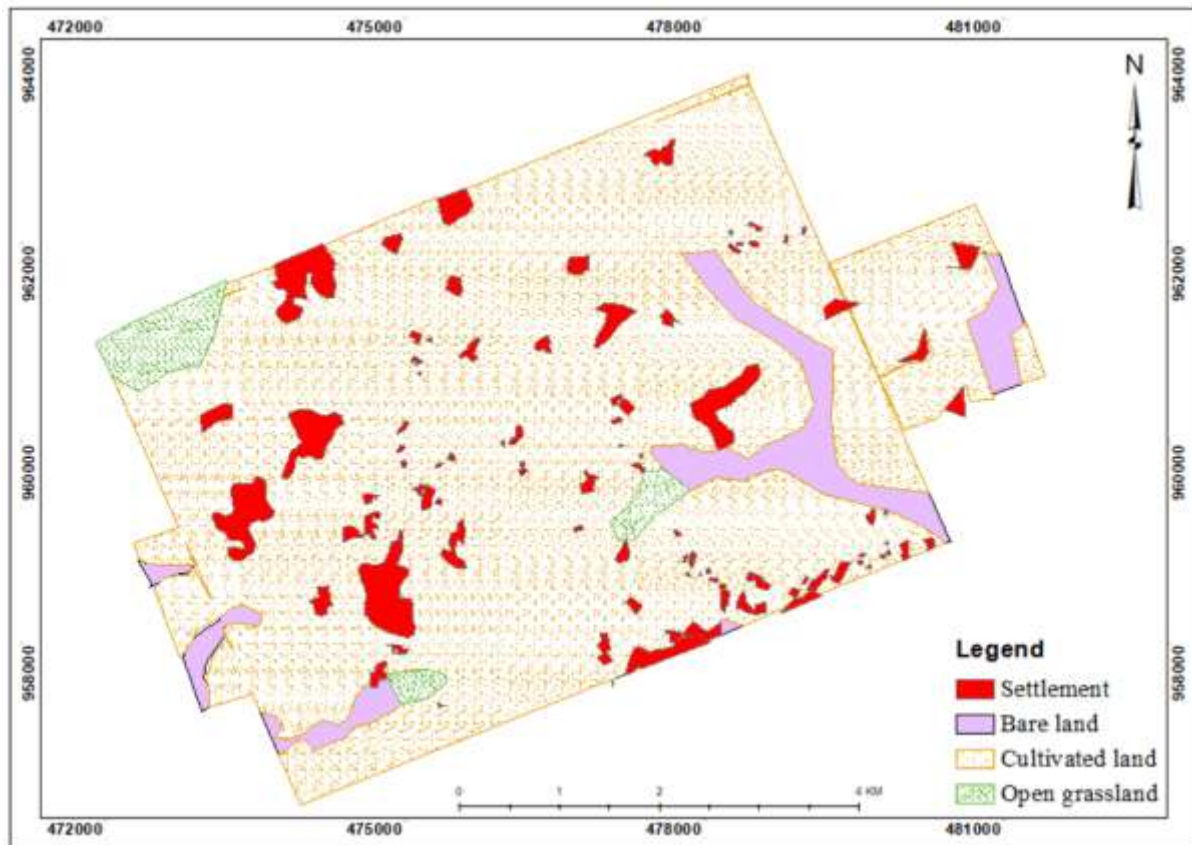


Figure 8-7: Impacted agricultural land and other land uses

Mitigation Measures:

Avoidance:

- Identify and map areas of high socio-economic and cultural sensitivity to avoid displacement wherever possible.
- Re-align project infrastructure to prevent displacement of vulnerable groups, especially female-headed households and households with elderly or disabled members.
- Avoid siting project components on productive agricultural land by exploring alternative locations with minimal socio-economic impact.

2. Minimization:

- Where total avoidance is not possible, minimize the extent of land acquisition and displacement by optimizing the project footprint and using available public or degraded land.
- Phase land acquisition in coordination with construction timelines to reduce the disruption period for affected households.

- Prioritize in-situ resettlement within the same community to maintain social networks and livelihoods.

3. Restoration (Rehabilitation):

- Develop a comprehensive Resettlement Action Plan (RAP) in compliance with Ethiopian Proclamation No. 1161/2019 and AfDB OS 5. to ensure timely and adequate livelihood and income restoration.
- Ensure land-for-land compensation where feasible, prioritizing the substitution of agricultural land with land of equivalent productivity.
- Facilitate access to agricultural inputs, extension services, and vocational training to help restore and improve the income sources of displaced households.
- Restore public services and infrastructure (e.g., schools, roads, water points) at resettlement sites to equal or better conditions than pre-displacement.

4. Compensation/Offset:

- Where land-for-land compensation is not feasible, provide monetary compensation at full replacement cost, equivalent to 15 years of lost agricultural income.
- Compensate fully for all lost assets, including houses, crops, trees, and other improvements, with no deduction for depreciation.
- Provide displacement compensation for temporary or permanent income loss related to land acquisition.
- Ensure gender-sensitive compensation mechanisms to protect vulnerable groups, particularly female-headed households, from economic hardship and marginalization.
- Establish a transparent Grievance Redress Mechanism (GRM) to resolve disputes related to valuation, compensation, and resettlement, involving local elders, kebele officials, and legal experts.
- Conduct informed consultations with all affected persons to identify preferred resettlement sites (e.g., near Abusera town) and ensure community acceptance.

8.5.1.2. Loss of Livelihoods

The displacement caused by the Bishoftu International Airport project will significantly disrupt the primary livelihoods of affected households, which are predominantly dependent on agriculture, including both crop cultivation and livestock rearing. With the expropriation of large tracts of farmland and grazing areas, the economic stability of these communities will be severely impacted.

One of the most critical consequences is the loss of crop production, as the displacement will result in the expropriation of 2,518.6 hectares of cropland, directly affecting 91.7% of households that rely on farming as their main source of income. The removal of these productive lands will not only diminish household earnings but also reduce local food supply, exacerbating food insecurity in the region.

Additionally, livestock-dependent households will face significant economic losses due to the disappearance of grazing land. The displacement will impact an estimated 31,432 cattle, 7764 goats and sheep, 2,102 equines, 63,179 poultry, and 1,225 beehives. The loss of pastureland will lead to higher feed costs, declining livestock productivity, and potential distress sales, further destabilizing the income of affected families.

Beyond agriculture, off-farm income sources will also suffer disruptions. Many households engage in petty trade, handicrafts, and daily labor to supplement their agricultural earnings. The displacement will interrupt these economic activities, resulting in an estimated annual income loss of ETB 92,875, 911 for affected households. This financial shock will have widespread implications, potentially increasing poverty levels and reducing overall economic resilience within the displaced communities.

Mitigation Measures

1. Avoidance and Minimization

- Project planning has sought to minimize physical and economic displacement by aligning infrastructure layouts to avoid densely populated or highly productive agricultural areas.
- Engagement with communities during project siting ensured early identification of vulnerable groups and sensitive livelihood zones to minimize disruption.

2. Restoration Measures

These measures aim to restore the livelihoods of affected persons to pre-displacement levels or better:

- **Livelihood Restoration Programs:**
 - Establish irrigated fruit and vegetable farms, dairy farms, and cattle fattening programs to restore and replace lost agricultural income.
 - Support agro-processing activities such as milk processing, poultry feed production, and garment manufacturing to create local value chains.
 - Facilitate community participation in trade and transport-related activities linked to the airport economy.
 - Facilitate access to microfinance services to help households restart or expand income-generating activities.
- **Agricultural Support for Relocated Farmers:**
 - Provide high-quality seeds, tools, and fertilizers to ensure sustained agricultural productivity.
 - Deliver training on climate-smart and modern farming techniques to enhance production efficiency on new or smaller landholdings.
- **Vocational Training and Employment Linkages:**
 - Provide targeted skills development in construction, agro-processing, and airport-related service sector jobs.
 - Prioritize project-affected persons for job opportunities during airport construction and operations (e.g., laborers, drivers, cleaners, maintenance, logistics).
 - Collaborate with Ethiopian Airlines and other partners to connect local youth with training, apprenticeships, and job placement programs.

3. Compensation and Offset

- **Temporary Cash Assistance:**
 - Deliver monthly cash transfers for up to 12 months to support basic needs while livelihood alternatives are being implemented.
- **Compensation for Losses:**

- Fair and prompt compensation for land, crops, and assets will be provided according to national laws and international best practices.
- Additional support will be extended to vulnerable households (e.g., female-headed, elderly, disabled) to offset disproportionate impacts.

8.5.1.3.Cultural and Social Disruption

The project will lead to the dismantling of vital community networks, religious sites, and traditional practices of the people in the project site, significantly impacting their social and cultural fabric. One of the major consequences will be the loss of social capital, as the displacement of communities will weaken traditional mutual aid systems such as Iddir, Iqub, and the Gadaa system. These networks play a crucial role in providing financial and social support, conflict resolution, and governance, and their disruption will leave the affected communities vulnerable.

Additionally, the project will result in the destruction of several religious and cultural sites, including four Orthodox churches, five Protestant church, one Mechereyesus Church, and one Full Gospel Church, along with their associated cemeteries. These sites hold deep historical, spiritual, and communal significance for the local population, and their loss will not only affect religious practices but also disrupt generational traditions and mourning customs.



Figure 8-8: Orthodox Church within the project cite



Figure 8-9: Cemetery within the project cite

Furthermore, the project will have a profound impact on the Kereyu Oromo pastoralists, who rely on seasonal pastoralism for their livelihood. The loss of access to essential grazing lands, which are utilized annually from December to June, will threaten their traditional way of life, disrupt their livestock management systems, and potentially force them into economic hardship. Overall, the project will severely affect the social cohesion, cultural heritage, and economic stability of the Oromo people, leading to long-term socio-cultural and economic challenges.

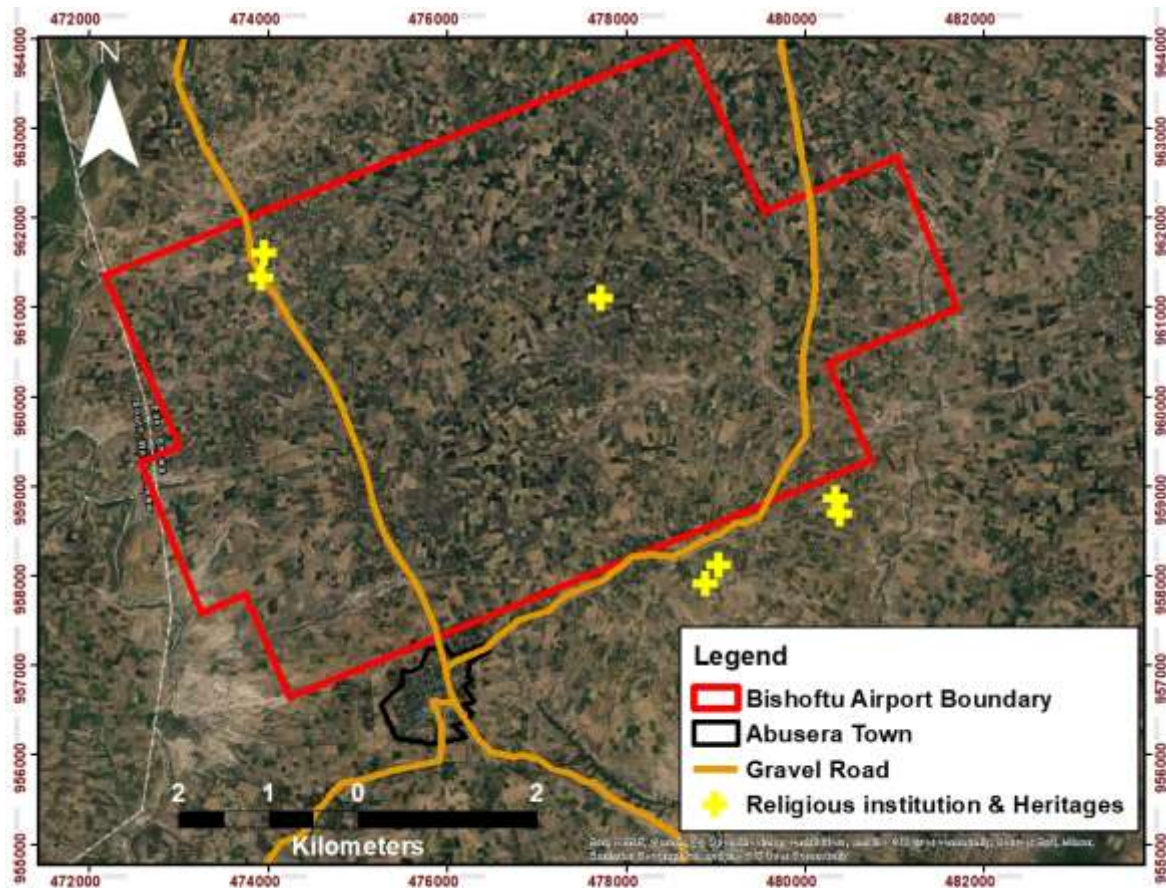


Figure 8-10: Impacted Religious Institution

Mitigation Measures:

Avoidance:

- Where feasible, reroute project infrastructure to avoid known cultural, spiritual, and communal heritage sites, including cemeteries and ritual grounds.
- Integrate cultural heritage considerations early in project planning to prevent unnecessary displacement of sacred sites and minimize disruption to community networks.

Minimization:

- In cases where avoidance is not possible, ensure minimal impact by conducting prior consultations with elders, religious leaders, and community members regarding sacred sites and cultural assets.
- Design resettlement areas to reflect the original spatial and social organization of the community, including access to communal spaces.

Restoration:

- Rebuild affected religious institutions and culturally significant structures within or near the resettlement areas in coordination with affected communities.
- Allocate suitable land for the reconstruction of cemeteries and ensure traditional rites can be performed in alignment with community practices.

Compensation/Offset:

- Group resettled households based on kinship and community ties to preserve social cohesion and traditional social support systems.
- Facilitate and support regular cultural events (e.g., Gadaa ceremonies, festivals) to promote cultural continuity and community resilience.
- Register, document, and preserve affected ritual and cultural heritage sites in accordance with Ethiopia's Proclamation on Research and Conservation of Cultural Heritage (No. 209/2000).
- Designate communal spaces in resettlement areas for cultural and religious practices to help restore and maintain social and spiritual well-being.

8.5.1.4. Impact on Social Infrastructure

The proposed land-clearing activities will have significant impacts on existing social infrastructure, including schools, churches, cemeteries, health centers, and roads. The project will result in the demolition of critical public infrastructure, further exacerbating service gaps for both displaced and surrounding communities. In the education sector, the loss of four first-cycle (grades 1–4) schools and two primary (grades 1–8) schools will directly affect 2,540 students. Healthcare services will also be disrupted, with the closure of five health posts that currently serve approximately 10,417 residents. Additionally, essential utilities will be impacted, including the disruption of 37 km of gravel roads, the demolition of two water reservoirs, and the loss of 73 piped water connections. Other key facilities affected by the project include five Farmers Training Centers (FTCs), five kebele offices, and five cooperative warehouses, further straining the social and economic stability of the affected communities.

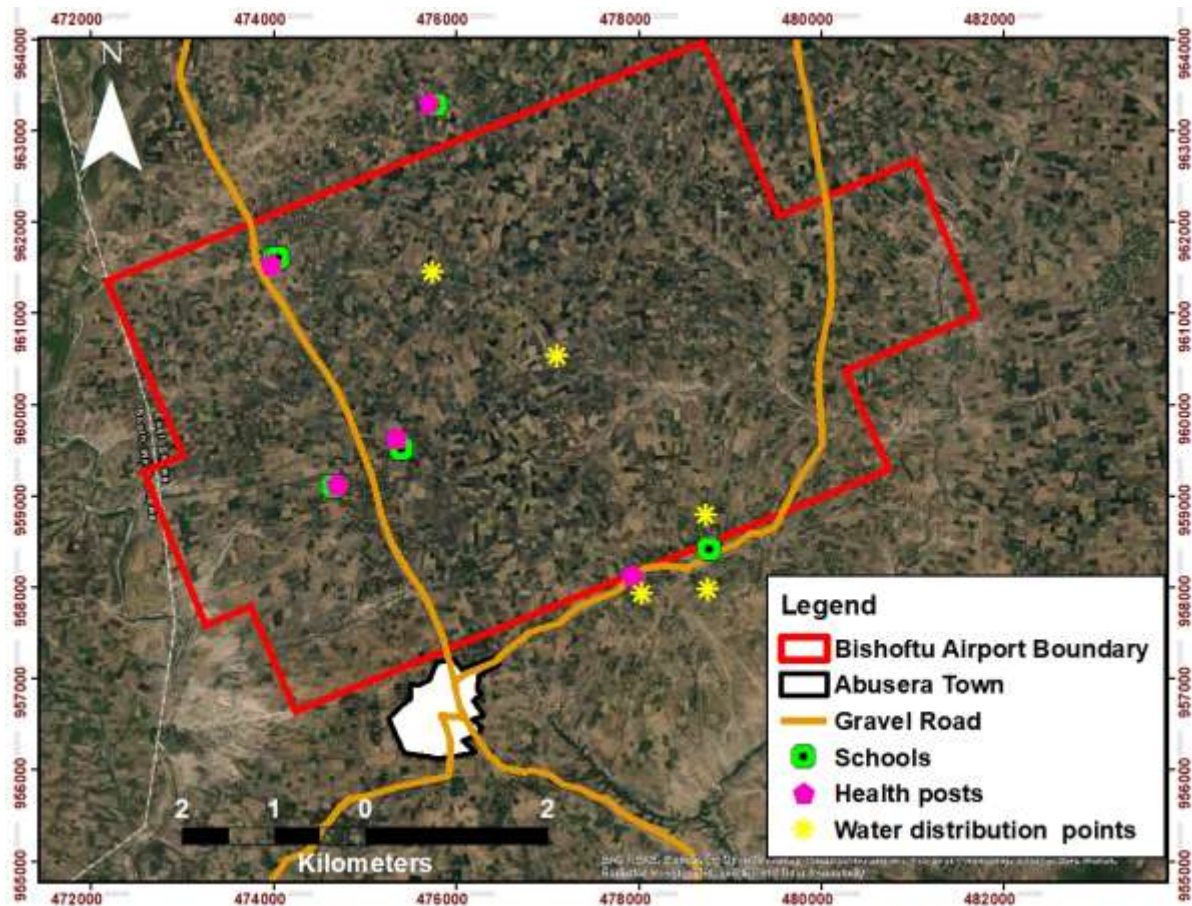


Figure 8-11: Impacted schools, healthcare facilities and other utilities

Mitigation Measures:

- Establish new schools and health posts in resettlement areas.
- Enhance road networks to connect resettlement sites with markets.
- Set up temporary learning centers to support education during the transition.
- Prioritize the construction of schools and healthcare facilities to reduce disruptions in services.
- Reassign affected government employees (106 staff) to equivalent positions in newly established facilities.
- Deploy mobile health units and temporary classrooms to ensure continuous access to essential services during the transition.

8.5.1.5. Impacts on Ambient Air Quality

During mobilization, vehicular movements along the access roads to the construction sites could cause dust emission from unpaved access roads. In addition, land clearing and excavation works during construction of storages and camp sites may cause dust emission unless managed

properly. Emissions from vehicles that transport machinery, equipment, construction materials, and workers to the construction site will occur. Dust generation could be significant if the mobilization work is going to be done during dry weather conditions. However mobilization phase impact on air quality is rated to be medium.

Mitigation measures

- Spray water on dusty and unpaved access roads and dusty working areas to suppress dust emission,
- Limit speed of vehicles to 30 km/hr when they are driven through residential areas and on unpaved roads.

8.5.1.6.Noise Pollution

During the mobilization phase, movement of construction machineries may produce high noise levels that could affect the health of people residing at nearby the project sites. The noise level set by Ethiopian standard that is 45dB for the residential area during the night and 55 dB during the day time should be maintained. Exposure for long time above these standard values may cause adverse impacts on the health of exposed people. However, the impact of noise from the mobilization activities is rated to be low given the short time required for the mobilization activities.

Mitigation measures

- Screen out noisy machineries,
- Do not mobilize noisy machineries during the rest time, particularly during the night time.
- Do not allow noise level above 45dB at night and 55dB during the day time at residential areas.

8.5.1.7.Soil Compaction and Pollution

Mobilization of machineries and movement of vehicles along the access roads and open spaces would cause soil compaction and soil erosion. Leakage and spill of oil from vehicles and machineries while mobilizing to the project site would contaminate and pollute the soil. However, the impact is rated to be low and duration of mobilization is short.

Mitigation Measures

- Use existing roads to mobilize construction machineries to the construction site;

- Do not park or drive on farm land and foot paths;
- Construct proper access road to the site;
- Reinstate access roads which are no more in use during the construction and operation phases of the project.

8.5.1.8.Surface Water Pollution

During mobilization of machinery to the project area there could be release of pollutants like fuel and oil which eventually contribute to water quality deterioration. Washing of vehicles and other equipment outside the designated area could also cause water pollution.

Mitigation measures

- Regularly maintain vehicles and prevent spill of fuel by filling fuel at only designated fuel stations,
- Use energy efficient vehicles for mobilizing machineries to the project area,
- Never wash vehicles and other machinery outside the area designated for this purpose.

8.5.1.9.Impacts on Flora and Fauna

During mobilization phase considerable impact is not anticipated to occur on flora and fauna of the project area. As there is no protected or natural habitat along the access roads and project sites, the impact of mobilization activities on flora and fauna would be low.

Mitigation measures

- Use alternative access roads which could not affect flora and fauna;
- Select storage area/camp site in areas where there is no trees and vegetation;
- Avoid unnecessary removing trees from storage areas;
- Avoid chasing out or scaring birds intentionally;

8.5.1.10. Health and Safety Issues

For an airport project, the health and safety of employees and nearby communities during mobilization, hinges on careful planning in terms of space, duration, reversibility, plus a suite of mitigation measures. There might be limited health and accident risks of various natures to the workers and other commuters in both cases caused in relation to vehicular and equipment movements, loading and unloading of materials, and dust emissions

- As part of the earlier assessment and characterization of the impacts during mobilization most of the negative impacts of a shorter to medium time which can

possibly years based on phases of execution. The impacts during mobilization are also expected to be reversible. All facilities (offices, material yards, parking) must be easily demobilizable and capable of being returned to original condition—e.g., camps dismantled, waste removed.

Mitigation Measures

Impacts during mobilization need to be properly handled by the contractor and consultant in terms of establishing secure zones - temporary fencing for camps, storage, office areas—outside airside zones and movement areas. To this effect there is a requirement of

- Clear signage and traffic control plans to prevent incursions.
- Secure parking to avoid unauthorized airside access.
- Worker training in overall safety, PPE, safe lifting, and basic protocols before site access.

8.5.1.11. Traffic Congestion and Accident

During the mobilization movement of vehicles and machineries to the project site will be expected and could cause traffic congestion and traffic accident. This impact is rated to be moderate.

Mitigation measures

- Prepare traffic management plan for the project including mobilization phase and implement it strictly;
- Aware drivers to drive carefully by respecting all the traffic laws and regulations;
- Limit speed of vehicles along access roads to 30km/h;
- Mobilize machineries during low pick hours of traffic.
- Use alternative routes or roads which are not crowded,

8.5.1.12. Gender and Gender Based Violence/SH Risks

Due to lack of awareness and understanding on gender and GBV by Contractor and also by the construction workers, female workers could face difficulties in their work places, such as, GBV and sexual harassment. Hence, there is a potential that gender abuse might occur during the mobilization phase. However, during mobilization number of workers are expected to be minimum and duration of mobilization works will be short. For these reasons, the impact is rated to be low.

Mitigation measures

- Provide and avail a separate sanitation facilities for women at temporary camp and office,
- Provide women friendly safety equipment and materials,
- Assign women in works that do not affect their biological condition,
- Ensure that women construction workers do not face GBV and sexual harassment,
- Incorporate measures to be taken against those workers who commit GBV and sexual harassment,
- Prepare and implement code of conduct that among others strictly forbid sexual harassment /GBV and to be signed by all workers including international workers if involved and subcontract workers,
- Ensure equal pay for women and men for equal job,
- Assign gender specialist at construction site to aware and prevent GBV and sexual harassment starting from mobilization phase.

8.5.1.13. Exposure to HIV/AIDS and Other Sexually Transmitted Infections (STIs)

It is obvious that the presence of a large number of workforce at construction site attracts sex workers to the area and also entices young girls from the locality to go into the business. Hence, this makes the project area highly vulnerable and easily exposed to the spread of STIs and HIV/AIDS transmitting factors. This impact is rate to be low during mobilization for the reason that the number of workforce is expected to be few and duration of mobilization phase is short.

Mitigation Measures

- Contractors should assign experienced HIV/AIDS sub consultant to handle the issues related to HIV/AIDS awareness and prevention starting from the mobilization phase.
- Launch awareness and education campaigns about HIV/AIDS starting from mobilization phase,
- Condoms shall be provided at a subsidized rate or for free to workers and health facilities must be supported with a supply of condoms. To prevent young and school age people, schools should include information campaigns and/or special courses.
- Woreda administrations and Woreda health offices, HIV/AIDS Prevention and Control Office, Elders, and NGOs operating in the area need to work jointly to

create positive impact and bring major attitudinal and behavioral changes.

8.5.2. Adverse Impacts during Construction

8.5.2.1. Air Pollution

Studies have demonstrated that construction sites are significant contributors to air pollution, accounting for approximately 14.5% of PM_{2.5} (particulate matter with a diameter of 2.5 micrometers) and 8% of PM₁₀ emissions. These emissions primarily originate from diesel-powered construction machinery and generators, while a smaller fraction, approximately 1%, results from dust generated by on-site construction activities. The construction phase of Bishoftu International Airport is expected to generate substantial air pollutants due to multiple activities, including site preparation, excavation, material transportation, and infrastructure development.

During the construction period, various processes will contribute to the release of airborne pollutants. Site preparation activities, such as land clearing, grading, and tree cutting, will disturb surface materials and increase dust emissions. Excavation and foundation work will further elevate particulate matter concentrations due to the handling and movement of soil. The sourcing, transportation, storage, and handling of construction materials, particularly fine aggregates, cement, and sand, will exacerbate dust generation. Additionally, the construction of civil structures—including terminal buildings, control towers, access roads, runways, and taxiways—will introduce further particulate and gaseous pollutants into the environment. The establishment of labor camps and supporting facilities will also contribute to emissions from fuel combustion, waste generation, and transportation.

During the construction phase, various activities contribute significantly to air pollution, primarily through the generation of fugitive dust and the emission of gaseous pollutants from combustion processes. Excavation, earthworks, and material handling are among the primary sources of air pollution. The movement of heavy machinery, backfilling, and excavation activities disturb the soil, releasing fine particulate matter into the air. Additionally, the storage and handling of construction materials such as sand, cement, and aggregates further contribute to airborne dust pollution. Unpaved roads and exposed surfaces are also prone to wind-induced erosion, exacerbating dust dispersion, particularly in dry and windy conditions.

Another major source of emissions arises from aggregate processing plants (APPs) and batching and mixing (BM) plants, which generate substantial amounts of dust and fugitive

emissions. The extent of these emissions depends on meteorological conditions, with wind direction playing a key role in their dispersion. Particulate matter of varying aerodynamic sizes emitted from these plants poses significant respiratory health risks to both workers and nearby communities.

Vehicular emissions from construction machinery and transportation fleets also contribute to air quality degradation. The operation of heavy-duty equipment such as bulldozers, excavators, dump trucks, and cranes results in the combustion of fossil fuels, leading to the release of pollutants including particulate matter (PM), sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon monoxide (CO). These pollutants can accumulate in the ambient air, potentially leading to adverse health effects and environmental deterioration.

Diesel generators (DG sets) and other fuel-fired machinery used during construction further contribute to air pollution through the incomplete combustion of diesel fuel. The pollutants emitted—PM, SO₂, NO_x, and CO—can vary in concentration depending on factors such as fuel quality, equipment efficiency, and operating hours. Poorly maintained machinery and suboptimal combustion processes exacerbate emissions, necessitating stringent maintenance and pollution control measures such as ensuring adequate stack height for improved dispersion.

Blasting operations and quarrying activities involved in site preparation also generate substantial emissions. The use of explosives releases large quantities of dust and gaseous pollutants into the atmosphere, which can travel considerable distances depending on wind conditions. Fine rock particles and dust suspended in the air further contribute to localized air pollution, potentially impacting both workers and the surrounding environment.

The environmental and health impacts of fugitive dust and pollutant emissions from construction activities can be severe. Construction workers are at immediate risk due to direct exposure to high dust concentrations, which can cause respiratory issues, eye irritation, and cardiovascular complications. Additionally, communities living in close proximity to construction sites may experience air quality deterioration, particularly during dry and windy conditions when dust dispersion is more pronounced. Long-term exposure to particulate matter can have chronic health effects, especially for vulnerable populations such as children and the elderly.

Beyond direct health impacts, increased concentrations of SO₂ and NO_x from diesel combustion can lead to acid rain formation, which contributes to soil acidification and water contamination. Additionally, these pollutants can interact with atmospheric moisture, forming secondary pollutants such as ground-level ozone, which poses further environmental and health hazards.

The majority of project activities are anticipated to remain confined within the designated project boundaries. The extent of the impact is expected to be localized, with a medium duration and moderate intensity. Consequently, the overall significance of the impact can be classified as moderate.

Mitigation Measures

To manage air pollution impacts associated with the construction phase of Bishoftu International Airport, mitigation measures have been designed based on the mitigation hierarchy approach—Avoidance, Minimization, Restoration, and Compensation/Offset—as follows:

1. Avoidance Measures

- Careful planning of construction activities to avoid working during adverse weather conditions (e.g., strong winds or prolonged dry periods) that may exacerbate dust generation.
- Locate emission-intensive activities (e.g., aggregate processing, batching plants, and quarrying) away from densely populated areas and sensitive receptors such as schools, hospitals, and natural habitats.
- Preserve vegetation cover where possible to act as a natural dust and pollutant barrier.

2. Minimization Measures

a) Dust Control Measures

- Regularly spray water on exposed soil surfaces, unpaved roads, and construction areas during dry and windy conditions.
- Apply dust suppressants or soil binders on haul roads and open stockpiles.
- Cover stockpiles of fine materials (e.g., sand, cement, aggregates) with tarpaulins.

- Install wind barriers or fences to limit dust dispersion beyond the site boundary.

b) Control of Emissions from Machinery and Vehicles

- Maintain all machinery and vehicles regularly to ensure efficient fuel use and low emissions.
- Use low-emission equipment (e.g., Euro IV or higher).
- Limit idling of vehicles and Implement fleet management to reduce redundant trips.

c) Aggregate Processing and Batching Plant Controls

- Install dust extraction units (e.g., bag filters or wet scrubbers) at plants.
- Use enclosed conveyors and silos to reduce fugitive dust.
- Ensure proper siting of plants away from sensitive areas.

d) Blasting and Quarrying Controls

- Use controlled and pre-wetted blasting techniques.
- Operate only during favorable weather to minimize dispersion.
- Use dust suppression systems (e.g., mists or water sprays).

e) Traffic and Material Transport Management

- Design efficient material routes and schedules to minimize travel time and emissions.
- Cover all vehicles carrying loose material and avoid overloading.

f) Generator and Equipment Emissions

- Use cleaner energy sources (e.g., grid electricity or solar) where feasible.
- Maintain generators regularly and install pollution control devices (e.g., catalytic converters).
- Limit generator usage hours and prioritize energy-efficient equipment.

3. Restoration Measures

- Rehabilitate temporarily disturbed areas (e.g., construction access roads and stockpile sites) by re-vegetation or paving after construction.

- Restore borrow pits and quarry sites through recontouring and replanting to reduce long-term dust sources.

4. Compensation/Offset Measures

- If air quality standards are exceeded despite mitigation, compensate through environmental offsets such as:
- Urban tree planting within nearby communities to improve ambient air quality.
- Support to local air quality monitoring Initiatives or community awareness programs on pollution reduction.

8.5.2.2.Noise Pollution

The construction phase of Bishoftu International Airport is anticipated to generate significant noise levels due to various activities, including the operation of heavy machinery, vehicular movement, and construction processes. The primary sources of noise pollution during this phase include:

1. Operation of Construction Machinery and Equipment
 - The use of cranes, excavators, bulldozers, backhoes, graders, compactors, loaders, and rollers will contribute to increased noise levels at the construction site.
 - The hammering, riveting, cutting, and welding processes will add to the noise pollution, particularly in steel fabrication and structural assembly works.
 - Concrete batching and mixing plants (BM Plant) and asphalt processing plants (APP) will generate constant noise during material preparation.
2. Drilling and Blasting for Quarry Materials
 - Drilling operations for foundation work and excavation may result in high-intensity noise emissions.
 - Blasting activities required for breaking down hard rock formations to extract raw materials for construction will generate sudden, high-decibel noise levels that may impact nearby areas.
3. Road Construction and Earthwork Operations
 - Noise from grading, leveling, and compacting the ground for roads, taxiways, and runways will be significant.

- The continuous operation of paving machines, asphalt layers, and road rollers will further contribute to elevated noise levels.

4. Vehicular Movement

- The movement of heavy trucks, dumpers, concrete mixers, and other transport vehicles carrying construction materials will contribute to sustained noise levels, especially during peak construction hours.
- Increased vehicular activity during nighttime may cause disturbances in nearby residential areas, particularly if construction work is extended beyond regular working hours.

The noise generated by construction activities may disrupt the daily lives of people residing near the site, as well as affect construction workers. Continuous exposure to high noise levels can cause disturbances, making it difficult for residents to carry out their routine activities. Additionally, if nighttime noise emissions are not properly controlled, they may lead to sleeplessness, stress, and general discomfort among the local population. Prolonged exposure to excessive noise can also impact overall well-being. The noise levels associated with the operation of different construction equipment are detailed in Table 8-4, providing a clearer understanding of the expected noise pollution during the construction phase.

Table 8-4: Construction equipment noise emission levels

Equipment	Noise Level (dBA) at 15 m	IFC Compliance (Worker Exposure)	Action Required
Air Compressor	81	✓ Compliant	None
Backhoe	80	✓ Compliant	None
Ballast Equalizer	82	✓ Compliant	None
Ballast Tamper	83	✓ Compliant	None
Compactor	82	✓ Compliant	None
Concrete Mixer	85	⚠ At Threshold	PPE recommended for prolonged use
Concrete Pump	82	✓ Compliant	None
Concrete Vibrator	76	✓ Compliant	None

Crane, Derrick	88	✗ Exceeds Limit	PPE mandatory
Crane, Mobile	83	✓ Compliant	None
Dozer	85	⚠ At Threshold	PPE recommended for prolonged use
Generator	81	✓ Compliant	None
Grader	85	⚠ At Threshold	PPE recommended for prolonged use
Impact Wrench	85	⚠ At Threshold	PPE recommended for prolonged use
Jack Hammer	88	✗ Exceeds Limit	PPE mandatory
Loader	85	⚠ At Threshold	PPE recommended for prolonged use
Paver	89	✗ Exceeds Limit	PPE mandatory
Pile Driver (Impact)	101	✗ Exceeds Limit	PPE mandatory + limit exposure time
Sonic	96	✗ Exceeds Limit	PPE mandatory
Pneumatic Tool	85	⚠ At Threshold	PPE recommended for prolonged use
Pump	76	✓ Compliant	None
Rail Saw	90	✗ Exceeds Limit	PPE mandatory
Rock Drill	98	✗ Exceeds Limit	PPE mandatory + limit exposure time
Roller	74	✓ Compliant	None
Saw	76	✓ Compliant	None
Scarifier	83	✓ Compliant	None
Scraper	89	✗ Exceeds Limit	PPE mandatory
Shovel	82	✓ Compliant	None
Spike Driver	77	✓ Compliant	None
Tie Cutter	84	✓ Compliant	None
Tie Handler	80	✓ Compliant	None

Tie Inserter	85	⚠️ At Threshold	PPE recommended for prolonged use
Truck	88	❌ Exceeds Limit	PPE mandatory

Source: Transit Noise and Vibration Impact Assessment, FTA, April 1995.

The continuous construction activities associated with the project are expected to generate peak noise levels ranging between 85 to 90 dB(A). Given that the nearest residential areas are located outside the airport premises, the impact of construction noise on the surrounding community is anticipated to be minimal or insignificant. However, despite the limited impact on external settlements, the noise levels within the construction site pose a significant concern for workers and employees who are directly exposed to prolonged noise emissions. Continuous exposure to high-decibel noise can lead to hearing impairment, stress, fatigue, and reduced productivity among workers.

Mitigation Measures

To address potential noise impacts during project construction and operation, the following measures are designed in accordance with the mitigation hierarchy: avoidance, minimization, restoration, and compensation/offset.

1. Avoidance Measures

- **Site Planning and Layout Optimization:** Locate fixed noise-generating equipment (e.g., generators, compressors) away from sensitive receptors such as residential areas, hospitals, and schools.
- **Schedule Management:** Restrict high-noise construction activities (e.g., pile driving, excavation) to daytime hours (e.g., 7:00 AM–6:00 PM) to avoid disturbance during night hours.

2. Minimization Measures

Engineering Controls

- **Acoustic Enclosures:** Install soundproof enclosures for diesel generator sets in compliance with CPCB and international standards to suppress noise emissions at source.

- **Noise Suppression Equipment:** Ensure all machinery and vehicles (e.g., cranes, loaders, dump trucks) are fitted with efficient silencers and mufflers.
- **Use of Quiet Technology:** Where feasible, adopt quieter alternatives such as electric or hybrid construction equipment to reduce noise intensity.

Operational Best Practices

- **Preventive Maintenance:** Implement scheduled maintenance to minimize noise due to wear, friction, or mechanical failure.
- **Routing of Mobile Equipment:** Design traffic flow routes for mobile equipment to avoid densely populated or sensitive areas.

Personal Protective Equipment (PPE)

- **Hearing Protection:** Provide workers exposed to noise >85 dB(A) with earplugs or earmuffs (NRR ≥ 25 dB).
- **Extreme Noise Protection:** For equipment exceeding 90 dB(A), implement dual protection (earplugs + earmuffs) and limit exposure time per worker.

3. Restoration Measures

- **Post-Activity Site Rehabilitation:** After noisy activities, particularly in ecologically or socially sensitive areas, implement vegetation or landscape restoration to reinstate natural sound buffers and reduce long-term impacts.

4. Compensation/Offset Measures

- **Community Support Programs:** In unavoidable cases where residual noise impact remains near sensitive receptors, support nearby communities through compensatory actions such as provision of noise-insulating materials (e.g., window glazing) or funding local health initiatives.

8.5.2.3. Impact from Quarry Sites, Borrow Areas and Access Roads

Construction of the airport demands huge amount of construction raw materials such as sand, natural gravel, crushed aggregate, selected material for sub base, masonry and dimension stones and etc. Based on information obtained from the Livelihood Restoration Plan for

Bishoftu International Airport Development Displaced Households report, prepared by ECO in 2024, the construction material needed during construction is summarized below.

Table 8-5: Construction Material Volumes

No.	Types construction raw material	Estimated total amount (in M ³)
1	Sand	90,000,000
2	Crushed aggregate	140,000,000
3	Gravel (natural)	168,320,000
4	Stone	3,150,000
5	Selected soil	120.000,000

(Source: ECO, 2024)

The construction materials will be obtained from the local quarry sites and/or river bottoms. Preliminary assessment of prospective quarry sites for construction raw materials has been conducted within 40km radius of the project area and submitted in separate document.

The area and in general central Ethiopia and associated rift escarpments is endowed with volcanic rocks used for crushed aggregate, selected material, dimension stones, sand, natural gravel and others.

However, quarrying activities must be produced and transported in an eco-efficient manner that minimizes total negative impacts and maximizes overall benefits to society.

Stripping, excavating, damping of the overburden soil, drilling, and blasting of the rocks are the serious causes of soil erosion due to the quarry sites. Due to this activity, frequent soil creeps, siltation of down steams, formation of pits and ponds, surface ragging or cliff, losses of the natural aesthetic of the area, and the bio diversity are created.

The environmental deterioration caused by quarry activities on the natural environment occurs mainly as a result of lack of conservation, inappropriate and wasteful working practices and lack of inappropriate rehabilitation measures.

During site visit assessed from south Addis Ababa up to Bishoftu area, the adverse impact of the quarrying activities is clearly seen resulting in landscape change, soil erosion, deforestation, water pollution to the surrounding area and producing enormous quantities of waste that can have deleterious impacts for years.

For all quarries, a rehabilitation plan must have been developed from the outset. It should be an integral part of the quarrying plan and should provide for progressive and coordinated rehabilitation whenever possible. To be fully effective, rehabilitation planning should have begun as early as possible in the quarry life cycle and be reviewed and updated on an ongoing basis

The likelihood of occurrence of the land degradation, aesthetic value change and erosion risks arising from extraction of construction materials from quarries is predicted to be ***“known to occur”*** and its risk significance will be ***moderate***.

Mitigation Measures:

To effectively manage and mitigate the environmental impacts associated with quarrying and borrow area operations, the following measures are recommended, categorized according to the mitigation hierarchy:

1. Avoidance

- **Conduct Pre-Extraction Assessment:** Prior to any extraction activity, perform detailed reserve estimation, including the surface area and thickness of the raw materials. This ensures that only necessary areas are disturbed, avoiding excessive excavation and unnecessary generation of rock and soil debris.
- **Site Selection:** Where feasible, avoid quarrying in ecologically sensitive areas, steep slopes, or zones prone to erosion and flooding.

2. Minimization

- **Adopt Bench Terracing:** During stripping and drilling operations, implement a bench terracing system along the slope to reduce the speed of surface runoff, control erosion, and prevent the formation of hazardous cliffs.
- **Construct Runoff Diversion Channels:** To minimize slope instability and soil erosion, construct diversion ditches or stormwater channels above quarry sites to safely redirect runoff.
- **Install Silt Retention Structures:** To reduce downstream siltation, construct sediment traps or silt fences at the base of the quarry. These structures help minimize water pollution and sediment transport.

3. Restoration

- **Vegetative Stabilization:** Replant disturbed areas with indigenous tree species and ground cover to restore soil stability, improve landscape aesthetics, and enhance ecological functions.
- **Rehabilitation of Quarry Sites:** Reuse excavated materials for backfilling, landscaping, or restoring abandoned quarry sites. Design restoration plans that include grading, topsoil replacement, and vegetation.

4. Compensation / Offset

- **Offset Measures:** Where complete restoration is not feasible, implement compensation mechanisms such as supporting local reforestation initiatives, protecting equivalent habitats elsewhere, or contributing to environmental conservation funds.

8.5.2.4. Solid Waste Generation

The construction activities associated with Bishoftu International Airport are anticipated to produce substantial volumes of solid waste, originating from site preparation, excavation, construction material utilization, labor accommodations, and facility development. Excavation and land clearing will produce large quantities of excess soil, rock fragments, and vegetation debris. Additionally, organic waste such as tree stumps, branches, and foliage will accumulate as part of land clearing operations. Construction and demolition activities will further contribute to waste generation, including leftover materials such as concrete, steel, bricks, wood, and glass. Packaging materials from construction supplies, such as cement bags, plastic wraps, and insulation components, will also add to the waste stream. If any existing structures need to be demolished, debris from broken masonry, asphalt, and structural remnants will further increase waste accumulation.

Hazardous and special waste will also pose environmental and health risks. Construction processes will involve chemical waste from paints, solvents, adhesives, and other industrial materials. Accidental spills of oil, fuel, and lubricants may lead to soil contamination, while the presence of hazardous substances such as asbestos-containing materials and electronic waste from temporary site facilities could further complicate waste management. Additionally, municipal solid waste (MSW) from labor camps and administrative offices will include organic waste from food preparation, non-biodegradable materials like plastic and paper, and sanitary

waste from restrooms and septic systems. Scrap metals and recyclable materials, including discarded rods, wires, glass, plastic, and wooden pallets, will also be generated throughout the construction phase.

The improper management of these waste streams could lead to significant environmental and health impacts. Soil and water contamination may occur due to leachate formation from inadequately disposed waste, threatening local ecosystems and water sources. Open burning or poor handling of waste materials could contribute to air pollution by releasing harmful particulate matter and toxic gases. Accumulated waste may also create breeding grounds for disease-carrying pests, increasing health risks for workers and nearby communities. Furthermore, uncontrolled waste disposal could degrade the visual appeal of the landscape and disrupt local biodiversity.

Mitigation Measures

Avoidance

- **Careful Site Selection and Design:** Prioritize construction in areas with minimal ecological sensitivity to avoid significant vegetation clearing and habitat disruption.
- **Pre-Construction Planning:** Avoid waste generation by conducting material estimates and precise procurement planning to prevent over-ordering and surplus material.
- **Hazardous Material Elimination:** Avoid use of asbestos-containing materials and other harmful substances during procurement.

2. Minimization

- **Waste Reduction and Segregation:**
 - Implement a waste minimization strategy by optimizing material use and reducing excess procurement.
 - Establish on-site segregation bins for different categories (organic, recyclable, hazardous, non-hazardous) to reduce cross-contamination.
- **Excavation and Land Clearing:**
 - Reuse excess soil and rock fragments for site grading, backfilling, or landscaping.
 - Compost organic waste (tree stumps, branches) or use as mulch or biomass fuel.
- **Construction and Demolition Waste:**

- Store reusable materials (wood, bricks, metals) for reuse or recycling.
- Implement take-back programs with suppliers for packaging (e.g., plastic wrap, pallets).
- Transport non-recyclable waste to authorized disposal sites with proper waste tracking.
- **Hazardous Waste Handling:**
 - Store chemicals in labeled, sealed containers; implement spill prevention using drip trays and absorbents.
 - Conduct asbestos surveys and follow strict removal protocols.
 - Dispose of e-waste through licensed facilities.
- **Municipal Solid Waste (MSW) and Sanitary Waste:**
 - Provide collection points at labor camps and offices.
 - Contract licensed waste services for regular MSW disposal.
 - Ensure provision of compliant sanitation facilities (septic systems or portable toilets).
- **Pollution Control:**
 - Ban open waste burning to avoid air pollution.
 - Use lined storage areas to prevent leachate affecting soil and groundwater.
 - Install sediment control systems (e.g., silt fences, retention ponds) to reduce runoff pollution.

3. Restoration

- **Site Restoration:**
 - Restore disturbed areas post-construction with native vegetation to stabilize soil and support biodiversity.
 - Implement erosion control measures and visual enhancements to restore site aesthetics.
- **Post-Construction Waste Management:**
 - Develop a long-term waste management plan for operational phases, ensuring sustainable waste practices.

4. Compensation / Offset

- **Environmental Offsetting Measures:**

- Where unavoidable habitat loss occurs, engage in reforestation or support local environmental rehabilitation projects as compensation.
- Coordinate with local authorities to contribute to municipal recycling and waste recovery programs

8.5.2.5. Effect of the project on land use modification and runoff generation

It is obvious that mega construction projects bring direct impact on the land use and land cover of the vicinity area which further results permanent land use land cover modification. Research papers indicated that land use land cover modification has a direct link with the magnitude of surface runoff water generation. Different hydrological research papers and model studies indicated that in cities where green areas replaced with impervious areas, the amount of surface runoff significantly increased. This is mainly due to the fact that surface water will not percolate down on impervious surfaces which results rain drop on the ground to be transformed into surface runoff.

In contrary, pervious surfaces or surfaces covered with green plants, the amount of runoff generated is significantly reduced since green plants decrease the speed of surface water which provides enough time to percolate into the earth surface. Keeping this in mind, urbanization or construction of mega projects will increase the runoff generation of that specific area. Since the airport project is a mega project, it significantly modifies the land cover of the site which results further increase on surface runoff potential of the area. This will result in frequent flooding and increase in the amount of surface runoff water to the main river course.

In long run after the project is completed and the airport becomes operational for millions of local and international customers are expected to use the services of the airport. This will attract local communities and other service providers to give different services which further increases urbanization which significantly alters the current agricultural farmlands.

In general urbanization and construction activities results land use land cover modification, consequently results increase in surface runoff generation. Increase in surface runoff results frequent flooding and related problems.

The likelihood of the land use modification is known to occur, irreversible, local and long term. Hence, the significance of the impact is rated high.

Mitigation Measures

- Reduce land requirement by utilizing effectively and only required size for the intended use.
- Drainage work should not only be limited to airport facility but also should incorporate local drainage system considering near future urbanization of the area.

8.5.2.6.Impacts on Soil

The new Bishoftu International Airport is anticipated to include large amount of soil is to be removed to prepare the construction site for foundations, basements, access roads and utility lines which requires excavation of top weak unsuitable material where weak unsuitable material is encountered.

The design document shows that about 73,132,110m³ disposal of unsuitable excavated soils is estimated during construction of cargo facility, runways and access roads, airport city and all other related infrastructures.

Given that there will be major earthworks activities, there is potential for soil disturbance and loss of topsoil resources associated with vegetation removal, topsoil stripping and stockpiling of soil resources. The location where the airport planned to be built is thick soil underlain by volcanic ash and loose volcanic deposits which are easily exposed to soil erosion and gully formations. Most of the stream networks are dry during non-rainy months and respond to torrential rain by flooding their channels when the rain falls during the Ethiopian Kiremt (rainy season). The exposure of the soft geological formation of the area to further soil erosion can aggravate gully formations which already affecting the area.

A risk to identified receptors as a result of residual soil contamination that may potentially be found to be present during construction cannot be completely ruled out. The introduction of new contamination during construction and impacts upon soil resources could also occur, however this scenario relies on the unplanned release of a hazardous substance to ground (i.e. accidental spillages of oil, diesel, etc.) from vehicles and machineries.

On the other side, movement of heavy-duty construction vehicles are likely to lead to soil compaction negatively affecting the soil structure which will lead to reduced capacity of water to infiltrate into the soil thereby affecting the soil-water balance and the hydrological cycle.

Therefore, the likelihood of the site clearing and excavation impacts on soil including soil compactions is known to occur. However, the impact consequence of the activities is

anticipated for a short time till backfilling of the excavated area and finishing of basement and other civil infrastructures. Therefore the impact is reversible, limited in scale and magnitude. Hence with incorporated mitigation measures in place, the significance of the impact is rated moderate..



Figure 8-12: *Gullies easily exposed to soil erosion found within the Airport boundary*

Mitigation Measures:

The following mitigation measures are recommended to minimize potential erosion and soil compaction impacts:

- Demarcate the area to be stripped clearly, so that the contractor does not strip beyond the demarcated boundary.
- In case of spillage the Contractor should isolate the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by the Resident Engineer;
- All vehicles and equipment should be kept in good working order, serviced regularly and stored in an area approved by the Resident Engineer;
- Implement re-using mechanisms of the top soils cleared from construction areas for land restoration (for example as material for soil-water conservation practice, for planting vegetation in degraded and stony lands at upstream).
- Pre-defined, essential road access routes should be clearly demarcated and adhered-to on site to restrict soil compaction in the project area.

8.5.2.7. Pollution of Water bodies

Pollution of water bodies could be anticipated during the construction phase due to inadequate handling and spillage of pollutants (like fuel, oils and paints). Release of solid and liquid wastes from construction camps has the potential to affect the water body. In addition, spillages of

hazardous substances such as fuel and oils from workshops may affect the water quality of nearby streams. Moreover, there will be increased silt loading of Akaki-Gerbi and Dukem Rivers and streams in downstream of the project sites due to increased soil erosion from areas cleared off vegetation cover and excavated for construction sites.

The impact on surface water bodies before mitigation measure is anticipated to be moderate, while the impact on groundwater is rated to be low.



Figure 8-13: *nearby and recipient rivers and ponds around the project area*

Mitigation measures

- Construction materials and other debris (aggregate, cement and fresh concrete, etc.) shall be prevented from entering existing drainage infrastructure.
- Ensure protection of the water body ecosystem by preventing the washing away of construction materials, soil, silt or debris into nearby rivers.

- Develop and display emergency response work instructions for accidental oil and chemical spills.

8.5.2.8.Occupational Health and Safety Hazards

Construction and operation of a mega airport project such as that of the proposed Bishoftu international Airport Large scale construction work by its very nature entails major potential occupational health and safety hazards during the construction period which include but not limited to

- Heavy machinery operation
- Working at heights
- Excavation and trenching
- Exposure to hazardous substances
- Noise & vibration exposures
- Ergonomic and repetitive motion injuries
- Fire and explosion risks
- Electrical and welding
- Fatigue and shift work

As such is a hazardous job, and hence it requires adopting appropriate occupational health and safety measures. Construction of certain sections of the sewer lines will take place along existing roads that are usually busy with vehicular traffic as well as pedestrians. This situation could result in traffic accidents. There will also be a risk of falling in trenches excavated for burying sewer pipes. In addition, there could be safety risks related to storage and use of hazardous chemicals and explosives. Moreover, there might be accidents of various nature to project workers. Furthermore, dust and exhaust emissions may affect the respiratory tract of project workers and local people exposed to such emissions.

The impact on the health and safety of project workers, local people and users of the existing roads is anticipated to be a moderate to high, short term to long term and direct adverse impact.

Mitigation measures

1. Avoidance

- Site Planning and Design:
 - Identify and avoid locating project components near sensitive areas (e.g., schools, health centers, water bodies, ecologically sensitive zones).

- Avoid construction camps or storage near residential areas or watercourses.
- Design to reduce the need for working at heights and eliminate use of highly hazardous substances by substituting with safer alternatives.
- Construction zones near runways/taxiways require marked, barricaded limits, ensuring no overlap with active airside operations.
- Scheduled runway/taxiway closures via A NOTAM (Notice to Airmen/Air Missions) which minimize risks by official aviation alert that informs pilots and aviation personnel of changes, hazards, or conditions impacting flight operations. In the context of airport construction.
- Work zones must be restored daily: debris cleared, equipment removed, runway systems (lighting, signage) reinstated
- Fire and Hazardous Materials:
 - Store flammable/explosive and hazardous materials separately in ventilated, compliant facilities.
 - Avoid conditions leading to spontaneous combustion (e.g., excessive moisture and heat in composting).
- Electrical Safety:
 - Identify and mark all buried and overhead electrical lines before excavation.
- Construction Equipment and Activities:
 - Prohibit use of uncertified cranes, lifting devices, and faulty ladders.
 - Avoid using ladders where permanent or temporary stairways or platforms can be provided.
- Noise and Receptor Protection:
 - Avoid siting noisy facilities near noise-sensitive receptors; design layouts to reduce exposure.
- Health and Safety:
 - Avoid worker exposure to risks through thorough OHS induction training and pre-employment medical checkups.
- Visitor Management:
 - Restrict construction site access to only authorized personnel.

2. Minimization

- Occupational Health & Safety (OHS):

- Implement international and national OHS standards.
- Provide and enforce the use of adequate PPE.
- Conduct training on safe chemical handling, lifting, electrical work, ladder use, and emergency procedures.
- Assign trained first aiders, and ensure availability of first aid kits, eyewash stations, and fire extinguishers.
- Ensure emergency ambulance or standby vehicle is on-site.
- Fire Safety:
 - Establish firefighting leadership teams and voluntary brigades.
 - Install firefighting signs and restricted access to fire equipment.
 - Conduct regular fire safety drills and patrols.
- Electrical Safety:
 - Use lock-out/tag-out systems.
 - Ground/double-insulate electrical tools, especially in wet conditions.
 - Designate “no-go” zones around high-voltage lines.
- Safe Lifting & Crane Operations:
 - Conduct daily inspection of lifting equipment.
 - Allow operation only by trained and certified personnel.
 - Never exceed rated load capacity; assign a single signal person during lifting.
- Working at Height & Ladder Use:
 - Use certified scaffolds; ensure competent workers erect and dismantle.
 - Ensure ladders are stable, in good condition, and not used with broken or missing parts.
 - Enforce safety rules—e.g., no carrying tools by hand while climbing ladders.
- Traffic & Dust Management:
 - Develop a traffic management plan with clear signage and speed limits.
 - Water unpaved roads and exposed surfaces to control dust during dry seasons.
- Noise & Vibration Control:
 - Use low-noise equipment and acoustic barriers.
 - Maintain machinery and access roads.
 - Model noise levels during design and update mitigation accordingly.
- Methane Gas Risk Control:
 - Install biogas collection or flaring systems.
 - Provide temperature sensors and adequate ventilation in treatment plants.

- **Hazardous Waste Handling:**
 - Segregate, label, and store hazardous wastes by type.
 - Separate incompatible materials; lock out unused valves.
 - Conduct emergency drills and maintain handling SOPs.
- **Community and Worker Engagement:**
 - Conduct awareness sessions on health, HIV/AIDS prevention, and risks associated with construction.
 - Orient visitors with safety protocols and provide PPE.

3. Restoration

- **Site Rehabilitation:**
 - Restore temporarily disturbed areas (e.g., campsites, detour roads) to original or better condition.
 - Rehabilitate public infrastructure damaged during construction (e.g., roads, drainage).
- **Environmental Restoration:**
 - Re-vegetate degraded and erosion-prone areas using native species. Remove and neutralize hazardous spills promptly.
- **Equipment and Systems:**
 - Replace faulty fire extinguishers, electrical tools, ladders, and lifting equipment.
 - Review and update visitor management and fire/emergency procedures following incidents.

4. Compensation / Offset

- **Environmental and Social Compensation:**
 - Where avoidance or restoration is not feasible, implement compensatory measures such as:
 - Compensatory tree planting
 - Community development programs
 - Livelihood restoration for affected persons
- **Worker Protection:**
 - Ensure all workers are covered under insurance for injury or fatality.

- Provide compensation in line with national labor law and international standards.
- Third-Party Claims:
 - Apply compensation and legal procedures for any verified third-party damage or injury (e.g., fire, methane explosion, hazardous exposure).

8.5.2.9. Risk to Traffic Accidents and Traffic Congestion

During the construction phase, increased transportation of construction materials, equipment, and workers could lead to traffic congestion, road hazards, and accidents, especially in areas with heavy construction activity or near major roadways. In the operational phase, the influx of passengers, vehicles, and airport-related traffic may cause traffic congestion, increase the likelihood of accidents, and impact road safety. The Project has also the potential to result in traffic and road safety risks to community members living around and Airport staff workers and road users.

This report assesses the daily Traffic impacts resulting from construction material transportation over the 1,461-day (4-year) construction period of a new proposed Bishoftu international airport in Ethiopia. This analysis excluding weekends (104 days/year), the construction spans approximately 1,044 working days. The analysis draws on projected material demand (Table 8.6) and identified supply sources (Figure 8.14) to estimate the number of daily truck movements and evaluate potential road congestion risks. The total transportation requirements are distributed across the project phases, with 20% of trips occurring in Year 1, which represents the ramp-up phase of the airport construction. In Year 2, during the peak construction period, this increases to 35% of the total trips. Year 3 accounts for 30% as major works continue, while the remaining 15% is concentrated in Year 4 during the finalization stage of the project. This phased approach provides a basis for calculating daily truck trips and understanding their implications for local traffic conditions throughout the construction period.

Table 8-6: Daily Truck Trip Volume through the construction period

Year	Total Trips	Working Days	Daily Trips	Change vs. 365-Day Model
Year 1	5,183,200	261	19,859	+40%
Year 2	9,070,600	261	34,753	+40%
Year 3	7,774,800	261	29,788	+40%
Year 4	3,887,400	261	14,894	+40%

The assessment further analyzes the distribution of trip loads by key construction material types. Figure 8.14 illustrates the sources of these materials in relation to the proposed Bishoftu International Airport, providing insight into the spatial distribution of material supply areas.

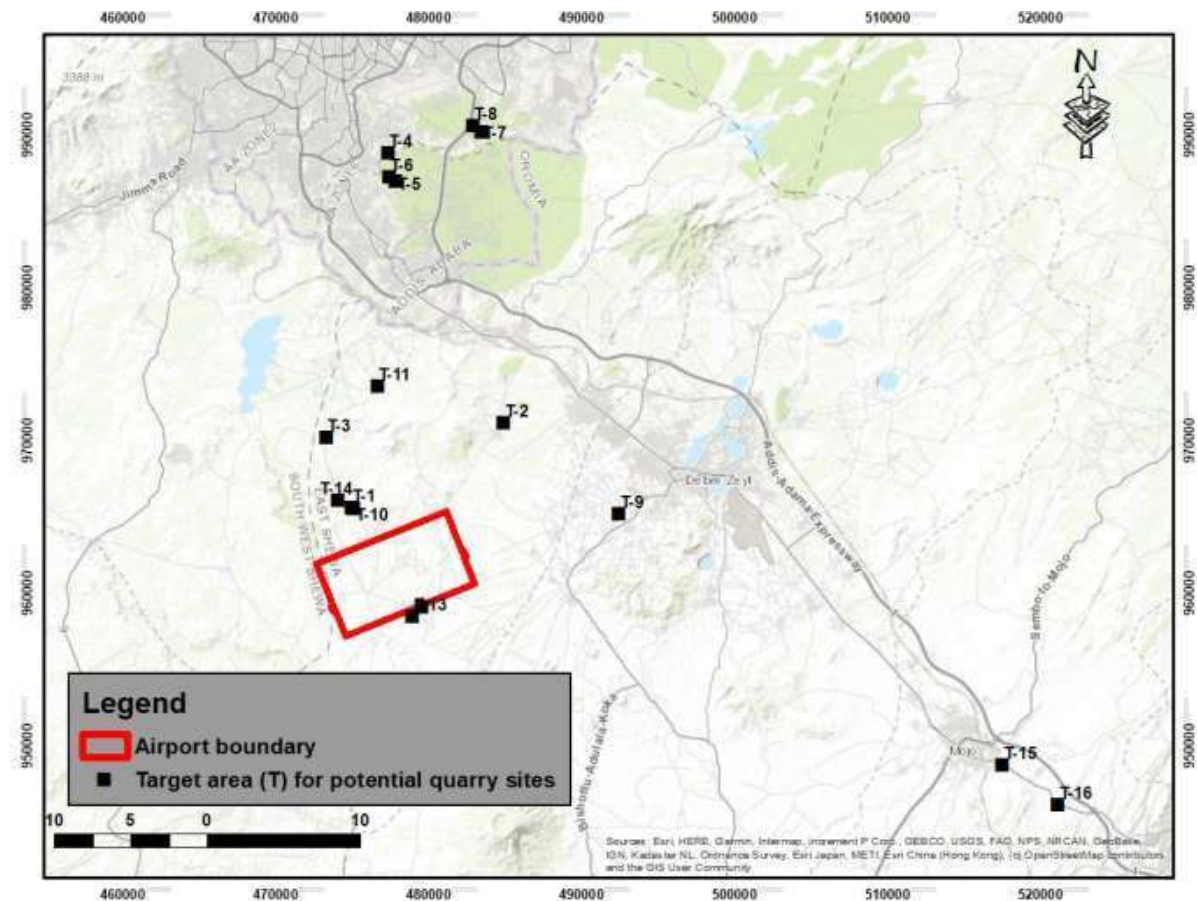


Figure 8-14: source area distributions of the key construction materials

The transport of construction materials will generate significant daily truck trips along various routes, impacting key areas around the project site. Crushed aggregate will require approximately 9,731 daily trips primarily along routes T-1 (3.5 km) and T-4 (35 km), affecting local road junctions near the site. Sand transport will involve about 6,256 daily trips via T-15 (39 km) and T-16 (42 km), impacting major highway intersections. Gravel, with the highest demand at 11,728 daily trips, will be moved along T-4 to T-8 (34–36 km), affecting highway freight corridors. Selected soil will account for roughly 5,357 daily trips on T-9 (10.3 km) and T-10 (3.4 km), primarily impacting access roads to the airport.

Table 8-7: Key material type flows (Peak Year 2 - 34,753 Trips/Day)

Material	Daily Trips	Primary Routes	Critical Impact Areas
Crushed Aggregate	9,731	T-1 (3.5km), T-4 (35km)	Local road junctions near site
Sand	6,256	T-15 (39km), T-16 (42km)	Major highway intersections
Gravel	11,728	T-4 to T-8 (34-36km)	Highway freight corridors
Selected Soil	5,357	T-9 (10.3km), T-10 (3.4km)	Access roads to airport

The assessment can be examined under various construction scheduling scenarios. The estimated daily truck trips and resulting road impacts vary significantly. A 365-day schedule would generate approximately 24,851 daily trips, leading to moderate congestion on highways and high stress on local roads. In contrast, a more compressed 261-day schedule would increase daily trips to around 34,753, causing severe highway congestion and critical strain on local roads. However, with mitigation measures in place, the effective daily trips could be managed at roughly 28,200, reducing highway impacts to a manageable level and keeping local road stress under control.

Table 8-8: various scheduling of the work and its Impact

Scenario	Daily Trips (Peak)	Highway Congestion	Local Road Stress
365-Day Schedule	24,851	Moderate	High
261-Day Schedule	34,753	Severe	Critical
With Mitigations	28,200 (effective)	Managed	Controlled

Proposed mitigation measures

Avoidance Measures

- **Route Planning to Avoid Sensitive Areas:** Select haul routes that minimize passage through residential neighborhoods, schools, hospitals, and other sensitive community areas to reduce exposure of vulnerable road users.
- **Schedule Construction Activities to Off-Peak Hours:** Conduct heavy truck movements and material deliveries during early morning, late evening, or night-time hours where feasible to avoid peak traffic congestion.
- **Optimize Construction Phasing:** Spread out material delivery schedules to avoid excessive concentration of truck trips during any single day or period, particularly during the peak Year 2.

2. Minimization Measures

- **Implement a Traffic Management Plan (TMP):** Develop and enforce a TMP that includes traffic control personnel at critical junctions, temporary signage, speed limits, and flaggers to ensure safe vehicle movement near construction zones.
- **Limit Daily Truck Trips to Manageable Levels:** Coordinate suppliers and contractors to cap daily truck trips around 28,200 trips during peak periods to reduce road stress and congestion.
- **Use Local Material Sources:** Prioritize procurement of construction materials from sources closer to the site to reduce overall transport distances and truck trip volumes.
- **Driver Training and Safety Protocols:** Require all drivers to complete safety and defensive driving Training and ensure strict compliance with speed limits and road safety rules.
- **Regular Road Maintenance:** Conduct ongoing maintenance on haul roads and affected local roads to prevent deterioration that could contribute to accidents.
- **Public Awareness and Communication:** Notify local communities in advance about high traffic days, expected congestion, and alternate routes to reduce surprises and improve safety.
- **Monitoring and Enforcement:** Use GPS tracking and traffic cameras where possible to monitor truck movements, enforce compliance with schedules, and reduce speeding or reckless driving.

3. Restoration Measures

- **Repair and Rehabilitation of Roads:** After construction, rehabilitate any roads and intersections damaged by heavy truck traffic, especially local access roads near the airport.
- **Restore Traffic Control Infrastructure:** Reinstall or repair traffic lights, signage, and road markings affected during the construction period.

4. Compensation / Offset Measures

- **Community Road Safety Initiatives:** Implement programs such as installing pedestrian crossings, speed calming measures, and road safety education in the communities affected by construction traffic.
- **Grievance Redress Mechanism:** Establish a clear and accessible system for the public and road users to report traffic-related incidents or hazards, with timely response and mitigation.

8.5.2.10. Conflict on Employment Opportunity

The proposed project construction will create job opportunities for skilled and unskilled job seekers. However, it would lead to some conflicts of interest between local and migrant job seekers.

Proposed mitigation measures

- Provide priority of job opportunity for the local people and particular attention for women.
- Involve local authority in the process of labor recruiting.
- Create a smooth relationship with community members.

8.5.2.11. Spread of HIV/AIDS and other STD

As it is well-known, large scale construction project workers are considered to have a high potential for the spread of HIV/AIDS and other sexually transmitted infections partly because construction workers are mostly young, sexually active group of the population, mobile and are partly because they are forced to live in hotel rooms or in construction camps.

It is obvious that the presence of a large number of workforce at construction site attracts sex workers to the area and also entices young girls from the locality to go into the business. Hence,

this makes the project area highly vulnerable and easily exposed to the spread of STIs and HIV/AIDS transmitting factors.

Mitigation Measures

- Contractors should assign experienced HIV/AIDS sub consultant to handle the issues related to HIV/AIDS awareness and prevention.
- Launch awareness and education campaigns about HIV/AIDS among the construction workers and community to make them informed. This has to be done on the one hand by the contractor's sub consultant and on the other hand by the local health institutes around the project area targeting especially women and sex workers.
- Condoms shall be provided at a subsidized rate or for free to construction workers and health facilities must be supported with a supply of condoms. To prevent young and school age people, schools within the direct influence area of the project should include information campaigns and/or special awareness creation activities.
- Woreda administrations and Woreda health offices, HIV/AIDS Prevention and Control Office, Elders, and NGOs operating in the area need to work jointly to create positive impact and bring major attitudinal and behavioral changes.

8.5.2.12. Project impact on tangible and/or intangible cultural heritage

These includes heritages like archaeological sites that comprise any combination of structural remains, artifacts, human or ecological elements, and may be located entirely beneath, partially above, or entirely above the land or water.

So far there are no known such sites in the proposed project area. The existence of such heritage in project site is not known, but could be uncovered while excavation. The project is not expected to have any impact on cultural heritage assets that are movable such as rare books, manuscripts, paintings, etc.

Mitigation Measures

- During the site visit, there is no observed cultural value resource in the site to be affected. However, during construction activities, any cultural values might be found to be affected. The contractors and supervisors need to inform if they found any cultural value as early as possible.
- Workers need to be made aware on how to inform any cultural values observed.

8.5.2.13. Impact on vulnerable groups

During the construction phase, potential negative effects and more risks are anticipated on vulnerable groups. Vulnerable social groups include female household heads, old aged, and physical and/or mentally disabled people. These people are more likely to be affected by the project construction impacts like dust pollution while using access roads, traffic accident by the movement of construction vehicles and machineries and due to loss of grazing and farm land and associated loss of livelihood during the project construction.

Mitigation measures

- Ensure that women and vulnerable groups will equally get job opportunities during the project construction processes and the benefits of the Project implementation.
- Aware local governments and community members to solicit their assistance for the project affected vulnerable groups,
- Ensure all project vulnerable groups are identified and eligible for the government's special support.

8.5.2.14. Concern with GBV/SEA and Child Labor Abuse

Gender mainstreaming and Gender Based Violence (GBV) experiences from different infrastructure projects show that there is lack of knowledge and understanding on Gender issues and GBV by Contractors. Due to lack of awareness and understanding on gender and GVB by Contractor and also the construction workers, female construction workers could face difficulties in their work places, such as, GVB and sexual harassment. Hence, there is a potential that gender inequality might occur during the construction of the proposed Bishoftu International airport construction through unequal distribution of work, sexual harassment, discrimination against women, and unequal pay for women, among others.

Mitigation measures

- Provide and avail a separate sanitation facilities for women at construction camp,
- Provide women friendly safety equipment and materials,
- Assign women in works that do not affect their biological condition,
- Ensure that women construction workers do not face GBV and sexual harassment,
- Incorporate measures to be taken against those workers who commit GBV and sexual harassment,

- Prepare and implement code of conduct that among others strictly forbid sexual harassment /GBV and to be signed by all workers including international workers if involved and subcontract workers,
- Ensure equal pay for women and men for equal job,
- Assign gender specialist at construction site to aware and prevent GBV and sexual harassment.

8.5.2.15. Cultural Conflict, Culture Dilution and Drug Abuse

Usually, construction works of large scale involve a workforce from various areas, regions, and continents with different cultures and traditional backgrounds. When people from these different backgrounds come together, cultural conflict and intolerance of one another would be manifested. The right thing and acceptable ethics in one culture may be taboo in other cultures. Therefore, in construction project, it would be important to know the cultural background of the project area so that precautions and awareness creation works could be provided for the workforce.

Experiences from various construction works revealed that communities in Ethiopia could not tolerate sexual abuse, alcoholism, and drug abuse. Hence, it is the responsibility of the contractor to aware his workforce of these and other cultural norms and traditional values of the community. In other words, foreign as well as migrant workers from other parts of the country should be thought to respect the culture and ways of living in the project area.

Mitigation Measures

- The contractor should understand the culture of people/community of the project area.
- The contractor shall aware of his workforce to not involve in any sexual, alcohol and drug abuse.
- If workers committed sexual and drug abuse, the case should be taken to court.
- If the worker committed sexual abuse and escaped from the project area, the contractor has to be responsible to bring him to court.
- The woreda authorities of the project area should control and shut any shop involved in drug business if any.

8.5.2.16. Impact on vegetation

The construction of the Bishoftu International Airport is expected to significantly affect the Acacia–Commiphora woodland vegetation, which covers a total of 105 hectares within the project area. This ecosystem, characterized by drought-resistant trees and shrubs, plays a crucial role in maintaining ecological balance, supporting biodiversity, and sustaining local livelihoods. The clearance of land for infrastructure development, including runways, terminals, and access roads, will lead to the removal of indigenous trees and shrubs. Species such as *Acacia prasinata*, *Acacia bussei* and *Commiphora obovata* will be directly affected. Additionally, important tree species recorded in the areas, such as *Acacia abyssinica*, *Cordia africana*, *Croton macrostachyus*, *Ficus vasta*, and *Millettia ferruginea*, may experience significant declines due to deforestation.

The removal of vegetation will also disrupt habitats for various plant and animal species. The Acacia-Commiphora woodland supports diverse wildlife, and its degradation can lead to habitat loss for native flora and fauna. Fragmentation of vegetation patches will affect seed dispersal, pollination, and natural regeneration processes, weakening the overall ecosystem. The reduction of vegetation cover, particularly in the project areas, may lead to increased soil erosion and decreased water retention capacity. Trees and shrubs play a vital role in stabilizing soils, regulating water flow, and preventing land degradation. The loss of native vegetation could result in changes to local hydrology, affecting groundwater recharge and increasing surface runoff.

In many residential areas, plantation trees such as *Eucalyptus camaldulensis*, *Grevillea robusta*, and *Cuppressus lusitanica* are more common. Their removal will further impact vegetation cover.

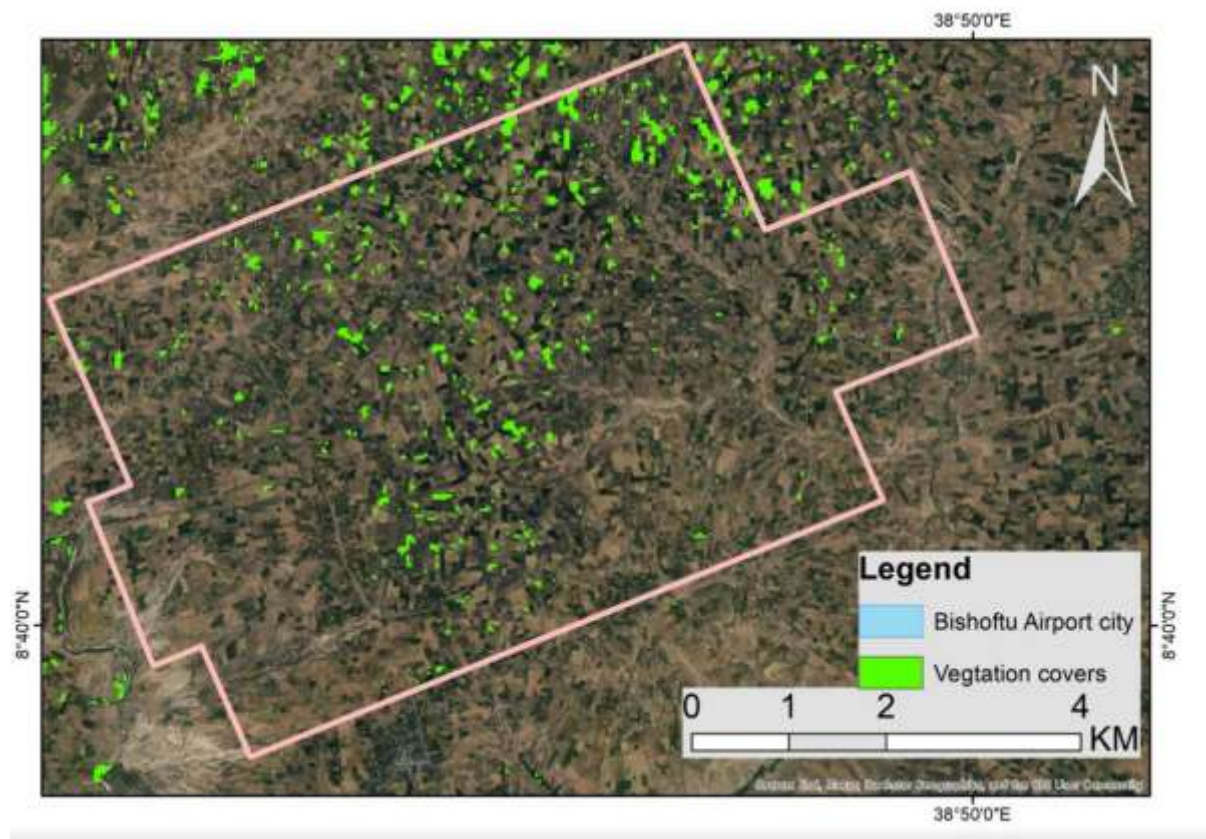


Figure 8-15 Vegetation Impacted by the project

Mitigation measures

Mitigation measures to minimize the vegetation and environmental impact of the ENIA construction on vegetation and ecosystems include:

- Conduct a detailed survey to identify and map sensitive vegetation areas before construction
- Establish a reforestation program to restore vegetation in affected areas, focusing on native tree species
- Use indigenous plant species for restoration, as they are better suited to the local climate and ecosystem needs.
- Mark and protect areas with high ecological value (e.g., key species habitats, or endemic plants).
- Avoid unnecessary clearing and preserve key plant species.
- Replant native vegetation in disturbed areas to restore biodiversity.
- Implement erosion control measures to protect plant roots and prevent land degradation.

- Prevent the introduction and spread of invasive plant species.
- Establish green belts around the site to enhance ecological balance.
- Identify and safeguard rare, endangered, and ecologically significant plant species.
- Design infrastructure to minimize impact on sensitive vegetation zones.
- Paying compensation for fruit trees as well as other residential and farmers land trees as per the Ethiopian applicable law and regulation that is Proclamation No. 1161/2019 and Regulation No. 472/2020 respectively.

8.5.2.17. Impacts on Agricultural crops diversity

The construction of the ENIA could significantly impact agricultural crop diversity in the surrounding region. The conversion of agricultural land for infrastructure development, such as land clearing, excavation, runway construction, terminal facilities, and access roads, may result in the loss of productive farmlands, reducing the area available for crop cultivation. This reduction in arable land could lead to a decline in crop diversity, as farmers might be forced to shift to less diverse, commercially viable crops or face limitations in planting a wide range of species. The displacement of valuable crops like wheat, Barely, tef, and bean, pea and others could further harm local agricultural biodiversity. Additionally, construction activities may alter local microclimates, water availability, and soil quality, further affecting crop growth. The disruption of local ecosystems, along with potential pollution from construction-related activities, could harm biodiversity and challenge the sustainability of farming practices. These impacts may be especially pronounced in areas where smallholder farmers rely on crop rotation and diverse planting strategies for resilience, ultimately threatening agricultural sustainability and food security.

Mitigation measures

To mitigate the impacts of the airport construction on agricultural crop diversity, the following measures could be implemented:

- Relocate affected farmers to nearby land with similar agricultural potential to minimize disruption to their livelihoods.
- Provide fair compensation for the loss of crops, land, and resources to ensure that farmers are financially supported during the transition.
- Ensure that farmers have access to resources to restart their agricultural activities on the new land, such as seeds, tools, and training

- Identify and protect agricultural zones that are rich in crop genetic diversity to minimize the loss of important crops.
- Develop strategies to preserve key crop species and ensure that these crops are not lost due to land clearing or infrastructure development.
- Promote the cultivation of diverse, locally adapted crop varieties that contribute to food security and reduce dependency on a few staple crops.
- Promote agroforestry practices in the affected areas to combine agriculture with the preservation of tree cover and improve soil fertility.
- Implement sustainable land management practices that enhance soil health, water retention, and biodiversity, reducing the negative effects of construction on local farming.
- Offer agricultural training programs to farmers to help them adapt to new farming conditions or crops, focusing on climate-smart and resilient agricultural practices.
- Provide farmers with access to agricultural extension services, which can offer guidance on improving crop production and diversifying farming systems.
- Establish cooperatives or farmer associations to ensure farmers have access to shared resources and knowledge, enabling them to maintain sustainable agricultural practices.
- Designate alternative agricultural land areas away from the construction site to minimize displacement of productive farmland and ensure continued crop cultivation.
- Offer training to farmers on sustainable agricultural practices, crop diversification, and alternative livelihood options, helping them adapt to the changes caused by the airport construction.
- Involve local communities in the planning and decision-making process to address concerns about the loss of agricultural land and ensure that mitigation measures align with the needs of farmers.
- Establish programs to preserve and promote genetic diversity of crops, particularly those that are displaced, and provide farmers with resources to grow a diverse range of crops.

8.5.2.18. Habitat, Wildlife and Birds

During the construction phase of an airport, habitat and wildlife can experience significant disruption due to land clearing, increased human activity, and construction-related noise. The

clearing of vegetation for infrastructure development can lead to habitat loss and fragmentation, severely impacting local wildlife by reducing available shelter and food sources. Disturbance from construction equipment and machinery can cause wildlife displacement, forcing animals to move to less suitable or unsafe areas. Noise pollution, especially from heavy machinery and construction activities, can disturb animal behavior, disrupt breeding and nesting cycles, and lead to habitat avoidance. Additionally, soil erosion, sedimentation, and chemical runoff from construction activities can degrade water quality and further threaten sensitive ecosystems. These combined impacts can lead to a decline in local biodiversity and the disruption of essential ecological processes.

Mitigation measures

- Identify and protect critical habitats before construction begins.
- Establish buffer zones around sensitive habitats to minimize disturbance.
- Relocate animals from construction areas to suitable habitats where possible.
- Implement wildlife rescue and relocation protocols for displaced animals.
- Use noise-reducing construction methods and equipment to minimize disturbance to wildlife.
- Schedule noisy activities during times when wildlife activity is low.
- Implement erosion control measures (e.g., silt fences, sediment traps) to prevent habitat degradation.
- Control runoff and manage waste to avoid contamination of nearby ecosystems.
- Maintain or create wildlife corridors to ensure safe movement during construction.
- Prevent barriers or obstructions that could block animal movement.
- Regularly monitor wildlife presence and health during construction.
- Adjust construction methods based on monitoring results to mitigate adverse impacts.
- Avoid unnecessary destruction of wetlands and vegetation that serve as bird habitats. Implement habitat restoration measures where feasible.
- Limit construction activities during peak bird migration and breeding seasons to reduce disturbance. Use noise-reducing technologies and schedule activities to minimize disruption.
- Properly dispose of food waste and other attractants to prevent birds from congregating in the construction zone

8.5.3. Adverse Impacts during Operation Phase

8.5.3.1. Air Pollution

The operation of Bishoftu International Airport is expected to contribute to increased air pollution due to emissions from aircraft, ground support equipment, and vehicular traffic. Aircraft operations will release pollutants such as carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SO_x), particulate matter (PM), and volatile organic compounds (VOCs) during landing, takeoff, taxiing, and idling. These pollutants can degrade air quality and pose long-term health risks to nearby communities. Additionally, ground support equipment, including baggage loaders, fuel trucks, and maintenance vehicles, will further contribute to emissions, as most of these operate using fuel-powered engines.

The expected rise in passenger and cargo flights will also lead to increased vehicular traffic in and around the airport, resulting in higher emissions from buses, taxis, private vehicles, and freight transport. Beyond direct emissions from airport operations, there may also be secondary pollution effects due to urbanization and industrial activities spurred by the airport's development, leading to additional environmental impacts.

The potential consequences of this increased air pollution include poor air quality, which can cause respiratory issues such as asthma and bronchitis among local residents. Furthermore, the emissions will contribute to greenhouse gas accumulation, exacerbating climate change. The presence of particulate matter in the air may also reduce visibility, affecting both aviation operations and the overall environmental quality of the area.

The emission modeling study was conducted to assess the levels of NO₂, PM₁₀, PM_{2.5}, SO₂, and CO expected in 2030 due to aircraft operations. The detailed methodology and results are presented below:

The emission prediction was conducted following internationally recognized methodologies, including the International Civil Aviation Organization (ICAO) Airport Air Quality Manual (Doc 9889), the U.S. Environmental Protection Agency (EPA) AP-42 guidelines and the Ethiopian Federal Environmental Protection Authority (EPA). The assessment focused on the dispersion of key pollutants such as NO_x (NO₂, NO), HC, CO, SO₂, PM_{2.5}, and PM₁₀, from aircraft operations, ground support equipment, and vehicular traffic for the time horizon of 2030. The assessment used the Aviation Environmental Design Tool (AEDT) a globally recognized model and emission inventories derived from ICAO standards and EPA

methodologies. The Aviation Environmental Design Tool (AEDT) is a comprehensive modelling system developed by the FAA to evaluate the environmental impacts of aviation operations, including air pollution and noise.

The pollution sources for air pollution assessment are categorized into:

- Aircraft operations (Landing and Take-Off (LTO) cycles, including taxiing, take-off, climb-out, and approach phases)
- Ground Support Equipment (GSE) (e.g., baggage tugs, fuel trucks, aircraft tow tractors)
- Auxiliary Power Units (APUs)
- Road traffic (in-airport and access roads)
- Fuel storage and handling (evaporative emissions)

In this assessment aircraft operations and auxiliary power units (APUs) air pollution sources are considered for air pollution assessment. Input data, including flight schedules, aircraft fleet mix, engine types, and ground vehicle usage, were obtained from consultants' airport operational and demand forecast document.

AEDT integrates aircraft performance data, fleet mix, flight trajectories, and operational parameters to simulate emissions (CO, NO_x, PM, CO₂, ...etc) around airports. The following are the major data sets used in AEDT for modelling pollution.

The list of aircraft types and their share of operations served as a foundational input for assessing air pollution (Table 8-8). For emission, the fleet mix determined APU/engine usage patterns, enabling calculations of total fuel burn and pollutants (CO, NO_x, PM) using emission indices from the ICAO Engine Emissions Database.

Table 8-9: List of aircraft types and their share of operations

Aircraft	Code	% Representation
A220	Code C Jet	12.10%
A320neo	Code C Jet	2.60%
A321neo/XLR	Code C Jet	1.50%
A321P2F	Code C Jet	0.20%
A300F	Code D	0.10%
A330F	Code E	0.80%
A350-900	Code E	13.50%

A350-1000	Code E	2.70%
B737 MAX8/9	Code C Jet	35.50%
B737-800	Code C Jet	1.80%
B747F	Code E	0.10%
B767F	Code D	0.10%
B777-8/9	Code F	7.00%
B777 F/LRF	Code E	3.10%
B777-300ER	Code E	0.20%
B787-800/900	Code E	16.90%
EMB 190	Code C	0.60%
DH8	Code C Turboprop	1.20%
Total:		100.0%

Source: Master plan report

Take-off and Landing Volume: Traffic volume forecast is based on the average daily aircraft movements projected for 2030 (Table 8.10). The study assumes 50% arrivals and 50% departures, per industry standard for hub airports.

Table 8-10: Take-off and landing volume forecast

			2030	2035	2040	2045	2050	2055	2060
Total ATMs	Annual		186,640	289,760	361,580	424,850	491,160	558,900	628,460
	Design Day		579	898	1,118	1,317	1,522	1,730	1,944
	Peak Hour	Arrival	42	57	64	71	79	85	92
		Depar.	42	58	65	72	80	86	93
		2-Way	51	69	78	87	97	106	113

Aircraft Engine and APU Types: The table 8.11 reveals APU configurations between short-haul and long-haul aircraft. Long-haul types (A350, B777, B787) utilize high-capacity APUs like the GTC331-500 and PW901A to support extended ground operations, while most short-haul aircraft employ lighter units. These configurations will significantly influence the airport's cumulative APU emissions profile as the 2030 fleet mix materializes and utilized as data input the analysis.

Table 8-11: Aircraft APU and Engine Configuration

Aircraft Type	ICAO Code	Engine Type	APU Type	APU Usage Category
A320neo	C	PW1100G-JM	APS3200	Short-haul
A350-900	E	Rolls-Royce Trent XWB	GTCP331-500	Long-haul
B737 MAX 8	C	CFM LEAP-1B	131-9	Short-haul
B777-300ER	E	GE90-115B	GTCP331-500	Long-haul
B787-9	E	GE _{nx} -1B	PW901A	Long-haul
Dash 8 Q400	C	PW127C	T-62T-47C1	Short-haul

Uncertainties in emission estimates were quantified using error propagation techniques, with key sources of uncertainty including: Emission factors (± 10 – 30%); Activity data (± 5 – 20%) & Fuel consumption estimates ($\pm 15\%$).

A. Predicted Air Pollution

• Total Daily Emissions by Aircraft Operation modes & Fuel

The predicted air pollution results are presented in terms of daily average emissions for the year 2030, based on modelled aircraft operations at Bishoftu International Airport. Below is a summary of the key predictions and metrics:

Table 8-12: Total Average Daily Emissions by Aircraft Operation Modes

Operation Mode	Fuel (tons)	CO (kg)	HC (kg)	NO _x (kg)	CO ₂ (tons)	SO _x (kg)	PM 2.5 (kg)	PM 10 (kg)
Climb Ground	245.1	3,232	106	3,867	774	287	15.7	15.7
Climb Below 1,000	274.0	3,238	107	5,081	865	321	17.7	17.7
Climb Below Mixing Height	377.6	3,261	110	8,851	1,192	442	24.4	24.4
Climb Below 10,000	678.8	3,337	118	20,010	2,142	795	42.7	42.7
Descend Below 10,000	182.1	1,936	65	1,608	575	213	15.1	15.1
Descend Below	164.5	1,676	56	1,480	517	192	13.5	13.5

Mixing Height								
Descend Below 1,000	87.9	1,259	41	654	277	103	6.3	6.3
Descend Ground	71.2	1,243	41	400	225	83	4.8	4.8
Full Flight	861.0	5,274	183	21,618	2,716	1,009	4.1	4.1
Taxi In	63.7	1,189	39	328	201	75	4.1	4.1
Taxi Out	173.1	3,218	104	894	546	203	11.0	11.0
APU Operations	0.0*	982	73	683	0	95	144.0	144.0

Note: All values in kilograms per day except CO₂/tons and Fuel Burn/tons

The projected Total Average Daily Emissions by Aircraft Operation Modes for 2030 highlight significant environmental impacts, with full flight operations dominating NO_x (21,618 kg/day) and CO₂ (2,716 tons/day) emissions due to fuel combustion at high thrust settings. Climb phases (particularly below 10,000 feet) contribute heavily to NO_x (20,010 kg/day), while taxi-out operations generate notable CO₂ (546 tons/day) and CO (3,218 kg/day) due to prolonged engine-idling. APU usage, though fuel-neutral, it remains a critical source of particulate matter (PM 2.5/10 at 144 kg/day), underscoring the need for ground power alternatives.

- **Total Daily Emissions by Aircraft Type and Category**

The predicted total daily mean emissions by aircraft category for Bishoftu International Airport in 2030 illustrated in the following table:

Table 8-13: Total Daily Emissions by Aircraft Type & Category

Aircraft Category & Type	Daily Operations	Fuel Burn (tons/day)	CO (kg)	NO_x (kg)	CO₂ (tons)	SO_x (kg)	PM2.5 (kg)
Narrow body (Code C)	672	311	1,622	7,879	1,244	462	34
B737-800	262	155	745	5,492	490	182	18
A220-300	262	130	658	2,160	409	152	12
DHC8-400	150	26	219	327	345	128	4
Wide body (Code E)	572	828	5,131	20,710	2,348	872	157

B777-300	236	395	1,871	11,457	1,244	462	97
B787-8	212	257	1,849	4,793	811	301	32
A330-900	124	176	1,411	4,540	552	203	28

Note: All values in kilograms per day except CO₂/tons and Fuel Burn/tons

The analysis of total daily emissions at Bishoftu International Airport in 2030 reveals significant disparities in environmental impact across aircraft categories. Wide body aircraft, representing 46% of daily movements, account for 73% of fuel consumption (828 tons/day) and 70% of total NO_x emissions (20,710 kg/day), with the Boeing 777-300 alone contributing 39% of NO_x. Narrow body aircraft, while comprising 54% of operations, generate lower absolute emissions but exhibit inefficiencies, particularly the Boeing 737-800, which produces 70% of narrow body NO_x (5,492 kg/day) due to older engine technology.

- Annual Emissions by Aircraft Type**

The analysis in table 8.10, shows the major contributors to air pollution based on projected annual operations in 2030, focusing on CO, HC, NO_x, CO₂, SO_x, and fuel burn. The data reveals significant disparities between aircraft types due to differences in engine technology, fuel efficiency, and operational frequency.

Table 8-14: Annual Emissions by Aircraft Type and Fuel

Aircraft Type	ICAO Code	Annual Operation	CO	HC	NO_x	CO₂	SO_x	Fuel Burn
Bombardier Dash 8-Q400	C	56,210	80	1	119	30,430	11	9,645
Airbus A220-300	C	97,090	240	14	788	149,379	55	47,347
Boeing 737-800	C	97,090	272	25	2,004	178,688	66	56,636
Boeing 777-300ER	E	88,695	683	52	4,182	454,199	161	144,193
Airbus A350-900	E	44,530	515	39	1,584	201,714	74	63,928
Boeing 787-8	E	78,110	675	22	1,750	296,077	110	93,844
TOTAL		461,725	2,465	153	10,427	1,310,487	477	415,593

***Note:** All values in metric tons/year, rounded to nearest whole number*

Nitrogen Oxides (NO_x), primarily produced during high-temperature combustion in aircraft engines, are a major concern due to their role in smog formation and respiratory health effects. The Boeing 777-300ER is the largest contributor, accounting for 40% of total NO_x emissions

(4,182 tons/year), followed by the Boeing 737-800 (19%) and Airbus A350-900 (15%). The 777-300ER's high NO_x output is attributed to its powerful GE90-115B engines, which operate at maximum thrust during takeoff and climb phases.

Carbon Dioxide (CO₂), a greenhouse gas directly linked to climate change. The Boeing 777-300ER again leads with 454,199 tons/year (35% of total CO₂), owing to its long-haul operations and high fuel burn rate. The Boeing 787-8 (23%) and Airbus A350-900 (15%), while more fuel-efficient than older models, still contribute significantly due to their extensive use on international routes.

Carbon Monoxide (CO) and Unburned Hydrocarbons (HC) result from incomplete combustion, particularly during low-thrust operations like taxiing. The 777-300ER generates 28% of CO emissions (683 tons/year), while the 737-800 produces 25 tons/year of HC (16% of total), a consequence of its older CFM56-7B engines that are less efficient at idle.

Sulfur Oxides (SO_x), derived from sulfur impurities in jet fuel, contribute to acid rain and particulate pollution. The 777-300ER emits 161 tons/year (34% of SO_x), with the 787-8 (23%) also a notable source due to their high fuel consumption.

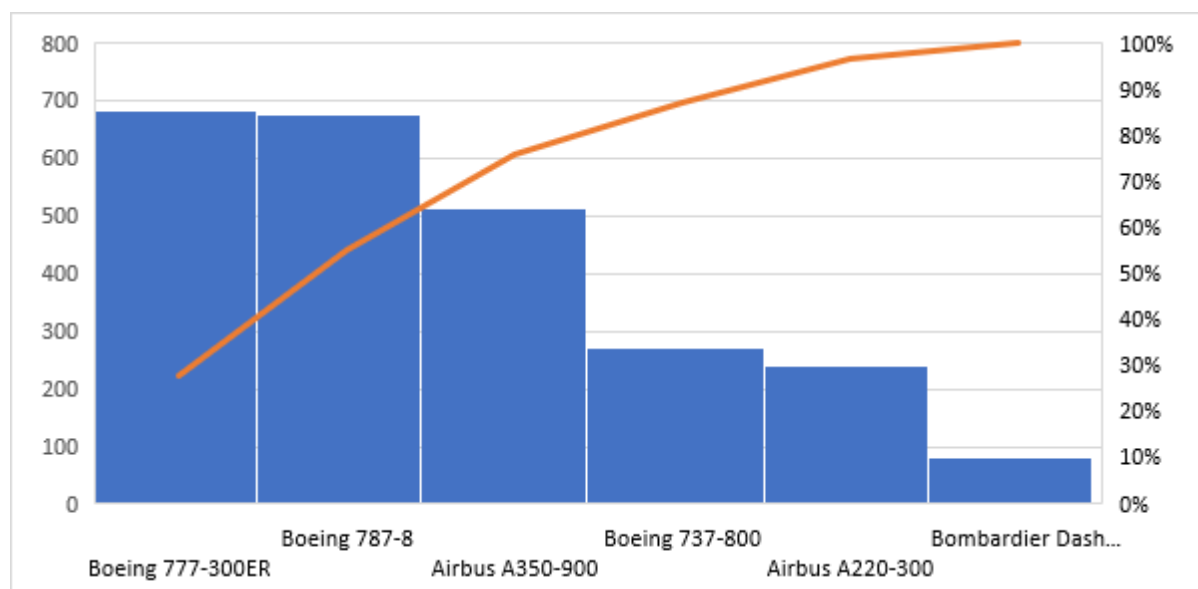


Figure 8-16: Amount of Air pollutant contributions by aircraft type

The aircraft-specific analysis (Figure 8.16) reveals that Boeing 777-300ER is the dominant emitter across all pollutants, contributing 40% of NO_x, 35% of CO₂, 31% of CO/HC, and 34%

of SO_x due to its high-thrust engines and long-haul fuel consumption. Newer models like the Boeing 787-8 and Airbus A350-900 show improved efficiency (20% lower CO₂/ton fuel) but still account for significant emissions due to operational scale. Among narrow-body aircraft, the Boeing 737-800 is the top NO_x emitter (19% of total) from older CFM56-7B engines, while the Airbus A220-300 demonstrates the lowest HC/CO outputs in its class. The Bombardier Dash 8-Q400, though low-emitting, plays a minor role due to limited regional operations. Fleet modernization (e.g., transitioning to 777X/737 MAX) and Sustainable Aviation Fuel (SAF) adoption are critical to reducing the airport's environmental impact.

- **Emissions by APU Type**

The analysis of APU emissions by equipment type reveals significant variations in pollutant output, driven by differences in APU technology, operational duration, and fleet composition (Table 8.11). The APU PW901A (B787) exhibits the highest CO emissions (65.50 kg/h), contributing 1,082,453 kg annually, accounting for 80% of total CO from APUs. In contrast, the APU GTCP331-500 (A350) dominates NO_x emissions (23.30 kg/h), producing 335,357 kg/year (Table 8.11), attributable to its high-thrust combustion characteristics. Meanwhile, the APU 131-9 (B737 MAX), despite its lower per-hour emissions, generates substantial PM 2.5/10 (6,206 kg/year each) owing to its frequent use in short-haul flights.

Table 8-15: APU Emissions Calculation (2030)

APU Type	CO (kg/h)	NO _x (kg/h)	HC (kg/h)	SO _x (kg/h)	PM 2.5 (kg/h)	PM 10 (kg/h)
APU 131-9	6.86	1.87	0.52	0.15	0.23	0.23
APU GTCP331-500	3.85	23.30	0.41	2.04	0.92	0.92
APU PW901A	65.50	10.70	5.85	3.90	11.50	11.50
APU T-62T-47C1	30.50	3.23	0.11	0.51	0.52	0.52

Notably, the APU T-62T-47C1 (DH8), though a minor contributor (1.2% fleet share), emits disproportionately high CO (30.50 kg/h) relative to its size, underscoring inefficiencies in older turboprop APU systems. These findings highlight the critical influence of fleet mix and APU technology on emission profiles, emphasizing the need for targeted mitigation

strategies, such as electrification for high-polluting APUs (e.g., PW901A) and operational restrictions on legacy systems.

Table 8-16: Total Annual APU Emissions (2030)

APU Type	Duration (hrs)	CO (kg)	NO _x (kg)	HC (kg)	SO _x (kg)	PM 2.5 (kg)	PM 10 (kg)
APU 131-9 (35.5% of Code C)	26,984	185,090	50,460	14,032	4,048	6,206	6,206
APU GTCP331-500 (13.5% of Code E/F)	14,393	55,413	335,357	5,901	29,362	13,242	13,242
APU PW901A (15.5% of Code E/F)	16,526	1,082,453	176,828	96,677	64,451	190,049	190,049
APU T-62T-47C1 (1.2% of Code C)	912	27,816	2,946	100	465	474	474
Total (2030)	182,628	1,350,772	565,591	116,710	98,326	209,971	209,971

Mitigation measures

Avoidance (Prevent impacts before they occur)

- Flight routing considerations should be incorporated during the detailed airspace assessment and flight procedure design stages to minimize fuel burn and reduce emissions.
- Promote the adoption of Continuous Descent Approach (CDA) and advanced Air Traffic Control (ATC) systems, where applicable as per traffic conditions on the runways, to avoid unnecessary holding patterns and fuel burn.
- Mandate the use of Fixed Electrical Ground Power (FEGP) and Pre-Conditioned Air (PCA) systems at gates to avoid Auxiliary Power Unit (APU) usage on the ground.
- Discourage high-emission aircraft by enforcing stringent aircraft emission standards aligned with ICAO and national regulations.

2. Minimization (Reduce the intensity or scale of impacts)

- Encourage airlines to adopt fuel-efficient aircraft and flight planning techniques.

- Provide incentives (e.g., reduced landing fees) for airlines using Sustainable Aviation Fuels (SAFs).
- Collaborate with fuel suppliers to establish sustainable fuel infrastructure at the airport to minimize fossil fuel dependence.
- Transition airport Ground operations to electric or hybrid systems (e.g., electric Ground Support Equipment, electric shuttle buses).
- Install electric vehicle (EV) charging infrastructure for airport vehicles and service fleets.
- Promote public transport, carpooling, and non-motorized transport for employees and passengers to reduce vehicular emissions.
- Implement runway and taxiway optimization to reduce aircraft Taxiing time and idle emissions.
- Introduce operational limits on APU use through airport policy and monitoring.

3. Restoration (Rehabilitate affected environments)

- Rehabilitate disturbed green spaces within the airport perimeter through landscaping with native vegetation.
- Develop green buffer zones around airport boundaries to improve local air quality and aesthetics.
- Implement noise and air quality restoration programs in affected communities where feasible.

4. Compensation / Offset (Compensate for residual impacts)

- Apply for ACI's Airport Carbon Accreditation and commit to carbon neutrality or net-zero targets.
- Implement carbon offset programs such as:
 - Afforestation and reforestation in nearby degraded landscapes.
 - Investment in renewable energy projects (e.g., solar farms) to offset unavoidable emissions.
- Introduce airport-led offset schemes for passengers (voluntary carbon contributions).
- Allocate a portion of airport revenues to Fund community-level environmental projects.

8.5.3.2.Noise Pollution

The operation of Bishoftu International Airport is expected to contribute to increased noise pollution due to aircraft operations, ground support activities, and associated vehicular traffic. Aircraft noise will be generated during landing, takeoff, taxiing, and idling, with the highest noise levels occurring during takeoff and landing. The continuous operation of jet engines will produce high-decibel noise that may impact communities living near the airport.

In addition to aircraft, ground support equipment such as baggage loaders, fuel trucks, maintenance vehicles, and auxiliary power units will generate constant noise within the airport premises. The increase in passenger and cargo flights will also lead to more vehicular traffic in and around the airport, with buses, taxis, private vehicles, and freight trucks contributing to noise pollution.

The expected impacts of noise pollution include disruptions to local communities, causing sleep disturbances, stress, and potential long-term health issues such as hearing impairment and cardiovascular diseases. Elevated noise levels may also affect educational institutions, healthcare facilities, and businesses near the airport by interfering with concentration and productivity. Wildlife in the surrounding areas may experience habitat disruption due to persistent high noise levels, potentially leading to changes in animal behavior and migration patterns.

The noise modeling study was conducted to assess the expected noise levels in 2030 resulting from aircraft operations. The detailed methodology and findings are presented below.

The noise pollution assessment for the Bishoftu international airport follows a structured methodology combining operational data, aircraft noise profiles, and environmental factors. First, the fleet mix daily movements of aircraft are integrated with noise-power-distance (NPD) curves for each aircraft type. Flight tracks and runway usage patterns are mapped to simulate noise propagation, accounting for local terrain and weather (elevation: 1,200m, 18°C). The Aviation Environmental Design Tool (AEDT) is then used to calculating metrics like L_{eq} (24-hour equivalent noise) and L_{den} (day-evening-night weighted average).

AEDT integrates aircraft performance data, fleet mix, flight trajectories, and operational parameters to simulate noise exposure (L_{Aeq} , DNL) around airports. The following are the major data sets used in AEDT for modelling sound impact.

List of aircraft types and their share of operations: - the list of aircraft types and their share of operations served as a foundational input for assessing noise impacts in this study (Table 8 5). For noise modelling, the operational shares weighted aircraft-specific noise performance data (e.g., A350-900's quieter Trent XWB engines vs. older B737-800s) in Aviation Environmental Design Tool (AEDT) simulations.

The table below presents a summary of noise contours and area. The finding reveals significant environmental challenges, with 9,405 hectares exposed to 45-55 dB L_{Aeq} , violating Ethiopia's EPA residential (Zone C) night limit of 45 dB.

Table 8-17: Noise contour levels and areas (2030 Forecast)

Noise Level (dB L_{Aeq})	Area (Hectares)	Land Use Compatibility (EPA Zones)	Key Affected Sectors
45-50	9,405	Zone C (Residential)	Northern farmlands
50-55	4,971	Zone C (Residential)	Eastern suburbs
55-60	1,732	Zone B (Commercial)	Airport perimeter
60-65	594	Zone B (Commercial)	Southern industrial
65-70	139	Zone A (Industrial)	Runway approaches
70-75	51	Zone A (Industrial)	Immediate NW runway
75-80	8	Exceeds all limits	Under flight paths
80-85	8	Exceeds all limits	Direct overflight
85-90	1	Exceeds all limits	Runway threshold

High-frequency narrow body operations (e.g., B737 MAX at 35.5% fleet share) dominate the 55-65 dB contours, while long-haul aircraft (B777/B787, 7–17% of fleet) contribute disproportionately to high-noise zones (>70 dB) under flight paths, affecting 68 hectares. Notably, 14,376 hectares exceed residential limits, primarily in northern farmlands and eastern suburbs, while 2,326 hectares breach commercial zone thresholds. The data underscores the urgency of night curfews (23.1% of operations), flight path optimization, and fleet modernization (e.g., replacing turboprops like the DH8) to align with Ethiopia's EPA standards and mitigate community impacts.

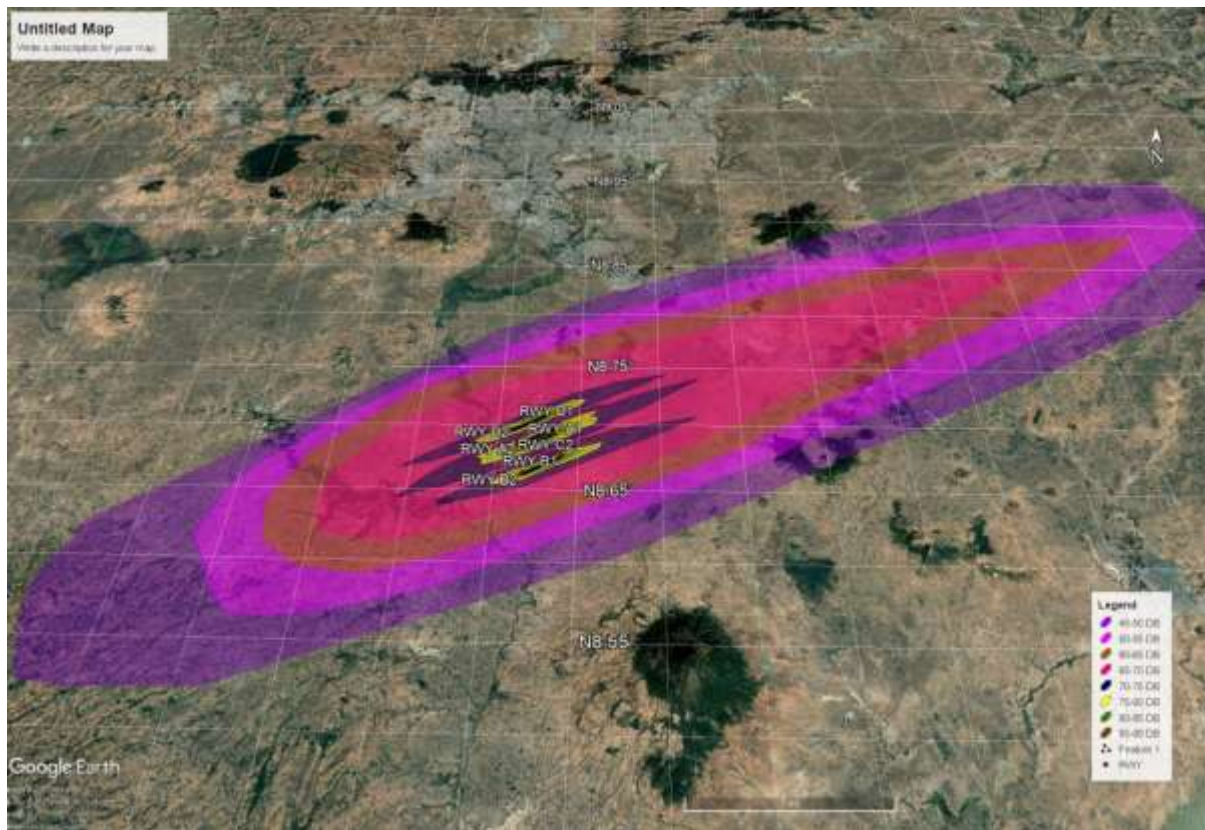


Figure 8-17 Noise pollution exposure map

Mitigation Measures

1. Avoidance Measures

These measures aim to prevent the occurrence of noise impacts in the first place:

- Design optimized flight paths and air corridors to avoid overflights of sensitive receptors (e.g., residential areas, schools, hospitals).
- Avoid scheduling non-essential night flights during the most sensitive hours (e.g., 23:00–06:00).
- Reduce the operation of high-noise aircraft models at the airport during planning and licensing stages.

2. Minimization Measures

These are applied when impacts cannot be fully avoided and aim to reduce their intensity:

- Implement Continuous Descent Approach (CDA) and other noise-abatement flight procedures to reduce thrust and drag.

- Optimize arrival and departure procedures to minimize low-altitude flying over noise-sensitive areas. This should be taken into consideration during the detailed airspace assessment and flight procedure design in future project stages.
- Enforce night curfews for Commercial operations and restrict high-noise aircraft during nighttime.
- Gradually encourage the use of quieter, next-generation aircraft (e.g., Boeing 787, Airbus A350) that comply with ICAO Chapter 14 noise standards through phased operational policies and incentives.
- Gradually phase out older, noisier aircraft, such as Boeing 737 Classics and older turboprops.
- Transition to electric or hybrid ground support equipment to minimize ground noise emissions.
- Design airport infrastructure (runways, taxiways, holding areas) to reduce aircraft idling and unnecessary engine use.
- Restrict noisy maintenance and fueling operations to daytime hours only.
- Establish designated low-noise operational zones within the airport premises.

3. Restoration Measures

These measures are applied to rehabilitate or restore areas affected by noise pollution:

- Use sound-absorbing materials in airport terminals and perimeter structures to reduce ambient noise propagation.
- Construct vegetative noise buffers and embankments around high-noise operational zones to reduce sound travel.
- Restore and enhance natural barriers (e.g., Tree lines) between the airport and residential communities.

4. Compensation / Offset Measures

These measures provide redress when impacts cannot be avoided or fully mitigated:

- Implement noise insulation programs (e.g., double-glazed windows, acoustic paneling) for residences, schools, and hospitals in affected zones (55–65 dB).
- Provide financial compensation or resettlement options for households in areas where noise exceeds acceptable thresholds ($>65 \text{ dB L}_{\text{Aeq}}$).

- Discourage new residential developments in high-noise impact zones; instead, promote compatible land uses such as commercial or industrial development.
- Establish a Noise Monitoring and Mitigation Committee to manage compensation mechanisms and stakeholder engagement.
- Deploy permanent noise monitoring stations and real-time tracking systems integrated with air traffic control for transparent monitoring.
- Set up a public grievance redress mechanism to allow residents to report noise disturbances and receive timely responses.

8.5.3.3. Solid Waste Generation

The operation of Bishoftu International Airport will generate substantial amounts of solid waste from various sources, including terminal buildings, in-flight operations, cargo handling, and maintenance workshops. The waste types will range from municipal solid waste (MSW) and food waste to hazardous materials such as oils, batteries, and electronic waste. The following table shows the primary sources of waste and estimated quantities.

Table 8-18: Solid Waste Sources & Quantities

Source	Waste Type	Estimated Quantity
Terminal Buildings	Municipal Solid Waste (MSW)	0.5 kg/passenger/day
In-Flight Cabin Waste	Food waste, packaging	0.4 kg/passenger/day
Cargo Facilities	Cardboard, pallets, plastics	2 kg/ton of cargo
Support Facilities	MSW + hazardous waste	0.56 kg/employee/day (offices)
Maintenance Workshops	Oils, batteries, tires	0.32 g/m ² /day

Based on the masterplan as passenger traffic increases, the waste generation rate will also rise. The following table provides a phased analysis of waste quantities, categorized into organic, dry recyclables, and residual waste.

Phase	Total Waste (kg/day)	Organic (kg/day)	Dry Recyclables (kg/day)	Residual (kg/day)
40 MAP	121,140	43,323	65,012	21,805
110 MAP	337,410	95,600	181,077	60,734

Solid waste mismanagement at airports can lead to significant environmental, public health, and operational challenges. Improper disposal of solid waste contributes to severe environmental degradation. Uncontrolled waste dumping can result in land and water pollution, as hazardous materials like oils, batteries, and chemicals from maintenance workshops seep into the soil and groundwater. Additionally, open burning of waste may release toxic emissions, deteriorating air quality and posing health risks to airport staff and travelers. Another major concern is the disruption of local ecosystems—improper disposal of food waste attracts birds and other wildlife, increasing the likelihood of bird strikes, which pose a serious safety risk for aircraft operations.

Poor waste management can directly impact public health and hygiene. Accumulation of food waste in terminal buildings and improperly handled in-flight cabin waste create breeding grounds for rodents, flies, and other pests, facilitating the spread of diseases. Airport workers handling waste, especially hazardous materials, face occupational health risks due to potential exposure to toxic substances if proper safety measures are not in place. Ensuring strict waste segregation and disposal protocols is essential to protect both workers and passengers.

Inefficient waste collection and disposal systems can disrupt airport operations. Overflowing waste bins and clogged disposal areas within terminal buildings not only create an unpleasant experience for passengers but may also hinder smooth airport functioning. Furthermore, as air traffic and passenger numbers grow, the increasing volume of waste presents logistical and spatial constraints. Efficient waste management infrastructure, including proper storage, transportation, and processing facilities, is crucial to maintaining airport efficiency and aesthetics.

Addressing these challenges requires a well-structured waste management strategy to minimize environmental damage, protect public health, and ensure seamless airport operations.

Mitigation measures

To minimize these impact, a comprehensive waste management strategy should be implemented, incorporating waste reduction, recycling, safe disposal, and strict regulatory enforcement. The key mitigation measures include:

1. Waste Reduction at the Source

- ✓ **Adopt Green Procurement Practices:** Encourage airlines, vendors, and cargo handlers to use biodegradable or recyclable packaging materials to minimize waste generation.
- ✓ **Passenger Awareness Programs:** Educate travelers on waste segregation and responsible disposal practices through digital displays, announcements, and recycling bins with clear instructions.

2. Efficient Waste Segregation and Recycling System

- ✓ **Establish a Three-Stream Waste Separation System:** Implement designated bins for organic waste, recyclables (paper, plastics, metals), and residual waste throughout the airport.
- ✓ **Integrate waste collected at the airport with off-site treatment/disposal facilities.**



Figure 8-18: Color-coded bins for organic, recyclable, and residual waste in terminal buildings and support facilities

3. Proper Hazardous Waste Management

- ✓ **Dedicated Collection Points:** Establish specialized collection areas for hazardous waste, including batteries, oils, and electronic waste, with clear labeling.
- ✓ **Certified Disposal Partners:** Partner with authorized hazardous waste disposal companies to ensure compliance with environmental regulations.

4. Infrastructure and Logistics Optimization

- ✓ **Strategic Waste Storage Facilities:** Construct well-equipped temporary waste storage areas to manage waste volumes before transportation to disposal sites.
- ✓ **Smart Waste Collection System:** Implement waste collection schedules based on real-time waste generation data using smart bins with fill-level sensors.

8.5.3.4. Fire and Explosion Hazards

During the operational phase of the fuel farm, the handling, storage, and distribution of Jet A-1 aviation fuel present significant fire and explosion risks. Jet A-1 is a highly flammable hydrocarbon. In the presence of an ignition source such as a spark, static discharge, or equipment malfunction and sufficient vapor concentrations, there is potential for fire or even explosion. Such incidents could result in serious injury or fatality, destruction of critical infrastructure, and environmental damage due to fuel combustion and the use of firefighting agents.

Mitigation Measures

1. Fire Detection and Alarm Systems

- Install automated fire detection systems throughout the fuel storage and handling areas, including smoke, heat, and flame detectors.
- Link fire alarms to central control rooms and emergency response systems for rapid notification.

2. Fixed and Mobile Fire Suppression Systems

- Equip the fuel farm with fixed firefighting systems such as:
 - Foam-water sprinkler systems for tanks and bunded areas,
 - Automatic deluge systems in high-risk zones.
- Maintain mobile fire extinguishers and firefighting equipment at critical points.

- Use foam concentrate agents compatible with Jet A-1 fuel fires.
3. Explosion-Proof Equipment and Zoning
- All electrical and mechanical equipment in hazardous zones must be ATEX/IECEx-certified or equivalent.
 - Strict adherence to hazardous area classification (Zone 0, 1, 2) for equipment selection and installation.
4. Static Electricity Control
- Implement electrostatic grounding and bonding systems for all tanks, transfer lines, and refueling equipment to prevent static buildup.
 - Conduct regular checks on grounding integrity during operations.
5. Emergency Response Plan (ERP)
- Develop and maintain a comprehensive ERP specific to fire and explosion scenarios, including:
 - Clear evacuation procedures,
 - On-site firefighting protocols,
 - Communication lines with local emergency services.
 - Conduct regular fire drills and emergency simulations.
6. Fuel Vapor Control
- Use closed-loop fuel transfer systems to minimize vapor emissions during filling and dispensing.
 - Equip vents and breather valves with flame arrestors.
7. Training and Capacity Building
- Provide specialized fire safety training for all personnel handling fuel or working in hazardous zones.
 - Certify key staff in firefighting techniques and use of suppression equipment.
8. Regular Inspection and Maintenance
- Routine testing and servicing of fire protection systems, including foam concentrate quality, pump readiness, and valve functionality.
 - Maintenance of flame arrestors, spark arrestors, and gas detectors.
9. Access Control and Smoking Policy
- Enforce restricted access to fuel farm areas.
 - Clearly mark and enforce no-smoking zones, and prohibit open flames or ignition sources.

10. Monitoring and Auditing

- Periodic safety audits and risk assessments to ensure continued compliance with fire safety standards (e.g., NFPA, ICAO, IATA, and national codes).
- Update mitigation measures based on findings and incident learnings.

8.5.3.5. Hazardous Materials

The aviation industry relies on a wide range of chemicals and some hazardous materials. From keeping engines in good condition to ensuring cabins are clean free from bacteria.

Fuel is the most used chemical with annual consumption. Other key chemical category include anti-freeze, de-icer, biocides, degreasers, solvents and detectors which are toxic to humans and other mammals, and damage the ecosystems where the fluids are discharged, such as the areas around airports. The use of such fluids can cause changes to nearby aquatic habitats that harm fish and other wildlife.

The chemicals used in the aviation industry fall into the following categories;

Biocides and bug kits: these types of chemicals are designed to prevent aircrafts from becoming infested with harmful organisms such as fungi. They include insecticides, fungicides and disinfectants.

Anti-freezing and de-icing: chemicals like ethylene glycol and propylene glycol prevent icing from forming on aircraft during cold weather. Some type of salt also used to de-ice runways before takeoff. However, de-icing chemicals are utilized in airports in cold climates, or those experiencing freezing temperatures and not applicable to Bishoftu International Airport which is located in tropical warm climate.

Contact cleaners: these remove dirt from different surfaces in the aircraft. Contact cleaners include cleaning agents like ammonia solution and hydrogen peroxide.

Degreasers: as the name suggest, degreasing chemicals are sprayed on pipe joints, tube connections, tanks and systems that are under pressure. Leak detectors commonly contain ethylene glycol as an active ingredient.

Solvents and alcohol: these chemicals are used to dissolve paints and other type of coating also used as cleaning agents.

These substances are categorized into different classes of hazardous goods that need proper handling, transportation and storage requirements.

It is a long-term impact, local and cumulative in nature and with increased continuous use of chemicals and hazardous materials. Sensitivity of environmental receptors due to improper handling, transportation and waste management of hazardous materials is given high impact significance, if not in comply with the mitigation measures.

Mitigation Measures

- The airport shall follow applicable national regulations and internationally accepted standards for packaging, labelling, and transport of hazardous materials and wastes;
- The airport shall adequately label all transport tanks and containers to identify the contents, hazards, and actions required in various emergency situations.
- Strengthen the internal waste management system (collection, storage and disposal) of chemicals and hazardous materials and equip it with additional facilities to allow for segregated collection at source.
- Regular visual inspection of all chemical and hazardous material storage areas for evidence of accidental releases and to verify that they are properly labelled and stored.
- Regular audits of waste segregation and collection practices.
- Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments.
- Keeping manifests or other records that document the amount of waste generated and its destination.
- Containers would be covered with lids during storage and transport.
- Regular transport routes and collection times would be fixed and reliable.
- Facility shall have an emergency preparedness and response plan
- Transport staff would wear adequate personal protective equipment (PPE) including gloves, closed shoes, overalls and masks.
- Education and training would be provided to all transport workers and include how to safely handle hazardous material and waste containers that leak or are broken.

8.5.3.6.Liquid Waste Generation

Millions of people annually are expected to use the airport and also local services. As a result, it is therefore anticipated to generate substantial volumes of wastewater, particularly as passenger traffic continues to grow.

The wastewater treatment plant proposed will significantly reduce the amounts of untreated waste water from the airport and minimize health risks caused by the environmental pollution, particularly for those using the nearby rivers water for agriculture and household consumption.

However, the allowable effluent discharge standards may not be some times achieved as previous experiences of similar plants show. A breakdown in any component of the treatment plant, blockage or system failure, ill management and possible process upset caused by fatigue, lack of competence, lack of timely maintenance, power outage and others may lead to below standard treatment which negatively affect the efficiency of the treatment process. This means that the effluent water quality might not be acceptable for discharge into the river and may adversely aggravate current river pollution in the downstream.

Table 8-19: Wastewater flows at different phases of airport development

Airport Phasing	Average Sewage Flow (m³/day)
40 MAP	5,097
60 MAP	7,472
80 MAP	10,013
110 MAP	15,390

Another potential impact is environmental pollution. If the airport's wastewater treatment facilities are not adequately designed or maintained, there is a risk that untreated or insufficiently treated wastewater could be released into nearby water bodies. This could result in water contamination, which would harm aquatic ecosystems and threaten the local community's access to clean water. Additionally, managing the growing volumes of wastewater will require more resources for effective treatment and disposal, leading to higher operational costs. This could strain the airport's budget and compromise its long-term sustainability.

Lastly, improper wastewater management could pose serious health risks. Passengers and workers may be exposed to waterborne diseases, such as cholera and typhoid, as pathogens thrive in untreated wastewater. This underscores the importance of proper wastewater management systems to protect both the environment and public health as the airport's operations expand.

Mitigation measures

1. Avoidance

- **Design optimization:** During the planning and design stages, avoid unnecessary wastewater generation by adopting water-efficient fixtures and infrastructure across airport facilities, such as low-flow toilets and taps, waterless urinals, and sensor-based systems.
- **Process redesign:** Incorporate water-saving technologies in airport operations to avoid excessive water use and reduce the volume of wastewater generated.

2. Minimization

- **Advanced treatment technologies:** Introduce advanced wastewater treatment systems such as Membrane Bioreactors (MBR), Advanced Oxidation Processes (AOPs), and Reverse Osmosis (RO) to minimize pollutants in the effluent before discharge.
- **Water reuse systems:** Implement on-site wastewater reuse for non-potable applications such as landscape irrigation, toilet flushing, and HVAC cooling systems, significantly reducing the volume of wastewater discharge.
- **Smart monitoring systems:** Install real-time sensors and smart monitoring systems throughout the wastewater infrastructure to detect leaks, overflows, and irregularities early, ensuring efficient system operation.
- **Education and awareness:** Conduct regular awareness programs for staff, passengers, and service providers on water conservation and proper waste disposal to minimize pollutant load in wastewater streams.

3. Restoration

- **Rehabilitation and maintenance:** Establish a scheduled maintenance and cleaning regime for the wastewater system to restore capacity and ensure efficient treatment.
- **Green infrastructure:** Incorporate constructed wetlands or green buffer zones where possible to support natural polishing of treated wastewater and improve ecosystem health.
- **Soil and vegetation restoration:** In areas affected by wastewater discharge or spillage, undertake soil remediation and revegetation to restore degraded environments.

4. Compensation / Offset

- Support local water management initiatives: As part of offset measures, contribute to local watershed management programs or support nearby communities with access to treated wastewater for agricultural or non-potable uses.
- Biodiversity offsets: Where wastewater infrastructure might disturb natural habitats, provide funding or implementation support for conservation efforts, such as the restoration of nearby wetlands or riparian buffers.

8.5.3.7. Increased Traffic Congestions

The operation of Bishoftu International Airport are expected to significantly increase vehicular traffic, leading to congestion in the surrounding road networks. This congestion can have several negative impacts:

1. Increased traffic can cause delays for passengers, employees, and cargo vehicles, reducing the overall efficiency of airport operations. This may lead to missed flights, longer commute times, and logistical challenges for businesses relying on timely cargo deliveries. According to the master plan Peak-hour vehicular demand shows 5,330 departing and 5,230 arriving passengers during Phase 1, with private cars dominating (57% international, 42% domestic). This high volume risks bottlenecks at curbside drop-off/pickup zones and parking entrances.
2. Higher traffic volumes contribute to increased emissions of greenhouse gases and air pollutants, worsening air quality and contributing to climate change. Noise pollution from idling vehicles and honking can also affect nearby communities.
3. Congested roads increase the likelihood of accidents, particularly in areas where vehicles, pedestrians, and airport shuttles intersect. Emergency response times may also be delayed due to traffic bottlenecks.
4. Traffic congestion can raise operational costs for businesses, including fuel wastage, increased maintenance for vehicles, and lost productivity due to delays. It may also deter potential investors or travelers who perceive the airport as difficult to access.
5. Residents and workers in the vicinity may experience reduced quality of life due to constant traffic noise, longer commute times, and restricted mobility.

Table 8-20: Estimated Traffic Impact (Peak Hour)

Scenario	Vehicle Volume (Peak Hour)	Road Lanes Required	Congestion Risk
Baseline (7% rail)	3,646 vehicles	5 lanes	High
Sensitivity 1 (12% rail)	3,455 vehicles	4 lanes	Moderate-High
Sensitivity 2 (22% rail)	2,953 vehicles	4 lanes	Moderate

Proposed Mitigation Measures

1. Avoidance Measures

- Integrate transportation infrastructure into early planning: Incorporate traffic management needs into the masterplan to prevent future congestion.
- Promote airport-rail integration from inception: Prioritize the development of a dedicated rail line connecting Bishoftu International Airport with Addis Ababa and the existing airport to avoid overdependence on road transport.

2. Minimization Measures

- Optimize Public Transport Options:
 - Provide high-frequency shuttle services and dedicated bus lanes for employees and passengers to reduce the number of private vehicles.
 - Promote ride-sharing for employees and passengers by offering incentives such as priority parking or reduced fees.
- Traffic Flow Management:
 - Use real-time traffic monitoring systems, adaptive traffic signal controls, and dynamic signage to reduce delays and congestion.
 - Coordinate shift schedules for airport employees to avoid overlapping with peak passenger travel times.
- Infrastructure Enhancements:
 - Construct overpasses or underpasses at major junctions to minimize traffic interruption.

- Provide adequate, well-designed parking areas with clear signage and promote off-site parking with shuttle access for long-term users.
 - Establish designated curb zones for taxis, private cars, and buses to reduce dwell times and improve flow.
- Non-Motorized Transport Infrastructure:
 - Develop sidewalks, pedestrian bridges, and bicycle lanes to encourage safe and sustainable mobility within the airport vicinity.
- Demand Management:
 - Introduce tolls or congestion fees during peak hours to reduce unnecessary private car trips.

3. Restoration Measures

- Rehabilitate affected areas: After construction, restore any road surfaces, sidewalks, or access ways temporarily disrupted by traffic management infrastructure upgrades.
- Replant vegetation: Where landscaping is removed for traffic facilities, undertake greening and replanting to restore the aesthetic and environmental balance.

4. Compensation/Offset Measures

- Offset emissions from increased traffic through environmental programs (e.g., urban reforestation or community greening initiatives).
- Promote electric vehicles: Provide charging infrastructure and incentivize the use of electric buses and taxis to offset carbon emissions.
- Construct noise barriers and integrate landscaping buffers to reduce the impact of traffic-related noise and visual intrusion on surrounding communities.

8.5.3.8. Community Health and Safety

The construction and operation of the airport will introduce several potential community health and safety risks due to the proximity of residential areas, natural habitats, and socio-economic activities around the project site. These risks include deterioration of air quality from aircraft and vehicular emissions, elevated noise levels, increased risk of bird strikes, and various public safety concerns, including those related to ground traffic, hazardous materials, and emergency preparedness. This section outlines the anticipated risks and provides detailed mitigation and management measures following the mitigation hierarchy (avoidance, minimization, restoration, and compensation/offset).

Aircraft operations emit pollutants such as NO_x, SO_x, PM_{2.5}, PM₁₀, CO, and unburnt hydrocarbons. Ground support equipment (GSE), backup generators, and vehicular traffic also contribute to local air quality degradation. These pollutants can affect respiratory health, particularly among vulnerable groups like children, the elderly, and people with pre-existing respiratory conditions.

Aircraft take-off, landing, and ground operations generate significant noise that can disturb local residents, interfere with sleep, affect learning in schools, and cause long-term health issues such as hypertension or stress.

Bird strikes pose safety risks to aircraft, particularly during takeoff and landing, and also cause ecological imbalances through airport-induced habitat changes that attract birds.

Proposed Mitigation Measures

Avoidance Measures

- Air Quality:
 - Site sensitive receptors (schools, health centers, residences) away from major emission sources (e.g., runways, tarmacs, fuel depots).
 - Locate the airport away from densely populated areas to reduce cumulative exposure to emissions and noise.
- Noise Pollution:
 - Design flight paths and airport layout to avoid flying over schools, hospitals, and residential neighborhoods, especially during takeoff and landing.
- Bird Strike Risks:
 - Avoid placing the airport near wetlands, landfills, or known bird migratory routes during the site selection phase.
- Public Safety:
 - Designate land-use buffers around the airport to prevent incompatible development and ensure zoning regulations restrict sensitive uses within high-risk zones.

2. Minimization Measures

- Air Quality:
 - Promote the use of fuel-efficient, low-emission aircraft and vehicles.
 - Electrify ground support equipment (GSE) and internal airport transport fleets.

- Enforce anti-idling policies for aircraft and ground vehicles.
 - Install dust suppression systems during construction activities.
- Noise Pollution:
 - Impose flight curfews or restrictions during nighttime hours (e.g., 10:00 PM–6:00 AM).
 - Require airlines to use low-noise aircraft and implement continuous descent approaches (CDAs).
 - Construct sound barriers or berms along airport boundaries adjacent to communities.
 - Design runways and taxiways to reduce reverse thrust and engine run-ups near populated zones.
- Bird Strike Hazards:
 - Apply habitat management practices around the airport (e.g., grass height control, removal of standing water).
 - Install bird deterrent systems (auditory, visual, falconry).
 - Ban or strictly control food waste disposal and open garbage areas within the airport perimeter and surrounding zones.
- Public Safety:
 - Establish a comprehensive Airport Emergency Response Plan (AERP) covering crash, fire, chemical spill, and natural disaster scenarios.
 - Install proper fencing, surveillance (CCTV), and access control systems to secure the airport perimeter.
 - Design safe access roads with proper signage, pedestrian crossings, and speed limits.
 - Train airport staff and contractors in hazardous material handling, first aid, and emergency evacuation.

3. Restoration Measures

- Air Quality and Ecosystems:
 - Rehabilitate disturbed areas around the airport with vegetation to act as green filters and improve aesthetics and air quality.
 - Restore nearby affected natural habitats, particularly those degraded during construction (e.g., wetlands or grasslands).

- **Noise-Affected Structures:**
 - Retrofit public buildings (e.g., schools, health centers) within high-noise zones with soundproofing materials.
- **Bird Habitat:**
 - Support offsite restoration of wetlands and bird habitats away from airport zones to safely redirect bird populations.
- **Community Infrastructure:**
 - Rehabilitate and upgrade local access roads and footpaths affected by airport-related traffic or construction works.

4. Compensation/Offset Measures

- **Air Quality and Noise:**
 - Provide health awareness and support programs for vulnerable community members affected by air quality or noise impacts.
 - Fund community-based tree planting and urban greening projects as carbon and noise offsets.
- **Bird Strike and Biodiversity:**
 - Support environmental education programs in nearby schools and communities to foster awareness of airport-related biodiversity risks.
 - Collaborate with wildlife authorities to manage relocated habitats or establish conservation offset sites.
- **Public Safety:**
 - Establish a Community Liaison Unit to receive grievances, share emergency information, and engage in safety awareness campaigns.
 - Contribute to local emergency services (e.g., fire stations, clinics) through capacity-building and resource support.

8.5.3.9. Occupational Health and Safety

Impacts related to occupational health and safety (OHS) have been adequately addressed with reference to the mobilization and construction phase. Much of the OHS negative impacts address earlier, in particular related to the construction phase also hold true to the operation phase. Furthermore, the impacts discussed above under the operation phase including air and noise pollution, solid and liquid waste generation (both hazardous and non-hazardous) as well as traffic congestion can directly and indirectly be regarded as sources of OHS impacts.

As such, the mitigation measures recommended in relation to each impact also apply to those of OHS.

Space & Duration

- Once fully operational, ensure all works are cleared: airside pathways open, no residual hazards or debris.

Reversibility

- If future expansion is planned, use flexible designs enabling adaptation or dismantling without structural impact—e.g., modular installations.

Mitigation Measures

- Transition safety oversight from construction-focused to airport operational safety protocols.
- Integrate prevention-through-design: embed hazard reduction in design to minimize reliance on PPE alone.
- Ongoing safety culture with periodic audits, refresher trainings, and review of incident trends.

However, other relevant OHS impacts and their mitigation are given in the table below.

Impact Area	Health/Safety Risks	Recommended Actions
Staff & Ground Safety	Physical injury, noise, ergonomics, fatigue, human error	PPE, training, SMS, maintenance, fatigue management
Public Health	Disease spread through surfaces, air, crowds	Enhanced cleaning, sanitizers, ventilation, screening, distancing
Air Quality & Environment	Pollutants, noise, water/fuel spills	Transition to sustainable aviation fuel (SAF) and electrify ground support equipment (GSE) monitoring, drainage control, noise barriers
Wildlife Hazards	Bird strikes, wildlife disease	Conduct regular Wildlife Hazard Assessments (WHA) and implement Wildlife Hazard

		Management Plans (WHMP) integrated with SMS, fencing, habitat management, wildlife emergency drills.
Emergency Response	Fires, hazardous material, medical events	ERP, training, drills, inter-agency coordination

By integrating these mitigation strategies through robust Safety Management Systems, staff training, advanced technology, and continual risk monitoring airports can significantly enhance health and safety during regular operations while minimizing risks to staff, passengers, and surrounding communities.

8.5.3.10. Fire and Explosion Hazard

The operation of the fuel farm involves the handling, storage, transfer, and distribution of Jet A-1 fuel a highly flammable substance. The presence of large volumes of this fuel, coupled with pressurized systems, mechanical operations, and potential ignition sources (e.g., static electricity, electrical faults, or accidental human error), creates a significant fire and explosion hazard. Key scenarios include:

- Overfilling of tanks leading to fuel spills and vapor buildup
- Equipment failure or pipeline leakage
- Static discharge during fuel transfer
- Exposure of fuel to open flame or hot surfaces
- Electrical sparks from lighting, motors, or instrumentation

If not properly controlled, such incidents could cause major fires or explosions, leading to human injury or fatality, loss of infrastructure, environmental contamination, disruption of airport operations, and damage to public confidence in safety.

Mitigation Measures

1. Avoidance

- Design Phase Risk Elimination:

- Install fixed roof tanks with internal floating suction and automatic shut-off systems to eliminate overfill risks.
 - Strictly separate fuel storage areas from passenger and operational buildings using NFPA 30-compliant plot planning (safe distances and fire zoning).
- Hazardous Area Classification:
 - Implement IEC 60079 standards to designate and restrict access to high-risk zones.
- Material Selection:
 - All electrical and mechanical systems in hazardous zones must be explosion-proof (Ex-rated).

2. Reduction (Minimize likelihood or consequence)

- Engineering Controls:
 - Install fire and gas detection systems with real-time alarms and shutdown capability.
 - Equip the facility with foam-based fire suppression systems, portable extinguishers, fire hydrants, and emergency spill kits.
 - Incorporate emergency shut-off valves and pressure relief systems in critical pipeline sections.
- Operational Controls:
 - Ensure regular preventive maintenance of storage tanks, hydrant systems, pumps, and valves.
 - Conduct routine inspection and calibration of pressure and temperature sensors.
- Personnel Management:
 - Restrict fuel farm access to trained and authorized personnel.
 - Implement a Permit-to-Work (PTW) system for all hot work or confined space activities.
 - Train all operators in fire prevention, spill response, and use of fire extinguishing equipment.
- Lightning Protection & Grounding:
 - Equip tanks, pumps, and pipelines with static grounding systems and lightning arrestors to reduce ignition risk.

- **Monitoring Systems:**
 - Use Tank Gauging Management Systems (TGMS) and Leak Detection Systems (LDS) to monitor and prevent abnormal fuel levels or pressure variations.

3. Remedy / Restoration (Prepare for incident response)

- **Emergency Response Plan (ERP):**
 - Develop and test a site-specific ERP, with procedures for firefighting, evacuation, and emergency communication.
 - Maintain a dedicated firefighting team on site trained in aviation fuel fires.
- **Containment Systems:**
 - Construct bund walls around tanks to contain spills from a single full tank plus 10% extra volume.
 - Provide oil-water separators to treat firefighting runoff before discharge.
- **Post-Incident Assessment:**
 - Conduct root cause analysis and immediate rectification after any fire-related incident.
 - Rehabilitate affected areas and infrastructure in accordance with safety standards.

4. Compensation / Offset

- **Insurance and Liabilities:**
 - Ensure comprehensive insurance coverage for environmental damage, human health, and asset loss due to fire/explosion.
- **Community Safety Support:**
 - Support local firefighting capacity and engage nearby communities in awareness and preparedness drills.

8.5.3.11. Soil contamination

Impacts to soil resources during the operation phase derive from contamination potential. This includes the potential to impact on soil resources due to likely exposure of contamination due to unplanned releases of hazardous substances and chemicals. Airlines use a variety of hazardous chemicals, including jet fuel, lubricants, hydraulic fluids, and cleaning agents, as

well as chemicals used in aircraft maintenance and de-icing. These substances are categorized into different classes of dangerous goods, each with specific handling and transportation requirements.

However during operation phase, soil exposure to chemical and oil spills is minimum as cargo facilities, workshops, garages, runways, training centers and offices are already to be covered with asphalt or tarmac and other floor covering materials like tile, ceramic and granite stones.

Based on that, the likelihood of soil exposure to chemical and oil spillages is to some extent likely to occur in some specific areas uncovered with asphalt, tarmac or other floor covering materials. Therefore the extent of these impacts will be local, temporary and reversible. And as a result it has low impact significance.

Mitigation measures

- In case of spillage it should isolated the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by environmental specialist.
- Frequent monitoring of garages or plane maintenance rooms, workshops, parking area and others to check any leakage and if in compliance with the design.

8.5.3.12. Surface and groundwater Contamination

The major impact on the water resource of the project areas and their down streams is anticipated from spillage of chemicals, oil, fuel and other hazardous substances such as , biocides, degreasers, solvents and detectors from vehicles, cargo facilities, maintenance rooms, garages, workshops, and other facility infrastructures.

If not properly managed, contaminated drainage water may enter into nearby streams and rivers. This will further aggravate the existing pollution of Awash River which currently affecting all downstream users up to its end course at Ethio- Djibouti border.

The other thing that needs attention is groundwater resource of the area. Despite groundwater table depth in the airport area is estimated to be 70m below ground level and seems to have less impact, the tectonic dynamism of the rift system resulting in fractures and joints, deep gullies and the groundwater flow direction may create conducive path for contaminated water to reach groundwater reservoir in the long run. During baseline survey, it was observed that the extensive plain towards eastern and south eastern direction is part of Ada'a plain groundwater

system where already categorised as one of the prospective groundwater area for water supply and irrigation purposes.

Hence, keeping water resource of the area safe and free of contamination is critical and needs proper waste management and regulating.

Surface water drainage infrastructure has been included in the design of the Proposed Project to manage surface water runoff across the Proposed Project Area. This and the implementation of management plans will ensure that no significant impacts will occur in surface water flows to hydrological receptors and downstream receptors. This will also control pollutants and prevent discharge of polluted surface water off-site.

Therefore, the likelihood of water body contamination is likely to occur during improper drainage system and hazardous waste management. The impact consequence of the activities is anticipated to be medium due to the fact that it is predictable, but spatial in scale and magnitude and can be avoided with proper hazardous waste management and applying the proposed mitigation measures. Hence the significance of the impact is rated moderate.

Mitigation measures

- Develop and implement a waste management plan in accordance with national hazardous management to guide the daily waste management operations.
- Used oils and lubricants shall be collected and disposed off safely.
- All drums, containers or bags containing oil/fuel/lubricating materials and other hazardous chemicals shall be stored at special designated disposal sites on a sealed and/or bonded area in order to contain potential spillage.
- All waste containers shall be collected and disposed off at designated disposal sites in line with the Ethiopian government waste management regulations.
- Incorporate implementation of surface water drainage infrastructure management plans in the design document.
- Waste water treatment facilities shall be properly operated and managed as per the design.

8.5.3.13. Increased water and energy demand

1. Water Demand

Due to the construction and operation of an airport, there will be an increased demand for potable as well as raw water. These surge in water demand will put stress on the already meagre resource.

The demand for clean water is expected to be huge. Based on the planning parameters provided in the master plan, the proposed water network is designed to accommodate the ultimate capacity of the airport facility users and which corresponds to the water needs of the expected number of employees, passengers and visitors in addition to the number of meals prepared daily. Below is total water demand for each phase:

Table 8-21: *Water demand in m³/day for each phase*

<i>Airport Phasing</i>	<i>Average Water Demand (m³/day)</i>
40 Million Passengers	5,996
60 Million Passengers	8,791
80 Million Passengers	11,780
110 Million Passengers	18,111

There are three option of possible water sources for the airport. Such as;

- I. **Existing water supply network:** one option for water source is to connect to Addis Ababa or adjacent towns water supply distribution network. Nevertheless, Addis Ababa is facing a severe water supply shortage due to a combination of factors including rapid urbanization, population growth, and climate change. The city's current water demand significantly surpasses its supply capacity, leading to intermittent water availability and rationing for many residents. Hence this option is not reliable and sustainable source.
- II. **Water supply source from surface water:** Akaki and its downstream Awash River are perennial rivers that flow throughout the year. To utilize it by constructing water treatment plant is though possible, water quality conditions in the rivers is a big concern as they are experiencing severe water pollution due to rapid urbanization and industrialization in the upstream and are susceptible to further chemical spills and accidental releases.
- III. **Groundwater source:** Groundwater is more essential and feasible water supply source to be utilized for the airport.

Eastern part of the airport area is part of Ada'a Plain Groundwater System, one of the potential areas proved to be future prospective area for irrigation and water supply to towns including Addis Ababa City. Groundwater abstraction from deep wells can meet water supply demand of the airport both during construction and operation phase.

One of the main concerns of pumping ground water is excess utilization or over-exploitation of the well field principally in the future when numerous boreholes are expected to be drilled for adjacent towns and irrigation purposes. Then it may lead a total imbalance on the local ground water system or even the effect will propagate basin wise. Therefore big emphasis should be given to limit pumping of water beyond the optimum well yield.

In another situation, studies indicate leaks and bursts in pipe networks, account for a substantial portion of the total water loss in the country. This wastage, alongside other factors, leads to a demand-supply gap and negatively impacts the efficiency of the water distribution system.

2. Energy demand

The airport is expected to consume high amount electric energy for various purposes such as lighting, electric cookers, refrigerators, boilers, washing machines, air conditioners, welding machines and others. This will add additional stress on electric energy supply in the area where currently most of the industries of the country are concentrated from Addis Ababa to Bishoftu Area. Therefore, energy use efficiency plan should be implemented through measuring and analysing energy consumption data to determine how effectively energy is being used. This includes evaluating the energy input and output of various processes, identifying areas of energy waste, and quantifying the potential for energy savings. Key performance indicators (KPIs) like Energy Use Intensity (EUI) are used to benchmark performance and track improvements over time.

Based on the performance indicators, energy management measures, technology acceleration measures and alternative energy sources have to be incorporated in the plan.

Technology acceleration measures are like for example to use a faster diffusion rate of efficient tube lamps, improved cook stoves and also adopting solar and biomass energy technologies. Solar energy can provide process heat and electricity, while biomass can be utilized for both heat and power generation, offering additional energy sources.

The likelihood of increased water and energy demand is known to occur, local and long term. However the impact consequence of stress on energy and shortage of water flow on downstream users or groundwater depletion can be minimized if proper water and energy management is implemented. Therefore, the significance of the impact is rated moderate.

Mitigation Measures

Water Management

- Avoid pumping of water beyond the optimum well yield recommended in drilling well completion reports .and should consider the overall groundwater potential system of the area.
- Conduct watershed management practices and soil-water conservation in and around the project area to enhance groundwater recharge.
- Introduce use of available precipitation (rain harvesting).
- Artificial groundwater recharge mechanism for example used water after treatment can be injected to groundwater to enhance groundwater recharge of the area.
- Implement proactive pipe line leak detection and repair, upgrading aging infrastructures, adopting smart technologies for monitoring and management, and promoting water use efficiency.

Energy Management

- The energy facility unit shall carry out regular surveys on key energy consuming appliances and equipment and each survey should be updated annually.
- Also it should have a central database where information on energy consumption, energy performance, efficiency and monitoring results are collected, collated and prepared for analysis.
- Regulatory and target setting measures, capacity building measures, finance measures, energy management measures, technology acceleration measures and supply chain measures shall be implemented in coordinated manner to process optimization and ensuring the most efficient technology is in place and a key energy savings .
- Adopt alternative additional energy sources like solar and biomass energy technologies to relive stress on electrical energy from the national grid system.

8.5.3.14. Vegetation and Flora

During the operation phase of an airport, vegetation and flora may face several adverse impacts due to ongoing human activities. These include habitat fragmentation, where increased infrastructure such as runways and terminals disrupt plant communities and wildlife corridors. Air and noise pollution from aircraft operations can negatively affect plant growth, health, and biodiversity. Invasive species may also spread more easily in disturbed areas, outcompeting native plants and altering local ecosystems. Additionally, light pollution can disrupt plant

cycles, such as flowering and seed dispersal, while the runoff of chemicals and pollutants from airport operations can contaminate surrounding soils and water sources, further harming plant life. Overall, the cumulative effect of these disturbances can lead to a decline in local vegetation diversity and ecosystem health.

Mitigation measures

- Restore and maintain natural habitats around the airport by planting native species and creating green buffers to protect ecosystems.
- Establish wildlife corridors to ensure safe movement for fauna and the preservation of critical plant communities.
- Implement stringent measures to minimize air, water, and soil pollution from airport operations, such as reducing emissions from aircraft, controlling stormwater runoff, and managing waste properly.
- Use environmentally friendly de-icing and cleaning products to prevent contamination of surrounding soils and water bodies.
- Regularly monitor for the presence of invasive plant species and take action to remove or control their spread.
- Promote the growth of native plant species through replanting and habitat management efforts to reduce the establishment of non-native species.
- Use noise barriers, reduced operating hours, and quieter technology to limit noise disturbances on surrounding vegetation.
- Install wildlife-friendly lighting systems that minimize light pollution, particularly in areas sensitive to nocturnal plant and animal life.
- Create and maintain buffer zones around sensitive plant habitats, limiting direct disturbances from airport activities such as construction or expansion.
- Ensure that buffer zones are protected from further development and maintained with minimal human interference.
- Educate airport staff and the surrounding community about the importance of protecting local flora and promoting biodiversity conservation.
- Involve local conservation organizations in monitoring and habitat restoration efforts.

8.5.3.15. Habitat and Wildlife

During the operation phase of an airport, wildlife and bird populations can face significant impacts due to ongoing airport activities. Habitat fragmentation is a primary concern, as the

expansion of runways, terminals, and other infrastructure can disrupt wildlife corridors and reduce the availability of suitable habitats. Birds, in particular, are at risk of collision with aircraft, especially during migration periods or when flying in proximity to the airport. Noise pollution from aircraft operations can disturb bird behavior, such as feeding, nesting, and breeding, while light pollution may disorient nocturnal species and affect their natural cycles. Additionally, the continuous human presence and activity around the airport can lead to displacement of wildlife, reducing biodiversity and altering local ecosystems. The cumulative effects of these disturbances can lead to a decline in wildlife populations and a decrease in overall ecological health surrounding the airport.

Observations revealed frequent bird movement between the Bishoftu lakes and the Akaki-Aba Samuel area, particularly during the winter season. This seasonal migration underscores the ecological link between these locations, meaning that habitat changes in one area could affect bird populations in the other. As a result, the project's implementation may disrupt migration patterns and habitats, potentially causing ecological imbalances. Furthermore, the presence of birds along this movement corridor heightens the risk of bird strikes, posing a safety concern for aircraft operations. Therefore, this interaction represents a significant impact on both avian populations and aviation activities.

Mitigation measures

- Create and maintain wildlife corridors to ensure safe movement of animals across the airport site.
- Use fences, tunnels, or bridges to prevent wildlife from accessing hazardous areas.
- Implement flight path management to avoid bird activity in critical areas.
- Preserve and restore natural habitats around the airport, especially near sensitive areas like wetlands and forests.
- Establish buffer zones around key wildlife habitats to minimize disturbance from airport operations.
- Implement noise-reduction technologies to minimize disruptions to wildlife, particularly during sensitive breeding or nesting periods.
- Monitor and manage invasive species to prevent them from outcompeting native flora and fauna.
- Regularly remove or control invasive plants and animals around the airport.
- Continuously monitor wildlife populations, bird activity, and habitat health.

- Use adaptive management practices to address any emerging issues based on monitoring results.
- Develop and implement a bird hazard control program, including monitoring and active deterrence measures.
- Modify airport surroundings to reduce food, water, and shelter availability for birds near runways. This may include vegetation management and water drainage modifications.
- Employ bird control measures such as auditory and visual deterrents, falconry, or habitat modification to minimize bird strikes.
- Where possible, adjust flight paths to minimize interactions with bird migration routes and high-bird-activity zones.
- Use bird-friendly lighting and minimize reflective surfaces to reduce bird attraction to the airport area.

8.5.3.16. Migratory Birds

During the operation phase of the Bishoftu International Airport, a significant potential impact is the disturbance and collision risk to migratory bird routes linked to the Bishoftu Lakes and Aba Samuel Reservoir, as these areas are recognized migratory bird habitats located approximately 40 km from the project site. Migratory birds seasonally cross the BIA airspace, increasing the likelihood of bird strikes, which pose safety risks to aircraft and can also result in bird mortality. Additionally, increased air traffic, noise, and habitat fragmentation during implementation may disrupt traditional migratory patterns, feeding grounds, and resting areas. These impacts necessitate targeted mitigation measures, including habitat management, bird monitoring, flight scheduling considerations, and bird strike prevention systems in line with ICAO and AfDB requirements.

The combined effects of the Bishoftu International Airport and other ongoing developments in the area are anticipated to cause progressive habitat degradation and fragmentation, particularly affecting vital vegetated zones that support wildlife movement. Given the airport's position along recognized migratory bird pathways connected to the Bishoftu Lakes and Aba Samuel Reservoir, there is an increased likelihood of bird collisions, habitat displacement, and disorientation due to air traffic, lighting, and related disturbances. Furthermore, the cumulative impact of expanding infrastructure could weaken ecosystem stability, disrupt water systems, and accelerate biodiversity decline. The project may also facilitate the spread of invasive

species through increased transportation and human activity, while elevated noise and artificial light from the airport and surrounding developments are expected to further interfere with wildlife behavior, reproduction, and the use of critical habitats by sensitive species.

Mitigation measures

- **Habitat Avoidance:** Critical habitats and stopover areas for migratory birds near the project site will be avoided through careful site planning and the establishment of No-Go Zones. However, as the construction phase itself may attract migratory birds and their movement patterns are not fully known at the design stage, a seasonal bird monitoring program will be implemented by the contractor. This will be done in collaboration with qualified biodiversity specialists and national wildlife conservation authorities. The monitoring program will assess seasonal and spatial movement patterns of migratory birds. Based on the results, ecologically sensitive areas such as stopover sites, nesting grounds, and flight corridors will be identified. These findings will guide the delineation of No-Go Zones, minimizing disturbance to bird populations. Additionally, once the aircraft take-off and landing directions are finalized, this data will be integrated with bird movement findings to refine the No-Go Zones, helping avoid overlap with critical avian habitats. This approach enhances both biodiversity protection and aviation safety by reducing the risk of bird strikes.
- **Risk Minimization:** Bird attractants (open water, food waste) will be controlled, and bird deterrent systems (visual and acoustic) will be installed around operational areas.
- **Habitat Restoration:** Disturbed non-operational areas will be rehabilitated with native vegetation to support biodiversity while reducing bird presence in high-risk zones.
- **Offsets and Conservation Support:** The project will collaborate with authorities to support regional bird conservation initiatives around Bishoftu Lakes and Aba Samuel Reservoir.
- **Monitoring and Adaptive Management:** A Bird Strike Monitoring Program will track risks and incidents, with ongoing adjustments to mitigation based on monitoring results and expert input.

8.5.3.17. Urban Heat Island Effect (UHIE)

The Airport dense cluster of buildings, extensive paved surfaces, and limited natural ground cover have the potential to significantly elevate local ambient temperatures relative to surrounding rural areas. Studies indicate that urban heat islands can increase temperatures by 1–3°C or more, depending on the density and materials used. This temperature rise can:

- Increase energy demand for cooling buildings by up to 20–30%, leading to higher operational costs and greenhouse gas emissions.
- Reduce outdoor thermal comfort, discouraging pedestrian activity and impacting public health, especially vulnerable groups such as children, the elderly, and people with respiratory or cardiovascular conditions.
- Exacerbate local air pollution and contribute to heat-related illnesses.

Given Airport's planned scale and mixed-use development, mitigating UHIE is critical to ensuring sustainable urban living conditions and minimizing climate impacts.

Quantitative Assessment:

- Surface Temperature Monitoring: Baseline and ongoing measurements of surface temperatures using satellite imagery and on-site sensors to identify hotspots.
- Energy Modeling: Simulate potential cooling load increases under different urban design scenarios to estimate additional energy consumption due to UHIE.
- Green Space Ratio: Aim towards achieving a minimum of 30% green and permeable surfaces within the Airport City footprint to achieve measurable cooling benefits (as deemed feasible and applicable by the design).

Mitigation Measures:

- Maximize Green and Open Spaces: Design and allocate at least 30% of the Airport City area to green spaces such as parks, green belts, and landscaped plazas. These areas will serve as “cool islands,” helping reduce ambient temperature through evapotranspiration and shading.
- Use of Cool Materials: Specify roofing and paving materials with a high solar reflectance index ($SRI \geq 70$) to reflect sunlight and reduce heat absorption. For example, cool roofs can reduce roof surface temperatures by 30–40°C compared to conventional materials.

- **Green Roofs and Vertical Gardens:** Encourage installation of green roofs covering at least 20% of available rooftop area on commercial and residential buildings. Green walls and vertical gardens can further insulate buildings and reduce ambient temperatures (as deemed feasible and applicable by the design).
- **Tree-Lined Boulevards and Shaded Corridors:** Plant native, drought-tolerant tree species along major roads and pedestrian pathways to provide continuous shade. Target canopy coverage of at least 40% for pedestrian zones (as deemed feasible and applicable by the design).
- **Urban Design for Ventilation:** Orient buildings and street layouts to enhance natural airflow and cross-ventilation, reducing stagnation of hot air. Implement spacing standards that prevent canyon effects which trap heat.
- **Energy Efficiency Integration:** Incorporate energy-efficient HVAC systems, shading devices, and smart building technologies that adjust cooling based on outdoor temperature and solar exposure. Promote passive cooling design features such as overhangs and operable windows.
- **Monitoring and Adaptive Management:** Establish a monitoring program using temperature sensors and energy use data to evaluate mitigation effectiveness and inform adaptive management strategies over time.

8.5.3.18. Flooding

The development of Airport City over a 60-hectare area will involve the construction of large impervious surfaces, including commercial buildings, access roads, parking areas, and paved walkways. These surfaces will substantially reduce natural infiltration and significantly increase surface runoff volume and velocity during rainfall events.

If the stormwater drainage system within Airport City is inadequately designed, constructed, or maintained, the area may experience localized flooding, particularly during peak rainfall. This can disrupt operations, damage infrastructure, and pose risks to businesses and public safety within the development. Moreover, the increased runoff can flow into surrounding communities, exacerbating existing flood risks, overwhelming local drainage systems, and leading to property damage, transportation disruption, and potential health hazards. The impact is considered Medium to High in significance, Long-term in duration, and may extend from local to regional scale if not mitigated effectively.

Mitigation Measures:

- **Integrated Stormwater Management System:** Design and implement a comprehensive stormwater management system tailored to the Airport City's topography and land use. The system should include:
 - Properly sized drainage channels, culverts, and underground piping systems to convey runoff efficiently;
 - Retention and detention ponds to temporarily store stormwater and reduce peak flow;
 - Use of green infrastructure such as:
 - Permeable pavements in walkways and parking lots;
 - Green roofs on buildings;
 - Rain gardens and bioswales (as deemed feasible by the design) to promote infiltration and filter pollutants.
- **Routine Maintenance of Stormwater Infrastructure:** Establish a scheduled inspection and maintenance plan for all stormwater facilities. This includes regular clearing of drains, culverts, and sediment traps, particularly before and during rainy seasons, to ensure the system functions effectively.
- **Flood Risk Assessment and Climate Resilience:** Conduct a detailed flood risk assessment for Airport City, including hydrological modeling and consideration of climate change projections (e.g., increased rainfall intensity and frequency). Use the findings to guide infrastructure design and identify areas requiring additional flood mitigation.
- **Emergency Preparedness and Early Warning Systems:** Develop an early warning system in coordination with local meteorological and disaster management agencies. This system should provide timely alerts for extreme rainfall and flooding risks. Establish evacuation routes and emergency response protocols for residents, workers, and businesses within the Airport City.
- **Community Engagement and Awareness:** Inform both Airport City occupants and adjacent communities about potential flood risks, safety measures, and emergency procedures. Provide training, signage, and informational materials to enhance local preparedness and response capacity.

8.5.3.19. Unplanned Urbanization

The construction of Bishoftu International Airport on agricultural land is expected to catalyze rapid and unplanned urban expansion in the surrounding regions. As the airport becomes operational, it will attract businesses, industries, and service providers seeking proximity to this major transportation hub. This sudden economic growth will drive an influx of workers, entrepreneurs, and migrants, increasing demand for housing, commercial spaces, and industrial zones. Without proper regulatory controls, this development could occur in a haphazard manner, leading to uncontrolled urban sprawl that encroaches on remaining farmland and natural habitats. The lack of structured planning may also result in the emergence of informal settlements (slums), as low-income migrants seek affordable housing near employment opportunities. These unregulated communities often lack access to basic services such as clean water, sanitation, and electricity, placing additional strain on already limited municipal infrastructure.

Mitigation measures

To prevent chaotic urban expansion and its associated challenges, a strategic and regulated approach must be implemented. First, integrated urban planning should be prioritized, ensuring that the airport's development aligns with Ethiopia's broader regional and national land-use policies. Authorities should designate specific growth corridors for commercial, industrial, and residential expansion while enforcing protected green belts to prevent uncontrolled encroachment into agricultural and ecologically sensitive areas. Additionally, affordable housing initiatives should be introduced to provide structured living spaces for low-income workers, reducing the likelihood of slum formation.

Infrastructure preparedness is another critical factor. Roads, water supply systems, and electricity networks must be upgraded before the airport becomes fully operational to accommodate the anticipated population surge. Public transportation links, such as dedicated shuttle services or rail connections, should be established early to reduce reliance on private vehicles and minimize traffic congestion. Furthermore, community engagement programs should be implemented to involve local stakeholders in development decisions, ensuring that urbanization benefits are distributed equitably.

The establishment of designated Airport City zones represents a critical urban planning strategy to manage the anticipated growth surrounding Bishoftu International Airport while preventing uncontrolled urban sprawl. This approach involves the deliberate allocation of

specific areas for commercial, industrial, and residential development, ensuring that expansion occurs in an organized and sustainable manner. By concentrating development within these predefined zones, authorities can minimize land-use conflicts, protect agricultural areas, and maintain ecological balance in the region.

8.5.3.20. Impacts of the District Cooling Plant during Operation Phase

The operation of the District Cooling Plant (DCP) at Bishoftu International Airport presents several environmental and social impacts that must be carefully assessed due to the nature of its function and technological components. During operation, the DCP will continuously supply chilled water to various airport buildings for cooling purposes through a network of underground insulated pipes. While district cooling systems are generally more energy-efficient than decentralized systems, they can pose significant localized impacts if not well-managed.

One of the primary environmental concerns is high energy consumption, as the system relies on electrically powered chillers, pumps, and cooling towers. If the energy source is fossil fuel-based, the operation of the plant will contribute to greenhouse gas emissions, including carbon dioxide (CO₂), nitrogen oxides (NO_x), and sulfur oxides (SO₂). These emissions may exacerbate local air pollution and contribute to climate change. In addition to emissions, the system will require a substantial amount of water, particularly if water-cooled chillers and open cooling towers are used. This can put additional pressure on local water resources, affecting both environmental sustainability and local communities' water supply.

Moreover, the noise generated by operational components such as compressors, pumps, and cooling fans may affect nearby communities and workers, particularly if the plant is located close to residential or sensitive institutional areas. Thermal pollution may also arise from the discharge of heated water or air, which can disturb the local microclimate or potentially affect nearby natural ecosystems, especially if surface water bodies are used for heat rejection. The use of chemical agents—such as refrigerants, corrosion inhibitors, and anti-scaling agents—poses risks of leaks or improper disposal. Certain refrigerants have high Global Warming Potential (GWP) or Ozone Depleting Potential (ODP), and any accidental leakage could have long-term consequences for both the environment and human health. Inappropriate management of these chemicals could also contaminate soil or water sources.

Socially, occupational health and safety risks are present for plant operators and maintenance personnel who may be exposed to pressurized systems, moving machinery, and hazardous

chemicals. There is also potential for visual and aesthetic disturbance if the cooling infrastructure, such as cooling towers or large piping networks, is prominently located, affecting the visual harmony of the airport's surrounding environment. Additionally, vibrations and odors from the operation of the cooling towers and chemical treatment processes, if not well managed, may result in discomfort for nearby residents and airport users.

Mitigation Measures

To minimize the adverse impacts of the District Cooling Plant during the operation phase, a number of technical and administrative mitigation measures will be implemented. Energy efficiency will be optimized through the use of high-efficiency chillers and variable-speed pumps, and the plant will be designed to utilize renewable or low-carbon energy sources where feasible, such as solar photovoltaic systems to power auxiliary operations. To mitigate water consumption, the system will incorporate water-saving technologies, including closed-loop cooling systems and water recycling units. Noise barriers or enclosures will be installed around noise-generating equipment, and all equipment will be subject to regular maintenance to minimize mechanical noise.

To address chemical-related risks, environmentally friendly and low-GWP refrigerants will be used, and a comprehensive chemical handling and storage protocol will be established, including secondary containment for storage areas, spill kits, and training for staff. Any thermal discharges will be regulated to ensure that they do not negatively affect local ecosystems or increase urban heat load; this will be achieved by designing the system to dissipate heat effectively, possibly through dry or hybrid cooling towers.

A comprehensive environmental monitoring plan will be established, including regular checks on air quality, water consumption, noise levels, refrigerant leak detection, and vibration control. For social concerns, aesthetically designed enclosures and landscaping will be used to integrate the DCP into the airport's built environment and reduce visual impacts. Furthermore, a Health, Safety, and Environment (HSE) management system will be enforced, covering training, use of personal protective equipment (PPE), emergency response protocols, and routine safety audits. With these mitigation measures in place, the operation of the District Cooling Plant can be managed in a way that minimizes its environmental and social impacts while maximizing the benefits of energy-efficient cooling for Bishoftu International Airport.

9. CUMULATIVE IMPACTS

9.1.Introduction

This chapter presents a cumulative impact assessment (CIA) resulting from existing, planned and reasonably defined developments, which include future expansions and neighboring developments, hereafter referred to as ‘cumulative developments’ with the Bishoftu International Airport Project.

The sections herein present:

- a definition of cumulative impacts based on current applicable guidance;
- the CIA approach adopted in this ESIA; and
- a CIA

9.2.Definitions

The assessment of cumulative impacts is a long established requirement for any comprehensive ESIA. For the purpose of this Project, the IFC Performance Standards (PS) have been used as a primary reference source; PS1 (Ref. 7.14.1) defines cumulative impacts as:

“impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted”.

The impacts of the Project thus need to be considered in conjunction with the potential impacts from other future developments or activities that are existing, planned or reasonably defined, and are located within a geographical scope where potential environmental and social interactions could act together with the Project to create a more or less significant overall impact

9.3.CIA Methodology

The Cumulative Impact Assessment for the Bishoftu International Airport project has been conducted following the six-step process detailed in the IFC CIA Handbook, which is primarily based on the 2012 IFC Performance Standards. This structured approach ensures a systematic and comprehensive evaluation of cumulative effects.

The methodology involves the following sequential steps:

- Scoping Phase I – Identify Valued Ecosystem Components (VECs), Spatial and Temporal

Boundaries: This initial phase focuses on identifying the environmental and social elements most susceptible to change, defining the geographical area over which impacts could extend, and establishing the timeframe for the assessment.

- **Scoping Phase II – Other Activities and Environmental Drivers:** This step involves identifying existing, ongoing, and reasonably foreseeable future activities within the defined spatial and temporal boundaries that could interact with the project's impacts.
- **Establish Information on the Baseline Status of VECs:** A detailed characterization of the pre-project conditions of each identified VEC is undertaken to provide a benchmark for impact assessment.
- **Assess Cumulative Impacts on VECs:** This is the core analytical step, where the project's predicted impacts are combined with those from other identified activities and environmental drivers to determine their combined, additive, or synergistic effects on the VECs.
- **Assess Significance of Predicted Cumulative Impacts:** The magnitude, duration, extent, and reversibility of the identified cumulative impacts are evaluated to determine their overall significance.
- **Management of Cumulative Impacts – Design and Implementation:** Based on the significance assessment, a plan is developed for avoiding, minimizing, or compensating for cumulative impacts, alongside a framework for their ongoing monitoring.

The overall approach to this CIA is participatory, integrating desk reviews of existing documentation (including the provided ESIA report), field observations, stakeholder consultations, and expert analysis. This multi-faceted approach ensures alignment with IFC Performance Standards (PS 1-8) and national environmental guidelines, promoting a robust and credible assessment.

9.4.Scoping Phase I: VECs, Temporal and Spatial Boundaries

9.4.1. Valued Ecosystem Components (VECs)

Valued Ecosystem Components are defined as the environmental and socio-economic elements that are critical for human well-being and ecosystem integrity, and which are susceptible to potential impacts from the Bishoftu International Airport project's construction and ongoing operations, as well as from other regional activities. The identification of VECs is a foundational step in the CIA, as it focuses the assessment on the most relevant and sensitive receptors.

The following VECs have been identified for this cumulative impact assessment:

- **Surface Water Bodies and Drainage Systems:** This VEC includes the Akaki/Gerbi River and the Dukem River, both of which are within the project's influence area and are susceptible to impacts from wastewater discharge, soil erosion, siltation, and potential chemical contamination. Seasonal and dry streams, such as Ululo Sera and Ululo Birke, are also included as they are vital for local hydrology and could be affected by runoff and sedimentation from construction activities.
- **Wetlands and Riverine Ecosystems:** Specifically, the riverine forests along the Akaki and Dukem rivers are considered, as they are likely to be impacted by vegetation removal and potential habitat loss.
- **Acacia-Commiphora Woodland Ecosystem:** The project site is situated within this semi-arid woodland ecosystem. Although already degraded by agricultural expansion, the remaining natural vegetation, including species like Acacia and Ficus, is at risk of further loss and habitat fragmentation, which could affect local biodiversity.
- **Biodiversity and Wildlife Habitat:** While no officially protected areas or IUCN Red List species have been identified directly on the project site, localized biodiversity, particularly bird species and small mammals, may be impacted. This includes migratory birds and endemic species that utilize regional habitats.
- **Groundwater Resources:** Local aquifers are a critical VEC due to their susceptibility to depletion from increased water demand and potential contamination from hazardous materials, fuel storage, and wastewater discharge.
- **Soil and Agricultural Land:** Black cotton soil and sandy loam areas, which are prone to erosion, compaction, and degradation from construction activities, are included. The loss of fertile agricultural land is also a significant concern, directly affecting local farmers and associated ecosystems.
- **Human and Cultural Receptors:** This VEC encompasses the local communities residing in the seven kebeles within the impact zone (Abu Achiro, Abu Garbi, Abu Luguna, Abu Serkema, Ammuye Sera, Abu Loyya, and Kombolcha). It also includes social infrastructure such as schools and health institutions, which may require relocation or experience dust, noise, and air pollution. Grave sites and cultural heritage, particularly cemeteries and religious sites, are also critical, as their potential relocation could lead to significant cultural and social impacts.

The VECs are not isolated entities; they are interconnected elements within the regional

ecosystem. For instance, impacts on soil, such as erosion and compaction, directly influence surface water quality through increased siltation. The transformation of agricultural land for airport development directly affects socio-economic VECs, leading to population displacement and livelihood changes, which in turn impact biological VECs by altering vegetation and wildlife habitats. Furthermore, the depletion of groundwater resources can reduce surface water flow, affecting dependent ecosystems and human water supply. This inherent interconnectedness among VECs necessitates a holistic approach in the cumulative assessment, recognizing that impacts on one component will inevitably cascade and amplify effects on others.

9.4.2. Spatial Boundaries of the Cumulative Impact Assessment

Defining appropriate spatial boundaries is crucial for a comprehensive CIA, as it delineates the geographical area over which direct and indirect impacts, including cumulative effects, are assessed. The boundaries extend beyond the immediate project footprint to encompass all areas potentially influenced by the airport development and other interacting regional activities.

The spatial boundaries for this assessment are categorized into direct and indirect impact zones:

- **Direct Impact Zone:** This zone includes the 7 kebeles (Abu Achiro, Abu Garbi, Abu Luguna, Abu Serkema, Ammuye Sera, Abu Loyya, and Kombolcha) with a total population of 13,939 individuals, residing across 2,488 households, which are within the airport footprint.
- **Indirect Impact Zone:** This broader zone encompasses Bishoftu City, Dukem Sub-City, and the Akaki River catchment.

The spatial boundary for this CIA extends significantly beyond the airport's immediate footprint to capture the full extent of interacting developments and their combined pressures on shared resources and communities. The project's influence is not confined to its physical boundaries but creates wider environmental and socio-economic ripple effects across the regional development corridor, for example, the Addis Ababa-Bishoftu-Dukem-Mojo axis. This expanded spatial scope is fundamental for identifying and assessing the full range of cumulative impacts.

9.4.3. Temporal Boundaries of the Cumulative Impact Assessment

The temporal boundaries for the CIA define the different phases of the project lifecycle and the broader timeframe over which cumulative impacts are assessed. This comprehensive approach ensures that both short-term disturbances and long-term, evolving effects are considered.

The temporal boundaries align with the project's lifecycle phases:

- **Mobilization Phase:** This is the initial phase of the project, characterized by the movement of machinery and vehicles to the project site and the setup of temporary facilities. Impacts during this phase are generally considered to be short-term, lasting for a limited period.
- **Construction Phase:** This phase involves extensive activities such as site preparation, excavation, material transportation, and the development of core airport infrastructure. Impacts during this phase are typically of medium duration, potentially extending over several years.
- **Operation Phase:** This phase represents the ongoing functioning of the airport, including regular aircraft operations, ground support activities, and associated vehicular traffic. Impacts during the operational phase are generally considered to be long-term, continuing over an extended period, potentially for decades (e.g., until 2060 and beyond, given traffic forecasts).
- **Decommissioning Phase (Potential):** Although specific impacts are not detailed in the provided information, the overall scope of the ESIA study covers potential decommissioning phases, indicating a consideration for the project's full life cycle.

A robust CIA necessitates a long-term temporal horizon, often extending 20 to 30 years or more into the future. This extended timeframe is crucial for adequately assessing the evolving nature of cumulative impacts as the airport and surrounding regional developments mature and interact. Understanding impacts across these distinct phases allows for the identification of transient effects, persistent changes, and the potential for impacts to accumulate or transform over time.

9.5. Scoping Phase II: Other Activities and Environmental Drivers

This phase identifies past, present, and reasonably foreseeable future activities and environmental drivers within the defined spatial and temporal boundaries that could interact

cumulatively with the Bishoftu International Airport project. Understanding these additional influences is crucial for a comprehensive cumulative impact assessment, as they contribute to the regional context and can amplify or alter the project's specific effects.

9.5.1. Existing Regional Development and Infrastructure

The region surrounding the proposed Bishoftu International Airport is not a pristine environment; it is already characterized by various forms of development and infrastructure that exert pressure on the environment and local communities.

- **Urbanization and Population Growth:** Bishoftu and its surrounding kebeles are experiencing rapid population growth. The project area alone currently hosts 15,320 individuals across 2,731 households. This demographic expansion drives an escalating demand for land, housing, and essential social services. The increasing population density inherently leads to greater resource consumption and waste generation, placing continuous stress on the local environment even without the airport project.
- **Existing Infrastructure:** The area possesses a basic road network, including gravel roads connecting Abusera to Addis Ababa and Dukem Sub City. However, the absence of paved roads and regular public transport indicates a baseline of underdeveloped infrastructure that struggles to keep pace with existing demands. This infrastructure deficit means that any new large-scale development, such as the airport, will place immediate and significant pressure on improving these networks.
- **Industrial Presence:** The pollution of the Akaki-Gerbi and Dukem Rivers by domestic and industrial wastewaters originating from Addis Ababa and its suburbs signifies the presence of substantial industrial activities upstream and regionally. This pre-existing industrial footprint contributes to regional air and water quality issues, establishing a baseline of environmental stress that the airport project will interact with.
- **Land Use Transformation:** The current land use is predominantly agricultural, covering approximately 2310 hectare. However, the region is undergoing a process of gentrification and experiencing increasing land scarcity. This transformation indicates a shift from traditional agrarian practices towards more urbanized and commercial land uses, leading to competition for land resources.

The region faces significant pre-existing development pressures, including ongoing urbanization, industrial pollution, and land scarcity, coupled with inadequate infrastructure. The airport project is not being introduced into an untouched area but rather into an already

complex and stressed environment. This implies that the cumulative impact will not merely be an addition of new effects, but rather an amplification of these existing stressors, making it crucial to assess the marginal contribution of the airport project to an already burdened system.

9.5.2. Ongoing Environmental Stressors and Trends

Beyond the direct impacts of existing infrastructure, the region is subject to a range of ongoing environmental stressors and trends that contribute to the cumulative impact profile.

- **Water Quality Degradation:** The Akaki River, before its confluence with Aba Samuel Lake, is highly polluted by industrial and domestic waste from numerous point and non-point sources in and around Addis Ababa. Similarly, the Dukem River exhibits alkaline water, elevated Electrical Conductivity (EC), Total Dissolved Solids (TDS), high turbidity, and concerning concentrations of Iron and Manganese ions, often exceeding WHO allowable limits for drinking water. Some groundwater boreholes also show elevated temperatures and fluoride concentrations, attributed to local geology and tectonic activities. These conditions establish a baseline of compromised water quality.
- **Air Quality Issues:** Even prior to the airport's construction, Bishoftu town frequently experiences levels of particulate matter (PM_{2.5} and PM₁₀), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂) that exceed both national and World Health Organization (WHO) standards. These exceedances are primarily attributed to existing traffic congestion, ongoing construction activities, and industrial emissions within the broader region. This indicates a pre-existing challenge in maintaining healthy air quality.
- **Land Degradation:** The Acacia-Commiphora woodland ecosystem, characteristic of the project area, has already undergone significant degradation due to historical and ongoing agricultural expansion. Furthermore, the presence of sensitive soil types, such as black cotton soil (Eutric Vertisols) which is prone to shrink-swell properties, and soft geological formations, contributes to existing issues of soil erosion and gully formation.
- **Climate Change Vulnerability:** Ethiopia is recognized as highly sensitive to climatic variability, with projections indicating potential temperature increases ranging from 1.7 to 2.1 degrees Celsius by 2050. The nation's Climate Resilient Green Economy Strategy (CRGE) underscores the national commitment to addressing greenhouse gas (GHG) emissions and adapting to climate change impacts.

The pre-existing environmental issues, such as polluted rivers, high particulate matter in the air, and degraded woodlands, indicate that the regional ecosystem possesses reduced resilience.

The airport project's impacts, including increased emissions, water demand, and land conversion, will not merely add to these problems but have the potential to accelerate their deterioration. For example, new wastewater discharge into already polluted rivers will exacerbate the existing pollution burden. Therefore, mitigation measures for the airport project alone may prove insufficient if they do not adequately account for the compounding effects of this pre-existing and ongoing regional environmental degradation.

9.5.3. Reasonably Foreseeable Future Developments

The proposed Bishoftu International Airport is not merely a static development but a catalyst for significant future growth and transformation in the surrounding region. These induced developments will contribute substantially to cumulative impacts.

- **Airport City Development:** A dedicated "Airport City" is planned at the airport entrance, strategically designed to boost non-aeronautical revenues and enhance the passenger experience. This development will feature a diverse mix of commercial, hospitality, and office spaces, including hotels, restaurants, retail outlets, and office buildings. Tentative plans allocate 520,000 square meters for core commercial facilities in the initial phase, expanding to 780,000 square meters in subsequent phases, on a reserved 60-hectare land area. This substantial development will drive significant real estate growth and stimulate economic activity, attracting new businesses and residents to the area.
- **Transportation Infrastructure Expansion:** The long-term transportation strategy for the region envisions a new road linking Addis Ababa and the Bole airport with the new facility, running parallel to the planned rail system. Furthermore, integration with Addis Ababa's existing Light Rail Transit (LRT) network through a future metro system is anticipated. These expansions are designed to enhance urban connectivity and reduce traffic congestion, but they also represent significant land-take and construction activities.
- **Continued Urbanization:** The airport is expected to act as a powerful catalyst for urban expansion in Bishoftu and its surrounding towns. This will lead to the growth of new residential, commercial, and industrial developments, driven by increased demand for housing, services, and business opportunities near the new aviation hub.
- **Increased Aviation Demand:** The airport's very purpose is to accommodate projected growth in passenger traffic from 30.3 million in 2030 to over 105 million by 2060, with cargo operations also expanding significantly. This implies a continuous increase in air traffic movements, ground services, and associated infrastructure demands over several

decades.

- Geda Economic Zone:** A Geda Economic Zone (GSEZ) is planned to be established around the new Bishoftu Airport, signaling a large-scale development project aimed at boosting the region's economic activities. Located between Modjo and Adama towns, this special economic zone is intended to attract businesses, industries, and other commercial entities, creating opportunities for employment, trade, and investment in the area. The GSEZ is projected to have a total power demand of around 575 MVA within a forty-year planning horizon and will host various industrial firms such as leather, jewelry, electrical and electronic appliance, agro-processing, and pharmaceutical industries. Its strategic location is highlighted as very good for investment. The zone is expected to provide more jobs to local people, increase exports, introduce new knowledge and techniques, and cultivate local employees.

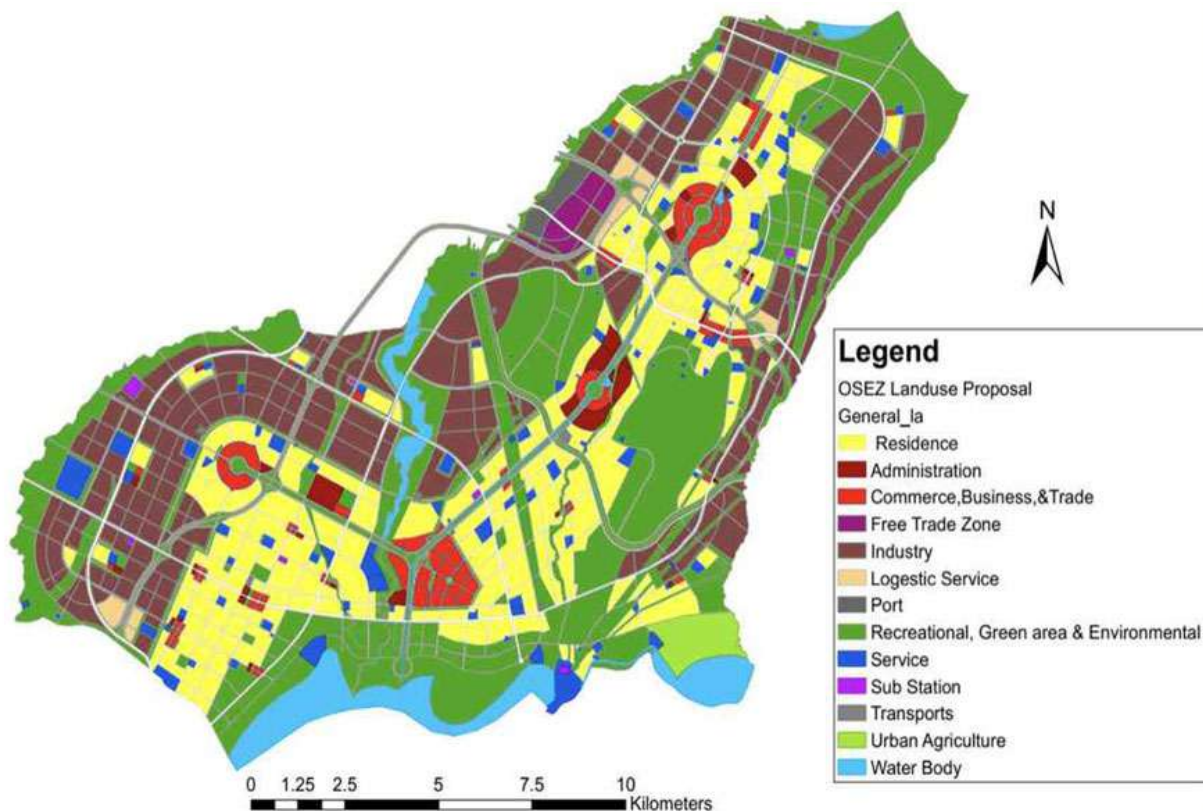


Figure 9-1: Land use of Geda Economic Zone

- Mojjo Dry Port II:** The Mojjo Dry Port II is another related development located in the vicinity of the airport. Dry ports are inland facilities where goods are transferred between different modes of transportation (e.g., from rail to road), facilitating the import and export

of goods without the need for direct access to a sea port. The development of the Mojo Dry Port II is expected to enhance trade logistics, supporting the airport's growth by streamlining the transportation of goods and materials. Its construction facilitates intermodal freight transport in import and export corridors, especially crucial for landlocked countries like Ethiopia.

The airport's existence and projected growth will inevitably induce further development, which is a direct consequence of the airport project itself. This induced development will generate its own set of impacts, which will then interact cumulatively with the airport's direct impacts. For instance, the increased population and commercial activities associated with the Airport City and general urbanization will lead to higher waste generation and water consumption, exacerbating the existing strain on local water resources and potentially overwhelming current waste management capacities. This necessitates a regional, integrated resource management strategy. The addition of the Geda Economic Zone and Mojo Dry Port II will further amplify these pressures, introducing significant industrial and logistics-related demands on land, water, air quality, and social services.

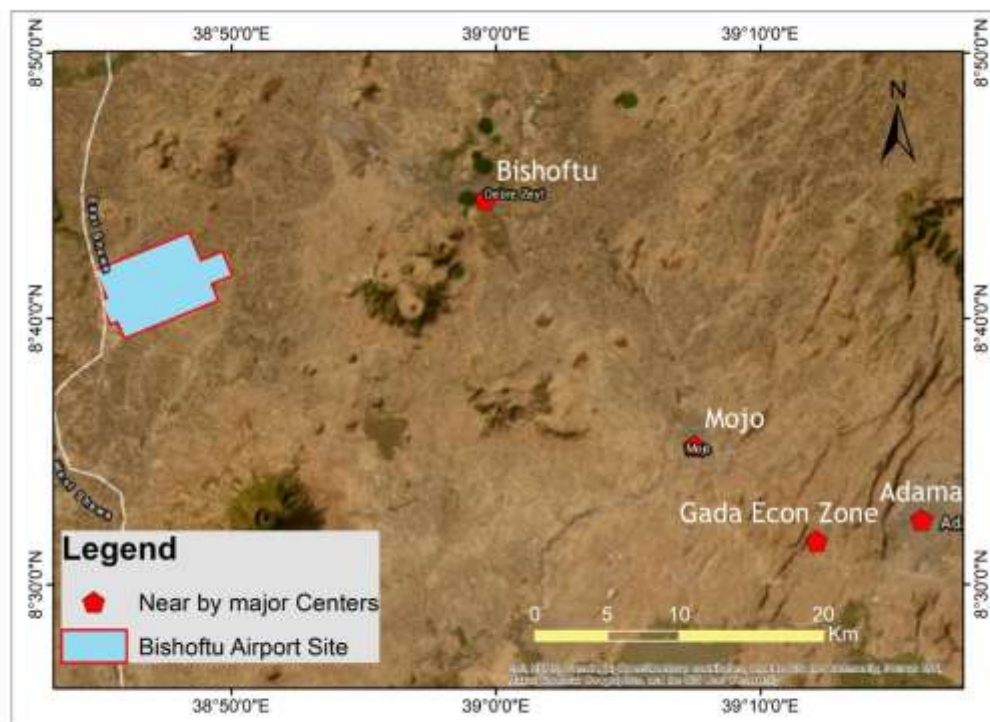


Figure 9-2: Future Growth and Transformation in the Surrounding Region of Airport

9.6. Establishing Information on the Baseline Status of VECs

Available baseline data have been gathered for the identified VECs. Defining the baseline characteristics of VECs is an important stage in the CIA process, as this identifies their sensitivity to change.

Baseline data for the Bishoftu International Airport are based on the detailed studies and survey work undertaken as part of the ESIA and as described section 4 and are not reproduced here. Project-specific studies are supplemented, where relevant, by information available at the regional scale, beyond the Project Area.

9.7. Assessing Cumulative Impacts on VECs

This section systematically assesses the cumulative impacts on each Valued Ecosystem Component (VEC) by combining the direct impacts of the Bishoftu International Airport project with the effects of other identified past, present, and reasonably foreseeable future activities and environmental drivers in the region. This integrated analysis aims to identify additive, synergistic, or antagonistic effects that may not be apparent when assessing impacts in isolation. Due to inherent uncertainties in the nature of cumulative impacts from future projects, this assessment has been performed in a qualitative manner, relying on professional judgment to determine whether the Bishoftu International Airport is a significant contributor to overall cumulative effects.

9.7.1. Cumulative Impacts on Land Use and Livelihoods

The Bishoftu International Airport project necessitates the acquisition of 3,979 hectares of land, leading to the displacement of 2,731 households, affecting 15,320 individuals, with 9% being female-headed households. This acquisition directly results in the loss of 2,518.6 hectares of agricultural land, 272.74 hectares of residential land, and 163.1 hectares of grazing land. The economic stability of these communities, predominantly reliant on rain-fed agriculture and livestock rearing, is severely impacted, with an estimated annual income loss of ETB 78,295,911.34 from off-farm activities.

These project-specific impacts occur within a regional context already characterized by rapid population growth and accelerating gentrification in Bishoftu and surrounding areas. Land is widely perceived as the primary means of economic self-actualization, making its scarcity a

pre-existing and intensifying issue. The cumulative effect of the airport's large-scale land acquisition, combined with this existing regional land scarcity and gentrification pressures, and the additional land demands from the Geda Economic Zone and Mojjo Dry Port, creates a compounding crisis for land access and livelihoods. The displacement of a largely agrarian population into an urbanizing environment (driven by the Airport City development and general regional urbanization) where land is already scarce and expensive will lead to accelerated socio-economic vulnerability. This situation will increase competition for remaining resources, potentially leading to heightened social conflict. The 20.3% of households without legal land titles face a particularly precarious situation, as their pre-existing vulnerability is significantly amplified by the cumulative pressure on land.

The project-specific land acquisition represents a direct impact. However, when layered with existing regional land scarcity and gentrification, the effect is not merely additive but multiplicative. Vulnerable groups, such as non-titled households and female-headed households, will find it increasingly difficult to re-establish sustainable livelihoods in a competitive, urbanizing environment. This can precipitate long-term poverty traps and exacerbate existing social inequalities. The cumulative impact on land use and livelihoods is high and irreversible for affected households, as their traditional agrarian way of life is fundamentally disrupted within a context of pre-existing land pressure. The project, combined with broader regional growth, accelerates the loss of traditional livelihoods without guaranteed equivalent alternatives, leading to significant social dislocation.

9.7.2. Cumulative Impacts on Water Resources (Surface and Groundwater)

The Bishoftu International Airport will impose substantial new demands on water resources during its operational phase, with projected consumption increasing from 6,596 cubic meters per day (m³/day) in Phase 1 to 18,111 m³/day in the ultimate phase. Concurrently, wastewater generation is estimated at 85% of water demand, translating to flows from 5,097 m³/day to 15,390 m³/day. The project also carries the potential for surface and groundwater contamination from fuel/oil spills, construction waste, and the discharge of treated wastewater.

These project-specific water impacts will interact with a baseline where the Akaki and Dukem Rivers are already highly polluted by domestic and industrial wastewaters from Addis Ababa and its suburbs. Baseline water quality data for the Dukem River indicates high levels of Electrical Conductivity (EC), Total Dissolved Solids (TDS), turbidity, Iron, and Manganese,

often exceeding WHO allowable concentrations for drinking. Some groundwater boreholes in the region also exhibit high temperatures and elevated fluoride concentrations due to local geology. The cumulative effect of the airport's substantial water demand, combined with existing regional water scarcity and the increasing demand from ongoing urbanization (including the Airport City and general population growth), as well as the water demands and wastewater generation from the Geda Economic Zone and Mojo Dry Port, will place severe cumulative stress on both surface and groundwater resources. Furthermore, the airport's wastewater discharge, even if treated, will add to the already high pollution load of the Akaki and Dukem Rivers, exacerbating existing water quality degradation in the Awash Basin. The risk of contamination from spills and waste is amplified by the pre-existing vulnerability and compromised quality of these water bodies.

The airport's significant water demands are introduced into a regional context where water sources are already stressed and polluted by existing urban and industrial activities. The cumulative effect is a dual burden: increased abstraction that can lead to potential scarcity, and increased discharge (even of treated wastewater) that contributes to an already high pollution load, thereby impeding the ecosystem's ability to recover. The cumulative impact on water resources is high and long-term. The airport's water demands, combined with existing regional pollution and increasing urbanization, threaten the long-term sustainability and quality of water resources in the Awash Basin, potentially affecting downstream users and ecosystems that depend on these sources.

9.7.3. Cumulative Impacts on Air Quality

The construction phase of Bishoftu International Airport is anticipated to generate substantial air pollutants. This includes significant dust emissions from land clearing, excavation, material transport, and operations at aggregate processing and batching plants, as well as from blasting activities. Gaseous pollutants, such as particulate matter (PM), sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon monoxide (CO), will be emitted from diesel-powered construction machinery and vehicles. During the operational phase, air quality will be further impacted by emissions from aircraft operations (take-off, landing, taxiing, Auxiliary Power Unit (APU) use), ground support equipment, and a significant increase in vehicular traffic to and from the airport.

These project-specific emissions will interact with a regional baseline where Bishoftu town already experiences air quality issues. Current data indicate that PM_{2.5}, PM₁₀, NO₂, and SO₂ levels frequently exceed both WHO and Federal EPA standards, with SO₂ and CO consistently categorized as "Moderately Polluted". These pre-existing exceedances are attributed to existing traffic congestion, ongoing construction projects, and industrial emissions in the area. The cumulative effect will be a significant increase in overall particulate matter and gaseous pollutants, particularly concentrated within the Bishoftu-Dukem corridor, further exacerbated by industrial emissions from the Geda Economic Zone and increased logistics traffic from Mojo Dry Port. This will lead to a marked deterioration of public health for communities within the impact zone, especially for vulnerable populations with pre-existing respiratory conditions. Furthermore, the increased pollution could contribute to regional haze and acid deposition. The long-term growth of the Airport City and the associated surge in vehicular traffic will further exacerbate this regional air quality burden.

The baseline air quality in Bishoftu is already compromised by existing sources. The airport introduces substantial new sources of emissions, including aircraft, construction activities, ground vehicles, and induced traffic. The cumulative effect is a synergistic increase in air pollution across the region, leading to a higher risk of chronic respiratory and cardiovascular diseases for residents. The cumulative impact on air quality is high and long-term, posing a significant public health risk. Integrated regional air quality management, extending beyond project-specific mitigation, is therefore essential to prevent severe health outcomes for the affected population.

9.7.4. Cumulative Impacts on Noise Environment

The construction phase of the Bishoftu International Airport will generate significant noise levels, primarily from the operation of heavy machinery, drilling, blasting, and the movement of construction vehicles. Peak noise levels during construction are anticipated to range between 85 to 90 dBA.¹ During the operational phase, the airport will introduce continuous noise from aircraft take-offs, landings, taxiing, engine run-ups, and ground support equipment, alongside increased vehicular traffic noise from airport access roads.

These project-specific noise impacts will combine with a regional baseline where ambient noise levels in some areas of the project site already exceed residential standards. For example, baseline measurements indicate noise levels of 55-75 dBA at Station 1 and 70 dBA at Station

5, which are above the residential limits of 55 dBA during the day and 45 dBA at night. This suggests a pre-existing noise burden from ongoing urban development and traffic. The cumulative effect will be chronic noise pollution for communities situated under flight paths and in close proximity to the airport's operational areas, further intensified by noise from industrial activities within the Geda Economic Zone and increased logistics operations at Mojjo Dry Port. This sustained noise exposure, when combined with existing ambient noise and the noise generated by induced urbanization, will lead to increased sleep disturbance, stress, and potential long-term health issues for residents. Furthermore, the elevated noise levels may disrupt wildlife behavior, particularly affecting sensitive bird species that utilize regional habitats.

The airport's operational noise represents a continuous, long-term impact. When this is combined with existing noise sources and the noise generated by induced urbanization, the cumulative noise burden on residential areas becomes substantial. This concern extends beyond just peak noise events to encompass sustained exposure, which can significantly degrade the quality of life for affected populations. The cumulative impact on the noise environment is high and long-term, particularly for communities directly affected by flight paths and airport operations. This necessitates comprehensive land-use planning around the airport to prevent the establishment of new noise-sensitive developments and the implementation of robust noise abatement procedures that consider the regional noise profile.

9.7.5. Cumulative Impacts on Biodiversity and Ecosystems

The Bishoftu International Airport project will directly impact biodiversity and ecosystems through land clearing, resulting in the loss of vegetation (including remnants of *Acacia-Commiphora* woodland and agricultural crops) and habitat disruption for localized biodiversity such as birds and small mammals. The project also carries the potential for increased soil erosion and water contamination, which can affect aquatic and riparian ecosystems.

These project impacts occur within a regional context where existing agricultural expansion has already significantly degraded natural vegetation. Furthermore, the pollution of the Akaki and Dukem Rivers by industrial and domestic wastewater impacts regional aquatic ecosystems.¹ While no officially protected areas or IUCN Red List species are directly on the project site, the broader region supports significant bird diversity, including endemic (Wattled Ibis, Thick-billed Raven, Abyssinian Lovebird) and globally threatened species (Greater

Spotted Eagle, Wattled Crane, Black Crowned Crane, Lesser Flamingo) in areas like the Akaki Sub-catchment and Aba-Samuel reservoir. Bird movement between Lake Bishoftu and Akaki-Aba Samuel is prevalent during migratory seasons. The cumulative effect of the airport's land conversion and operational disturbances (noise, air pollution, light pollution) will combine with ongoing agricultural expansion and regional water pollution, and further habitat alteration and pollution from the Geda Economic Zone and Mojo Dry Port, to create a cumulative pressure on these fragmented ecosystems. The loss of remaining natural vegetation and habitat fragmentation, combined with existing pollution, will reduce overall ecological connectivity and resilience. This is particularly critical for migratory and endemic bird species that rely on regional water bodies and habitats, as increased air traffic and associated disturbances could disrupt their patterns, increase collision risks, and further stress already vulnerable populations.

The project's land conversion directly contributes to habitat loss, adding to the historical impact of agricultural expansion. The airport's operational noise and air traffic introduce a new layer of stress on remaining wildlife, particularly birds, potentially disrupting their use of regional habitats and migratory routes. This creates a cumulative pressure on a regional scale, even if individual project impacts are localized. The cumulative impact on biodiversity and ecosystems is medium to high and long-term. While direct impacts on formally protected areas are avoided, the combined effects of land conversion, pollution, and operational disturbances from the airport and other regional developments will lead to a gradual but significant degradation of regional ecological integrity, particularly affecting avifauna.

9.7.6. Cumulative Impacts on Social and Cultural Fabric

The Bishoftu International Airport project will result in profound social and cultural disruptions. The displacement of 2,488 households will lead to a significant loss of social capital, disrupting traditional mutual aid systems such as Iddir, Iqub, and the Gadaa system. Furthermore, the project will necessitate the destruction of several religious and cultural sites, including two Orthodox churches, one Protestant church, one Mechereyesus Church, and one Full Gospel Church, along with their associated cemeteries. These sites hold deep historical, spiritual, and communal significance for the local population, and their loss will disrupt religious practices, generational traditions, and mourning customs. The Kereyu Oromo pastoralists, who rely on seasonal pastoralism, face a direct threat to their traditional way of life due to the loss of access to essential grazing lands.

These project-specific social and cultural disruptions will be compounded by the broader regional trends of rapid urbanization and gentrification in Bishoftu and Dukem. These trends already exert pressure on traditional community structures and land-based livelihoods. The influx of migrant workers during the construction and operational phases of the airport can also lead to cultural conflicts within the host communities. The cumulative effect will be an accelerated erosion of traditional social networks, cultural practices, and community identity, further intensified by the large-scale workforce and population influx associated with the Geda Economic Zone and Mojo Dry Port. The Kereyu Oromo pastoralists, already a marginalized group, will face intensified pressure on their traditional way of life from both the airport development and general regional urbanization. The rapid demographic shift and cultural mixing associated with the induced urbanization (e.g., Airport City development) will further strain existing social cohesion and community bonds.

Project displacement directly impacts social networks. However, the broader regional trend of urbanization and gentrification means that even if communities are relocated, the new environment may not adequately support the re-establishment of traditional social structures. This leads to a loss of intangible cultural heritage, such as social capital and traditional governance systems, which are inherently difficult to compensate for. The cumulative impact on the social and cultural fabric is high and irreversible. The combined pressures from the airport project and regional urbanization will lead to a profound and potentially unrecoverable loss of traditional community structures, cultural practices, and spiritual connections to land, necessitating proactive cultural preservation and social integration programs that operate at a regional scale.

9.7.7. Cumulative Impacts on Public Health and Safety

The Bishoftu International Airport project introduces several direct public health and safety risks. During construction, occupational health and safety hazards are prevalent, including risks of accidents, falls, chemical exposure, and exposure to dust and exhaust emissions. Increased vehicle movement will contribute to traffic accidents. The presence of a large workforce also heightens the risk of HIV/AIDS and other sexually transmitted infections (STIs), as well as Gender-Based Violence (GBV) and sexual harassment (SH). In the operational phase, air and noise pollution from aircraft and increased vehicular traffic will affect respiratory and cardiovascular health.¹ Increased human movement associated with airport operations will also elevate the risk of communicable disease transmission.

These project-specific risks will be amplified by the pre-existing health vulnerabilities of the local population and the strain on limited healthcare infrastructure. The baseline indicates that communities already face health challenges such as Diarrhea, Typhoid Fever, and Pneumonia, and there is a shortage of medical equipment and personnel in existing health facilities. The cumulative effect of increased regional traffic from induced development (e.g., Airport City, new roads), as well as from the Geda Economic Zone and Mojo Dry Port, will worsen overall road safety. The combined impact of increased population mobility (driven by the airport, Airport City, and general urbanization) will heighten the risk of communicable disease transmission, including HIV/AIDS and COVID-19. The potential for GBV/SH is also cumulatively increased by the larger, more transient workforce and the associated social changes that often accompany rapid development.

The project introduces new health and safety risks, including occupational hazards, pollution, and disease transmission. The baseline reveals existing health issues and an under-resourced health system. The cumulative effect is an overburdening of local health services and an increased overall public health risk for the region. This extends beyond just airport workers to the general population due to widespread pollution and increased disease vectors. The cumulative impact on public health and safety is high and long-term. The combined pressures from project activities, induced development, and pre-existing health vulnerabilities will strain local healthcare systems and increase the incidence of pollution-related illnesses, traffic accidents, and communicable diseases, necessitating a robust regional public health strategy.

Table 9-1: Cumulative Impact Matrix

Valued Ecosystem Component (VEC)	Key Cumulative Impact	Overall Cumulative Significance	Justification
Land Use & Livelihoods	Accelerated Livelihood Disruption & Social Dislocation	Very High	Large-scale displacement combined with pre-existing land scarcity and gentrification leads to fundamental, irreversible disruption of agrarian

			livelihoods and community structures.
Water Resources	Exacerbated Water Scarcity & Pollution Load	High	High airport water demand adds pressure to already strained groundwater resources and polluted regional rivers, posing a challenge to long-term sustainability
Air Quality	Regional Air Quality Deterioration & Public Health Risk	High	Airport emissions (construction/operation) compound existing high levels of PM, NO ₂ , SO ₂ from regional traffic/industry, leading to significant public health impacts.
Noise Environment	Chronic Noise Burden & Quality of Life Degradation	High	Continuous airport operational noise combined with existing ambient noise and induced urbanization creates sustained, high-level noise exposure for communities.
Biodiversity & Ecosystems	Habitat Fragmentation & Avifauna Stress	High	Land conversion and operational disturbances (noise,

			air traffic) from airport, compounded by agricultural expansion and regional pollution, degrade ecological integrity, particularly for sensitive bird species.
Social & Cultural Fabric	Accelerated Erosion of Traditional Social Fabric & Cultural Identity	Very High	Displacement and loss of sacred sites, exacerbated by broader urbanization and cultural shifts, lead to profound and potentially unrecoverable loss of community identity and social capital.
Public Health & Safety	Overburdened Health Systems & Increased Public Health Risks	High	Project-induced risks (pollution, traffic, disease) combine with pre-existing health vulnerabilities and strained healthcare infrastructure, significantly increasing regional public health burdens.

9.8. Assessing Significance of Predicted Cumulative Impacts

Significant cumulative impacts have been evaluated as far as possible using the impact significance matrix presented in section 2 Impact Assessment Methodology, which describes

the methodology applied within the ESIA, and in particular the assessment of significance as a function of impact ‘severity’ and ‘likelihood’.

However, it is noted that given the inherent uncertainties associated with the prediction of impacts from future projects, less reliance can be placed on the ‘likelihood’ component of impact significance. Furthermore, assessment has been possible only where the magnitude of impacts is capable of definition, for example, through readily accessible ESIA reports or project documentation.

It is beyond the reasonable scope of this ESIA Report to undertake an impact assessment of other developments that may occur within the vicinity of the Bishoftu International Airport. Where such information is not available, the assessment of potential cumulative impacts has been qualitative, and has relied upon professional judgment using the impact significance definitions described in section 2 Impact Assessment Methodology.

The cumulative impact assessment reveals that many environmental and social risks, which might be considered manageable at a project-specific level, become critically significant when viewed in the broader regional context. The interaction of the Bishoftu International Airport project with other regional developments and environmental drivers escalates the overall significance of impacts across several VECs.

- **Land Use and Livelihoods: Very High Significance (Irreversible, Regional/National).** The large-scale land acquisition required by the airport project, when combined with pre-existing regional land scarcity, rapid population growth, and accelerating gentrification, creates a fundamental and long-term disruption of traditional agrarian livelihoods and social structures. The displacement of communities into an already competitive urbanizing environment leads to amplified socio-economic vulnerability and can result in irreversible changes to community identity and economic self-sufficiency.
- **Water Resources: High Significance (Long-term, Regional).** The airport's substantial water demand and wastewater generation, coupled with the already high pollution load from existing domestic and industrial wastewaters in the Akaki and Dukem Rivers, will place severe cumulative stress on both surface and groundwater resources. This exacerbates existing water quality degradation in the Awash Basin, threatening long-term sustainability and potentially affecting downstream users and ecosystems.
- **Air Quality: High Significance (Long-term, Regional).** The emissions from airport

construction and operations (aircraft, ground support equipment, increased vehicular traffic) will add significantly to an already compromised regional air quality. Baseline data for Bishoftu town indicates frequent exceedances of national and international standards for particulate matter and other pollutants from existing traffic and industry. The cumulative effect will be a substantial increase in regional air pollution, posing a significant and chronic public health risk to communities in the impact zone.

- **Noise Environment: High Significance (Long-term, Local/Regional).** The continuous operational noise from aircraft take-offs, landings, and ground activities, combined with existing ambient noise levels and the noise generated by induced urbanization, will result in a chronic noise burden for communities under flight paths and near the airport. This sustained exposure will lead to increased sleep disturbance, stress, and potential health issues for residents, significantly degrading their quality of life.
- **Biodiversity and Ecosystems: Medium to High Significance (Long-term, Regional).** While direct impacts on formally protected areas are avoided, the airport's land conversion and operational disturbances (noise, air pollution, light pollution) will combine with ongoing agricultural expansion and regional water pollution. This creates a cumulative pressure on fragmented ecosystems, leading to a gradual but significant degradation of regional ecological integrity, particularly affecting sensitive avifauna that utilize regional water bodies and migratory routes.
- **Social and Cultural Fabric: Very High Significance (Irreversible, Local/Regional).** The direct displacement of households, loss of sacred sites, and disruption of traditional social networks by the airport project will be severely compounded by broader regional urbanization and cultural shifts. This will lead to an accelerated and profound erosion of traditional community structures, cultural practices, and spiritual connections to land, changes that are largely irreversible and deeply impactful on community identity.
- **Public Health and Safety: High Significance (Long-term, Local/Regional).** The airport project introduces new occupational hazards, pollution-related illnesses, and risks of communicable disease transmission. These risks, when combined with the pre-existing health vulnerabilities of the local population and the strain on limited healthcare infrastructure, will significantly increase the overall public health burden for the region, including increased traffic accidents.
- The cumulative impact assessment clearly demonstrates that many environmental and social risks, which might be considered manageable at a project-specific level, become

critically significant when viewed in the broader regional context. This necessitates a shift from project-specific mitigation to regional, strategic management

9.9. Management of Cumulative Impacts

Effective management of cumulative impacts requires a strategic shift from project-specific mitigation to a broader, integrated regional approach. This necessitates robust inter-agency coordination, long-term planning, and adaptive management strategies.

9.9.1. General Considerations for Cumulative Impact Management

Mitigation of cumulative impacts is required at both the local development scale, under the responsibility of the individual developers, and at the regional scale for the management of Valued Ecosystem Components (VECs). The primary mechanism for regional-scale management of VECs should be through strategic regional development assessment and planning, which is typically the function of the relevant government authorities. In particular, it is not possible for an individual project developer to enforce mitigation and management methods on other parties over which it has no direct control, authority or responsibility. In this context, it is therefore not appropriate or realistic for EAG to directly manage cumulative impacts on a regional development basis.

However, in line with IFC Performance Standards Guidance Note 1, Bishoftu International Airport will use commercially reasonable efforts to engage relevant government authorities, and other developers, Affected Communities and, where appropriate, other relevant stakeholders, in the design and implementation of coordinated mitigation measures to manage the potential cumulative impacts identified in Section 8.

Appropriate mitigation measures at the local, individual project scale for the other developments considered within the CIA would be, in general terms, similar to those implemented by Bishoftu International Airport as described in Section 8. Bishoftu International Airport will have no direct control or authority over the implementation of such measures by other developers. However, it is possible to influence the adoption of good practice mitigation measures through sharing of information (good practice, monitoring data, etc.) via standard engagement with other developers/authorities.

Due to the nature of the Bishoftu International Airport Project, its large land-take, combined with minimal avoidance and mitigation options, the Project is heavily reliant on developing

multiple offsetting strategies. The planning and implementation of these offset strategies will take into account the effects from cumulative developments to ensure that the offsets are secured for the long-term. Therefore, it is likely that the offsets will need to be located beyond the area of influence of the cumulative developments. This may increase the level of offset requirement to achieve equivalency in space and compensate for the potential increase in uncertainty of delivery.

9.9.2. Mitigation at Project Level

Many of the impact types identified with the potential development considered in this CIA are similar in nature to those identified and assessed for Bishoftu International Airport. Therefore, the mitigation measures being developed by Bishoftu International Airport (as described in Section 8.5) would, to a large extent, be applicable to other project developments. Many of the key mitigation controls being implemented by Bishoftu International Airport are either required under national standards or else in line with industry standard practices, and therefore may be reasonably assumed to be adopted by other project developers.

In addition, Bishoftu International Airport has elected to adopt a number of wider good practice mitigation measures. Bishoftu International Airport will endeavor to work with other developers to share these mitigation measures.

9.9.3. Mitigation at a Local/Regional Level

In addition to the control of impacts at the individual project level, Bishoftu International Airport will, to the extent that is practicable and reasonable, take a proactive role contributing to the management of cumulative impacts at the wider district/regional level. Specific approaches to be adopted by Bishoftu International Airport in this regard are summarized below:

- **Monitoring and Research:** Monitoring and research will be implemented within the Awash Basin, Bishoftu lakes, and Akaki-Aba Samuel reservoir areas, as well as the broader regional environment. An adaptive management system will be used to review the results of the monitoring to determine if additional mitigation measures are required to avoid, reduce or offset impacts. Bishoftu International Airport will use best endeavors with both local authorities and other relevant developers/operators to:
 - Share information on the results of the monitoring; and

- Identify potential joint initiatives as monitoring data becomes available.
- **Information Sharing:** Bishoftu International Airport will proactively share information on the implementation of good practice measures, including lessons learned and monitoring data, with relevant local authorities and other developers/operators in the Bishoftu region, where appropriate.
- **Biodiversity Action Plan (BAP):** The Bishoftu International Airport Biodiversity Action Plan (BAP) will set out specific actions for the assessment and management of natural habitats and avifauna within the Project Area. Bishoftu International Airport will use best endeavors with both local authorities and other relevant developers/operators within the Bishoftu region to:
 - Share information on the BAP (including results of any survey and monitoring data); and
 - Identify potential joint initiatives under the BAP as it evolves.

9.10. Residual Impacts

This sub section outlines the residual impacts anticipated after the application of all proposed mitigation measures for the Bishoftu International Airport project. Despite comprehensive mitigation efforts, certain environmental and social impacts may persist. The analysis of these residual impacts is primarily derived from the cumulative impact assessment, which considers the incremental impacts of the project in conjunction with other existing, planned, or reasonably defined developments in the region.

9.10.1. Land Use and Livelihoods Disruption

Even with mitigation measures, the project will result in significant and largely irreversible residual impacts on land use and livelihoods. The acquisition of 3,979 hectares of land for the airport, displacing 2,731 households and affecting 15,320 individuals, will fundamentally disrupt traditional agrarian lifestyles. The loss of 2,518.6 hectares of agricultural land, 272.74 hectares of residential land, and 163.1 hectares of grazing land, combined with existing regional land scarcity and gentrification, will lead to accelerated socio-economic vulnerability. This situation is exacerbated by the displacement of a largely agrarian population into an urbanizing environment where land is already scarce and expensive, increasing competition for resources and potentially heightening social conflict. Vulnerable groups, such as non-titled households

and female-headed households, will face increased difficulty in re-establishing sustainable livelihoods, potentially leading to long-term poverty traps and exacerbated social inequalities.

9.10.2. Water Resources Strain

The Bishoftu International Airport's operations will introduce substantial new demands on water resources, with projected consumption increasing significantly over phases. Although wastewater will be treated, its discharge will add to the already high pollution load of the Akaki and Dukem Rivers, which are currently severely polluted by domestic and industrial wastewaters from Addis Ababa and its suburbs. This, combined with existing regional water scarcity and increasing demand from urbanization and other industrial developments, will place severe and long-term cumulative stress on both surface and groundwater resources. The risk of contamination from spills and waste is amplified by the pre-existing vulnerability and compromised quality of these water bodies.

9.10.3. Air Quality Degradation

Despite mitigation measures during construction and operation, residual impacts on air quality are anticipated. The construction phase will generate dust and gaseous pollutants from machinery and vehicles, while the operational phase will contribute emissions from aircraft, ground support equipment, and increased vehicular traffic. These project-specific emissions will interact with an existing regional baseline where Bishoftu town already experiences air quality challenges, leading to persistent air quality degradation.

9.10.4. Noise Pollution

Even with the implementation of various noise mitigation strategies, such as the construction of noise barriers around specific airport facilities, the enforcement of operational restrictions (e.g., limitations on nighttime flight operations, preferential runway use to direct aircraft away from densely populated areas), and the application of land-use zoning regulations to control development in high-noise zones, noise levels may still remain above recommended thresholds in some areas. This is particularly true for communities situated directly under the primary flight paths, where the sheer volume and intensity of aircraft noise, especially from larger or older aircraft, can penetrate even well-designed barriers. The propagation of sound through the

air, combined with the continuous nature of airport operations, means that a complete elimination of noise impact is not feasible, leading to persistent elevated noise levels for these specific communities.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

10.1. Environmental and Social Management Plan

The preceding chapters of this ESIA report presented details of the baseline socio-environment, the proposed Bishoftu International Airport as well as the identified environmental and social impacts and their mitigation measures. This section provides an Environmental and Social Management Plan (ESMP) that comprises a specific plan of action for the proposed mitigation measures to ensure implementation of the “mitigation measures” to avoid or reduce adverse impacts and enhance positive impacts from the design, construction and operation of the proposed project components.

ESMP is the key to ensure that the environmental and social quality of the project influence area does not deteriorate due to the implementation of the proposed development project covering all aspects of project implementation in its different phases. It is generally used as the basis for establishing the environmental and socio-economic behavior that the proposed project requires during its various stages. Unless the mitigation and benefit enhancement measures identified in the ESIA are fully implemented, the prime function of the ESIA, which is to provide a basis for shaping the project to enhance the overall environmental and social performance, cannot be achieved.

The ESMP for the proposed project consists of a set of feasible and cost-effective mitigation and institutional measures to be undertaken during the different phases of the project to eliminate or reduce to acceptable levels the adverse environmental and social impacts identified. It also includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. It is prepared in such a way that it serves as a document that sets forth those practices which will be implemented to prevent, control, and mitigate significant negative environmental and social impacts arising as a consequence of the implementation of the proposed project. Hence, the ESMP is directed at mitigating, minimizing, or controlling negative impacts arising throughout the different phases of the project.

This ESMP defines the roles and responsibilities of various stakeholders for ensuring smooth and well-integrated implementation and monitoring of the project operations. It contains commitments that are binding on the proponent. It can be translated into project documentation and provide the basis for a legal contract that establishes responsibilities of the proponent. In

turn, the proponent can use the ESMP to establish environmental and social performance standards and requirements for those carrying out the works or providing supplies. It can be also used to prepare an environmental and social management system for the operational phase of the project.

The plan depicts the identified adverse impacts, the proposed mitigation measures and responsibilities for implementation and follow up. It also summarizes beneficial impacts and enhancement measures as well as responsible bodies for the implementation.

Several key assumptions underpin the cost projections presented in this Environmental and Social Management Plan. The Estimated Direct Costs (ETB) and Associated Management & Overhead Costs (ETB) included in this plan are high-level, indicative estimates based on a combination of industry benchmarks, expert judgment, and key project-specific assumptions:

- **Unit Costs:** Ethiopian-specific unit costs have been applied where available. These include rates for water truck rental, wages for unskilled and skilled labor (the latter based on typical salaries in the construction and real estate sectors), prices for Personal Protective Equipment (PPE) such as safety helmets, reflective vests, and safety shoes, as well as costs related to waste disposal at sanitary landfills. Additionally, costs for erosion control materials like sandbags and silt fences have been considered.
- **Project Duration:** The mobilization phase is assumed to be short-term, lasting approximately three to six months, while the construction phase is estimated to span three to five years. For budgeting purposes, a four-year construction duration has been used consistently.
- **Scale of Operations:** Cost assumptions reflect the scale of typical large infrastructure projects, including the extent of dust suppression needed, volume of waste generated, and workforce size.
- **Inflation Considerations:** Although inflation is not explicitly factored into the cost estimates, it is acknowledged as a significant factor in Ethiopia that can affect multi-year projects. All costs are presented in current Ethiopian birr, and it is recommended that inflation be considered in detailed project budgeting.
- **Basis of Estimates:** The cost figures are informed by industry benchmarks for similar environmental and social mitigation measures and management activities in comparable projects regionally and internationally. Expert input from environmental

and social specialists, engineers, and project managers familiar with the Ethiopian context has further informed these estimates.

- **Assumptions and Limitations:** These cost estimates assume standard implementation practices and do not incorporate potential unforeseen complexities, substantial scope changes, or major fluctuations in market prices. As such, the figures are conceptual and intended for planning purposes only. Detailed cost estimations should be developed during subsequent engineering design phases, site-specific assessments, and market reviews.

Table 10-1: ESMP for Enhancing Beneficial Impacts of the proposed Bishoftu international airport (*Common ESMP for All Components*)

Socio-Environmental Component	Project Phase	Proposed Enhancement Measures	Responsibility		Cost estimation
			Implementation	Supervision	
Job Creation	Construction & Operation	- Prioritize local employment (Abusera Wereda residents). - Implement fair wage policies and labor rights. - Allocate spaces for informal vendors. - Establish public-private partnerships for job creation.	Construction contractor, Airport Management, Ethiopian Airlines,	Ministry of Labor, Oromia regional state, Supervision Consultant and Bishoftu city Administration	Part of operational budget (training & recruitment).
Skill Transfer	Construction & Operation	- Establish an Aviation Training Center. - Provide on-the-job training and apprenticeships. - Partner with TVETs for aligned curricula. - Promote gender-inclusive training programs.	Ethiopian Airlines, Ministry of Education, TVETs	Ethiopian Aviation Academy, ICAO	50,000,000 ETB (training infrastructure).
Local Economic Growth & Investment	Operation	- Develop investment promotion strategies (tax incentives, SEZs). - Encourage local business participation in Airport City. - Facilitate FDI in logistics and hospitality.	Ethiopian Investment Commission, Private Sector	Ministry of Trade & Industry	Part of the regular budget of the Ethiopian Investment Commission.
Aviation Capacity Expansion	Operation	- Phased infrastructure development. - Strengthen aviation policies (ICAO/IATA compliance). - Integrate multimodal transport (rail, expressways).	Ethiopian Civil Aviation Authority	ICAO, IATA	Part of national aviation budget.
Tourism Development	Operation	- Establish a visitor information center. - Develop tourism packages (airline-hotel partnerships). - Launch digital marketing campaigns.	Ethiopian Tourism Organization, Airlines	Ministry of Culture & Tourism	Part of the regular budget of the Ethiopian Tourism Organization and Airline
Cargo & Logistics Hub	Operation	- Build modern cargo handling & cold storage facilities. - Establish a customs-free trade zone. - Implement digital cargo tracking systems.	Ethiopian Airlines, Ethiopian Customs	Ministry of Transport	Part of national aviation budget.
Urban Development & Infrastructure	Construction & Operation	- Implement sustainable urban planning (zoning, green spaces). - Develop affordable housing for workers. - Upgrade utilities (water, electricity, waste management).	Bishoftu City Administration, Oromia Regional state	Ministry of Urban Development	Part of regular budget of Bishoftu City Administration and Oromia Regional state
Smart Airport Technologies	Operation	- Deploy AI-driven passenger flow systems. - Install biometric security & self-service kiosks. - Implement 5G/Wi-Fi connectivity.	Construction contractor and EAG	Supervision Consultant and Ethiopian Innovation & Tech Agency	Part of construction and operational budget
Renewable Energy Integration	Construction & Operation	- Install solar panels on terminal roofs. - Use energy-efficient LED/HVAC systems. - Develop waste-to-energy projects.	Construction contractor, EAG, Ethiopian Electric Utility, Private Sector	Supervision Consultant and Ministry of Energy	Part of construction budget
Total Cost					50,000,000 ETB

Table 10-2: ESMP for the adverse impacts of the proposed new airport (*Common ESMP for All Components*)

Code	Socio-Environmental Component	Risk	Potential Environmental and Social Impact	Proposed Mitigation measures	Mitigation Schedule	Responsibility		Cost estimation	
						Implementation	Supervision	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
A	Mobilization Phase								
A1	Land Acquisition & Displacement	Involuntary physical and economic displacement of households and loss of land.	-Physical displacement of 2,731 households (15,320 individuals), across 8 kebeles. -Loss of 3,979 hectares of land, comprising 2,518.6 ha (80.3%) of agricultural land, 272.74 ha (8.7%) of residential land, and 163.1 ha (5.2%) of grazing land.	- Fully implement the Livelihood Restoration Plan for Bishoftu International Airport Development Displaced Households- Provide land-for-land compensation or monetary compensation at full replacement cost. - Construct replacement housing for all physically displaced households	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and rehabilitation committee	14,699,999,999ETB	
A2	Loss of Livelihoods	Significant disruption and loss of primary income sources for project-affected households.	-Economic displacement affecting 91.7% of households reliant on farming. -Loss of livelihood from 31,432 cattle, 7,764 goats and sheep, 2,102 equines, 63,179 poultry, and 1,225 beehives. -Estimated annual income loss of ETB 92,875,911 from off-farm activities.	- Implement livelihood restoration programs (irrigated farming, dairy, agro-processing, trade and transport, and construction sector.) - Provide vocational training and job linkages to airport-related employment. - Offer temporary cash assistance for 12 months.	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and rehabilitation committee	7,298,687,275 ETB	
A3	Cultural and Social Disruption	Loss of social cohesion, destruction of religious/cultural sites, and disruption of	-Destruction of four Orthodox churches, five Protestant church, one Mechereyesus Church, and one Full Gospel Church, along with their associated cemeteries	-reroute project infrastructure to avoid known cultural, spiritual, and communal heritage sites, including cemeteries and ritual grounds	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and	The cost are already included in A4	

		traditional practices.	- Disruption of traditional mutual aid systems (Iddir, Iqub, Gadaa system) and seasonal grazing lands for Kereyu Oromo pastoralists	- Design resettlement areas to reflect the original spatial and social organization of the community, including access to communal spaces - Rebuild affected religious institutions and culturally significant structures within or near the resettlement areas in coordination with affected communities. -Allocate suitable land for the reconstruction of cemeteries and ensure traditional rites can be performed in alignment with community practices.			rehabilitation committee		
A4	Impact on Social Infrastructure	Demolition and disruption of essential public services and utilities.	-Loss of 4 first-cycle schools and 2 primary schools (affecting 2,540 students). -Closure of 5 health posts (serving 10,417 residents). -Disruption of 37 km of gravel roads, -demolition of 2 water reservoirs, and loss of 73 piped water connections. -Loss of 5 Farmers Training Centers (FTCs), 5 kebele offices, and 5 cooperative	- Construct temporary schools and health posts in resettlement areas. - Deploy mobile health units and temporary classrooms. - Reassign displaced government staff to new facilities. -Rebuild religious institutions and cemeteries in resettlement areas. - build social infrastructures including schools, health center, religious institutions;	Before the commencement of construction activities	Ethiopian Airlines Group, Oromia Regional State, Bishoftu city Administration and Abusera Woreda	Bishoftu city Administration and Abusera Woreda Land Devt Office in cooperation with Resettlement and rehabilitation committee	7,889,241,200.00 ETB	

			warehouses.	building water supply and electric power supply at the resettlement site					
A5	Deterioration of Ambient Air Quality	Increased dust and exhaust emissions from vehicular movement and land clearing.	Increased fugitive dust emissions (PM2.5, PM10) from unpaved roads and land clearing; localized increase in vehicle exhaust emissions (NOx, CO) from machinery transport. Impact is significant during dry weather conditions.	- Implement daily water spraying on all unpaved roads, active construction areas, and exposed soil surfaces, particularly during dry and windy conditions. - Cover all stockpiles of soil, sand, and other construction materials with tarpaulins or other suitable covers. Seal or enclose materials prone to dust generation. - Limit vehicle speed to 30 km/h in residential areas and on unpaved access roads.	While moving machineries and vehicles along unpaved access roads	Construction Contractors	Bishoftu city Administration Environmental Protection Authority and consultant	40,000,000	4,000,000
A6	Increased Noise Levels	Elevated noise from construction machinery affecting nearby communities and workers.	Localized noise levels potentially exceeding Ethiopian standards (45dB night, 55dB day for residential areas) during machinery movement and camp establishment. Impact is low due to short duration of mobilization.	- Restrict noisy machinery use at night (maintain ≤ 45dB). - Screen noisy equipment and enforce daytime-only operations. - Install acoustic barriers or sound-insulating screens around active construction zones - Use modern, quieter construction equipment - Mandate the use of Personal Protective Equipment (PPE)	During mobilization and camp establishment	Construction contractor	Supervision consultant	40,000,000	4,000,000
A7	Soil Compaction & Contamination	Compaction and pollution	Compaction of soil along access roads and open spaces;	- Use existing roads for machinery transport.	During mobilization and camp	Construction contractor	Supervision consultant	4,000,000	400,000

		of soil from heavy machinery movement and accidental spills.	potential contamination from leakage/spill of oil/fuel from vehicles and machinery. Impact is low due to short duration.	- Avoid driving on farmland; construct designated access roads.	establishment				
A8	Surface Water Contamination	Pollution of surface water bodies from fuel/oil spills and improper vehicle washing.	Potential release of fuel/oil pollutants into nearby water bodies, contributing to water quality deterioration.	- Prohibit vehicle washing near water bodies. - Designate fuel stations and maintenance zones.	During mobilization of construction machineries and vehicles	Construction contractor	Supervision consultant	2,000,000	200,000
A9	Flora & Fauna Disturbance	Minor disturbance to local flora and fauna from site activities.	Low impact anticipated as no protected or natural habitats are along access roads/project sites.	- Select storage/camp sites in non-vegetated areas. - Avoid unnecessary tree removal; - replant shade trees post-construction.	During mobilization and camp establishment	Construction contractor	Supervision consultant	2,500,000	250,000
A10	Occupational Health & Safety Risks	Health and accident risks to workers and commuters from vehicular/equipment movements, loading/unloading, and dust emissions.	Limited health and accident risks due to short duration and minimal workforce during mobilization.	-Implement Occupational Health & Safety Plan -Provide PPE and safety training for workers. - Isolate work zones from public areas. -Integrate mitigation strategies—through robust Safety Management Systems, staff training, advanced technology, and continual risk monitoring	During mobilization and camp establishment	Construction contractor	Supervision consultant	10,000,000	1,000,000
A11	Traffic Congestion and Accident Risk	Increased traffic congestion and accident	Moderate impact from increased vehicular and machinery movement to the project site.	- Implement a Traffic Management Plan (TMP).	During mobilization and camp establishment	Construction contractor	Supervision consultant	2,000,000	200,000

		potential due to vehicle and machinery movement.							
A12	Gender-Based Violence (GBV) Risks	Potential for GBV and sexual harassment against female workers due to lack of awareness and understanding .	Low impact due to minimum number of workers and short duration of mobilization.	- Provide separate sanitation facilities for women. - Enforce a strict anti-harassment code of conduct.	During mobilization and camp establishment	Construction contractor	Supervision consultant	1,500,000	150,000
B	Construction Phase								
B1	Air Pollution (Deterioration of Ambient Air Quality)	Significant fugitive dust emissions and exhaust from construction activities and machinery.	High impact from dust (PM 2.5, PM10) from excavation, material transport, and vehicle exhaust (NOx, CO) from diesel powered equipment. Exacerbates existing air quality issues in Bishoftu town.	-Locate emission-intensive activities (e.g., aggregate processing, batching plants, and quarrying) away from densely populated areas and sensitive receptors such as schools, hospitals, and natural habitats. -Preserve vegetation cover where possible to act as a natural dust and pollutant barrier. - Water spraying on unpaved roads and exposed soil. - Apply dust suppressants or soil binders on haul roads and open stockpiles. - Cover stockpiles with tarpaulins. - Use low-emission (Euro	Throughout the construction Phase	Contractor	Bishoftu city Administration Environmental Protection Authority /Consultant	150,000,000	15,000,000

				IV+) machinery. - Prohibit open burning of waste. -Use update technology or modern equipment in excavation works that will minimize dust generation from earthen materials; -Regular vehicle inspections and maintenance of equipment and vehicles to reduce excessive exhaust emissions; - Install dust extraction units (e.g., bag filters or wet scrubbers) at plants. -Minimize excavation and earth moving to only what is required for the specific nature and type of construction; - Use controlled and pre-wetted blasting techniques. • Operate only during favorable weather to minimize dispersion. -Use dust suppression systems (e.g., mists or water sprays).					
B2	Noise Pollution (Elevated Noise Levels)	High noise levels from heavy construction equipment impacting nearby	High impact from machinery noise (e.g., excavators, bulldozers, dump trucks, piling rigs) potentially exceeding Ethiopian EPA (55 dB day, 45 dB night) and IFC (70 dB day, 55 dB night for	- Limit noisy activities to daytime (7 AM–6 PM). - Use acoustic barriers for DG sets. - Install soundproof enclosures for diesel	Throughout the construction Phase	Contractor	Supervision Consultant	7,000,000	700,000

		communities and workers.	residential) standards.	generator sets in compliance with CPCB and international standards to suppress noise emissions at source. - Mandate PPE (earplugs) for workers in >85 dB zones. - Enforce 30 km/h speed limit near residential areas. - Use update technology or modern equipment in excavation works that will minimize noise emissions and vibration					
B3	Solid Waste Generation	Generation of large volumes of solid waste (unsuitable soil, construction debris, domestic waste) posing contamination and health risks.	Generation of approximately 73,132,110 m ³ of unsuitable excavated soil. Significant volumes of municipal solid waste from labor camps and construction debris.	- Implement a waste minimization strategy by optimizing material use and reducing excess procurement. -Establish on-site segregation bins for different categories (organic, recyclable, hazardous, non-hazardous) to reduce cross-contamination - Dispose of hazardous waste via licensed facilities. - Provide sealed waste bins at labor camps. - Transport non-recyclable waste to authorized disposal sites with proper waste tracking. - Store chemicals in labeled, sealed containers; implement spill prevention using drip	Throughout the construction Phase	Contractor	Bishoftu city Administration Environmental Protection Authority /Consultant	20,000,000	2,000,000

				trays and absorbents					
B4	Land Use Modification	Changes in land cover leading to increased surface runoff and flood potential.	Significant modification of the project site's land cover (from predominantly agricultural to impervious surfaces), increasing surface runoff potential and leading to frequent local flooding.	-Reduce land requirement by utilizing effectively and only required size for the intended use. -Drainage work should not only be limited to airport facility but also should incorporate local drainage system considering near future urbanization of the area.	Throughout the construction Phase	Constructioncontractor	Supervision consultant	10,000,000	1,000,000
B5	Soil Erosion & Compaction	Loss of topsoil, increased erosion, and soil compaction from site clearing, excavation, and heavy machinery.	Potential for soil disturbance and loss of topsoil resources. Aggravation of gully formations in soft geological formations. Soil compaction from heavy-duty vehicles affecting soil structure and water infiltration.	-Demarcate the area to be stripped clearly, so that the contractor does not strip beyond the demarcated boundary. - In case of spillage the Contractor should isolate the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by the Resident Engineer; -Pre-defined, essential road access routes should be clearly demarcated and adhered-to on site to restrict soil compaction in the project area	Throughout the construction Phase	Constructioncontractor	Supervision consultant	9,000,000	900,000
B6	Pollution of Water Bodies	Contamination of surface and groundwater from inadequate	Increased silt loading of Akaki-Gerbi and Dukem Rivers. Potential pollution from fuel/oil/paint spills and solid/liquid waste from construction camps,	-Construction materials and other debris (aggregate, cement and fresh concrete, etc.) shall be prevented from	Throughout the construction Phase	Construction contractor	Supervision consultant	20,000,000	2,000,000

		handling/spillage of pollutants and increased siltation.	exacerbating existing severe pollution.	entering existing drainage infrastructure. -Ensure protection of the water body ecosystem by preventing the washing away of construction materials, soil, silt or debris into nearby rivers. -Develop and display emergency response work instructions for accidental oil and chemical spills and debris into the rivers. in other manner approved by the Supervision consultant					
B7	Vegetation and Flora Loss	Loss of vegetation and fragmentation of habitats.	Loss of 105 hectare land covered with Acacia-Commiphora woodlands and other indigenous/plantation vegetation.	• Design infrastructure to minimize impact on sensitive vegetation zones. • Avoid unnecessary clearing and preserve key plant species. • Establish green belts around the site to enhance ecological balance. • Implement erosion control measures to protect plant roots and prevent land degradation. • Replant 2x the cleared trees (native species).	Throughout the Construction and construction completion phase	Contractor, EAG, Bishoftu city environmental protection offices	Supervision consultant, Bishoftu city environmental protection	10,000,000	1,000,000

				• Preserve Acacia-Commiphora woodlands.					
B8	Habitat and Fauna Disturbance	Habitat fragmentation, disturbance to wildlife, and potential for bird strikes.	-Habitat loss/fragmentation for wildlife (hyenas, rabbits, monkeys) and bird species -Increased risk of bird strikes.	• Conservation of important habitat and Key plant species including the remnant secondary growth trees and shrubs for nesting and food sources, • Preserve existing vegetation where possible and avoid unnecessary clearing. • Maintain natural corridors to allow fauna movement.	Throughout the construction Phase	Construction contractor	Supervision consultant	40,000,000	4,000,000
B9	Occupational Health & Safety Hazards	Physical injuries, chemical exposure, noise exposure, fatigue, and human error for construction workers.	-High potential for accidents, chemical exposure, and noise-induced hearing loss, and -fatigue-related incidents among workers.	• Implement Occupational Health and Safety Plan • Contractor has to take maximum care and minimize accident risks by applying internationally accepted standards and recognized occupational health and safety guidelines; • The contractor to take appropriate care in storing and using hazardous chemicals and explosives and provide training to workers in handling hazardous chemicals;	Throughout the construction phase	Construction Contractor	Supervision consultant, EAG and Bishoftu City Health office	80,000,000	8,000,000

			• Provide workers with protective clothing and equipment and create awareness on safety issues; • Provide awareness creation among the local community on the hazardous nature of chemicals, explosives if it is used during the construction works; • Provide first aid kits at workshops, construction worksites, and inside vehicles; • Provided workers with appropriate PPE such as hand gloves, eye goggles, safety shoes, reflective vests, helmets, etc., based on their work condition as much as possible and strictly inspect proper use of the same throughout the construction phase; • Avail equipped ambulance at construction site for any emergency cases; • Conduct general medical check-ups for recruits and subsequently, conduct periodic medical check for all employees and take					
--	--	--	--	--	--	--	--	--

				appropriate action and keep all records; • Hung-up fire extinguisher bearing detailed information about its status at appropriate places; • All personnel, vehicles, and machinery should be covered under an appropriate Insurance System; • Carefully record and keep all incidence of injuries and accidents including date, time, and place of occurrence, level of injuries, resources damage, people injured/dead, major causes for the accident, etc.; • Provide awareness creation on safety procedures and HIV/AIDS and avail healthcare services; • Regularly spray water in dusty roads and work areas; and; • Introduce a traffic management plan with speed and traffic regulation through the neighboring areas by					
--	--	--	--	---	--	--	--	--	--

				using appropriate traffic signs.					
B10	Traffic Accident and Congestion	Increased traffic accidents and congestion on local roads due to construction vehicle movements.	-Estimated 34,753 daily truck trips during peak construction period (Year 2), overwhelming unpaved local road networks. -Increased accident risks, dust pollution, and long-term infrastructure strain.	• Implement Traffic Management Plan • Avoid parking construction vehicles and equipment at road sides instead provide temporary parking areas within the construction compound or in camp sites; • Post proper and clearly visible signs, barricades, reflectors at appropriate locations; • Delineate or fence work zone esp. risky areas and provide sufficient information about the site through posting of clearly visible signs; • Set and enforce speed limits for vehicular traffic by putting appropriate signals and assigning traffic regulators around project operational area; • Minimize the duration of construction works through arrangement of capable and professionally trustful contractors and supervision consultants; • Reinstate the damaged sections of roads as soon	Throughout the construction phase	Construction contractor	Client/Supervision consultant, Oromia and Bishoftu city traffic management offices	10,000,000	1,000,000

				as the construction works is completed;					
B11	Conflict on Employment Opportunity	Potential for conflicts between local communities and migrant workers over employment opportunities.	Risk of social tension and conflict if local employment expectations are not met.	- Implement Labor Management Procedure Plan - Provide priority of job opportunity for the local people and particular attention for women; - Involve local authority in the process of labor recruiting; - Create a smooth relationship with community members.	Throughout the construction phase	Construction Contractor in cooperation with, Bishoftu city labour offices	Supervision consultant, Bishoftu city	1,000,000	100,000
B12	Impacts on Vulnerable People	Disproportionate negative impacts on vulnerable groups (e.g., elderly, disabled, female-headed households).	Vulnerable groups (as identified in baseline) may face increased hardship if not specifically supported.	- Ensure that women and vulnerable groups will equally get job opportunities during the project construction processes and the benefits of the Project implementation; - Aware local governments and community members to solicit their assistance for the project affected vulnerable groups; - Ensure all project vulnerable groups are identified and eligible for the government's special support.	Throughout the construction phase	Contractor in cooperation with Bishoftu city administration office	Consultant	2,000,000	200,000

B13	Gender Equity and Sexual Harassment	Potential for gender inequality, sexual harassment, and gender-based violence (GBV) in the workforce and community.	Risk of GBV/SEA and child labor abuse due to influx of male workers and associated social changes.	• Create awareness among workers on gender and sexual harassment issues; • Issue a strong Workers Code of Conduct (CoC) that sufficiently addresses gender and sexual harassment issues; • Take appropriate actions on workers violating the CoC; • Provide women workers with appropriate type of safety equipment and protective materials; • Include in the employment contract for the construction workers that any GBV and sexual harassment against women workers will lead to administrative measures and also legal actions; • The Contractor is required to design gender core labour standards and employment and contract procedures; and also design gender responsive workers' manuals; • The Contractor should ensure that women are paid equal pay for equal work with their male counterparts;	Throughout the construction Phase	Contractor	Consultant, and; Office of Women, Children and Youth Affairs.	4,800,000	480,000
-----	-------------------------------------	---	--	---	-----------------------------------	------------	---	-----------	---------

				• Provision of gender disaggregated bathing, cloth changing areas & sanitation facilities; • Include gender expert among the consultant's team to follow up Gender mainstreaming activities.					
B14	HIV/AIDS and other STI Spread	Increased risk of HIV/AIDS and other STIs due to influx of workers.	Increased risk of communicable disease transmission, including HIV/AIDS, due to large, transient workforce.	• Contractors should assign experienced HIV/AIDS sub consultant to handle the issues related to HIV/AIDS awareness and prevention; • Launch awareness and education campaigns about HIV/AIDS among the construction workers and community to make them informed. This has to be done on the one hand by the contractor's sub consultant and on the other hand by the local health institutes around the project area targeting especially women and sex workers; • Condoms shall be provided at a subsidized rate or for free to construction workers and health facilities must be supported with a supply of condoms.	Starting from mobilization to end of construction phase	Construction contractor through HIV/AIDS sub consultant to be hired under the contractor	Supervision consultant, Bishoftu City Administration	2,000,000	200,000

				- To prevent young and school age people, schools within the direct influence area of the project should include information campaigns and/or special awareness creation activities; - City administrations and city health offices, HIV/AIDS Prevention and Control Office, Elders, and NGOs operating in the area need to work jointly to create positive impact and bring major attitudinal and behavioral changes. The contractor should understand the culture of people/community of the project area.					
B15	Cultural Conflict, Culture Dilution and Drug Abuse	Potential for cultural conflicts, dilution of local culture, and increased drug/alcohol abuse.	Risk of social friction, cultural clashes, and increased drug/alcohol abuse due to interaction between local communities and migrant workers.	- Contractor shall aware of his workforce to not involve in any sexual, alcohol and drug abuse. - If workers committed sexual and drug abuse, the case should be taken to court. - If the worker committed sexual abuse and escaped from the project area, the contractor has to be responsible to bring him to court.	Throughout the construction phase	Contractor in cooperation with project woreda administration office	Consultant, Bishoftu city Administration	5,000,000	500,000

				The Abusera Woreda authorities should control and shut any shop involved in drug business if any.					
C	Operation Phase								
C1	Air Pollution (Deterioration of Ambient Air Quality)	Emissions from aircraft operations, ground support equipment (GSE), and increased vehicular traffic.	By 2030, daily emissions projected at 21,618 kg of NO _x , 2,716 tons of CO ₂ , and 144 kg of PM. Aircraft like B777-300ER and APU operations are major contributors. Exacerbates existing air quality issues in Bishoftu town (PM _{2.5} , PM ₁₀ , NO ₂ , SO ₂ often exceed standards).	- Discourage high-emission aircraft -Transition airport Ground operations to electric or hybrid systems (e.g., electric Ground Support Equipment, electric shuttle buses). -Install electric vehicle (EV) charging infrastructure for airport vehicles and service fleets. -Promote public transport, carpooling, and non-motorized transport for employees and passengers to reduce vehicular emissions. -Implement runway and taxiway optimization to reduce aircraft Taxiing time and idle emissions. -Introduce operational limits on APU use through airport policy and monitoring. - Develop green buffer zones around airport boundaries to improve local air quality and aesthetics.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu City Administration	50,000,000	7,500,000
C2	Noise Pollution (Chronic Noise Burden)	High noise levels from aircraft operations and ground activities affecting nearby communities.	By 2030, noise projected to affect around 14,376 hectares: 9,405 ha exposed to 45–50 dB, and 4,971 ha to 50–55 dB (exceeding residential night-time limits of 45 dB). Commercial thresholds (70 dB) breached across 2,326 hectares, with 68 hectares exposed to	-Avoid scheduling non-essential night flights during the most sensitive hours (e.g., 23:00–06:00). -Reduce the operation of high-noise aircraft models at the airport during planning and licensing stages. -Transition to electric or hybrid ground support	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	30,000,000	4,500,000

			over 70 dB, and smaller areas exceeding 75–90 dB.	equipment to minimize ground noise emissions. -Design airport infrastructure (runways, taxiways, holding areas) to reduce aircraft idling and unnecessary engine use. -Restrict noisy maintenance and fueling operations to daytime hours only. - Use sound-absorbing materials in airport terminals and perimeter structures to reduce ambient noise propagation. -Construct vegetative noise buffers and embankments around high-noise operational zones to reduce sound travel. -Restore and enhance natural barriers (e.g., Tree lines) between the airport and residential communities.					
C3	Fire and Explosion Hazards	Risk of fire and explosion from fuel and hazardous materials.	Loss of life or serious injury to personnel, extensive damage to infrastructure, interruption of operations, and environmental contamination from burning fuel and firefighting residues.	-Fire Detection and Alarm Systems; -Fixed and Mobile Fire Suppression Systems (foam-water, deluge, extinguishers); -Explosion-Proof Equipment and Zoning (ATEX/IECEX); -Static Electricity Control (grounding/bonding); -Emergency Response Plan (ERP, drills); Fuel Vapor Control (closed-loop, flame arrestors);	During the operation phase	Client (Airline Group)	Federal fire and emergency prepared Agency, Project Management Unit, Regulatory Authorities	40,000,000	6,000,000
C4	Solid Waste Generation	Continuous generation of various solid wastes from airport operations.	Significant generation of municipal solid waste from terminal buildings (0.5 kg/passenger/day), in-flight cabin waste (0.4 kg/passenger/day), and packaging waste from cargo facilities (2 kg/ton cargo).	- Deploy 3-stream waste segregation (organic, recyclable, residual). - Establish an on-site recycling plant. - Partner with certified hazardous waste disposal firms.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection.	60,000,000	9,000,000

C5	Liquid Waste Generation	Discharge of wastewater and potential contamination of water bodies.	Wastewater volumes reaching up to 15,390 m ³ /day (at 110MAP). Risk of groundwater and surface water contamination from spills and discharges, exacerbating existing severe pollution in Akaki and Dukem Rivers.	- Install advanced wastewater treatment (MBR/RO systems). - Reuse treated water for landscaping. - Monitor effluent quality monthly.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	80,000,000	12,000,000
C6	Hazardous Materials		-Exposure to toxic chemicals (fuels, biocides, degreasers, solvents) can cause acute or chronic health effects such as respiratory irritation, skin burns, eye damage, or long-term organ toxicity. -Risk of chemical burns or poisoning due to accidental spills, leaks, or improper handling. -Potential inhalation of harmful vapors in confined spaces. -Contamination of soil and water bodies from chemical spills or improper disposal.	-Implement Hazardous Waste management Plan -Properly label and secure all chemical containers. -Strengthen waste collection, storage, and disposal systems. -Conduct regular inspections and audits of storage and handling. -Maintain records of waste generation and disposal. -Cover containers during storage and transport. -Set fixed routes and schedules for hazardous waste transport. -Ensure emergency preparedness and response plans. -Provide PPE and training for all handling and transport staff.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	3,750,000	
C7	Traffic Congestion	Increased vehicular traffic leading to congestion on surrounding road networks.	Significant peak-hour passenger movement (e.g., 5,330 departing and 5,230 arriving passengers during Phase 1 peak hours). This will overwhelm unpaved local road networks, raising accident risks and amplifying urban sprawl.	- Implement Traffic Management Plan	During the operation phase	Airlines Group	-Ethiopian Roads Authority. - Bishoftu city Administration	30,000,000	4,500,000
C8	Community Health and Safety	Air pollution, noise disturbance, bird strikes, and public safety concerns from traffic and hazardous	Exacerbation of respiratory and cardiovascular health issues from air pollution; sleep disturbance and stress from noise; risk of aircraft bird strikes; public safety concerns	-Design flight paths to minimize noise over communities. -Avoid wetlands and bird migratory routes to reduce bird strikes. -Use low-emission aircraft and electrify ground vehicles.	During the operation phase	Airlines Group	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	70,000,000	10,500,000

		materials impacting communities.	from increased traffic and hazardous material transport.	-Enforce noise curfews and build sound barriers. -Manage habitat and install bird deterrents. -Implement strict waste control to prevent attracting birds. -Secure airport perimeter with fencing and surveillance.					
C9	Occupational Health and Safety	Continuous physical, chemical, and ergonomic risks for airport staff	-Physical injury -Noise exposure -Ergonomic hazards -Fatigue -Human error -Exposure to air pollution -Handling hazardous and non-hazardous waste -Traffic congestion and related accidents	-Implement Operational Health and Safety Plan -Provide personal protective equipment (PPE) to all workers. -Implement regular OHS training and awareness programs. -Enforce strict handling and disposal procedures for hazardous and non-hazardous waste. -Monitor and control air quality and noise levels at the workplace. -Manage work schedules to reduce fatigue and ergonomic risks. -Maintain clear and safe traffic management to minimize congestion and accidents. -Conduct regular health and safety audits during operation. -Establish emergency response plans and first aid facilities onsite.	During the operation phase	Airlines Group	-Federal Health office -Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	50,000,000	7,500,000
C10	Soil contamination	Soil contamination from spills and leaks of oil, fuel, and other chemicals.	Potential for localized soil contamination from spills of oil/grease in maintenance rooms, workshops, and parking areas.	-In case of spillage it should isolated the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by environmental specialist. -Frequent monitoring of garages or plane maintenance rooms, workshops, parking area and others to check any	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	10,000,000	1,500,000

				leakage and if in compliance with the design					
C11	Contamination of water bodies	Contamination of surface and groundwater from improper storage/disposal of hazardous chemicals and materials.	Potential for water body contamination from improper storage/disposal of oil/fuel/lubricants and hazardous chemicals.	-All drums, containers or bags containing oil/fuel/lubricating materials and other hazardous chemicals shall be stored at special designated disposal sites on a sealed and/or bonded area in order to contain potential spillage. -All waste containers shall be collected and disposed off at designated disposal sites in line with the Ethiopian government waste management regulations. -Incorporate implementation of surface water drainage infrastructure management plan in the design document.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	20,000,000	3,000,000
C12	Increased water demand	Strain on local water resources due to increased airport water consumption.	Daily water demand rising from 6,596 m3 (Phase I) to 18,111 m3 (Ultimate Phase), placing substantial pressure on local groundwater and surface water resources.	- Limit pumping of water beyond the optimum well yield. -Conduct watershed management and soil-water conservation practice in and around the project area. -Introduce use of available precipitation (rain harvesting). - Practice artificial groundwater recharge mechanism.	During the operation phase	Client (Airline Group)	Federal EPA -Oromia Regional Bureau of Environment Protection. -Oromia Regional Bureau of Water Resource - Bishoftu city Administration	15,000,000	2,250,000
C13	Vegetation and flora	Continued impact on vegetation from airport operations (pollution, maintenance).	Ongoing loss of Acacia-Commiphora woodlands and other vegetation; habitat fragmentation.	- Regularly assess the health and growth of vegetation around the airport site. - Maintenance of Green Spaces – Ensure the upkeep of planted trees, shrubs, and grasslands to support biodiversity.	During the operation phase	Client (Airline Group) and Biodiversity Institute	Ethiopian Biodiversity Institute and Bishoftu city Administration	8,000,000	1,600,000

				• Continue monitoring and controlling invasive plant species to protect native flora. • Maintain wildlife corridors and green belts to ensure continued movement of fauna and flora. • Promote awareness of the importance of vegetation and flora protection within the local community and airport staff.					
C14	Habitat and Fauna			➤ Regularly monitor wildlife populations and behaviors around the airport to assess the impact of operations. ➤ Maintain and enhance wildlife corridors to ensure safe movement of fauna between habitats. ➤ Protect existing vegetation and implement ongoing restoration efforts to support fauna habitat. ➤ Set up wildlife rescue programs to respond to animals in distress or danger due to airport activities. ➤ Install barriers or fences where necessary to prevent wildlife from	During the operation phase	Client (Airline Group) and Biodiversity Institute	Ethiopian Biodiversity Institute and Bishoftu city Administration	12,000,000	2,400,000

				accessing dangerous areas.					
C15	Migratory birds			➤ Avoid critical bird habitats; establish No-Go zones. ➤ Control bird attractants; apply visual and acoustic deterrents. ➤ Rehabilitate disturbed areas with native vegetation. ➤ Support regional bird conservation programs. ➤ Implement Bird Strike Monitoring and adjust measures as needed.	During the operation phase	Client (Airline Group) and Biodiversity Institute	Ethiopian Biodiversity Institute, Ethiopian Wildlife Conservation Authority and Bishoftu city Administration	15,000,000	3,000,000
C16	Urban Heat Island Effect		- increasing operational costs and greenhouse gas emissions. -Higher temperatures may strain building systems and infrastructure durability. -reduces outdoor thermal comfort, -exacerbates local air pollution and heat-related illnesses.	➤ Allocate $\geq 30\%$ area for green spaces to cool surroundings. ➤ Use cool roofing and paving materials with high reflectance. ➤ Install green roofs and vertical gardens on buildings. ➤ Plant tree-lined boulevards and shaded pedestrian corridors. ➤ Design building orientation and spacing for natural ventilation. ➤ Integrate energy-efficient HVAC and passive cooling features.	During the operation phase	Client (Airline Group)	Federal Environmental Protection Authority and Bishoftu city Administration	10,000,000	2,000,000

				➤ Monitor temperatures and energy use to adapt strategies.					
C17	Flooding		- Erosion, pollution, and strain on local drainage systems. -disrupts airport business activities, access, and safety. -damages buildings, roads, and other airport infrastructure.	• Design integrated stormwater management system based on site conditions. • Install properly sized drainage channels, culverts, and pipes. • Construct retention and detention ponds to reduce peak runoff. • Use green infrastructure: permeable pavements, green roofs, rain gardens, bioswales. • Implement routine inspection and maintenance of all stormwater facilities. • Clear drains and sediment traps regularly, especially before rainy seasons.	During the operation phase	Client (Airline Group)	Federal EPA -Oromia Regional Bureau of Environment Protection. -Oromia Regional Bureau of Water Resource - Bishoftu city Administration	25,000,000	3,750,000
C18	Unplanned Urbanization			➤ Enforce zoning laws (Airport City masterplan). ➤ Expand public transit to reduce sprawl.	During the operation phase	Client (Airline Group), Oriomia Planning Institute and Urban Development & Housing Agency	Ministry of Urban Development, Oriomia Planning Institute and Bishoftu City Administration	150,000,000	15,000,000
Total Cost								1,151,550,000 without the cost included under code A1, A2, A3 and A4	179,280,000 without the cost included under code A1, A2, A3 and A4

10.1.1. Environmental and Social Management Plan for Detailed Sub-Component of the Airport

The Environmental and Social Management Plan (ESMP) functions as a dynamic instrument that translates the findings and recommendations of the ESIA into concrete, actionable measures. Its overarching purpose is to systematically avoid, minimize, reduce, or compensate for adverse environmental and social impacts while simultaneously enhancing positive ones throughout the project's entire lifecycle. The ESMP serves as the definitive basis for establishing the required environmental and socio-economic performance standards and behaviors across all project stages, from design and procurement through construction and operation. The disaggregation of the overarching ESMP into distinct sub-component specific matrices represents a fundamental shift towards practical implementability and accountability. This granular approach ensures that E&S responsibilities, specific mitigation actions, and associated resource allocations are clearly delineated for each distinct project area, such as the Passenger Terminal or Runways. This approach moves from a generalized, airport-wide oversight to targeted, localized management, directly addressing the need for the ESMP to be practical and more implementable.

Each newly developed sub-component ESMP matrix adheres to a standardized, comprehensive format to ensure consistency, clarity, and actionability. The columns within each matrix include:

- **Socio-Environmental Component/Impact:** A precise description of the specific impact identified, directly referencing the detailed assessments in Chapters 8 of the original ESIA.
- **Project Phase:** Clearly indicating the relevant project stage(s) during which the impact occurs and the mitigation measure is applicable (e.g., Design, Construction, Operation, Decommissioning).
- **Proposed Mitigation/Enhancement Measures:** Detailed, specific actions designed to address the identified impact. These measures strictly follow the internationally recognized mitigation hierarchy: Avoidance (first preference), Minimization, Restoration, and Compensation (as a last resort). Crucially, a clear, distinct measure is provided for each identified impact.
- **Mitigation Schedule:** A precise timeline for the implementation of each measure, moving beyond broad phases to specific periods (e.g., "Pre-construction," "Monthly during excavation," "Continuous during operation," "Post-construction within 3 months").

- Responsibility (Implementation): Identifying the specific entity, department, or contractor directly accountable for carrying out the mitigation or enhancement measure.
- Responsibility (Supervision/Monitoring): Designating the entity responsible for overseeing the implementation and verifying the effectiveness of the measure.
- Cost Estimation (ETB): A detailed financial breakdown for each specific measure. This includes direct costs (e.g., materials, labor, equipment), associated management costs (e.g., dedicated E&S staff time, administrative overhead for managing the measure), and monitoring costs (e.g., specific costs for data collection, lab analysis, reporting related to this measure). The explicit inclusion of management and monitoring costs for each mitigation measure within these granular, sub-component-specific matrices represents a critical move towards full-cost accounting for E&S safeguards. This ensures that the often overlooked operational aspects of E&S management, such as dedicated E&S personnel salaries, specialized equipment calibration, reporting overhead, and administrative support, are not implicitly absorbed by other project budgets or, worse, left unfunded. By securing dedicated funding for these elements, the project significantly enhances the likelihood of effective safeguard implementation and robust verification.

Note: The cost estimations provided in the following matrices are indicative and will be further refined during the detailed engineering design phase and the preparation of the Contractor's Environmental and Social Management Plan (C-ESMP).

Table 10-3 ESMP for Passenger Terminal Sub-component

Code	Socio-Environmental Component	Risk	Potential Environmental and Social Impact	Proposed Mitigation measures	Mitigation Schedule	Responsibility		Cost estimation	
						Implementation	Supervision	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
D	Construction Phase								
D1	Air Pollution (Deterioration of Ambient Air Quality)	Significant fugitive dust emissions and exhaust from construction activities and machinery.	High impact from dust (PM 2.5, PM10) from excavation, material transport, and vehicle exhaust (NOx, CO) from diesel powered equipment. Exacerbates existing air quality issues in Bishoftu town.	-Locate emission-intensive activities (e.g., aggregate processing, batching plants, and quarrying) away from densely populated areas and sensitive receptors such as schools, hospitals, and natural habitats. -Preserve vegetation cover where possible to act as a natural dust and pollutant barrier. - Water spraying on unpaved roads and exposed soil. - Apply dust suppressants or soil binders on haul roads and open stockpiles. - Cover stockpiles with tarpaulins. - Use low-emission (Euro IV+) machinery. - Prohibit open burning of waste. -Use update technology or modern equipment in excavation works that will minimize dust generation from earthen materials; -Regular vehicle inspections and maintenance of equipment and vehicles to	Throughout the construction Phase	Contractor	Bishoftu city Administration Environmental Protection Authority /Consultant	The cost are already included code B1 table 10.3	The cost are already included code B1 table 10.3

				reduce excessive exhaust emissions; - Install dust extraction units (e.g., bag filters or wet scrubbers) at plants. -Minimize excavation and earth moving to only what is required for the specific nature and type of construction; - Use controlled and pre-wetted blasting techniques. • Operate only during favorable weather to minimize dispersion. -Use dust suppression systems (e.g., mists or water sprays).					
D2	Noise Pollution (Elevated Noise Levels)	High noise levels from heavy construction equipment impacting nearby communities and workers.	High impact from machinery noise (e.g., excavators, bulldozers, dump trucks, piling rigs) potentially exceeding Ethiopian EPA (55 dB day, 45 dB night) and IFC (70 dB day, 55 dB night for residential) standards.	- Limit noisy activities to daytime (7 AM–6 PM). - Use acoustic barriers for DG sets. - Install soundproof enclosures for diesel generator sets in compliance with CPCB and international standards to suppress noise emissions at source. - Mandate PPE (earplugs) for workers in >85 dB zones. - Enforce 30 km/h speed limit near residential areas. - Use update technology or modern equipment in excavation works that will minimize noise emissions	Throughout the construction Phase	Contractor	Supervision Consultant	The cost are already included code B2 table 10.3	The cost are already included code B2 table 10.3

				and vibration					
D3	Solid Waste Generation	Generation of large volumes of solid waste (unsuitable soil, construction debris, domestic waste) posing contamination and health risks.	Significant volumes of municipal solid waste from labor camps and construction debris.	- Implement a waste minimization strategy by optimizing material use and reducing excess procurement. -Establish on-site segregation bins for different categories (organic, recyclable, hazardous, non-hazardous) to reduce cross-contamination - Dispose of hazardous waste via licensed facilities. - Provide sealed waste bins at labor camps. - Transport non-recyclable waste to authorized disposal sites with proper waste tracking. - Store chemicals in labeled, sealed containers; implement spill prevention using drip trays and absorbents	Throughout the construction Phase	Contractor	Bishoftu city Administration Environmental Protection Authority /Consultant	The cost are already included code B3 table 10.3	The cost are already included code B3 table 10.3
D4	Land Use Modification	Changes in land cover leading to increased surface runoff and flood potential.	Significant modification of the project site's land cover (from predominantly agricultural to impervious surfaces), increasing surface runoff potential and leading to frequent local flooding.	-Reduce land requirement by utilizing effectively and only required size for the intended use. -Drainage work should not only be limited to airport facility but also should incorporate local drainage system considering near future urbanization of the area.	Throughout the construction Phase	Constructioncontractor	Supervision consultant	The cost are already included code B4 table 10.3	The cost are already included code B4 table 10.3

D5	Soil Erosion & Compaction	Loss of topsoil, increased erosion, and soil compaction from site clearing, excavation, and heavy machinery.	Potential for soil disturbance and loss of topsoil resources. Aggravation of gully formations in soft geological formations. Soil compaction from heavy-duty vehicles affecting soil structure and water infiltration.	-Demarcate the area to be stripped clearly, so that the contractor does not strip beyond the demarcated boundary. - In case of spillage the Contractor should isolate the source of oil and grease spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by the Resident Engineer; -Pre-defined, essential road access routes should be clearly demarcated and adhered-to on site to restrict soil compaction in the project area	Throughout the construction Phase	Construction contractor	Supervision consultant	The cost are already included code B5 table 10.3	The cost are already included code B5 table 10.3
D6	Pollution of Water Bodies	Contamination of surface and groundwater from inadequate handling/spillage of pollutants and increased siltation.	Increased silt loading of Akaki-Gerbi and Dukem Rivers. Potential pollution from fuel/oil/paint spills and solid/liquid waste from construction camps, exacerbating existing severe pollution.	-Construction materials and other debris (aggregate, cement and fresh concrete, etc.) shall be prevented from entering existing drainage infrastructure. -Ensure protection of the water body ecosystem by preventing the washing away of construction materials, soil, silt or debris into nearby rivers. -Develop and display emergency response work instructions for accidental oil and chemical spills and debris into the rivers.	Throughout the construction Phase	Construction contractor	Supervision consultant	The cost are already included code B6 table 10.3	The cost are already included code B6 table 10.3

				in other manner approved by the Supervision consultant					
D7	Occupational Health & Safety Hazards	Physical injuries, chemical exposure, noise exposure, fatigue, and human error for construction workers.	-High potential for accidents, chemical exposure, noise-induced hearing loss, and fatigue-related incidents among workers.	• Implement Occupational Health and Safety Plan • Contractor has to take maximum care and minimize accident risks by applying internationally accepted standards and recognized occupational health and safety guidelines; • The contractor to take appropriate care in storing and using hazardous chemicals and explosives and provide training to workers in handling hazardous chemicals; • Provide workers with protective clothing and equipment and create awareness on safety issues; • Provide awareness creation among the local community on the hazardous nature of chemicals, explosives if it is used during the construction works; • Provide first aid kits at workshops, construction worksites, and inside vehicles;	Throughout the construction phase	Construction Contractor	Supervision consultant, EAG and Bishoftu City Health office	The cost are already included code B9 table 10.3	The cost are already included code B9 table 10.3

				• Provided workers with appropriate PPE such as hand gloves, eye goggles, safety shoes, reflective vests, helmets, etc., based on their work condition as much as possible and strictly inspect proper use of the same throughout the construction phase; • Avail equipped ambulance at construction site for any emergency cases; • Conduct general medical check-ups for recruits and subsequently, conduct periodic medical check for all employees and take appropriate action and keep all records; • Hung-up fire extinguisher bearing detailed information about its status at appropriate places; • All personnel, vehicles, and machinery should be covered under an appropriate Insurance System; • Carefully record and keep all incidence of injuries and accidents including date, time, and place of occurrence, level of injuries, resources					
--	--	--	--	---	--	--	--	--	--

				damage, people injured/dead, major causes for the accident, etc.; • Provide awareness creation on safety procedures and HIV/AIDS and avail healthcare services; • Regularly spray water in dusty roads and work areas; and; • Introduce a traffic management plan with speed and traffic regulation through the neighboring areas by using appropriate traffic signs.					
E	Operation Phase								
E1	Air Pollution (Deterioration of Ambient Air Quality)	Emissions from aircraft operations, ground support equipment (GSE), and increased vehicular traffic.	By 2030, daily emissions projected at 21,618 kg of NOx, 2,716 tons of CO2, and 144 kg of PM. Aircraft like B777-300ER and APU operations are major contributors. Exacerbates existing air quality issues in Bishoftu town (PM2.5, PM10, NO2, SO2 often exceed standards).	-Transition airport Ground operations to electric or hybrid systems (e.g., electric Ground Support Equipment, electric shuttle buses). -Install electric vehicle (EV) charging infrastructure for airport vehicles and service fleets. -Develop green buffer zones around airport boundaries to improve local air quality and aesthetics.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu City Administration	The cost are already included code C1 table 10.3	The cost are already included code C1 table 10.3
E2	Noise Pollution (Chronic Noise Burden)	High noise levels from aircraft operations and ground activities affecting	By 2030, noise projected to affect around 14,376 hectares: 9,405 ha exposed to 45–50 dB, and 4,971 ha to 50–55 dB (exceeding residential night-time limits of 45 dB). Commercial thresholds (70 dB) breached across 2,326 hectares,	-Avoid scheduling non-essential night flights during the most sensitive hours (e.g., 23:00–06:00). -Reduce the operation of high-noise aircraft models at the airport during planning and licensing stages.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. -Bishoftu city Administration	The cost are already included code C2 table 10.3	The cost are already included code C2 table 10.3

		nearby communities.	with 68 hectares exposed to over 70 dB, and smaller areas exceeding 75–90 dB.	-Transition to electric or hybrid ground support equipment to minimize ground noise emissions. -Design airport infrastructure (runways, taxiways, holding areas) to reduce aircraft idling and unnecessary engine use. -Restrict noisy maintenance and fueling operations to daytime hours only. - Use sound-absorbing materials in airport terminals and perimeter structures to reduce ambient noise propagation. -Construct vegetative noise buffers and embankments around high-noise operational zones to reduce sound travel. -Restore and enhance natural barriers (e.g., Tree lines) between the airport and residential communities.					
E3	Solid Waste Generation	Continuous generation of various solid wastes from airport operations.	Significant generation of municipal solid waste from terminal buildings (0.5 kg/passenger/day), in-flight cabin waste (0.4 kg/passenger/day), and packaging waste from cargo facilities (2 kg/ton cargo).	- Deploy 3-stream waste segregation (organic, recyclable, residual). - Establish an on-site recycling plant. - Partner with certified hazardous waste disposal firms.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection.	The cost are already included code C4 table 10.3	The cost are already included code C4 table 10.3
E4	Liquid Waste Generation	Discharge of wastewater and potential contamination of water bodies.	Wastewater volumes reaching up to 15,390 m3/day (at 110MAP). Risk of groundwater and surface water contamination from spills and discharges, exacerbating existing severe pollution in Akaki and Dukem Rivers.	- Install advanced wastewater treatment (MBR/RO systems). - Reuse treated water for landscaping. - Monitor effluent quality monthly.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	The cost are already included code C5 table 10.3	The cost are already included code C5 table 10.3

E5	Hazardous Materials		-Exposure to toxic chemicals (fuels, biocides, degreasers, solvents) can cause acute or chronic health effects such as respiratory irritation, skin burns, eye damage, or long-term organ toxicity. -Risk of chemical burns or poisoning due to accidental spills, leaks, or improper handling. -Potential inhalation of harmful vapors in confined spaces. -Contamination of soil and water bodies from chemical spills or improper disposal.	-Implement Hazardous Waste management Plan -Properly label and secure all chemical containers. -Strengthen waste collection, storage, and disposal systems. -Conduct regular inspections and audits of storage and handling. -Maintain records of waste generation and disposal. -Cover containers during storage and transport. -Set fixed routes and schedules for hazardous waste transport. -Ensure emergency preparedness and response plans. -Provide PPE and training for all handling and transport staff.	During the operation phase	Client (Airline Group)	-Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	The cost are already included code C6 table 10.3	The cost are already included code C6 table 10.3
E6	Traffic Congestion	Increased vehicular traffic leading to congestion on surrounding road networks.	Significant peak-hour passenger movement (e.g., 5,330 departing and 5,230 arriving passengers during Phase 1 peak hours). This will overwhelm unpaved local road networks, raising accident risks and amplifying urban sprawl.	- Implement Traffic Management Plan	During the operation phase	Airlines Group	-Ethiopian Roads Authority. - Bishoftu city Administration	The cost are already included code C7 table 10.3	The cost are already included code C7 table 10.3
E7	Occupational Health and Safety	Continuous physical, chemical, and ergonomic risks for airport staff	-Physical injury -Noise exposure -Ergonomic hazards -Fatigue -Human error -Exposure to air pollution -Handling hazardous and non-hazardous waste -Traffic congestion and related accidents	-Implement Operational Health and Safety Plan -Provide personal protective equipment (PPE) to all workers. -Implement regular OHS training and awareness programs. -Enforce strict handling and disposal procedures for hazardous and non-hazardous waste. -Monitor and control air quality and noise levels at the workplace. -Manage work schedules to reduce fatigue and ergonomic risks.	During the operation phase	Airlines Group	-Federal Health office -Federal EPA -Oromia Regional Bureau of Environment Protection. - Bishoftu city Administration	The cost are already included code C9 table 10.3	The cost are already included code C9 table 10.3

				-Maintain clear and safe traffic management to minimize congestion and accidents. -Conduct regular health and safety audits during operation. -Establish emergency response plans and first aid facilities onsite.					
--	--	--	--	--	--	--	--	--	--

Table 10-4 ESMP for Cargo Facility Terminal Sub-component

Project Phase	Adverse Impact	Specific Mitigation Measures	Implementation Schedule	Implementation Responsibility	Supervision Responsibility	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
Mobilization	Land Acquisition and Displacement	Targeted Resettlement Action Plan (RAP) Implementation (full compensation at replacement cost, clear communication, land-for-land or monetary compensation, housing relocation support); Livelihood Restoration Programs (agricultural inputs, vocational training, business startup grants); Grievance Redress Mechanism (GRM) operationalization.	Pre-Construction & Ongoing	Project Proponent, RAP Team	Project Management Unit, Independent Monitor	The cost are already included code A1 table 10.3	The cost are already included code A1 table 10.3
Mobilization	Loss of Livelihoods	Livelihood Restoration Programs (training in construction trades, airport ground services, transport & logistics); Temporary Financial Support (6-12 months); Priority Employment & Skills Development for Project Affected Persons (PAPs); Access to Agricultural Alternatives; Enterprise Support & Microfinance.	Pre-Construction & Ongoing	Project Proponent, Contractor, Health Team	Health & Safety Manager, Local Health Authorities	The cost are already included code A2 table 10.3	The cost are already included code A2 table 10.3
Mobilization	Impacts on Ambient Air Quality (Dust & Exhaust)	Dust Suppression (frequent water spraying 2-4 times/day on unpaved roads, active zones); Enforce Speed Limits (e.g., 20 km/h on unpaved surfaces); Vehicle & Equipment Maintenance (regular emission checks); Covered & Sealed Loads; Staging & Routing Plans; Vegetative Buffering.	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A5 table 10.3	The cost are already included code A5 table 10.3
Mobilization	Noise Pollution	Restricted Working Hours (daytime 7:00 AM - 6:00 PM); Equipment Maintenance (mufflers); Temporary Noise Barriers (if sensitive receptors are close); Public Notification.	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A6 table 10.3	The cost are already included code A6 table 10.3
Mobilization	Soil Compaction and Pollution	Designated Routes & Parking; Spill Prevention & Response (strict protocols, spill kits, trained personnel); Regular Inspections for leaks.	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A7 table 10.3	The cost are already included code A7 table 10.3
Mobilization	Surface Water Pollution	Erosion & Sediment Control (silt fences, sediment traps, straw bales); No Washing near Water Bodies; Proper Waste Management (collection & disposal).	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A8 table 10.3	The cost are already included code A8 table 10.3
Mobilization	Impacts on Flora and	Minimize Footprint (demarcate area, restrict activities); Pre-	Pre-Construction &	Contractor,	Environmental	The cost are	The cost are already

	Fauna	Construction Survey (identify sensitive species, relocation/protection).	During Activity	Environmental Specialist	Manager	already included code A9 table 10.3	included code A9 table 10.3
Mobilization	Health and Safety Issues (Workers)	Comprehensive OHS Plan (training, PPE, safety briefings); First Aid & Emergency Response (station, trained personnel); Site Security (controlled access).	Ongoing	Contractor, OHS Manager	Health & Safety Manager, Site Engineer	The cost are already included code A10 table 10.3	The cost are already included code A10 table 10.3
Mobilization	Traffic Congestion and Accidents	Traffic Management Plan (TMP - routes, schedules, flaggers, signage); Road Maintenance; Public Awareness.	During Activity	Contractor, Logistics Manager	Site Engineer, Local Authorities	The cost are already included code A11 table 10.3	The cost are already included code A11 table 10.3
Mobilization	Gender and Gender-Based Violence (GBV)/Sexual Harassment (SH) Risks	Strict Code of Conduct (prohibiting GBV/SH); Awareness Training for workers; Confidential GRM for GBV/SH; Gender-Sensitive Facilities.	Pre-Construction & Ongoing	Project Proponent, Contractor, HR	HR Manager, Community Liaison	The cost are already included code A12 table 10.3	The cost are already included code A12 table 10.3
Construction	Air Pollution (Dust & Exhaust)	Continuous Dust Suppression (regular watering, increased during dry/windy conditions); Enclosed Operations & Dust Control Equipment; Emission Control for Machinery (Euro IV standards, regular maintenance); Site Access & Traffic Management (stabilized internal roads, reduced idling, speed limits); Ambient Air Quality Monitoring & Adaptive Management (real-time monitors, AQI display, adaptive controls).	During Activity	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B1 table 10.3	The cost are already included code B1 table 10.3
Construction	Noise Pollution	Installation of Temporary Noise Barriers (min 3m high); Use of Low-Noise Equipment & Methods (electric/hybrid, noise-dampened); Optimized Work Scheduling (daylight hours, avoid weekends/holidays); Real-Time Noise Monitoring (alerts, corrective action); Community Engagement & Grievance Mechanism; Protection for Workers & Public (PPE, public notification, buffer zones).	During Activity	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B2 table 10.3	The cost are already included code A12 table 10.3
Construction	Solid Waste Generation	Waste Management Hierarchy (reduction, reuse, recycling); On-site Waste Segregation; Proper Storage (covered, secure); Transport to Authorized Facilities; Hazardous Waste Management (strict compliance, spill containment, PPE, training); Detailed Construction Waste Management Plan (CWMP).	Ongoing	Contractor, Waste Management Team	Environmental Manager, Site Engineer	The cost are already included code B3 table 10.3	The cost are already included code B3 table 10.3

Construction	Land Use Modification and Runoff Generation	Comprehensive Stormwater Management Plan (SUDS principles, temporary retention basins, silt traps); Stabilize Exposed Soils (hydroseeding, mulching); Engineered Drainage Channels; Minimize Exposed Surfaces (phased construction); Permeable Surfaces (for temporary roads); Strict Controls on Refueling/Maintenance; Regular Inspection & Maintenance of controls; Personnel Training.	Ongoing	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B4 table 10.3	The cost are already included code B4 table 10.3
Construction	Impacts on Soil	Topsoil Management (strip, stockpile, protect, reuse); Work Zone Demarcation; Erosion & Sediment Control (silt fences, basins, straw wattles, hydroseeding); Excavation & Backfilling (minimize exposure); Machinery Operation Zones (bunded platforms, oil separators); Soil Spill Response (kits, cleanup); Access Road Stabilization; Monitoring & Reporting (soil quality testing).	Ongoing	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B5 table 10.3	The cost are already included code B5 table 10.3
Construction	Pollution of Water Bodies (Surface & Groundwater)	Erosion & Sediment Control (fences, traps, ponds); Stabilize Exposed Soils; Buffer Zones & Setback Distances; Designated Maintenance Areas (oil-water separators, impermeable surfaces); Lined Containment for Hazardous Materials; Construction Site Drainage Management Plan; Prohibit Concrete Washout Discharge; Modular Treatment for Worker Camp Wastewater; Regular Waste Collection; Awareness Training; Water Quality Monitoring (upstream/downstream).	Ongoing	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B6 table 10.3	The cost are already included code Bb6 table 10.3
Construction	Occupational Health and Safety	OHS Management System (Ethiopian labor law, IFC EHS Guidelines, AfDB OS); Task-specific PPE; Daily Safety Briefings; First Aid Posts, Fire Extinguishers, Emergency Assembly Points; Certification & Inspection of Equipment; Construction Traffic Management Plan; Dust Suppression; Worker Insurance; Worker GRM; Medical Check-ups; Refresher OHS Training; Dedicated HSE Officers.	Ongoing	Contractor, OHS Manager	Health & Safety Manager, Site Engineer	The cost are already included code B9 table 10.3	The cost are already included code B9 table 10.3
Construction	Risk of Traffic Accidents and Traffic Congestion	Route Planning to Avoid Sensitive Areas; Schedule Construction Activities Off-Peak; Optimize Delivery Phasing; Traffic Management Plan (TMP); Cap Daily Truck Trips; Prioritize Local Material Sources; Driver Training; Road Maintenance; Public Awareness; Monitoring & Enforcement (GPS tracking, cameras);	Ongoing	Contractor, Logistics Manager	Site Engineer, Local Authorities	The cost are already included code B10 table 10.3	The cost are already included code B10 table 10.3

		Road Repair; Traffic Control Infrastructure Repair; Community Road Safety Programs; GRM.					
Construction	Spread of HIV/AIDS and Other STDs	Health Awareness Programs (prevention, safe practices); Access to Services (condoms, VCT, STI treatment); Code of Conduct (prohibiting sexual exploitation/abuse); Community Health Liaison.	Ongoing	Project Proponent, Contractor, Health Team	Health & Safety Manager, Local Health Authorities	The cost are already included code B14 table 10.3	The cost are already included code B14 table 10.3
Construction	Impacts on Vulnerable Groups	Targeted Support Programs (compensation, livelihood restoration, benefits); Inclusive Engagement (accessible information, dedicated support); Regular Monitoring of well-being.	Ongoing	Project Proponent, RAP Team, Community Liaison	Project Management Unit, Independent Monitor	The cost are already included code B12 table 10.3	The cost are already included code B12 table 10.3
Construction	Gender-Based Violence/Sexual Exploitation and Abuse (GBV/SEA) and Child Labor	Zero Tolerance Policy (clear reporting, disciplinary actions); Worker Training (GBV/SEA prevention, child protection); Community Awareness; Confidential GRM for GBV/SEA; Child Protection (on-site, supply chain).	Ongoing	Project Proponent, HR, Community Liaison	HR Manager, Community Liaison, Local Authorities	The cost are already included code B13 table 10.3	The cost are already included code B132 table 10.3
Construction	Cultural Conflict, Cultural Dilution, and Drug Abuse	Worker Orientation (local culture, customs); Community-Worker Engagement; Strict Drug and Alcohol Policy; Collaboration with Local Authorities.	Ongoing	Project Proponent, HR, Community Liaison	HR Manager, Community Liaison, Local Authorities	The cost are already included code B15 table 10.3	The cost are already included code B15 table 10.3
Construction	Impact on Vegetation	Landscape Restoration Plan (native, drought-tolerant species); Green Buffer Zones; Erosion Control Measures (bioengineering); Tree Replacement & Compensation (2 native species per removed tree); Awareness & Supervision.	Ongoing & Post-Construction	Contractor, Environmental Specialist	Environmental Manager, Local Environmental Authority	The cost are already included code B7 table 10.3	The cost are already included code B72 table 10.3
Operation	Air Pollution (Vehicle & Aircraft Emissions, Dust)	Vehicle & Ground Support Equipment (GSE) Management (emission standards, maintenance, electric/hybrid, restrict idling, designated paths); Aircraft Emission Control (single-engine taxiing, minimize idling, off-peak scheduling); Dust Control (pave/stabilize roads, sweep, covered storage, vegetative buffers); Monitoring & Awareness (ambient air quality stations, regular assessments, staff training).	Ongoing	Cargo Facility Operator, Airlines, Airport Authority	Environmental Manager, Regulatory Authorities	The cost are already included code C1 table 10.3	The cost are already included code C1 table 10.3
Operation	Noise Pollution	Infrastructure & Design Measures (sound insulation, acoustic barriers, noise-reducing pavement); Operational Measures (limit night activities, schedule movements, electric/hybrid GSE, speed limits); Technological & Equipment Measures (low-noise systems,	Ongoing	Cargo Facility Operator, Airlines, Airport Authority	Environmental Manager, Regulatory Authorities	The cost are already included code C2 table 10.3	The cost are already included code C2 table 10.3

		acoustic shielding); Monitoring & Engagement (continuous noise monitoring, GRM, noise audits).					
Operation	Increased Traffic Congestion	Traffic Management Plan (off-peak scheduling); Infrastructure Upgrades (road strengthening); Airside Coordination (ground support vehicles, aircraft movements, real-time systems); Stakeholder Engagement; Alternative Routing.	Ongoing	Cargo Facility Operator, Airport Authority, Local Authorities	Logistics Manager, Traffic Police	The cost are already included code C7 table 10.3	The cost are already included code C7 table 10.3
Operation	Waste Generation (General, Specialized, Hazardous)	Comprehensive Waste Management Plan (segregation, proper storage, regular collection); Hazardous Waste Handling (strict compliance, spill containment, PPE, training); Emergency Response Protocols; Awareness Programs; Continuous Monitoring.	Ongoing	Cargo Facility Operator, Waste Management Contractor	Environmental Manager, Regulatory Authorities	The cost are already included code C5 table 10.3	The cost are already included code C5 table 10.3
Operation	Operational Health and Safety	Detailed Safety Guidelines & Training Programs (hazard recognition, emergency preparedness, equipment handling); Appropriate PPE; Monitoring Systems (noise, air quality); Reliable Communication Tools; Clear Standard Operating Procedures (SOPs); Physical Safety Measures (barriers, warning lights, signage); Regular Health Screenings & Safety Drills; Routine Equipment Inspection & Maintenance; Limited Access to Operational Areas.	Ongoing	Cargo Facility Operator, OHS Manager	Health & Safety Manager, Regulatory Authorities	The cost are already included code C9 table 10.3	The cost are already included code C9 table 10.3

Table 10-5 ESMP for Runways Sub-components

Project Phase	Adverse Impact	Specific Mitigation Measures	Implementation Schedule	Implementation Responsibility	Supervision Responsibility	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
Mobilization	Land Acquisition and Displacement	Permanent loss of productive agricultural land; Disruption of established settlements; Risk of livelihood loss, especially for farming communities. Mitigation measures were not detailed specifically for runway/taxiway component in the provided text, but the overall project ESIA has documented displacement of 2,731 households.	Pre-Construction & Ongoing	Project Proponent, RAP Team	Project Management Unit, Independent Monitor	The cost are already included code A1 table 10.3	The cost are already included code A1 table 10.3
Mobilization	Noise Pollution	Installation of Temporary Noise Barriers (minimum 3 meters high); Use of Low-Noise Equipment and Methods (e.g., electric/hybrid machinery, regular maintenance); Optimized Work Scheduling (daylight hours, avoid weekends/holidays); Real-Time Noise Monitoring; Community Engagement & Grievance Mechanism; Protection for Workers and Public (PPE, public notification, buffer zones).	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A6 table 10.3	The cost are already included code A6 table 10.3
Construction	Air Pollution	Continuous Dust Suppression; Enclosed Operations and Dust Control Equipment; Emission Control for Construction Machinery (Euro IV); Site Access and Traffic Management; Ambient Air Quality Monitoring and Adaptive Management (real-time AQI).	During Activity	Contractor, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code B1 table 10.3	The cost are already included code B1 table 10.3

Construction	Noise Pollution	Installation of Temporary Noise Barriers (minimum 3 meters high); Use of Low-Noise Equipment and Methods; Optimized Work Scheduling (daylight hours); Real-Time Noise Monitoring; Community Engagement & Grievance Mechanism; Protection for Workers and Public (PPE, notification).	During Activity	Contractor, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code B2 table 10.3	The cost are already included code A12 table 10.3
Construction	Impacts on Soil	Demarcation of Work Zones; Soil Spill Risk Management (spill kits, immediate cleanup, hazardous waste disposal); Designated Equipment Zones (refueling in bunded areas); Topsoil Management; Internal Access Control; Erosion and Sediment Control; Backfilling and Stabilization; Periodic Monitoring and Soil Testing.	During Activity & Post-Construction	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B5 table 10.3	The cost are already included code B5 table 10.3
Construction	Pollution of Water Bodies	Double-walled Fuel Storage Tanks & Secondary Containment (110%); Impermeable Surfaces & Drainage Channels with Oil-Water Separators; Spill Prevention, Control, and Countermeasure (SPCC) Plan; Geotextiles/Liners under high-risk areas; Groundwater Quality Monitoring; Stormwater Management Controls; Mandatory Training; Prohibit Untreated Discharge (modular treatment); Proper Waste Collection/Disposal; Frequent Inspections.	During Activity & Ongoing	Contractor, Environmental Manager, OHS Manager	Environmental Manager, Project Management Unit	The cost are already included code B6 table 10.3	The cost are already included code B6 table 10.3
Construction	Occupational Health and Safety	Avoidance Measures (segregate high-risk areas, minimize confined space); Minimization Measures (OHSMS, PPE, toolbox talks, first aid, firewatch, certified equipment, TMP, dust suppression, ventilation); Restoration Measures (dismantle temporary facilities, restore land, neutralize contaminated soil); Compensation/Offset (insurance, GRM); Cross-Cutting (incident logs, medical screenings, refresher training, access control, HSE supervisors).	During Activity & Ongoing	Contractor, OHS Manager, HR	OHS Manager, Project Management Unit	The cost are already included code B9 table 10.3	The cost are already included code B9 table 10.3
Construction	Risk of Traffic Accidents and Traffic Congestion	Avoidance (Transport Scheduling, Phased Deliveries); Minimization (Specific Traffic Management Plan, Traffic Controllers, Speed Limits, Nearby Material Sources, Driver Training, Routine Road Maintenance, Community Notifications); Restoration (Post-Construction Road Repairs, Traffic Infrastructure Restoration); Compensation/Offset (Community Safety Enhancements, Road Safety Education, GRM).	During Activity & Post-Construction	Contractor, Logistics Manager, Community Liaison	Project Management Unit, Local Authorities	The cost are already included code B10 table 10.3	The cost are already included code B10 table 10.3
Construction	Spread of HIV/AIDS and Other STDs	Health Awareness Programs; Access to Services (condoms, VCT, STI treatment); Code of Conduct reinforcement; Community Health Liaison.	Ongoing	Project Proponent, Contractor, Health Team	Health & Safety Manager, Social Safeguards Specialist, Local Health Authorities	The cost are already included code B14 table 10.3	The cost are already included code B14 table 10.3

Operation	Air Pollution	Avoidance (Closed/Sealed Transfer Systems, Vapor Recovery Units - VRUs); Minimization (Emission-Controlled Generators, Scheduled Fuel Deliveries, Leak Detection and Repair - LDAR, Personnel Training); Restoration (Perimeter Green Buffer Zones, Air Quality Monitoring); Compensation/Offset (Emission Offsets, Green Procurement Policy).	Ongoing	Operations Manager, Maintenance Team, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code C1 table 10.3	The cost are already included code C1 table 10.3
Operation	Noise Pollution	Avoidance Measures (optimized flight paths, avoid non-essential night flights, reduce high-noise aircraft); Minimization Measures (Continuous Descent Approach (CDA), optimize arrival/departure procedures, enforce night curfews, encourage quieter aircraft, transition to electric/hybrid ground support equipment, optimize infrastructure to reduce idling, restrict noisy maintenance); Restoration Measures (sound-absorbing materials, vegetative noise buffers, restore natural barriers); Compensation/Offset Measures (noise insulation programs, financial compensation/resettlement, discourage new residential developments, Noise Monitoring and Mitigation Committee).	Ongoing	Operations Manager, Maintenance Team, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code C2 table 10.3	The cost are already included code C2 table 10.3
Operation	Increased Traffic Congestion	Avoidance (Staggered Truck Arrivals, Airport Traffic Coordination); Minimization (Dedicated Lanes, Real-time Traffic Management, Clear Routes/Signage, Off-peak Deliveries, Low-emission Trucks); Restoration (Road Maintenance, Landscape Buffers); Compensation/Offsets (Electrification, Carbon Offset Programs).	Ongoing	Operations Manager, Logistics Manager, Airport Traffic Control	Project Management Unit, Local Authorities	The cost are already included code C7 table 10.3	The cost are already included code C7 table 10.3
Operation	Community Health and Safety	Buffer Zones; Emergency Preparedness (ERP communication); Regular Monitoring (air/water quality); Community Engagement (GRM, open communication); Traffic Management.	Ongoing	Operations Manager, Safety Manager, Community Liaison, Environmental Manager	Project Management Unit, Local Authorities	The cost are already included code C8 table 10.3	The cost are already included code C8 table 10.3
Operation	Operational Health and Safety	Strict Fire Prevention & ERP; Proper Ventilation; Personal Protective Equipment (PPE); Regular H&S Training; Air Quality & Noise Monitoring; Equipment Maintenance; Restricted Access & Safety Signage; Medical Surveillance Programs.	Ongoing	Operations Manager, Safety Manager, HR	Safety Manager, Project Management Unit	The cost are already included code C9 table 10.3	The cost are already included code C9 table 10.3
Operation	Soil Contamination	Immediate Isolation and Containment of spills; Routine Inspections and Maintenance of garages, workshops, parking, and fuel storage areas; Training of Operational Staff on handling and emergency response; Impermeable Liners and Containment Systems in storage/handling areas; Spill Response Protocols.	Throughout Operation	Airport Management, Tenants, Maintenance Teams	EAG PMU, EPA, Local Administration	The cost are already included code C10 table 10.3	The cost are already included code C10 table 10.3

Operation	Flooding	Drainage Infrastructure Maintenance; Surface Grading and Design; Installation of Oil-Water Separators; Rainwater Harvesting or Detention Systems; Climate-Resilient Planning; Emergency Flood Response Protocols.	Throughout Operation	Airport Management, Maintenance Teams, Environmental Manager	EAG PMU, EPA, Local Administration	The cost are already included code C17 table 10.3	The cost are already included code C17 table 10.3
Operation	Bird Strike	Flight Path and Habitat Integration; Habitat Avoidance & Seasonal Monitoring; Risk Minimization (bird attractant control, deterrent systems); Habitat Restoration; Offsets and Regional Cooperation; Monitoring and Adaptive Management.	Ongoing	Airport Management, Environmental Manager, Air Traffic Control	EAG PMU, EPA, Local Administration, Wildlife Authorities	The cost are already included code C15 table 10.3	The cost are already included code C15 table 10.3
Operation	Ground Collisions	Advanced Ground Movement Control System; Runway Incursion Detection Systems; Strict Standard Operating Procedures (SOPs); Regular Training and Certification; Clear Markings and Lighting; Limited Access; Optimized Aircraft Movement Scheduling.	Ongoing	Airport Management, Safety Manager, Air Traffic Control	EAG PMU, EPA, Local Administration		
Operation	Hydraulic Fluid & De-icing Chemical Runoff	Dedicated Drainage and Containment Systems (collect, isolate, treat runoff); Environmentally Friendly/Biodegradable De-icing Agents; Routine Water Quality Monitoring Programs; Aircraft Maintenance and Spill Prevention Protocol (rapid response, staff training); Retention Ponds or Oil-Water Separators.	Ongoing	Airport Management, Maintenance Teams, Environmental Manager	EAG PMU, EPA, Local Administration	The cost are already included code C11 table 10.3	The cost are already included code C11 table 10.3

Table 10-6 ESMP for Airport City Sub-component

Socio-Environmental Component/Impact	Project Phase	Proposed Mitigation/Enhancement Measures	Mitigation Schedule	Responsibility (Implementation)	Responsibility (Supervision/Monitoring)	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
Land Acquisition and Displacement	Mobilization	- Detailed Resettlement Action Plan (RAP) Implementation - Land-for-Land Compensation	Pre-mobilization to Ongoing Construction	Ethiopian Airlines Group (EAG) Project Management Unit (PMU), Contractor, Bishoftu City Administration, Oromia Urban Planning Institute (OUPi)	AfDB Environmental and Social Safeguards Team, Ethiopian Environmental Protection Authority (EPA), Local Administration (Woreda/Kebele)	The cost are already included code A1 table 10.3	The cost are already included code A1 table 10.3
Loss of Livelihoods	Mobilization	- Implement diverse programs tailored to affected households to enable integration into the new Airport City economy. - Temporary Financial Support - Priority Employment: Microfinance and Business Development:	Pre-mobilization to Ongoing Construction	EAG PMU, Contractor, Local Administration, NGOs (for training)	AfDB Environmental and Social Safeguards Team, EPA, Local Administration	The cost are already included code A2 table 10.3	The cost are already included code A2 table 10.3
Cultural and Social Disruption	Mobilization	- Respectful Relocation and Reconstruction: Community Integration Programs - Support for Local Social Structures: - Cultural Preservation Awareness	Pre-mobilization to Ongoing Construction	EAG PMU, Contractor, Bishoftu City Administration, Local Cultural/Religious Institutions	EPA, Local Administration, Cultural Heritage Authority	The cost are already included code A3 table 10.3	The cost are already included code A3 table 10.3
Impacts on Ambient Air Quality	Mobilization & Construction	- Continuous Dust Suppression - Enclosed Operations and Dust Control Equipment - Emission Control for Construction Machinery - Site Access and Traffic Management - Ambient Air Quality Monitoring and Adaptive Management - Community Engagement and Communication	Daily throughout Mobilization & Construction	Contractor	EAG PMU, EPA, Local Administration	The cost are already included code A5 and B1 table 10.3	The cost are already included code A5 and B1 table 10.3
Noise Pollution	Mobilization & Construction	- Installation of Temporary Noise Barriers - Use of Low-Noise Equipment and Construction Methods - Optimized Construction Scheduling - Noise Monitoring and Compliance - Community Engagement and Complaint Mechanism - Worker and Public Protection	Daily throughout Mobilization & Construction	Contractor	EAG PMU, EPA, Local Administration	The cost are already included code A6 and B2 table 10.3	The cost are already included code A6 and B2 table 10.3
Solid Waste Generation	Construction	- Waste Minimization and Resource Efficiency - On-site Waste Segregation and Storage - Authorized and Safe Disposal	Daily throughout Construction	Contractor	EAG PMU, EPA, Local Administration	The cost are already included code B3 table 10.3	The cost are already included code B3 table 10.3

		- Construction Waste Management Plan (CWMP) - Training and Awareness					
Land Use Modification and Runoff Generation	Construction	- Design and implement comprehensive stormwater management system (SUDS: permeable pavements, green roofs, retention/detention ponds) to manage runoff and promote infiltration. - Construct well-designed and stable drainage channels to safely convey runoff and prevent erosion. - Minimize Impervious Surfaces	Throughout Construction	Contractor, Design Consultants	EAG PMU, OUPI, EPA	The cost are already included code B4 table 10.3	The cost are already included code B4 table 10.3
Impacts on Soil	Mobilization & Construction	- Limit excavation strictly to designated areas; prevent unnecessary disturbance. - Isolate and contain spills immediately using spill kits; supervised cleanup. - Topsoil Conservation and Reuse - Establish and enforce pre-defined internal access roads to minimize compaction. - Implement erosion control (check dams, silt fences, sediment traps, re-vegetation) immediately after earthworks. - Initiate backfilling, compaction, and grading immediately after foundation/utility installation.	Throughout Mobilization & Construction	Contractor	EAG PMU, EPA	The cost are already included code B5 table 10.3	The cost are already included code B5 table 10.3
Pollution of Water Bodies	Mobilization & Construction	- Prevent Runoff of Construction Materials - Oil-Water Separators and Spill Containment - Prohibit Untreated Wastewater Discharge - Emergency Preparedness Training: For chemical spill response. - Using mulching, geotextiles, temporary vegetation.	Throughout Mobilization & Construction	Contractor	EAG PMU, EPA, Local Water Authority	The cost are already included code B6 table 10.3	The cost are already included code B6 table 10.3
Occupational Health and Safety	Mobilization & Construction	- Site layout to minimize proximity to sensitive receptors; restrict hazardous storage near water bodies; clearly mark dangerous zones. - Implement comprehensive OHSMS; provide PPE; conduct daily safety briefings/drills; install first aid stations; use certified equipment; implement Traffic Management Plan (speed limits, flagmen, signage); suppress dust.	Daily throughout Mobilization & Construction	Contractor	EAG PMU, EPA, Ministry of Labor and Social Affairs	The cost are already included code B9 table 10.3	The cost are already included code B9 table 10.3

		• Rehabilitate construction camps/roads; remove hazardous waste; replant native vegetation. • Enroll workers in injury insurance; provide compensation for injuries/fatalities; establish GRM for third-party claims. • Maintain incident logs; routine health checkups; continuous OHS training; restrict access to authorized personnel; appoint qualified HSE supervisors.					
Risk of Traffic Accidents and Traffic Congestion	Mobilization & Construction	• Designate haul routes bypassing populated areas; schedule heavy movements during off-peak hours; optimize construction phasing. • Develop and enforce dedicated Traffic Management Plan (traffic control, signage, speed limits, flaggers); use nearby material sources; driver safety training; ongoing road maintenance; public communication; monitoring (GPS, inspections). • Rehabilitate roads/sidewalks degraded by traffic; replace/repair damaged infrastructure. • Install pedestrian crossings, speed bumps; conduct road safety awareness programs; establish GRM for traffic-related complaints.	Throughout Mobilization & Construction	Contractor, Local Traffic Police	EAG PMU, Road Authority, Local Administration	The cost are already included code B10 table 10.3	The cost are already included code B10 table 10.3
Spread of HIV/AIDS and Other STDs	Mobilization & Construction	• Ongoing programs for workers and communities on prevention, safe practices, testing, and treatment. • Facilitate access to condoms, VCT services, and STI treatment • Reinforce prohibition of sexual exploitation/abuse; clear reporting. • Appoint liaison to work with local health centers.	Throughout Mobilization & Construction	Contractor, Local Health Authorities, NGOs	EAG PMU, Local Health Bureau	The cost are already included code B14 table 10.3	The cost are already included code B14 table 10.3
Impacts on Vulnerable Groups	Mobilization & Construction	• Develop and implement targeted support programs for vulnerable groups (female-headed households, elderly, disabled, landless, Kereyu Oromo pastoralists) in compensation, livelihood restoration, and access to benefits. • Ensure meaningful participation in consultations with accessible information and dedicated support. • Regularly monitor well-being of vulnerable groups to address emerging issues.	Throughout Mobilization & Construction	EAG PMU, Local Administration, NGOs	AfDB Environmental and Social Safeguards Team, EPA, Local Administration	The cost are already included code B12 table 10.3	The cost are already included code B12 table 10.3

Gender-Based Violence/Sexual Exploitation and Abuse (GBV/SEA) and Child Labor	Mobilization & Construction	- Implement and strictly enforce zero-tolerance for GBV/SEA and child labor; clear reporting and disciplinary actions. - Mandatory, recurrent training for all workers on GBV/SEA prevention and child protection. - Community-based awareness campaigns on risks, reporting, and support services. - Establish confidential, safe, and accessible GRM for survivors; ensure support and referral. - Prevent child labor on-site and monitor supply chain.	Throughout Mobilization & Construction	Contractor, Local Police, NGOs, Community Leaders	EAG PMU, Ministry of Labor and Social Affairs, Local Administration	The cost are already included code B13 table 10.3	The cost are already included code B13 table 10.3
Cultural Conflict, Cultural Dilution, and Drug Abuse	Mobilization & Construction	- Comprehensive orientation on local culture, customs, and social norms. - Facilitate structured engagement to foster understanding. - Implement strict drug/alcohol policy for workers with enforcement and rehabilitation support. - Work with law enforcement and community leaders to prevent issues.	Throughout Mobilization & Construction	Contractor, Local Police, Community Leaders, NGOs	EAG PMU, Local Administration	The cost are already included code B15 table 10.3	The cost are already included code B15 table 10.3
Impact on Vegetation	Mobilization & Construction	- Integrate natural green spaces into urban design; adjust infrastructure footprints to protect buffer zones. - Implement Landscape Restoration Plan with native, drought-tolerant species post-construction. - Establish vegetated buffers around Airport City. - Apply erosion control measures (mulching, slope stabilization). - Provide compensation for fruit/shade trees as per Proclamation No. 1161/2019; provide replacement seedlings. - Prioritize native species in landscaping.	Pre-mobilization to Post-construction	Contractor, Landscaping Contractor	EAG PMU, EPA, Local Agriculture/Environment Bureau	The cost are already included code B7 table 10.3	The cost are already included code B7 table 10.3
Air Pollution	Operation	- Sustainable Transport Promotion: Integrate public transport, non-motorized transport (bike lanes, pedestrian walkways), EV charging infrastructure, and traffic demand management. - Cleaner Energy Use in Buildings: Promote solar energy, energy-efficient appliances, green building technologies, and low-emission HVAC systems.	Throughout Operation	Airport City Management, Tenants, Service Providers	EAG PMU, EPA, Local Administration	The cost are already included code C1 table 10.3	The cost are already included code C1 table 10.3

		- Green Architecture: Encourage vertical greening, green roofs, and shaded areas. - Monitoring and Adaptive Management: Install air quality monitoring stations; adjust policies based on real-time data. - Offset Residual Emissions: Invest in afforestation/reforestation, clean air initiatives, or carbon offset markets.					
Urban Heat Island Effect (UHIE)	Operation	- Maximize Green and Open Spaces: Design and allocate at least 30% of the Airport City area to green spaces (parks, green belts, landscaped plazas). - Use of Cool Materials: Specify roofing and paving materials with high solar reflectance index ($SRI \geq 70$). - Green Roofs and Vertical Gardens: Encourage installation of green roofs (at least 20% of available rooftop area) and vertical gardens. - Tree-Lined Boulevards and Shaded Corridors: Plant native, drought-tolerant trees along roads and pedestrian pathways (target 40% canopy coverage). - Urban Design for Ventilation: Orient buildings and street layouts to enhance natural airflow and cross-ventilation. - Energy Efficiency Integration: Incorporate energy-efficient HVAC systems, shading devices, and smart building technologies. - Monitoring and Adaptive Management: Establish a monitoring program using temperature sensors and energy use data.	Throughout Operation	Airport City Management, Developers, Landscaping Contractors	EAG PMU, OUPI, EPA	The cost are already included code 16 table 10.3	The cost are already included code 16 table 10.3
Noise Pollution	Operation	- Separate noise-generating zones (logistics, commercial traffic) from sensitive areas. - Allocate green buffer zones or non-sensitive uses along the perimeter of noise-emitting facilities. - Use newer, well-maintained, and low-noise operational equipment (e.g., electric service vehicles). - Use acoustic shielding in building design (orientation, double façades, sound-insulated windows). - Plant dense vegetation along roadways and commercial service zones.	Throughout Operation	Airport City Management, Tenants, Service Providers	EAG PMU, EPA, Local Administration	The cost are already included code C2 table 10.3	The cost are already included code C2 table 10.3

		• Provide soundproofing for existing nearby homes, schools, and clinics. • Deploy noise monitoring stations across strategic locations.					
Solid Waste Generation	Operation	• Green procurement policies; tenant/resident education programs. • Three-stream waste system (organic, dry recyclables, residual) with color-coded bins and designated collection points. • Dedicated collection zones; authorized disposal contractors. • Hygienic, ventilated temporary storage facilities; smart collection systems; well-maintained collection vehicles. • Develop and enforce an Operational Waste Management Plan (OWMP); regular monitoring and reporting.	Daily throughout Operation	Airport City Management, Tenants, Waste Management Contractors	EAG PMU, EPA, Local Administration	The cost are already included code C4 table 10.3	The cost are already included code C4 table 10.3
Hazardous Materials	Operation	• Adhere to national and international hazardous materials regulations (IFC EHS Guidelines, AfDB Safeguards). • Maintain inventory and MSDS for all substances; clear labeling. • Equip designated hazardous waste storage areas with proper containment, fire safety, ventilation. • Implement source-segregated collection; regular audits.	Throughout Operation	Airport City Management, Tenants, Hazardous Waste Contractors	EAG PMU, EPA, Local Administration	The cost are already included code C6 table 10.3	The cost are already included code C6 table 10.3
Liquid Waste Generation	Operation	• Design Optimization: Integrate water-efficient fixtures and sensor-controlled plumbing. • Process Redesign: Encourage water-saving technologies in operations. • Decentralized or Modular Treatment: Consider modular wastewater treatment units for peak flows or specific areas. • Promote on-site reuse of treated wastewater for landscaping, flushing, cooling. • Deploy real-time monitoring for leaks, overflows, or equipment failures. Campaigns on proper waste disposal and water conservation • Preventive maintenance for sewer lines, manholes, pumping stations.	Throughout Operation	Airport City Management, Utilities Providers, Tenants	EAG PMU, EPA, Local Water Authority	The cost are already included code C5 table 10.3	The cost are already included code C5 table 10.3

		• Incorporate constructed wetlands, bioswales as polishing units.					
Increased Traffic Congestion	Operation	• Incorporate Airport City-specific traffic demand modeling in the broader transport master plan. • Develop high-frequency internal shuttle services; introduce dedicated bus lanes; incentivize ride-sharing. • Install smart traffic signals, real-time vehicle monitoring, dynamic signage. • Clearly demarcate drop-off/pick-up points, freight loading bays, taxi ranks. • Build sidewalks, pedestrian bridges, cycling paths. • Construct structured parking facilities; promote off-site parking with shuttle access. • Promote EVs; offset traffic-related emissions through urban reforestation. • Construct sound barriers; integrate visual screens and landscaping. • Establish a Community Liaison Office to monitor traffic impacts and receive grievances.	Throughout Operation	Airport City Management, Local Traffic Police, Public Transport Operators	EAG PMU, Road Authority, Local Administration	The cost are already included code C7 table 10.3	The cost are already included code C7 table 10.3
Community Health and Safety	Operation	• Implement ongoing public health awareness programs (disease prevention, hygiene). • Conduct regular traffic safety campaigns for pedestrians, cyclists, and drivers. • Implement appropriate security measures within the Airport City and coordinate with local police. • Ensure existing communities have continued and improved access to health services.	Throughout Operation	Airport City Management, Local Health Authorities, Local Police	EAG PMU, Local Administration	The cost are already included code C8 table 10.3	The cost are already included code C8 table 10.3
Fire and Explosion Hazard	Operation	• Incorporate advanced fire detection and suppression systems (sprinklers, smoke detectors, alarms). • Ensure clear, well-marked, and unobstructed emergency exits and evacuation routes. • Provide adequate fire extinguishers and other firefighting equipment, regularly inspected. • Develop and regularly drill a comprehensive emergency response plan, including coordination with local fire departments.	Throughout Operation	Airport City Management, Fire Department, Tenants	EAG PMU, Local Administration	The cost are already included code C3 table 10.3	The cost are already included code C3 table 10.3

		• Provide mandatory fire safety training for all employees.					
Increased Water Supply Demand	Operation	• Groundwater Abstraction Controls: Restrict pumping to optimum well yield; monitor recharge rates. • Implement rainwater harvesting; reuse treated wastewater; explore aquifer recharge. • Install smart water meters, leak detection systems; use water-saving fixtures. • Promote soil and water conservation; collaborate on integrated watershed management.	Throughout Operation	Airport City Management, Water Utility Providers	EAG PMU, EPA, Local Water Authority	The cost are already included code C12 table 10.3	The cost are already included code C12 table 10.3
Soil Contamination	Operation	• Immediate Isolation and Containment: Isolate and contain any spills using absorbent materials. • Routine Inspections and Maintenance: Regularly inspect garages, workshops, parking, and fuel storage areas for leaks. • Training of Operational Staff: Train staff on proper handling and emergency response to hazardous material spills • Impermeable Liners and Containment Systems: Use in areas where hazardous materials are stored or handled. • Spill Response Protocols: Implement spill reporting and remediation procedures.	Throughout Operation	Airport City Management, Tenants, Maintenance Teams	EAG PMU, EPA, Local Administration	The cost are already included code C10 table 10.3	The cost are already included code C10 table 10.3
Surface and Groundwater Contamination	Operation	• Develop and enforce in accordance with regulations. • Ensure collection and safe disposal of used oils, lubricants, and other hazardous wastes through licensed contractors. • Store all hazardous substances in designated, sealed, and banded containment areas. • Maintain and operate surface water drainage systems and wastewater treatment facilities. • Conduct regular water quality monitoring in adjacent surface water bodies. • Train operational staff on environmental management procedures, emphasizing hazardous waste handling and spill prevention.	Throughout Operation	Airport City Management, Waste Management Contractors, Utilities Providers	EAG PMU, EPA, Local Water Authority	The cost are already included code C11 table 10.3	The cost are already included code C11 table 10.3

		Establish for chemical spill incidents.					
Flooding	Operation	- Design and implement comprehensive SUDS (drainage channels, retention/detention ponds, permeable pavements, green roofs, rain gardens, bioswales). - Establish a scheduled inspection and maintenance plan for all stormwater facilities. - Conduct detailed flood risk assessment; use findings to guide infrastructure design. - Develop early warning system; establish evacuation routes and emergency response protocols. - Inform occupants and adjacent communities about flood risks, safety measures.	Throughout Operation	Airport City Management, Design Consultants, Maintenance Teams	EAG PMU, OUPI, EPA, Local Administration	The cost are already included code C17 table 10.3	The cost are already included code C17 table 10.3
Induced Unplanned Urbanization and Risk of Urban Sprawl	Operation	- Enforce strict adherence to the Airport City master plan and existing zoning laws. - Promote development of affordable and mixed-income housing within designated urban growth areas. - Invest in and expand efficient public transportation networks. - Implement GIS-based land management and monitoring systems. - Maintain continuous coordination among relevant urban planning bodies.	Throughout Operation	Bishoftu City Administration, Oromia Urban Planning Institute (OUPI), EAG PMU	EPA, Local Administration, Regional Planning Authorities	The cost are already included code C18 table 10.3	The cost are already included code C18 table 10.3

Table 10-7 ESMP for Fuel Farm Sub-component

Project Phase	Adverse Impact (Description, Magnitude, Duration, Spatial Extent)	Specific Mitigation Measures	Implementation Schedule	Implementation Responsibility	Supervision Responsibility	Estimated Direct Cost (ETB)	Associated Management & Overhead Costs (ETB)
Mobilization	Land Acquisition and Displacement (High, Irreversible, Local)	Detailed Resettlement Action Plan (RAP) Implementation; Land-for-Land Compensation; Housing Relocation/Construction; Grievance Redress Mechanism (GRM).	Pre-Construction & Ongoing	Project Proponent, RAP Team	Project Management Unit, Independent Monitor	The cost are already included code A1 table 10.3	The cost are already included code A1 table 10.3
Mobilization	Loss of Livelihoods (High, Long-term, Local)	Livelihood Restoration Programs (vocational training); Temporary Financial Support; Priority Employment for Project Affected Persons (PAPs).	Pre-Construction & Ongoing	Project Proponent, Contractor, RAP Team	Project Management Unit, Social Safeguards Specialist	The cost are already included code A2 table 10.3	The cost are already included code A2 table 10.3
Mobilization	Impacts on Ambient Air Quality (Medium, Short-term, Local)	Dust Suppression (water spraying); Speed Limits (20 km/h); Vehicle and Equipment Maintenance; Covered Loads.	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A5 table 10.3	The cost are already included code A5 table 10.3
Mobilization	Noise Pollution (Medium, Short-term, Local)	Restricted Working Hours (7:00 AM-6:00 PM); Equipment Maintenance (mufflers); Temporary Noise Barriers; Public Notification.	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A6 table 10.3	The cost are already included code A6 table 10.3
Mobilization	Soil Compaction and Pollution (Low to Medium, Short-term, Local)	Designated Routes and Parking; Spill Prevention and Response (spill kits, training); Regular Inspections (for leaks).	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A7 table 10.3	The cost are already included code A7 table 10.3
Mobilization	Surface Water Pollution (Low to Medium, Short-term, Local)	Erosion and Sediment Control (silt fences, traps); No Washing near Water Bodies; Proper Waste Management.	During Activity	Contractor	Environmental Manager, Site Engineer	The cost are already included code A8 table 10.3	The cost are already included code A8 table 10.3
Mobilization	Impacts on Flora and Fauna	Minimize Footprint (demarcation); Pre-Construction Survey; Re-vegetation (native species).	Pre-Construction	Contractor,	Environmental	The cost are already	The cost are already included code A9

	(Low to Medium, Short-term, Local)		& During Activity	Environmental Manager	Manager	included code A9 table 10.3	table 10.3
Mobilization	Health and Safety Issues (Medium, Short-term, Local)	Comprehensive Occupational Health and Safety (OHS) Plan; First Aid and Emergency Response; Site Security.	During Activity	Contractor, OHS Manager	OHS Manager, Project Management Unit	The cost are already included code A10 table 10.3	The cost are already included code A10 table 10.3
Mobilization	Traffic Congestion and Accidents (Medium, Short-term, Local)	Traffic Management Plan (TMP); Road Maintenance; Public Awareness.	During Activity	Contractor, Logistics Manager	Project Management Unit, Local Authorities	The cost are already included code A11 table 10.3	The cost are already included code A11 table 10.3
Mobilization	Gender and Gender-Based Violence (GBV)/Sexual Harassment (SH) Risks (Low to Medium, Short-term, Local)	Strict Code of Conduct; Awareness Training; Confidential GRM; Gender-Sensitive Facilities.	Pre-Construction & Ongoing	Project Proponent, Contractor, HR	Social Safeguards Specialist, GRM Committee	The cost are already included code A12 table 10.3	The cost are already included code A12 table 10.3
Construction Phase							
Construction	Air Pollution (High, Medium-term, Localized to Regional)	Continuous Dust Suppression; Enclosed Operations and Dust Control Equipment; Emission Control for Construction Machinery (Euro IV); Site Access and Traffic Management; Ambient Air Quality Monitoring and Adaptive Management (real-time AQI).	During Activity	Contractor, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code B1 table 10.3	The cost are already included code B1 table 10.3
Construction	Noise Pollution (High, Medium-term, Localized)	Temporary Noise Barriers (3m high); Low-Noise Equipment and Construction Methods; Optimized Construction Scheduling (daytime only); Noise Monitoring and Compliance; Community Engagement and Complaint Mechanism; Worker and Public Protection (PPE, notification).	During Activity	Contractor, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code B2 table 10.3	The cost are already included code B2 table 10.3
Construction	Solid Waste Generation (Medium to High, Medium-term, Localized)	Waste Minimization and Resource Efficiency; On-site Waste Segregation and Storage; Licensed Disposal (certified transporters, manifest system); Construction Waste Management Plan (CWMP).	During Activity & Post-Construction	Contractor, Waste Management Team	Environmental Manager, Site Engineer	The cost are already included code B3 table 10.3	The cost are already included code B3 table 10.3
Construction	Land Use Modification and	Comprehensive Stormwater Management System (SUDS,	During Activity &	Contractor, Design	Environmental	The cost are	The cost are already

	Runoff Generation (Medium to High, Long-term, Localized)	permeable pavements, retention ponds, oil-water separators); Engineered Drainage Channels; Minimize Impervious Surfaces; Regular Maintenance of stormwater infrastructure.	Post-Construction	Team, Environmental Manager	Manager, Project Management Unit	already included code B4 table 10.3	included code B4 table 10.3
Construction	Impacts on Soil (Moderate, Localized & Temporary, Elevated Risk)	Demarcation of Work Zones; Soil Spill Risk Management (spill kits, immediate cleanup, hazardous waste disposal); Designated Equipment Zones (refueling in bunded areas); Topsoil Management; Internal Access Control; Erosion and Sediment Control; Backfilling and Stabilization; Periodic Monitoring and Soil Testing.	During Activity & Post-Construction	Contractor, Environmental Manager	Environmental Manager, Site Engineer	The cost are already included code B5 table 10.3	The cost are already included code B5 table 10.3
Construction	Pollution of Water Bodies (Surface: High, Groundwater: Moderate; Short-term to Long-term/Irreversible; Localized, potential downstream)	Double-walled Fuel Storage Tanks & Secondary Containment (110%); Impermeable Surfaces & Drainage Channels with Oil-Water Separators; Spill Prevention, Control, and Countermeasure (SPCC) Plan; Geotextiles/Liners under high-risk areas; Groundwater Quality Monitoring; Stormwater Management Controls; Mandatory Training; Prohibit Untreated Discharge (modular treatment); Proper Waste Collection/Disposal; Frequent Inspections.	During Activity & Ongoing	Contractor, Environmental Manager, OHS Manager	Environmental Manager, Project Management Unit	The cost are already included code B6 table 10.3	The cost are already included code B6 table 10.3
Construction	Occupational Health and Safety (Moderate to High, Direct, Adverse, Short-term to Long-term)	Avoidance Measures (segregate high-risk areas, minimize confined space); Minimization Measures (OHSMS, PPE, toolbox talks, first aid, firewatch, certified equipment, TMP, dust suppression, ventilation); Restoration Measures (dismantle temporary facilities, restore land, neutralize contaminated soil); Compensation/Offset (insurance, GRM); Cross-Cutting (incident logs, medical screenings, refresher training, access control, HSE supervisors).	During Activity & Ongoing	Contractor, OHS Manager, HR	OHS Manager, Project Management Unit	The cost are already included code B9 table 10.3	The cost are already included code B9 table 10.3
Construction	Risk of Traffic Accidents and Traffic Congestion (Medium to High, Long-term, Local)	Avoidance (Transport Scheduling, Phased Deliveries); Minimization (Fuel Farm-Specific Traffic Management Plan, Traffic Controllers, Speed Limits, Nearby Material Sources, Driver Training, Routine Road Maintenance, Community Notifications); Restoration (Post-Construction Road Repairs, Traffic Infrastructure Restoration); Compensation/Offset (Community Safety Enhancements, Road Safety Education,	During Activity & Post-Construction	Contractor, Logistics Manager, Community Liaison	Project Management Unit, Local Authorities	The cost are already included code B10 table 10.3	The cost are already included code B10 table 10.3

		GRM).					
Construction	Spread of HIV/AIDS and Other STDs (Medium, Medium-term, Local)	Health Awareness Programs; Access to Services (condoms, VCT, STI treatment); Code of Conduct reinforcement; Community Health Liaison.	Ongoing	Project Proponent, Contractor, Health Team	Health & Safety Manager, Social Safeguards Specialist, Local Health Authorities	The cost are already included code B14 table 10.3	The cost are already included code B14 table 10.3
Construction	Impacts on Vulnerable Groups (High, Long-term, Local)	Targeted Support Programs; Inclusive Engagement; Regular Monitoring of well-being.	Ongoing	Project Proponent, RAP Team, Social Safeguards Specialist	Social Safeguards Specialist, Independent Monitor	The cost are already included code B12 table 10.3	The cost are already included code B12 table 10.3
Construction	Gender-Based Violence/Sexual Exploitation and Abuse (GBV/SEA) and Child Labor (High, Medium-term, Local)	Zero Tolerance Policy; Worker Training; Community Awareness; Confidential GRM for GBV/SEA (Annex 10); Child Protection measures.	Ongoing	Project Proponent, Contractor, HR, Social Safeguards Specialist	Social Safeguards Specialist, GRM Committee, Local Authorities	The cost are already included code B13 table 10.3	The cost are already included code B13 table 10.3
Construction	Cultural Conflict, Cultural Dilution, and Drug Abuse (Medium, Medium-term, Local)	Worker Orientation (local culture); Community-Worker Engagement; Strict Drug and Alcohol Policy; Collaboration with Local Authorities.	Ongoing	Project Proponent, Contractor, HR, Community Liaison	Social Safeguards Specialist, Project Management Unit, Local Authorities	The cost are already included code B15 table 10.3	The cost are already included code B15 table 10.3
Construction	Impact on Vegetation (Medium to High, Medium- to Long-term, Localized)	Restoration and Replanting (native species, Landscape Restoration Plan); Green Belt and Buffer Zones; Soil and Erosion Control; Compensation for Removed Trees; Protection of Sensitive Areas; Environmental Awareness.	During Activity & Post-Construction	Contractor, Environmental Manager, Landscaping Team	Environmental Manager, Project Management Unit	The cost are already included code B7 table 10.3	The cost are already included code B7 table 10.3
Operation Phase							
Operation	Air Pollution (Moderate, Localized, Intermittent)	Avoidance (Closed/Sealed Transfer Systems, Vapor Recovery Units - VRUs); Minimization (Emission-Controlled Generators, Scheduled Fuel Deliveries, Leak Detection and Repair - LDAR, Personnel Training); Restoration (Perimeter Green Buffer Zones, Air Quality Monitoring); Compensation/Offset (Emission Offsets, Green Procurement Policy).	Ongoing	Operations Manager, Maintenance Team, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code C1 table 10.3	The cost are already included code C1 table 10.3

Operation	Noise Pollution (Low to Medium, Long-term, Localized)	Avoidance (Equipment Siting, Noise Buffering); Minimization (Low-Noise Equipment, Routine Maintenance, Traffic Management); Restoration (Landscaping Buffers); Monitoring and Compensation (Permanent Noise Monitoring, Worker Protection - PPE, Grievance Mechanism).	Ongoing	Operations Manager, Maintenance Team, Environmental Manager	Environmental Manager, Project Management Unit	The cost are already included code C2 table 10.3	The cost are already included code C2 table 10.3
Operation	Fire and Explosion Hazards (Significant, High Risk)	Fire Detection and Alarm Systems; Fixed and Mobile Fire Suppression Systems (foam-water, deluge, extinguishers); Explosion-Proof Equipment and Zoning (ATEX/IECEX); Static Electricity Control (grounding/bonding); Emergency Response Plan (ERP, drills); Fuel Vapor Control (closed-loop, flame arrestors); Training and Capacity Building; Regular Inspection and Maintenance; Access Control and Smoking Policy; Monitoring and Auditing (NFPA, ICAO, IATA).	Ongoing	Operations Manager, Safety Manager, Maintenance Team	Safety Manager, Project Management Unit, Regulatory Authorities	The cost are already included code C3 table 10.3	The cost are already included code C3 table 10.3
Operation	Fuel and Oily Water Spill Risks (Significant, High Risk)	Robust Primary Containment Systems (double-walled tanks, inspections); Secondary Containment Structures (bunds 110%); Leak Detection and Monitoring Systems (LDS, SCADA alerts); Closed Drain System; Oily Water Separator (OWS); Emergency Spill Response Plan (ERP, kits, drills); Routine Monitoring and Inspections; Stormwater Management (segregation, treatment); Operational Training and SOPs.	Ongoing	Operations Manager, Maintenance Team, Environmental Manager	Environmental Manager, Project Management Unit, Regulatory Authorities	The cost are already included code C6 table 10.3	The cost are already included code C6 table 10.3
Operation	Hazardous Materials (Potentially High Significance, Localized, Long-term)	Regulatory Compliance (IFC EHS, AfDB, JIG, Shell DEP); Hazardous Materials Inventory and MSDS; Spill Prevention and Containment (bunds 110%, secondary containment, auto shut-off); Emergency Response Preparedness (ERP, drills, spill kits); Training and Capacity Building; Hazardous Waste Management (licensed disposal); Monitoring and Auditing (groundwater/soil quality).	Ongoing	Operations Manager, Maintenance Team, Environmental Manager	Environmental Manager, Project Management Unit, Regulatory Authorities	The cost are already included code C6 table 10.3	The cost are already included code C6 table 10.3
Operation	Waste Generation (Significant Risk)	Comprehensive Waste Management Plan; Waste Segregation at Source; Safe Storage (labeled, sealed, impermeable floors); Regular Collection and Off-site Disposal (licensed	Ongoing	Operations Manager, Maintenance Team,	Environmental Manager, Project	The cost are already included code	The cost are already included code C4 table 10.3

		contractors); Training of Operational Staff.		Environmental Manager	Management Unit	C4 table 10.3	
Operation	Increased Traffic Congestion (Medium to High, Long-term, Local)	Avoidance (Staggered Truck Arrivals, Airport Traffic Coordination); Minimization (Dedicated Lanes, Real-time Traffic Management, Clear Routes/Signage, Off-peak Deliveries, Low-emission Trucks); Restoration (Road Maintenance, Landscape Buffers); Compensation/Offsets (Electrification, Carbon Offset Programs).	Ongoing	Operations Manager, Logistics Manager, Airport Traffic Control	Project Management Unit, Local Authorities	The cost are already included code C7 table 10.3	The cost are already included code C7 table 10.3
Operation	Community Health and Safety (Potential, Remote Risks)	Buffer Zones; Emergency Preparedness (ERP communication); Regular Monitoring (air/water quality); Community Engagement (GRM, open communication); Traffic Management.	Ongoing	Operations Manager, Safety Manager, Community Liaison, Environmental Manager	Project Management Unit, Local Authorities	The cost are already included code C8 table 10.3	The cost are already included code C8 table 10.3
Operation	Operational Health and Safety (Significant Risks)	Strict Fire Prevention & ERP; Proper Ventilation; Personal Protective Equipment (PPE); Regular H&S Training; Air Quality & Noise Monitoring; Equipment Maintenance; Restricted Access & Safety Signage; Medical Surveillance Programs.	Ongoing	Operations Manager, Safety Manager, HR	Safety Manager, Project Management Unit	The cost are already included code C9 table 10.3	The cost are already included code C9 table 10.3
Operation	Soil Contamination (Operation)	Immediate Isolation and Containment: Isolate and contain any spills using absorbent materials. Routine Inspections and Maintenance: Regularly inspect garages, workshops, parking, and fuel storage areas for leaks. Training of Operational Staff: Train staff on proper handling and emergency response to hazardous material spills. Impermeable Liners and Containment Systems: Use in areas where hazardous materials are stored or handled. Spill Response Protocols: Implement spill reporting and remediation procedures.	Throughout Operation	Airport Management, Tenants, Maintenance Teams	EAG PMU, EPA, Local Administration	The cost are already included code C10 table 10.3	The cost are already included code C10 table 10.3

10.1.2. Emergency Preparedness and Response Plans for Airport-Specific Emergencies

A robust emergency preparedness and response framework is paramount for an international airport, given the inherent risks associated with aviation operations. This framework must anticipate and effectively manage a range of airport-specific emergencies, including aircraft incidents, fuel spills, and fires, with a clear focus on community protection.

A. Aircraft Incidents

Aircraft incidents, ranging from minor malfunctions to major crashes, pose significant risks to both on-airport personnel and surrounding communities.

- **Emergency Scenarios:** These include aircraft accidents on or near runways, off-airport crashes impacting residential areas, and incidents involving hazardous materials (e.g., fuel, cargo) onboard.
- **Response Planning:**
 - **Immediate Response:** The Aircraft Rescue and Fire Fighting (ARFF) stations, strategically located to ensure a response time of no more than 3 minutes to any point on operational runways and other movement areas, are the frontline responders. Their primary objective is passenger rescue and evacuation.
 - **Incident Command System (ICS):** Establish a unified Incident Command System (ICS) involving airport management, ARFF, local fire services, police, medical services, and relevant government agencies. This ensures coordinated decision-making and resource deployment.
 - **Search and Rescue (SAR):** Develop detailed SAR protocols for both on-airport and off-airport incidents, including coordination with national SAR authorities and local volunteer groups.
 - **Medical Triage and Evacuation:** Establish clear procedures for mass casualty triage, on-site medical treatment, and rapid evacuation to designated hospitals. The airport's planned 30-bed medical center will provide immediate care.
 - **Debris Management:** Plan for the safe and systematic collection, storage, and disposal of aircraft debris, including potential hazardous materials.

B. Fuel Spills

Fuel spills, whether from aircraft, fuel storage facilities (fuel farm), or ground vehicles, present severe environmental and safety hazards due to flammability and potential for soil and water contamination.

- **Emergency Scenarios:** These include large-scale spills from ruptured aircraft tanks, leaks from the fuel farm or hydrant system, and smaller spills during refueling operations or from ground support equipment.
- **Response Planning:**
 - **Containment:** Immediate deployment of spill containment booms, absorbent materials, and specialized equipment to prevent spread into drainage systems or water bodies.
 - **Fire Suppression:** Availability of appropriate fire suppression agents (e.g., foam) and trained personnel to manage potential ignition sources. The fuel farm will have fire protection facilities.
 - **Recovery and Remediation:** Protocols for rapid recovery of spilled fuel and contaminated soil/water. This includes engaging specialized environmental cleanup contractors.
 - **Waste Disposal:** Safe and compliant disposal of contaminated materials and recovered fuel in accordance with national and international hazardous waste regulations.
 - **Preventive Measures:** Regular maintenance of fuel infrastructure, leak detection systems, and training for personnel handling fuel.

C. Fires

Fires can originate from various sources within the airport environment, including aircraft, buildings, fuel storage, or ground vehicles.

- **Emergency Scenarios:** These include aircraft fires (onboard or on the ground), structural fires in terminals or support facilities, and wildland fires in surrounding vegetation areas exacerbated by airport activities.
- **Response Planning:**
 - **Fire Suppression Systems:** Ensure all airport buildings and critical infrastructure are equipped with state-of-the-art fire detection and suppression systems (e.g., sprinklers, alarms, inert gas systems).
 - **ARFF Deployment:** Rapid deployment of ARFF units for aircraft-related fires.
 - **Mutual Aid Agreements:** Formalize mutual aid agreements with local municipal fire

departments to provide additional resources and expertise for large-scale incidents.

- Hazardous Material Firefighting: Specific training and equipment for fighting fires involving hazardous materials (e.g., chemicals from the District Cooling Plant, aircraft components).
- Post-Fire Assessment: Procedures for assessing structural integrity, environmental contamination, and initiating recovery operations.

D. Community Notification Procedures

Effective and timely community notification is critical during an airport emergency to ensure public safety and minimize panic. The report must detail specific multi-channel procedures for informing affected communities. While the ESIA mentions general public consultations and formal notifications for project information, it lacks specific emergency notification protocols.

- Tiered Alert System: Implement a tiered alert system based on the severity and proximity of the emergency:
 - Level 1 (Advisory): For minor incidents with no immediate community threat. Information disseminated via airport website, social media, and local media outlets.
 - Level 2 (Watch/Warning): For incidents with potential community impact (e.g., smoke plume, traffic disruption). Utilize local radio and TV broadcasts, community liaison officers (CLOs), and direct communication with local administration offices (Woreda and Kebele).
 - Level 3 (Emergency/Evacuation): For incidents requiring immediate action (e.g., off-airport crash, large hazardous spill). Activate sirens, reverse 911/SMS alerts, emergency broadcast system (EBS), and door-to-door notification by emergency services and CLOs in directly affected areas.
- Community Liaison Officers (CLOs): Appoint CLOs from the local community, preferably from the project Woreda or Kebele, to serve as direct communication channels between the airport and affected residents. CLOs will be trained in emergency communication protocols and will facilitate information dissemination and feedback.
- Public Information Center (PIC): Establish a dedicated Public Information Center (PIC) during emergencies to provide accurate, verified information to the public and media, countering misinformation.
- Language and Accessibility: Ensure all emergency communications are provided in local languages (e.g., Oromo, Amharic) and accessible formats for vulnerable groups, including those

with disabilities or limited literacy.

- Regular Drills and Awareness Campaigns: Conduct regular community-wide drills and public awareness campaigns to familiarize residents with emergency procedures, notification methods, and safe assembly points.

E. Evacuation Routes

Clear and well-communicated evacuation routes are essential for the safety of surrounding communities in the event of an airport emergency that necessitates off-site evacuation. The initial report lacks explicit details on these routes.

- Pre-Identified Primary and Secondary Routes:
 - Primary Routes: Designate main roads connecting affected communities to safe zones, ensuring they are well-maintained and clearly signposted. These should leverage the improved road networks linking the airport to Addis Ababa and Dukem.
 - Secondary/Alternative Routes: Identify alternative routes, including smaller roads or pathways, to be used if primary routes are compromised or congested.
- Traffic Management during Evacuation: Develop specific traffic management plans for emergency evacuations, coordinating with local traffic police and emergency services to manage vehicle flow and prevent bottlenecks. This includes potential use of adaptive signal control and dynamic signage.
- Assembly Points and Shelters: Designate and communicate safe community assembly points and temporary shelters away from the airport's direct impact zone. These locations should have basic amenities and be accessible.
- Vulnerable Population Considerations: Develop specific assistance plans for vulnerable groups (e.g., elderly, persons with disabilities, female-headed households, children) during evacuation, ensuring they receive priority support and transport.
- Mapping and Dissemination: Create and widely distribute detailed maps of evacuation routes and assembly points to all affected households and local administrative offices. These maps should be part of community awareness programs.
- Regular Review and Drills: Conduct periodic reviews and drills of evacuation plans with community participation to ensure their effectiveness and familiarity among residents.

F. Coordination with Local Emergency Services

The ESIA report acknowledges the need for coordination with local law enforcement and emergency services, particularly concerning traffic management and accident response.¹ However, the extent of this coordination, especially in terms of formal agreements, regular joint training, or integrated emergency response plans beyond traffic management, is not explicitly detailed.¹ A comprehensive framework for coordination with all local emergency services (fire, medical, police) for overall project safety and incident response is crucial.

- **Formalized Agreements (Memoranda of Understanding - MoUs):**

- Establish formal Memoranda of Understanding (MoUs) between airport management and all relevant local emergency services, including Bishoftu City Security Office, Bishoftu City Traffic Office, local fire departments, municipal police, and regional health authorities.¹ These MoUs should clearly define roles, responsibilities, communication protocols, and resource sharing during emergencies.

- **Joint Emergency Planning and Drills:**

- Conduct regular joint emergency planning sessions and full-scale drills with local emergency services. These drills should simulate various airport-specific scenarios (aircraft incidents, fuel spills, fires) to test response capabilities, identify gaps, and improve inter-agency coordination.
- Include scenarios that involve off-airport impacts and community evacuation to ensure seamless transition of command and control.

- **Integrated Communication Systems:**

- Establish integrated communication systems that allow for real-time information sharing between airport operations, air traffic control, and local emergency services. This could involve shared radio frequencies, secure data networks, and common operational pictures.

- **Shared Resources and Training:**

- Develop protocols for sharing specialized equipment and resources during large-scale emergencies.
- Conduct cross-training programs for airport personnel and local emergency responders to familiarize them with each other's procedures, equipment, and command structures. For example, local fire departments should be trained on aircraft fire suppression techniques, and airport ARFF teams on urban search and rescue.

- **Medical Response Coordination:**

- Formalize coordination with local hospitals and medical facilities to ensure they are prepared to receive and treat mass casualties from airport incidents. This includes pre-arranged patient transfer protocols and surge capacity planning. The airport's own medical center should be integrated into this wider network.

- **Environmental Emergency Response:**

- Coordinate with environmental protection agencies (Federal EPA, Oromia Regional Bureau of Environment Protection) and local waste management services for rapid response to hazardous material spills (e.g., fuel, chemicals from DCP) to minimize environmental contamination. This includes protocols for containment, cleanup, and disposal of hazardous waste.

- **Post-Emergency Recovery Coordination:**

- Develop plans for coordinated post-emergency recovery, including damage assessment, environmental remediation, and community support services, involving relevant local and regional government bodies.

10.1.3. Biodiversity Management Plan (BMP)

The area designated for the Bishoftu International Airport is predominantly agricultural land, mainly used for crop cultivation and livestock grazing, reflecting the community's strong dependence on agro-based livelihoods. Limited and scattered patches of natural vegetation occur mostly along farm boundaries and near homesteads, providing minor habitats for local flora and fauna. While the site lies within the broader Ethiopian Rift Valley known for its diverse landscapes including crater lakes, wetlands, grasslands, and cultivated fields the project footprint itself does not encompass ecologically sensitive habitats. The proximity of water bodies such as Lake Bishoftu and the Aba Samuel Reservoir contributes to regional biodiversity, particularly as resting points for some migratory birds, but the immediate project area plays only a marginal role in supporting significant wildlife movement or critical ecological functions.

Biodiversity Management Plan has been developed to guide the protection and sustainable management of biodiversity throughout the planning, construction, and operation phases of the airport. The project acknowledges that airport development, if not properly managed, may result in habitat loss, fragmentation, increased human and vehicle movement, introduction of invasive

species, disruption to migratory routes, and other ecological disturbances. Therefore, a comprehensive set of mitigation measures and a robust biodiversity monitoring program are essential to safeguard the environmental integrity of the Bishoftu area.

The biodiversity monitoring program will focus on five key components: vegetation and flora, agricultural crop biodiversity, domestic animals, wild animals, and bird species, with particular attention given to local birds and migratory birds that use the area as a resting, feeding, or breeding ground. The monitoring of vegetation and flora will involve regular surveys to document native plant species, assess the health of natural habitats, and track the success of habitat restoration efforts. Special consideration will be given to the identification and management of invasive plant species, which may spread due to construction activities and disrupt the local ecosystem.

Agricultural biodiversity is another critical component, given the area's reliance on smallholder farming systems. The project will monitor changes in crop diversity, with a focus on the conservation of traditional crop varieties that contribute to food security and cultural heritage. Sustainable agricultural practices will be promoted in collaboration with local farmers to ensure that biodiversity-friendly farming is maintained in the areas surrounding the airport.

The monitoring of domestic animals will involve assessing the types, numbers, and movement patterns of livestock in the project area, particularly as they relate to ecological interactions with wildlife and natural habitats. Changes in grazing patterns, animal health, and livestock-wildlife conflicts will be tracked to mitigate potential negative impacts resulting from increased development pressure.

Wild animal populations will be systematically monitored to assess species diversity, abundance, and habitat use. The project will pay close attention to the ecological corridor connecting Lake Bishoftu and Aba Samuel Reservoir, ensuring that wildlife movement is not obstructed by airport infrastructure. Measures such as designated wildlife crossing zones and habitat connectivity enhancements will be implemented where necessary to maintain ecological functions.

Birds, both local and migratory, represent a critical focus of the biodiversity monitoring program. The Bishoftu area lies along an internationally significant migratory route, and the nearby lakes provide essential stopover points for many species. Regular bird surveys will be conducted to

monitor population trends, nesting sites, and seasonal patterns. Specific attention will be given to potential bird strike risks, as the proximity of the airport to migratory pathways increases the likelihood of bird-aircraft collisions. Mitigation measures such as bird diverters, habitat management near operational zones, and lighting controls will be employed to minimize these risks. Collaboration with ornithologists, local communities, and conservation organizations will be prioritized to enhance bird conservation efforts and ensure continuous knowledge sharing.

Overall, the Biodiversity Management Plan for Bishoftu International Airport reflects a strong commitment to environmental stewardship and the sustainable coexistence of development and biodiversity conservation. The monitoring of vegetation, agricultural biodiversity, domestic animals, wild animals, and birds, with a clear emphasis on the ecological corridor between Lake Bishoftu and Aba Samuel Reservoir, will provide critical information for informed decision-making and adaptive management. Through careful implementation, the project will contribute to safeguarding the region's ecological integrity while supporting Ethiopia's infrastructure development goals.

A. Management Plan for Migratory Birds During Airport Operations

The Bishoftu International Airport is located within a critical ecological zone along the African-Eurasian Migratory Flyway, where large numbers of seasonal migratory birds pass through or temporarily settle around water bodies such as Lake Bishoftu and Aba Samuel Reservoir. These birds rely on the area for resting, breeding, and food search activities. However, their presence near airport operational zones, especially during peak migration seasons, significantly increases the risk of bird strikes, posing threats to both aviation safety and bird populations. The period from September to May typically sees increased migratory bird activity, overlapping with times when birds may fly at low altitudes during landing and take-off operations.

To effectively manage these risks, a targeted Migratory Bird Management Plan will be implemented. This includes continuous monitoring of bird populations, flight patterns, and seasonal movement trends, with real-time reporting to airport operations teams. Habitat management will be carried out to discourage bird congregation near critical airport zones, including vegetation control, minimizing open water near runways, and using bird deterrent technologies such as visual scare devices, acoustic signals, and bird diverters on infrastructure. Collaboration with ornithologists and local stakeholders

will ensure that the airport's operations remain compatible with migratory bird conservation, while minimizing collision risks during the most critical phases of aircraft take-off and landing.

B. Biodiversity Monitoring Plan

The Biodiversity Monitoring Plan for the Bishoftu International Airport project is designed to ensure the long-term conservation of diverse biological resources in the area, including native plant species, agricultural crop varieties, domestic animals that support local livelihoods, and wild animal populations. Regular monitoring activities will assess changes in vegetation cover, habitat quality, species diversity, and ecosystem health. Agricultural biodiversity will be tracked to ensure the protection of traditional crop varieties, while the movement, abundance, and health of domestic and wild animal populations will be continuously monitored to avoid disruptions from project activities. Through this integrated approach, the project will maintain ecosystem integrity while promoting sustainable development.

A critical focus of the monitoring plan is the protection and management of both resident and migratory bird species, which are essential to the ecological function of the area. The region's location along the African-Eurasian Flyway, combined with the presence of nearby lakes such as Bishoftu and Aba Samuel Reservoir, makes it a vital stopover and breeding ground for migratory birds. Regular bird surveys will be conducted to monitor seasonal movement patterns, habitat use, and population trends. This information will guide adaptive management actions to minimize the risk of bird strikes during airport operations, particularly during critical periods of aircraft take-off and landing, while also contributing to national and international efforts to conserve migratory bird populations.

10.1.4. Pesticide Use and Integrated Pest Management (IPM)

Airport operations, particularly in food handling areas, cargo warehouses, landscaping, and waste management zones, require the application of pest control to maintain hygiene and operational safety. However, improper or excessive use of pesticides poses risks to human health and the environment.

To manage these risks effectively, an Integrated Pest Management (IPM) strategy will be adopted throughout the construction and operational phases of Bishoftu International Airport. IPM emphasizes the use of environmentally sensitive pest control methods that minimize risks to people and ecosystems.

Key Elements of the IPM Plan:

- **Prevention:** Eliminate pest breeding habitats through good sanitation (especially around food storage, garbage bins, landscaping, and drainage systems).
- **Monitoring:** Regular surveillance and monitoring to identify pest presence and population levels before treatment.
- **Thresholds:** Define action thresholds based on pest type and population density.
- **Non-Chemical Methods:** Prioritize mechanical (traps), biological (natural predators), and physical control methods before chemical application.
- **Selective Chemical Use:** When necessary, apply low-toxicity, targeted pesticides in minimal amounts and in compliance with national regulations and international standards (e.g., WHO and FAO pesticide safety guidelines).
- **Training and PPE:** Ensure all pest control workers are trained and equipped with personal protective equipment to avoid health risks.
- **Storage and Disposal:** Store pesticides in secure, ventilated locations. Dispose of pesticide containers and residues in accordance with hazardous waste protocols.

Mitigation Measures:

- Avoid pesticide use near food handling zones, water sources, or sensitive ecological areas.
- Maintain a pesticide application logbook (type, quantity, date, applicator).

- Engage licensed pest control contractors familiar with IFC EHS Guidelines and Ethiopian EPA standards.

Monitoring and Evaluation:

- The Environmental Unit of the airport shall supervise pest control operations.
- Include pesticide use indicators in the Environmental and Social Monitoring Plan.

10.1.5. Occupational Health and Safety Plan

The development and operation of the airport present a variety of occupational health and safety risks that must be addressed systematically and specifically in accordance with international best practices and national labor and safety laws. While some general OHS risks apply across construction projects, airport projects present unique, high-risk hazards that require industry-specific planning, procedures, and controls.

OHS Risks during Construction and Operation

The OHS impacts associated with the airport are grouped into two phases: construction and operation.

Construction Phase Risks:

- Working at heights (e.g., terminal buildings, air traffic towers).
- Heavy machinery use (e.g., excavators, cranes, concrete mixers).
- Electrical installation and wiring.
- Manual handling of materials.
- Exposure to dust, vibration, and noise.
- Welding, cutting, and hot works.
- Traffic accidents from movement of construction vehicles.

Operational Phase Risks:

- Aircraft servicing and fueling (fire/explosion hazards).
- Working around jet engines and high-speed taxiways.
- Noise exposure from aircraft takeoff/landing.
- Operating specialized equipment (GSE, baggage handling systems).
- Electrical risks from lighting, runway systems, and navigation equipment.
- Ergonomic risks for ground staff and airside operators.
- Occupational fatigue and shift work-related issues.
- Wildlife hazard management (e.g., bird strikes).

Proposed Occupational Health and Safety Plan

The following detailed OHS Plan outlines mitigation measures and safety procedures tailored for airport-specific hazards:

Risk Assessment and Hazard Identification

- Conduct comprehensive Job Hazard Analyses (JHA) and Task Risk Assessments (TRA) prior to all activities.
- Identify site-specific hazards using historical data, international benchmarks (e.g., ICAO, IATA), and lessons learned from similar projects.

Key Mitigation Measures by High-Risk Activity

High-Risk Activity	Mitigation Measures
Working at Heights	- Use certified fall protection equipment (harnesses, guardrails, scaffolds). - Train workers in fall prevention and rescue procedures. - Implement permit-to-work (PTW) system.
Electrical Works	- Ensure only certified electricians perform electrical tasks. - Use lockout/tagout (LOTO) procedures. - Maintain updated single-line diagrams and safety barriers.
Hot Works (Welding, Cutting)	- Use fire-resistant PPE and welding curtains. - Provide fire extinguishers and hot work permits. - Monitor work areas for gas leaks and flammable substances.
Specialized Equipment Operation	- Train operators and license heavy machinery users. - Conduct pre-use inspections. - Ensure proper signaling and airside coordination.
Fuel Handling and Jet Operations	- Establish spill containment systems. - Use intrinsically safe equipment. - Train in hazardous material handling and firefighting.
Noise Exposure	- Conduct baseline noise assessments. - Issue hearing protection devices (HPDs). - Rotate staff and monitor cumulative exposure.

Manual Handling and Ergonomics	- Train workers on safe lifting. - Provide mechanical aids for baggage and cargo handling. - Conduct workstation ergonomic assessments.
--------------------------------	---

Occupational Health Protocols

- Pre-employment and periodic medical screenings.
- Establish on-site first aid stations and trained first aiders.
- Monitor workers for heat stress, fatigue, and psychological strain, especially during long shifts.
- Implement vector control and sanitation procedures in worker facilities.

Safety Management System (SMS) Integration

- Develop a site-specific OHS Management System integrated with:
 - Safety Policy and Objectives
 - Hazard Identification and Risk Management Procedures
 - Safety Assurance and Audits
 - Incident/Accident Reporting Mechanisms
- Regular OHS audits and inspections (monthly or quarterly).
- Near-miss reporting culture with no-blame policies.
- Maintain OHS KPIs: Lost Time Injury Frequency Rate (LTIFR), Total Recordable Incident Rate (TRIR), etc.

Emergency Preparedness and Response (ERP)

- Develop and implement a full Emergency Response Plan (ERP) including:
 - Aircraft crash response
 - Fuel spill containment
 - Fire response
 - Medical emergencies
 - Wildlife hazard response
- Conduct regular drills and simulations with fire services, medical teams, and airport authorities.

Safety Culture and Capacity Building

- Induction training for all workers on OHS rules, hazards, and site-specific risks.
- Regular refresher training and toolbox talks for high-risk work categories.
- Establish a safety committee with worker representation.
- Promote a zero-harm culture with visible commitment from top management.

10.1.6. Community Health and Safety Plan

Introduction

The development and operation of the airport pose various community health and safety (CHS) risks due to proximity to residential areas, community infrastructure, natural habitats, and active socio-economic zones. This plan outlines mitigation measures based on the four-level Mitigation Hierarchy: avoidance, minimization, restoration, and compensation/offset.

Objectives

- Protect the health and well-being of communities adjacent to the airport.
- Prevent or reduce risks related to air emissions, noise, traffic, bird strikes, public safety, and labor influx.
- Ensure emergency preparedness and effective response mechanisms.
- Comply with national legislation and IFC Performance Standards (especially PS 4: Community Health, Safety and Security).

Identified Risks

- Deterioration of air quality from emissions.
- Increased noise pollution from aircraft and vehicles.
- Bird strike incidents due to habitat interference.
- Public safety threats from construction, heavy traffic, and hazardous materials.
- Potential social conflicts due to labor influx.
- Emergency response limitations in crash/fire/hazardous events.

Mitigation Measures

Avoidance Measures

Aspect	Actions
Air Quality	- Locate sensitive community structures (e.g., schools, clinics) away from runways and tarmacs. - Site the airport away from densely populated settlements.
Noise	- Design flight paths avoiding schools, hospitals, and dense housing.

	- Avoid nighttime operations over residential zones.
Bird Strikes	- Select site away from wetlands, landfills, and bird migration routes.
Public	- Establish land-use buffer zones around the airport.
Safety	- Apply zoning regulations to restrict incompatible land use near the airport.

Minimization Measures

Aspect	Actions
Air Quality	- Use low-emission aircraft and electrified GSE. - Enforce no-idling rules. - Use dust suppression during construction.
Noise	- Restrict construction activities to daytime hours only (e.g., 6 AM–10 PM) to limit disturbance. - Use low-noise aircraft. - Build sound barriers. - Design runways to reduce noise near populated areas.
Bird Strike	- Control habitats near runways (e.g., grass height, remove standing water). - Install bird deterrents. - Ban open waste and food disposal.
Public Safety	- Develop an Airport Emergency Response Plan (AERP). - Install fencing, CCTV, and secure entry points. - Ensure safe road design and traffic signage. - Train all staff in emergency protocols and hazardous materials handling.
Labor Management	- Set up labor camps inside project boundary, distanced from local homes. - Limit interaction between laborers and locals. - Follow IFC worker accommodation guidelines (potable water, sanitation, drainage).
Community Infrastructure	- Avoid use of community property without permission. - Avoid dismantling utilities (water, gas, telecom) without notification

	and alternatives. - Avoid heavy vehicles during rush hours. - Do not use agricultural land for storage.
Access & Traffic	- Barricade all work areas. - Install local-language safety signage. - Provide pedestrian crossings, speed limits, and safe detours.
Waste & Sanitation	- Segregate and dispose of waste as per national law. - Use licensed disposal sites only. - Maintain machinery to limit emissions/noise. - Implement on-site vector control.

Restoration Measures

Aspect	Actions
Environment	- Rehabilitate disturbed lands using green buffers. - Restore nearby natural habitats, especially wetlands.
Infrastructure	- Retrofit affected public structures (e.g., schools) with sound insulation. - Rehabilitate damaged roads and walkways.
Bird Habitat	- Redirect bird populations by restoring offsite wetlands.

Compensation/Offset Measures

Aspect	Actions
Health & Environment	- Support health awareness for communities affected by noise and emissions. - Fund tree planting and greening projects.
Biodiversity	- Collaborate with wildlife authorities for conservation sites. - Provide biodiversity awareness programs in schools.
Public Services	- Establish a Community Liaison Unit (CLU). - Support local emergency services (fire, clinics) with equipment/training.

The following additional mitigation measures should be incorporated to avoid or reduce potential impacts:

- Labour camps should be located, to the extent possible, within the project site boundary.
- Develop labour camps in accordance with IFC Workers' Accommodation Guidelines, including:
 - Provision of an adequate supply of safe potable water.
 - Proper sanitation facilities (e.g., functional toilets), with wastewater managed through septic tanks and soak pits.
 - Adequate drainage systems to prevent wastewater contamination and disease transmission.
- Avoid heavy vehicle movement during peak traffic hours to reduce the risk of traffic accidents and community disruption.
- Do not use open grounds, community properties, or public land for construction activities or parking without proper authorization from relevant authorities.
- Labour camps must be sufficiently distanced from nearby residences, and workers should be instructed not to trespass into adjacent community areas.
- Avoid dismantling or disrupting community infrastructure (e.g., roads, gas lines, telecom networks) without:
 - Prior permission from authorities, and
 - Adequate notice and alternative service arrangements for the affected community.
- If relocation of community utilities is unavoidable, relocate them to nearby suitable locations in consultation with local stakeholders.
- Schedule construction activities to minimize noise, dust, and general nuisance during sensitive hours or days.
- Do not use agricultural land for storing construction materials, equipment, or waste.
- Barricade all work areas for public safety and restrict unauthorized access, especially for community members and passers-by.
- Install appropriate signage (in the local language) at and around construction sites to warn and inform travelers of ongoing work and risks.
- Segregate, store, and dispose of all solid and liquid waste in compliance with national regulations.

- Disposal must be conducted only in approved areas with formal permission.
- Maintain all construction machinery and equipment regularly to minimize:
 - Air emissions,
 - Noise pollution,
 - Vibration impacts on surrounding communities.
- Implement on-site vector control measures to reduce the risk of diseases caused by pests or insects.
- Train and instruct security staff to ensure the safety and dignity of women in nearby communities and within the labour camps.

10.1.7. Hazardous waste management plan

The aviation industry relies heavily on a variety of hazardous materials (HazMat) such as aviation fuels, solvents, degreasers, contact cleaners, leak detectors, biocides, and disinfectants. These substances, if not managed properly, pose significant risks to human health and the environment, especially near sensitive receptors like water bodies and residential zones.

Although de-icing chemicals are not used at Bishoftu International Airport due to its warm climate, several other hazardous materials will be routinely used and require strict management through a structured Hazardous Materials Management Plan (HMMP).

Objectives

- Prevent spills, leaks, or accidental releases of hazardous substances.
- Ensure compliance with Ethiopian laws and international guidelines (e.g., ICAO, IFC, IATA, Basel Convention).
- Protect airport personnel, nearby communities, and environmental resources.
- Promote responsible storage, handling, transport, and disposal of hazardous materials and wastes.

Categories of Hazardous Materials in Use

Category	Examples	Associated Risks
Fuels & Lubricants	Jet A1 fuel, diesel, hydraulic oils	Flammability, groundwater contamination
Biocides	Insecticides, fungicides, disinfectants	Toxicity to humans, aquatic and soil organisms
Degreasers	Hydrocarbon-based sprays for engines and mechanical parts	VOC emissions, skin/eye irritation
Contact Cleaners	Ammonia solution, hydrogen peroxide	Respiratory and dermal irritation
Leak Detectors	Ethylene glycol-based products	Toxic to aquatic life
Solvents & Alcohols	Paint removers, alcohol-based cleaners	Flammability, vapor inhalation risks

Handling Procedures

- Ensure all personnel involved in handling hazardous materials are trained and certified in proper procedures.
- Implement Standard Operating Procedures (SOPs) for:
 - Chemical handling and transfer
 - First aid response
 - Spill prevention and control
- Label all containers clearly with contents, hazards, and safety data per GHS (Globally Harmonized System) standards.
- Use secondary containment (e.g., drip trays, bunds) during decanting and dispensing.

Storage Procedures

- Designate dedicated storage areas for hazardous materials, located away from drainage paths and environmentally sensitive zones.
- Storage areas must have:
 - Impervious flooring
 - Spill containment systems
 - Fire detection and suppression systems
 - Ventilation and temperature controls (where applicable)
- Separate incompatible substances (e.g., acids and bases, oxidizers and fuels).
- Store chemicals in original containers or approved secondary containers with secure lids.

Transportation Procedures

- Comply with national transport regulations for hazardous substances and ICAO/IATA Dangerous Goods Regulations (DGR).
- All vehicles used for hazardous material transport must be:
 - Clearly marked with hazard symbols
 - Equipped with spill response kits, fire extinguishers, and first aid.
- Route planning must avoid densely populated or ecologically sensitive areas where possible.
- Transport logs should be maintained, including:
 - Material type

- Quantity
 - Destination
 - Date and time
- Transport personnel must:
 - Wear adequate PPE (gloves, closed shoes, overalls, goggles, and masks)
 - Be trained in emergency response and container handling
 - Report all incidents or near misses

Waste Management and Disposal

- Hazardous waste streams must be segregated at the source into compatible categories (e.g., flammable liquids, corrosives, reactive chemicals).
- Use covered containers during storage and transport.
- Maintain waste inventory logs and manifests indicating:
 - Waste type
 - Quantity
 - Storage location
 - Date of generation and disposal
- Dispose of hazardous waste only through licensed contractors and approved disposal sites, with proof of compliance (e.g., disposal receipts).
- Do not dispose of hazardous waste in municipal landfills or through unauthorized burning or open dumping.

10.1.8. Air Quality and Dust Management Plan

This plan aims to minimize air pollution and dust generation from all project activities, protecting both workers and nearby communities.

Objectives:

- To comply with national (Ethiopian EPA) and international (WHO) air quality standards.
- To minimize dust generation from construction activities and vehicle movements.
- To reduce exhaust emissions from machinery, vehicles, and aircraft.
- To prevent adverse health impacts on workers and local communities.

Measures:

During Mobilization and Construction Phases:

- **Dust Suppression:**
 - Regularly spray water on unpaved roads, active construction areas, and exposed soil surfaces. This should be done daily, particularly during dry and windy conditions.
 - Harden temporary access and main roads to reduce dust generation.
 - Avoid large earthwork operations during windy seasons to prevent widespread dust dispersion.
- **Stockpile Management:**
 - Cover stockpiles of soil, sand, and other construction materials with tarpaulins or other suitable covers.
 - Seal or enclose materials prone to dust generation.
- **Vehicle and Equipment Management:**
 - Ensure all hauling trucks carrying construction materials and spoils are completely covered and secured.
 - Limit vehicle speed to 30 km/h in residential areas and on unpaved access roads.
 - Conduct regular vehicle inspections and maintenance of all construction machinery and vehicles (e.g., excavators, dump trucks) to reduce excessive exhaust emissions.
 - Use modern, low-emission (Euro IV+ or equivalent) machinery and equipment where feasible.

- Prohibit overload operation of diesel-fueled equipment.
- **Excavation and Earthworks:**
 - Minimize excavation and earth-moving activities to only what is strictly required for the specific construction task.
 - Use updated technology or modern equipment in excavation works that will minimize dust generation from earthen materials.
 - Backfill borrow pits and exposed excavation sites as soon as possible.
- **Waste Management:**
 - Strictly prohibit open burning of any waste materials on-site, as this is a significant source of air pollutants.

During Operation Phase:

- **Aircraft Emissions:**
 - Encourage airlines to adopt fuel-efficient aircraft and flight planning techniques.
 - Provide incentives (e.g., reduced landing fees) for airlines using Sustainable Aviation Fuels (SAFs).
 - Collaborate with fuel suppliers to establish sustainable fuel infrastructure at the airport to minimize fossil fuel dependence.
 - Implement runway and taxiway optimization to reduce aircraft taxiing time and idle emissions.
 - Introduce operational limits on Auxiliary Power Unit (APU) use through airport policy and monitoring.
- **Ground Support Equipment (GSE) and Airport Vehicles:**
 - Transition airport ground operations to electric or hybrid systems (e.g., electric GSE, electric shuttle buses).
 - Install electric vehicle (EV) charging infrastructure for airport vehicles and service fleets.
 - Enforce strict emission standards for all airport vehicles.
 - Implement anti-idling policies for trucks and other vehicles.
- **Traffic Management:**

- Promote public transport, carpooling, and non-motorized transport for employees and passengers to reduce vehicular emissions from airport access.
- **Green Infrastructure:**
 - Rehabilitate disturbed green spaces within the airport perimeter through landscaping with native vegetation.
 - Develop green buffer zones around airport boundaries to improve local air quality and aesthetics.

Monitoring:

- **Parameters:** PM2.5, PM10, SO₂, NO₂, and CO levels.
- **Locations:** At five strategically selected locations within the project area, particularly near sensitive receptors (e.g., nearby communities, schools, health centers).
- **Frequency:**
 - **Mobilization:** Once during mobilization.
 - **Construction:** Once during construction.
 - **Operation:** Continuous monitoring and periodic tests, with quarterly reporting.
- **Methodology:** Air quality tests using appropriate equipment and ambient air quality modeling to predict impacts.
- **Reporting:** Regular reporting to relevant authorities and internal management.

Responsibilities:

- **Implementation:** Construction Contractor (mobilization & construction), Ethiopian Airlines Group (operation).
- **Supervision/Monitoring:** Bishoftu City Environmental Protection Authority (EPA), Supervision Consultant, Federal EPA, Oromia Regional EPA.

10.1.9. Noise Management Plan

This plan aims to control and reduce noise pollution generated by airport activities to protect the health and well-being of workers and surrounding communities.

Objectives:

- To comply with Ethiopian EPA and IFC noise level guidelines (e.g., 55 dB(A) day/45 dB(A) night for residential areas).
- To minimize noise disturbance to sensitive receptors (residential areas, schools, hospitals, places of worship).
- To protect workers from excessive noise exposure.

Measures:

During Mobilization and Construction Phases:

- **Equipment Selection and Maintenance:**
 - Use modern, quieter construction equipment.
 - Ensure exhaust outlets are fitted with silencers or mufflers.
 - Keep compressor motor covers closed when running.
 - Check that machinery panels are secured to prevent rattling.
 - Regularly maintain all machinery and vehicles to ensure optimal performance and reduced noise.
- **Operational Restrictions:**
 - Limit noisy construction activities (e.g., heavy machinery use, blasting, drilling) to daytime hours (7 AM–6 PM).
 - Restrict noisy machinery use at night to maintain noise levels at or below 45 dB(A).
 - Schedule noisy activities during times when wildlife activity is low, especially near sensitive habitats.
- **Noise Barriers and Screening:**
 - Install acoustic barriers or sound-insulating screens around active construction zones, particularly near sensitive receptors.

- Where practicable, site noisy machinery behind earth mounds or brick stacks to isolate or screen it.
- **Worker Protection:**
 - Mandate the use of Personal Protective Equipment (PPE), specifically earplugs or earmuffs, for workers in zones where noise levels exceed 85 dB(A) for more than 8 hours per day.
 - Limit the duration of noise exposure for workers.
 - Conduct periodic medical hearing checks for workers exposed to high noise levels.
- **Traffic Management:**
 - Enforce a 30 km/h speed limit for construction vehicles near residential areas.

During Operation Phase:

- **Flight Path Optimization:**
 - Design optimized flight paths and air corridors to avoid overflights of sensitive receptors (e.g., residential areas, schools, hospitals).
 - Implement Continuous Descent Approach (CDA) and other noise-abatement flight procedures to reduce thrust and drag during approach.
 - Optimize arrival and departure procedures to minimize low-altitude flying over noise-sensitive areas.
- **Operational Restrictions:**
 - Implement nighttime flight restrictions (e.g., 23:00–06:00) for non-essential flights.
 - Prohibit the operation of high-noise aircraft models at the airport during planning and licensing stages.
- **Aircraft and GSE:**
 - Encourage airlines to use quieter aircraft that comply with ICAO Chapter 14 noise standards.
 - Install noise barriers around ground support equipment (GSE) and loading/unloading zones.
 - Mandate hearing protection for workers in high-noise areas within the airport premises.
- **Soundproofing:**

- Install advanced soundproofing systems in terminal buildings and other airport facilities.
- Retrofit affected public structures (e.g., schools, clinics) with sound insulation where necessary.
- **Land-Use Planning:**
 - Implement comprehensive land-use planning around the airport to prevent the establishment of new noise-sensitive developments within high-noise zones.

Monitoring:

- **Parameters:** Noise levels (dB(A) Leq) for both daytime (6:00 am – 9:00 pm) and nighttime (9:00 pm – 6:00 am).
- **Locations:** At nearest sensitive receptors (e.g., residential areas, schools, health centers) and at 4-5 strategic locations around the project area.
- **Frequency:**
 - **Mobilization:** Weekly noise meter readings.
 - **Construction:** Weekly during construction.
 - **Operation:** Continuous noise monitoring, with quarterly reporting.
- **Methodology:** Noise meter readings and noise modeling using GIS tools (e.g., AEDT) to predict future noise contours.
- **Reporting:** Regular reporting to relevant authorities and internal management.

Responsibilities:

- **Implementation:** Construction Contractor (mobilization & construction), Ethiopian Airlines Group (operation).
- **Supervision/Monitoring:** Supervision Consultant, Bishoftu City EPA, Federal EPA, Oromia Regional EPA.

10.1.10. Soil and Groundwater Management Plans

This plan focuses on preventing soil erosion, compaction, and contamination, and protecting groundwater resources throughout the project lifecycle.

Objectives:

- To prevent soil erosion and sedimentation of water bodies.
- To minimize soil compaction in non-designated areas.
- To prevent contamination of soil and groundwater from hazardous materials and waste.
- To ensure proper management and reuse of excavated soil.
- To protect surface and groundwater quality in accordance with WHO and Ethiopian EPA standards.

Measures:

During Mobilization and Construction Phases:

- **Erosion and Sediment Control:**
 - Implement robust erosion and sediment control plans, including the use of silt fences, sediment traps, and immediate re-vegetation of disturbed areas.
 - Stabilize slopes and embankments immediately after grading to prevent soil erosion.
 - Implement stormwater runoff control management measures to prevent construction materials, soil, silt, or debris from entering existing drainage infrastructure and nearby water bodies.
- **Topsoil Management:**
 - Demarcate areas to be stripped clearly to ensure the contractor does not strip beyond the designated boundary.
 - Implement mechanisms for re-using topsoil cleared from construction areas for land restoration, particularly for abandoned quarry sites.
 - Promote reuse of clean and uncontaminated excavated soil as fill material for other project sections or for other construction and landscaping initiatives in the surrounding areas.

- **Spill Prevention and Response (Soil & Groundwater):**

- All drums, containers, or bags containing oil/fuel/lubricating materials and other hazardous chemicals shall be stored at special designated disposal sites on a sealed and/or bunded area in order to contain potential spillage.
- In case of spillage, the Contractor should immediately isolate the source of oil and grease spill and contain the spillage using absorbent materials (e.g., sandbags, sawdust, absorbent material).
- Prohibit vehicle washing and equipment maintenance near water bodies.
- Designate specific fuel stations and maintenance zones with impervious surfaces and spill containment.
- Develop and display emergency response work instructions for accidental oil and chemical spills.

- **Site Access and Compaction:**

- Use existing roads for machinery transport whenever possible.
- Avoid driving on farmland; construct clearly demarcated and adhered-to designated access roads to restrict soil compaction in the project area.
- Do not use open grounds, community properties, or public land for construction activities or parking without proper authorization.

- **Waste Disposal:**

- Manage excavated soil deemed unsuitable for reuse by transporting it to identified disposal sites (Site-1 for temporary holding, Site-2 for long-term backfilling of quarry pits with landscaping efforts).
- All waste containers shall be collected and disposed of at designated disposal sites in line with Ethiopian government waste management regulations.

During Operation Phase:

- **Hazardous Material Storage and Handling:**

- Establish dedicated, bunded storage areas for hazardous materials (e.g., fuels, chemicals, maintenance waste) with secondary containment systems to prevent spills.
- Partner with certified hazardous waste disposal firms for proper handling and disposal.

- Implement strict waste manifests and tracking for hazardous materials.
- Regular inspections of refueling processes should be conducted and documented to ensure adherence to safety standards.
- **Drainage and Wastewater Management:**
 - Install oil-water separators in drainage systems, particularly around fuel farms, maintenance areas, and aprons, to prevent contamination.
 - Install advanced wastewater treatment systems (e.g., MBR/RO) for all effluents from airport facilities, including hangars and maintenance areas.
 - Reuse treated wastewater for non-potable uses like landscaping and toilet flushing.
 - Monitor effluent quality from the wastewater treatment plant monthly to ensure compliance with discharge standards.
 - Incorporate implementation of surface water drainage infrastructure management plan in the design document.
- **Groundwater Recharge and Conservation:**
 - Conduct watershed management and soil water conservation practices in and around the project area.
 - Introduce the use of available precipitation (rain harvesting).
 - Practice artificial groundwater recharge mechanisms.
 - Limit pumping of water beyond the optimum well yield to prevent over-extraction.
- **Regular Monitoring:**
 - Frequent monitoring of garages, plane maintenance rooms, workshops, and parking areas to check for any leakage and compliance with design.

Monitoring:

- **Parameters:**
 - **Soil:** Soil characteristics, presence of hydrocarbons or other contaminants near fuel storage/maintenance areas.
 - **Surface Water:** Physicochemical and bacteriological parameters (e.g., nitrates, ammonia, phosphates, pH, turbidity, TDS, oil/grease) at upstream and downstream points of nearby rivers (Akaki/Gerbi and Dukem Rivers) and effluent quality from WWTP.

- **Groundwater:** Water quality (physicochemical parameters, fluoride, nitrate, etc.) and water levels in boreholes and wells.
- **Locations:** Soil samples from the new proposed airport area, water quality samples from upstream and downstream points of Akaki/Gerbi and Dukem Rivers, and borehole water samples.
- **Frequency:**
 - **Mobilization:** Water quality samples once during mobilization.
 - **Construction:** Water quality samples four times during construction. Soil tests as needed for spills.
 - **Operation:** Soil tests biannually near fuel storage/maintenance areas. Surface/groundwater quality biannually downstream and effluent quality from WWTP monthly.
- **Methodology:** Lab analysis of soil and water samples, field assessments, GIS mapping of water bodies and groundwater flow.
- **Reporting:** Regular reporting to relevant authorities and internal management.

Responsibilities:

- **Implementation:** Construction Contractor (mobilization & construction), Ethiopian Airlines Group (operation).
- **Supervision/Monitoring:** Supervision Consultant, Bishoftu City EPA, Oromia Water Bureau, Federal EPA, Oromia Regional EPA.

10.2. Environmental and Social Monitoring Plan

Environmental monitoring is an important component of environmental management as it provides the basis for rational management decisions regarding impact control. Monitoring will provide the information necessary for feedback into the environmental management process including feedback about the actual environmental and social impacts of a project and will assist in identifying where additional mitigation effort or where alteration to the adopted management approach may be required.

The environmental monitoring plan is developed to provide a basis for evaluating the efficiency of the proposed mitigation measures and for updating of the actions and impacts of baseline data. It also gives information for adoption of additional mitigation measures if the proposed measures are found insufficient. Thus, it avails information for management decisions taking in the different phases of the project.

Monitoring should be performed during all stages of the project (namely: mobilization, construction, and operation) to ensure that the impacts are no greater than predicted, and to verify the impact predictions. The monitoring program will indicate where changes to procedures or operations are required, to reduce impacts on the environment or local population.

The Monitoring methodology and its implementation consists of:

- identification of the relevant monitoring standards;
- identification of components to be monitored;
- identification of parameters to be used for monitoring;
- setting the monitoring frequency and responsibilities for monitoring; and
- visual observations and testing of environmental parameters.

Monitoring will also serve as a tool:

- to understand the environmental conditions of the project area;
- to check whether mitigation and benefit enhancement measures have been adopted, and are proving effective in practice;

- to provide a means to identify impacts which were subject to uncertainty at the time of preparation of the ESIA, or which were unforeseen, and to provide a basis for formulating appropriate additional impact mitigation measures;
- to provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future, similar projects; and
- to evaluate Ambient Environmental Standards for water, air, etc. quality is maintained.

Table 10-8: Environmental and Social Monitoring plan

Code	Safeguard Area/Key Impact	Risk	Specific, Measurable Indicator(s)	Monitoring Methodology	Frequency	Monitoring Party (Implementation)	Monitoring Party (Oversight/Reporting)	Estimated Direct Monitoring Cost (ETB)	Associated Management & Overhead Costs (ETB)	Contingency (15%) (ETB)	Total Cost per Indicator/Area (ETB)
AA	Mobilization Phase										
AA1	Land Acquisition & Displacement	Involuntary physical and economic displacement of households and loss of land	- Percentage of physically displaced households receiving replacement housing. - Number of households receiving monetary compensation at full replacement cost. - Total area of land acquired vs. compensation disbursed.	- Review of compensation records, land deeds, and official disbursement documents. RAP compliance audits & monthly reports, compensation logs - Field verification of replacement housing construction. - Sample surveys and interviews with project-affected households.	- Monthly record review. - Quarterly field verification & surveys.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Bishoftu city Administration, Supervision Consultant, EAG	1,500,000	150,000	247,500	1,897,500
AA2	Loss of Livelihoods	Significant disruption and loss of primary income sources	- Number of displaced households enrolled in livelihood restoration programs. - Percentage of vocational training participants placed in employment. - Verification of temporary cash assistance for 12 months.	- Review of program enrollment lists and training certificates. - Tracking of cash disbursement records. - Follow-up interviews with program participants.	- Monthly review of records. - Bi-annual follow-up with participants.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Bishoftu city Administration, Supervision Consultant, EAG	2,000,000	200,000	330,000	2,530,000
AA3	Cultural and Social Disruption	Loss of social cohesion, destruction of religious/cultural sites	Completion status of rerouting infrastructure to avoid cultural sites (Yes/No).	- Number of new religious institutions and cemeteries rebuilt in resettlement areas. - Documentation of community consultations on the design of resettlement areas. - Site verification using GPS and design plans. - Community consultation records and meeting minutes. - Photographic and video evidence of rebuilt structures.	- Pre-construction site audit. - Bi-monthly consultations.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Supervision Consultant	1,200,000	120,000	198,000	1,518,000

AA4	Impact on Social Infrastructure	Demolition and disruption of essential public services	• Number of temporary schools and health posts constructed.	• Percentage of displaced students and residents served by new facilities. • Status of rebuilding permanent social infrastructure. • Inventory and visual inspection of temporary facilities. • Review of school and health post enrollment/service records. • Inspection of reconstruction progress.	• Quarterly inspection of facilities. • Monthly review of records.	Resettlement & Rehabilitation Committee, Construction Contractor	Oromia Regional State, Bishoftu city Administration, Supervision Consultant	1,800,000	180,000	297,000	2,277,000
AA5	Deterioration of Ambient Air Quality	Increased dust and exhaust emissions	• PM10, PM2.5, NOx, SO2, CO levels at sensitive receptors ($\mu\text{g}/\text{m}^3$). • Number of water spraying applications logged per day vs. project requirements. • Percentage of stockpiles covered with tarpaulins.	• Handheld and fixed ambient air quality monitoring. • Review of contractor's daily activity logs. • Visual site inspections.	• Monthly at sensitive receptors.	Construction Contractors	Bishoftu city Admin. Environmental Protection Authority, Consultant	1,000,000	100,000	165,000	1,265,000
AA6	Increased Noise Levels	Elevated noise from construction machinery	• Weekly average and peak noise levels (dB) at nearest residential areas. • Number of noisy activities performed during restricted hours (23:00-06:00). • Compliance with PPE usage for workers in high-noise zones.	• Handheld noise level monitoring at designated points. • Site surveillance during off-hours. • Contractor safety audit and worker interviews.	• Weekly at sensitive receptors. • Monthly safety audits.	Construction contractor	Supervision consultant	800,000	80,000	132,000	1,012,000
AA7	Soil Compaction & Contamination	Compaction and pollution of soil	• Number of designated access roads constructed and utilized. • Number of soil compaction incidents on farmlands. • Number of verified fuel/oil spills.	• Site inspections and GPS tracking of machinery movements. • Review of incident reports and spill logs. • Periodic soil sampling and analysis.	• Bi-weekly site inspections. • As-needed for incidents. • Quarterly soil sampling.	Construction contractor	Supervision consultant	500,000	50,000	82,500	632,500
AA8	Surface Water Contamination	Pollution of surface water bodies	• Total Petroleum Hydrocarbons (TPH) and other pollutant levels (e.g., pH) in nearby water bodies. • Verification of designated fuel	• Number of unauthorized vehicle washing incidents near water bodies. • Water quality sampling and laboratory analysis. • Site inspections of fuel/maintenance zones.	• Monthly water quality sampling. • Bi-weekly site inspections.	Construction contractor	Supervision consultant	600,000	60,000	99,000	759,000

			stations and maintenance zones.	• Visual surveillance of water bodies							
AA9	Flora & Fauna Disturbance	Minor disturbance to local flora and fauna	• Location of storage/camp sites relative to vegetated areas. • Number of unnecessary trees removed. • Documentation of post-construction tree replanting.1	• Review of site plans and land clearing permits. • Site inspections and photographic documentation. • Tree inventory counts.	• Pre-construction audit. • Monthly site inspections.	Construction contractor	Supervision consultant	300,000	30,000	49,500	379,500
AA10	Occupational Health & Safety	Health and accident risks to workers and commuters	• Availability and proper use of PPE. • Number of workers who have received safety training. • Number of work zone isolation measures implemented.	• Site safety audits and worker interviews. • Review of training records and PPE distribution logs. • Inspection of safety signage and barriers.	• Weekly site audits. • Monthly training record reviews.	Construction contractor	Supervision consultant	500,000	50,000	82,500	632,500
AA11	Traffic Congestion	Increased traffic congestion and accident potential	• Implementation status of a Traffic Management Plan (TMP) (Yes/No). • Number of traffic-related incidents reported. • Observation of traffic flow and congestion at key junctions.	• Review of the TMP document. • Review of incident logs. • Visual observation and traffic counts.	• Pre-construction review. • Monthly review of logs. • Weekly site observation.	Construction contractor	Supervision consultant	350,000	35,000	57,750	442,750
AA12	Gender-Based Violence (GBV) Risks	Potential for GBV and sexual harassment	• Availability of separate sanitation facilities for women. • Awareness of anti-harassment code of conduct among female workers. • Number of GBV-related incidents reported via GRM.1	• Site inspections of facilities. • Worker surveys and confidential interviews. • Review of GRM logs.	• Monthly site inspections. • Quarterly worker surveys. • Continuous GRM monitoring.	Construction contractor	Supervision consultant	300,000	30,000	49,500	379,500
BB	Construction Phase										
BB1	Air Pollution	Significant fugitive dust emissions and exhaust	• Monthly average PM10 and PM2.5 concentrations (µg/m³).	• Monthly ambient air quality monitoring at 10 stations. • Review of contractor's daily logs and visual inspections.	• Monthly for fixed monitors. • Daily logs and inspections. • Quarterly vehicle inspections.	Contractor's EHS team	Bishoftu city Admin. Environmental Protection Authority, Supervision Consultant	3,000,000	300,000	495,000	3,795,000

			• Frequency of water spraying on unpaved roads and stockpiles. • Number of vehicle emissions tests passed by construction fleet.	• Regular vehicle inspections and maintenance records review.							
BB2	Noise Pollution	High noise levels from heavy construction equipment	• Monthly average and peak noise levels (dB) at 10 station. • Number of hours of noisy activities outside of 7 AM–6 PM. • Mandated PPE (earplugs) usage compliance for workers.	• Monthly noise level monitoring at perimeter. • Review of contractor's daily activity logs. • Site safety audits.	• Continuous with hourly reporting. • Daily log review. • Monthly audits.	Contractor's EHS team	Supervision Consultant	1,500,000	150,000	247,500	1,897,500
BB3	Solid Waste Generation	Generation of large volumes of solid waste	• Volume and type of waste generated (m³) per week. • Percentage of waste segregated into different bins (organic, recyclable, hazardous). • Number of off-site waste disposal receipts from licensed facilities.	• Waste audits and visual inspections of segregation bins. • Review of contractor's waste tracking and disposal manifests. • On-site storage inspections.	• Weekly waste audits. • Monthly manifest review.	Contractor's EHS team	Bishoftu city Admin. Environmental Protection Authority, Supervision Consultant	2,500,000	250,000	412,500	3,162,500
BB4	Land Use Modification	Increased surface runoff and flood potential	• Area of impervious surface vs. vegetated cover (ha). • Functional status of local drainage systems (Yes/No). • Number of localized flood events during the rainy season.1	• GIS and drone mapping of the project site. • Visual inspection of drainage channels and culverts. • Review of community and contractor incident reports.	• Quarterly aerial mapping. • Bi-weekly inspections. • As-needed during weather events.	Construction contractor	Supervision consultant	2,000,000	200,000	330,000	2,530,000
BB5	Soil Erosion & Compaction	Loss of topsoil, increased erosion, and soil compaction	• Area of demarcated stripped zones vs. area actually stripped (m²). • Number of verified spills of oil and grease contained. • Adherence to pre-defined access routes for heavy machinery.	• Site inspections using GPS. • Spill incident report review and verification. • Soil sampling and analysis to check for compaction.	• Bi-weekly site inspections. • As-needed for incidents. • Bi-annual soil sampling.	Construction contractor	Supervision consultant	1,500,000	150,000	247,500	1,897,500
BB6	Pollution of Water Bodies	Contamination of surface and	• Water quality parameters (e.g., pH,	• Water sampling and laboratory analysis.	• Monthly water sampling.	Construction contractor	Supervision consultant	2,500,000	250,000	412,500	3,162,500

		groundwater from inadequate handling/spillage	TSS, TPH) in Akaki-Gerbi and Dukem Rivers. • Number of emergency response drills conducted. • Number of incidents of construction materials entering drainage systems.	• Review of emergency drill reports. • Visual inspections during and after rain events.	• Quarterly drills. • Weekly site inspections.						
BB7	Vegetation and Flora Loss	Loss of vegetation and fragmentation of habitats	• Area of Acacia-Commiphora woodlands and other vegetation cleared (ha). • Number of trees replanted vs. number cleared. • Survival rate of replanted trees after one year. • Area of green belts established.	• Pre- and post-clearing site surveys and GIS mapping. • Tree counting and photographic evidence. • Survival rate assessments.	• Pre-construction survey. • Quarterly counts and surveys. • Annual survival assessment.	Contractor, EAG, Bishoftu city environmental protection offices	Supervision consultant, Bishoftu city environmental protection	1,500,000	150,000	247,500	1,897,500
BB8	Habitat and Fauna Disturbance	Habitat fragmentation and disturbance to wildlife	• Presence of natural corridors and avoidance of unnecessary clearing. • Number of reported wildlife encounters or incidents. • Efficacy of bird strike mitigation measures.	• Site inspections and wildlife surveys. • Review of incident reports. • Monitoring of vegetation preservation efforts.	• Monthly wildlife surveys. • Continuous incident reporting.	Construction contractor	Supervision consultant	2,000,000	200,000	330,000	2,530,000
BB9	Occupational Health & Safety	Physical injuries, chemical exposure, noise exposure, fatigue	• Number of OHS trainings conducted. • Availability of first aid kits, ambulance, and fire extinguishers. • Lost Time Incident Rate (LTIR) and Total Recordable Incident Rate (TRIR). • Periodic medical check-up records for all employees.	• Review of OHS Plan and training records. • Site safety audits and inspections of equipment. • Analysis of incident reports and medical check-up records.	• Weekly safety audits. • Continuous incident tracking. • Annual review of medical records.	Construction Contractor	Supervision consultant, EAG, Bishoftu City Health office	4,000,000	400,000	660,000	5,060,000

BB10	Traffic Congestion and Accident	Increased traffic accidents and congestion	• Implementation status of a Traffic Management Plan (TMP) (Yes/No). • Number of traffic accidents involving construction vehicles. • Availability of proper signs, barricades, and speed limits.	• Review of the TMP. • Review of police reports and incident logs. • Site inspections of traffic signs and speed limit compliance.	• Bi-weekly inspections. • Monthly review of logs.	Construction contractor	Supervision consultant, Oromia and Bishoftu city traffic offices	1,500,000	150,000	247,500	1,897,500
BB11	Conflict on Employment Opportunity	Potential for conflicts over employment opportunities	• Percentage of local people employed in the project. • Number of women hired vs. project targets. • Documentation of local authority involvement in labor recruitment.1	• Review of employment contracts and payroll data. • Interviews with local community leaders. • Review of labor recruitment records.	• Quarterly review of employment data. • Quarterly interviews.	Construction Contractor in cooperation with Bishoftu city labour offices	Supervision consultant, Bishoftu city labor office	500,000	50,000	82,500	632,500
BB12	Impacts on Vulnerable People	Disproportionate negative impacts on vulnerable groups	• Number of identified vulnerable groups receiving special support. • Documentation of assistance provided (e.g., job opportunities, fin • Number of grievances submitted by vulnerable groups via GRM.ancial aid).	• Review of support records and disbursement logs. • Interviews with representatives of vulnerable groups. • Review of GRM logs.	• Monthly record review. • Bi-annual interviews. • Continuous GRM monitoring.	Contractor in cooperation with Bishoftu city administration office	Consultant	600,000	60,000	99,000	759,000
BB13	Gender Equity and Sexual Harassment	Potential for gender inequality, sexual harassment, GBV	• Availability of a Workers Code of Conduct (CoC). • Number of CoC trainings conducted for all workers. • Number of female workers with access to separate sanitation facilities. • Number of sexual harassment cases reported and resolved.	• Review of CoC and training records. • Worker surveys and confidential interviews. • Site audits of facilities.	• Monthly CoC verification. • Quarterly worker surveys. • Continuous GRM monitoring.	Contractor	Consultant, Office of Women, Children and Youth Affairs	700,000	70,000	115,500	885,500

BB14	HIV/AIDS and other STI Spread	Increased risk of HIV/AIDS and other STIs	• Number of HIV/AIDS and STI awareness campaigns conducted. • Availability of subsidized or free condoms at construction camps. • Collaboration records with local health institutions and NGOs.	• Review of campaign schedules and attendance records. • Inspection of health facilities and condom supply logs. • Meeting minutes and joint work plans.	• Monthly campaign tracking. • Bi-weekly inspections.	Construction contractor via HIV/AIDS sub-consultant	Supervision consultant, Bishoftu City Administration	600,000	60,000	99,000	759,000
BB15	Cultural Conflict, Culture Dilution and Drug Abuse	Potential for cultural conflicts, drug/alcohol abuse	• Number of awareness sessions conducted on cultural sensitivity and drug/alcohol abuse. • Number of cases of drug/alcohol abuse reported or prosecuted. • Closure status of illegal drug businesses in the area.	• Review of training records. • Review of incident logs and court documents. • Collaboration records with local authorities.	• Bi-monthly training sessions. • Continuous incident tracking.	Contractor in cooperation with project woreda administration office	Consultant, Bishoftu city Administration	800,000	80,000	132,000	1,012,000
CC	Operation Phase										
CC1	Air Pollution	Emissions from aircraft, GSE, and vehicular traffic	• Daily average NOx, CO2, PM2.5, PM10 concentrations (kg/day) at airport boundaries. • Percentage of Ground Support Equipment (GSE) transitioned to electric/hybrid systems.1	• Average aircraft taxiing time per flight. • Continuous air quality monitoring at multiple stations. • Inventory and audit of GSE fleet. • Review of flight data logs.	• Continuous monitoring with daily data analysis. • Bi-annual fleet audit. • Monthly flight log review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	3,500,000	350,000	577,500	4,427,500
CC2	Noise Pollution	High noise levels from aircraft affecting communities ¹	• Average and peak noise levels (dB) at designated community monitoring points. • Number of noise-related community complaints per quarter.1	• Percentage of night-time flights by high-noise aircraft. • Continuous noise monitoring with fixed-site monitors. • Review of quarterly complaint logs from GRM. • Analysis of flight data logs.	• Continuous monitoring with quarterly reporting. • Quarterly review of complaint logs. • Monthly flight data analysis.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	2,500,000	250,000	412,500	3,162,500
CC3	Fire and Explosion Hazards	Risk of fire and explosion from fuel and hazardous materials	• Number of fire detection and suppression systems tested. • Number of emergency response	• Review of maintenance and testing records. • Observation of drills and drill reports. • Annual third-party safety audit.	• Monthly system checks. • Bi-annual drills. • Annual third-party audit.	Client (Airline Group)	Federal Fire and Emergency Preparedness Agency, Regulatory Authorities	2,000,000	200,000	330,000	2,530,000

			drills conducted per year. • Audits of fuel vapor control and static electricity control systems.								
CC4	Solid Waste Generation	Continuous generation of solid wastes	• Volume of municipal and in-flight waste generated (kg/passenger). • Percentage of waste segregated and recycled on-site. • Number of off-site disposal receipts from licensed firms.	• Waste audits and weighing of segregated waste streams. • Review of recycling plant operational logs. • Review of disposal manifests.	• Monthly waste audits. • Bi-monthly manifest review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection	3,500,000	350,000	577,500	4,427,500
CC5	Liquid Waste Generation	Discharge of wastewater and potential contamination	• Volume of wastewater generated (m³/day). • Effluent quality (e.g., BOD, COD, TPH, pH) from wastewater treatment plant. • Verification of reuse of treated water for landscaping.	• Flow meter readings and operational logs of the treatment plant. • Monthly effluent sampling and laboratory analysis. • Inspection of irrigation systems.	• Daily for flow meter readings. • Monthly for effluent sampling. • Quarterly inspections.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	4,000,000	400,000	660,000	5,060,000
CC6	Hazardous Materials	Exposure to toxic chemicals and contamination	• Number of spill incidents and their containment status. • Compliance with labeling and storage protocols for chemicals.	• Number of staff trained in hazardous material handling. • Review of incident reports and spill logs. • Regular inspections and audits of storage facilities • Review of training records.	• Continuous incident tracking. • Monthly audits. • Quarterly training review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC7	Traffic Congestion	Increased vehicular traffic on road networks	• Implementation status of Traffic Management Plan (TMP). • Traffic flow rates and congestion levels at key access points. • Number of passenger journeys by public vs. private transport.	• Review of the TMP. • Traffic counts and flow analysis. • Surveys of employees and passengers.	• Bi-annual TMP review. • Quarterly traffic surveys.	Client (Airline Group)	Ethiopian Roads Authority, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC8	Community Health and Safety	Air pollution, noise disturbance, bird strikes, public safety	• Number of noise and air pollution-related community health complaints.	• Review of GRM logs. • Bird strike data analysis. • Regular site inspections of perimeter.	• Quarterly GRM log review. • Monthly data analysis.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	3,000,000	300,000	495,000	3,795,000

			• Number of reported bird strikes per 10,000 movements. • Integrity of airport perimeter fencing and surveillance.		• Weekly inspections.						
CC9	Occupational Health & Safety	Continuous physical, chemical, and ergonomic risks for staff	• Lost Time Incident Rate (LTIR) for airport staff. • Compliance with PPE usage and OHS procedures. • Number of OHS trainings and health check-ups conducted.1	• Analysis of incident reports. • Regular OHS audits. • Review of training and health record logs.	• Monthly incident review. • Quarterly audits. • Annual record review.	Client (Airline Group)	Federal Health office, Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	2,500,000	250,000	412,500	3,162,500
CC10	Soil contamination	Soil contamination from spills and leaks	• Number of verified spills in maintenance areas and workshops. • Integrity and functionality of spill containment measures (e.g., sealed floors, drip trays).	• Regular soil sampling and analysis for TPH. • Review of incident logs. • Regular inspections and audits of maintenance areas. • Bi-annual soil sampling.	• Continuous incident tracking. • Monthly inspections. • Bi-annual sampling.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	1,000,000	100,000	165,000	1,265,000
CC11	Contamination of water bodies	Improper storage/disposal of hazardous materials	• Water quality parameters (e.g., pH, TSS, TPH) in surface and groundwater. • Compliance with storage protocols for hazardous chemicals. • Implementation of surface water drainage infrastructure plan.	• Monthly water sampling and laboratory analysis. • Regular audits of hazardous material storage areas. • Review of drainage management plan.	• Monthly sampling. • Bi-monthly audits.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Bishoftu city Administration	2,000,000	200,000	330,000	2,530,000
CC12	Increased water demand	Strain on local water resources	• Volume of water consumed (m³/day) from various sources. • Volume of rainwater harvested and reused. • Status of watershed management and groundwater recharge practices.	• Water meter readings and operational logs. • Review of rain harvesting and recharge project reports. • Site inspections.	• Daily for meter readings. • Quarterly report review. • Bi-annual inspections.	Client (Airline Group)	Federal EPA, Oromia Bureau of Water Resource, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC13	Vegetation and flora	Continued impact on vegetation from operations	• Health and growth of vegetation around the airport.	• Regular ecological surveys and visual assessments. • Monitoring of invasive species spread.	• Bi-annual ecological surveys. • Monthly inspections.	Client (Airline Group), Biodiversity Institute	Ethiopian Biodiversity Institute, Bishoftu city Administration	800,000	80,000	132,000	1,012,000

			• Presence of invasive plant species. • Maintenance of green spaces and wildlife corridors.	• Review of landscape maintenance records.							
CC14	Habitat and Fauna	Habitat fragmentation and disturbance to wildlife	• Population and behavior of key wildlife species (e.g., hyenas, rabbits, monkeys). • Integrity of wildlife corridors. • Number of animals rescued or injured due to airport activities.	• Bi-annual wildlife population surveys. • Site inspections and drone footage of corridors. • Review of wildlife rescue program reports.	• Bi-annual surveys. • Quarterly corridor inspections.	Client (Airline Group), Biodiversity Institute	Ethiopian Biodiversity Institute, Bishoftu city Administration	1,200,000	120,000	198,000	1,518,000
CC15	Migratory birds	Risk of bird strikes from migratory birds	• Bird strike incident rate per 10,000 aircraft movements. • Presence of bird attractants (e.g., standing water, waste) on the airfield. • Effectiveness of visual and acoustic deterrents.	• Review of bird strike reports. • Regular airfield inspections. • Efficacy audits of deterrent systems.	• Continuous tracking. • Daily airfield inspections. • Quarterly audits.	Client (Airline Group), Biodiversity Institute	Ethiopian Biodiversity Institute, Ethiopian Wildlife Conservation Authority, Bishoftu city Administration	1,500,000	150,000	247,500	1,897,500
CC16	Urban Heat Island Effect (C16)	Increased local temperatures and operational costs ¹	• Percentage of airport area dedicated to green spaces. • Surface temperatures of roofing and paving materials (C). • Energy consumption vs. ambient temperature.	• GIS analysis of land use and green cover. • Regular thermal imaging surveys. • Review of energy consumption and weather data.	• Annual GIS analysis. • Quarterly thermal surveys. • Monthly data analysis.	Client (Airline Group)	Federal Environmental Protection Authority, Bishoftu city Administration	1,000,000	100,000	165,000	1,265,000
CC17	Flooding	Erosion, pollution, and strain on drainage systems	• Functionality of stormwater management systems (e.g., drains, culverts). • Number of flood incidents on airport property. • Regularity of inspection and maintenance of drainage infrastructure.	• Visual inspections of drainage infrastructure. • Review of incident logs. • Review of maintenance records.	• Weekly inspections, especially during rainy seasons. • Continuous incident tracking. • Monthly record review.	Client (Airline Group)	Federal EPA, Oromia Regional Bureau of Environment Protection, Oromia Regional Bureau of Water Resource, Bishoftu city Administration	2,000,000	200,000	330,000	2,530,000

CC18	Unplanned Urbanization	Uncontrolled urban sprawl around the airport	• Adherence to the Airport City masterplan and zoning laws. • Rate of urban growth in the airport vicinity (ha/year). • Implementation of public transit expansion.	• Review of zoning maps and planning documents. • Satellite imagery analysis and field verification. • Review of public transit project reports.	• Quarterly review of urban development. • Bi-annual satellite imagery analysis.	Client (Airline Group), Oromia Planning Institute, Urban Development & Housing Agency	Ministry of Urban Development, Oromia Planning Institute, Bishoftu City Administration	2,000,000	200,000	330,000	2,530,000
Total											92,408,250 ETB

10.3. Institutions Responsible for the Implementation of ESMP

The main responsible body for the implementation of the Environmental and Social Management Plan (ESMP) for the Bishoftu International Airport project is the Ethiopian Airlines Group (EAG) through its Sustainability unit. EAG should ensure that the tender preparation consultant incorporates the proposed mitigation measures in the tender documents and that the construction contractual agreement includes clauses to enforce environmental and social compliance.

During the construction phase, environmental management activities are primarily the responsibility of the contractor and the construction supervision consultant. The actual implementation of mitigation measures occurs at this stage.

For socio-economic issues such as compensation for damaged properties or affected land, a committee comprising representatives from EAG, Oromia Regional state, Bishoftu City Administration, local administrative bodies, and affected communities should be established to oversee fair resolution.

During the operation phase, EAG will manage environmental and social issues, requiring staff to acquire basic knowledge of environmental management. Capacity building is essential, including strengthening environmental monitoring labs and recruiting additional specialists (e.g., environmentalists, sociologists, occupational health and safety officers, and gender experts) through short- and medium-term training programs.

Other stakeholders include the Oromia Regional Administration, Bishoftu City Administration, Ethiopian Environmental Protection Authority (EPA), Ministry of Transport, Ethiopian Electric Utility (EEU), Ethio-telecom, Ethiopian Roads Authority, contractors, consultants, and financiers.

Table 10-9: Institutions Responsible for the Implementation of ESMP

Stakeholders	Roles and Responsibilities	Capacity Assessment & Enhancement Needs (Technical & Financial)
Internal Stakeholders		
Ethiopian Airlines Group (EAG)	- Responsible for overall project implementation. - Ensures ESMP compliance in tender and contract documents. - Strengthens environmental and social monitoring capacity. - Establishes a technical advisory committee. - Allocates budget for the project construction and operation.	Existing Capacity: High-level policy commitment to environmental protection and continuous improvement.⁶ Foundational ESIA and M&E unit. Enhancement Needs: Significant. Establish a dedicated, adequately staffed ESMP Implementation Unit with full-time Environmental, Social, OHS, and Gender Specialists. Requires substantial, dedicated financial allocation for these roles and their operational budgets (estimated 50,000-150,000+ ETB/month per specialist). Strengthen internal environmental monitoring labs and equipment. Develop clear internal reporting lines to senior management

Oromia Regional Administration	- Allocates budget for RAP and monitors utilization. - Coordinates with local administrations for project implementation. - Oversees resettlement and compensation processes.	Existing Capacity: Mandate for regional oversight and coordination for RAP. Enhancement Needs: Moderate to Significant. Requires enhanced technical capacity in social safeguards, particularly for complex resettlement and compensation processes. Needs dedicated financial resources for staffing and operational costs related to RAP oversight and community engagement. Formalize coordination mechanisms with EAG and Bishoftu City Administration.
Bishoftu City Administration	- Monitors project implementation within city boundaries. - Coordinates with local stakeholders for smooth execution. - Oversees resettlement and compensation processes.	Existing Capacity: Local administrative presence and coordination role. Enhancement Needs: Moderate to Significant. Requires enhanced technical capacity in social safeguards (e.g., land acquisition, grievance management at local level). Needs dedicated financial resources for

		staffing, community liaison officers, and logistical support for local consultations. Formalize coordination mechanisms with EAG and Oromia Regional Administration.
Ethiopian Environmental Protection Authority (EPA)	- Provides technical guidance on environmental compliance. - Conducts intermittent audits and monitoring.	Existing Capacity: Regulatory mandate and technical guidance role. Enhancement Needs: Moderate. Requires additional financial resources for increasing frequency and depth of audits and monitoring activities. Needs capacity building for staff on large-scale airport project-specific environmental impacts and international safeguard standards. May require additional technical staff or external expert support for specialized assessments.
Ministry of Transport	- Ensures alignment with national aviation policies. - Monitors impacts on transportation infrastructure.	Existing Capacity: Policy oversight and infrastructure monitoring. Enhancement Needs: Minor

		to Moderate. Requires capacity building for staff on environmental and social impacts specific to aviation infrastructure development and operation, and their integration with national policies. Needs clear protocols for information sharing with EAG ESMP Unit.
Ethiopian Electric Utility (EEU)	- Supplies power for airport operations. - Coordinates to avoid conflicts with electrical infrastructure during construction.	Existing Capacity: Operational capacity for power supply. Enhancement Needs: Minor. Requires enhanced coordination protocols and training for relevant staff on ESMP requirements related to utility infrastructure protection during construction and operation, particularly regarding safety and environmental impacts of power lines.
Ethio-telecom	- Supplies telecom network for airport operations. - Ensures telecom infrastructure is unaffected by	Existing Capacity: Operational capacity for telecom supply. Enhancement Needs: Minor.

	construction. - Participates in technical advisory committees.	Requires enhanced coordination protocols and training for relevant staff on ESMP requirements related to telecom infrastructure protection during construction and operation.
Ethiopian Roads Authority	- Reinstates roads affected by construction. - Advises on integrating road and airport infrastructure.	Existing Capacity: Expertise in road infrastructure and reinstatement. Enhancement Needs: Minor. Requires enhanced coordination protocols and training for relevant staff on ESMP requirements related to road construction, traffic management, and environmental/social impacts during road reinstatement.
External Stakeholders		
Contractors	- Prepares and implements Construction-ESMP (C-ESMP). - Mobilizes environmental, social, and safety experts on-site.	Existing Capacity: Expected to mobilize ESHS experts. Enhancement Needs: Significant. Contractually require dedicated, qualified ESHS Manager and team with sufficient funds and manpower for ESMP implementation.⁵ Mandate

		specific training on project ESMP, OHS, GBV/SEA/SH, and GRM protocols. Ensure explicit budget lines for ESMP implementation in tender documents.
Consultants	- Monitors compliance with ESIA and ESMP. - Advises contractors on mitigation measures.	Existing Capacity: Role in monitoring and advising. Enhancement Needs: Moderate. Ensure PMC/Supervision Engineer team includes dedicated, qualified ESHS specialists. Provide adequate financial resources to ensure consistent and effective supervision and guidance. Capacity building on specific ESMP monitoring tools and reporting requirements.
Affected Communities & NGOs	- Participate in grievance redress mechanisms. - Provide feedback on social and environmental impacts.	Existing Capacity: Willingness to participate and provide feedback. Enhancement Needs: Moderate. Requires proactive support for effective engagement, including accessible information in local languages, facilitated

		meeting arrangements (transportation, childcare), and training on their rights and GRM processes. Capacity building to effectively monitor project impacts and articulate concerns.
--	--	---

10.3.1. Existing Institutional Capacity for ESMP Implementation

Ethiopian Airlines Group (EAG)

Existing Capacity: EAG is designated as the primary responsible body, operating through its sustainability unit. EAG's environmental policy underscores its commitment to environmental protection, compliance with national and international laws, risk reduction, sustainable resource management, and continuous improvement through training and stakeholder engagement. This demonstrates a high-level organizational commitment and a foundational policy framework.

Identified Gaps: Despite the policy commitment, there is insufficient consideration of resource requirements and organizational structures. This indicates that while the intent exists, the practical operationalization of ESMP responsibilities may be constrained. Specifically, there appears to be a need for a dedicated, adequately staffed ESMP Implementation Unit within EAG, with clearly defined mandates, sufficient authority, and direct reporting lines to senior management.

Contractors

Existing Capacity: Contractors are assigned primary responsibility for implementing mitigation measures during the construction phase and preparing/implementing Construction ESMPs (C-ESMPs). They are expected to mobilize environmental, social, and safety experts on-site.

Identified Gaps: A critical gap often observed in large projects is ensuring contractors possess "sufficient funds and manpower" to effectively implement ESMP mitigation and monitoring schemes. Financiers often need to explicitly require contractors to strengthen their ESMP implementation capabilities, especially if initial assessments reveal deficiencies. The need for a "suitably qualified and experienced safeguard specialist" for regular site inspections and support is paramount, indicating that simply stating "mobilizes experts" is insufficient without specifying qualifications and dedicated roles.

Construction Supervision Consultant

Existing Capacity: The supervision consultant's role is to monitor compliance with the ESIA and ESMP and advise contractors on mitigation measures. The Supervision Engineer is responsible for ensuring that a qualified safeguard specialist is available for site inspections and support.

Identified Gaps: While responsible for monitoring, their capacity to effectively supervise ESMP implementation is directly tied to their own technical and financial resources. They must have adequate financial provisions to ensure consistent and effective supervision and guidance to contractors. Furthermore, their capacity to review and approve C-ESMPs and manage non-compliance instances requires robust internal expertise and clear protocols.

Government Agencies (Oromia Regional Administration, Bishoftu City Administration, Ethiopian Environmental Protection Authority (EPA), Ministry of Transport, Ethiopian Electric Utility (EEU), Ethio-telecom, Ethiopian Roads Authority)

Existing Capacity: These agencies hold crucial roles in overall project oversight, coordination, technical guidance, and the provision of specific infrastructure or regulatory functions. The Ethiopian EPA, for instance, provides technical guidance and conducts intermittent audits.

Identified Gaps: Capacity for frequent and in-depth audits might be limited, and local administrations' capacity for managing complex socio-economic issues like resettlement and compensation needs explicit evaluation and potential strengthening. Inter-agency coordination mechanisms, require formalization and resourcing to ensure seamless ESMP integration.

Affected Communities & NGOs

Existing Capacity: These stakeholders are involved in grievance redress mechanisms and provide feedback on social and environmental impacts.

Identified Gaps: While their participation is crucial, their capacity for effective engagement often requires support. This includes ensuring access to project information in understandable formats and local languages, facilitating appropriate meeting arrangements (e.g., transportation, childcare), and providing training on their rights and avenues for participation. Their capacity to effectively monitor project impacts and articulate concerns needs to be proactively built.

10.3.2. Identification of Technical and Financial Resource Requirements for Key ESMP Roles

Effective ESMP implementation necessitates dedicated, qualified personnel in key roles. This section outlines the essential technical qualifications and provides realistic financial resource estimates (salaries) for these specialists.

Environmentalists/Environmental Safeguard Specialists

- **Technical Qualifications:** Requires a strong background in environmental science, engineering, or a related field, with demonstrated expertise in environmental impact assessment and management. Essential experience includes working on large-scale infrastructure projects, particularly those adhering to international safeguard standards such as AfDB and IFC Performance Standards (PS). Proficiency in developing, reviewing, and overseeing the implementation of ESMPs, environmental monitoring plans, and Construction ESMPs (C-ESMPs) is critical. Strong analytical, problem-solving, communication, and team-working skills are also necessary to effectively liaise with diverse stakeholders.
- **Financial Resources:** 50,000 ETB to 150,000+ ETB per month, depending on experience, qualifications, and specific responsibilities.

Sociologists/Social Safeguard Specialists

- **Technical Qualifications:** A Master's degree in a relevant social science field (e.g., sociology, social development, social anthropology) is preferred. A minimum of 5 years of experience in social development, with demonstrated experience in large-scale, partner-funded infrastructure projects, is essential. Key expertise includes participation in the

development and management of ES management tools such as Environmental and Social Impact Assessments (ESIAs), ESMPs, Resettlement Action Plans (RAPs), and Construction ESMPs. Knowledge of Ethiopian legal processes related to gender-based violence (GBV), land acquisition, and population displacement is crucial. Prior experience with World Bank-funded activities and their ES standards is a significant advantage. Excellent interpersonal and communication skills are paramount for effective community engagement.

- **Financial Resources:** For a dedicated social safeguard specialist on a project of this magnitude, a salary in the range of 60,000 ETB to 150,000+ ETB per month would be appropriate, reflecting the specialized skills and critical nature of the role.

Occupational Health and Safety (OHS) Officers

- **Technical Qualifications:** A Bachelor's or Master's degree in Occupational Health & Safety, Environmental Health & Safety Science, or a related field is required. Essential duties include monitoring ETP operations, hazardous waste management, conducting daily safety inspections, recommending control measures, and monitoring handling and storage of hazardous chemicals. Experience in implementing ESMPs and other social/environmental assessments related to infrastructure projects is highly desirable. Knowledge of international HSSE standards and civil engineering principles is also valuable.
- **Financial Resources:** Given the scale and complexity of an airport project, a dedicated and experienced OHS Officer would likely earn in the range of 20,000 ETB to 60,000 ETB per month, reflecting the higher risks and responsibilities.

Gender Experts

- **Technical Qualifications:** Strong understanding of gender dynamics, particularly in pastoralist and agro-pastoralist settings, and familiarity with the gender and conflict nexus in Ethiopia. Experience working with marginalized and vulnerable groups, focusing on women's social, economic, and political empowerment. Proven ability to draft strategy documents, conduct assessments, and write proposals and reports. At least 6 years of professional experience in gender mainstreaming, gender equality, and women's empowerment, preferably in international development.
- **Financial Resources:** For a dedicated gender expert on a large infrastructure project, a salary

within this higher range would be appropriate, reflecting the specialized expertise and strategic importance.

10.3.3. 3. Detailed Capacity Building Plan

This section outlines a comprehensive capacity building plan designed to address identified gaps, specifying strategic objectives, targeted training programs, resource allocation, and an implementation schedule.

Strategic Objectives of the Capacity Building Program

The overarching goal of the capacity building program is to empower all project stakeholders with the necessary knowledge, skills, and resources to effectively implement, monitor, and report on the ESMP throughout the Bishoftu International Airport project lifecycle. Specific objectives include:

- **Enhance Implementation Effectiveness:** To significantly improve the ability of all implementing entities (EAG personnel, contractors, consultants, and relevant government agencies) to execute ESMP measures and manage environmental and social risks effectively.
- **Ensure Compliance:** To guarantee adherence to all applicable national environmental and social regulations and international safeguard standards, including the IFC Performance Standards and World Bank guidelines.
- **Foster a Culture of Responsibility:** To cultivate a project-wide culture of proactive environmental and social responsibility, promoting ethical conduct and sustainable practices among all project participants.
- **Promote Continuous Improvement:** To establish mechanisms for ongoing learning and adaptation, enabling the project to continually improve its ESMP performance and respond effectively to emerging challenges.
- **Strengthen Stakeholder Engagement:** To enhance the capacity for meaningful engagement with affected communities and other stakeholders, ensuring their participation and feedback are integrated into project decision-making.

Specific Training Programs

The training programs will be multi-tiered and tailored to the specific roles, responsibilities, and existing knowledge levels of different stakeholder groups, ensuring relevance and maximum impact. The training is designed to address both technical competencies and behavioral aspects, recognizing that effective ESMP implementation relies as much on ethical conduct and social awareness as it does on technical expertise. By integrating modules on ethics, social responsibility, and specific social risks, the project can proactively mitigate potential negative social impacts that often arise from human behavior, thereby reducing overall project risk and enhancing its social performance.

10.3.4. Enhanced Organizational Structures, Reporting Lines, and Accountability Mechanisms

This section details the proposed enhancements to the organizational structure for ESMP implementation, establishing clear reporting lines and robust accountability mechanisms to ensure effective governance and oversight throughout the project lifecycle.

Organizational Structure for ESMP Implementation

The organizational structure will ensure clear roles, responsibilities, and lines of authority for ESMP implementation across all project phases (design, construction, operation). It will integrate seamlessly with the existing Ethiopian Airlines Group structure while establishing dedicated ESMP functions to enhance effectiveness.

- Ethiopian Airlines Group (EAG) - Project Owner & Implementing Agency:
 - Group Chief Executive Officer (GCEO): Holds ultimate accountability for the overall effectiveness and compliance of the ESMP. The GCEO's explicit commitment and leadership are essential for driving environmental and social performance.
 - Dedicated ESMP Implementation Unit/Office: This unit will be established as the central coordinating body for all ESMP activities, reporting directly to a high-level executive (e.g., Chief Operating Officer or GCEO).
 - Composition: The unit will be staffed with a dedicated Environmental and Social Safeguards Manager, supported by full-time Environmental Specialists, Social

Specialists, Occupational Health and Safety (OHS) Officers, and Gender Experts.

- Core Functions: This unit will be responsible for overall ESMP management, supervision, and execution; ensuring ESMP aspects are integrated into project planning, tender documents, and construction contracts; overseeing capacity building and training programs; managing the project's Grievance Redress Mechanism (GRM); and coordinating with all internal and external stakeholders. This directly addresses the reviewer's call for "clear organizational structures."
- Project Management Consultant (PMC) / Construction Supervision Consultant:
 - The PMC will be contracted to oversee the design and reconstruction works, acting as the 'Engineer' for contract administration.
 - Dedicated ESHS Specialists: The PMC will be required to deploy dedicated Environmental, Social, Health, and Safety (ESHS) specialists within their team. These specialists will be responsible for monitoring the Contractor's compliance with ESMP requirements, providing technical guidance, and ensuring that mitigation measures are effectively implemented.
 - Review and Approval: They will review and approve contractor-prepared ESMP documents (C-ESMPs) and site-specific management plans.
- Contractors:
 - Primary Implementers: Contractors bear the primary responsibility for the on-site implementation of mitigation measures and site-specific Construction ESMPs (C-ESMPs).
 - Dedicated ESHS Manager and Team: Each main contractor will be contractually required to appoint a qualified and experienced ESHS Manager and supporting team on-site, ensuring sufficient funds and manpower are allocated for ESMP implementation.
 - GRM Operation: Contractors will be responsible for the initial operation of the grievance mechanism during the construction stage, ensuring accessibility for workers and local communities.
- Government Agencies (Oromia Regional Administration, Bishoftu City Administration, Ethiopian Environmental Protection Authority (EPA), Ministry of Transport, Ethiopian

Electric Utility (EEU), Ethio-telecom, Ethiopian Roads Authority):

- These agencies will continue to fulfill their regulatory, oversight, and coordination roles as outlined in the original ESMP.
- They will engage directly with the EAG ESMP Implementation Unit for technical guidance, intermittent audits, and monitoring.
- A formalized multi-stakeholder committee, as proposed in the original ESMP for socio-economic issues, will be established with clear mandates, regular meeting schedules, and defined reporting lines to facilitate inter-agency coordination and decision-making.
- Affected Communities & Non-Governmental Organizations (NGOs):
 - Formalized channels for participation in grievance redress mechanisms and providing feedback on social and environmental impacts will be maintained and strengthened. Their involvement in monitoring the effectiveness of mitigation measures will be encouraged.

Clear Reporting Lines and Communication Protocols

Establishing clear and efficient reporting lines and communication protocols is vital for effective ESMP oversight, timely information dissemination, and adaptive management.

- Upward Reporting:
 - Contractor to Supervision Consultant: The Contractor's ESHS Manager will submit regular (e.g., monthly) ESMP implementation reports to the Contractor's Project Manager and the PMC/Supervision Engineer.
 - Supervision Consultant to EAG ESMP Unit: The PMC/Supervision Engineer's ESHS Specialist will provide regular (e.g., monthly) monitoring reports, including compliance status, incident reports, and recommendations, to the EAG ESMP Implementation Unit.
 - EAG ESMP Unit to Senior Management and Financiers: The EAG ESMP Unit will prepare comprehensive monthly and annual progress reports on ESMP implementation for submission to EAG's senior management (e.g., COO/GCEO) and directly to project financiers (e.g., AfDB, IFC).
 - EAG to Government Agencies: The EAG ESMP Unit will provide regular updates and reports to relevant government agencies (e.g., Ethiopian EPA) as required for regulatory oversight and compliance.

- **Internal EAG Reporting:** The ESMP Implementation Unit will report regularly to EAG's senior management and relevant internal departments (e.g., Finance, Procurement, Engineering, Operations) to ensure that environmental and social considerations are mainstreamed across all business functions.
- **External Communication and Stakeholder Engagement:**
 - **Public Disclosure:** Regular disclosure of ESMP progress, environmental and social monitoring results, and grievance redress outcomes to affected communities and relevant NGOs through accessible channels (e.g., public meetings, community notice boards, project website).
 - **Formal Consultations:** Maintenance of formalized and inclusive consultation processes with all stakeholders, ensuring their feedback is systematically captured and addressed.
- **Incident Reporting:** Clear and rapid protocols will be established for immediate notification and detailed reporting of all environmental and social incidents (e.g., spills, accidents, social conflicts) to relevant internal and external stakeholders. This includes conducting root cause analyses and developing corrective and preventative actions within specified timeframes.

Accountability Framework and Performance Monitoring Mechanisms

A robust accountability framework is essential to ensure that ESMP commitments are met and that performance is continuously improved. This framework also integrates adaptive management, recognizing that accountability encompasses demonstrating responsiveness, flexibility, and a commitment to continuous improvement as new risks emerge or mitigation measures prove ineffective.

- **Contractual Obligations and Enforcement:**
 - All ESMP requirements, including specific mitigation measures, monitoring activities, and capacity building provisions, will be legally binding contractual obligations for contractors and consultants.
 - Contractual agreements will include clear clauses for non-compliance, specifying penalties (e.g., withholding payments, fines) and corrective action requirements. This transforms the ESMP from a set of guidelines into a legally enforceable framework, making non-compliance a direct financial and contractual liability for implementing

parties.

- Financiers will set out ESMP requirements in project financing agreements and require periodic monitoring reports.

- **Performance Indicators and Monitoring:**

- Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) performance indicators will be developed for all key aspects of ESMP implementation. These indicators will cover:
 - Rates of implementation for specific mitigation measures.
 - Effectiveness of mitigation measures in reducing impacts.
 - Completion rates and effectiveness assessments of training programs.
 - Number and type of grievances received, resolution rates, and stakeholder satisfaction levels.
 - Compliance rates with national environmental standards and international safeguard requirements.
 - Resource utilization efficiency.
- Regular internal monitoring will be conducted by the EAG ESMP Unit and the PMC/Supervision Engineer.
- Intermittent audits will be conducted by the Ethiopian EPA.
- Consideration will be given to engaging independent third-party monitoring or external audits, particularly for high-risk environmental and social aspects, to ensure objectivity and credibility.
- Monitoring findings will be systematically analyzed to inform adaptive management decisions and necessary updates to the ESMP.
- **Financial Accountability:** Dedicated budget allocations for ESMP implementation and capacity building will be meticulously tracked, reported, and audited to ensure efficient and transparent use of funds.
- **Grievance Redress Mechanism (GRM):** A robust, accessible, and transparent GRM will be maintained throughout the project lifecycle. It will ensure that complaints and concerns from affected communities and workers are received, addressed, and resolved promptly, fairly, and

transparently. Regular reporting on GRM performance will be a key accountability measure.

- **Leadership Accountability:** The ultimate accountability for the overall effectiveness of the ESMP rests with the senior leadership of the Ethiopian Airlines Group. This leadership commitment ensures that adequate resources are provided and that ESMP implementation is prioritized as a core business function.

10.4. Environmental Audit

To ensure that the proposed environmental and social mitigation measures are effectively implemented as per the Environmental and Social Impact Assessment (ESIA), ESMP, and monitoring arrangements, periodic auditing by internal and external entities will be conducted.

1. Internal Auditing

The Ethiopian Airlines Group will lead internal audits in collaboration with its Environmental and Social Unit and Airport Operations Management. The primary objectives of internal auditing are:

- Ensure compliance with the approved ESMP and identify gaps in implementation.
- Evaluate progress against planned timelines and budgets.
- Verify mitigation measures are applied as per ESIA and ESMP.
- Monitor compensation for affected persons (timely and full payment).
- Assess grievance redress mechanisms and community concerns.

Specific Objectives of Internal Auditing:

- Check ESMP implementation against schedules and budgets.
- Verify mitigation measures for environmental and social impacts.
- Identify unforeseen impacts and propose corrective actions.
- Ensure fair compensation for project-affected persons (PAPs).
- Evaluate grievance mechanisms and community feedback.

Internal audits should be integrated into regular project monitoring to ensure continuous compliance and improvement.

2. External Auditing

EAG should engage independent auditors to conduct annual environmental and social performance reviews, covering:

- Air pollution & GHG emissions (aviation & construction-related).
- Water pollution (surface & groundwater impacts).
- Waste management (solid & hazardous waste disposal).
- Soil contamination (fuel spills, construction materials).
- Handling of hazardous materials (aviation fuel, chemicals).
- Occupational health & safety (worker protections).
- Gender & social inclusion (employment equity, GBV risks).
- Community impacts (noise, resettlement, livelihood restoration).

External audits should be participatory, involving:

- Oromia EPA & Federal EPA (regulatory oversight).
- Bishoftu City Administration (local governance).
- Kebele & Woreda representatives (community liaison).
- Affected communities & PAPs (feedback on grievances).

3. Reporting & Compliance

- Audit findings must be shared with regulatory bodies (Federal EPA, Oromia EPA, Ministry of Transport) and Financiers.
- Corrective actions should be tracked and documented.
- Public disclosure of key findings (where applicable) to ensure transparency.

Table 10-10: Key Auditing Responsibilities

Audit Type	Responsible Entity	Key Focus Areas
Internal Audits	EAG Environmental Unit	Compliance, mitigation, compensation, grievances
External Audits	Independent Auditors + EPA	Air/water/soil pollution, waste, gender, community impacts
Stakeholder Reviews	Oromia EPA, Bishoftu City, Kebele Adm.	Local concerns, regulatory compliance

4. Cost for Environmental Auditing

The following table breaks down the anticipated annual costs, differentiating between internal operational expenditures for ongoing monitoring and the project-specific expenses associated with engaging independent external auditors, encompassing professional fees, travel, laboratory analyses, and necessary stakeholder engagement

Table 10-11: Financial estimation for the comprehensive environmental auditing

Audit Type	Cost Component	Annual Estimate (ETB)
Internal Auditing	Personnel Costs	1,000,000
	Training & Resources	100,000
External Auditing	Consultant Fees	3,745,980
	Travel and Logistics	693,700
	Laboratory Analysis	416,220
	Stakeholder Consultation Expenses	277,480
Total Annual Estimated Cost		6,233,380

10.5. Training Need and Capacity Building

Capacity building is essential to properly implement the proposed environmental and social management and monitoring plans. The main implementer of the environmental management plan of the Bishoftu International Airport project is EAG. In this regard, it is necessary to upgrade the capacity of relevant staffs of EAG, particularly staffs of technical department who directly involve on environmental protection and safety management. This type of training could be planned by EAG. Training could be short term (on job training) or long term arranged in country or abroad depending on the available budget in EAG.

Long-term training initiatives could focus on implementing sustainable practices that minimize the environmental impact of airport operations. These programs should emphasize noise pollution control strategies to reduce disturbances to surrounding communities while ensuring compliance with regulatory standards. Additionally, training could cover air quality and emissions monitoring to mitigate the effects of aviation-related pollutants, as well as waste management practices for both hazardous and non-hazardous materials to promote responsible disposal and recycling. Water resource protection and runoff management could also be prioritized to safeguard local water bodies from contamination, ensuring that airport operations align with environmental sustainability goals.

The capacity building initiatives are designed with several interconnected objectives:

- **Empowering Stakeholders with Knowledge and Skills:** To equip EAG staff, contractors, consultants, and local authorities with the requisite knowledge, practical skills, and essential tools. This empowerment will enable them to proactively identify, assess, mitigate, and effectively monitor environmental and social risks and impacts throughout both the construction and operational phases of the airport.
- **Ensuring Comprehensive Compliance:** To guarantee strict adherence to the project's Environmental and Social Management Plan (ESMP), all applicable national environmental laws, and relevant international safeguard frameworks. This includes aligning with established guidelines such as the African Development Bank Integrated Safeguards System; World Bank Environmental and Social Framework (ESF) and the Asian Development Bank

(ADB) Environmental and Social Framework.

- **Enhancing Institutional Autonomy and Sustainability:** To significantly bolster the institutional capacity of EAG, enabling the organization to manage environmental and social aspects with greater independence and sustainability. This fosters a culture of accountability and promotes transparency in all project-related environmental and social performance.
- **Promoting Inclusive Development and Participation:** To actively promote inclusive development by empowering project-affected communities and vulnerable groups. This involves ensuring their meaningful participation in project benefits, fostering their understanding of potential impacts, and providing effective access to grievance redress mechanisms.

The pursuit of these objectives signifies a move beyond a reactive, compliance-driven approach to environmental and social management. International best practices emphasize that the goal of safeguards is not just to protect from adverse impacts but also to enhance benefits and promote environmentally sustainable and socially inclusive growth. This means that capacity building is not merely about fulfilling minimum requirements but about building internal capabilities within EAG and among stakeholders to proactively pursue superior sustainable development and social equity outcomes. The aim is to transition from a "check-the-box" mentality to a value-adding strategy for environmental and social stewardship.

The design and implementation of the capacity building plan are guided by the following core principles:

- **Strategic and Long-Term Perspective:** Capacity building is conceptualized not as a series of isolated interventions but as an integrated, continuous process embedded within the project's entire lifecycle. This necessitates detailed planning for sustained impact and ongoing development.
- **Targeted and Needs-Based Approach:** Programs will be meticulously tailored to address specific roles, responsibilities, and identified skill gaps within each distinct stakeholder group. This ensures relevance and maximizes the effectiveness of training efforts.
- **Practical and Adaptive Methodology:** Training methodologies will prioritize hands-on

application, practical problem-solving, and adaptive management principles. This allows for continuous adjustments to strategies based on real-time monitoring results and the emergence of unforeseen issues, ensuring that the project can respond dynamically to environmental and social challenges.

- **Inclusive and Participatory Engagement:** Capacity building efforts will deliberately extend to local communities and vulnerable groups. This fosters their active participation, enhances their understanding of project dynamics, and empowers them to engage effectively in project-related processes.
- **Leveraging International Best Practices:** The plan will incorporate modules, methodologies, and case studies derived from internationally recognized safeguard frameworks and successful airport development projects globally. This ensures that EAG benefits from global expertise and aligns with leading industry standards.

The emphasis on these principles underscores a profound shift from a traditional training paradigm to fostering an organizational learning culture within EAG. This means that capacity development goes beyond individual skill acquisition to cultivate an institutional ability to continuously learn, adapt, and integrate new knowledge and best practices into its operational framework. This involves establishing mechanisms for internal knowledge sharing, creating feedback loops from monitoring data to inform future training needs, and actively benchmarking performance against leading international airports to ensure long-term sustainability and resilience.

10.5.1. Training Needs Assessment and Target Audiences

Prior to the commencement of any training phase, a formal training needs assessment will be conducted. This assessment is critical for precisely identifying existing skill gaps and tailoring training content to ensure maximum relevance and impact.

The identified target audiences for capacity building include a broad spectrum of stakeholders, reflecting the multifaceted nature of environmental and social management in a large infrastructure project:

- **Ethiopian Airlines Group (EAG) Staff:** This core group includes personnel from the Technical

Department (e.g., Environmental, Social, Health & Safety specialists, engineers, project managers), Operational Staff (involved in airport operations, maintenance, ground handling, and security), Procurement and Contract Management Staff (to integrate safeguard requirements into contractual agreements), and Senior Management (for strategic oversight, policy implementation, and resource allocation).

- **Construction Supervision Consultant Staff:** This comprises Environmental and Social Experts, Site Engineers, and Occupational Health and Safety (OHS) Officers who are directly responsible for overseeing on-site compliance.
- **Contractors' Staff:** This vital group includes Project Managers, Site Supervisors, Environmental & Social Liaisons, OHS Officers, Foremen, and General Workers, who are on the front lines of implementing mitigation measures.
- **Junior Environmental and Social Experts from Project Woredas (Local Administrations):** Their inclusion is crucial for fostering local ownership, enabling effective community-level monitoring, and facilitating local grievance redress mechanisms.
- **Community Representatives and Vulnerable Groups:** Training for these groups is essential to enhance their understanding of project impacts and benefits, familiarize them with grievance mechanisms, and ensure their rights to participation are upheld.

Identifying these diverse target groups and their specific needs in advance is a strategic imperative, as it allows for the proactive development of skills necessary to achieve project objectives over an extended period.

10.5.2. Specific Training Programs and Modules

The capacity building plan is structured into distinct programs tailored to different project phases and stakeholder needs.

A. Construction Phase On-Job Training (Initial and Midway Sessions)

This program focuses on practical, on-site learning during the critical construction period.

- **Target Audience:** A maximum of 35 participants per session, including 7 EAG staff, 10

Contractors' staff, 8 Consultant's staff, and 10 Junior environmental and social experts from project woredas. The exact number will be finalized through discussion with EAG, the construction supervision consultant, and the contractor.

- Duration: A total of 4 days, with an initial 2-day session conducted immediately before the commencement of construction works, and a second 2-day session held at the midway point of construction.
- Training Modality: The training will adopt an on-job, highly interactive, and informal approach to foster open discussion and practical problem-solving.

Content Modules (Initial Session - 2 days):

- Module 1: Introduction to ESIA, ESMP, and H&S Management for Airport Projects: This module will introduce fundamental concepts, terminology, aims, and objectives of Environmental and Social Impact Assessments (ESIA), Environmental and Social Management Plans (ESMP), and Health & Safety Management. Specific reference will be made to the Bishoftu International Airport project's ESIA and ESMP documents.
- Module 2: On-site Socio-Environmental Conditions, Potential Impacts, and Mitigation Measures: Participants will review the existing socio-environmental baseline conditions in the project area. The module will detail potential impacts, including noise pollution, dust generation, waste management challenges, water resource impacts, and greenhouse gas (GHG) emissions. Crucially, it will cover the practical application of specific mitigation measures outlined in the ESMP. This includes detailed instruction on dust control strategies such as setting up 2.5-meter fences at site boundaries, implementing online dust monitoring systems, regular water sprinkling on construction sites, hardening temporary access and main roads, covering or temporarily greening exposed sites, and sealing or enclosing materials prone to dust generation. It will also cover avoiding large earthwork operations during windy seasons. For wastewater management, training will cover the collection and treatment of domestic sewage using environment-friendly mobile toilets or anti-seepage septic tanks, regular off-site transport, reuse of treated wastewater for dust suppression, and the establishment of catch drains and sedimentation tanks to prevent untreated discharge into water bodies. Regarding GHG emissions, the module will emphasize energy efficiency,

energy conservation, and selection of high-quality fuels, strengthening maintenance of construction machinery, and prohibiting overload operation of diesel-fueled equipment to reduce exhaust emissions.

- **Module 3: Health and Safety During Construction:** This module will raise awareness about common types of accidents in construction environments, emphasize the proper use of Personal Protective Equipment (PPE), outline emergency response procedures, and ensure adherence to national and international Occupational Health and Safety (OHS) standards.
- **Module 4: Grievance Redress Mechanism (GRM) and Stakeholder Engagement:** Participants will gain a comprehensive understanding of the GRM process, their specific roles and responsibilities in grievance handling, and the paramount importance of transparent communication with affected communities. Basic principles of effective stakeholder engagement and information disclosure will also be covered.
- **Module 5: HIV/AIDS and Gender-Based Violence (GBV) Prevention & Awareness:** This module will focus on specific awareness creation campaigns, prevention strategies, and reporting mechanisms related to HIV/AIDS and GBV, promoting a safe and respectful working environment.
- **Module 6: General Environmental Conservation and Awareness:** This module will provide a broader understanding of environmental conservation principles relevant to large-scale airport construction, fostering a general sense of environmental stewardship among all participants.

Content Modules (Midway Session - 2 days):

- **Module 1: Impact Prediction vs. Actual Outcomes:** This session will involve an on-site comparison of the environmental and social impacts predicted in the initial ESIA with what has actually transpired during the first half of the construction works. A critical analysis of reasons for any significant variations will be undertaken.
- **Module 2: Mitigation Measure Effectiveness and Adaptive Management:** This module will conduct an on-site review and analysis of the success or failure of the mitigation measures implemented to date. Discussions will focus on identifying corrective actions and adaptive strategies to enhance successful interventions and effectively address areas of failure. This dynamic approach aligns with risk-based and adaptive management principles.

- **Module 3: Lessons Learned and Best Practices:** The session will conclude with a summary of key lessons learned from the ongoing construction phase. This will involve identifying successful practices that can be replicated and areas for improvement, documenting valuable insights that could be applied to similar, future projects.

The design of the on-job training, particularly the midway session, is structured to move beyond generic theoretical knowledge to practical problem-solving and adaptive management. The detailed mitigation measures for airport construction, such as online dust monitoring and specific wastewater treatment methods, necessitate hands-on training. The adaptive management approach requires that these sessions function as critical review and problem-solving workshops, enabling participants to dynamically adjust their strategies based on real-world observations. This ensures the training cultivates practical skills and contributes to continuous operational improvement.

B. Operational Phase Specialized Training

This program is designed for the long-term operational sustainability of the airport.

- **Target Audience:** EAG Technical Department Staff, Operational Staff, Environmental Specialists, and OHS Personnel.
- **Duration:** These programs will range from medium-term (1-2 weeks per specific program) to long-term (specialized courses and certifications, potentially ongoing).
- **Training Modality:** A mix of classroom-based instruction, practical workshops, external certifications, and potentially international study tours for key personnel to observe best practices in leading airports.

Content Modules:

- **Module 1: Sustainable Airport Operations and Environmental Management Systems (EMS):** This module will focus on implementing sustainable operational practices, developing and maintaining an Environmental Management System (e.g., ISO 14001 certification), and comprehensive environmental performance reporting.
- **Module 2: Advanced Noise Pollution Control Strategies:** In-depth training will cover noise modeling, the operation and calibration of advanced noise monitoring equipment,

implementation of noise abatement procedures for aircraft, and effective community engagement strategies for addressing noise-related concerns.

- **Module 3: Air Quality and Emissions Monitoring & Mitigation:** This module will provide detailed training on the use of air quality instruments, including Photoionization Detectors (PIDs) for site characterization, multi-gas monitors (for CO₂, CO, H₂S), particulate monitors (aerosol photometers/nephelometers) for real-time dust and PM monitoring, and air samplers. It will also cover emissions inventory development, mitigation strategies for aviation-related pollutants, and carbon footprint management, including the use of carbon management platforms.
- **Module 4: Advanced Waste Management:** Comprehensive training on hazardous and non-hazardous waste segregation, treatment technologies, recycling programs, responsible disposal practices, and the application of circular economy principles within airport operations.
- **Module 5: Water Resource Protection and Runoff Management:** This module will focus on safeguarding local water bodies from contamination, implementing effective stormwater management plans, appropriate wastewater treatment for operational discharges, and strategies for water conservation.
- **Module 6: Emergency Preparedness and Response for Environmental Incidents:** Training will cover protocols for spill response, hazardous materials management, and comprehensive environmental emergency preparedness and response procedures.

C. Advanced Safeguards Training for E&S Specialists

This specialized training is designed to build deep expertise in environmental and social safeguards.

- **Target Audience:** Senior EAG Environmental and Social Specialists, relevant management staff, and key consultant personnel.
- **Duration:** Short-term intensive courses (e.g., 2-5 days) complemented by leveraging accessible online learning platforms for foundational and in-depth knowledge.
- **Training Modality:** A blended learning approach combining online courses, in-person workshops, and practical case studies.

Content Modules:

- **Module 1: World Bank ESF Fundamentals:** This module will provide an in-depth understanding of the World Bank's Environmental and Social Framework (ESF) Policy and Directives. It will delve into specific Environmental and Social Standards (ESS), particularly ESS1 (Assessment and Management of Environmental and Social Risks and Impacts) and ESS10 (Stakeholder Engagement and Information Disclosure), along with other relevant ESSs. This can effectively leverage free online courses such as the World Bank's "ESF Fundamentals", which includes practical case studies.
- **Module 2: Comprehensive ESIA and ESMP Development & Review:** Advanced techniques in scoping, conducting baseline studies, predicting impacts, applying the mitigation hierarchy (avoid, minimize, mitigate, offset), and developing robust ESMPs will be covered.
- **Module 3: Stakeholder Engagement, Consultation, and Grievance Mechanisms:** Advanced strategies for identifying and engaging diverse stakeholders, including vulnerable groups, will be taught. This includes ensuring Free, Prior, and Informed Consent (FPIC) where applicable, and establishing effective, transparent, and accessible Grievance Redress Mechanisms (GRMs).
- **Module 4: Gender and Social Inclusion in Infrastructure Projects:** This module will explore the critical role of gender and social analysis in environmental and social safeguards. It will focus on strategies to ensure that women, children, and vulnerable groups are meaningfully involved and equitably benefit from project outcomes. Specific attention will be given to addressing gender-based violence (GBV) and discrimination, and implementing positive action during recruitment processes to increase participation of underrepresented groups.
- **Module 5: Monitoring, Evaluation, and Adaptive Management of Safeguards:** Participants will learn to design robust Monitoring & Evaluation (M&E) frameworks for tracking safeguard implementation. This includes defining performance indicators, utilizing real-time monitoring tools and software, conducting compliance audits, fulfilling reporting requirements to donors and regulatory agencies, and implementing corrective actions based on monitoring results.
- **Module 6: Biodiversity Protection and Cultural Heritage Management:** This module will

cover strategies for safeguarding natural habitats, developing and implementing cultural heritage management plans, and principles for managing biodiversity offsets where unavoidable impacts occur.

The allocation of resources for long-term training requires a strategic approach. The availability of free, comprehensive online courses, such as the World Bank's "ESF Fundamentals", offers a cost-effective and standardized method for foundational and even advanced theoretical training. This allows for a more efficient use of the budget, reducing the need for expensive, prolonged international travel for every individual's long-term training. The funds can then be strategically reallocated towards more targeted, specialized, and hands-on training, such as in-country workshops with international experts, specific equipment operation training, and crucial institutional strengthening measures like laboratory upgrades. This approach represents a smarter investment in human capital development, prioritizing practical capabilities and institutional infrastructure.

10.5.3. Training Modalities and Resources

A blended approach to training modalities will be employed to maximize effectiveness and reach:

- **Short-Term (1-5 days):** This will primarily involve on-job training sessions, focused workshops, targeted seminars, and broad awareness campaigns.
- **Medium-Term (1-4 weeks):** This will encompass specialized courses, professional certifications, and intensive workshops delivered by a combination of national and international experts.
- **Long-Term (Ongoing):** Continuous professional development will be facilitated through leveraging online learning platforms (e.g., the World Bank Online Learning Campus), structured mentorship programs, and strategic knowledge exchange initiatives with leading international airports, drawing upon their advanced experience in green and low-carbon management.

The resources required for these initiatives will include:

- Trainers: A diverse pool comprising internal EAG experts, qualified local consultants, and highly experienced international environmental and social safeguard specialists.
- Materials: Development of customized training manuals, compilation of relevant local and international case studies, utilization of effective visual aids, and provision of access to a curated library of online resources.
- Facilities: Access to appropriate on-site training areas, dedicated classrooms, and where feasible, simulation environments for practical exercises to reinforce learning.

10.5.4. Implementation Plan, Timelines, and Budget

The capacity building and institutional strengthening plan will be implemented in four distinct phases, aligning with the project's lifecycle:

- Phase 1: Pre-Construction (Months 1-3)
 - Conduct a formal Training Needs Assessment across all identified target audiences.
 - Initiate the recruitment process for key EAG Environmental and Social Specialists and Officers.
 - Deliver the initial 2-day On-Job Training session for Construction Phase personnel (EAG, contractors, consultants, woreda experts).
 - Formally establish the Technical Advisory Committee (TAC) and convene its inaugural meeting.
 - Develop and finalize procurement plans for initial environmental monitoring equipment.
 - Enroll key EAG staff in the World Bank ESF Fundamentals online course and other relevant foundational online training programs.
- Phase 2: Construction Phase (Months 4-24)
 - Conduct the midway 2-day On-Job Training session for Construction Phase personnel.
 - Organize and deliver ongoing specialized workshops for contractors, focusing on specific mitigation measures such as advanced dust control, comprehensive waste management, and stringent OHS protocols.
 - Hold regular quarterly meetings of the TAC to provide ongoing oversight and guidance.

- Execute phased procurement and installation of advanced environmental monitoring laboratory equipment, alongside the initial setup of the integrated environmental data management system.
- Develop and formalize EAG's internal Environmental and Social (E&S) policies and key Standard Operating Procedures (SOPs).
- Provide targeted training for EAG procurement and contract management staff on effectively integrating and enforcing E&S clauses within contracts.
- Phase 3: Pre-Operations & Early Operations (Months 25-36)
 - Deliver specialized training programs for EAG operational staff, covering critical areas such as advanced noise management, air quality control, comprehensive waste management, and water resource protection.
 - Ensure the full operationalization of the integrated environmental data management system and the airport carbon management platform.
 - Conduct Advanced Safeguards Training for EAG E&S Specialists, potentially involving external experts or international benchmarking visits.
 - Develop and finalize operational phase-specific SOPs.
 - Initiate and sustain ongoing knowledge exchange and benchmarking initiatives with leading international airports.
- Phase 4: Long-Term Operational Phase (Beyond Month 36)
 - Implement annual refresher training courses and adaptive management workshops, informed by ongoing environmental and social performance reviews.
 - Facilitate continuous professional development pathways for all E&S staff within EAG.
 - Conduct regular reviews and updates of E&S policies and SOPs to ensure their continued relevance and effectiveness.
 - Maintain ongoing TAC oversight and strategic guidance to ensure long-term environmental and social sustainability.

The cost estimated for the proposed on job training (capacity building) is listed in Table below.

Table 10-12: Cost Estimate for Capacity Building and Institutional Strengthening

No.	Item	Number of Trainees/Units	Unit Rate (ETB Birr)	Duration/Quantity	Total Amount (ETB Birr)	Justification/Details
1	Construction Phase On-Job Training (Initial & Midway)				400,000	
1.1	Training Delivery (Consultant/Expert Fees)	1 team	100,000	4 days	400,000	Covers fees for experienced trainers (construction supervision consultant, external experts) for two 2-day sessions, focusing on practical ESMP implementation, OHS, GRM, and specific mitigation measures (e.g., dust, wastewater).
2	Per Diem for Trainees (Construction Phase)	35	2,000	4 days	280,000	Covers daily allowances for participants (EAG, contractors, consultants, woreda experts) during the 4 days of on-job training.
3	Course Materials (Construction Phase)	Lump sum	-	-	200,000	Development and printing of customized training manuals, handouts, case studies, and visual aids for the construction phase and another 2 days in the middle of construction

						phase)training sessions.
4	Recruitment & Professional Development of E&S Cadre				3,000,000	
4.1	Recruitment of 3 Key E&S Specialists (Env., Social, OHS)	3	500,000	Initial 6 months	1,500,000	Covers initial salaries and recruitment costs for dedicated Environmental Specialist, Social Safeguards Officer, and OHS Manager to professionalize EAG's E&S functions.
4.2	Advanced Safeguards Training for E&S Specialists	5	300,000	2 weeks (intensive)	1,500,000	Targeted in-country workshops with international experts on advanced ESIA/ESMP, stakeholder engagement, M&E, and adaptive management. Leverages free online courses (e.g., WB ESF Fundamentals) for foundational knowledge, optimizing this budget for specialized, high-impact training.
5	Long-Term Strategic Knowledge Exchange & Certifications	3	500,000	1-3 months (per person, staggered)	1,500,000	Covers participation of key EAG personnel in international certifications, specialized courses abroad, or strategic knowledge exchange programs with leading green airports.

						Focus on green airport development, carbon management, and advanced operational safeguards.
6	Enhancement of Environmental Monitoring Systems				35,000,000	
6.1	Air Quality Monitoring Equipment	1 set	10,000,000	-	10,000,000	Procurement of real-time direct-reading instruments (PIDs, multi-gas monitors, particulate monitors, air samplers) for comprehensive air quality assessment.
6.2	Noise & Vibration Monitoring Equipment	1 set	5,000,000	-	5,000,000	Acquisition of real-time noise and vibration monitoring devices, integrated with data analysis software.
6.3	Water Quality & Waste Characterization Lab Equipment	1 set	10,000,000	-	10,000,000	Upgrading lab capabilities for comprehensive water quality testing and hazardous/non-hazardous waste characterization.
6.4	Integrated Data Management & Carbon Management Platform Software/Hardware	1 system	10,000,000	-	10,000,000	Investment in software solutions (e.g., SiteHive Enviro) and necessary hardware for real-time data integration, centralized monitoring, analysis, and establishment of an airport

						carbon management platform. This ensures the lab equipment functions as part of a smart, data-driven environmental intelligence system.
7	Technical Advisory Committee (TAC) Operational Costs	1 committee	100,000	4 meetings/year (for 1 year)	400,000	Covers meeting logistics, expert honoraria (if applicable), and administrative support for the TAC to provide impartial, expert oversight and guidance.
8	Policy & SOP Development	Lump sum	-	-	500,000	Development of internal E&S policies, detailed Standard Operating Procedures (SOPs) for monitoring, GRM, emergency response, and E&S integration into procurement.
Sub Total					41,380,000	

10.6. Budget for Socio-Environmental Mitigation, Management and Monitoring

The socio-environmental mitigation and management budget comprises the costs required for mitigation/ enhancement measures, compensatory requirements, and monitoring and training. It is assumed that most of the cost required for the implementation of mitigation and enhancement measures (except for RAP, which is estimated to be about (39, 612, 233, 318.9 ETB) will be inbuilt in the construction bid document as part of the contractor's and supervisor's work. However, costs which are specifically needed to mitigate and enhance environmental and social issues are included in Table 10-3. 10.4, 10.5, 10.6 and 10.7. The estimated total budget for the implementation of ESMP and monitoring plan is estimated to be 1,495,992,630 ETB. It should be noted that most of the recommended mitigations measures for identified impacts are assumed to be incorporated in the design when they require engineering interventions.

Table 10-13: Summary of Budget Estimate for Environmental Mitigation, Management and Monitoring

Category	Estimated Cost (ETB)	Percentage of Total Budget
ESMP Mitigation & Enhancement (Annual)	1,330,830,000	88.96%
ES Monitoring (Annual)	92,408,250	6.18%
Capacity Building & Institutional Strengthening (Annual)	41,380,000	2.77%
Environmental Auditing (Annual)	6,233,380	0.42%
GRM Implementation (Annual)	21,691,000	1.45%
Stakeholder Engagement Plan (Annual)	3,450,000	0.23%
Overall Total	1,495,992,630	

10.7. Grievances Redress Mechanism

A grievance redress mechanism (GRM) is expected to outline procedures to respond to project-related grievances in an efficient and effective manner. GRM should be accessible and appropriate to bring about remedial measures for complaints. Appropriateness and accessibility basically signifies the need to have a workable GRM arrangement tailored to local context. Without these main ingredients of GRM, complaint procedures will have no expected outcome in redressing grievances. In case of complaints by PAPs and other project stakeholders on project related activities, the preferred way of settlement is through amicable means so as to save time and resources as opposed to taking the matter to formal courts.

To ensure that the PAPs have avenues for redressing grievances related to any aspect of environmental and social impacts, compensation, construction management negligence, and any other relevant project related matters procedures for the redress of grievances should be established for the project. The objective is to respond to the complaints of the PAPs efficiently, i.e., the mechanism to be easily accessible, transparent and fair and to avoid the need to resort to complicated formal channels to redress grievances. Accessible and appropriate GRM not only help to have more effective and efficient procedure but it also has strong bearing on the project implementation progress, as PAPs grievances tends to thwart timely accomplishments of project activities.

For the project at hand, grievance redress committee needs to be established that consists of members from project woreda administration office, PAPs, elders/religious leaders and local NGOs.

10.7.1. Objectives and Guiding Principles

The primary objective of this Grievance Redress Mechanism (GRM) is to establish clear procedures for responding to project-related grievances in an efficient and effective manner. It is designed to ensure that Project-Affected Persons (PAPs) have readily available avenues for redressing concerns related to environmental and social impacts, compensation, construction management negligence, and any other relevant project-induced matters. The mechanism aims to

be easily accessible, transparent, and fair, thereby minimizing the need for PAPs to resort to complex or formal legal channels for resolution. Beyond dispute resolution, the GRM is intended to foster trust, accountability, and inclusivity within the project framework, serving as a critical component for safeguarding against offensive behaviors and unfair treatment.

The GRM's operational framework is built upon core principles that ensure its integrity and effectiveness. These include fairness, objectiveness, simplicity (ensuring it is localized and contextual), accessibility to PAPs, responsiveness, and overall efficiency. The repeated emphasis on the mechanism being "accessible and appropriate," "tailored to local context," and "culturally appropriate" for "inclusivity for vulnerable populations" highlights a fundamental aspect of its design. A GRM, regardless of its theoretical soundness, will only be effective if it is genuinely usable and trusted by the very people it is intended to serve. This is particularly true for populations with varying literacy levels or those who may face barriers in accessing formal channels. Therefore, active community engagement during the GRM's design phase is not merely a compliance requirement but is foundational to its operational viability and sustained success. Without such tailored arrangements, complaint procedures are unlikely to yield the desired outcomes in redressing grievances.

Furthermore, the role of the GRM extends beyond a reactive complaint-handling function; it serves as a proactive instrument for project risk mitigation and enhancing overall project outcomes. By providing a structured platform for feedback and concerns, the GRM functions as an early warning system. This enables the timely identification and resolution of minor issues before they escalate into significant disruptions, costly delays, or even litigation, which can otherwise impede the timely accomplishment of project activities. This transformative capacity positions the GRM as a strategic asset for project management, contributing directly to the project's efficiency and long-term sustainability.

10.7.2. GRM Structure and Tiers

To ensure that grievances are addressed at the most appropriate level and to provide clear escalation pathways, the GRM will operate through a multi-tiered structure. This layered approach

ranges from localized community engagement to central project management oversight and, ultimately, to external appeal mechanisms.

At the Community Level (Tier 1), local Grievance Redress Committees (GRCs) will serve as the primary point of contact. These committees will be established with members drawn from the project woreda administration office, Project-Affected Persons (PAPs), respected elders/religious leaders, and local non-governmental organizations (NGOs). This composition ensures local context understanding and cultural appropriateness. A crucial element of this tier is the commitment to gender representation, with at least 30% of GRC members being female, specifically to enhance accessibility and ensure the voices of women are heard.

The Project-Level (Tier 2) will be overseen by a central Project Management Unit (PMU) GRC. This committee holds overall responsibility for all GRMs, encompassing all project activities and sub-components. Its composition will include the Project Manager (Convener), E&S Specialists, Gender Specialists, representatives from relevant sectoral bureaus, legal advisors, and a Member Secretary. These members will work collectively to guide the establishment of the GRM, manage complex cases, and facilitate referrals to appropriate bodies. Gender balance will also be prioritized in this tier to ensure inclusiveness and equitable participation.

For grievances that remain unresolved at the lower tiers, an Appeals Level (Tier 3) is available. This involves an appeal mechanism to a higher authority, which could include an inter-ministerial committee or, as a final recourse, formal court procedures.

This multi-tiered structure, combined with specific gender representation requirements, reflects a sophisticated understanding of effective grievance management. It ensures that concerns are addressed at the lowest possible appropriate level, closest to the affected parties, which often proves more accessible and culturally relevant. Simultaneously, it provides clear escalation pathways and institutional oversight for complex or unresolved issues, preventing them from stagnating or forcing complainants to resort to formal legal recourse. The mandated gender representation directly addresses the imperative for inclusivity, particularly for vulnerable groups such as women, who may face unique barriers within traditional structures and require dedicated

representation to ensure their grievances are heard and handled equitably. This design choice enhances both the efficiency and equity of the grievance resolution process.

10.7.3. Procedures for Grievance Submission, Processing, Resolution, and Monitoring

The GRM is designed with clear, structured procedures to ensure efficient and transparent handling of all grievances.

- **Channels for Submission**

Complainants will have multiple convenient channels to submit their grievances, including written form, verbally, through telephone calls, text messages, or any other accessible means. To enhance accessibility and allow for anonymity where appropriate, options such as suggestion boxes will also be made available. Community liaison personnel will play a vital role, serving as accessible points of contact within local communities to facilitate the informal airing of concerns and their subsequent referral into the formal GRM process.

- **Registration, Documentation, and Tracking**

Upon receipt, all complaints will be registered in a standard format each complaint will be itemized, clear, and concise, with designated space for any remedial suggestions from the complainant. For oral complaints, the GRC secretary or designated officer is responsible for accurately recording the complaint in writing. A comprehensive logbook or a more sophisticated database will be meticulously maintained for all complaints, capturing essential details such as the name of the individual or organization (optional for sensitive cases), the date and nature of the complaint, any follow-up actions taken, and the final resolution.

- **Investigation and Verification Process**

The designated officer, typically the GRC secretary, serves as the first contact point, receiving and conducting an initial screening of complaints to determine their relevance and whether they are project-induced. Relevant cases are then forwarded to the GRC for a thorough investigation. This

process may involve consulting the affected party for further information, assigning personnel to gather additional relevant details, and conducting field visits if deemed necessary. Throughout the investigation, all complaints will be treated with strict confidentiality.

- **Resolution Pathways**

The GRC will prioritize amicable dispute settlement as the preferred method of resolution, aiming to conserve time and resources. If the GRC is unable to settle a complaint, it will be formally forwarded to the project owner or client for their intervention and resolution. For particularly complex cases that require specialized expertise or independent oversight, the GRM may facilitate engagement with an independent and credible body, which can either issue a binding judgment or mediate a dialogue to find a mutually acceptable solution.

- **Communication and Feedback to Complainants**

Transparent and timely communication with complainants is a cornerstone of the GRM. Feedback or the GRC's decision will be communicated to the PAP(s) within a maximum of 30 working days from the date of complaint submission. For oral complaints, a response will be provided within one week. Should further investigation be required, the complainant will be promptly informed, and a final response will be provided within an additional 15 working days. The entire process, including how decisions are reached, will be communicated transparently to foster confidence in the system.

- **Appeal Process**

Should PAPs remain unsatisfied with the resolution provided at the initial tiers, they retain the right to appeal. This can involve appealing to a higher authority within the project structure or, as a final step, exercising their right to pursue formal court procedures.

The emphasis on multiple submission channels, including written, verbal, telephone, text message, and anonymous options, along with localized contact points, directly addresses the requirement for accessibility across all stakeholder groups, particularly vulnerable populations. This multi-

channel approach acknowledges the diverse literacy levels, varying geographical access, and differing cultural preferences within affected communities. By offering a range of avenues for complaint submission, the mechanism ensures it is genuinely usable by a broad spectrum of stakeholders, rather than inadvertently excluding those who might be unable to engage through formal, written means. This demonstrates a practical commitment to inclusivity.

The specified timelines for response (one week for oral complaints, 30 days for GRC decisions, and an additional 15 days for further investigation) coupled with the emphasis on transparency and communication of decisions are critical for building and maintaining trust in the GRM. Without clear, consistently adhered-to timelines and transparent feedback on how decisions are reached, the mechanism risks being perceived as unresponsive or unfair. Such perceptions can lead to stakeholder disengagement, a loss of confidence in the formal process, and a potential return to informal, potentially disruptive channels or formal litigation, thereby undermining the GRM's overall effectiveness.

Table 10-14: GRM Procedures and Timelines

Stage	Action/Procedure	Responsible Party	Timeline/Target	Key Output/Outcome
Submission	Complainant submits grievance via chosen channel (written, verbal, phone, text, suggestion box)	Complainant	Immediately	Grievance received
Registration	Record complaint in standard format; itemize, clarify, note suggestions; record oral complaints in writing	GRC Secretary / Designated Officer	Within 1 working day of receipt	Complaint logged in database/logbook

Initial Assessment	Screen for relevance and project-inducement; acknowledge receipt to complainant	GRC Secretary / Designated Officer	Within 1 week (for oral) / Within 5 days (general)	Acknowledgment of complaint; Case assigned
Investigation	Forward to GRC; consult affected party; gather information; conduct field visits (if needed); maintain confidentiality	GRC	As required by complexity	Investigation Report
Resolution	GRC deliberates; prioritizes amicable settlement; if unresolved, forwards to Project Owner/Client	GRC / Project Owner/Client	Within 30 working days of registration	Resolution Agreement / Decision
Communication	Communicate GRC/Project Owner decision to complainant; inform if further investigation needed	GRC Secretary / PMU	Within 30 working days of registration	Formal communication of decision
Extended Investigation	If further investigation is needed, conduct and provide final response	GRC / PMU	Within additional 15 working days	Final Resolution / Decision

Appeal	Complainant appeals to higher authority within project or formal court if unsatisfied	Complainant	As per appeal mechanism guidelines	Appeal lodged / Case referred to court
Closure	Document satisfactory resolution; formally close grievance	GRC / PMU	Upon complainant satisfaction / Final decision	Grievance formally closed

10.7.4. Roles and Responsibilities for GRM Implementation

Effective GRM implementation relies on clearly defined roles and responsibilities across various entities involved in the project.

- **Grievance Redress Committee (GRC) Composition and Mandate**

The Grievance Redress Committee (GRC) will be established with a diverse membership, including representatives from the project woreda administration office, Project-Affected Persons (PAPs), respected elders/religious leaders, and local non-governmental organizations (NGOs). To ensure broad representation and accessibility, particularly for vulnerable groups, at least 30% of all GRC members will be female. The core mandate of the GRC includes verifying if complaints are project-induced, meticulously registering and organizing all complaints, forwarding cases to the full committee for deliberation, and communicating decisions back to the complainants.

- **Roles of Project Management Unit (PMU)**

The Project Management Unit (PMU) bears the overarching responsibility for the effective functioning of all GRMs, encompassing every activity and sub-component of the project. This includes overseeing the entire investigation process and identifying the appropriate entities responsible for reviewing and resolving specific issues. The PMU is also responsible for providing periodic updates on the status of grievances to complainants and issuing formal written responses.

• Roles of Community Liaison Officers (CLOs)

Community Liaison Officers (CLOs) are pivotal in localizing the GRM's reach. They will maintain a regular presence within communities, fostering trust and creating an informal atmosphere where grievances can be aired and initially sorted out. CLOs should possess the authority to resolve basic complaints independently and maintain a direct reporting line to senior managers for more serious or complex issues that require higher-level intervention.

Other Key Personnel

- **GRC Secretary:** This individual serves as the first point of contact for grievance submission. Their responsibilities include receiving, meticulously registering, and organizing all complaints.
- **Project Owner/Client:** The project owner or client is responsible for providing feedback and making final decisions on cases that have been escalated by the GRC.
- **Environmental and Social (E&S) Safeguards Specialist:** This specialist plays a crucial role in guiding the establishment of the inter-ministerial national project GRC. They are also responsible for monitoring sensitive cases, such as those related to Gender-Based Violence (GBV), and ensuring overall compliance with AfDB Safeguards throughout the project lifecycle.

Table 10-15: GRM Roles and Responsibilities

Role/Entity	Key Responsibilities	Reporting Line/Coordination
Project Management Unit (PMU)	Overall responsibility for all GRMs; oversees investigations; provides periodic updates to complainants; issues formal responses for escalated cases.	Direct accountability to Project Director/Senior Management. Coordinates with all GRM tiers.
Grievance Redress Committee (GRC)	Checks if complaints are project-induced; registers and organizes	Reports to PMU. Coordinates with GRC Secretary, CLOs, and

	complaints; investigates cases; facilitates amicable settlements; forwards unresolved cases to PMU.	Project Owner/Client.
GRC Secretary	First contact point for grievances; receives, registers, and organizes complaints; records oral complaints in writing; maintains grievance logbook/database.	Reports to GRC Convener/Chair. Coordinates with complainants, GRC members.
Community Liaison Officers (CLOs)	Serve as localized points of contact; build trust in communities; facilitate informal grievance airing; resolve basic complaints; refer complex issues upwards.	Direct reporting line to relevant PMU/GRC senior managers. Coordinates with community members, GRC Secretary.
Project Owner/Client	Provides feedback and makes final decisions on grievances escalated by the GRC.	Receives escalated cases from GRC. Communicates decisions back through GRM channels.
E&S Safeguards Specialist	Guides the establishment of the GRM structure; monitors compliance with AfDB Safeguards; monitors sensitive cases (e.g., GBV).	Reports to PMU. Coordinates with GRCs, specialized GRM focal points.
External Mediator/Arbiter (as needed)	Facilitates dialogue or provides binding judgment for complex disputes where amicable resolution is difficult.	Engaged by PMU/GRC as an independent third party.

10.7.5. Ensuring Accessibility for All Stakeholder Groups, including Vulnerable Populations

The effectiveness of any Grievance Redress Mechanism hinges on its genuine accessibility to all stakeholder groups, with particular attention to vulnerable populations. This requires a proactive and culturally sensitive approach to design and implementation.

Language, Literacy, and Cultural Considerations

The GRM will be meticulously designed to be both accessible and appropriate, specifically tailored to the local context in which the project operates. Information regarding GRM procedures will be disseminated in formats and languages that are readily understandable to the local population. In areas with low literacy levels, oral communication will be prioritized to ensure comprehension. Furthermore, comprehensive community consultations will be conducted during the GRM's design phase to ensure that the views and preferences of affected communities are thoroughly integrated, thereby enhancing the mechanism's relevance and usability.

Support for Marginalized Groups

Particular attention will be dedicated to ensuring the GRM's accessibility for disadvantaged and vulnerable groups. The mechanism is structured to allow all community members, especially those from vulnerable and marginalized groups, easy access to the grievance process. This commitment is reflected in the composition of the GRC, which will include representation from diverse community groups such as women, elders, and local NGOs. Specifically, the inclusion of at least 30% female members in all GRM committees will directly address gender-related accessibility issues and ensure that women's concerns are adequately represented and addressed.

Beyond merely stating "accessibility," the approach emphasizes proactive outreach and tailored communication strategies rather than passive availability. This involves utilizing local languages, visual aids, oral communication, and engaging trusted community intermediaries to ensure that vulnerable groups are not only aware of the GRM but also feel comfortable, safe, and empowered to use it. This proactive engagement transcends passive disclosure, transforming the GRM into a genuinely inclusive and effective mechanism for all community members. For a grievance

mechanism to be truly effective, it cannot simply exist; it must be actively publicized and explained in ways that resonate with the target audience, particularly those who may be illiterate or distrust formal processes. Localized points of contact and community liaison personnel further reinforce this active, culturally sensitive outreach, which is a crucial step beyond just making the mechanism available.

10.7.6. Specialized Grievance Redress Mechanisms

A distinct Workers' Grievance Redress Mechanism (WGRM) will be established, operating separately from the main GRM, specifically to address labor-related issues concerning both direct and contract workers. This separation is crucial because worker grievances involve unique power dynamics, contractual relationships, and specific legal frameworks. The WGRM will align with AfDB's 2023 ISS Operational Safeguard 2 (Labour and Working Conditions), necessitating compliance with International Labour Organization (ILO) core labor standards, the provision of written information to workers regarding their working conditions and rights, and adherence to basic occupational health and safety standards. The WGRM's overarching objectives include preventing minor complaints from escalating into more serious disputes, fostering a culture of transparency and trust in the workplace, ensuring that employees feel heard and valued, preventing and addressing bias, discrimination, and harassment, and providing a structured tool for problem resolution.

Procedures for Submission, Processing, and Resolution of Worker Grievances

The WGRM will follow a structured process to ensure fair and timely resolution of worker grievances:

- **Informal Resolution:** Employees will first be encouraged to discuss their complaints informally with their immediate supervisor, following a clear chain of command. Often, a direct conversation can resolve minor issues effectively.
- **Formal Submission:** If informal resolution proves unsuccessful, employees can submit a formal grievance. While verbal complaints are accepted, the preferred method is a written

submission, using a standardized grievance form or email. Any verbal complaint received will be formally documented by the designated personnel.

- **Evaluation and Investigation:** Upon formal submission, the human resources department will evaluate the grievance. For more complex issues, a formal investigation will be conducted. This may involve interviewing the employee who filed the grievance, any other involved staff members, and collecting relevant evidence such as email chains or witness testimonies. To ensure impartiality, an independent investigator may be appointed.
- **Resolution and Appeal:** Once a resolution is reached, a formal conclusion will be provided to the employee, outlining the decision and any actions to be taken. Mediation may be utilized to help resolve disputes. Employees will be informed of their right to appeal the decision, and this appeal process will be clearly outlined in the WGRM policy.

Roles and Responsibilities of Workers Grievance Redress Committee (WGRC), Supervisors, and HR

- **Supervisors:** Serve as the initial point of contact for informal grievance resolution.
- **Human Resources (HR) Department:** Responsible for evaluating grievances, overseeing formal investigations, and ensuring consistent application of workplace policies.
- **Workers Grievance Redress Committee (WGRC):** A dedicated committee or designated personnel, as outlined in the Labour Management Procedures (LMP), will be responsible for the formal processing and resolution of worker grievances.

Best Practices for Workplace Grievance Management

Effective workplace grievance management incorporates several best practices:

- **Formal Policy Documentation:** All grievance procedures should be documented in a formal workplace policy to ensure consistency and clear expectations.
- **Employee Handbook:** Provide all employees with a copy of an employee handbook and require them to sign a document confirming receipt and readership. This ensures awareness of company rules and grievance procedures.

- **Positive Relationships:** Building positive and professional relationships with employees through regular meetings can help identify potential grievances early, facilitating timely resolution.
- **Consistent Standards:** Hold all employees to the same standards to ensure fairness in disciplinary procedures and reduce grievances related to perceived favoritism.
- **Documentation:** Managers and supervisors should maintain records of employee performance, infractions, and grievances. This helps in tracking issues and addressing them before they escalate.
- **Frequent Training:** Offer regular workplace training to teach employees how to interact positively and build stronger relationships, which benefits overall departmental morale and reduces dissatisfaction.
- **Prompt Initiation:** Initiate the grievance procedure as soon as an employee files a complaint to ensure timely processing.

The explicit requirement for a *separate* Workers GRM (WGRM) under AfDB ISS and its linkage to ILO core labor standards signifies that worker grievances are not merely a subset of community grievances but a distinct category requiring specialized handling. This distinction is critical due to the unique power dynamics, contractual relationships, and specific legal frameworks that govern labor. Integrating these issues into a general community GRM could lead to inadequate attention or a lack of specialized expertise. The separation acknowledges these distinct legal and operational contexts, ensuring that worker rights and occupational health and safety are specifically addressed with dedicated processes and appropriate expertise.

Furthermore, the emphasis on informal resolution channels, such as direct discussions with supervisors, *before* formal grievances are filed, coupled with the cultivation of positive workplace relationships and the provision of comprehensive employee handbooks, indicates a proactive approach to grievance prevention and early conflict resolution. This strategic focus suggests that a well-functioning WGRM is designed not merely to react to existing complaints but to foster a workplace culture that minimizes the occurrence of grievances and resolves minor issues

efficiently before they escalate. This approach ultimately contributes to improved overall project efficiency and enhanced worker morale.

10.7.7. GRM for Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Violence Against Children (VAC)

Zero-Tolerance Policy and Survivor-Centered Approach

The project maintains a strict zero-tolerance policy toward any form of Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), or Sexual Harassment (SH). The Grievance Redress Mechanism for these sensitive issues will prioritize a survivor-centered approach, ensuring safe, timely, and ethical responses to all allegations. This approach is founded on treating survivors with dignity and respect, prioritizing their needs, rights, and choices, and ensuring that any support provided is voluntary. In all cases involving children, the "Best Interest of the Child" principle will be strictly upheld, and mandatory reporting laws will be applied as required.

Confidential and Safe Reporting Channels

A separate GRM will be established specifically for GBV/SEAH and Child Protection risks. Crucially, these grievances will *not* be documented in publicly accessible logbooks; instead, a separate, confidential logbook will be utilized. Multiple reporting channels will be available to facilitate access and ensure anonymity where desired, including dedicated hotlines, email addresses, and in-person reporting options at national, district, and community levels. These channels will be managed by trained focal persons to ensure utmost confidentiality and sensitivity. When a survivor reports a case, the information will be recorded confidentially in a private setting, with full consideration of their vulnerabilities. Strict confidentiality will be maintained throughout the process, and informed consent will be an absolute requirement before sharing any survivor information with third parties.

Immediate Referral Pathways to Specialized Support Services

GRM operators for GBV/SEA/VAC cases are trained to make immediate referrals to appropriate specialized support services without asking additional questions beyond the complainant's initial

statement. Referrals will be directed to external GBV service providers, legal units, or specialized Project Grievance Management Committees, depending on the specific nature of the case. Available support services include:

- Health: Comprehensive medical examination and treatment, forensic evidence collection, post-exposure prophylaxis (PEP), and abortion services where legally applicable.
- Legal/Justice: Legal counseling and support to navigate the justice system and ensure timely case resolution.
- Psychosocial Support: Emotional support, crisis counseling, and assistance with community reintegration.
- Safety/Security: Protection measures for survivors and witnesses, investigation of incidents, and support in legal action against perpetrators.

It is imperative that project teams *do not* undertake independent investigations of GBV incidents, including SEA, through their project mechanisms.

Protocols for Handling Sensitive Information

Key confidential information recorded will be limited to essential details such as the age and sex of the survivor, the type of alleged incident, whether the alleged perpetrator is linked to the project, and whether the survivor was referred to a support service. If a case is reported by someone other than the survivor, direct engagement with the survivor will be encouraged to ensure accurate and respectful handling. Furthermore, no primary data collection on GBV incidence from survivors will be conducted during general stakeholder consultations.

Preventive Measures

To complement the response mechanisms, proactive preventive measures are integral. All workers and contractors will be required to adhere to a Code of Conduct that explicitly outlines unacceptable behaviors and sanctions, including specific definitions of sexual harassment. Regular training and sensitization on GBV/SEA/SH will be provided for all staff, contractors, and community members. Culturally appropriate Information, Education, and Communication (IEC)

materials and community awareness campaigns will also be conducted to raise awareness about rights and reporting channels.

The absolute necessity of a *separate, specialized, survivor-centered* GRM for GBV/SEA/VAC highlights a critical understanding of the profound vulnerabilities, potential for re-traumatization, and inherent power imbalances associated with these types of grievances. Unlike conventional complaints, the paramount objective here shifts from mere dispute resolution to ensuring immediate survivor safety, protection, and access to specialized support services, with confidentiality and informed consent being non-negotiable. This distinct approach recognizes that standard GRM procedures (e.g., direct investigation by project staff, public logging) would be inappropriate and potentially harmful, underscoring an ethical imperative for specialized handling.

The integration of proactive preventive measures, such as Codes of Conduct, regular training, and awareness campaigns, alongside the reactive referral system, signifies a comprehensive and holistic approach to addressing GBV/SEA/VAC. This demonstrates a recognition that while robust response mechanisms are vital for addressing incidents, proactive efforts to prevent their occurrence and foster a safe, respectful environment are equally, if not more, crucial for long-term project success and community well-being. This dual strategy reflects a mature safeguarding framework where prevention complements response, leading to broader positive impacts beyond just grievance resolution.

10.7.8. Monitoring and Evaluation of the GRM

Effective implementation of the Grievance Redress Mechanism requires robust and continuous monitoring and evaluation. This systematic oversight ensures accountability, identifies areas for improvement, and demonstrates the GRM's effectiveness to all stakeholders.

10.7.8.1. Key Performance Indicators (KPIs) for GRM Effectiveness

The following Key Performance Indicators (KPIs) will be tracked to assess the GRM's performance:

- Total Number of Community Complaints/Grievances: The target for this KPI is a year-on-year reduction, which indicates a healthy GRM that effectively identifies and addresses root causes of grievances. This will be monitored through the Grievance Database.
- Percentage of Complaints Responded to within 5 Days: This KPI measures the GRM's initial responsiveness and will be monitored through regular reporting.
- Percentage of Complaints Closed within 30 Days: The target for this KPI is 100%, indicating efficient resolution of grievances. This will be monitored using the Grievance Database.
- Percentage of Grievances Closed to the Satisfaction of the Complainant: A critical measure of effectiveness from the complainant's perspective, the target for this KPI is 100% within 30 days, monitored through audit reports.
- Number of GBV Grievances Referred to GBV Services Providers: This specific KPI ensures that sensitive cases are handled appropriately and referred to specialized support, reflecting adherence to survivor-centered principles.

The selected KPIs extend beyond simple complaint counts to measure the *quality* and *effectiveness* of the GRM's operations, specifically focusing on responsiveness, resolution efficiency, and complainant satisfaction. By tracking metrics such as the percentage of complaints responded to within defined timeframes and the percentage resolved to the complainant's satisfaction, the evaluation framework moves beyond a mere quantitative assessment. This approach reflects a commitment to ensuring that the GRM not only processes grievances but also achieves meaningful and acceptable outcomes for those affected, aligning with core principles of fairness and responsiveness.

The inclusion of a "reduction in total number of complaints year on year" as a target KPI signifies that the GRM is conceptualized not merely as a reactive mechanism for addressing existing grievances, but as a dynamic tool for *proactive learning and continuous improvement*. By systematically analyzing grievance trends, the project can identify underlying systemic issues or recurring problems. This data-driven approach enables the implementation of targeted preventative

measures, thereby reducing the incidence of future grievances and ultimately enhancing overall project performance and sustainability.

Table 10-16: Key Performance Indicators (KPIs) for GRM Monitoring

KPI	Target	Monitoring Frequency	Data Source	Rationale/Purpose
Total Complaints Received	Reduction Y-o-Y	Monthly/Quarterly	Grievance Database	Indicates overall grievance load and effectiveness of preventative measures.
% Complaints Responded to within 5 days	100%	Monthly	Grievance Database / Reporting	Measures initial responsiveness and adherence to timely communication.
% Complaints Closed within 30 days	100%	Monthly	Grievance Database	Measures efficiency of the resolution process.
% Complaints Closed to Complainant's Satisfaction	100%	Quarterly / Bi-annually	Audit Reports / Follow-up Surveys	Critical measure of GRM effectiveness from the affected party's perspective.
Number of GBV Referrals to Service Providers	>X (specific target to be set)	Monthly	GBV Logbook	Ensures appropriate and confidential handling of sensitive cases and access to specialized support.

10.7.8.2. Reporting and Learning Framework

Internal Reporting Mechanisms and Frequency

Regular reports on GRM performance, including the achievement of KPIs, will be generated by the GRC secretary and submitted to the Project Management Unit (PMU). These reports will be a standing agenda item for internal project management meetings, facilitating the identification of trends, systemic issues, and areas requiring improvement within project operations.

External Reporting to AfDB and Stakeholders

Periodic reports on GRM performance will be shared with the AfDB as part of the project's safeguard compliance reporting. Furthermore, aggregated and anonymized GRM data will be periodically reported back to communities and other stakeholder groups as an integral part of broader community engagement efforts. This external communication of GRM performance fosters transparency and underscores the project's commitment to continuous improvement based on direct community feedback. Such transparency reinforces the GRM's credibility and strengthens overall community relations.

Using GRM Data for Continuous Improvement and Risk Mitigation

Grievance data will be systematically collected, categorized, and analyzed to identify patterns and inform policy decisions. The insights derived from GRM data will drive evidence-based policy changes and project adjustments, aiming to reduce dispute-related risks and enhance overall project outcomes. This continuous feedback loop ensures the GRM is a dynamic learning system, contributing to adaptive management.

10.7.8.3. Auditing Procedures for GRM Compliance and Effectiveness

To ensure the GRM's adherence to established procedures and its overall effectiveness, regular auditing will be conducted. Bi-annual audits of the GRM procedure will be performed during the construction phase of the project, and annually during the operational phase. These audits will assess compliance with established procedures, the timeliness of responses, the effectiveness of

resolutions, and adherence to the core principles of fairness and accessibility. Audit reports will provide an independent assessment of the GRM's performance and recommend corrective actions where necessary.

10.7.9. Capacity Building and Training for GRCs

Effective implementation of the Grievance Redress Mechanism fundamentally relies on the competence and continuous development of the personnel involved. Capacity building and awareness creation interventions for local-level GRCs are therefore essential, and the project owner/client is expected to facilitate such trainings for better overall project performance. Officials handling grievances must be adequately trained to take effective action and respond quickly to grievances and suggestions.

The training curriculum for GRC members will be comprehensive, extending beyond basic procedural steps to encompass critical soft skills, analytical capabilities, and ethical considerations. Key modules will include:

- **Introduction to GRMs:** This module will cover the fundamental principles and importance of Grievance Redress Mechanisms, their role within social protection systems, key principles such as fairness, accountability, and transparency, and an understanding of stakeholder dynamics.
- **Designing and Implementing GRM Frameworks:** Participants will learn to develop GRM policies and procedures, establish clear roles and responsibilities within the mechanism, and tailor GRM frameworks to specific organizational and project goals.
- **Complaint Handling Fundamentals:** This module will explore why people complain, different types of complainers, the correct attitude towards complaints, and strategies for maintaining stakeholder dignity throughout the process.
- **Active Listening and Communication Skills:** Training will focus on techniques for active listening, effective communication strategies, and methods for de-escalating tension during interactions with complainants.

- **Conflict Analysis and Assessment:** Participants will learn to conduct thorough conflict analysis and stakeholder mapping, identify the root causes and drivers of conflict, utilize various conflict assessment tools and methodologies, and understand the importance of proper data collection in this context.
- **Mediation and Negotiation Techniques:** This module will cover the core principles of mediation and negotiation, effective facilitation skills, strategies for reaching mutually acceptable solutions, and the critical importance of cultural sensitivity in dispute resolution.
- **Legal and Ethical Considerations:** Training will address understanding relevant legal frameworks and regulations related to GRMs and conflict resolution, ensuring compliance with ethical standards such as fairness, impartiality, and transparency, and the importance of proper documentation.
- **Monitoring and Evaluation:** This module will equip participants with skills for collecting and categorizing grievance data, analyzing trends for systemic improvements, visualizing data for stakeholder reporting, and using derived insights to drive evidence-based policy changes.
- **Assertiveness and Body Language:** Practical sessions will cover how to be assertive without being aggressive, critical postures and gestures to observe, how not to appear defensive, and what body language signals best suit assertive communication for calming interactions.

The comprehensive nature of this suggested training curriculum extends far beyond basic procedural steps. It emphasizes critical soft skills like active listening, empathetic communication, de-escalation, cultural sensitivity, and mediation, along with analytical skills (conflict analysis, data analytics) and ethical considerations. This holistic training approach recognizes that effective grievance handling is not just about following rules but about empathetic engagement, skilled negotiation, and informed decision-making, which is crucial for building trust and achieving sustainable resolutions.

Table 10-17: GRM Training Modules and Content

Module Title	Key Topics/Learning Objectives	Target Audience	Suggested Duration
GRM Fundamentals	Principles & importance of GRMs; role in project governance; key principles (fairness, accountability, transparency); stakeholder dynamics.	All GRC members, PMU GRM staff, CLOs	0.5 Day
Complaint Handling & Communication	Why people complain; types of complainers; active listening; effective communication; de-escalation techniques; maintaining stakeholder dignity.	All GRC members, CLOs, GRC Secretaries	1 Day
Conflict Analysis & Resolution	Conflict analysis & stakeholder mapping; identifying root causes; mediation & negotiation techniques; reaching mutually acceptable solutions; cultural sensitivity.	All GRC members, PMU GRM staff	1.5 Days
Legal & Ethical Aspects	Legal frameworks & regulations; ethical standards (fairness, impartiality, transparency); proper documentation; non-retribution.	All GRC members, PMU GRM staff	0.5 Day
Data Management & M&E	Collecting & categorizing grievance data; analyzing trends; visualizing data for reporting; using insights for evidence-based policy changes; KPIs.	GRC Secretaries, PMU GRM staff	1 Day
Specialized Training: WGRM	Labor laws & ILO standards; OHS regulations; workplace conflict resolution; specific WGRM procedures.	WGRC members, HR personnel, Supervisors	1 Day
Specialized Training: GBV/SEA/VAC	Survivor-centered approach; trauma-informed care; strict confidentiality; informed consent; immediate referral pathways; empathetic handling; gender sensitivity; unconscious bias.	GBV/SEA/VAC GRM Focal Points, E&S Safeguards Specialists, relevant CLOs	2 Days

10.7.10. Financial Resources and Cost Estimates for GRM Implementation

Effective Grievance Redress Mechanisms, while offering significant long-term cost savings by preventing dispute escalation and mitigating project risks, nonetheless require dedicated financial resources for their establishment and ongoing maintenance. A robust GRM demands a planned investment to ensure its operational effectiveness and accessibility.

Table 10-18: Estimated Annual Budget for GRM Implementation (in Ethiopian Birr)

Budget Category	Specific Item	Unit/Frequency	Estimated Cost (ETB)	Justification/Notes
Personnel	GRC Member Honorariums	Annual	2,850,000	Compensation for time and effort of GRC members at all levels.
	Dedicated GRM Staff (e.g., GRC Secretary, CLOs, GBV Focal Point)	Annual	8,550,000	Salaries for full-time or part-time staff managing GRM operations.
Meetings & Operations	GRC/GRM Committee Meetings	4 meetings/year	1,140,000	Covers logistical costs for regular committee meetings.
	Stationery, Printing, Phone/SMS	Annual	285,000	General office supplies and communication costs.
	Travel for Investigations/Outreach	Annual	570,000	Field visits for grievance verification and community

				engagement.
Communication & Materials	Communication Brochures/Posters	One-time	2,280,000	Initial production and distribution for public awareness.
	GRM Guidebook/Manual	One-time	570,000	Development and printing of detailed operational guidelines.
	GRM Boxes (100 units)	One-time	1,140,000	Physical collection points for grievances in communities.
Training	Training Workshops for GRCs & Staff	Annual	1,425,000	Covers trainers, materials, venue for initial and refresher trainings.
Contingency (10%)	Unforeseen Expenses	Annual	1,881,000	To cover unexpected costs or increased workload.
	Total Estimated Annual Budget		21,691,000	Note: All figures are approximate and would require detailed local costing.

10.8. Code of Conduct

The project shall develop and implement a Code of Conduct to deal with the environmental and social risks related to construction. The Code of Conduct shall be applied to all staff, laborers and other employees at the construction site or any other places where construction related activities are being carried out. It also applies to the personnel of each contractor, subcontractor, consultant and any other personnel assisting the contractor in the execution of the Works.

The purpose of the Code of Conduct is to ensure an environment where unsafe, offensive, abusive or violent behavior should not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation. More specifically, the Code of Conduct should include the following core requirements applicable to the project workers.

Every person involved in the project activities should:

- Carry out his/her duties competently and diligently;
- Comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the environment, health, safety and well-being of other contractor's personnel and any other person;
- Maintain a safe working environment including by:
 - ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
 - wearing required personal protective equipment;
 - using appropriate measures relating to chemical, physical and biological substances and agents; and
 - Following applicable emergency operating procedures.
- Report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health;
- Treat other people with respect, and not discriminate against specific groups such as women, people with disabilities or migrant workers;

- Not engage in any form of sexual harassment including unwelcome sexual advances, requests for sexual favours, and other unwanted verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel;
- Not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust for sexual purposes, including but not limited to profiting monetarily, socially or politically from the sexual exploitation of another.
- Not engage in Sexual Assault, which means sexual activity with another person who does not consent.
- Not engage in any form of sexual activity with individuals under the age of 18, except in case of a pre-existing marriage.
- Complete relevant training courses that shall be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation and Assault (SEA).
- Report violations of this Code of Conduct. Any violation of this Code of Conduct by contractor's personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.
- The contractor shall require all employees and the employees of sub-Contractor to individually sign the Code of Conduct, and shall proactively address any breach to the Code of Conduct.
- A copy of the Code of Conduct in Amharic/Oromifa shall be displayed in a location easily accessible to workers.

11. CONCLUSIONS AND RECOMMENDATIONS

10.1. Conclusion

The proposed Bishoftu International Airport project is a critical infrastructure development aimed at addressing the growing aviation demands of Ethiopia, alleviating capacity constraints at Bole International Airport, and fostering socio-economic growth. The project will enhance regional connectivity, boost tourism, and create employment opportunities, contributing to Ethiopia's position as a leading aviation hub in Africa. However, the construction and operation of the airport will inevitably have environmental and social impacts that must be carefully managed to ensure sustainability and minimize adverse effects on local communities and ecosystems.

The Environmental and Social Impact Assessment has identified both positive and negative impacts associated with the project. Key positive impacts include job creation, skill transfer, local economic growth, improved transportation, and international connectivity. Conversely, potential adverse impacts include land acquisition and displacement, loss of livelihoods, noise and air pollution, disruption of social and cultural structures, and impacts on biodiversity and water resources.

The baseline conditions of the project area reveal a predominantly agricultural community with limited access to modern infrastructure and services. The project will significantly alter land use patterns, necessitating careful planning to mitigate displacement and livelihood losses. The ESIA has also highlighted the importance of stakeholder engagement, ensuring that affected communities are consulted and their concerns addressed throughout the project lifecycle.

The proposed mitigation and enhancement measures outlined in the Environmental and Social Management Plan (ESMP) are designed to minimize negative impacts while maximizing benefits. These measures include compensation and livelihood restoration for displaced persons, noise and air pollution control, sustainable waste management, and biodiversity conservation. Proper implementation of these measures will ensure that the project aligns with national and international environmental and social standards.

10.2 Recommendations

To ensure the sustainable implementation of the Bishoftu International Airport project, the following recommendations are proposed:

1. Land Acquisition and Compensation:

- Ensure full compliance with Ethiopia's Proclamation No. 1161/2019 on land expropriation and compensation.
- Provide fair and timely compensation to Project-Affected Persons (PAPs), including alternative land or livelihood restoration programs for displaced households.
- Prioritize vulnerable groups, such as women-headed households, the elderly, and people with disabilities, in compensation and resettlement efforts.

2. Environmental Mitigation Measures:

- Implement dust and emission control measures during construction to minimize air pollution.
- Adopt noise reduction strategies, such as sound barriers and restricted operating hours for noisy machinery, to protect nearby communities.
- Develop a comprehensive waste management plan to handle construction and operational waste, including recycling and safe disposal of hazardous materials.

3. Water Resource Management:

- Monitor and mitigate potential impacts on local water resources, including surface and groundwater, during construction and operation.
- Implement stormwater drainage systems to prevent flooding and erosion.

4. Biodiversity Conservation:

The ecological survey conducted in the project area did not identify the presence of any sensitive species or habitats. However, in line with best environmental practices and precautionary principles, the following measures are recommended to ensure continued protection of biodiversity during construction activities:

- Although no sensitive species or habitats were observed during the baseline ecological survey, the contractor shall conduct a site-specific ecological assessment prior to the commencement of construction to confirm the continued absence of such features. Regular ecological monitoring shall also be undertaken during construction.
- Relocation of fauna, if encountered, shall be undertaken in coordination with the relevant environmental and wildlife authorities.
- A Biodiversity Conservation Plan shall be developed and implemented to mitigate potential impacts from habitat loss or fragmentation, especially during site preparation and construction phases.
- Vehicles shall be confined to designated areas, including within construction site boundaries, laydown areas, and access/hauling roads. Entry into surrounding undeveloped land shall be strictly prohibited.
- Site clearance and worker access shall be restricted to within clearly marked and agreed project boundaries.
- Laydown areas and stockpiles shall be located away from ecologically sensitive areas. Where necessary, informative signage and fencing shall be installed to prevent accidental disturbance to fauna.
- In the event that an active bird nest is found during construction, workers shall immediately notify the environmental supervisor, and appropriate steps shall be taken in coordination with the relevant wildlife authority to avoid disturbance.

5. Stakeholder Engagement and Grievance Mechanisms:

- Maintain ongoing consultation with local communities, government agencies, and other stakeholders to address concerns and ensure transparency.
- Establish a grievance redress mechanism to resolve disputes related to land, compensation, or other project impacts promptly.

6. Health and Safety:

- Enforce occupational health and safety standards for workers, including protective equipment and training.

- Monitor and mitigate potential health risks for nearby communities, such as exposure to construction-related pollutants or increased traffic accidents.

7. Economic and Social Benefits:

- Prioritize local hiring and skill development programs to maximize employment opportunities for the surrounding communities.
- Support local businesses and service providers to benefit from the airport's operations, such as through procurement contracts or tourism-related ventures.

8. Monitoring and Compliance:

- Develop and implement a robust Environmental and Social Management and Monitoring Plan (ESMMP) to track compliance with mitigation measures.
- Conduct regular audits and inspections to ensure adherence to environmental and social safeguards.

9. Climate Resilience:

- Integrate climate-resilient design features into the airport's infrastructure to account for extreme weather events and long-term climate change impacts.
- Promote the use of renewable energy sources, such as solar power, to reduce the project's carbon footprint.

10. Cultural and Heritage Protection:

- Conduct cultural heritage assessments if any unanticipated archaeological or cultural sites are discovered during construction.
- Engage with local communities to preserve and respect cultural practices and sacred sites affected by the project.

The Bishoftu International Airport project holds significant potential to transform Ethiopia's aviation sector and contribute to national development. By adhering to the proposed mitigation measures and recommendations, the project can minimize its environmental and social impacts while maximizing its economic and infrastructural benefits. Continuous monitoring, adaptive management, and stakeholder collaboration will be key to ensuring the project's long-term sustainability and success.

It is recommended that the Ethiopian Airlines Group, in collaboration with relevant government agencies and local communities, implement these measures diligently to achieve a balance between development and environmental stewardship. The project should serve as a model for sustainable infrastructure development in Ethiopia and the broader region.

REFERENCES

1. ADP Ingénierie, 20022. Feasibility Study and Master Plan Report for a New Major Hub Airport Development in the Environs of Addis Ababa. Ethiopian Airlines Group, Addis Ababa Ethiopia.
2. African Development Bank Group. (2023). Integrated safeguards system: Policy statement and operational safeguards. Abidjan, Côte d’Ivoire: Author.
3. Bishoftu City Administration, 2015. Socio Economic Profile of Bishoftu City Administration. March, 2015.
4. Bishoftu City Administration. (2024). Bishoftu City Master Plan.
5. DAR. (2024). Bishoftu International Airport final master plan report.
6. DAR. (2025a). Bishoftu International Airport infrastructure – Concept design report (Report No. ET24167-0102D).
7. DAR. (2025b). Bishoftu International Airport sitewide utilities – Concept design report.
8. DAR. (2025c). Bishoftu International Airport sitewide special airport systems & security report – Concept design.
9. DAR. (2025d). Bishoftu International Airport airside traffic study report.
10. DAR. (2025e). Bishoftu International Airport concept design report.
11. DAR. (2025f). Bishoftu International Airport architecture & engineering report.
12. DAR. (2025g). Bishoftu International Airport landside traffic study.
13. DAR. (2025h). Bishoftu International Airport façade design report.
14. Environmental Protection Authority (EPA). (2003). *Environmental Impact Assessment Procedural Guideline Series 1, Addis Ababa*.
15. Environmental Protection Organs Establishment Proclamation № 295/2002. 13. Federal Democratic Republic of Ethiopia Rural Land Administration and Utilization Proclamation № 456/2005.
16. EPA. Directive No. 2/2008 issued to determine the Categories of projects subject to the Environmental Impact Assessment Proclamation No. 299/ 2002. Addis Ababa, Ethiopia.

17. Ethiopia. (2007). Proclamation No. 541/2007: Conservation and utilization of wildlife. Federal Negarit Gazeta, 13(5).
18. Ethiopian Airlines Group. (2017). Ethiopian Airlines Group Establishment Proclamation No. 406/2017.
19. Ethiopian Biodiversity Institute (EBI) (2022). SIXTH NATIONAL REPORT ON THE IMPLEMENTATION OF Ethiopian National Biodiversity Strategic and Action Plan (Et_NBSAP) 2015-2020
20. Federal Democratic Republic of Ethiopia. (1993). National health policy.
21. Federal Democratic Republic of Ethiopia. (1993). National policy on women.
22. Federal Democratic Republic of Ethiopia. (1997). Environmental policy of Ethiopia.
23. Federal Democratic Republic of Ethiopia. (1998). Water resources policy.
24. Federal Democratic Republic of Ethiopia. (2000). Public health proclamation No. 200/2000.
25. Federal Democratic Republic of Ethiopia. (2002a). Environmental impact assessment proclamation No. 299/2002.
26. Federal Democratic Republic of Ethiopia. (2002b). Environmental pollution control proclamation No. 300/2002.
27. Federal Democratic Republic of Ethiopia. (2007). Solid waste management proclamation No. 513/2007.
28. Federal Democratic Republic of Ethiopia. (2011). Climate resilient green economy (CRGE) strategy.
29. Federal Democratic Republic of Ethiopia. (2019a). Labor proclamation No. 1156/2019.
30. Federal Democratic Republic of Ethiopia. (2019b). Expropriation of land and compensation proclamation No. 1161/2019.
31. Federal Democratic Republic of Ethiopia. (n.d.). Conservation strategy of Ethiopia.
32. Federal Democratic Republic of Ethiopia. (n.d.). National social protection policy of Ethiopia.
33. IFC 2012: Sustainability Framework. Policy and Performance Standards on Environmental and Social Sustainability

34. International Civil Aviation Organization. (n.d.-a). Annex 16 – Environmental protection.
35. International Civil Aviation Organization. (n.d.-b). Doc 9829 – Guidance on environmental assessment of aviation projects.
36. International Finance Corporation. (2012). IFC performance standards on environmental and social sustainability. Washington, DC: World Bank Group.
37. National Aeronautics and Space Administration (NASA). (2024). Prediction of Worldwide Energy Resource (POWER) data. NASA Langley Research Center (LaRC) Prediction of Worldwide Energy Resource (POWER) Project. Accessed November 10, 2024. <https://power.larc.nasa.gov/>
38. Revised version of the World Bank operational manual: operational policies (English). Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/428991468137090171/Revised-version-of-the-World-Bank-operational-manual-operational-policies>
39. Secretariat of the Convention on Biological Diversity. (1992). Convention on Biological Diversity (CBD): Text and annexes. United Nations. <https://www.cbd.int/convention/text/>
40. U.S. Congress. Endangered Species Act of 1973. Public Law 93-205, 87 Stat. 884. 1973. <https://www.fws.gov/laws/lawsdigest/ESACT.html>
41. World Bank Group. (n.d.). Environmental, health and safety (EHS) guidelines for airports.
42. World Bank. The World Bank Environmental and Social Framework. 2017, the World Bank 1818 H Street NW, Washington, DC 20433.

ANNEX 1: APPROVED SCREENING LETTER



የኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የአካባቢ ጥበቃ ዋስትና ሚኒስቴር
The Federal Democratic Republic of Ethiopia
Environmental Protection Authority

#TC/Ref.No 9/11-1/8230/17

#Date 11/2/2025

ETHIOPIAN AIRLINES

Addis Ababa

Subject: - Approval of Screening Report of Environmental and Social Impact Assessment for Ethiopian New International Airport

It is to be recalled that you have submitted the Screening Report of Environmental and Social Impact Assessment study for *Ethiopian New International Airport Project* which will be implemented in Oromia National Regional State; East Showa Zone; Bekebora Woreda at Abusera.

We have evaluated the report in accordance with the environmental requirements of the country and found that the project complies with them. Accordingly, we have approved the implementation of it with the following **Conditions**:

- The company has to conduct full Environmental and Social Impact Assessment (ESIA) study and submit to FDRE Environmental Protection Authority (EPA).

Sincerely,



Shifraw Negash Biru
 Lead Executive, Environment and
 Social Impact Assessment and
 Licensing



Cc:

- Environmental Regulatory Sector
- Development Projects ESIA Department
- **FDRE Environmental Protection Authority**
- Oromia Environmental Protection Authority
- **Finfinnee**



+251-(0)11-170-4060

+251-(0)11-170-4038

+251-(0)11-170-4158

+251-(0)11-170-4145

12760

Website
www.epa.gov.et

አዲስ አበባ፣ ኢትዮጵያ

Addis Ababa, Ethiopia

ANNEX 2: SCOPING REPORT FOR ESIA OF BISHOFTU INTERNATIONAL AIRPORT DEVELOPMENT

Environmental and social scoping has been undertaken to identify the key environmental and social issues requiring detailed analysis as part of the Environmental and Social Impact Assessment (ESIA) for the Bishoftu International Airport project. This scoping exercise is grounded in a comprehensive review of the proposed airport's design documents, relevant national environmental policies and legal frameworks, applicable international safeguard standards (including IFC Performance Standards), and World Bank Environmental and Social Safeguards. The process also incorporated findings from preliminary field assessments, consultations and interviews with stakeholders and affected communities, as well as biophysical and socio-economic baseline data collected during the inception phase.

The purpose of this scoping is to define the area of influence, highlight valued environmental and social components likely to be impacted by the project, prioritize significant issues, and delineate the scope and depth of further assessment to be carried out in the ESIA. The findings of the scoping process are summarized in the table below.

S.N	Issues	Description/Anticipated Impacts/Scope of Assessment	Remark
1	Boundary of the project	The boundary of the proposed Bishoftu International Airport project is located in Abusera, ~40 km southeast of Addis Ababa, within Bishoftu City, Oromia Region, covering 7 kebeles and incorporating both direct and indirect areas of influence.	Project area includes Direct Impact Zone: Airport footprint (runways, terminals, cargo facilities), access roads, utilities, and construction camps. Indirect Impact Zone: Ecological: Adjacent wetlands, migratory bird corridors (e.g., Akaki River floodplain). Social: Displacement of 2,488 households (7

			kebeles), noise/air pollution radius (15 km). Economic: Regional trade, tourism, and urban expansion (Bishoftu-Dukem corridor).
2	Objectives of the project	Develop a world-class international airport to decongest Bole International Airport, enhance global connectivity, promote regional development, and stimulate tourism, trade, and local employment.	Strategic national infrastructure project. Anchors long-term transport, economic and urban development.
3	Scope of the ESIA study	The scope covers the entire lifecycle: planning, construction, operation, and potential decommissioning phases. Includes runways, terminals, fuel farms, cargo zones, airport city, roads, utilities, and support infrastructure.	Assessment includes direct project footprint and all ancillary components like roads, borrow pits, and material stockpiles.
4	Description of the Scoping Process and Its Purpose	The scoping phase was designed to: • Identify Valued Environmental and Social Components (VESC)s • Determine the area of influence for environmental and social impacts • Engage stakeholders early in the process • Define key issues, alternatives, and study boundaries • Establish a Terms of Reference for the detailed ESIA	The process involved document reviews, site visits, stakeholder consultations, and adherence to Ethiopian legal requirements and IFC Performance Standards.

5	Legal and Regulatory Framework	Applicable Ethiopian Laws, Regulations, and Guidelines Key frameworks include: • Environmental Impact Assessment Proclamation No. 299/2002 • Environmental Pollution Control Proclamation No. 300/2002 • Solid Waste Management Proclamation No. 513/2007 • Proclamation on Expropriation and Compensation No. 1161/2019 • Forest Development and Conservation Proclamation • Public Health and Labor Proclamations • Oromia Regional State Environmental Regulations International Standards and IFC Performance Standards • AfDB Operational Safeguards • IFC PS1–8 (Assessment and Management, Labor, Resource Efficiency, Community Health, Land Acquisition, Biodiversity, Indigenous Peoples, Cultural Heritage) • World Bank OP/BP 4.01, 4.04, 4.11, 4.12	
---	--------------------------------	---	--

		• ISO 14001, ICAO Environmental Protection Standards • UN Conventions (e.g., Biodiversity, Climate Change, Stockholm Convention)	
6	Baseline Environmental and Social Conditions	Environmental Setting • Topography: Relatively flat terrain, ideal for aviation. • Soil & Geology: Quaternary alluvial and eluvial deposits. • Climate: Moderate rainfall, wind, and evapotranspiration. • Air & Noise Quality: Currently within acceptable levels. • Water Resources: Seasonal streams and groundwater with fluoride and nitrate concerns. • Biodiversity: Modified habitat dominated by agriculture; presence of migratory birds. Socioeconomic Profile • Population: 13,939 in 2,488 households. • Livelihoods: Predominantly agriculture and livestock. • Services: Limited education, health, water, and power infrastructure.	

		Cultural Sites: Churches and cemeteries located within the project influence area.	
7	Main project components	- 4 runways, passenger terminals, cargo and maintenance facilities - Fuel farm, power plants, stormwater & waste systems - Rail and road connectivity - Airport city for residential, commercial and recreational services	Components span over aviation infrastructure, urban development, and utility expansion. All must be assessed for biophysical and socio-economic impacts.
8	Potential Adverse Impacts during mobilization and construction phases	• Land acquisition and involuntary resettlement of 2,488 HHs • Dust, noise, vibration from earthworks and heavy equipment • Pollution (soil, water, air) from waste, fuel, and chemicals • Occupational health and safety risks • Social disruption, cultural heritage loss (churches, cemeteries) • Disturbance to fauna/flora and loss of agricultural land	Detailed environmental baseline established; impacts quantified by severity, magnitude, spatial extent and duration. Cultural sites require special attention (e.g., Orthodox church and cemetery within project site).
9	Potential Adverse Impacts during operation phase	• Aircraft noise and GHG emissions • Increased traffic congestion • Solid & liquid waste generation • Surface and groundwater contamination • Urban sprawl, unplanned settlement pressure • Habitat fragmentation & biodiversity disturbance	Continuous air/noise/water monitoring recommended. Urban planning coordination with Bishoftu Municipality essential.
10	Adverse impacts during decommissioning	• Site contamination • Hazardous material handling • Uncontrolled dismantling and waste dumping • Economic loss for dependent communities	Risk-based decommissioning plan needed. Residual environmental impact and economic transition plan to be designed.

11	Positive Impacts during construction	• Temporary employment for locals • Income generation through services • Capacity building and skill development	Opportunities to enhance through training and labor rights enforcement.
12	Positive Impacts during operation	• Job creation (aviation, logistics, hospitality) • Tourism and trade boost • Urban modernization and smart infrastructure • Increased government revenue • Technological transfer and global connectivity	Positive impacts to be maximized by inclusive policies (e.g., youth employment, SME involvement, smart infrastructure).
13	Sensitive receptors and valued ecosystem components	- Nearby schools, health posts, religious institutions, and lakes - Agricultural lands and natural vegetation - Migratory and endemic birds (e.g., Wattled Crane, Ethiopian Boubou) - Wetlands and seasonal streams feeding Awash basin	Risk of habitat loss and noise sensitivity around flight paths. Requires avifauna-specific assessments and buffer zones.
14	Stakeholder concerns and community interests	• Low compensation rates • Lack of transparent communication • Risk of joblessness and homelessness • Cultural site preservation • Gender concerns, youth employment, social equity	Stakeholder engagement plan (SEP) and grievance redress mechanism (GRM) must be enforced. Gender-based violence (GBV) and labor abuse safeguards needed.
15	Proposed Methodologies for Impact Assessment	• Baseline Field Studies: Water, air, soil, biodiversity • GIS & Remote Sensing: Land use and habitat mapping • Social Surveys: Household interviews, FGDs, KIIs • Impact Evaluation Matrix: Magnitude, duration, reversibility	

		- Quantitative Modelling: Air and noise emissions (ICAO standards) - Cultural Heritage Assessment: CHMP framework - Gender and Vulnerability Assessment	
16	Overall focus of the ESIA	- Holistic assessment of biophysical, social, economic and cultural risks and benefits - Stakeholder consultations and participation - Design of mitigation, enhancement, monitoring and management measures across all phases - Compliance with national legislation and IFC/WB standards	High-risk (Category A) project requiring rigorous ESIA, EMP, and monitoring protocols.

The scoping report identifies the key environmental and social risks, sensitive receptors, stakeholder priorities, and impact domains for further detailed study under the Environmental and Social Impact Assessment (ESIA). The findings will guide the preparation of the ESIA report, Environmental and Social Management Plan (ESMP), and complementary instruments to ensure full compliance with national and international requirements.

To ensure alignment with the African Development Bank's 2023 Integrated Safeguards System (ISS), the scoping exercise included a safeguard scoping matrix that maps project activities against the following ten Operational Safeguards:

- OS1: Environmental and Social Assessment
- OS2: Labour and Working Conditions
- OS3: Resource Efficiency and Pollution Prevention

- OS4: Community Health, Safety, and Security
- OS5: Land Acquisition, Restrictions on Land Use, Involuntary Resettlement, and Livelihoods
- OS6: Biodiversity and Ecosystem Services
- OS7: Indigenous Peoples
- OS8: Cultural Heritage
- OS9: Financial Intermediaries
- OS10: Stakeholder Engagement and Information Disclosure

Mapping Project Activities to AfDB 2023 Operational Safeguards

Project Activity	OS1: Environmental & Social Assessment	OS2: Labour & Working Conditions	OS3: Resource Efficiency & Pollution Prevention	OS4: Community Health, Safety & Security	OS5: Land Acquisition, Restrictions on Land Use, Involuntary Resettlement & Livelihoods	OS6: Biodiversity & Ecosystem Services	OS7: Indigenous Peoples	OS8: Cultural Heritage	OS9: Financial Intermediaries	OS10: Stakeholder Engagement & Information Disclosure	Cumulative Impact Consideration
Land acquisition and site clearing	Land use change; baseline disruption ; E&S screening and impact analysis	Worker contracts, fair treatment, and OHS provisions during site prep	Dust, noise, solid waste during clearance; resource use	Safety risks to surrounding communities during clearance	Possible physical and economic displacement	Minor loss of flora/fauna ; habitat modification	None identified	Chance finds procedure for artifacts during clearing	Not applicable	Information disclosure to PAPs; grievance handling	Combined land transformation with nearby development (urbanization, industrial parks)

Construct ion of runways, terminals & facilities	Soil disturban ce; water quality impacts	OHS for machine ry operator s; fair working conditio ns	Use of materials, fuel; emissions from equipment	Commun ity safety from traffic and construct ion hazards	Access restrictio n; possible relocatio n	Limited habitat loss; runoff impacts	None identif ied	Potential disturban ce to cultural sites	Not applica ble	Ongoing stakehold er updates and consultati ons	Increased burden on local infrastru ctu re; induced urban sprawl
Material sourcing (quarry & borrow sites)	Site degradati on; hydrolog y alteration	Worker safety in quarries ; contract ual complia nce	Noise, dust, spoil disposal impacts; inefficient resource use	Road safety risks from hauling activities	Temporar y livelihood impacts for local resource users	Disturbanc e to local ecosystem s; erosion	None identif ied	Low potential unless heritage site in quarry area	Not applica ble	Consultati ons with affected quarry communit ies	Multiple projects competing for same resource zones
Access road and utility infrastru ctu re developm ent	Soil and water disturban ce; E&S review	OHS during trenchin g and laying works	Air pollution, waste generation	Traffic hazards to local residents	Land use conflicts; altered communi ty access	Fragmenta tion of natural habitats	None identif ied	Chance finds manage ment during excavatio n	Not applica ble	Engagem ent with communit ies on road alignment	Aggregated traffic and emissions with other infrastru ctu re
Operation of airport (flights, transport, logistics)	Increased energy/w ater demand; noise impacts	Fair treatme nt for staff; health monitori	GHG emissions; high energy use	Commun ity exposure to noise and air pollution	Indirect displacem ent due to land value pressures	Indirect impacts on habitats from emissions	None identif ied	Possible effects on heritage sites from	Not applica ble	Informati on sharing with surroundi ng communit	Long-term air/noise/la nd use pressures in region

		ng						expansio n		ies	
Waste management (solid, hazardous, wastewater)	Soil/water pollution risks if mismanaged	Worker safety when handling waste	Hazardous waste emissions; leachate; pollution	Health risks to nearby communities	Informal waste pickers losing access to waste streams	Contamination risks to ecosystems	None identified	Low potential unless cultural sites near disposal areas	Not applicable	Public awareness on waste management plans	Combined pollution from other urban/industrial sources
Community engagement & stakeholder consultation	Incorporation of E&S inputs into planning	Addressing worker welfare feedback	Awareness on pollution/resource efficiency	Community health/safety information sessions	Identifying and						

ANNEX 3: LIST OF FLORA SPECIES RECORDED FROM ETHIOPIAN NEW INTERNATIONAL AIRPORT

No.	Scientific Name	Family	Habit/Type	IUCN Status	Uses
1	<i>Acacia abyssinica</i> Hochst . Ex Benth	Fabaceae	Tree	NE	Timber, traditional medicine
2	<i>Acacia bussei</i> Harms ex sjostedt	Fabaceae	Tree	NE	Firewood, fodder, gum production
3	<i>Acacia etbaica</i> Schweinf	Fabaceae	Tree	NE	Fencing material, firewood
4	<i>Acacia melanoxyton</i> R.Br	Fabaceae	Tree	LC	High-quality timber, shade tree,
5	<i>Acacia nilotica</i> (L.) willd .ex Del.	Fabaceae	Tree	LC	Traditional medicine, tannins,
6	<i>Acacia seyal</i> Del	Fabaceae	Tree	LC	Gum arabic production, fodder,
7	<i>Acacia tortilis</i> (Forssk) Hayne	Fabaceae	Tree	LC	Fodder, firewood, soil conservation
8	<i>Acacia venosa</i> Hochst .ex .Benth	Fabaceae	Tree	NE	Firewood, soil improvement
9	<i>Aloe barbadensis</i>	Asphodelaceae	Succulent Herb	NE	Medicinal uses
10	<i>Amaranthus caudatus</i> L.	Amaranthaceae	Herb	NE	Edible leaves and seeds
11	<i>Andropogon abyssinicus</i> Fresen	Poaceae	Grass	NE	Used as fodder
12	<i>Andropogon amethystinus</i> Steud.	Poaceae	Grass	NE	Forage
13	<i>Argemone mexicana</i> L.	Papaveraceae	Herb	NE	Traditional medicine, ornamental
14	<i>Argemone mexicana</i> L.	Papaveraceae	Herb	NE	Medicinal uses, oil extraction,
15	<i>Aristida adoensis</i> Hochst.	Poaceae	Grass	NE	Forage
16	<i>Arthraxon micans</i> (Nees ex Steud.) Hochst.	Poaceae	Grass	NE	Forage
17	<i>Astragalus atropilosulus</i> Hochst.	Fabaceae	Herb	NE	Traditional medicine

18	<i>Beta vulgaris</i> L.	Amaranthaceae	Herb	NE	Edible roots and leaves (beet)
19	<i>Bidens macroptera</i>	Asteraceae	Herb	NE	Traditional medicine
20	<i>Bidens pilosa</i>	Asteraceae	Herb	NE	Edible leaves, medicinal uses
21	<i>Bidens prestinaria</i>	Asteraceae	Herb	NE	Traditional medicine
22	<i>Bothriochloa insculpta</i> (Hochst. ex A. Rich.) A. Camus	Poaceae	Grass	NE	Fodder, soil conservation
23	<i>Brassica carinata</i>	Brassicaceae	Herb	NE	Edible leaves
24	<i>Calpurnia aurea</i>	Fabaceae	Shrub/Tree	NE	Traditional medicine,
25	<i>Calpurnia aurea</i> (Aiton) Benth.	Fabaceae	Shrub/Tree	NE	Traditional medicine,
26	<i>Carduus ellenbeckii</i>	Asteraceae	Herb	NE	Traditional medicine
27	<i>Carica papaya</i>	Caricaceae	Tree	NE	Edible fruit (papaya), medicinal
28	<i>Carissa spinarum</i> L.	Apocynaceae	Shrub	NE	Edible fruits, traditional medicine
29	<i>Carthamus lanatus</i>	Asteraceae	Herb	NE	Oil production (safflower)
30	<i>Cicer arietinum</i>	Fabaceae	Herb	NE	Edible seeds (chickpea)
31	<i>Cirsium vulgare</i>	Asteraceae	Herb	NE	Traditional medicine
32	<i>Clerodendrum myricoides</i> (Hochst.) Vatke	Lamiaceae	Shrub	NE	Traditional medicine,
33	<i>Conyza aegyptiaca</i> (L.) Dry and ex Ait	Asteraceae	Herb	NE	Medicinal plant for skin ailments
34	<i>Conyza stricta</i> Willd	Asteraceae	Shrub	NE	Traditional medicine,
35	<i>Cordia africana</i> Lam.	Boraginaceae	Tree	NE	Timber, traditional medicine
36	<i>Crepis rueppellii</i>	Asteraceae	Herb	NE	Traditional medicine

37	<i>Crotalaria incana</i>	Fabaceae	Herb/Shrub	NE	Soil improvement, fodder
38	<i>Croton macrostachyus</i> Hochst. ex Delile	Euphorbiaceae	Tree	NE	Traditional medicine, timber
39	<i>Cynodon dactylon</i>	Poaceae	Grass	NE	Forage, soil stabilization
40	<i>Cyperus rigidifolius</i>	Cyperaceae	Herb	NE	Wetland plant, traditional uses
41	<i>Dactyloctenium aegyptium</i>	Poaceae	Grass	NE	Forage
42	<i>Datura stramonium</i>	Solanaceae	Herb	NE	Poisonous, medicinal uses
43	<i>Desmodium</i> sp.	Fabaceae	Shrub	NE	nitrogen fixation, medicinal uses
44	<i>Digitaria abyssinica</i>	Poaceae	Grass	NE	Forage
45	<i>Dodonea angustifolia</i> L.f	Sapindaceae	Shrub	NE	Traditional medicine
46	<i>Dovyalis abyssinica</i> (A.Rich.) Warb.	Salicaceae	Shrub/Small Tree	NE	traditional medicine
47	<i>Eleusine floccifolia</i>	Poaceae	Grass	NE	Forage
48	<i>Emex spinosa</i> (L) Campd	Polygonaceae	Herb	NE	Traditional medicine
49	<i>Ensete ventricosum</i>	Musaceae	Herbaceous Plant	NE	banana
50	<i>Eragrostis cilianensis</i>	Poaceae	Grass	NE	Forage
51	<i>Eragrostis papposa</i>	Poaceae	Grass	NE	Forage
52	<i>Eragrostis tef</i>	Poaceae	Grass	NE	teff grain
53	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Tree	LC	Timber, firewood, windbreak
54	<i>Eucalyptus globulus</i>	Myrtaceae	Tree	LC	Timber, essential oil, firewood
55	<i>Euphorbia abyssinica</i> J.F.Gmel.	Euphorbiaceae	Succulent Tree	NE	traditional medicine
56	<i>Euphorbia tirucalli</i> L.	Euphorbiaceae	Succulent Shrub/Tree	NE	Traditional medicine,
57	<i>Faidherbia albida</i> (Delile) A.Chev.	Fabaceae	Tree	NE	Agroforestry, fodder
58	<i>Ficus sur</i>	Moraceae	Tree	NE	traditional medicine
59	<i>Ficus sycomorus</i> L.	Moraceae	Tree	NE	Edible fruits, shade tree
60	<i>Ficus vasta</i>	Moraceae	Tree	NE	Shade tree, medicine

61	<i>Galinsoga parviflora</i>	Asteraceae	Herb	NE	Edible, medicinal
62	<i>Glycine wightii</i> (Wight & Am) Verde.	Fabaceae	Climber	NE	Fodder, soil improvement
63	<i>Helianthus annuus</i>	Asteraceae	Herb	NE	Sunflower
64	<i>Hordeum vulgare</i>	Poaceae	Grass	NE	barley
65	<i>Hygrophila auriculata</i>	Acanthaceae	Herb	NE	Medicinal uses
66	<i>Hyparrhenia anthistirioides</i>	Poaceae	Grass	NE	Forage
67	<i>Ipomoea obscura</i>	Convolvulaceae	Herb	NE	Traditional medicine
68	<i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders.	Acanthaceae	Shrub	NE	Traditional medicine
68	<i>Lantana camara</i> L.	Verbenaceae	Shrub	LC	traditional medicine
69	<i>Launaea intybacea</i> (Jacq.) Beauv.	Asteraceae	Herb	NE	Traditional medicine, forage
70	<i>Lens culinaris</i>	Fabaceae	Herb	NE	Lentil
71	<i>Leucaena leucocephala</i>	Fabaceae	Tree/Shrub	LC	Fodder, soil improvement,
72	<i>Leucas abyssinica</i> (Benth.) Briq.	Lamiaceae	Shrub	NE	Traditional medicine
73	<i>Leucas deflexa</i> Hook.f.	Lamiaceae	Shrub	NE	Traditional medicine
74	<i>Leucas martinicensis</i> (Jacq.) R.Br	Lamiaceae	Shrub	NE	Medicinal use for fevers and colds
75	<i>Linum usitatissimum</i>	Linaceae	Herb	NE	edible seeds
76	<i>Mangifera indica</i>	Anacardiaceae	Tree	NE	Mango, timber
77	<i>Millettia ferruginea</i>	Fabaceae	Tree	NE	Soil improvement, traditional uses
78	<i>Musa</i> sp.	Musaceae	Herbaceous Plant	NE	Edible fruits (banana)
79	<i>Nicotiana glauca</i>	Solanaceae	Shrub/Tree	NE	Traditional medicine,
80	<i>Ocimum forskolei</i> Benth	Lamiaceae	Herb	NE	Traditional medicine,
81	<i>Ocimum lamiifolium</i> Hochst. ex Benth.	Lamiaceae	Herb	NE	Traditional medicine, aromatic
82	<i>Ocimum urticifolium</i> Roth	Lamiaceae	Herb	NE	Medicinal uses
83	<i>Olea europaea</i> L. subsp. <i>cuspidata</i>	Oleaceae	Tree	NE	Oil production, medicinal uses

84	<i>Opuntia ficus-indica</i> (L.) Mill.	Cactaceae	Succulent Shrub	NE	Edible fruits
85	<i>Orobanche minor</i>	Orobanchaceae	Herb	NE	Parasitic plant
86	<i>Parthenium hysterophorus</i>	Asteraceae	Herb	NE	Invasive species
87	<i>Persea americana</i>	Lauraceae	Tree	NE	Avocado, oil,
88	<i>Persicaria nepalensis</i>	Polygonaceae	Herb	NE	Traditional medicine
89	<i>Phaseolus vulgaris</i>	Fabaceae	Herb	NE	Edible beans
90	<i>Physalis lagascae</i>	Solanaceae	Herb	NE	Edible fruits
91	<i>Pisum sativum</i>	Fabaceae	Herb	NE	Pea
92	<i>Reichardia tingitana</i>	Asteraceae	Herb	NE	Traditional medicine
93	<i>Rhamnus prinoides</i>	Rhamnaceae	Shrub	NE	medicine, flavoring agent
94	<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub/Small Tree	LC	Castor oil, medicinal uses
95	<i>Rosa abyssinica</i> R.Br. ex Lindl.	Rosaceae	Shrub	NE	Ornamental, medicine
96	<i>Rumex nepalensis</i>	Polygonaceae	Herb	NE	Medicinal uses
97	<i>Ruta chalepensis</i>	Rutaceae	Herb	NE	Medicinal uses, culinary herb
98	<i>Salvia nilotica</i>	Lamiaceae	Herb	NE	Medicinal uses
99	<i>Salvia schimperii</i> Berth .	Lamiaceae	Herb	NE	Medicinal uses, flavoring agent
100	<i>Salvia tiliifolia</i> Vahl	Lamiaceae	Herb	NE	Medicinal uses
101	<i>Schinus molle</i> L.	Anacardiaceae	Tree	LC	Ornamental, spice
102	<i>Setaria incrassata</i>	Poaceae	Grass	NE	Forage
103	<i>Setaria pumila</i>	Poaceae	Grass	NE	Forage
104	<i>Sida schimperiana</i> Hochst . ex Benth	Malvaceae	Shrub	NE	Traditional medicine,
105	<i>Solanum anguivi</i> Lam.	Solanaceae	Shrub	NE	Edible fruits medicine
106	<i>Solanum incanum</i> L.	Solanaceae	Shrub	NE	Traditional medicine
107	<i>Solanum lycopersicum</i>	Solanaceae	Herb	NE	tomato
108	<i>Solanum tuberosum</i>	Solanaceae	Herb	NE	Potato
109	<i>Sonchus oleraceus</i>	Asteraceae	Herb	NE	Edible leaves, medicinal uses
110	<i>Spinacia oleracea</i>	Amaranthaceae	Herb	NE	Edible leaves
111	<i>Sporobolus pyramidalis</i>	Poaceae	Grass	NE	Forage
112	<i>Tamarindus indica</i> L.	Fabaceae	Tree	LC	Edible fruit, timber, medicinal

113	<i>Trichodesma zeylanica</i> (Burm.f.) R.Br	Boraginaceae	Shrub	NE	Medicinal uses, soil conservation
114	<i>Trichodesma zeylanicum</i>	Boraginaceae	Herb	NE	Traditional medicine
115	<i>Trigonella foenum-graecum</i>	Fabaceae	Herb	NE	Edible seeds
116	<i>Triticum aestivum</i>	Poaceae	Grass	NE	Wheat
117	<i>Vachellia abyssinica</i> (Hochst. ex Benth.)	Fabaceae	Tree	NE	Timber, traditional medicine
118	<i>Vachellia seyal</i> (Delile) P.J.H.Hurter	Fabaceae	Tree	LC	Gum arabic production, timber
119	<i>Verbascum sinaiticum</i> Benth.	Scrophulariaceae	Herb	NE	Traditional medicine
120	<i>Verbesina encelioides</i>	Asteraceae	Herb	NE	Traditional medicine
121	<i>Vernonia amygdalina</i> Delile	Asteraceae	Shrub/Small Tree	NE	Traditional medicine,
122	<i>Xanthium spinosum</i>	Asteraceae	Herb	NE	Traditional medicine
123	<i>Xanthium strumarium</i>	Asteraceae	Herb	NE	Traditional medicine
124	<i>Zea mays</i>	Poaceae	Grass	NE	Maize

Key to IUCN Status: EN= Endangered; Vu = Vulnerable; NT = Near Threatened; LC = Least concern; CD = Conservation Dependent; DD = Data Deficient; NE = Not Evaluated yet

Annex 4: LIST OF BIRDS IN BISHOFTU LAKE AROUND AREAS

No.	Common name	Scientific name	IUCIN Status
1	Laughing Dove	<i>Spilopelia senegalensis</i>	LC
2	African Sacred Ibis	<i>Threskiornis aethiopicus</i>	LC
3	Western Marsh Harrier	<i>Circus aeruginosus</i>	LC
4	Speckled Mousebird	<i>Colius striatus</i>	LC
5	Ethiopian Bee-eater	<i>Merops lafresnayii</i>	LC
6	Black-winged Lovebird**	<i>Agapornis taranta</i>	LC
7	Ethiopian Boubou**	<i>Bostrychia aethiopicus</i>	LC
8	Tawny-flanked Prinia	<i>Prinia subflava</i>	LC
9	Eastern Olivaceous Warbler	<i>Iduna pallida</i>	LC
10	Common Bulbul	<i>Pycnonotus barbatus</i>	LC
11	Common Chiffchaff	<i>Phylloscopus collybita</i>	LC
12	Marico Sunbird	<i>Cinnyris mariquensis</i>	LC
13	Variable Sunbird	<i>Cinnyris venustus</i>	LC
14	Rüppell's Weaver	<i>Ploceus galbula</i>	LC
15	Red-faced Crombec	<i>Sylvietta whytii</i>	LC
16	Bronze Mannikin	<i>Spermestes cucullata</i>	LC
17	Mocking Cliff-Chat	<i>Thamnolaea cinnamomeiventris</i>	LC
18	Hadada Ibis	<i>Bostrychia hagedash</i>	LC
19	Wattled Ibis *	<i>Bostrychia carunculata</i>	LC
20	Squacco Heron	<i>Ardeola ralloides</i>	LC
21	Great Egret	<i>Ardea alba</i>	LC
22	Hamerkop	<i>Scopus umbretta</i>	LC
23	Common Buzzard	<i>Buteo buteo</i>	LC
24	Hemprich's Hornbill Fan-tailed Raven	<i>Lophoceros hemprichii</i> <i>Corvus rhipidurus</i>	LC
25	Vitelline Masked-Weaver	<i>Ploceus vitellinus</i>	LC
26	Speckled Pigeon	<i>Columba guinea</i>	LC
27	Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	LC
28	Swainson's Sparrow	<i>Passer swainsonii</i>	LC
29	African Citril	<i>Crithagra citrinelloides</i>	LC
30	Egyptian Goose	<i>Alopochen aegyptiaca</i>	LC
31	Red-eyed Dove	<i>Streptopelia semitorquata</i>	LC
32	Eurasian Moorhen	<i>Gallinula chloropus</i>	LC
33	Red-knobbed Coot	<i>Fulica cristata</i>	LC
34	Little Grebe	<i>Tachybaptus ruficollis</i>	LC
35	Marabou Stork	<i>Leptoptilos crumenifer</i>	LC
36	Reed Cormorant	<i>Microcarbo africanus</i>	LC
37	Great Cormorant	<i>Phalacrocorax carbo</i>	LC

38	Black Kite	<i>Milvus migrans</i>	LC
39	Malachite Kingfisher	<i>Corythornis cristatus</i>	LC
40	Northern Red-fronted Tinkerbird	<i>Pogoniulus uropygialis</i>	LC
41	African Paradise-Flycatcher	<i>Terpsiphone viridis</i>	LC
42	Buff-bellied Warbler	<i>Phyllolais pulchella</i>	LC
43	Red-throated Crag-Martin	<i>Ptyonoprogne rufigula</i>	LC
44	Abyssinian White-eye	<i>Zosterops abyssinicus</i>	LC
45	Red-winged Starling	<i>Onychognathus morio</i>	LC
46	Beautiful Sunbird	<i>Cinnyris pulchellus</i>	LC
47	Red-cheeked Cordonbleu	<i>Uraeginthus bengalus</i>	LC
48	Red-billed Firefinch	<i>Lagonosticta senegala</i>	LC

Source: <https://ebird.org/hotspot/L1550648/bird-list?yr=cur>

ANNEX 5: LIST OF BIRD SPECIES RECORDED FROM THE AKAKI-ABA SAMUEL RIVERS AND RESERVOIRS

No.	Common Name	Scientific Name	IUCN Status
1	Greater Spotted Eagle	<i>Aquila clanga</i>	Vu
2	Lesser Kestrel	<i>Falco naumanni</i>	LC
3	Yellow-billed Kite	<i>Milvus aegyptius</i>	LC
4	Dark Chanting Goshawk	<i>Melierax poliopterus</i>	LC
5	Tawny Eagle	<i>Aquila rapax</i>	LC
6	African Fish Eagle	<i>Haliaeetus vocifer</i>	LC
7	Marabou Stork	<i>Leptoptilos crumeniferus</i>	LC
8	Ruff	<i>Philomachus pugnax</i>	LC
9	Northern Shoveler	<i>Anas clypeata</i>	LC
10	Lesser Flamingo	<i>Phoeniconaias minor</i>	NT
11	Wattled Crane	<i>Buggeranus carunculatus</i>	Vu
12	Common Crane	<i>Grus grus</i>	LC
13	Wattled Ibis*	<i>Bostrychia carunculata</i>	LC
14	Hadada Ibis	<i>Bostrychia hagedash</i>	LC
15	Great White Pelican	<i>Pelecanus onocrotalus</i>	LC
16	Yellow-billed Stork	<i>Mycteria ibis</i>	LC
17	Greater Flamingo	<i>Phoenicopterus ruber</i>	LC
18	Egyptian Goose	<i>Alopochen aegyptiacus</i>	LC
19	Yellow-billed Duck	<i>Anas undulata</i>	LC
20	Black-winged Stilt	<i>Himantopus himantopus</i>	LC
21	Spur-winged Lapwing	<i>Vanellus spinosus</i>	LC
22	Black Crowned Crane	<i>Balearica pavonina</i>	Vu
23	African Pigmy-goose	<i>Nettapus auritus</i>	LC
24	Corncrake	<i>Crex crex</i>	LC

25	African Sacred Ibis	<i>Threskiornis aethiopicus</i>	LC
26	Hamerkop	<i>Scopus umberetta</i>	LC
27	Cattle Egret	<i>Bubulcus ibis</i>	LC
28	Little Egret	<i>Egretta garzetta</i>	LC
29	Great Egret	<i>Ardea alba</i>	LC
30	Black-headed Heron	<i>Ardea melanocephala</i>	LC
31	Squacco Heron	<i>Ardeola ralloides</i>	LC
32	Striated Heron	<i>Butorides striata</i>	LC
33	Helmeted Guinea-fowl	<i>Numida meleagris</i>	LC
34	Speckled Pigeon	<i>Columba guinea</i>	LC
35	Red-eyed Dove	<i>Streptopelia semitorquata</i>	LC
36	Laughing Dove	<i>Streptopelia senegalensis</i>	LC
37	Ring-necked Dove	<i>Streptopelia capicola</i>	LC
38	Dusky Turtle Dove	<i>Streptopelia lugens</i>	LC
39	Tacazze Sunbird	<i>Nectarinia tacazze</i>	LC
40	Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	LC
41	Common Bulbul	<i>Pycnonotus barbatus</i>	LC
42	African Paradise Flycatcher	<i>Terpsiphone viridis</i>	LC
43	Mocking Cliff Chat	<i>Thamnolaea cinnamomeiventris</i>	LC
44	Pied Crow	<i>Corvus albus</i>	LC
45	Greater Blue-eared Starling	<i>Lamprotornis chalybaeus</i>	LC
46	Wattled Starling	<i>Creatophora cinerea</i>	LC
47	Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>	LC
48	Abyssinian Ground- hornbill	<i>Bucorvus abyssinicus</i>	LC
49	Fan-tailed Raven	<i>Corvus rhipidurus</i>	LC
50	Thick-billed Raven*	<i>Corvus crassirostris</i>	LC

51	Black-crowned Tchagra	<i>Tchagra senegalus</i>	LC
52	Abyssinian Thrush	<i>Turdus abyssinicus</i>	LC
53	Northern Red Bishop	<i>Euplectes franciscanus</i>	LC
54	Common Fiscal	<i>Lanius collaris</i>	LC
55	Abyssinian lovebird (Black-winged Lovebird)**	<i>Agapornis taranta</i>	LC
56	Long-billed Pipit	<i>Anthus similis</i>	LC
57	Little Bee-eater	<i>Merops pusillus</i>	LC
58	Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	LC
59	Village Weaver	<i>Ploceus cucullatus</i>	LC
60	Baglaffeht Weaver	<i>Ploceus baglaffeht</i>	LC
61	Swainson's Sparrow	<i>Passer swainsonii</i>	LC
62	Ethiopian Boubou**	<i>Laniarius aethiopicus</i>	LC
63	Blue-breasted Bee-eater	<i>Merops variegatus</i>	LC
64	Speckled Mousebird	<i>Colius striatus</i>	LC
65	Brown-rumped Seedeater	<i>Serinus tristriatus</i>	LC
66	Streaky Seedeater	<i>Serinus striolatus</i>	LC
67	Red-cheeked Cordon- bleu	<i>Ureghinthus bengalus</i>	LC
68	Red-billed Firefinch	<i>Lagonosticta senegala</i>	LC
69	Village Indigobird	<i>Vidua chalybeata</i>	LC
70	Pin-tailed Whydah	<i>Vidua macroura</i>	LC
71	Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	LC
72	Red-billed Quelea	<i>Quelea quelea</i>	LC
73	Thekla's lark	<i>Galerida theklae</i>	LC

* = Endemic; ** = Near Endemic : **Key to IUCN Status:** EN = Endangered; VU = Vulnerable; LC = Least Concern; NT = Near Threatened

Sources: Previous ESIA Studies on “Environmental and Social Impact Assessment (ESIA) of South Akaki Sub-Catchment WWTPs and Sewer Lines Project” By **ETG Designers and Consultants Sh.Co.** ; Local Informants; and Site Observation by the Consultant.

Sources: **A.** BirdLife International (2021) Important Bird Areas factsheet; **B.** N. Redman, et. al. (2009) Birds of the Horn of Africa: Ethiopia, Eritrea, Djibouti, Somalia and Socotra; **C.** Observation by the Consultant

ANNEX 6: LABORATORY WATER QUALITY RESULT

Laboratory water quality result (Coordinate is UTM, Zone 37, WGS 1984)

Source	Sample Code	Easting(m)	Northing (m)	Turbidity(NTU)	EC (us/cm)	TDS (mg/l)	T, 0C	pH	NH4 (mg/l)	Na+ (mg/l)	K+ (mg/l)	Ca++ (mg/l)	Mg++(mg/l)	Fe total (mg/l)	Mn++ (mg/l)	Cl- (mg/l)	NO2- (mg/l)	NO3- (mg/l)	F-(mg/l)	HCO3-(mg/l)	CO3--(mg/l)	SO4--(mg/l)	PO4---(mg/l)
Akaki/Gerbi River	RS-1	4729 27	9570 24	6.65	87 0	532	21	8.5	1.5 6	91.5	31	78. 24	12. 46	0.2 6	0.9 8	68. 67	3.6 4	19. 05	0.7 4	329	4.7 4	20. 97	1.1 6
Dukem River	RS-2	4813 59	9610 88	209. 37	10 74	731	25	9.6 8	5.2 8	188. 68	49	22. 22	3.3 3	2.8	1.5 4	237 .9	0.2 1	0.9 8	0.6 8	55	30. 8	29. 5	0.0 1
Borehole	BH-1	4757 97	9564 79	0.41	72 0	493	58. 7	8.8 7	0.2 1	87.2 9	47. 72	10. 34	4.7 7	0.0 2	0.0 2	49. 3	0.0 6	0.3 3	2.6	278. 32	14. 28	21. 79	0.1 7
Borehole	BH-2	4802 80	9631 40	0.43	47 8	316. 21	34	8.4	0.3 4	38.8	9.1 6	46. 06	28. 11	0.1	0.0 2	10. 8	0.0 4	3.4 3	0.4 7	236. 28	14. 23	10. 88	0.0 2

Insitu/field/ water quality measurement from upstream of Akaki/Gerbi River

Source	Easting	Northing	Temperature	PH	EC (us/cm)	TDS (mg/l)
Akaki/Gerbi River	4717 15	9602 63	21.5	8.4	85 8	527

		ኢትዮጵያ ኢንጅነሪንግ ኮርፖሬሽን Ethiopian Engineering Corporation	
Tel: +251-11-872-3643/+251-11-872-3478/+251-11-869-5125/+251-11-872-1236, Fax +251-11-661-53-71 P.O.Box 2561, Meggenaga to Boile Road, in front of firmes Imperial Hotel, headquarter E-mail: info@eec.com		Page No. 2 of 2	
Water Quality Test Report			
Title: Lab No.: 0675/17 Client/Project: ETG Design & Consultant S.C Client ID: RS-1 Place of sampling: Abusera, Gerbi Contact Person: Dr. Yared Contact Address: 0942-23-32-78 Date Reported: 31/01/2025	Document No. DF/EEC/0941	Client Ref.: Lab /02/Wq/343/25 Date of sampled: 14/01/2025 Source of Sample: River Date Received: 22/01/2025 Date Analysis: 22/1/25-5/2/2025	

No	Tests	Test Results	Unit	Test Method (APHA 24th Edition)	WHO maximum allowable Concentration (mg/L)
23	Sulfide	ND	mg/L	4500 S ² -D	-
24	Boron(B)	0.05	mg/L	4500-B.B.	0.5
25	Nickel (Ni)	ND	mg/L	311 B.	0.07
26	Copper(Cu)	ND	mg/L	3111 B.	2
27	Chromium(Cr)	ND	mg/L	3111 B.	
28	Zinc (Zn)	ND	mg/L	3111 B.	15
29	Lead (pb)	ND	mg/L	3111 B.	0.01
30	Cadmium (Cd)	ND	mg/L	3111 B.	0.003

REMARK:-1. The test result can be compared with the WHO maximum allowable concentration (mg/L) presented on the right column.

2 This test report is only for this specific water sample.

3 The water sample is collected and submitted to the laboratory by client.

4 ND = Not detected

5 The sample was collected eight days ago.

Reported by  Lab Expert Abcebaw Ayana	Checked by  Senior W.Q Expert Fekadu Badeg	Approved by  Rep. W.Q S/P Manager Mekdes Berma
---	--	--

Please make sure that this document is the correct version before use.



		06-8889 A-383079 INC 409 Ethiopian Engineering Corporation Tel: +251-11-872-3643/-351-11-872-3478/-351-11-869-8125/-351-11-872-1236, Fax: +251-11-661-81-71 P.O. Box: 2561, Addis Ababa, Ethiopia Email: info@eec.com	
Water Quality Test Report		Document No: 06-888941	Page No: 1 of 3
Lab No.: 0677/17	Client Ref.: Lab/02/99/03/25	Date of sampling:- 14/01/2025	
Client/Project:- ETO Design & Consultant S.C	Client ID:- BH-1	Source of sample:- Bore Hole	
Place of sampling:- Abusera	Contact Person:- Dr. Yared	Date Received:- 22/01/2025	
Contact Address:- 9942-23-32-78	Date Reported:- 05/02/2025	Date Analyzed:- 22/1/25-5/2/2025	

No	Tests	Test Results	Unit	Test Method (APHA 23th Edition)	WHO maximum allowable Concentration (mg/L)
1	pH	8.87		4500-11 th B.	6.5-8.5
2	Electrical Conductivity	720.00	µS/cm	2510 B.	-
3	Total Solids	484.00	mg/L	2540 B.	-
4	T. Dissolved Solid	493.95	mg/L	2540 C.	1000.0
5	Turbidity	0.41	NTU	2130 B.	5.0
6	Sodium (Na ⁺)	87.29	mg/L	3500-Na B.	200.0
7	Potassium (K ⁺)	47.72	mg/L	3500-K B.	-
8	Total Iron (Fe ²⁺ & Fe ³⁺)	0.02	mg/L	3111 B.	0.5
9	Manganese (Mn)	0.02	mg/L	3111 B.	0.4
10	Ammonia (NH ₃ -N)	0.21	mg/L	Neusler	-
11	Total Hardness (Ca CO ₃)	45.73	mg/L	2340 C.	500.0
12	Calcium (Ca ²⁺)	10.34	mg/L	3500-Ca B.	200.0
13	Magnesium (Mg ²⁺)	4.77	mg/L	3500-Mg B.	150.0
14	Alkalinity (CaCO ₃)	251.9	mg/L	2320 B.	-
15	Carbonate (CO ₃ ²⁻)	14.28	mg/L	2320 B.	-
16	Bicarbonate (HCO ₃ ⁻)	278.32	mg/L	4500-Cl B.	250.0
17	Chloride (Cl ⁻)	49.30	mg/L	4500-SO ₄ ²⁻ E.	400.0
18	Sulphate (SO ₄ ²⁻)	21.79	mg/L	HACH Cadmium Reduction Method	10.0
19	Nitrate (NO ₃ -N)	0.33	mg/L	HACH Diazotization Method	3.0
20	Nitrite (NO ₂ -N)	0.06	mg/L	4500-F C.	1.5
21	Fluoride (F ⁻)	2.60	mg/L	4500-P D.	-
22	Phosphate (PO ₄ ³⁻ -P)	0.17	mg/L	4500-B B.	0.5
23	Boron (B)	0.23	mg/L	4500-S ² D	-
24	Sulfide	ND	mg/L		-

REMARK:- 1. The test result can be compared with the WHO maximum allowable concentration (mg/L) presented on the right column.
 2. This test report is only for this specific water sample.
 3. The water sample is collected and submitted to the laboratory by client.
 4. ND = Not detected
 5. The sample was collected eight days ago.

Reported by:  Checked by: 
 Lab Expert: Alchaw Ayana Senior WQ Expert: Fekadu Badaj

Approved by: 
 Rep. W. Q. SPP Manager: Mekdes Gebreyohannes

Please make sure that this document is the correct version before use.

		ኢትዮጵያ ኢንጅነሪንግ ከርፖራሽን Ethiopian Engineering Corporation	
Tel: +251-11-872-3643/+251-11-872-3478/+251-11-869-5126/+251-11-872-1236, Fax: +251-11-661-5371 P.O. Box: 2561, Megnewa to Bole Road, in front of former Imperial Hotel, headquarter E-mail: info@eec.com		Page No: 1 of 2	
Water Quality Test Report		Document No: DR/EEC/0941	
Title: Lab No.: 0678/17		Client Ref.: Lab/02/WQ/343/25	
Client/Project: ETG Design & Consultant S.C		Date of sampled: 14/01/2025	
Client ID: BH-2		Source of Sample: Bore Hole	
Place of sampling: Abuseta		Date Received: 22/01/2025	
Contact Person: Dr. Yared		Date Analysis: 22/1/25-5/2/2025	
Contact Address: 0942-23-32-78			
Date Reported: 05/02/2025			

No	Tests	Test Results	Unit	Test Method (APHA 23th Edition)	WHO maximum allowable Concentration (mg/L)
1	pH	8.40		4500-H ⁺ B.	6.5-8.5
2	Electrical Conductivity	478.00	µS/cm	2510 B.	-
3	Total Solids	328.00	mg/L	2540 B.	-
4	T. Dissolved Solid	316.21	mg/L	2540 C.	1000.0
5	Turbidity	0.43	NTU	2130 B.	5.0
6	Sodium (Na ⁺)	38.80	mg/L	3500-Na B.	200.0
7	Potassium (K ⁺)	9.16	mg/L	3500-K B.	-
8	Total Iron (Fe ²⁺ & Fe ³⁺)	0.1	mg/L	3111 B.	0.5
9	Manganese (Mn)	0.02	mg/L	3111 B.	0.4
10	Ammonia (NH ₃ -N)	0.34	mg/L	Nessler	-
11	Total Hardness (CaCO ₃)	232.28	mg/L	2340 C.	500.0
12	Calcium (Ca ²⁺)	46.06	mg/L	3500-Ca B.	200.0
13	Magnesium (Mg ²⁺)	28.11	mg/L	3500-Mg B.	150.0
14	Alkalinity (CaCO ₃)	217.4	mg/L	2320 B.	-
15	Carbonate (CO ₃ ²⁻)	14.23	mg/L	2320 B.	-
16	Bicarbonate (HCO ₃ ⁻)	236.28	mg/L	2320 B.	-
17	Chloride (Cl ⁻)	10.80	mg/L	4500-Cl B.	250.0
18	Sulphate (SO ₄ ²⁻)	10.88	mg/L	4500-SO ₄ ²⁻ E.	400.0
19	Nitrate (NO ₃ -N)	3.43	mg/L	HACH Cadmium Reduction Method	10.0
20	Nitrite (NO ₂ -N)	0.04	mg/L	HACH Diazotization Method	3.0
21	Fluoride (F ⁻)	0.47	mg/L	4500-F C.	1.5
22	Phosphate (PO ₄ ³⁻ -P)	0.02	mg/L	4500-P D.	-
23	Boron (B)	0.07	mg/L	4500-B B.	0.5
24	Sulfide	ND	mg/L	4500-S ²⁻ D	-

REMARK:-1. The test result can be compared with the WHO maximum allowable concentration (mg/L) presented on the right column.

2. This test report is only for this specific water sample.

3. The water sample is collected and submitted to the laboratory by client.

4. ND = Not detected

5. The sample was collected eight days ago.

Reported by:  Senior W. Q. Expert

Lab Expert: Abchaw Ayana

Checked by:  W. Q. Ssp Manager

Approved by:  W. Q. Ssp Manager

Rep. W. Q. Ssp Manager Maken/Chirwa

Please make sure that this document is the correct version before use



Page | 666

		06/444FA28/6079 HC/2487 Ethiopian Engineering Corporation	
Title: _____		Tel: +251-11-872-4643 ~ 251-11-872-3478 ~ 251-11-869-5125 ~ 251-11-872-1236, Fax: +251-11-661-63-71 P.O. Box: 2561, Meskenna to Bole Road, in front of former Imperial Hotel, Addis Ababa, Ethiopia E-mail: info@eec.com	
Water Quality Test Report		Document No: 06/EEC0041	Page No: 4 1 of 2
Lab No.: 0676/17	Client Ref.: Lab/02/WQ/043/25		
Client/Project: ETG Design & Consultant S.C	Date of sampling: 14/01/2025		
Client ID: RS-2	Source of Sample: River		
Place of sampling: Abusra	Date Received: 22/01/2025		
Contact Person: Dr. Yared	Date Analysis: 22/1/25-5/2/2025		
Contact Address: 0942-23-32-78			
Date Reported: 05/02/2025			

No	Tests	Test Results	Unit	Test Method (APHA 23th Edition)	WHO maximum allowable Concentration (mg/L)
1	pH	9.68			
2	Electrical Conductivity	1074.00	µS/cm	4500-H ⁺ B.	6.5-8.5
3	Total Solids	576.00	mg/L	2510 B	
4	T. Dissolved Solid	731.08	mg/L	2540 B.	
5	Turbidity	209.37	NTU	2540 C	1000.0
6	Sodium (Na ⁺)	188.68	mg/L	2130 B.	5.0
7	Potassium (K ⁺)	49.09	mg/L	3500-Na B.	200.0
8	Total Iron (Fe ²⁺ & Fe ³⁺)	2.80	mg/L	3500-K B	0.5
9	Manganese (Mn)	1.54	mg/L	3111 B.	0.4
10	Ammonia (NH ₃ -N)	5.28	mg/L	Nessler	
11	Total Hardness (Ca CO ₃)	69.44	mg/L	2340 C	500.0
12	Calcium (Ca ²⁺)	22.22	mg/L	3500-Ca B.	200.0
13	Magnesium (Mg ²⁺)	3.33	mg/L	3500-Mg B.	150.0
14	Alkalinity (CaCO ₃)	96.8	mg/L	2320 B	
15	Carbonate (CO ₃ ²⁻)	30.82	mg/L	2320 B	
16	Bicarbonate (HCO ₃ ⁻)	55.44	mg/L	2320 B	
17	Chloride (Cl ⁻)	237.94	mg/L	2320 B	
18	Sulphate (SO ₄ ²⁻)	29.52	mg/L	4500-Cl B.	250.0
19	Nitrate (NO ₃ -N)	0.98	mg/L	4500-SO ₄ ²⁻ E	400.0
20	Nitrite (NO ₂ -N)	0.21	mg/L	HACH Cadmium Reduction Method	10.0
21	Fluoride (F ⁻)	0.68	mg/L	HACH Diazotization Method	3.0
22	Phosphate (PO ₄ ³⁻ -P)	0.01	mg/L	4500-F C.	1.5
23	Boron (B)	0.16	mg/L	4500-P D.	0.5
24	Sulfide	0.40	mg/L	4500-B B.	
				4500 S ²⁻ D	-

REMARK:- The test result can be compared with the WHO maximum allowable concentration (mg/L) presented on the right column.

2 This test report is only for this specific water sample.

3 The water sample is collected and submitted to the laboratory by client.

4 The sample was collected eight days ago. And the sample was slightly turbid.

Reported by: A
 Lab Expert: Abraham Ayana

Checked by: Assef
 Senior WQ Expert: Fekadu Baig

Approved by: Assef
 Rep. WQ Specialist: Assef



Please make sure that this document is the correct version before use.

Water quality result of boreholes (within 30km radius) from collected secondary data (Coordinate is UTM, Zone 37, WGS 1984)																						
Source ID no	ID given no	Easting	Northing	EC (µs/cm)	TDS (mg/l)	T, 0C	pH	NH4(mg/l)	Na+(mg/l)	K+(mg/l)	Ca++(mg/l)	Mg++(mg/l)	Fe total(mg/l)	Mn++(mg/l)	Cl-(mg/l)	NO2-(mg/l)	NO3-(mg/l)	F-(mg/l)	HCO3-(mg/l)	CO3--(mg/l)	SO4--(mg/l)	PO4---(mg/l)
AdBh0199	BH-3	456740	962388	510	350	21	7.19	0.06	42	9.8	62.8	9.4	0.03	0	6.7	0.01	7.5	1.25	333.1	0	2.64	0.18
AMW4	BH-4	456402	962608	536	360	29.4	7.25	0.23	41	11	65.32	12.32	0.03	0	8.64		2.39	1.36	311.47	0.25	18	0.4
AdBh0263	BH-4	481162	935226	354	232	30	7.4	0.05	29.5	6.7	38.2	7.2	0.32	0	3.8	0.01	7	0.96	225.5	0	0.26	0.22
AdBh0207	BH-5	444924	954222	546	372	21.7	7.03	0.025	28	7.2	81.9	13.2	0.05	0	6.7	0.01	10.7	0.96	296.1	0	0.53	0.18
AdBh0049	BH-6	483243	961360	503	330		7.58	0.25	39	6.8	56.1	17.3	0	0	5.8	0.01	13.5	1.6	320	0	0.26	0.08
AdBh0032	BH-7	489485	943724	486	310		7.53	0.113	48.5	7.6	55.2	4.3	0	0	6.7	0.01	7.5	2.2	297.2	0	3.96	0.33
AA085	BH-8	476574	975607	385	250.25		8.1	0	25.5	4.3	44.9	11.6	0.05	0	14.2	0.04	3.2	0.6	244	0	0	0.07
AA086	BH-9	479714	978929	485	315.25		7.5	0	24.5	4.2	45.7	27.2	0.04	0	9	0.02	18.6	0.35	307.4	0	6.6	0.03
AA089	BH-10	476246	977104	512	332.8		7.3	0	27.2	3.6	48.5	27.7	0	0	8.7	0.02	16.7	0.42	327	0	7	0.04
AA088	BH-11	479061	976370	464	301.6			0	27.2	3.63	44.9	29.2	0	0	17	0.01	25.7	0.24	305	0	0	0.06
AA090	BH-12	478808	976897	508.2	330.33		8	0	27.2	3.96	59.3	24.32	0.02	0	11.96	0.01	9.8	0.52	341.6	0	6.5	0.03
AA092	BH-13	478347	976752	542.4	352.56		7.5	0	27.2	5.3	56.1	24.4	0.12	0	14.2	0.15	3.9	0.39	329.4	0	5.35	0
AA0101	BH-14	477945	976985	398	258.7		7.5	0	23.8	4.6	43.3	13.6	0.03	0	14.2	0.01	4.9	0.6	244	0	0	0.03
AA097	BH-15	477477	977216	462.8	300.82			0.04	18.7	4.64	59.3	19.5	0.04	0	14.2	0.13	1.33	0.5	305	0	0	0.04
AA100	BH-	4770	9756	476.	309.		7.8	0	27.	3.9	49.7	23.3	0.01	0	12	0.01	12.3	0.55	292.	0	7.4	0

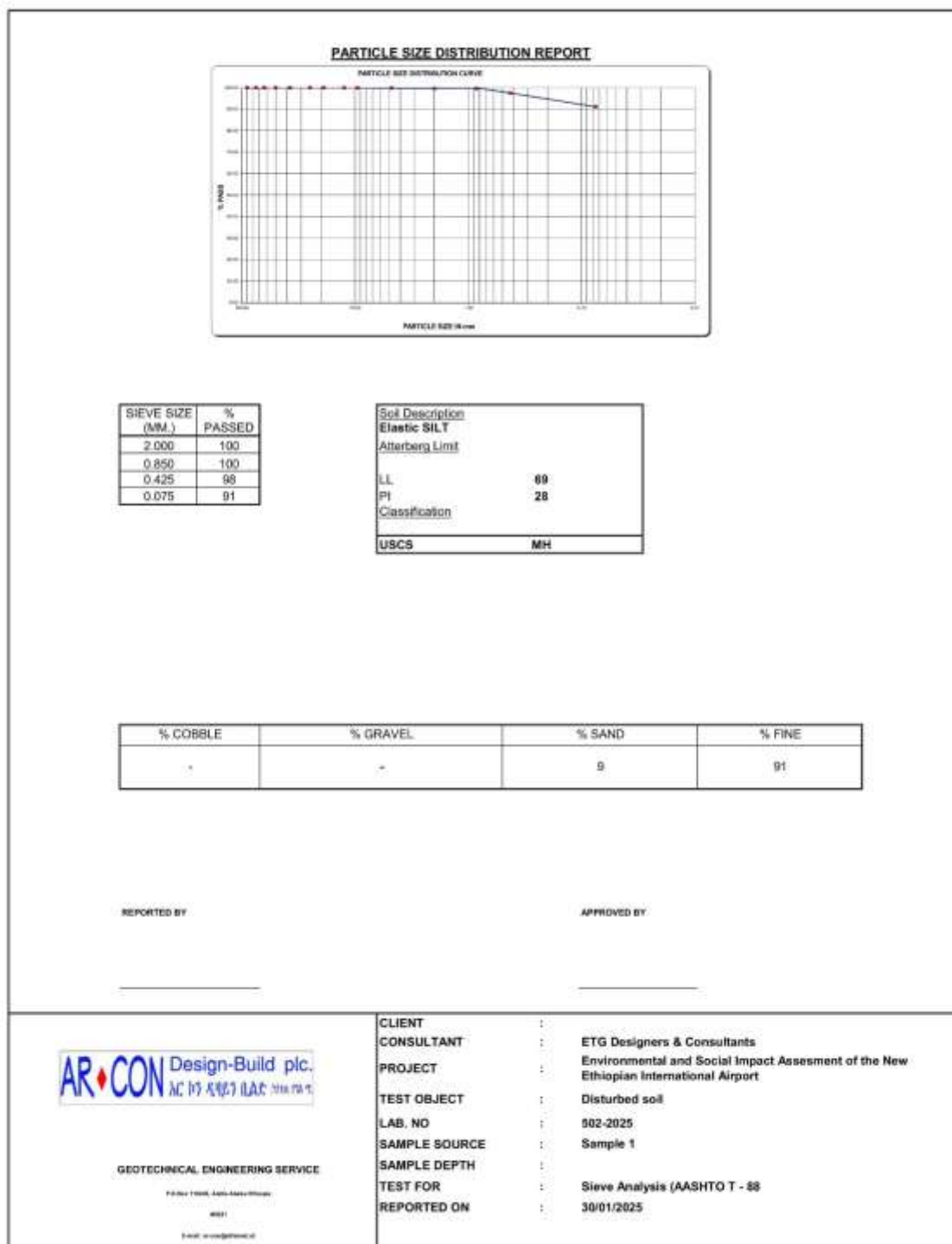
	16	86	24	4	66				2	6		5						8				
AA099	BH-17	4771 62	9760 38	494. 2	321. 23		7.3	0	27. 2	4.3	49.7	23.4	0.08	0	14.2	4.2	9.4	0.4	292. 8	0	8.85	0
AMW12 B	BH-18	4903 36	9707 89	500	350	38	8.0 7	0.20 8	75	22	27.7 2	5.1	0.02		89.1 5	0.2	5	1.59	340. 38	0	1.14	0.41 5
AMW24 B	BH-19	4904 44	9513 36	599	390	39	7.0 3	0.12	64	10. 6	50.4	20.4	0.06	0.02	11.9 2	0.01 5	7.5	1.62	399. 67	0	1.82	0.15
AMW25	BH-20	5064 64	9419 89	854	578	39	7.9 7	0.03	21 4	14. 8	12.6	2	0.04	0	62.5 6	4.6	7.82	5.8	419. 7	0	43.5 1	0.35
AMW4	BH-21	4563 14	9625 92	536	360	29.4	7.2 5	0.23	41	11	65.3 2	12.3 2	0.2	0.1	8.64	0	2.39	1.36	311. 47	0	13.6 5	0.4
AMW5	BH-22	4789 90	9558 03	616	400	44.5	7.5	2.14	10 5	23. 5	21.1 2	3.24	0.04	0.1	13.4 4	0.00 5	0.17	1.94	363. 07	0	13.0 8	0.28
AdBh02 01	BH-23	4569 88	9521 35	368	246	20	6.8 8	0.05	22	7.2	45.5	14.9	0	0	4.8		4.8	1.2	240. 8	0	0.53	0.18
AdBh02 07	BH-24	4449 24	9542 22	546	372	21.7	7.0 3	0.02 5	28	7.2	81.9	13.2	0.05	0	6.7		10.7	0.96	296. 1	0	0.53	0.18
AA062	BH-25	4842 66	9761 50	545	362	79.4 1	41. 9	20	7.6 5	0.3	36	5.9	55.4 4	23.9 7	0.1	0.2	11.9 2	0.01 5	4.88	0.3	346. 5	0
AdBh00 02	BH-26	4757 05	9562 71	159 0		24																
AdBh00 37	BH-27	4806 41	9770 09	453		19																
AdBh00 38	BH-28	4835 67	9760 37	460		20																
AdBh00 39	BH-29	4964 79	9657 00	807																		
Water quality laboratory test of Awash River																						
Source ID	Source	Easting	Northing	EC (µs/cm)	TDS (mg/l)	T, 0C	pH	NH4(mg/l)	Na+(mg/l)	K+(mg/l)	Ca++(mg/ l)	Mg++(mg/ l)	Fe total(mg/l)	Mn++(mg /l)	Cl-(mg/l)	NO2- (mg/l)	NO3- (mg/l)	F-(mg/l)	HCO3- (mg/l)	CO3-- (mg/l)	SO4-- (mg/l)	PO4--- (mg/l)
BHTRv 4	Awa sh River	4725 70	9521 75	316	230	20	8	4.9	27	6.2	41.8	12.5	0.03	0	5.7	0	8	0.41	233. 9	0	1.1	0.06

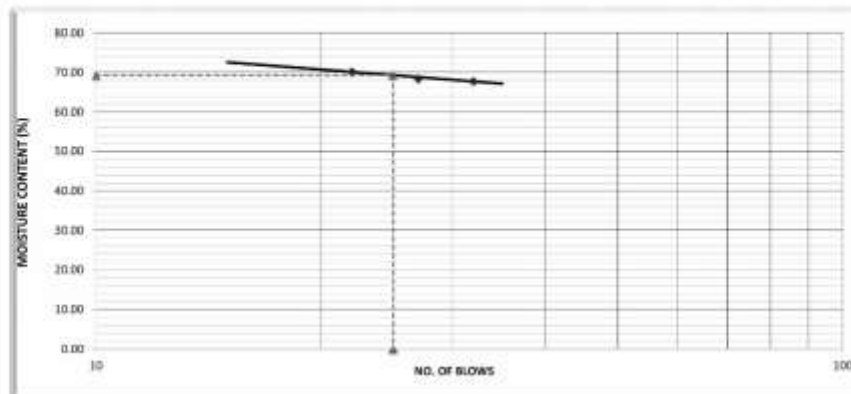
ANNEX 7: SOIL TEST RESULT

Soil test result of field collected samples							
Date collected	Sample-ID	Easting	Northing	Grain size	Liquid limit	Plastic limit	Specific Gravity
30/01/2025	S-1	478635	962927	9% sand, 91% fine	69	28	2.49
30/01/2025	S-2	479270	961194	20% sand, 77%fine, 3%gravel	NP	NP	2.53
30/01/2025	S-3	478015	959047	2% sand, 98 %fine	60	25	2.52
30/01/2025	S-4	475222	958740	57% sand, 41% fine, 2% gravel	NP	NP	2.47
30/01/2025	S-5	474256	960942	3% sand, 97% fine	65	23	2.49
30/01/2025	S-6	476108	961696	3% sand, 97% fine	65	22	2.47

Secondary soil test data from Geotechnical borhole log data in the area								
Bh ID from source	Bh depth	Easting	Northing	Top	Medium	Bottom (to 10m)	Bottom (to 20m)	Bottom to 25m)
BH-01	10m	474501	957348	0.5m high plastic, medium stiff, dark grey, silt clay	3.5m medium to low plastic, very stiff, sandy clay	6m of Decomposed rock, low to non plastic, dense, light brown to light grey clay, silt, sand with parent rocks.		
BH-02	10m	475497	957491	2.5m	2m	5.5m		
BH-03	10m	476374	957987	3m	7m			
BH-05	10m	477318	958352	3m	1m	16m		
BH-07	10m	478207	958752	2.5m	3.5m	4m		
BH-08	10m	474093	959119	5m	5m			
BH-09	10m	479164	959137	2m	1.5m	6.5m		

BH-10	20m	476898	959229	5m	10m	5m low plastic, very dense, light brown clay sandy silt	5m of Decomposed rock, low to non plastic, dense, light brown to light grey clay, silt, sand with parent rocks	
BH-11	10m	474976	959443	2m	1m	6m of Decomposed rock, low to non plastic, dense, light brown to light grey clay, silt, sand with parent rocks.		
BH-12	10m	480047	959593	1.5m	8.5m			
BH-13	25m	478265	959727	3m	2.5m	3m	4m medium plastic, stiff to very stiff, light brown to light grey, clay silt	3m of Decomposed rock, low to non plastic, dense, light brown to light grey clay, silt, sand with parent rocks
BH-14	10m	475833	959923	4.5m	3m	2.5m		
BH-16	10m	476812	960238	5m	4m	1m		
BH-17	10m	477734	960617	5m	5m			
BH-18	10m	479538	961296	2m	3m	5m		



LIQUID AND PLASTIC LIMITS TEST REPORT

No. Blows	LIQUID LIMIT			PLASTIC LIMIT	
	32	27	22		
Wt. wet soil (g.)	16.35	16.26	16.53	2.73	3.46
Wt. dry soil (g.)	9.74	9.65	9.71	1.94	2.47
Moisture content (%)	67.86	68.50	70.24	40.72	40.89
				AV. PL (%)	40.8

Liquid Limit LL(%)	Plastic Limit PL(%)	Plasticity Index Pi	% PASSED Sieve Size		
			2mm	0.425mm	0.075mm
69	41	28	0	0	0

Natural Moisture Content(%)	17.86
Dry Density (kg/m ³)	17.29
Specific Gravity	2.53
Shrinkage Limit (%)	16.5

REPORTED BY

APPROVED BY



GEOTECHNICAL ENGINEERING SERVICE

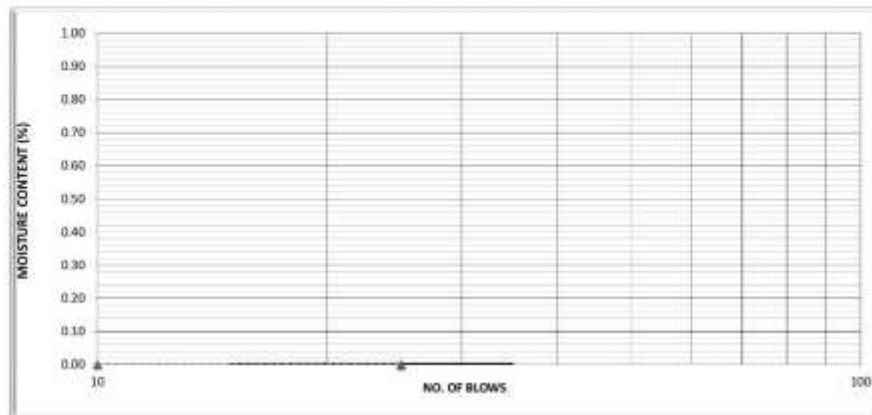
P.O. Box 110344, Addis Ababa Ethiopia

WEBSITE

Fax: +251 880 36 96

CLIENT :
 CONSULTANT : ETG Designers & Consultants
 PROJECT : Environmental and Social Impact Assessment of
 TEST OBJECT : the New Ethiopian International Airport
 LAB. NO : Disturbed soil
 SAMPLE SOURCE : 502-2025
 SAMPLE DEPTH : Sample 1
 TEST FOR : Atterberg Limit
 REPORTED ON : 30/01/2025

PARTICLE SIZE DISTRIBUTION REPORT																													
																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SIEVE SIZE (MM.)</th> <th>% PASSED</th> </tr> </thead> <tbody> <tr><td>9.500</td><td>100</td></tr> <tr><td>4.750</td><td>98</td></tr> <tr><td>2.000</td><td>96</td></tr> <tr><td>0.850</td><td>96</td></tr> <tr><td>0.425</td><td>91</td></tr> <tr><td>0.075</td><td>77</td></tr> </tbody> </table>	SIEVE SIZE (MM.)	% PASSED	9.500	100	4.750	98	2.000	96	0.850	96	0.425	91	0.075	77	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="padding: 2px;">Soil Description</td></tr> <tr><td colspan="2" style="padding: 2px;">SILT</td></tr> <tr><td colspan="2" style="padding: 2px;">Atterberg Limit</td></tr> <tr><td style="padding: 2px;">LL</td><td style="padding: 2px;">NP</td></tr> <tr><td style="padding: 2px;">PI</td><td style="padding: 2px;">NP</td></tr> <tr><td colspan="2" style="padding: 2px;">Classification</td></tr> <tr><td style="padding: 2px;">USCS</td><td style="padding: 2px;">ML</td></tr> </table>	Soil Description		SILT		Atterberg Limit		LL	NP	PI	NP	Classification		USCS	ML
SIEVE SIZE (MM.)	% PASSED																												
9.500	100																												
4.750	98																												
2.000	96																												
0.850	96																												
0.425	91																												
0.075	77																												
Soil Description																													
SILT																													
Atterberg Limit																													
LL	NP																												
PI	NP																												
Classification																													
USCS	ML																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">% COBBLE</th> <th style="width: 25%;">% GRAVEL</th> <th style="width: 25%;">% SAND</th> <th style="width: 25%;">% FINE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">3</td> <td style="text-align: center;">20</td> <td style="text-align: center;">77</td> </tr> </tbody> </table>				% COBBLE	% GRAVEL	% SAND	% FINE	-	3	20	77																		
% COBBLE	% GRAVEL	% SAND	% FINE																										
-	3	20	77																										
REPORTED BY _____		APPROVED BY _____																											
 ARCON Design-Build plc. አርኮን ዲዛይን ቢልድ ቢሮ GEOTECHNICAL ENGINEERING SERVICE P.O. Box 11046, Addis Ababa, Ethiopia E-mail: arcon@arcon.et		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">CONSULTANT</td> <td style="width: 10%; text-align: center;">:</td> <td>ETG Designers & Consultants</td> </tr> <tr> <td>PROJECT</td> <td style="text-align: center;">:</td> <td>Environmental and Social Impact Assessment of the New Ethiopian International Airport</td> </tr> <tr> <td>TEST OBJECT</td> <td style="text-align: center;">:</td> <td>Disturbed soil</td> </tr> <tr> <td>LAB. NO</td> <td style="text-align: center;">:</td> <td>502-2025</td> </tr> <tr> <td>SAMPLE SOURCE</td> <td style="text-align: center;">:</td> <td>Sample 2</td> </tr> <tr> <td>SAMPLE DEPTH</td> <td style="text-align: center;">:</td> <td></td> </tr> <tr> <td>TEST FOR</td> <td style="text-align: center;">:</td> <td>Sieve Analysis (AASHTO T - 88)</td> </tr> <tr> <td>REPORTED ON</td> <td style="text-align: center;">:</td> <td>30/01/2025</td> </tr> </table>		CONSULTANT	:	ETG Designers & Consultants	PROJECT	:	Environmental and Social Impact Assessment of the New Ethiopian International Airport	TEST OBJECT	:	Disturbed soil	LAB. NO	:	502-2025	SAMPLE SOURCE	:	Sample 2	SAMPLE DEPTH	:		TEST FOR	:	Sieve Analysis (AASHTO T - 88)	REPORTED ON	:	30/01/2025		
CONSULTANT	:	ETG Designers & Consultants																											
PROJECT	:	Environmental and Social Impact Assessment of the New Ethiopian International Airport																											
TEST OBJECT	:	Disturbed soil																											
LAB. NO	:	502-2025																											
SAMPLE SOURCE	:	Sample 2																											
SAMPLE DEPTH	:																												
TEST FOR	:	Sieve Analysis (AASHTO T - 88)																											
REPORTED ON	:	30/01/2025																											

LIQUID AND PLASTIC LIMITS TEST REPORT

No. Blows	LIQUID LIMIT			PLASTIC LIMIT	
	NP	NP	NP	NP	NP
Wt. wet soil (g.)					
Wt. dry soil (g.)					
Moisture content (%)					
				AV. PL (%)	

Liquid Limit LL(%)	Plastic Limit PL(%)	Plasticity Index PI	% PASSED Sieve Size		
			2mm	0.425mm	0.075mm
NP	NP	NP	96	91	77

Natural Moisture Content (%)	9.09
Dry Density (kg/m ³)	20.56
Specific Gravity	2.53
Shrinkage Limit (%)	9.1

REPORTED BY

APPROVED BY

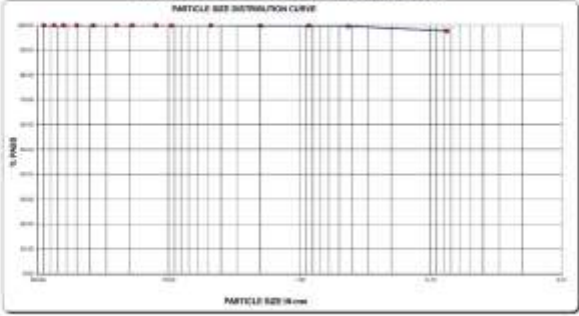


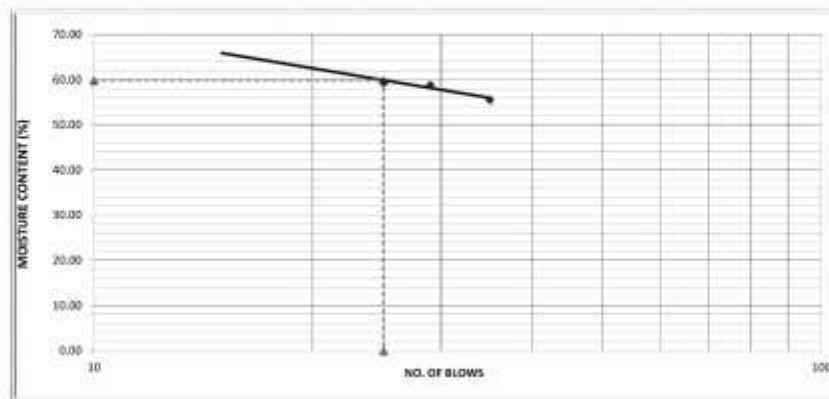
GEOTECHNICAL ENGINEERING SERVICE

P.O.Box 110318, Addis Ababa, Ethiopia

Fax: +251 944 34 18

CLIENT :
 CONSULTANT : ETG Designers & Consultants
 PROJECT : Environmental and Social Impact Assessment of
 TEST OBJECT : the New Ethiopian International Airport
 LAB. NO : Disturbed soil
 SAMPLE SOURCE : 502-2025
 SAMPLE DEPTH : Sample 2
 TEST FOR : Atterberg Limit
 REPORTED ON : 30/01/2025

PARTICLE SIZE DISTRIBUTION REPORT																														
																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">SIEVE SIZE (MM.)</th> <th style="text-align: left;">% PASSED</th> </tr> </thead> <tbody> <tr> <td>2.000</td> <td>100</td> </tr> <tr> <td>0.850</td> <td>100</td> </tr> <tr> <td>0.425</td> <td>100</td> </tr> <tr> <td>0.075</td> <td>98</td> </tr> </tbody> </table>	SIEVE SIZE (MM.)	% PASSED	2.000	100	0.850	100	0.425	100	0.075	98	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Soil Description</td> </tr> <tr> <td colspan="2">Elastic SILT</td> </tr> <tr> <td colspan="2">Atterberg Limit</td> </tr> <tr> <td>LL</td> <td style="text-align: right;">80</td> </tr> <tr> <td>PI</td> <td style="text-align: right;">25</td> </tr> <tr> <td colspan="2">Classification</td> </tr> <tr> <td>USCS</td> <td style="text-align: right;">MH</td> </tr> </table>			Soil Description		Elastic SILT		Atterberg Limit		LL	80	PI	25	Classification		USCS	MH			
SIEVE SIZE (MM.)	% PASSED																													
2.000	100																													
0.850	100																													
0.425	100																													
0.075	98																													
Soil Description																														
Elastic SILT																														
Atterberg Limit																														
LL	80																													
PI	25																													
Classification																														
USCS	MH																													
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 25%;">% COBBLE</th> <th style="width: 25%;">% GRAVEL</th> <th style="width: 25%;">% SAND</th> <th style="width: 25%;">% FINE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>2</td> <td>98</td> </tr> </tbody> </table>				% COBBLE	% GRAVEL	% SAND	% FINE	0	0	2	98																			
% COBBLE	% GRAVEL	% SAND	% FINE																											
0	0	2	98																											
REPORTED BY _____		APPROVED BY _____																												
 ARCON Design-Build plc. አር ኮን ዲዛይን ቢልድ ሃዘ. ም.ኤ. GEOTECHNICAL ENGINEERING SERVICE P.O. Box 11000, Addis Ababa, Ethiopia Email: arcon@arcon.com.et		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">CLIENT</td> <td style="width: 70%;">:</td> <td></td> </tr> <tr> <td>CONSULTANT</td> <td>:</td> <td>ETG Designers & Consultants</td> </tr> <tr> <td>PROJECT</td> <td>:</td> <td>Environmental and Social Impact Assessment of the New Ethiopian International Airport</td> </tr> <tr> <td>TEST OBJECT</td> <td>:</td> <td>Disturbed soil</td> </tr> <tr> <td>LAB. NO</td> <td>:</td> <td>002-2025</td> </tr> <tr> <td>SAMPLE SOURCE</td> <td>:</td> <td>Sample 3</td> </tr> <tr> <td>SAMPLE DEPTH</td> <td>:</td> <td></td> </tr> <tr> <td>TEST FOR</td> <td>:</td> <td>Sieve Analysis (AASHTO T - 88)</td> </tr> <tr> <td>REPORTED ON</td> <td>:</td> <td>21/02/2025</td> </tr> </table>		CLIENT	:		CONSULTANT	:	ETG Designers & Consultants	PROJECT	:	Environmental and Social Impact Assessment of the New Ethiopian International Airport	TEST OBJECT	:	Disturbed soil	LAB. NO	:	002-2025	SAMPLE SOURCE	:	Sample 3	SAMPLE DEPTH	:		TEST FOR	:	Sieve Analysis (AASHTO T - 88)	REPORTED ON	:	21/02/2025
CLIENT	:																													
CONSULTANT	:	ETG Designers & Consultants																												
PROJECT	:	Environmental and Social Impact Assessment of the New Ethiopian International Airport																												
TEST OBJECT	:	Disturbed soil																												
LAB. NO	:	002-2025																												
SAMPLE SOURCE	:	Sample 3																												
SAMPLE DEPTH	:																													
TEST FOR	:	Sieve Analysis (AASHTO T - 88)																												
REPORTED ON	:	21/02/2025																												

LIQUID AND PLASTIC LIMITS TEST REPORT

No. Blows	LIQUID LIMIT			PLASTIC LIMIT	
	35	29	25		
Wt. wet soil (g.)	16.31	16.38	16.57	3.14	2.68
Wt. dry soil (g.)	10.48	10.31	10.39	2.32	1.99
Moisture content (%)	55.63	58.87	59.48	35.34	34.67
				AV. PL (%)	35.0

Liquid Limit LL(%)	Plastic Limit PL(%)	Plasticity Index PI	% PASSED Sieve Size		
			2mm	0.425mm	0.075mm
60	35	25	100	100	98

Natural Moisture Content(%)	16.13
Dry Density (kg/m ³)	17.87
Specific Gravity	2.52
Shrinkage Limit (%)	16.77

REPORTED BY

APPROVED BY

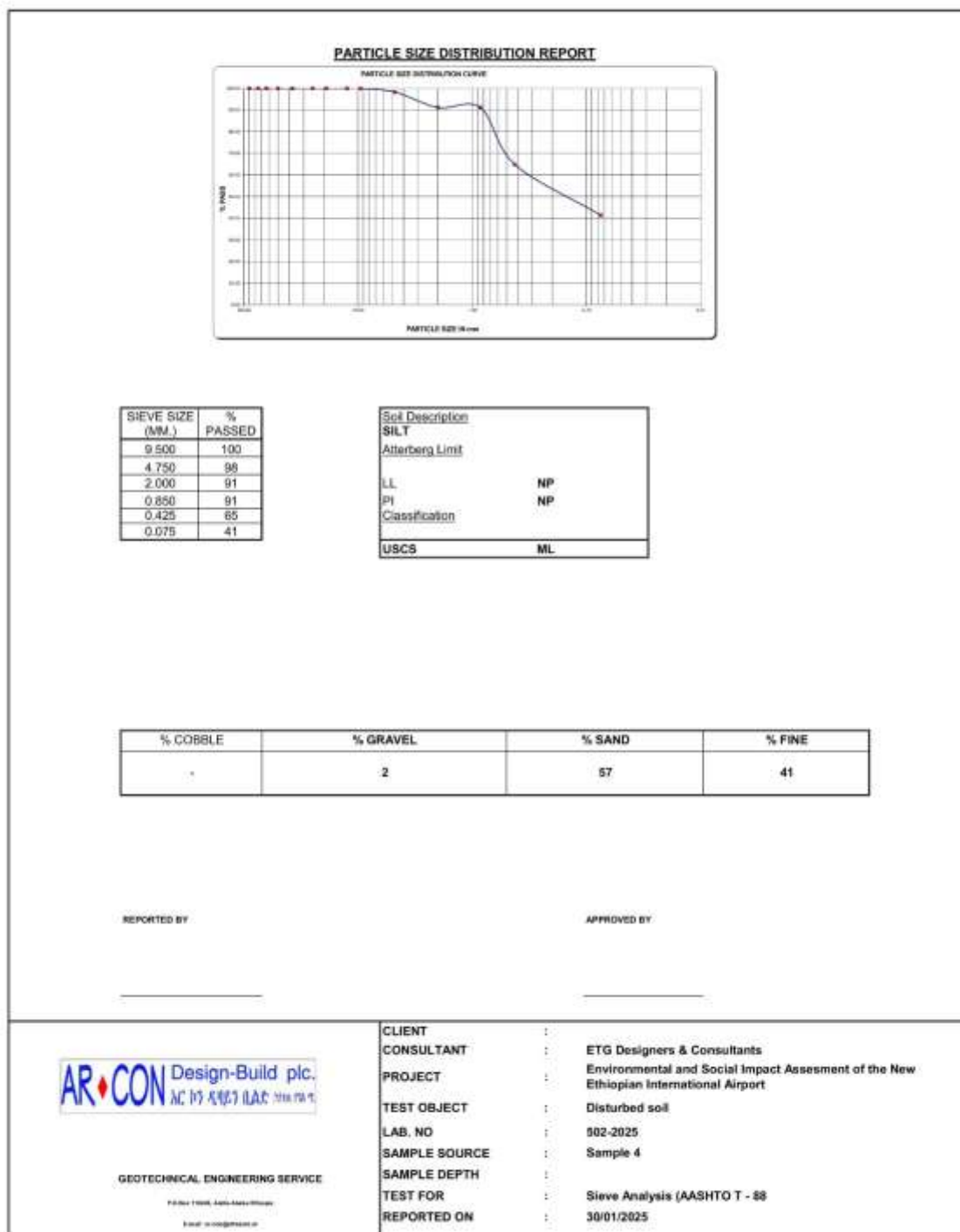
AR+CON Design-Build plc.
አር.ኤስ.ኤ.ኤ. ዲዛይን-ብልድ

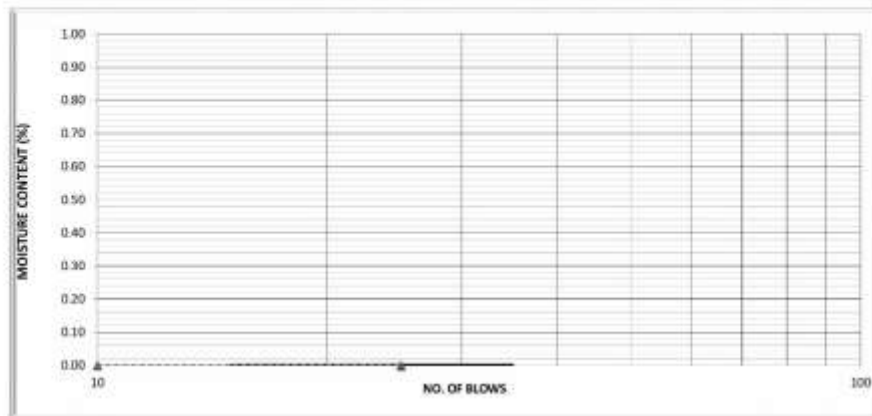
GEOTECHNICAL ENGINEERING SERVICE

P.O.Box 110248, Addis Ababa, Ethiopia

Fax: +251 880 26 90

CLIENT :
CONSULTANT : ETG Designers & Consultants
PROJECT : Environmental and Social Impact Assessment of
TEST OBJECT : the New Ethiopian International Airport
LAB. NO :
SAMPLE SOURCE : Disturbed soil
SAMPLE DEPTH : 502-2025
SAMPLE DEPTH : Sample 3
TEST FOR : Atterberg Limit
REPORTED ON : 21/02/2025



LIQUID AND PLASTIC LIMITS TEST REPORT

No. Blows	LIQUID LIMIT			PLASTIC LIMIT	
	NP	NP	NP	NP	NP
Wt. wet soil (g.)					
Wt. dry soil (g.)					
Moisture content (%)					
					AV. PL (%)

Liquid Limit LL(%)	Plastic Limit PL(%)	Plasticity Index PI	% PASSED Sieve Size		
			2mm	0.425mm	0.075mm
NP	NP	NP	91	65	41

Natural Moisture Content(%)	8.11
Dry Density(kg/m ³)	20.58
Specific Gravity	2.47
Shrinkage Limit (%)	7.1

REPORTED BY

APPROVED BY

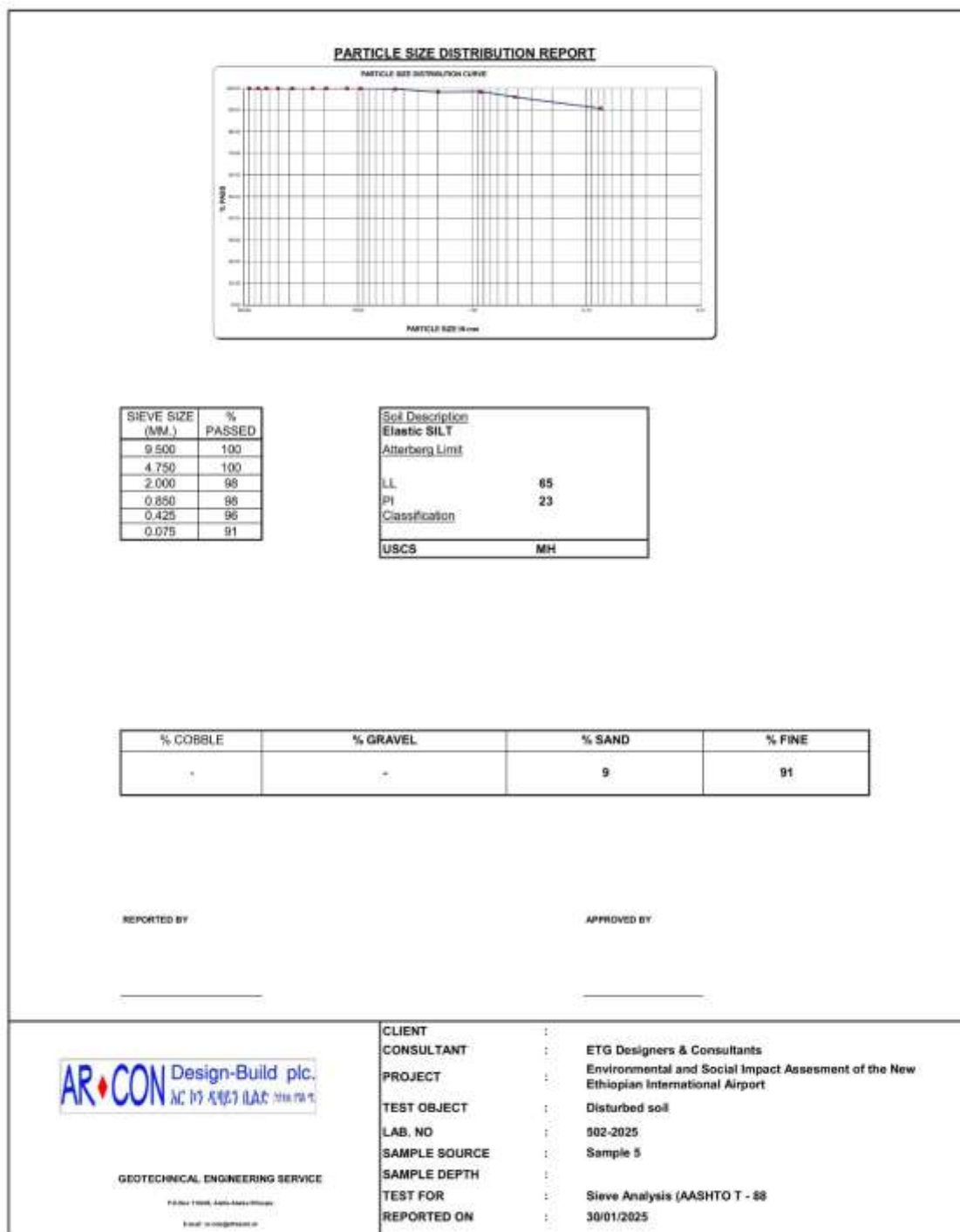


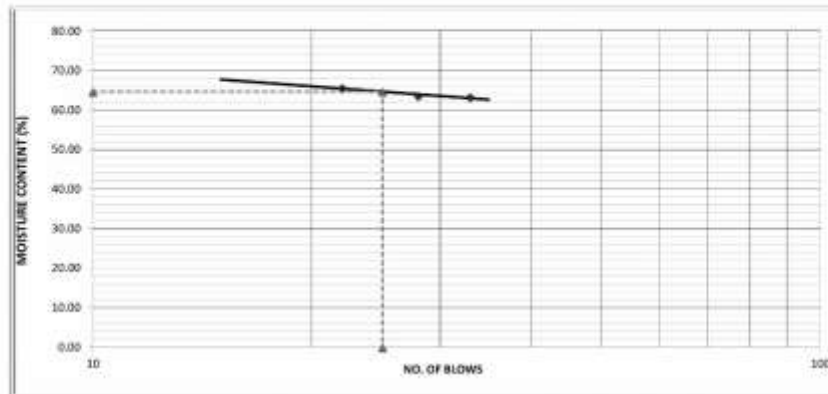
GEOTECHNICAL ENGINEERING SERVICE

P.O.Box 110340, Addis Ababa 55003

Fax: +251 944 04 58

CLIENT : ETG Designers & Consultants
 CONSULTANT : Environmental and Social Impact Assessment of
 PROJECT : the New Ethiopian International Airport
 TEST OBJECT : Disturbed soil
 LAB. NO : 502-2025
 SAMPLE SOURCE : Sample 4
 SAMPLE DEPTH :
 TEST FOR : Atterberg Limit
 REPORTED ON : 30/01/2025



LIQUID AND PLASTIC LIMITS TEST REPORT

No. Blows	LIQUID LIMIT			PLASTIC LIMIT	
	33	28	22		
Wt. wet soil (g.)	16.03	16.08	15.93	2.82	2.85
Wt. dry soil (g.)	9.82	9.83	9.62	2.00	2.00
Moisture content (%)	63.24	63.58	65.59	41.00	42.50
				AV. PL (%)	41.8

Liquid Limit LL(%)	Plastic Limit PL(%)	Plasticity Index PI	% PASSED Sieve Size		
			2mm	0.425mm	0.075mm
65	42	23	98	96	91

Natural Moisture Content(%)	17.28
Dry Density(kg/m ³)	17.4
Specific Gravity	2.49
Shrinkage Limit (%)	16.82

REPORTED BY

APPROVED BY

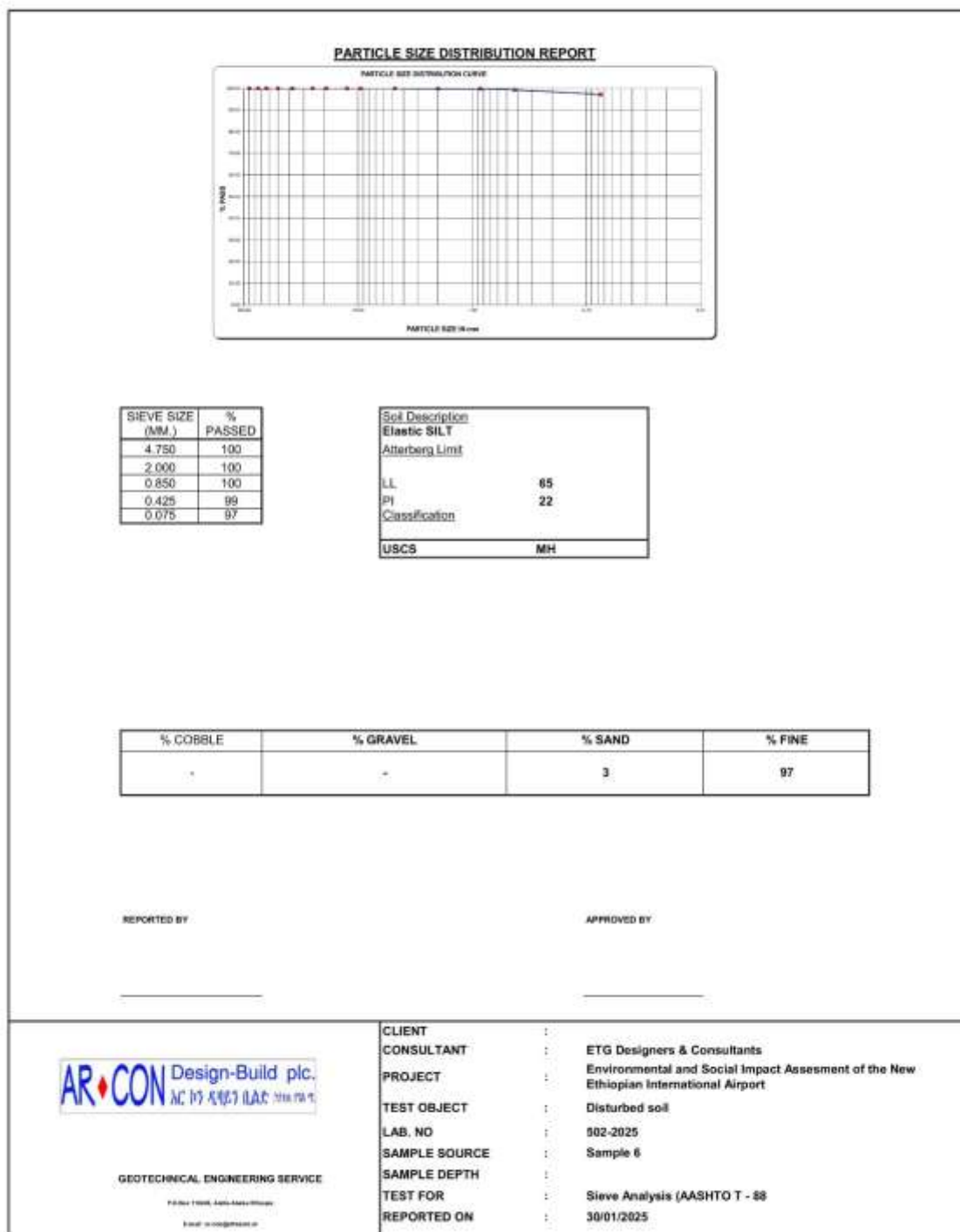


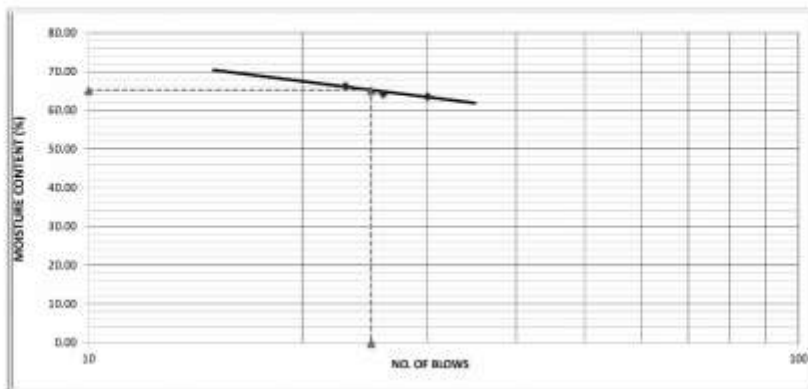
GEOTECHNICAL ENGINEERING SERVICE

P.O. Box 113246, Addis Ababa - Ethiopia

Fax: +251 886 36 00

CLIENT	:	ETG Designers & Consultants
CONSULTANT	:	Environmental and Social Impact Assessment of
PROJECT	:	the New Ethiopian International Airport
TEST OBJECT	:	Disturbed soil
LAB. NO	:	502-2025
SAMPLE SOURCE	:	Sample 5
SAMPLE DEPTH	:	
TEST FOR	:	Atterberg Limit
REPORTED ON	:	30/01/2025



LIQUID AND PLASTIC LIMITS TEST REPORT

No. Blows	LIQUID LIMIT			PLASTIC LIMIT	
	30	26	23		
Wt. wet soil (g.)	16.88	16.31	17.01	3.19	3.09
Wt. dry soil (g.)	10.31	9.92	10.22	2.21	2.16
Moisture content (%)	63.72	64.42	66.44	44.34	43.06
				AV. PL (%)	43.7

Liquid Limit LL(%)	Plastic Limit PL(%)	Plasticity Index PI	% PASSED Sieve Size		
			2mm	0.425mm	0.075mm
65	44	22	100	99	97

Natural Moisture Content(%)	13.3
Dry Density(kg/m ³)	18.57
Specific Gravity	2.47
Shrinkage Limit (%)	18.6

REPORTED BY

APPROVED BY

ARCON Design-Build plc.
አርኮን ዲዛይን ብልድ

GEOTECHNICAL ENGINEERING SERVICE

P.O.Box 115248, Addis Ababa, Ethiopia

Fax: +251 900 28 98

CLIENT :
CONSULTANT : ETG Designers & Consultants
PROJECT : Environmental and Social Impact Assessment of
TEST OBJECT : the New Ethiopian International Airport
LAB. NO : 502-2025
SAMPLE SOURCE : Sample 6
SAMPLE DEPTH :
TEST FOR : Atterberg Limit
REPORTED ON : 30/01/2025

SPECIFIC GRAVITY TEST REPORT

Source	GS
Sample-1	2.49
Sample-2	2.53
Sample-3	2.52
Sample-4	2.47
Sample-5	2.49
Sample-6	2.47

REPORTED BY:

APPROVED BY


Design-Build plc.
 አር ኮን ዲዛይን ቢልድ
GEOTECHNICAL ENGINEERING SERVICE

P.O.Box 110246, Addis Ababa Ethiopia

Tel. +251 911 52 96 76, +251 920 90 64 54/55

E-mail: ar-con@africonet.et

CONSULTANT**PROJECT****TEST OBJECT****LAB. NO.****SAMPLE SOURCE****SAMPLE DEPTH****TEST FOR****REPORTED ON**

ETG Designers & Consultants

Environmental and Social Impact Assessment of the New
Ethiopian International Airport

Disturbed soil

502-2025

Refer from the above table

Refer from the above table

Specific Gravity

24/02/2025

ANNEX 8: MINUTES OF CONSULTATION

Environmental and Social Impact Assessment (ESIA) of Abusera International Airport Project

Minute of Consultation

Date: 6/12/2024

Venue: Rish town Admia meeting hall

Name of the office/stakeholder/affected community _____

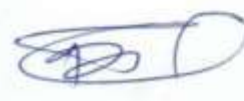
List of Participants:

1. ~~SLP~~ 429 ncyt 
2. ZF 239 Y3AC, 0- 
3. YF YnF gWLT
4. YF Y-09 074- 
5. YF ncyt. Yn2. 
6. 22 3tF- 2n4u 
7. 01e m0lt. 900 
8. 4t 0n3 744 



Objective and agenda of the meeting:

1. PnAAb 7c7c7 YnA0hnt 7h5 7376 HCS 0447
2. P7C7h73 7nLh277 7t0hnt P7h2c7 h747 90hnt
3. 77C7h7F 7nL7h75 7h2c7 h747 907 7372mnd
4. 6F 6F 77F7 7h-
5. P7h2c7 h747 025 77775 7h7673

- (1) -

Points raised by participants:

- መሪዎች የሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡
- ሕዝቡ የሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡ በዚህም ውስጥ የሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡

1) ሕዝቡ የሕግና ሥነ ምግባር ስርዓት ማስፈጸም

- ሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡ ሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡

ሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡ ሕግና ሥነ ምግባር ስርዓት ማስፈጸም አስፈላጊ ሲሆን ለዚህ ዓላማ የሚፈጸሙትን ስራዎች ማሳደግ ይገባል፡፡



Handwritten signatures and marks at the bottom of the page, including a large signature on the right and some scribbles on the left.

Points raised by participants:

3. ~~ኢትዮ~~ ኢኮኖሚ

- በፕሮጀክቱ አጠቃላይነት ላይ ማሳሰብ አለብን፡፡ ምሳሌ ሆኖ የሚገኝ ጉዳይ ሲሆን፡፡ በዚህ ላይ ፕሮግራም ያሳያል፡፡ ግንባራ-ገንዘብ የሚገኝበት ሰዓት ማግኘት አስቸኳይ ሲሆን፡፡ ፕሮጀክቱ በሀገር ሆኖ ትኩረት ማግኘት ያለበት ሲሆን፡፡ የሀገሪቱ ገንዘብ ትኩረት ማግኘት አስቸኳይ ሲሆን፡፡ ከቀዳሚው ፕሮጀክት ጋር ሲነፃፅር፡፡ ፀረ-ለሳሥ ማረጋገጫ ይገኛል፡፡ ኢንፎርሜሽን ማስተላለፍ አስቸኳይ ሲሆን፡፡ ወጪው ማረጋገጥ አስቸኳይ ሲሆን፡፡ ይህንን ፀደቀው በሀገሪቱ ለሚገኙ ሰዎች ማሳሰብ አለብን፡፡ በዚህ ላይ የሀገሪቱ ፕሮጀክት ማረጋገጫ አስቸኳይ ሲሆን፡፡ ሀገሪቱ ለሀገሪቱ ፕሮጀክት ማረጋገጫ አስቸኳይ ሲሆን፡፡ ኢንፎርሜሽን ማስተላለፍ አስቸኳይ ሲሆን፡፡ ወጪው ማረጋገጥ አስቸኳይ ሲሆን፡፡ ይህንን ፀደቀው በሀገሪቱ ለሚገኙ ሰዎች ማሳሰብ አለብን፡፡

4. ወጪ ማረጋገጫ / የሀገሪቱ ከተማ አስተዳደር ጋር

- ኢትዮጵያ በሀገሪቱ ለሚገኙ ሰዎች ማሳሰብ አለብን፡፡ ምሳሌ ሆኖ የሚገኝ ጉዳይ ሲሆን፡፡ በዚህ ላይ ፕሮግራም ያሳያል፡፡ ግንባራ-ገንዘብ የሚገኝበት ሰዓት ማግኘት አስቸኳይ ሲሆን፡፡ ፕሮጀክቱ በሀገር ሆኖ ትኩረት ማግኘት ያለበት ሲሆን፡፡ የሀገሪቱ ገንዘብ ትኩረት ማግኘት አስቸኳይ ሲሆን፡፡ ከቀዳሚው ፕሮጀክት ጋር ሲነፃፅር፡፡ ፀረ-ለሳሥ ማረጋገጫ ይገኛል፡፡ ኢንፎርሜሽን ማስተላለፍ አስቸኳይ ሲሆን፡፡ ወጪው ማረጋገጥ አስቸኳይ ሲሆን፡፡ ይህንን ፀደቀው በሀገሪቱ ለሚገኙ ሰዎች ማሳሰብ አለብን፡፡ በዚህ ላይ የሀገሪቱ ፕሮጀክት ማረጋገጫ አስቸኳይ ሲሆን፡፡ ሀገሪቱ ለሀገሪቱ ፕሮጀክት ማረጋገጫ አስቸኳይ ሲሆን፡፡ ኢንፎርሜሽን ማስተላለፍ አስቸኳይ ሲሆን፡፡ ወጪው ማረጋገጥ አስቸኳይ ሲሆን፡፡ ይህንን ፀደቀው በሀገሪቱ ለሚገኙ ሰዎች ማሳሰብ አለብን፡፡

8. $\frac{27}{64} \times \frac{125}{216} = \frac{27 \times 125}{64 \times 216}$

• በጥንቃቄ ለሥራ ስራ ፕሮጀክት ለሰላምና ጥቅም ላይ ሆኖ
ከሕግ በፍጥነት ማረጋገጥ ይቻላል፡፡ ወደ
የተሳተፈ ስልጣን ማሳተፍ ይቻላል፡፡
ጥራትና ማረጋገጥ የሚችል ስራ ይሆናል፡፡
Indegenous የሆኑ ስራዎችን ማረጋገጥ ይቻላል
የዚህ ስራ ዕቅድ ማረጋገጥ ይቻላል፡፡ ማረጋገጥ
በሕግ ይቻላል፡፡ Environmental
Impact Assessment ስራ ፕሮጀክት ይሆናል
በሕግ ይቻላል፡፡

6. За нечет / 53272/64

[illegible]

Official stamp (if any)

7. Inf two h ~~h~~ MC 43

[illegible]

[illegible]

- Puzia 5 pms nolye lala stw :: natw puzia
vuctan 144 pms ecey yymms nrtst
wnr zizey + 4 zsa nrtst :: Hwse wazthw
:: nwpze 6cyl wnt hwnr hrtz nwp
nrtst :: hwnrtst nrtst nrtst
vuctan zizey ecey hms nrtst nrtst
puzia :: RLEST pms pms nrtst nrtst
nrtst nrtst :: puzia nrtst nrtst
nrtst hwnr nrtst ::

[illegible]

Official stamp (if any)

- பஞ்சுதேவன் பிள்ளை தனது பிள்ளைகளை
 பிள்ளைகளை பிள்ளைகளை பிள்ளைகளை
 பிள்ளைகளை பிள்ளைகளை பிள்ளைகளை

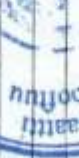


List of Participants Involved in Stakeholder's Consultation for Environmental and Social Impact Assessment (ESIA) of Abusera International Airport Project

Date:- 6/12/2024

Places:- Bishoftu

Name of the office/stakeholder/affected community:- _____

No	Name of the participant	Organization	Position	Phone No	Email address	Signature
1	Enaye Berhanu	Town Health office	Head	0938062546	giffberhanu@gmail	
2	Dhinae Hindarimu	Urban adm. office	Head	0917121160	dhinae-hindarimu@gmail.com	
3	Abeyehu Mihiratu	Abusera	Manager	0911046578	-	
4	Kenna Gadaa	Land office	Head	0911751585	Kenna.Gadaa@gmail.com	
5	Kenna Gadaa	Land office	Head	0911751585	Kenna.Gadaa@gmail.com	
6	Dhinae Hindarimu	Urban adm. office	Head	0917121160	dhinae-hindarimu@gmail.com	
7	Taitu Yami	Envir. Prolt	Head	0912634062	Bisalecity@gmail.com	
8						
9						
10	Getachew Adga	Agri. office	Head	0911904355	getachewadga@gmail.com	
11						
12	Hassen Behiru	Etic	Head	0911602608		
13						
14						
15						
16						
17						
18						
19						
20						



Environmental and Social Impact Assessment (ESIA) of Abusera International Airport Project

Minute of Consultation

Date: 30-01-2025

Venue: Dorem

Name of the office/stakeholder/affected

community Stakeholder (Dorem sub-city Ad-sever Office)

List of Participants:

1. Habtemu xebede --- Education Office
2. Itoghiyan Abate --- Agriculture Office
3. Tesfaye Abbun --- Administration Office
4. Edris Yemal --- Water Office
5. obsa Waxe --- Health Office
6. Addemuu Gaddisa --- Land Office



Objective and agenda of the meeting:

- 1) ለፕሮጀክቱ ፕሮጀክት ዘርፍ የገጠራ ጉዞ ጥያቄ
 - 2) የዘጠኝ ከገጠራ ፕሮጀክት የሚጠቀሙት ያህል ያህል ድጋፍ
 - 3) የወጪ ከተሰጠው የሚገኝ ሥራ
- የሚከተሉት ያህል ያህል ርዕሰ ዘርፍ የሚገኙት ተገቢዎች የሚጠቀሙት
ከተሰጠው ሥራ ለተገኙት ፡፡

[Handwritten signatures and initials]

Points raised by participants:

- [illegible]

[Handwritten signature]



Ergebnis

[Signature]

Signature of participants

5) $2 \neq$ ~~unt~~ ~~o~~ ~~n~~ ~~i~~ ~~e~~ ~~n~~ ~~t~~ ~~r~~ ~~e~~ ~~c~~ ~~t~~ ~~e~~ ~~/~~ ~~n~~ ~~t~~

Points raised by participants:

- [illegible]

④

[illegible]

~~Handwritten signature~~ ~~Handwritten signature~~ ~~Handwritten signature~~ ~~Handwritten signature~~ ~~Handwritten signature~~

- 9) $\ln \neq$ true primary control tower

- Now $150 \times 1.5 \times 1.5$ for nymphs $22 \times 27 \times 1.5$
 150×1.5 for sub =

~~PLS~~ 29

AA Adamu. G
E.A.A.

28

List of Participants Involved in Stakeholder's Consultation for Environmental and Social Impact Assessment (ESIA) of Abusera International Airport Project

Date:- 30-01-2025

Places:- Bakam Sub-city Admin. Office

Name of the office/stakeholder/affected community:- _____

No	Name of the participant	Organization	Position	Phone No	Email address	Signature
1	Habtemu Kebede	Education of	Expert	0912149467		
2	Itanphivaa Asaffa	Agriculture office	Expert	0939172558		
3	Tesfaye Abiyona	Adicorporation		0917286937		
4	Edris Kemal	Water office	Branch Manager	0911490699		
5	Osaa Klatona	Health office	HIV Expert	0904166628		
6	Addaamuu Gaddisaa	W/Labota	Expert	0924454455	kebedemariam@gmail.com	
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						



Environmental and Social Impact Assessment (ESIA) of Abusera
International Airport Project

Minute of Consultation

Date: 14-01-2025

Venue: Abusera Woreda

Name of the office/stakeholder/affected

community project affected community Representative

List of Participants:

1.

Objective and agenda of the meeting:

- 1) Hubannoo haawasni pirojaktii buufata xiyaara ilaalchise qabu
- 2) Abdi haawasni pirojaktii irraa qabu ma' akka fakkaatu
- 3) Sodaa Ykn Komi yeroo ilaalchise yaada jiru irratti mari'achu.





Points raised by participants:

- Obs. Teefaye haara gabaasadha bananiru. Sanawatti aansaani Dr. Yared ibsa gababaa kanuudhaan gabxiwaan marii maali maali irratti akka xiyyeeffatu hirmaatotaaf qabsisanii jiru. Haaluma Kanaa
 - i) Hubannoo ummanni gahu ii) abdi jiru
 - iii) Sodaa jiru
 irratti hirmaatoni yaada ammaa gadii kennanii jiru.
- 1) Obs. Idosa Tolosa, Foni. Abu Sarkam, Hagi gageessu
 - pirojektii eega duba sirna wajuu shan keessa jiru. Gam ummanni hubannoo gahas hin gahu. Burjaajamu keessa jiru. Fedhiyyumateaduu ala bakka wali hirsale irratti qubatu kan jadhun jiru. Asii bugaane maaliif Bishoo flutti gals? Maaliif naano kana maaliif qubachu dadhabne. Pirojektich iftoomina hin gahu.
 - Sodaan nutti gabaa. Nutti golee bulaaadha. kan lafa hin gaba. Kontinuufta jirata. Gaafa asii kaanu kaale 322 gafaatu

nauf keenani. Beenyaa nauf keenani
naufi maatii keenya nu jiraachisu danda'a?
kan jedhu sodaa gaba. Gaud tokko

keessa dargageen 500-600 jira. yoo
mani hin ijaaramuufi eessa gaba'.

projekti misooma kana nu deegars
gama soda keensa ibsine irratti
maaltu yaadame.

2) obbo Babade Kefani, Zoni Waajitu

- projekti hin jaalana, gama shaki guda
gaba. Projektiichi sirritti goteebulaaf
himamu gaba. irra dedesibamu hin
jira: kaanee 322 kan jaamani kun
gaha mitti. Akkamitti jiraachu
dandeenya kan jaalhi sodaa guda
gaba. Mootumma maaliif haala
ifte ta'een deemu dadhase.

- ummanni hedduun dargagoodha. Dargagoo
lafe hin jaba kaanee 150 keeraamta
mani gama hin ijaaramuufi kan jedhu
sodaachi, sodhi. Lafiche guugurufti waan
dirqamuufi sanii 5000 eessa deemas?
maatii isaan akkaan ta'aa? 13

- Tajajili kan akka bishanni fi ibsa
nuuf foyya kan jedhu gabaa.
Magadan Asu Seera ni guddatti
gaane addans. Magaala # foyya
deemtu irraa kaane eenyutu dhufe
irratti gusaa kan jedhu shakins.

3) Olbo Goss Fayisi, Zoni waqitu.

- Marii gahaan hingageeffanne. Baraas
xifo mari'ane jiru. Dhimi dhimi guddan
waan ta'eet shaki gabaa. Kaaneen
322 kan jadhni nu sodachisa. Ilmolee
Keeny eesa geesine. Mana ijaareebi
dalaa Keeny keess jirraachi jiru.
Signature of participants
pirojektiin ~~lata~~ mana hinkeenuti
Waan jadhameet sodaa keess balinaan
uummani galu jira. Kaane 105
gefti gahaan mitti. Kunis marii
uummataa osoo hin godhanu kan
musta'e dha. Sirni dimokraasii eessa
Official stamp (if any)
deeme? pira. biyaat bu'aa guddaa akka
gahu ni tubanna. Gaari beengas gahaan
kaafalannu fassa. Gaari maala faa
kufaa waan deemte? 9rri. 322 kunis
maaf nu fayyaduu. (4)

- jiraataan naanoo keeny pirojektii irratti fayyadaman duraa ta'u gaba. Ijoollee baratanis nu gabne. Kan hin baranees fayyadannu gaba.
- Lafti kun muka adda adda gaba. Gam gimitiin isaa nutti hin himanne. Inni gudaan marii gahaa ummataa wajjin haa godhamu.

4) Obbo Asate Midakso, Durat'aa Zooni Furdaa

- Dhimoota armaan olitti ka'an dhinoota hundis keenyati. Akkami Qul. 322 lafti shalegama kan jedhi gatii guddaa nutti ta'ee jiru. Baayee gadi bi'aa nutti ta'ee jiru. Mogaabaa keessatti meega akka ta'e nu seekna.
- Biqiltannu gimitii keessa nutti hin gale. Gimitiin maamu hin tilmaamamu jedhamo ture. Durii ijoollee keenyaan lafa hin keenise ture, amm dhaabate jiru. maalifii? Sababa pirojektivaa kan ka'edhamo? Ilmooleen keessa maan ijaarachu



Points raised by participants:

hin dandee.

- Kan bima qumoo maalif magaala
kan irratti nu gubachisu dadhabame?
eenyutti eessa dhuf pirojaktii irratti
konistarakshii irratti hojjataa?

5) Obbo Kisa Garba, Asu Lubu

- Misooma hin jaalanaa, hin deegars.
misoomi warra lafa gabaniif gaariidha.
gaar dargagoota lafa hin gabne ni
mishaa.
- Dargagootii keenya erga asii buqsani
Bishoftutti gubatan, akkaammitti
dedeebi'ani ijaarsa piroj. irratti hirmaa-
chu danda'u. Baasii tiiransportii akkaatti
danda'u.

6) Obbo Labu Zooni Kombolet

- Armaanduu maakiigayya tokko sana
gaggeesine.
- Laffi keensu sirrii hinshalegama. safarii



lattaa irratti dogongorri jira. Lattii
cicite haafe jira. Komii guddaa gabaa.

- manni kan ijaarami shalagin kaanee ma
moo baajata mataa isaa gaba?
- shalagii keenya marif gadi bu'aa t'ee?
322 gatii di'aa dha.
- ~~Ha~~ Lattii piroj. keessa ⁰⁵⁰⁰ hin galin
citee haafe akkaan ta'a:

7) Obbo Tetani Kefalapa.

- piroj. wassa dhufu biyya keenya ni jijjira jadhne
itti samanne. Dargagoota carraa hoji'
nu sana jenne samadne. Ammas faayidaata
kans ni eegane.
- kafalii beensa illaalchise abdiin tane
guddaa tura. Saniin alus nama
gibita kafeeleef gote jadhame. Kun
nama heedu manni malee kan
haan bisu dha.
- Dargagoo kan jedhamus yunniin
isaa haanga meegaa dha? ifa
miti.



~~8) - Add~~

8) Obbo Baharu Ishete, Kombolcha

- Laftti jarjaraan shalagame, kun gubn ta'uu danda's.
- Darsageessaf lafa fofatu keenaa, garshin hin kennami

9) Obbo Dabala Wige, Kombolcha

- Laftti waliin heeduu jiru. Gadi keenya keessa heektara 200/kan ta'uu jiru. Ken kan eenyu ta'a?

Signature of participants

10) Obbo Balacho Bagabi, Doyaa

- Beengaan keenya gara sheerii Buntata xiyaata nuuf hinjiiranne?

~~Official stamp (if any)~~



- Bishooftu osoo hin ta'u namooni buq'aa maaliif firtinnet hin gale hin gubanne?

11) Obbo. Da'anjee Tamim

- Barojaktiin kan Federaals osoo ta'u heeregni maaliif akka Federaalaanti hin tiiregame? maaliif akka magaalaa Dukkamitti tiiregame.
- Gatiin ijaarsa manaa leengaa kan keessa tiiregame moo baajata bima gaba.
- Ummanni eersa asii ka'ee eechaa dhufe fayyadaman ta'aa? asuma dhiyootti gubachuu gabsa.
- ~~to~~ Ummata siritti hubachisuuf mariin irra deebi'ame mariyachisuun barbachisa.



Points raised by participants:

2

Xumurs innatti Dr. Yareed fi Osbo

Testayeen gab xiyaan marii keessatti
 Ka'an innatti ibsaa gabaaba kannani
 adeensi gafa fuulduratti akkataa
 ittiin deemamu ibsanii walgalachi
 Xumuraameera.

~~XXXXXXXXXX~~







ARCHITECTS • ENGINEERS • DESIGNERS

List of Participants Involved in Stakeholder's Consultation for Environmental and Social Impact Assessment (ESIA) of Abusera International Airport Project

Date:- 14-01-2025

Places:- Abusera Woreda

Name of the office/stakeholder/affected community:- Affected Community Representative

No	Name of the participant	Organization	Position	Phone No	Email address	Signature
1	Moqun Marjam			0911355784		
2	Balacho Bafalla			0913284726		
3	kabada Skibiru			0913300135		
4	kafani Shabir			0919642004		
5	Baiaa Xidun			0911414188		
6	Bafalla Ayman			0912917072		
7	Seifu Danyer			09114934084		
8	Tafaar kabada			0913098735		
9	kabada kofani			0904205445		
10	Dajane Gmachu			0951527750		
11	Skibiru Tafaa			0966319701		
12	Kisaa Torco			0992064673		
13	Asaafa miedakko			0941396462		
14	Abbe Gmachu			0914244201		
15	Tafara Sabaa					
16	Ayelu Gofare					
17	Groffa Fayisa			0945778428		
18	Abiree Adunva			0923333443		
19	Dalane Tambe			0949653495		
20	Maaher Garamu			0984052011		







AMBODITTS - ENVIRONMENTAL • 071 71 01 80

List of Participants Involved in Stakeholder's Consultation for Environmental and Social Impact Assessment (ESIA) of Abusera International Airport Project

Date:- 14-01-2023

Places:- Abusera Woreda

Name of the office/stakeholder/affected community:- Affected Community Representative

No	Name of the participant	Organization	Position	Phone No	Email address	Signature
1	<u>Abey Gunetha Gunetha</u>			<u>09 48 75 33 82</u>	<u>abeygunetha@gmail.com</u>	<u>[Signature]</u>
2	<u>Gedamu Hordofaa</u>			<u>09 27 71 98 81</u>	<u>Gedamu Hordofaa</u>	<u>[Signature]</u>
3	<u>Makareish Mindebaa</u>			<u>09</u>		<u>[Signature]</u>
4	<u>Simaa Bairdaa</u>			<u>09</u>		<u>[Signature]</u>
5	<u>Ababae Dargi</u>			<u>09 53 93 64 08</u>		<u>[Signature]</u>
6	<u>Adunya Gaudisa</u>			<u>09 49 47 38 23</u>		<u>[Signature]</u>
7	<u>Tolera Asabhaa</u>			<u>09 79 15 11 00</u>		<u>[Signature]</u>
8	<u>Sabooja Dofaa</u>			<u>09 67 51 97 29</u>		<u>[Signature]</u>
9	<u>Dakaloo Aligul</u>			<u>09 10 98 22 29</u>		<u>[Signature]</u>
10	<u>Baharu Asheba</u>			<u>09 68 58 33 30</u>		<u>[Signature]</u>
11	<u>Gaudito Paereo</u>			<u>09 83 50 35 55</u>		<u>[Signature]</u>
12						
13						
14						
15						
16						
17						
18						
19						
20						



Magaalaa Bishoftu, Kutee Magaala Dufan

Gumyaa 17/06/2017

Aanee Abbuu Seeraa Maree Hawuwasaa Qorannoo
Lafa Debalatna Dirree xiyyaarsaaf gaggabsu.

Yaaduu marii dhimma butanta xiyyaarsa lafa Debalatna
heektaraa 700 dekalama irratti fufaa fi baalee himmanna
ummatoo barbaachisaa ugaan to'ee marii baalee.

Yaaduu ummataan: Ida'ee 2000: Keenyaa lafa kataltuun marii

afko to'ee marii himma irratti baalee himma marii Keenyaa
hee akkaan to'ee marii fi baalee.

Bakannaa fufaa: lafa: Siinoo hin shalgamne maqsaan ugaan
Rukhutaadha namaa tokko namaa bi'ra waliin ugaan make
dursaa Kuun jalaa Siinoo fufaa.

Algaan Hifaa: Yaaduu hee Hifaa to'ee fufaa Kuun lafa
iddaa idaa asaa baalee gawidha. Kalamni Keenya dursaa
dhagaayee Siinoo marii asaa Siinoo gawidha.

ma bi'ra dargagoo Keenyaa namaa i'eenya dursaa Keenya
fufaa.

Dammasaa Galleeta: Yaaduu hee Bi'ra to'ee marii Keenyaa irratti

Siinoo Keenya fufaa.

Katannoo Shumaa: mizaamaa hin jiruun yaaduu marii Baalee Keenya

gawidha dhagaayee fufaa irratti iddaa Keenya dhagaayee marii hin galee

Torofaa Ayoonoo: dhaltumman irratti shalgama baalee Siinoo fufaa
fufaa shalgama Kuun irratti baalee shalgama ma akkaan.

yaaduu ummantiin hee irratti baalee irratti Kalamni
uugaan gawidha xumuraama irratti.



Magaalaa Bishoftu, kutaa Magaalaa Duka Gurgura 17/6/2017

Aanaa Abbun Seeraa

~~Magaalaa~~ Harmaattota Maara Hawwaalaa Gorannoo Dimee
Xigyaaraaf gargaarame

Lakk	Magaalaa	Saala	Ummurii	Lakk Balaalee	Mallattoon
1	Dubaaba	Firfadu	Dhi	40	0986675362
2	Kereachuu	Asafaa	Dhi	50	11 07/8/17
3	Saadaa	Alkamu	Dhi	60	6 + 7
4	Daabalee	Murdo	Dhi	56	0987153107
5	Idaayee	Dooni	Dhi	58	7/8/17
6	Shimaduu	Saati	Dhi	42	094168 6303
7	Xuuma	Dhaadi	Dhi	28	0910749272
8	Daamajaa	Goalaa	Dhi	55	0900543978
9	Gaazoo	Gaamaachoo	Dhi	45	097277787
10	Silmaa	Asafaa	Dhi	60	0965608075
11	Taamubuu	Maadaa	Dhi	55	0555235538
12	Alkamu	Faayidaa	Dhi	42	0976804937
13	Idaa	Taafaa	Dhi	30	0920301625
14	Taafaa	Gurmaa	Dhi	35	0920307413
15	Kaalamaa	Shuuma	Dhi	54	091137784
16	Abuu	Gurmaa	Dhi	57	091137784
17	Maqaa	Hiraa	Dhi	50	091137784
18	Saanaa	Taadaa	Dhi	47	094025123
19	Silmaa	Shuuma	Dhi	47	094025123
20	Maqaa	Murdo	Dhi	22	094025123
21	Saanaa	Kaadaa	Dhi	47	094025123
22	Maqaa	Kaadaa	Dhi	42	094025123
23	Maqaa	Gurmaa	Dhi	46	094025123
24	Abuu	Maqaa	Dhi	36	094025123
25	Gaazoo	Maqaa	Dhi	57	094025123
26	Maqaa	Maqaa	Dhi	45	094025123
27	Maqaa	Taadaa	Dhi	45	094025123
28	Gaazoo	Maqaa	Dhi	60	094025123
29	Gaazoo	Maqaa	Dhi	25	094025123
30	Gaazoo	Maqaa	Dhi	60	094025123
31	Taafaa	Maqaa	Dhi	45	094025123

Laka	maṣaa	Jalae	umurrī	Lak bilbira	malḥato
1	Baṣṣa Nuṣuṣe	Dhī	40	—	E
2	Salamon Ashete	Dhī	56	—	—
3	Gradisa miratuṣ	Dhī	25	0922290034	h h t
4	Shammi Cufallae	Dhī	42	—	—
5	Jokeṣ mangiṣṣuṣ	Dhī	30	0969142139	—
6	Tarata Anyanno	Dhī	46	0954620949	—
7	Degite Dabalḥe	Dhī	45	0913941333	+ L 6
8	Kassam moxonuṣ	Dhī	20	0905707676	—
9	Akiliṣ Alamayṣ	Dhī	28	0935516384	—
10	Tarkuṣ Keṣile	Dhī	38	0930387950	—
11	Amalla Daṣatto	Dhī	13	—	Tefflu
12	Taddae Girmas	Dhī	29	—	—
13	Balchae mangiṣṣuṣ	Dhī	42	0923186723	—
14	Simas Tarkuṣ	Dhī	40	—	—
15	Mafaxa Danyre	Dhī	20	—	—
16	Masaru fṣaduv	Dhī	24	0917317636	—
17	Dabaluv Balḥae	Dhī	18	0929872153	—
18	Anyanno Dabalḥe	Dhī	21	—	Dabu
19	Dhabboṣ Dabaneḥae	Dhī	46	0912066587	Anyanno
20	Lataa Ashetuṣ	Dhī	36	0941176736	—
21	Dasatuṣ Gamachuṣ	Dhī	40	0926648799	—
22	Damise Xigoo	Dhī	40	0914977363	—
23	Baqaluv Alamlu	Dhī	50	—	—
24	Tatarri Shṣashuṣ	Dhī	43	—	—
25	Buzayo mammoṣ	Dhī	45	0915928036	—
26	Korbuṣ Debṣae	Dhī	35	0905016923	—
27	Jamboṣ Baṣuṣ	Dhī	34	—	Korbu
28	Baica Mardasso	Dhī	28	0910357506	—
29	Obanneṣ Shṣbṣuṣ	Dhī	44	0963051764	Baica
30	Daribe maṣae	Dhī	49	0927232730	—
31	Abatto Dabalḥe	Dhī	20	0972921669	—
32	Oboluv Alamlu	Dhī	56	0926659723	—
33	Kanṣuṣ Kabade	Dhī	28	0979957562	—
34	Juyume hṣpho	Dhī	50	0911256077	—



	laas	maafar	laas	umuri?	laas	3 mallatio
1	Seetaw	Guuma	Phi	40	Se. Uba	
2	Pacoma	Baacha	Phi	43		
3	Kemol	Nirru	Phi	38	0979299	
4	Akasa	Paabona	Phi	30	0589680563	
5	Kaasu	Paabona	Phi	35	0745177823	

-4-

Magaalaa Bishoftuu, kutaa Magaalaa Duukam
 Aanaa Abbuu-Seeraa, Zoonii Abbuu Kombolchae Gupya 24/6/2017
 Qaboo yaa'ii Maree Hawwaasaa Pirojeektii
 Daandii Qilleensa Itiyooophiyaa

Ajandaa Maarii/Hawaasa Waa'ee Goranoo Buffatee Xayyaraaf

Buffatti xayyaraa kana dura 3500 hedhtaan fudhetam kan
 Beekamu yaa'ilee taamatti garuu amma immoo heet 700
 akka dabalamu yedhamu irraa kan ke'ee. amma immoo
 data lafa dabalamuuf ta'ee irratti akka fumanamuuf fopheessu irraa
 kana irra kan ta'ee data fumanamu kana biita sirrii ta'ee akka
 kenamu irratti wal akka galuuf Maarii hawwasaa waliin gaggessam
 Keenyaan hali kanfalti beenyaa Ummata kanaf kanfalamm
 kan inni irratti hundaan galii fotee bulcan tokko lafa
 irraa Dmishsee argatam irratti hundaanundhan kan kanfalamm
 ta'uu isaa Ummataaf hubannoo kenameera. Wanti Raawwatamun
 hundaa Seera fi labsii garuu irratti hundaa'e kan hojjetamun ta'uu
 isaa hubannoo kenameera.

Yaadaa Maarii kenamee irratti ke'ee. i. yeroo lafa kana
 gadii dhismu waltu nu mudata. ta'uu hojii ammatti hojjetachaa
 garuu gonaa debalettee, fudhiisee looni akka summaa gagguraa
 Damaa fopheessu hojjetnee. isaa kana akkamitti irraatu.
 Kane duraa Sebabe kanfalti beenyaa irratti kaatiibaan
 M/Bishoftu garshii Karree 1 garshii 322 nu jedhamu kanaf
 nutti kanfalti beenyaa irratti sodaa fabama jedhamu.

- Sodaa ammatti fotee bulcan fahu dargaggoo tokkof karee ~~las~~
 gahaa miito akkamitti shaaltu?

haali Shallagi kartaa lafa Ummata ammas kan kane duraa
 dargaggoo fabechuu irraa kan ke'ee. lefti fotee bulaa tokko
 kane fala hiraatee fi kan tokko irratti dabalamu ta'uu isaa
 irraa kan ta'ee sirriin fabe jedhamu.

(1)

akka gaffiti kan ba'ee, dhangaa buftatze X/VVare
 Ummataa kanaf akka ifaa ta'uu gafachu isaanii
 - haalli mana folee buftottee ifaramaa fiiru sirrii nuutti
 manichi hojjatamu dhaorini isaa ni xijjatan inni kunille
 sirriifhamu fabe.
 lagaan fumanamuf kana irratti fabeenyaa fotee bukaan fabe
 fi baay'inaan kafa, baay'ina biqilto, kana malees nicaati
 isaanii ifollee isaan fabe kana malees ifollee futte gaffiti
 kan jalannamu ta'uu isaa.
 Mana ifaramu irratti manicha Calaan fiiru damee egaa
 ilaalaa boode yoo manichis isinf miqallum katee nu tane
 jellamu yada fiiru ibalechu miqaa fabe. kanaf manii
 eega laltani boode gaffiti kessan akka gafatan fumanaa
 argachuu akka fabeen irratti mir'atameera yada karee
 irratti ibsi bal'aan kenamee irratti wali galameera.



(2)

Latit	Ward	Gender	Age	Phone	Latit
1	Ward 1	Male	33	0915291387	1
2	Tafari Silwadi Amam	Male	42	0979157822	2
3	Dawro Bencan Bencan	Male	48	0946771819	3
4	Shaghi Bancha Manu	Male	48		4
5	Daamasa Ballew Oda	Male	55	0910749272	5
6	Fisri midhaabo Bignale	Male	52	0910711637	6
7	Seyumie hithou Mirkasa	Male	41	091056077	7
8	Palme Alamir Toke	Male	38	0979297085	8
9	Makko Tufana Tefana	Male	16	09	9
10	Laata Tefana Merga	Male	17	0910028796	10
11	Daafana Bignan Amam	Male	21	0919889575	11
12	Asheste Tannan Oda	Male	40		12
13	Banca Damed Manu	Male	30		13
14	Dopu Hargan M/kale	Male	34	0966220162	14
15	Asheste Xilalulul Yodante	Male	13	0915831724	15
16	Kibabo Muguse Asheba	Male	36	0940337318	16
17	Bizanaa Boonaa Kibanda	Male	39	09	17
18	Itaa Tefana Alamir	Male	30	0915239538	18
19	Muguse hithou Mirkasa	Male	49	0911858784	19
20	Lamir Boonaa Kibanda	Male	23		20
21	Cheetu Tifandu Deesisa	Male	18	0946308647	21
22	Banca Mamasa Buraay	Male	29	0963051764	22
23	Sinna Taku Tembare	Male	68		23
24	Margasa Mirkasa Gammachir	Male	28	0940215123	24
25	Salaamoon Asheste Kale	Male	65	0922290034	25
26	Alamir Fayisa Gudara	Male	42	0965803095	26
27	Obboolu Alamir Baddaschi	Male	16		27
28	Daame Baalaa Goma	Male	43	09	28
29	Bancha Manu Shab	Male	30	09	29
30	Dhaabo Babanella muguse	Male	46	0912176736	30
31	Buraayoo Mamir Aibaa	Male	27	0905016923	31
32	Tedci Tafaayya Gammachir	Male	23	0932976094	32
33	Abushir Gomma Kibacha	Male	17	0920307413	33
34	Shimaalet Alamir M/kale	Male	55	09	34
35	Daame Tashooni Dhab	Male	30	09	35
36	Dasaalu Gammachir Tifaa	Male	40	0914957363	36
37	Shimiri Abada Madhi	Male	20	0914503586	37
38	Tamboo Kibanda Kibanda	Male	35	09	38
39	Margasa Tifandu Deesisa	Male	37	0923772242	39
40	Kumaa Muguse Ward	Male	27	0912484733	40
41	Shagaa Daddho Taddasa	Male	44	0910165725	41
42	Gasaa Daribu Lama	Male	20	0949184931	42

ሰነድ	የሰነድ ስም	ፊርማ	ገጽ	ስልክ	ቀን
1	ገብረመስቀል ለገሰ	ሰነድ	35	09--	1997
2	ገብረመስቀል ገብረመስቀል	ሰነድ	20	0989127722	
3	ገብረመስቀል ገብረመስቀል	ሰነድ	25	0989127376	
4	ገብረመስቀል ገብረመስቀል	ሰነድ	20	0933927021	
5	ገብረመስቀል ገብረመስቀል	ሰነድ	20	0910102026	
6	ገብረመስቀል ገብረመስቀል	ሰነድ	20	0921703975	
7	ገብረመስቀል ገብረመስቀል	ሰነድ	25	0934500860	
8	ገብረመስቀል ገብረመስቀል	ሰነድ	43	09--	
9	ገብረመስቀል ገብረመስቀል	ሰነድ	20	0984568395	
10	ገብረመስቀል ገብረመስቀል	ሰነድ	20	09--	
11	ገብረመስቀል ገብረመስቀል	ሰነድ	27	09--	
12	ገብረመስቀል ገብረመስቀል	ሰነድ	36	0926648799	
13	ገብረመስቀል ገብረመስቀል	ሰነድ	56	09--	
14	ገብረመስቀል ገብረመስቀል	ሰነድ	10	0913971122	



4

LAKK	Magaal Guntur	Sex	Umur	Laka Bilbila	Mallatu
1	Fideela battala Gannaduu	Shi	27		
2	BORCE mukisee Shammii	Shi	24	0969659921	
3	Asaftea Guntur muktee	Shi	60		
4	Baaca Alamuu filate	Shi	60		
5	Abdoo Gadaa makulaa	Shi	20	0908897405	
6	Gurfa Shogzu Baichaa	Shi	25	0712343998	
7	Zaffitee Aynaxan Gattosaa	Shi	32	0717383225	
8	Baas. miidharroo bafteela	Shi	18	0710613710	
9	Zattibaa mallaa bashaane	Shi	46	0972921669	
10	Abdoo Asaftea Wafuu	Shi	19		
11	Zattibuu mukkeessa Gannaduu	Shi	28	0926835540	
12	Zachooraa Baaca Bannaraa	Shi	28		
13	Alamuu Nattoosh makulaa	Shi	52		
14	Mattinaa Alamuu filate	Shi	40		
15	Caala Ramisee Manooarroo	Shi	20	0777711894	
16	Takkuu Kitee Wafuu	Shi	37	0967716062	
17	Lamisa Aboataa Aftaanuu	Shi	20	0922061772	
18	Wanduu Aftaafaa manoojaa	Shi	22	0999608770	
19	Tamasseh Zeiso Baulu	Shi	19	0968017392	
20	Girmaa Xaafitee Tattalaa	Shi	57		
21	Bashoada Bannaraa Wafuu	Shi	40	0973978237	
22	Kunoo Zoodu baafaa	Shi	28		

ተከታ	ጠያቂ	ጾታ	ህጻን	ሀገር	ጠለቁ
1	Damee maamoo	ባሕር	55	-	-
2	Ganasuu Gazzuu	ባሕር	49	-	-
3	Abiyoot Girmuu	ባሕር	46	-	-
4	Sisaa Kallile	ባሕር	50	-	-
5	Buuyisaa Mugusaa	ባሕር	40	-	-
6	Bahamu Asheete	ባሕር	39	-	-
7	Toedii Asaffaa	ባሕር	41	0921407400	-
8	Tammsuu Ababaa	ባሕር	56	0972957187	-
9	Kaasuu Dabalee	ባሕር	32	0949197823	-
10	Tafaa Alamuu	ባሕር	65	-	-
11	Amara Girmaa	ባሕር	46	-	-
12	Gazzuu Gannadha	ባሕር	45	0900543478	-
13	Xaayoo Hirphoo	ባሕር	65	-	-
14	Dabalaw Mugusaa	ባሕር	30	0910982281	-
15	Idee Doonii	ባሕር	58	-	-
16	Gidaa Dairbee	ባሕር	58	-	-
17	Asaffaa Moohii	ባሕር	60	-	-
18	Milfeessaa Gannadha	ባሕር	67	-	-
19	Xaasaaee Bahadha	ባሕር	66	-	-
20	Getachoo Asaffaa	ባሕር	50	-	-
21	Kabbadha Alamuu	ባሕር	58	-	-
22	Sootee Baqqalaa	ባሕር	50	-	-
23	Balaadha Alamuu	ባሕር	59	0940445104	-
24	Tuffaafaa Getachoo	ባሕር	38	-	-
25	Jiruu Baqqalaa	ባሕር	42	0912692660	-
26	Jnee Tasamaa	ባሕር	50	0969142139	-
27	Gosaa Makuraa	ባሕር	55	-	-
28	Sisaa Shilashii	ባሕር	47	0985320117	-
29	Taddasaa Makuraa	ባሕር	57	-	-
30	Tafaa Girmaa	ባሕር	40	0996804937	-
31	Balaadha Kabbadha	ባሕር	47	0924053274	-

ሰነድ	የሰነድ ስም	ጾታ	ህጻን	የሰነድ ቁጥር	ማሳሰቢያ
32	ሙሙን ካባልዳ	ቀኝ	42	0912770928	ዘላቂ
33	ዋሳሳታ ገብረ	ቀኝ	80	-	የገብረ ገብረ
34	ገብረ ገብረ	ቀኝ	19	0917711159	ገብረ
35	ገብረ ገብረ	ቀኝ	18	0989676671	-ገብረ
36	ገብረ ገብረ	ቀኝ	29	0923106123	ገብረ
37	አብረኛ ገብረ	ቀኝ	32	0900136659	አብረኛ
38	አብረኛ ገብረ	ቀኝ	29	0941573318	-አብረኛ
39	አብረኛ ገብረ	ቀኝ	45	-	-አብረኛ
40	ሙሙን ገብረ	ቀኝ	44	-	ገብረ
41	አብረኛ ገብረ	ቀኝ	53	-	ገብረ
42	ወሳኝ ገብረ	ቀኝ	40	095258376	ወሳኝ
43	አብረኛ ገብረ	ቀኝ	26	0979957762	አብረኛ
44	ወሳኝ ገብረ	ቀኝ	25	0968047433	ወሳኝ
45	ፍቅረ ገብረ	ቀኝ	28	0911269434	ፍቅረ
46	ወሳኝ ገብረ	ቀኝ	40	0986695362	ወሳኝ
47	ገብረ ገብረ	ቀኝ	27	0935803229	ገብረ
48	ገብረ ገብረ	ቀኝ	50	-	ገብረ
49	ወሳኝ ገብረ	ቀኝ	37	-	ወሳኝ
50	ገብረ ገብረ	ቀኝ	20	0955781166	ገብረ
51	ገብረ ገብረ	ቀኝ	20	0912613688	ገብረ
52	ገብረ ገብረ	ቀኝ	20	0717317636	ገብረ
53	ገብረ ገብረ	ቀኝ	30	0910385766	ገብረ
54	ገብረ ገብረ	ቀኝ	20	0712623333	ገብረ
55	ገብረ ገብረ	ቀኝ	23	0935617278	ገብረ
56	ገብረ ገብረ	ቀኝ	20	0946672377	ገብረ
57	ገብረ ገብረ	ቀኝ	18	0944466367	ገብረ

ሰነድ	የሰነድ ስም	ጾታ	ህጻን	የሰነድ ቁጥር	ማሳሰቢያ
32	ሞሐንበላ ክብረአብ	ባለ	42	0912770928	ዘላቂ
33	ወልደአብ ገብረ	ባለ	80	-	የገብረ ገብረ
34	ወልደአብ ገብረ	ባለ	19	0917711159	ገብረ
35	ወልደአብ ገብረ	ባለ	18	0989676671	-ገብረ
36	ወልደአብ ገብረ	ባለ	29	0923106123	ገብረ
37	ወልደአብ ገብረ	ባለ	32	0900136659	ወልደአብ
38	ወልደአብ ገብረ	ባለ	29	0941573318	-ወልደአብ
39	ወልደአብ ገብረ	ባለ	45	-	-ወልደአብ
40	ወልደአብ ገብረ	ባለ	44	-	ገብረ
41	ወልደአብ ገብረ	ባለ	53	-	ገብረ
42	ወልደአብ ገብረ	ባለ	40	095258376	ገብረ
43	ወልደአብ ገብረ	ባለ	26	0979957762	ገብረ
44	ወልደአብ ገብረ	ባለ	25	0968047433	ገብረ
45	ወልደአብ ገብረ	ባለ	28	0911269434	ገብረ
46	ወልደአብ ገብረ	ባለ	40	0986695362	ገብረ
47	ወልደአብ ገብረ	ባለ	27	0935803229	ገብረ
48	ወልደአብ ገብረ	ባለ	50	-	ገብረ
49	ወልደአብ ገብረ	ባለ	37	-	ገብረ
50	ወልደአብ ገብረ	ባለ	20	0955781166	ገብረ
51	ወልደአብ ገብረ	ባለ	20	0912613688	ገብረ
52	ወልደአብ ገብረ	ባለ	20	0717317636	ገብረ
53	ወልደአብ ገብረ	ባለ	30	0910385766	ገብረ
54	ወልደአብ ገብረ	ባለ	20	0712623333	ገብረ
55	ወልደአብ ገብረ	ባለ	23	0935617272	ገብረ
56	ወልደአብ ገብረ	ባለ	20	0946672377	ገብረ
57	ወልደአብ ገብረ	ባለ	18	0944466367	ገብረ

ANNEX 9: SUMMARY OF TRANSLATED MINUTES OF MEETING

Environmental and Social Impact Assessment (ASIA) of Abusera Airport Project

Minute of Consultation

SH Discussion with Bishoftu Town Stakeholders

Date 01/12/2024

Venue Bishoftu Town Administration Hall

Name of the Participants

- 1.S/r Fasica Birhanu- Town Health Office
- 2.Ato Dinsa Hinsermu- City Administration
- 3.Ato Abiyu Mihretu- Security Office
- 4.Ato Kuma Cala-
- 5.Ato Birhanu Kebede- Mayor Office
- 6.Ato Getachew Asfaw- Agriculture Office
- 7.W/ro Tayitu Yami- Environmental Protection

Agenda of the meeting

1. To discuss the understanding of Abusera Airport
2. Stakeholder perspectives on the importance of the project
3. What is expected from the project by the community and stakeholders?
4. If there are any specific concerns
5. Role of stakeholders in construction and operation activities

Points Raised By Participants:

- We understand that the airport will play a significant role in the economic growth of our country and will make our country competitive. We are fortunate that it will benefit the social and economic development of our city, Bishoftu.
- However, since the project will displace farmers, it needs to be handled carefully.
- The town administration has selecting appropriate location with necessary infrastructure and a site plan is already prepared. The potential livelihood activities have been studied

in detail. A total of 36 hectares of land have been prepared to be used by the project affected people. Four G+7 in Dukem, 3 in Bishoftu Degelo Sub-city; 3 in Cheleleka, a total of 10 G+7 studies have been completed. We have prepared and handed over the land needed for the airport.

- We prepared and handed over the land for the airport construction. In our opinion, the farmers will be beneficiaries, not victims. Now a good place to live has been prepared for them. Work has been facilitated for them. We hear that some farmers have complaints that should be carefully studied before the start of construction to avoid setbacks.
- The city administration will cooperate with the project in any way possible to start the project quickly.
- The entire cabinet is in full agreement regarding the importance of the project. It is historical opportunity and we and the residents of the city are lucky.
- The few complaints from some farmers that their land has not been properly measured should be addressed promptly to prevent expansion of grievances. Everything should be transparent for the displaced community. The people must get awareness. We suggest the project to go ahead with no delay. Farmers need not only training but also practical technical support and follow up.
- We believe that Environmental Impact Assessment is essential. It must be clear how the environmental impacts during construction will be dealt with. People should be aware on how the project is going to create green and clean environment. The study should be done with the people, involve the town's environmental experts and be included in the study document.
-
- The city cabinet unanimously endorses the importance of the project. As our city is a tourist city, the project is in line with the vision of the city. We expect the project to provide improved medical facility in replacement of the 5 health posts that would be demolished by the project. Modern solid waste management system should also be considered for the communities remaining around the project area.

- We suggest the history of Abusera, people's way of life and culture to be included in the study. A sort of museum construction. Assigning local village names to various facilities of the airport can be considered.
- During construction and operation, job priority needs to be given to the local people to tackle unemployment.
- If the name of the airport is changed to Bishoftu Airport, it will help to promote our city internationally to attract tourism.
- If the local people could be supported financially so that they can establish small businesses targeting tourists.
- For community around the airport, if a waste management system integrated with Bishoftu city is constructed.
- If a system that allows local farmers to sell their agricultural products to the airport is designed.

MoM 2

Date 30/01/2025

Stakeholder Consulted: Dukem sub city

Participants

Habtamu Kebede- Education office

Ethiopia Assefa- Agriculture office

Tesfaye Abuni- Administration office

Edris Kemal- Water office

Obsa Wakene- Health office

Adamu Guddisa- Land Administration office

Agenda of the meeting

1. To discuss the understanding of Abusera Airport
2. Stakeholder perspectives on the importance of the project
3. What is expected from the project by the community and stakeholders?
4. If there are any specific concerns
5. Role of stakeholders in construction and operation

Points Raised By Participants

- The project is great and important for our country and our city. Since the local residents are farmers, it is important that the discussion be held with them so that all the farmers have sufficient understanding of the benefits of the project. Land is the foundation of the farmer's life; hence it is necessary to discuss what is prepared for them when they are displaced from their land.
- We understand that the project is of great importance to the country as well as to the surrounding area. There are so many farmers' children in the area that have returned to their parents after completing their education. There are not enough job opportunities in the area and it is better to have frequent discussions with the farmers to hear their views. Continuous and repeated efforts needed to convince them. It is important that all family members have equal awareness. Fair rate should be applied to calculate compensations. In this way we can minimize social risks.

MoM 3

Date 14/01/2025

Venue Abusera woreda

Name of the office/stakeholders affected

Discussion with Representatives of the Project Affected Community

Name of Participants

- 1.Negu Worku
- 2.Balcha Bekele
- 3.Kebede Shibiru
- 4.Kefeni Dhaba
- 5.Boja Tilahun
- 6.Bekele Ayana
- 7.Seyfu Daniye
- 8.Tefera Kebede
- 9.Kebede Kefeni
- 10.Dejene Gmechu
- 11.Shibru Tesfa
- 12.Kisa Tareca
- 13.Asefa Midhegsa
- 14.Abe Gemechu
- 15.Taferu Gobena
- 16.Gebisa Feysa
- 17.Abire Adunya
- 18.Dejene Tamiru
- 19.Tahir Gemechu
- 20.Abe Gemechu

21. Getahun Hordofa
22. Mekoyash Minda
23. Sima Baldar
24. Ababo Deribe
25. Adunya Dalesa
26. Tolera Assefa
27. Seboqa Dafa
28. Debela Niguse
29. Bahiru Ashetu
30. Gudeta Naco

Agenda of the meeting

1. To discuss the understanding of Abusera Airport
2. Stakeholder perspectives on the importance of the project
3. What is expected from the project by the community and stakeholders?
4. If there are any specific concerns
5. Role of stakeholders in construction and operation

Points Raised By Participants

- It has been five years since the project was announced, and adequate clarity has not been created about the project in the community. There is a confusion that we will be settled in a place where consensus has not been reached against the will of the people. It is not clear to us why can't we settle in this area? Why settle in Bishoftu which is very far? The project lacks clarity on this.
- Our fear is that are we going to get adequate land and compensation to generate sufficient income for ourselves and our families? From what we here we are doubtful. Otherwise we are supportive of the project. There was not enough consultation this year to clarify all these.
- Residents of our area must benefit from the project first. Our children, educated and uneducated, must benefit from the project. The rate applied to calculate compensation (322 square meter of land) is very much below market value. We know how much this estimate is in cities. We feel our land is not properly estimated
- Another thing is why it is not possible to make us settle close to the airport, so that it becomes easier for our youth to participate in the construction of the project.

- Only land is given to the youth, but no money for house construction. This can force the youth to sell their land.
- Is it possible to get our compensation in the form of share in the airport?

Date17/06/2017

Bishoftu Administration city, Dukem-sub city Abu sera district, Abu Konbolcha zone

Agenda: Community consultation on additional land for Bishoftu International Airport (BIA) Project

The chairperson announced that the BIA project needs more land. They already have 3,500 hectares, but they need to expand. The extra land they need has already been marked out, and they will acquire it from the community after all requirements are satisfied.

During a community meeting, people expressed their worries to the chairperson about the project's impact:

Fair Payment: They are concerned that the money they receive for their land will not be equal to what they currently earn from farming it each year.

New Jobs: They are unsure how to start new businesses, like raising cattle for meat or keeping bees for honey.

Housing Costs: They want to know who will pay the compensation for the houses that were built in the Bishoftu area for people who have to move.

Land for Young People: They feel that giving only 105 square meters of land to the youth is not enough.

Incorrect Land Measurement: They believe the mapping of their farmland is inaccurate, with some areas overlapping, being made smaller, or being overestimated. They want to know how the land will be measured correctly for each family to ensure fair payment.

The chairperson responded by assuring the community that all their concerns, especially about compensation, would be addressed according to the official laws on land compensation.

Date17/06/2017

Bishoftu Administration city, Dukem-sub city Abu sera district**Agenda: Community consultation on additional land for Bishoftu International Airport (BIA) Project**

The chairperson started the meeting by announcing that the project needs an additional 700 hectares of land. The goal of the meeting was to explain to the community how the land would be acquired and to get their approval.

During the meeting, several community members stood up to voice their individual concerns:

Ida`ee Doni asked: "How much money will you pay us for our land? And will our families be given new houses as part of the plan?"

Beheru Ashete said: "The maps and measurements of our farmland are wrong and contain mixed-up information. What is your plan to fix these errors before you decide on our payment?"

Nagaw Hirpa asked: "Where exactly is the 700 hectares you need located in our community? We've heard the payment offered isn't enough; will you increase it? Also, why aren't young people getting houses?"

Demekso Galatu asked: "Will we be paid for the trees we have in our gardens?"

Ketamo Shumi said: "We know investment is important for development, but why do we have to be moved so far away? Why can't the relocation site be somewhere closer to our current homes?"

Tarekeng Ayano asked: "What is the process for inherited land? How will it be measured and paid for to make sure the right family members receive the compensation?"

ANNEX 10: ENVIRONMENTAL AND SOCIAL CLAUSES TO BE CONSIDERED IN THE CONSTRUCTION CONTRACTOR DOCUMENT

General

In order to ensure the proper implementation of socio-environmental safeguard measures the contract document needs to contain, but not limited to the following indicative environmental, social and health management plans as part of the contract clauses:

a) Dust and Air Quality Management

Air quality and dust emission is always the issue in construction activities. Dust is expected during the construction proposed Bishoftu International Airport as well as during the construction material extraction from borrow pits and quarry areas. Dust and air pollution could also occur during vehicle movement along unpaved access roads and during the decommission phase from removal of abandoned structures and while reinstating the project affected areas. Therefore, it is essential to prepare indicative dust and air quality management plan. Accordingly, an indicative air quality and dust management plan is included as follow. The plan could be updated by the construction work contractor depending on the site condition and significance of impact.

Dust and air quality management activities should include at least the following:

- Dust control measures should be part of the construction contract clauses;
- Hauling trucks carrying construction materials and construction spoils shall be completely covered and secured to avoid dust emission.
- The contractor shall minimize the effect of dust on the surrounding environment resulting from the construction machineries moving around to ensure safety, health and the protection of workers and communities living in the vicinity of dust producing activities.
- Use paved roads for mobilizing the construction machineries and vehicles;
- Spry water on the dusty access roads to suppress dust emission in such a way that dusty roads are remain wet while vehicle and machinery movements;
- Limit vehicles speed to 30km/h.

- Provide appropriate PPE (noise and mouth mask) to prevent workers working at excavation site including the excavator operator;
- Use excavation machineries which cause less dust while excavating,
- Cover dump trucks while transporting the excavated spoil to dump site,
- Dust controlling activities should be done daily, particularly during the construction phase and required materials including water trucks and required manpower should be mobilized at the construction site and awareness and training should be provided for the workers involving in the dust and air quality management activities.
- During the performance of the work and any operations appurtenant thereto, the contractor shall carry out proper and efficient measures, such as sprinkling with water or other means, whenever necessary to reduce the dust and air pollution nuisance, and to prevent dust which has originated from his operations from damaging crops, cultivated fields, and dwellings or causing a nuisance to persons. The contractor will be held liable for any damage resulting from dust originating from his operations around his working areas.

b) Noise and Vibration Management

Excessive exposure to loud noise can cause permanent damage to hearing. Noise at work can cause stress, making it difficult to sleep. Very high levels of noise could cause instantaneous hearing damage. Noise also makes it difficult to hear sounds that you need to hear such as work signals and warning shouts.

The construction contractors of the Bishoftu International Airport projects has to implement the following noise & vibration hazards management activities.

- Ensure the noise levels emanating from machinery, vehicles and noisy construction activities are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.
- If the construction of Bishoftu International Airport projects involve heavy machines that can cause significant vibration, the contractor has to fix any damage resulted from vibration impact of his machineries.
- According to EPA noise standard, the limits of noise permitted for industrial, commercial and residential areas during the day time are 75, 65 and 55 dB respectively while that of

the night time are 70, 55 and 45 dB respectively. Whenever, the noise level is more than the specified standards, it requires appropriate mitigation measures.

- Contractors shall adhere to EPA's permissible noise levels and ensure construction works comply with the set standard.
- Check that exhaust outlets are fitted with silencers or mufflers, and do not keep machinery running unnecessarily.
- Keep compressor motor covers closed when they are running.
- Check that machinery panels are secured and do not rattle.
- Ensure that sound-insulating screens are provided to reduce noise from stationary plant and that where practicable noisy machinery is sited behind earth mounds or brick stacks to isolate or screen it as far as possible.

For workers working at or near a noisy machine:

- Don't expose them to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection.
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB (A).
- Limiting the duration of noise exposure.
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible;
- Periodic medical hearing checks should be performed on workers exposed to high noise levels; and insert ear plugs with clean hands;
- Keep hearing protection clean and in a safe place when they are not in use.

c) Public Safety and Health Management

Public safety and health management should include the following activities:

- Contractor shall provide accident insurance for the workforce;

- All potential hazard sites shall be marked with visible tapes to avoid accidents, or else the contractor shall be held accountable for accidents that occur on project site and areas of influence.
- The contractor shall avail Medical care for ill-health and injuries of his workers.
- Provide a first-aid post (clinic) at the base-camp, and it should be staffed on a full-time basis by a fully qualified health officer or nurse. Simple first aid materials, suitable for dealing with minor injuries should be available at all active work sites. Medical facilities provided by the contractor for his own use, as much as possible are made available in emergencies to local communities at marginal cost, as a goodwill gesture,
- Provide the required protective clothing and equipment based on the work risk analysis.
- Continuously reminded about safety and signage during the toolbox talks ,
- Avoid use of dump trucks and other hauling vehicles for transportation of labor-force by replacing with mini busses or buses.
- Impose penalty whenever the contractor fails to comply with the contractual obligation, and
- Include the input of safety officer among the workforce of the contractor.

d) Construction Material Extraction Sites Management and Reinstatement Plan

Construction material extraction site management and reinstatement activities should cover at least the following:

- The contractor shall obtain appropriate licenses/permits from relevant authorities to extract construction materials.
- The location of construction materials extraction areas shall be subject to approval by the city or sub city or woreda level environmental protection office.
- Material sites shall not be located in the vicinity of settlement areas, cultural and historical sites, wetlands or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value, areas supporting rare plant / animal species;

- Material sites shall not be located in forest reserves and archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.
- At the completion of construction work, all construction sites shall be landscaped and rehabilitated to acceptable standards. The areas shall be first landscaped, dressed with topsoil and covered with tree planting.
- Plant locally acceptable indigenous or exotic tree species at the reinstated areas.

e) Worksite/ Camp Site Waste Management

- Workers camp shall be provided by the construction contractor with adequate facility of toilet, waste disposal site, and adequate water needed for personal hygiene.
- Toilets and shower rooms should be separate and clearly leveled for Men and women.
- All solid waste should be reduced at source, segregated by type and reuse and recycle all the reusable and recyclable wastes wherever possible.
- The contractor shall provide all sanitary facilities (e.g. garbage collection and disposal, drinking water facilities, etc.) in construction workers' camps and provide living rooms with necessary facilities.
- Contractor shall assign adequate number of camp and office cleaners.
- Used oil and hydraulic fluid generated on the construction sites must be collected in a closed container and stored temporarily in a safe place and sent to an authorized recycling depot.
- All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.
- The contractor shall take all possible steps to prevent pollution of streams, rivers, and other water supplies, at or in the vicinity of the site and shall comply with applicable laws, orders and regulations in force in the country concerning the control and abatement of water pollution.

- If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the RE in consultation with City/Sub city/Woreda level environmental protection office, for landfill and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low lying areas and should be compacted and dressed with top soil and then planted with species indigenous to the locality.

f) Hazardous Wastes Management

Hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health or the environment. Hazardous wastes can be liquids, solids, contained gases, or sludge. They can be the by-product of manufacturing processes or simply discarded commercial products, such as cleaning fluids, batteries, and oils. They have one or more of the following characteristics: ignitable (flash point $> 60^{\circ}\text{C}$), corrosive ($\text{pH} < 2$ or > 12.5), toxic (harmful or fatal when ingested or absorbed) and reactive (unstable under normal conditions). The main classes of hazardous material are heavy metals, synthetic organic compounds, petroleum products, acids, biological substances and radioactive materials.

A hazardous waste can cause injury in various ways depending upon whether it is solid or liquid, or in the form of airborne dust, vapor, fumes or gas. The routes into body are by:

- Inhalation: Some toxic gases and vapors cause irritation in the nose and throat and so give warning of their presence; others do not, and penetrate to the lungs or blood stream.
- Ingestion: This is possible when you handle chemicals such as lead-based paints and then eat or smoke without first washing your hands, when toxic vapors contaminate cups, plates or eating utensils, or when you eat meals at the work site;
- Absorption through the skin. Some solvents can be absorbed through the skin into the blood stream and may travel to internal organs such as the brain and liver.

These substances should not be discharged in the environment and only be removed from site by an approved hazardous waste contractor. Other safety precautions to avoid harms from chemical hazards include:

- Substitute the chemical with a harmless or less hazardous one;
- Use personal protective equipment (PPE);

- Keep containers of chemicals in a separate and secure store.
- Make sure there is a label on the container—if there is no label, and then do not use the contents.
- Read the label and make sure you understand what it says, then follow the instructions.
- When opening containers, hold a rag over the cap or lid as some volatile liquids tend to spurt up when this is released; transfer the contents of containers in the open air.
- Avoid breathing in any fumes from chemicals. Provide good ventilation, or work in the open air. Leave the work area immediately if you feel dizzy or unwell.
- When using large quantities of solvents, wear impermeable clothing. Remove any clothing wetted by solvents and leave it to dry in a well-ventilated place.
- Eye protection should be worn when chemicals are being moved or transferred on site.
- When mixing or pouring chemicals using temporary containers, make sure they are suitable and correctly labeled.
- Wash before you eat and do not eat or smoke at workstation.
- If the skin is splashed with a chemical, it should be rinsed immediately with plenty of clean running water. Eyes should be flushed out thoroughly with water and should receive immediate medical attention.
- If you are burned by a chemical or feel unwell after using a chemical, seek medical attention without delay.
- If there is a spillage of chemicals on the ground or floor, report the matter at once so that the right action can be taken, such as soaking it up with dry sand.

g) Repair of Private Property

If the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been repaired satisfactorily in order to indemnify the Client from subsequent claims.

h) Traffic Management Plan (TMP)

The construction of Bishoftu International Airport will involve extensive transportation of construction materials, equipment, and workforce to and from the site. Without proper traffic management, this could lead to congestion, safety hazards, and disruptions to local communities. This Traffic Management Plan (TMP) aims to minimize traffic-related impacts by implementing efficient and safe transportation strategies.

Key Components of the TMP

- Designate specific entry and exit points for construction vehicles to minimize interaction with public traffic.
- Establish clear routes for the transportation of materials to avoid congested areas.
- Implement one-way traffic systems where feasible to reduce bottlenecks.
- Restrict heavy vehicle movements to off-peak hours (early morning or late evening) to avoid congestion
- Implement staggered work shifts to reduce peak-hour transportation demand.
- Coordinate deliveries to ensure a steady supply of materials without overloading roads.
- Install proper road signage, including speed limits, warning signs, and detour notifications.
- Implement speed control measures such as speed bumps and traffic barriers near residential and sensitive areas.
- Conduct regular road maintenance to ensure safe driving conditions for both construction and public vehicles.
- Assign trained traffic marshals to guide and control vehicle movement at key intersections and work zones.
- Inform local communities, businesses, and public transport operators about construction schedules and road closures.
- Provide alternative routes and temporary detours for local traffic where necessary
- Establish a complaint resolution mechanism to address traffic-related grievances from the public.
- Develop a clear protocol for responding to traffic accidents and vehicle breakdowns.

- Ensure that emergency vehicles, such as ambulances and fire trucks, have uninterrupted access to and from the construction site.
- Maintain communication with local law enforcement and emergency services for rapid response.
- Implement dust control measures such as water spraying on unpaved roads to reduce air pollution.
- Optimize vehicle routes to minimize fuel consumption and carbon emissions.
- Encourage the use of eco-friendly construction vehicles where possible.
- Conduct regular inspections to assess the effectiveness of the traffic management plan.
- Adjust traffic control measures as needed based on real-time conditions and feedback from stakeholders.
- Ensure strict adherence to TMP guidelines by construction personnel and drivers.

By implementing this Traffic Management Plan, the construction phase of Bishoftu International Airport can proceed with minimal traffic disruptions, enhanced safety, and reduced environmental impact.

i) Chance Find Procedure

Contracts for civil works involving excavations will require contractors to prepare and submit for approval by the supervising engineer/borrower a Chance Finds Procedure. This Annex provides guidance on the structure and content of an acceptable Chance Finds Procedure which are the procedures the contractor will follow in the event of buried Physical Cultural Resources (PCR) being unexpectedly encountered. The approved procedure will meet the local regulatory authority, including any “chance find” procedures already incorporated in Ethiopian legislation dealing with antiquities or archaeology.

i.Physical Cultural Resources (PCR) Definition

PCRs are defined as “movable or immovable objects, sites, structures or groups of structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance”. This section should define the types of PCR that are likely to be present and that will be covered by the procedure. In some cases the Chance-Finds Procedure will be confined to archaeological finds; more commonly it will apply to all types of PCR. The types of PCR that

are likely to be present will be determined following review of the ESIA/ESMP and in consultation with relevant local authorities.

ii. Ownership

Depending on the circumstances, the owner could typically be, for example, the state, the government, a religious institution, the land owner, or could be left for later determination by the concerned authorities.

iii. Recognition

In areas of high risk of finds being encountered, the training should be provided by qualified cultural heritage or archaeological experts.

iv. Procedure upon Discovery

Suspension of Work

The contractor shall stop the works in the area of the find, and secure the site such that no further activity that could damage the find can be undertaken.

After stopping work, the contractor must immediately report the discovery to the supervision consultant or to the client.

Demarcation of the Discovery Site

To the approval of the supervisor, the contractor will demarcate, and limit access to, the site.

Investigating the Find

This begins with the process for notifying the project environmental specialists, the responsible local authorities and other relevant governmental organizations, and then agreeing with the responsible agencies and to the satisfaction of the concerned and responsible agency how the find will be protected, preserved, studied and evaluated, and when and which archaeologists or cultural heritage experts should be involved.

The significance and importance of the find will determine the actions that are required, which could include a change in work locations, conservation, preservation in situ, restoration or salvage.

Non-Suspension of Work

Only once the relevant authorities have agreed the actions to be taken and these actions have been taken, will works re-commence.

v. Chance Find Report

The contractor will ensure that a report is prepared detailing the find and the action taken and issued to the supervisor and other relevant authorities within 1 week of the find. The report shall be updated as necessary each week until the suspension of works is lifted. The report will include as a minimum the following details:

- Date and time of discovery;
- Location of the discovery;
- Description and photographs of the PCR, including estimated weight/dimensions etc.;
- Temporary protection implemented;
- Plan of the actions agreed with the relevant authorities;
- Details of the actions taken.

j) Contractor's ESMP (C-ESMP)

During the construction, the contractor shall prepare and implement C-ESMP. C-ESMP should be prepared based on the indicative ESMP presented in section 9 of this document.

The plan has to be prepared and submitted within two months after the official mobilization of the contractor.

Any other environmental plans, as required, such as bioengineering plan, compensatory plantation plan, etc. shall be prepared and included in the C-ESMP. The Contractor's C-ESMP will serve two main purposes:

- (i) For the contractor, it will be important to ensure that all measures are in place for adequate Environmental, Occupational Health and Safety management, and as an operational manual for his staff.
- (ii) For the Client, supported where necessary by RE, to ensure that the Contractor is fully prepared for the adequate management of the C-ESMP aspects of the project, and as a basis for monitoring of the Contractor's performance.

The Contractor's ESMP shall provide at least:

- (i) Description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in this ESIA;
 - (ii) Description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
 - (iii) Description of all planned monitoring activities (e.g. proper reinstatement of borrow areas, spoil disposal sites, etc.) and the reporting thereof; and
 - (iv) The internal organizational, management and reporting mechanisms put in place.
- The Contractor's ESMP will be reviewed and approved by the Client before start of the actual construction works. This review should demonstrate if the Contractor's ESMP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.
 - In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS and traffic accident.
 - The plan shall include providing and managing adequate safety signs and PPE;
 - The plan among others should include restrictions on speed of vehicles, (Construction vehicles shall not exceed a maximum speed limit of 30km per hour in populated areas and within the project construction sites).
 - In order to effectively implement the C-ESMP, the contractor shall include environmentalist, sociologist and occupational health and safety officers among his workforce and show specific responsibilities and job descriptions in the plan.
 - The Contractor shall comply with the C-ESMP while implementing works he is responsible for. The Contractor shall inform himself about environmental and social policies, laws, guidelines and standards relevant to his work and prepare his work strategy and plan to fully taking into account these relevant provisions.

- The Contractor shall prepare method statements indicating the period within which he shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.
- The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan/strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.

Reporting: the Contractor shall prepare monthly progress reports to the RE on compliance with these general conditions and the C-ESMP. It is expected that the Contractor's reports will include information on:

- C-ESMP actions/measures taken, including approvals sought from EGA or Bishoftu City Administration;
- Problems encountered in relation to C-ESMP aspects (incidents, including delays, cost consequences, etc. as a result thereof);
- Lack of compliance with contract requirements on the part of the Contractor;
- Changes of assumptions, conditions, measures, designs and actual works in relation to C-ESMP aspects; and
- Observations, concerns raised and/or decisions taken with regard to C-ESM management during site meetings.

It is advisable that reporting of significant Environmental and social incidents be done "as soon as practicable". Also, it is advisable that the Contractor keeps his own records on health, safety and welfare of persons, and damage to property. Details of C-ESMP performance shall be reported through the RE to the Client.

Training: the Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions and C-ESMP and are able to fulfil their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the C-ESMP.

ANNEX 11: SEXUAL EXPLOITATION, ABUSE AND HARASSMENT (SEAH) PREVENTION AND RESPONSE ACTION PLAN

The Inter-Agency Standing Committee (IASC) defines Gender-based Violence as “an umbrella term for any harmful act that is perpetrated against a person’s will, and that is based on socially ascribed (gender) differences between males and females.

The United Nations defines “sexual exploitation” as any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially, or politically from the sexual exploitation of another.

Sexual harassment is defined as any unwelcome sexual advance, request for sexual favor, verbal or physical conduct or gesture of a sexual nature, or any other behavior of a sexual nature that might reasonably be expected or be perceived to cause offense or humiliation to another, when such conduct interferes with work, is made a condition of employment, or creates an intimidating, hostile or offensive work environment. It occurs between personnel/staff and involves any unwelcome sexual advance or unwanted verbal or physical conduct of a sexual nature.

Guidance by the WB on Sexual Exploitation, Abuse, and Harassment (SEAH)

The WB Guidance Note defines four key areas of SEAH risks:

- i. SEA - exploitation of a vulnerable position, use of differential power for sexual purpose, actual or threatened sexual physical intrusion;
- ii. Workplace sexual harassment - unwanted sexual advances; requests for sexual favors, sexual physical contact;
- iii. Human trafficking - sexual slavery, coerced transactional sex, illegal transnational people movement; and
- iv. Non-SEA - physical assault, psychological or physical abuse, denial of resources, opportunities, or services and Intimate Partner Violence (IPV)

National Legislative and policy framework of Ethiopia

Internationally and regionally Ethiopia has adopted several international and regional instruments, including the Convention on the Rights of the Child (ratified by Ethiopia in 1991), the African Charter on the Rights of the Child (1999), and the Convention on the Elimination of Discrimination Against Women (CEDAW) (ratified within the Constitution 1995). Most recently, the Sustainable Development Goals Education Goal 4 includes a target on creating child, disability and gender-sensitive education facilities and to ‘provide safe, non-violent, inclusive and effective learning environments for all’.

Laws and codes

The Revised Family Code (2000) of Ethiopia has provisions to protect the rights and dignity of women, boys and girls at household level. It sets the legal age of marriage at 18 years with full and free consent of both partners. The Criminal Code (2005) specifies crimes and penalties prescribed by law.

Policies, Plans and Guidelines

National Policy on Ethiopian Women (1993) aimed to institutionalize the political, economic, and social rights of women by creating appropriate structures in government offices and institutions so that public policies and interventions are gender-sensitive and equitable.

1) The contractor’s, Sexual Exploitation, Abuse and Harassment (SEAH) Code of Conduct

Based on the above policy, legislation and criminal code of Ethiopia, the Contractor’ are obliged to create and maintain an environment which prevents SEAH issues, and where the unacceptability of SEAH and actions against children are clearly communicated to all those engaged on the project. In order to prevent SEAH, the following core principles and minimum standards of behavior will apply to all employees without exception:

- SEAH constitutes acts of gross misconduct and is therefore grounds for sanctions, penalties and/or termination of employment. All forms of SEAH including grooming are unacceptable being it on the work site, the work site surroundings, or at worker’s camps. Prosecution of those who commit SEAH will be pursued.

- Treat women and children (persons under the age of 18) with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
- Do not use language or behavior towards women or children that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- Sexual activity with children under 18—including through digital media—is prohibited. Mistaken belief regarding the age of a child and consent from the child is not a defense.
- Exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior is prohibited.
- Sexual interactions between contractor's and consultant's employees at any level and member of the communities surrounding the workplaces that are not agreed to with full consent by all parties involved in the sexual act are prohibited. This includes relationships involving the withholding, promise of actual provision of benefit to community members in exchange for sex – such sexual activity is considered “non-consensual” within the scope of this Code.
- Where an employee develops concerns or suspicions regarding acts of SEAH by a fellow worker, whether in the same contracting firm or not, he or she must report such concerns in accordance with Standard Reporting Procedures.
- All employees are required to attend an induction training course prior to commencing work on site to ensure they are familiar with the SEAH Code of Conduct.
- All employees must attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the institutional SEAH Code of Conduct.
- All employees will be required to sign an individual Code of Conduct confirming their agreement to support SEAH activities.
- I do hereby acknowledge that I have read the foregoing Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to SEAH. I understand that any action inconsistent with this Code of Conduct or failure to act as mandated by this Code of Conduct may result in disciplinary action.

Signed by: _____

Title: project Director

2) Project Manager's, Sexual Exploitation, Abuse and Harassment (SEAH) Code of Conduct

Managers at all levels play an important role in creating and maintaining an environment which prevents SEAH. They need to support and promote the implementation of the Company and Individual Codes of Conduct. To that end, they must adhere to the Manager's Codes of Conduct. This commits them to support and developing systems which maintain a SEAH-free and child safe work environment. These responsibilities include but are not limited to:

Mobilization

1. Establish a SEAH Compliance Team from the contractor's, clients and consultant's staff to write a Plan that will implement the SEAH Codes of Conduct.

The Plan shall, as a minimum, include:

- Standard Reporting Procedure to report SEAH issues through the project Grievance Mechanism (GM);
- Accountability Measures which will be taken against perpetrators; and,
- Response Protocol applicable to SEAH survivors/survivors and perpetrators.
- Coordinate and monitor the development of the Plan and submit for review before mobilization
- Update the Plan to reflect feedback and ensure the Plan is carried out in its entirety.
- Provide appropriate resources and training opportunities for capacity building so members of the SEAH Compliance Team feel confident in performing their duties. Participation in the SEAH Compliance Team will be recognized in employee's scope of work and performance evaluations.
- Ensure that contractor, consultant, and client staff are familiar with the proposed project GM and that they can use it to anonymously report concerns over SEAH.
- Hold quarterly update meetings with the SEAH Compliance Team to discuss ways to strengthen resources and SEAH support for employees and community members.

Training

- All managers are required to attend an induction manager training course prior to commencing work on site to ensure that they are familiar with their roles and responsibilities in upholding the SEAH Codes of Conduct. This training will be separate from the induction training course required of all employees and will provide managers with the necessary understanding and technical support needed to begin to develop the Plan for addressing SEAH issues.
- Provide time during work hours to ensure that direct reports attend the mandatory project facilitated induction SEAH training required of all employees prior to commencing work on site.
- Ensure that direct reports attend the monthly mandatory training course required of all employees to combat increased risk of SEAH during civil works.
- Managers are required to attend and assist with the facilitated monthly training courses for all employees. Managers will be required to introduce the trainings and announce the self-evaluations.
- Collect satisfaction surveys to evaluate training experiences and provide advice on improving the effectiveness of training.

Prevention

- All managers and employees shall receive a clear written statement of the client's requirements with regards to preventing SEAH in addition to the training.
- Managers must verbally and in writing explain the client's and individual codes of conduct to all direct reports.
- All managers and employees are to sign the individual 'Code of Conduct for SEAH, including acknowledgment that they have read and agree with the code of conduct.
- To ensure maximum effectiveness of the Codes of Conduct, managers are required to prominently display the Company and Individual Codes of Conduct in clear view in public areas of the workspace. Examples of areas include site office, rest, and lobby areas of sites.
- All posted and distributed copies of the client's and Individual Codes of Conduct should be translated into the appropriate language of use in the work site areas (e.g., local language).

- Managers will encourage employees to notify the GM of any acts of threats or violence to women or children they have witnessed or received or have been told that another person has witnessed or received, or any breaches of this code of conduct.
- Managers should also promote internal sensitization initiatives (e.g., workshops, campaigns, on-site demonstrations etc.) throughout the entire duration of their appointment
- Managers must provide support and resources to the SCCT to create and disseminate the internal sensitization initiatives through the Awareness-raising strategy under the Plan.

Response

- Managers will be required to provide input, final decisions and sign off on the Standard Reporting Procedures and Response Protocol developed by the SCCT as part of the Plan.
- Once signed off, managers will uphold the Accountability Measures set forth in the Plan to maintain the confidentiality of all employees who report or (allegedly) perpetrate incidences of SEAH (unless a breach of confidentiality is required to protect persons or property from serious harm or where required by law).
- If a manager develops concerns or suspicions regarding any form of SEAH by one of his/her direct reports, or by an employee working for another contractor on the same work site, she/he shall immediately refer the case to the competent authorities (Police) and, at the same time, report the case to the GM and the SCCT for internal processing according to the established reporting and accountability measures
- Once a sanction has been determined, the relevant manager(s) is/are expected to be personally responsible for ensuring that the measure is effectively enforced, within a maximum timeframe of 10 days from the date on which the decision was made.
- Managers failing to comply with such provision can be in turn subject to disciplinary measures, to be determined and enacted by the contractor's CEO, Managing Director, or equivalent highest-ranking manager. Those measures may include:
 - a. Informal warning
 - b. Formal warning
 - c. Additional Training
 - d. Loss of up to one week's salary.

- e. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
- f. Termination of employment.
 - Ultimately, failure to effectively respond to SEAH cases on the work site by the contractor's managers or CEO may provide grounds for legal actions by authorities.

I do hereby acknowledge that I have read the foregoing Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to SEAH. I understand that any action inconsistent with this Code of Conduct or failure to take action mandated by this Code of Conduct may result in disciplinary action.

Signed by: _____

Title: _____

ANNEX 12: RAP AND LIVELIHOOD RESTORATION PLAN

Introduction

The Ethiopian Airlines Group envisions transporting one hundred million passengers per annum by 2035 by increasing flight destinations and increasing the fleet sizes which, among other things, necessitate the need for developing new mega international airport. Accordingly, the Ethiopian Airlines Group is planning to develop a new international airport in Oromia National Regional State, Bishoftu City, Dukem Sub-City, Abusera District on 3520 hectares of land that covers seven administrative kebeles of the district. This new international airport development project entails the displacements of residents, social and economic infrastructures, religious institutions, and communal resources used by the residents and seasonal users. A new resettlement site is selected for resettling the displaced residents, which also affects the users of the resettlement land. This annexed section, presents the socioeconomic conditions of the sites and the residents; and the identified resettlement and housing plan, the resettlement site development, the livelihood restoration plan programs identified; and the associated costs in summarized way.

Identification and understanding of the possible effects

Identification and understanding of the project effects on different groups of PAPs should be assessed. In the case of the envisioned airport, the following effects are identified to face the residents and the surrounding areas.

- All home (house) owners (both residential, business and houses for other purposes) lose their houses in the project site
- Agricultural land owners (farm-households and others) lose their agricultural land (may be permanently if the land-for-land replacement may not be possible)
- The landless rural households and the rural poor lose their off farm income they depend mainly on the land owners as share croppers, laborers, etc.
- Business owners also lose their business income (at least temporarily)
- Employees of GOs, NGOs, POs, religious institutions etc. working in the project site will also be displaced and may shift to other similar institutions

- The unemployed and other dependents may also be affected as their families on which they depend will be economically affected by the project
- Students and children attending their education in schools in the project site may also be affected as these schools will be displaced by the project
- Seasonal users of the project site, the Kerreyyu Oromo Community Members will also be affected significantly as they use the project site for 5–6 months in a year for the purposes of feed and water for their camels and also as a pathway to West Arsi Zone Districts after staying in the area for such long times
- Residents residing in the surrounding project site will also be affected by the project as access road networks to different towns and other kebeles pass through the project site will be closed by the project

Notification and consultation of the land owners about the land to be acquired

- The responsibility availing the land decided for any development project is vested into the powers of the Woreda/Town administrators and should be formally notified to implement the land acquisition.
- Accordingly, the regional government should officially notify the respective Town administrator about the land decided for the project together with the demarcated boundaries, site plan and map of the project delineated area.
- In addition to these, the project implementer/promoter (being with concerned bodies) has to continuously work on awareness creation, design and implement plans to monitor and control illegal constructions, settlements, and the making of any permanent changes to the land delineated for the MEGA AIRPORT.
- In so doing, the promoter should work in close collaboration with the government bodies at Zonal, Woreda and Kebele levels.

Compensation estimation, approval and disclosure

- The estimation of compensation for private PAPs and communal assets is conducted by the compensation committee established at Woreda level.

- It includes the estimation of compensation for displacement, economic damages, damages to private structures, damages to private perennial trees and damages to other immovable assets.
- Compensation estimation will be conducted as per the existing applicable laws
- The estimation of compensations for communal assets and the public infrastructure services will be conducted by the providers of the respective infrastructure services.
- The compensation committee should also verify the eligibility status of each of the PAPs for which compensation is estimated as per the eligibility criteria developed.
- The estimated compensations should be approved by the concerned Woreda level bodies (in consultation with regional level bodies).
- The approved private compensation should be disclosed to the eligible PAPs in a transparent way.
- The disclosure includes the results of the asset inventory, the estimated replacement cost for each, the bases for the estimation of displacement and economic damages compensations, and any detail needed.
- The disclosure should be made in a conference meeting in which the husband, wife and other family members participate.
- This is to reach on consensus/agreement on the fairness of the estimated compensation.
- The project promoter/implementer should follow up the execution of the compensation estimation and provide technical supports for the Woreda Administrators at this stage of the land acquisition process.

Managing grievances

- The disclosure of the estimated compensation is expected to generate some grievances among some PAPs.
- All grievances should be accepted, verified, and resolved by the Grievance Management Committee.
- The conclusion of the grievance management stage, leads to effecting the compensation payments.

- The detailed grievance management and redress procedures should be developed and implemented.

Objectives of the socioeconomic and LRP study

The general objective of the assignment is to conduct detailed socioeconomic study of the Project Affected Persons and developing the resettlement and LHR plans for the smooth realization of the proposed project. The specific objectives include

- Describe the current socioeconomic condition of the project site and the project affected persons
- Identify anticipated possible impacts of the project
- Identify and propose resettlement area for the PAPs
- Identify and propose LR measures for the PAPs

Scopes of the socioeconomic and LRP study

- Thematically: The scope of the study focuses on updating all basic socioeconomic data of the PAPs; identifying the potential resettlement area required; and developing the resettlement and LHRP Plans for the PAPs.
- Geographically: The study focuses on the seven project Kebeles within the total area of 3,520Ha of the proposed project site; and the 753 hectare of land identified for resettlement of the project site PAPs
- Methodologically: The study employs both quantitative and qualitative data and data analysis methods

Socioeconomic conditions of affected project and resettlement sites

The project site inhabits a total of 2488 households (of which 1982 households have legal land holding certificates) with total population of 13,939 people (including 5151 people of 18+ youths and 506 households residing on the lands of their families without having their own title deeds) which will be displaced by the project. With regards to house ownership, there are 2794 houses in

the project site of which 1342 (48 percent) are corrugated iron sheet houses and the remaining are described as huts.

The development of the project entails the displacement of these residents and the different social and economic infrastructures including schools, health posts, water supply structures, roads, Farmers Training Centers, Cooperative Warehouses, Kebele Offices, religious institutions found in the project site. On the other hand 753 hectares of land is identified for resettling the project displaced households and persons in Bishoftu City, Dhibayu Sub-City, Dhaka-Bora District. The resettlement site inhabit 396 households of which 308 households with legal title deed to land, a total population of 1800 people of which 634 are with age 18+ years.

Households land ownership status

Description	HHs obtained land owner certificate	Backyard
Above 5 Ha	228 (11.5%)	
2–5 Ha	595 (30%)	
0.1–2 Ha	1,159 (58.5%)	
Total	1982	506

Structures Affected by the Project

S/N	Type of Structure	Total Number
1	Houses	
1.1	Residential houses	2,488
1.2	Business houses	39
2	Toilets	563
3	Animal shade	406
4	Grain storage	46
5	Biogas units	5
6	Water harvesting structures	6
7	Backyards with fences (<i>mostly natural vegetation</i>)	1,369
8	Water wells	91
9	Houses connected to different utilities	
9.1	Houses connected to piped water	73
9.2	Houses connected to electric power	143
9.3	Houses connected to telephone lines	27

Social and economic infrastructures affected

Type of Infrastructure/Communal Property	Number
Health post	5
School	5
FTC (Farmers Training Center)	5
Water reservoir with distribution lines	1
DA office	5
Kebele Office	5
Coop Warehouse	5
Orthodox Church	2
Full Gospel Church	1
Protestant Church	1
Mekaneyesus Church	1
Road (km)	37

Number of government employees affected

Institution	A/Serkema	A/Achiro	A/Loya	A/Lugna	Kombolcha	A/Garbi	Amuye Sera	Total
Schools	7	11	16	20	10	10	0	74
FTC	4	0	1	4	1	3	0	13
Health Post	1	0	2	2	1	2	0	8
Livestock Clinic	1	0	0	0	0	0	0	1
Cooperative Office	1	0	0	1	0	0	0	2
Land Management	1	0	0	0	0	0	0	1
Kebele Office	1	2	1	2	0	1	0	7
Total	16	13	20	29	12	16	0	106

Economic activities of the PAPs

- The livelihood of the households of the project site depends on both crop production and livestock rearing.
- In addition, non-farm activities like petty trade practiced in order to cover household essentials in most parts of the area.
- Production and productivity are relatively better in most parts of the area.
- Crop production carried out under rain fed agriculture in all Kebeles of the project site.
- Crops grown in the area includes Teff, Wheat, Barley, Chick Pea, Soya Bean, Maize, Sorghum, Pea and Beans.
- Most of the crops grown are local varieties except few improved seeds of wheat and teff.
- Land preparation is undertake using simple local hand tools.
- Regarding to land size, it is occasional that a household could cultivate more than 2 hectares.
- The contribution of livestock to the livelihood system is considerable in that their contribution in terms of livestock products and provision of draught power is significant.
- Livestock is insurance for the farmers during drought and failure of crop production.
- Availability of high development potential both for crop production and livestock rearing in the project site.
- Their crucial resource that they entirely depend on for their livelihood is income generated from agricultural activities.
- Small scale fattening, simple/traditional/ poultry production, renting cart for transportation purposes (for both goods and humans) among others.
- As one part of petty trade activity, the women also sell local drinks including Tela & like to supplement their major income.

The resettlement and housing plan

A total of 2290 legal land owners from both sites (1982 from project site and 302 from resettlement site) will be provided 500m² of housing plot each; while a housing plot of 105m² of land will be provided each for the total of 6291 (5657 from project site and 634 from resettlement site) 18+

household members. Accordingly, a total of 1,805,555m² or about 180.6 hectares of housing plot of land will be provided.

With regards to housing plan, the study identified the need for constructing houses for those legal land owner households losing their homes totaling to 1359 households (1210 from the project site and 149 from the resettlement site) on 30 percent of the 500m² of housing plot provided for each – amounting to a total of 203,850m² constructible plots of land requiring a total construction cost of **4,994,325,000.00 ETB** (assuming a 24,500 Birr per meter square of unit construction cost) for villa houses that share walls with each other.

Resettlement site development

Developing the resettlement site calls for the construction of road networks; building social infrastructures including schools, health center, religious institutions; building water supply, electric power supply and ensuring the sustainable functioning of these infrastructures; the total cost of which is estimated to **5,020,837,200.00 ETB**.

Different criteria were considered in identifying the resettlement site for the displaced persons from the seven kebeles indicated above, that are discussed briefly as follows.

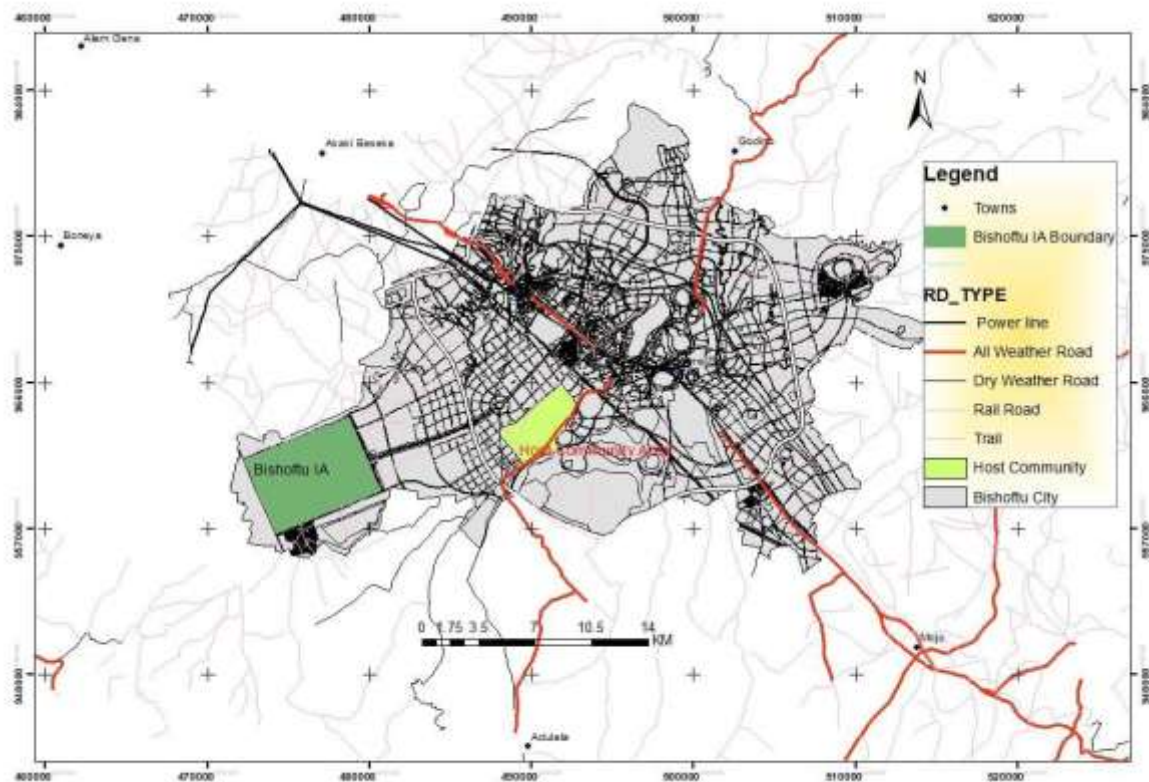
The first is interest of the community coupled with the accessibility of the resettlement site to be selected so as to keep the advantage of the displaced households.

Secondly, the consideration of available legal and regulatory environments, including the Constitution of FDRE- Art 40(3) of the Constitution provides for the public ownership of both rural and urban land as well as all natural resources; Urban Development Policy- National Urban Development Policy (2005); Proclamation to Provide for Urban Plans (Proclamation No. 574/2008, asserting the needs to regulate and guide urban centers with sound and visionary urban plans to bring about balanced and integrated national, regional and local development; and Proclamation No. 1161/2019- Expropriation of Land Holdings for Public Purposes, Payments of Compensation and Resettlement of Displaced People were reviewed and considered in selecting the resettlement site.

Thirdly, the Bishoftu city Structural Plan is also considered with regards to the settlement areas. Fourth is the consideration of Safety Issues related to Airline (especially during Landing and

takeoff) and that of maintaining sufficient distance from the airport. Moreover, future infrastructure construction by the airport including access road and rail way construction were considered.

Based on these criteria, the selected resettlement site location is in Bishoftu City, Malka Dibayu Sub-City, Dhakaa Booraa District with a total area of 753 hectares of land. The location of the site is depicted in in the figure below.



Livelihood programs identified and proposed

Approaches used in identifying the income generating business activities

The livelihood restoration programs and plans are designed based on identified demand opportunities that are believed to be created by mainly by the Ethiopian Airlines Catering services, the demands created following the establishment of businesses to satisfy the Ethiopian Airlines demands, the general market demand trends. These include the demand for agricultural products, agro-processed products, construction materials and construction services and construction

machinery services demanded for construction of the Airport and others as will be discussed in the following sections.

- Identification of demand for different inputs from the EAG
 - Agricultural and agro-processed products demand identified – including the required level of processing, packaging, quality standards and daily demand volume
 - Demand for construction material supply
 - Demand for labor supply are identified
- Demand for inputs created by some of the proposed LH activities such as dairy, poultry, fattening, etc. for feeds
- Consideration of the general market demand for different agricultural and agro processed products
- Consideration of agro-ecological suitability
- Prior development of the general roadmap document to be guided with
- Consideration of availability of primary inputs for the proposed livelihood activities
- Experience sharing from previously implemented livelihood restoration plans for different projects including: the Wonci Eco-tourism development, the Geda Especial Zone Development, and other federal level projects.
- Use of expertise knowledge from diverse discipline (livestock, construction, land management, water engineer, electric engineer, job-opportunity and skill development, economists, sociologists, etc.) in identifying the proposed livelihood activities and estimating the costs

A total of seven livelihood opportunities are identified and proposed from four sectors, namely: Agriculture sector, Industry sector (agro-industry), Trade and transport, and Construction sector. Six livelihood opportunities including fruits and vegetables production, dairy farm, cattle beef fattening, chicken for egg, chicken for meat and beekeeping (honey production); six livelihood opportunities from industry sector including: dairy processing, chicken meat processing, dairy feed processing, chicken feed processing, cattle beef feed processing, and garment processing; two opportunities from trade and transport sector, namely: mixed use building business and public transport business; different construction material supply production opportunities from construction sector are identified and proposed. Moreover, minimum transitional support scheme

in terms of cash transfer is proposed for the time period that runs over the time of displacement and the time the households start sustainably stands on themselves by the income that they generate engaging in the proposed livelihood programs. These identified livelihood programs/businesses involve a **total of 2796 households** with the total estimated implementation cost of **16,011,121,200.00 ETB**.

Summary of Livelihood Programs and Number of Households to be involved

Sector	LHRP Activities	No. of HHs	Land Required (ha)
Agriculture	Irrigated fruits and vegetables production on 200 hectares using underground water	496	200
	Dairy farm with 300 milking cows (100 cows per shed)	100	6
	Beef fattening with 1500 cattle in 15 sheds (100 cattle/shed)	700	3
	Poultry farm for egg production (4000 birds, 2000/shed for 50 HHs each)	100	1
	Poultry farm for meat (4000 birds, 2000/shed for 50 HHs each)	100	1
	Beekeeping with 60 hives (bee colonies)	10	0.1
Subtotal (Agriculture)		1506	211.1
Agro-processing	Small-scale milk processing	10	0.05
	Chicken meat processing	5	0.04

	Poultry feed processing	10	0.05
	Dairy feed processing	10	0.08
	Cattle beef feed processing	20	0.04
	Garment processing	95	0.05
Subtotal (Agro-processing)		150	0.31
Trade and Transport	Mixed-use building businesses (10 G+7 buildings; 50 HHs per building)	500	1
	Public transport (20 mini-buses for 40 HHs)	40	—
Subtotal (Trade & Transport)		540	1
Construction	Construction material supply businesses	550	—
Subtotal (Construction)		550	—
Transitional Support	Cash payments	2796	—

Summary of Estimated Costs and Possible Sources for Resettlement Plan and LHRPs

The estimated costs for the implementation of the resettlement plan and the implementation of the Livelihood Restoration Programs are summarized and presented in the table below.

Programs	Cost Items	Estimated Cost (Birr)
Housing and Site Development	Housing development	14,699,999,999.00
	Sub-total 1	14,699,999,999.00
Resettlement Site Development	Road network development	3,413,813,138.57
	Schools (Bu'ura Boruu and Ifa Boruu)	422,240,338.72

	construction	
	Health center	263,900,211.70
	Water supply	430,106,101.99
	Electric power supply	769,940,209.02
	Sub-total 2	5,300,000,000.00
Agriculture-Based LHRPs	Fruit production farm (200 ha, underground irrigation)	542,150,000.00
	Dairy farm (300 cows for 100 HHs)	717,500,000.00
	Beef fattening (1,500 cattle for 700 HHs)	900,500,000.00
	Poultry farm for egg production (4,000 birds, 100 HHs)	102,750,000.00
	Poultry farm for meat (4,000 birds, 100 HHs)	94,100,000.00
	Beekeeping farm (60 bee colonies)	28,290,000.00
	Sub-total 3	2,385,290,000.00
Agro-Processing-Based LHRPs	Milk processing factory	
	Chicken meat processing factory	54,550,000.00
	Poultry feed processing factory	39,950,000.00
	Dairy feed processing	245,150,000.00
	Beef feed factory	338,000,000.00
	Garment processing	174,250,000.00
	Sub-total 4	851,900,000.00
AGRI and AGRO-PROCESSING TOTAL		3,237,190,000.00
Trade and Transport-Based LHRPs	10 G+7 mixed-use buildings for 500 HHs	5,415,000,000.00
	20 mini-buses for public transport (40 HHs)	300,000,000.00
	Sub-total 5	5,715,000,000.00

Construction Input-Based LHRPs	Crusher Machineries:	
	3 Belt (China)	550,471,247.10
	2 Belt (China)	275,235,623.55
	1 Belt (China)	213,413,468.11
	Total 6a – Crusher Machineries	1,039,120,338.75
	Brick Machines:	
	60 Automatic (Turkey)	677,503,073.35
	Hydraulic Big (China)	460,702,089.88
	Hydraulic Medium (China)	338,751,536.68
	Hydraulic Small (China)	127,031,826.25
	Total 6b – Brick Machines	1,603,988,526.16
	Machineries and Trucks:	
	Loaders	423,439,420.84
	Excavators	762,190,957.52
	Sino Trucks	592,815,189.18
	Dozer	1,270,318,262.53
	Jackhammer	508,127,305.01
	Total 6c – Machineries and Trucks	3,556,891,135.09
	Sub-total 6 – Total Machineries	6,200,000,000.00
Transitional Support	Transitional support	858,931,200.00
	Sub-total 7	858,931,200.00
Contingency and Totals	Total cost (before contingency)	36,011,121,199.00
	Contingency (10%)	3,601,112,119.90
	Grand Total	39,612,233,318.90

In sum, the overall cost of housing, resettlement site development, livelihood restoration and transitional support payments is estimated to **39,612,233,318.90 ETB**.

ANNEX 14: ASSESSMENT OF FEASIBLE DISPOSAL SITES FOR EXCAVATED SOILS FROM BISHOFTU INTERNATIONAL AIRPORT CONSTRUCTION PHASE



ETHIOPIAN AIRLINES' GROUP

Assessment of Feasible Disposal Sites for Excavated Soils from Bishoftu International Airport Construction Phase



ETG Designers and Consultants S.C.

Kirkos Sub-city Worerda 08, House No, 201

Addis Ababa, Ethiopia

M: +251942383278

E: yared.girma@etgdesigners.net

EXECUTIVE SUMMARY

The assessment of feasible disposal sites for excavated soils generated during the construction of Bishoftu International Airport has identified two designated areas capable of accommodating the estimated 41,280,664m³ of unsuitable material. This large-scale project, which includes the development of cargo terminals, runways, access roads, and related infrastructure, demands an efficient and environmentally sound strategy for soil disposal to ensure minimal ecological disruption and optimal land use.

Two primary disposal sites have been proposed. Site-1, located approximately 1.4 kilometers south of the airport boundary, spans 760,000 square meters and is designated as a temporary disposal area during the early stages of construction. This site consists of gently sloping terrain with pumiceous soils and includes both farmland and degraded land. Site-2, situated around 9 kilometers east of the airport near Dire Town, covers 1,073,067 square meters and comprises an active and abandoned quarry. It is intended for long-term use, particularly for backfilling and rehabilitating areas affected by quarrying activities, thereby contributing to environmental restoration efforts.

Each site presents specific environmental and operational considerations. Site-1, being closer to the Dukem River, requires the construction of retaining walls and diversion canals to control runoff and prevent soil erosion and sedimentation in nearby water bodies. Its accessibility via an all-weather gravel road ensures the smooth transport of excavated materials. On the other hand, Site-2 provides a unique opportunity for sustainable land rehabilitation, where the reused soil can help restore the landscape, reduce erosion risks, and combat deforestation caused by previous quarry operations.

The site selection and analysis methodology integrated both primary and secondary data sources. Field visits and consultations with local stakeholders provided on-the-ground insights, while land use maps and satellite imagery supported spatial analysis. Furthermore, recommendations from local authorities were essential in finalizing the suitability of the proposed disposal sites.

To minimize environmental risks, the report recommends stringent precautionary measures for contractors. These include conducting soil contamination tests, constructing necessary retaining

and drainage structures, and establishing systems to manage surface runoff. If any contaminated soils are identified, they must be treated and disposed of according to specialized procedures to prevent environmental harm.

In conclusion, the two selected disposal sites represent a balanced approach to managing excavated materials addressing both the immediate need for disposal during airport construction and the longer-term goal of environmental rehabilitation. This strategy reflects a commitment to sustainable development and circular economy principles, ensuring that construction progress aligns with responsible land use and ecological preservation.

1. INTRODUCTION

1.1 Background

The new proposed Bishoftu International Airport is anticipated to include huge amount of soil excavation which is the foundation of any construction project, where tons and in this case in million tons of excavated soil, rock, and clay are to be removed to prepare the construction site for foundations, basements, and utility lines which requires excavation of top weak unsuitable material where weak unsuitable material is encountered. When a construction project kicks off, piles of excavated soil start to accumulate. Managing this material efficiently is key to keeping the project on track, reducing soil waste, and minimizing any negative impact on the environment.

The design document shows that about 41,280,664m³ disposal of unsuitable excavated material is estimated during construction of cargo facility, runways and access roads, airport city and all other related infrastructures.

The excavated soil is often disposed off at designated dump sites, which can be either landfills or dedicated soil disposal facilities. The specific disposal method depends on the soil's characteristics (e.g., contamination levels) and local regulations. In some cases, excavated soil can be reused on-site or at other locations for various purposes like backfilling, landscaping, or land reclamation.

Hence, this report is a short summary report on assessment of feasible soil disposal/dump site for the huge amount of excavated soils to be awaited during construction phase of the new Bishoftu International Airport.

1.2 Methodology

A number of key steps and methods involved both primary and secondary sources. Primary data were obtained using a combination of methods, including field visit and observation as well as key informant interviews with governmental officials at the project site. Secondary data was collected from document/literature review particularly on land use maps and satellite imageries to find appropriate soil disposal site in the area.

The relevant stakeholders (government local administration) have been formally briefed about the purpose of the task and consulted for their recommendation on selecting feasible site for soil disposal.

2. SITE DESCRIPTION

Based on field visit and recommendation from local governmental bodies, two sites have been selected for disposal sites for excavated soils from construction of Bishoftu International Airport.

The first site (Site-1) has been proposed about 1.4km south of the airport boundary. The site covers an area of 760,000m². However, taking into the account that huge amount of excavated soil to be disposed off from construction site which couldn't be accommodated by one site, another second site (Site-2) has been proposed for soil disposal site. The second site is part of a large active and abandoned quarry sites located about 9km east of the airport boundary.

Site-1 will be a disposal site during the initial period of the construction phase until some arrangements made on how to backfill and rehabilitate the abandoned quarry sites (Site-2). In addition, Site-1 will serve as temporary disposal site for excavated soil and often stored on-site temporarily until its final use is determined. Managing excavated soils goes beyond moving dirt around. The project should find ways to reuse this material and keep soil waste to a minimum. For example, fill material for other projects. Clean and uncontaminated soil can be repurposed as fill material for other parts of the project or transported to different sites or other construction projects. This approach follows the principles of the circular economy by reducing waste and maximizing the use of available resources. Project owner and Contractors in collaboration with government/city administrations can re-purpose excess soil for landscaping or large-scale reclamation projects, which makes this a vital element of sustainable construction.

Site-2 will be used for properly managed backfilling of the abandoned quarry sites in the area and landscaping to be implemented under well planned land rehabilitation program and will make a good example for similar quarry sites causing environmental deterioration on the natural environment as a result of lack of conservation, inappropriate and wasteful working practices and lack of inappropriate rehabilitation measures.

3. BASELINE ASSESSMENT

3.1 Disposal Site-1

3.1.1 Location

Site-1 is situated approximately 1.4 kilometers south of the boundary of the proposed airport. The total area designated for this site is about 760,000 square meters, making it a significant location for soil disposal or other construction-related activities. Currently, access to Site-1 is provided by a dirt road, which is inadequate for the anticipated heavy use during the construction phase. To ensure efficient and uninterrupted transportation of excavated soils, the existing dirt road must be upgraded to an all-weather gravel road. This improved road should be designed to accommodate frequent and heavy movement of dump trucks and other construction vehicles, ensuring durability and reliability under varying weather conditions.



Location Map of Disposal Site-1

3.1.2 Topography and Drainage pattern

The topography of the site is characterized by a gentle slope or rolling terrain, gradually descending from an elevation of approximately 1856 meters at its northern end to about 1815 meters along the southwestern boundary. This gradual change in elevation indicates a relatively mild slope, which could be advantageous for construction and drainage planning. Throughout the site, there are numerous small and shallow depressions scattered across the landscape, suggesting minor surface undulations that may collect runoff or seasonal water. Additionally, the site is situated in close proximity to the Dukem River, with its southern boundary extending parallel to the river for a significant length.

3.1.3 Soil Type

The soil in the area is derived from reworked parent material of the Chefe Donsa pyroclastic falls. It is predominantly yellow to grey in color and consists of pumiceous soil with varying proportions

of clay, silt, and sand. The soil is mainly composed of loose pyroclastic flow deposits, which contribute to its unconsolidated nature. Additionally, the presence of lithic and clastic fragments mixed within the soil further characterizes the area's unique geological composition.



Soil Type of Site-1

3.1.4 Land use and Land cover

Out of the total area of 760,000 square meters, approximately 178,646 square meters is covered by farmland. The remaining and significantly larger portion of the land is predominantly degraded and barren, characterized by sparse vegetation with scattered short acacia trees.

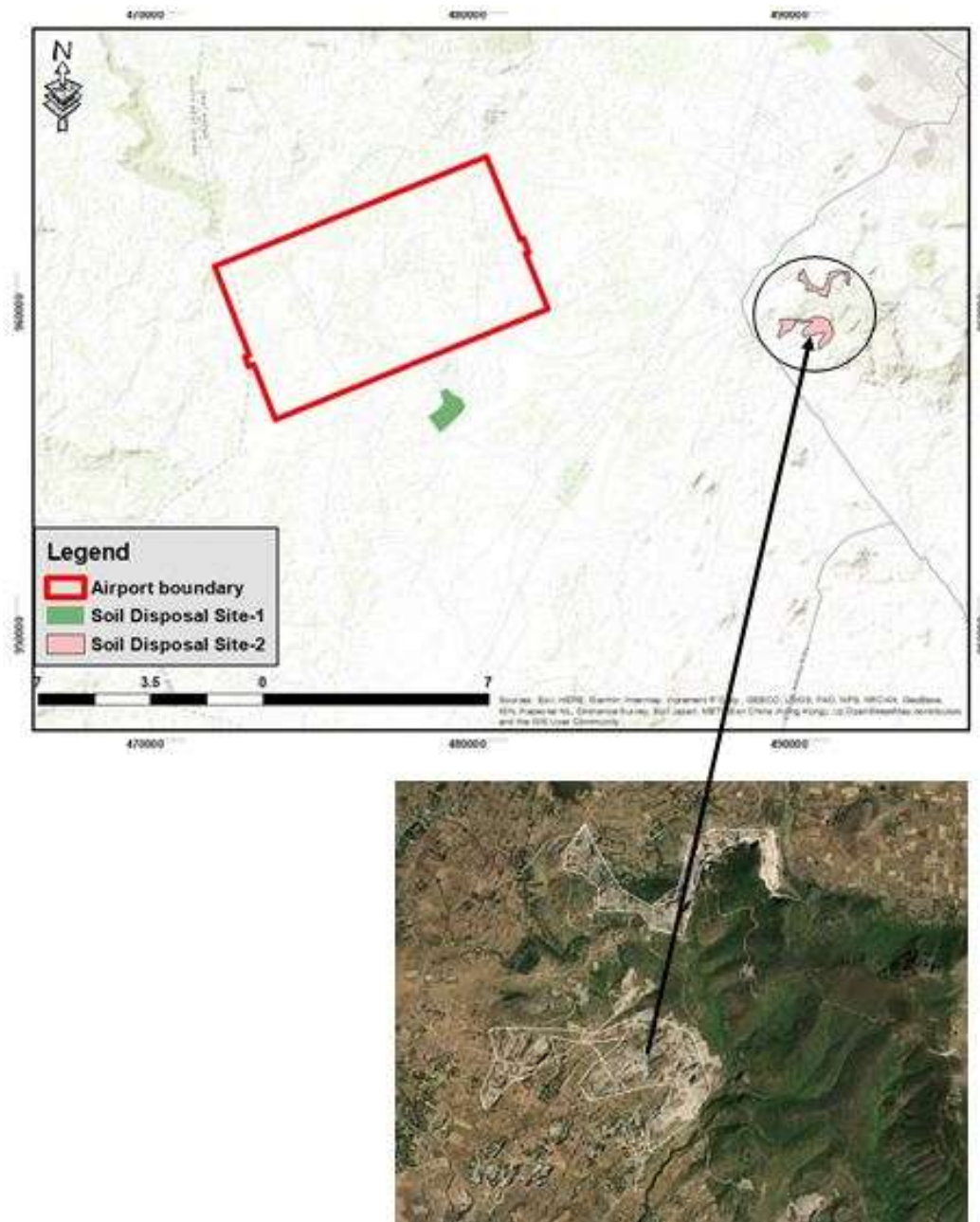


Land use/Land cover of Site-1

3.2 Disposal Site-2

3.2.1 Location

Site-1 is located about 9km east of the airport boundary near Dire Town. The quarry sites cover vast area of elliptical shaped volcanic hills with approximate area of 1,073,067m². It is accessed through all-weather gravel road to Dire Town followed by steep sloped mountain where the quarry sites are located.



Location Map of Site-2

3.2.2 Topography and Drainage pattern

Topography of the site is very steep side of Volcano hill where there is a sharp increase in elevation by about 300m from the foothill of the volcano hills. The elevation at the quarry sites varies from 2000m to 2260m at its peak points. Being situated at peak point of the volcanic hills, there are only small erratic streams with radial drainage pattern stayed after rain for a short time.

3.2.3 Soil Type

The soil is pumiceous soil consists of loose, yellow to light grey colour, pumiceous soils. The area is one of the many central to elliptical shaped volcanic centers in Ethiopian Main Rift Valley. Dominantly, it is pyroclastic and pumice fall deposits. The area is one of the potential quarry sites in the country where different cement factories are using pumice as an input for cement production.



Pumice deposits exposed at quarry site

3.2.4 Land use/Land cover

Based on the site visit and detailed observation of satellite imagery, it is evident that quarrying activities have had significant adverse impacts on the local environment. These impacts are particularly visible in the degradation of the natural landscape, instability of the land, and widespread deforestation. While a substantial portion of the volcanic hill remains untouched and still retains a healthy vegetation cover, the areas subjected to quarrying operations reveal a stark contrast. The active quarrying sites are characterized by pronounced environmental disruption, including the stripping of vegetation, alteration of the landform, and visible signs of soil erosion. These activities not only contribute to the physical degradation of the area but also lead to the depletion and potential pollution of local water sources due to the disturbed hydrological patterns and increased runoff. Furthermore, the process generates a large volume of waste materials, which are often improperly managed, posing long-term environmental hazards. The cumulative effect of

these changes is a severe transformation of the ecosystem, with impacts that could persist for years if not mitigated through responsible management and rehabilitation measures.



Land cover of Site-2 captured from satellite images

4. ENVIRONMENTAL PRECAUTIONS

During the disposal of excavated soils at the project site, contractors are required to implement stringent environmental protection measures to ensure that the soil stockpiles remain confined within the designated disposal area. These precautions are critical to preventing the displacement of soils due to wind or water and to avoid any exposure to surface runoff that could lead to erosion, sediment transport, and eventual siltation in the nearby river system. One of the key protective measures includes the construction of a retaining wall along the southern boundary of the disposal site. This structure is essential to prevent the accumulated soils from sliding or collapsing toward

the river during heavy rains or periods of high moisture content, which would otherwise pose a serious risk of environmental degradation.

Additionally, the site must be equipped with diversion canals strategically placed to intercept and redirect runoff water from the immediate upstream area of Site-1. These canals are particularly important during the rainy season, as they help to control surface water flow and reduce the direct impact of rainfall on exposed soil surfaces, thereby minimizing the potential for erosion and uncontrolled discharge.

In cases where contaminated or hazardous soils are encountered, the disposal process becomes even more critical. Such soils must be handled using specialized facilities and procedures designed for remediation and safe disposal. This includes soil testing to determine the level and type of contamination, followed by appropriate treatment or containment methods to neutralize or safely isolate the hazardous components. The contractors must exercise continuous vigilance during every phase of the operation—from initial excavation and handling to final disposal. Each activity must be carried out with precision and care to ensure that environmental standards are upheld and that no risks are posed to surrounding ecosystems, water bodies, or communities. The successful management of excavated and potentially contaminated materials is thus a vital component of environmentally responsible construction practice.

5. CONCLUSION

Bishoftu International Airport will include disposal of unsuitable excavated material estimated to be 41,280,664m³ during construction of cargo facility, runways and access roads, airport city and all other related infrastructures. This huge amount of excavated soil needs designated disposal sites. Accordingly, under this report, two sites have been recommended as feasible sites for the disposal sites.

The first site (Site-1) has been proposed about 1.4km south of the airport boundary. The site covers an area of 760,000m². However, taking into the account that huge amount of excavated soil to be disposed off from construction site which couldn't be accommodated by one site only, another second site (Site-2) has been proposed for soil disposal site. The second site is part existing quarry sites located about 9km east of the airport boundary.

Site-1 will be a disposal site during the initial period of the construction phase until some arrangements made on how to backfill and rehabilitate the abandoned quarry sites (Site-2).

Contractors should enforce strict environmental precautions to prevent any soil stockpiles from leaving the disposal site and avoid exposure to surface runoff which can cause erosion and siltation in the nearby river. Retaining wall and diversion canals are required to be constructed to avoid soil falling, sliding as well as exposure to erosion during rainy season.

ANNEX 15: PRELIMINARY ASSESSMENT OF PROSPECTIVE QUARRY SITES FOR CONSTRUCTION MATERIALS



ETHIOPIAN AIRLINES' GROUP

Preliminary Assessment of Prospective Quarry Sites for Construction Materials for Bishoftu International Airport Project



ETG Designers and Consultants S.C.

Kirkos Sub-city Worerda 08, House No, 201

Addis Ababa, Ethiopia

M: +251942383278

E: yared.girma@etgdesigners.net

EXECUTIVE SUMMARY

The preliminary assessment of prospective quarry sites for construction materials for the Bishoftu International Airport Project was undertaken to identify and evaluate potential geological sources within close proximity to the proposed airport site. The investigation aimed to locate suitable sites for key construction inputs such as crushed aggregates, red ash (scoria), masonry and dimension stones, soil, and sand and gravel deposits. The study area, located south of Addis Ababa in the Oromia Regional State, falls within the Main Ethiopian Rift (MER) and is geologically characterized by volcanic formations such as basalts, scorias, trachytes, and ignimbrites all of which are promising for various construction purposes.

The assessment revealed several prospective quarry sites. For crushed aggregates, fresh fine-grained basalts were identified as ideal, with three new sites located within a 10 km radius of the airport, in addition to existing quarry operations near Addis Ababa. Scoria deposits, suitable for road base layers and lightweight concrete applications, were found at multiple locations, including sites near Bishoftu Town and a newly identified deposit northeast of the airport. For masonry and dimension stones, trachyte and trachy-basalt domes were located and deemed suitable for use in retaining walls, stone blocks, and slabs, with one active quarry site documented. The study also identified extensive soil resources and river sand deposits from the Melkelem River near Mojo Town as viable construction materials. Importantly, all new quarry sites are within 13 kilometers of the airport and are accessible via all-weather gravel roads, enhancing their logistical feasibility.

To advance the utilization of these resources, the study recommends conducting detailed physico-mechanical and petrographic tests to evaluate properties such as compressive strength, porosity, and water absorption. Drilling core samples or performing geophysical surveys is also advised to determine the volume and depth of the deposits. These follow-up investigations are necessary to ensure compliance with engineering standards and optimize material usage for the airport's construction. In conclusion, the study effectively identified multiple quarry sites that can supply essential construction materials for the Bishoftu International Airport Project, and it recommends further detailed analysis to confirm the quality and quantity of these resources, supporting a sustainable and efficient construction process.

1. INTRODUCTION

1.1 Background

The demand for geological construction materials is escalating from time to time due to the construction boom which is evidenced by unparalleled expansion and up gradation of infrastructures such as highways, airports, schools, hospitals, public and private buildings in major towns of Ethiopia. These projects utilize voluminous geological construction materials, from quarries located in different parts of the country for using crushed aggregate, selected materials and building stones (cobblestone or pavements, structural loading, wall claddings, fencing etc.).

Volcanic rocks have been widely used in various industrial applications in many parts of the world but the most widespread application is in the construction industry as crushed aggregate and building stone for various civil structures. Volcanic rocks are used extensively as engineering material throughout the world as aggregates in cement concrete, asphalt concrete, rock fill dams, railway ballast and high way base courses.

Massive basalt rock is widely used in the central highland of Ethiopia comprising major source of local crushed rock aggregates and building stones suitable for various purposes.

For each type of application, assessment of quality is required which depends on the property of the each rock type in which rocks quality for construction material is governed by petrographic composition, texture, particle shape, porosity, among others. These properties directly affect the mechanical behavior of the rock in question.

With regard to the new proposed Bishoftu Airport, huge amount of construction materials is expected to be consumed during construction phase. Runway and access roads, cargo facility, airport city and other related infrastructures require large quantity of crushed aggregates, sand and cement for concrete, selected materials for access roads as well as masonry and dimension stones for river training schemes in the river bank and bed protection and stabilization in the prevention of scour around bridge piers.

For that reason, this is a preliminary geological survey carried out for prospective quarry sites for construction materials located in proximity to the new proposed airport in different directions made using conventional field techniques. Physico-mechanical tests and petrographic examination was not carried out for the new identified sites.

1.2 Methodology

The study on the geological construction materials involved desk study to select possible target areas taking distance from the airport into consideration. The desk study concentrated on review of previous studies, published and unpublished reports and geological data collection. This was followed by formal prospecting and selection of target areas using topographic and geological maps. Site survey was carried out in many traverses in north-south and east-west directions to collect and describe geological characteristics. The rock units were geologically described using conventional field techniques (type, description of texture, colour, extent of weathering and surface coverage etc.) and measurements of geographic coordinate were taken using GPS.



Site survey

2. GENERAL DESCRIPTION OF THE STUDY AREA

2.1 Location

The area of investigation for potential quarry site for construction materials focuses south of Addis Ababa and largely in Oromia Regional State covering 1800km² including the proposed airport. The area can be accessed by a four-wheeled drive vehicle in three directions from Akaki, Gelan and Dukem Towns through all-weather gravel roads.

2.2 Physiography and Drainage

The area is basically found in the central axial zone of the Main Ethiopian Rift valley (MER) and form an extensive plain land with open slopes and some central volcano cones and domes scattered in the area. Generally, the area has diverse topographic features consisting of plain areas, small volcanic domes, and numerous gullies which are covered dominantly by quaternary superficial deposits.

The area is part of Awash Basin, prominently composed of the Awash river that flows to the southwest and turns to south before reaching to Zikwala mountain and bends almost to the east and then to northeast and join Lake Asle, near Djibouti border. Most of its tributaries in its upper course, dissected the area in a northwest-southeast direction. Some of these rivers include: Dukem, Akaki and Mojo Rivers.

Apart from these, several volcanic crater lakes (e.g. Bishoftu Guda, Haro, Cheleleka and Bishoftu and Horo Hado) are found near Debre Zeyt area.

3. GEOLOGICAL SETTING OF THE AREA

In Ethiopia, the present morphology, physiographic, and geological setting are a result of two major post Paleozoic events which were followed by important phases of volcanic activity (Mohr, 1964). The first tectonic event which occurred in late Mesozoic and early Tertiary period produced the Afro Arabian and the associated fissure volcanic activities gave rise to the extrusion of the Trap series succession. The extrusion of the Trap series fissure basalts during Eocene-Oligocene time was the major and the largest volcanic episode on the south eastern and the western plateau of the country (Kazmin, 1975). The second tectonic event resulted in rift development and related volcanic phenomenon during late Tertiary to quaternary period is the extensional tectonics which produced the Ethiopian Rift valley genetically related to the Rift valley of East Africa.

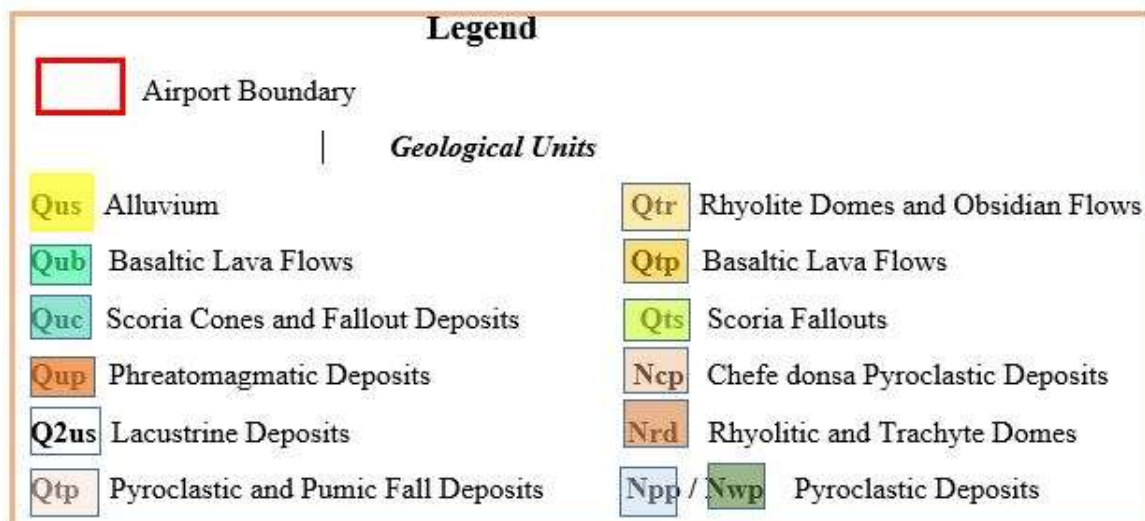
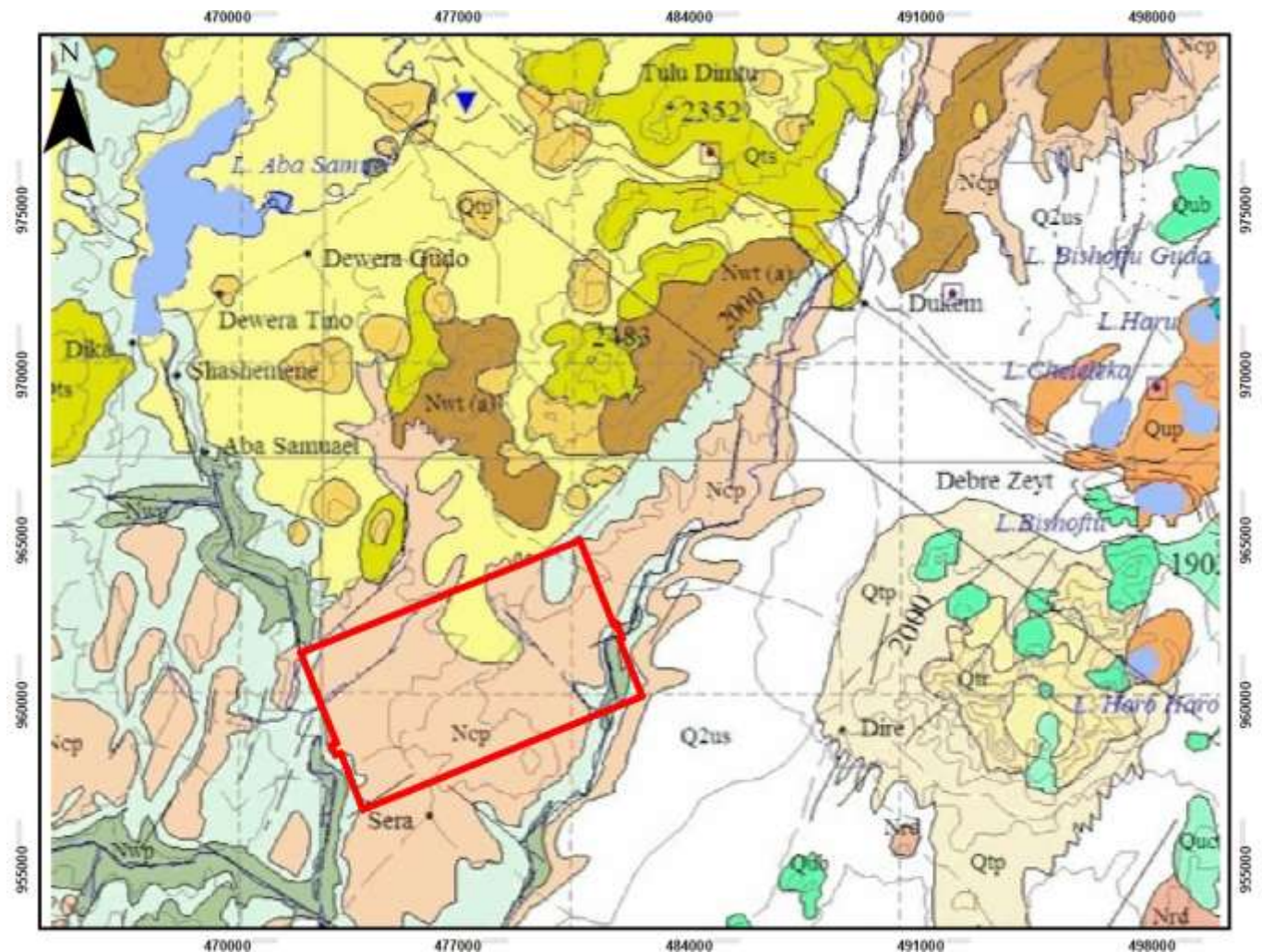
The area belongs to north- central part of the Main Ethiopian Rift (MER). MER developed over a span from the Oligocene to the Quaternary. During that period, major volcanic episodes are recognized in Oligocene, middle Miocene, late Miocene, early-middle Pleistocene and Holocene (Wolde Gabriel et al. 1990).

The oldest volcanic activities are basalt and rhyolite flows in Oligocene, exposed in and around the rift margins (e.g. Blue Nile gorge), which formed lava plateau in the surrounding area. By middle Miocene, the rift was formed in some parts with containment basaltic flows.

In Pliocene, a huge pyroclastic flow covered the northern part of MER known as Nazareth group which is composed of a thick succession of ignimbrite, unwelded tuffs, ash flows, rhyolites and trachytes forming the larger part of the rift floor and also outcrop in the rift escarpments and on the adjacent plateau margins. In the rift, the group attains thickness up to 250m and possibly more, while on the rift shoulders only a few meters of ignimbrites are generally observed (Wolde Gabriel et al. 1990, Wolde Gabriel et al, 2000).

In Pleistocene, Wonji Fault Belt (WFB), which is the main spreading axis of MER, is formed at the rift floor, and floor basalt and rhyolite are erupted along WFB. According to Kazmin and Seifemichael Berhe (1978), the Wonji Group includes all rift volcanics formed after the last major episode of rift faulting which followed accumulation of the basalts. The volcanic activities are characterized by peralkaline fissure basaltic eruptions and rhyolitic eruptions which make volcanoes and calderas. MER was formed as symmetrical depression zone in this period and many lakes appeared and disappeared by obstruction of volcanic deposit and/or climate change.

The lacustrine deposits in the rift floor are Pleistocene to Holocene in age and they are deposited from extensive lakes during the Pleistocene pluvial and are lake or swamp deposits. The lacustrine sediments consisting of clay, silt, tuffs, travertine, and diatomites with intercalation of pumices are widely distributed. The alluvial deposits are of two types: those spread out in alluvial plains and those strips along rivers and streams. Alluvial plains are filled up with gravels and large stretches of flat land in the rift valley.



Geological Map of the Project Area (Modified from Geological Map of Akaki-Beseka Sheet by Ethiopian Geological Survey)

4. PROSPECTIVE QUARRY SITES FOR CONSTRUCTION MATERIALS

4.1 Target-I: Crushed aggregates and selected materials

Coarse and fine aggregates are the major inputs for most of the infrastructural systems and building projects. Approximately three quarter of the volume of concrete is occupied by aggregate and 90% of asphalt pavement is aggregate.

Based on field incursion along selected traverses around the project area, potential quarry sites for crushed aggregates were identified and inventoried. Fresh, fine-grained, jointed and strong basalts are good source for crushed concrete aggregates, whereas scoracious and highly weathered basalts are good source of selected material which is suitable for sub base or as natural gravel., Crushed rock aggregates are produced from hard, strong rock formations like massive basalts. Aggregate can be classified as concrete aggregate, road aggregates, riprap and other large rock material.

In the area, they form ridges, hills and steep cliff topography and are characterized by light to dark gray color and fine to medium grained aphanitic, porphyritic texture, and also vesicular and amygdaloidal basalt at places.



a) Massive fine grained basalt



b) Scoraceous basalt

Rock samples of basaltic rocks in the area

Generally, basalt rock unit has an excellent bearing capacity, durability, thermal insulator and others engineering properties. Also as Armourstone which is a large blocks of rock that are used in the construction of river training schemes, in the river bank and bed protection and stabilization as well as in the prevention of scour around bridge piers.

Fresh to slightly weathered basalt and columnar basalt are also used as a masonry stones and are ease to access, workable and the most dominant lithologic units around the area.

Based on Engineering Geological Mapping and Geohazard Assessment of Akaki Map Sheet conducted by Geological Survey of Ethiopia in 2012, the unconfined compressive strength of massive basalts calculated from point load index strength ranges from 83mpa-140mpa.

Based on site survey, three new prospective sites for crushed aggregates are identified within 10km distance from Bishoftu Airport boundary located within 10km radius from the proposed airport boundary.

Moreover, many quarry sites for crushed aggregates are found around southern tip of Addis Ababa City particularly Bole Bulbula and ICT Park along Great Akaki Gorge. The quarry sites are currently active and a lot of crusher machines are working.



a) Existing quarry site

b) New potential sites proposed for aggregates

Quarry sites for aggregates identified in the area

4.2 Target-II: Red ash and selected materials

Scoria fallout deposits and scoraceous basalt crops out in areas towards northern and southeastern direction of the project area. It occurs and forms unevenly distributed cinder cones and some are broad based gentle sloping circular to elliptical hills. It has low strength, dark brown to reddish colour, vesicular coarse grained.

In hand specimen, the rock is reddish brown, fine grained to cryptocrystalline, vesicular and commonly agglutinated. The scoraceous basalt crops out as discontinuous patches with boulder outcrop pattern and defining small hills/ridges, at places. It is black to grayish dark, fine to medium grained, often vesicular, at places porphyritic and aphyric varieties are noted.

Red ash is a common construction material in Ethiopia for access road construction and for road base courses and lightweight concrete. It's often used as a coarse aggregate in concrete, offering potential benefits like self-curing and higher compressive strength. Red ash can also be blended with crushed stone aggregate and marble chips for road construction, potentially reducing costs and utilizing local resources. However, it's crucial to ensure the quality of red ash by testing its properties, as it may not always meet the ERA (Ethiopian Road Authority) standards on its own.

There are existing scoria quarry site for red ash and selected materials at 13km southeast of Airport boundary near Debrezeye Town and 11km in north direction. Additional new prospective site was identified at 12km northeast of Airport boundary. Generally numerous scoria cones and fallout deposits are scattered all around southern Addis Ababa up to Bishoftu area.



Existing scoria quarry sites for red ash and selected materials around the project area

4.3 Target-III: Masonry and Dimension stones

Trachyte rocks are outcropped in circular to elliptical hills southern and northern direction of the project area. Megascopically, the trachyte is gray to grayish green, medium grained, exhibiting flow banding. The trachy-basalt is gray to greenish gray, aphanitic to vesicular, columnarly jointed and sheeted locally.

The trachyte, trachy-basalt and Ignimbrite rocks can be used as masonry and dimension stones which only need cutting and shaping into specific sizes to be used for retaining walls, blocks, slabs and for other purposes. The locally availability and requires little energy for extraction and processing of the dimensional stones. Depending on the geological environment and characteristics of geological formations, dimension stones are separated from their natural bedrock formations using different techniques (excavation, blasting, heating, wedging) and processed for their use in engineering works.

Two trachyte and trachy-basalt domes were identified at southern boundary of the airport. There is currently one water reservoir in trachyte dome which can't be used for quarry site. Another existing quarry site for trachyte and ignimbrite was observed at a distance of 4km north of Airport boundary.



Trachy-basalts

b) Trachyte

c) Ignimbrite/Welded tuff

Identified quarry sites for masonry and dimension stones

4.4 Target-IV: Soil quarry sites

The project area is endowed with extensive quantity of soil deposits, which can be used as a potential source of construction materials. The main soil type for this purpose is the reddish brown and silty clay soil, which occurs at the flat terrains and as residual on basaltic parent material. The soil has all average thickness of 3 to 4 meters. The soil can serve as an impervious blanket in construction of water retaining walls, borrow materials in road construction.

4.5 Target V: Sand and gravel quarry sites

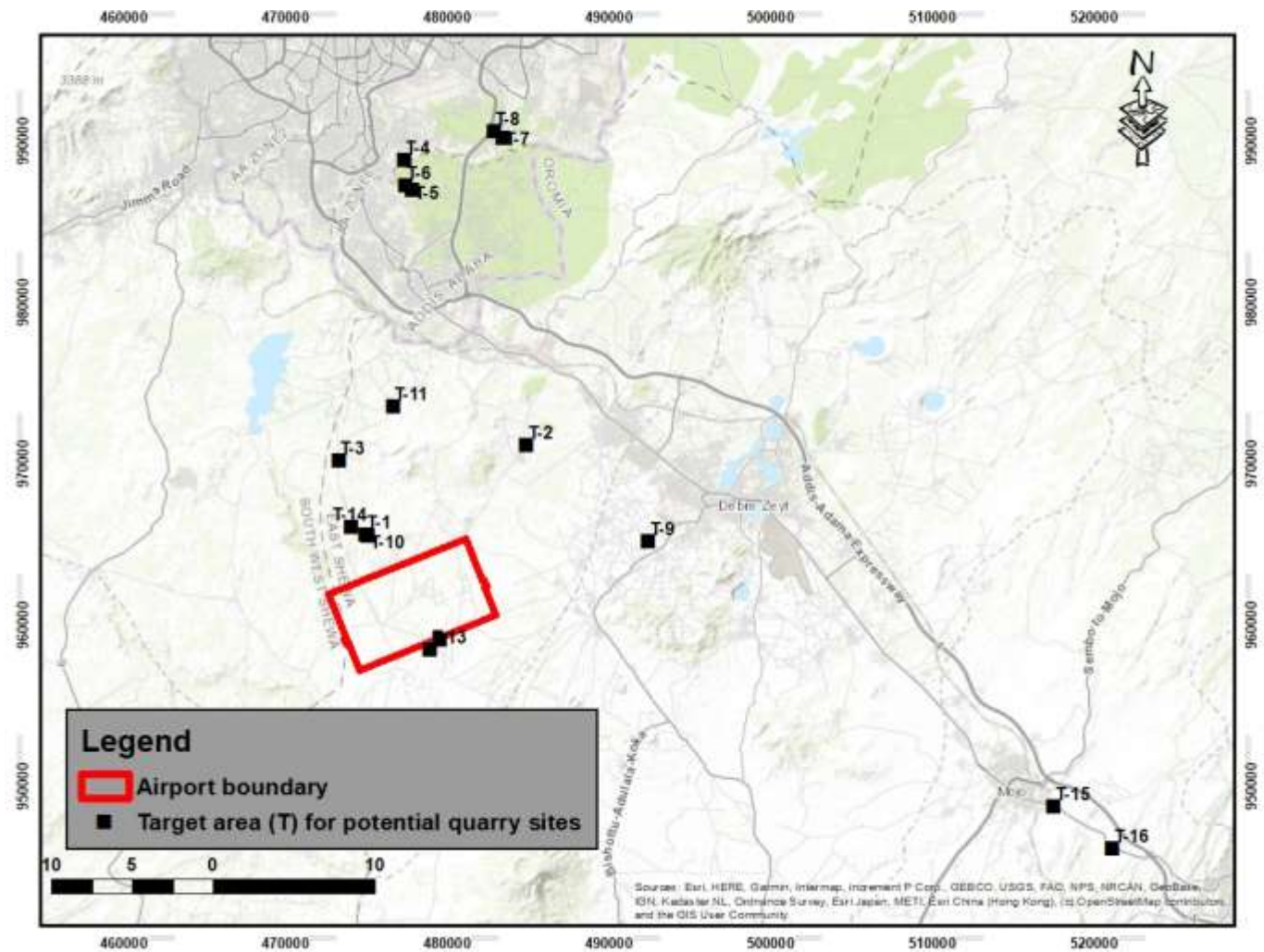
Alluvial sand is commonly used for concrete mixture. These resources are obtained from the main rivers and their tributaries and the grain size of these deposits range from fine to course grained. Mojo and other adjacent rivers are the main sources for sand deposits currently in use for most of construction activities in Addis Ababa and major towns in central Ethiopia. During site survey, it was observed that sand is extracted from Melkelem River near Mojo Town and transported with dump tracks to Addis Ababa and other adjacent towns.



Sand deposits in Melkelem River near Mojo Town

New identified and existing quarry site for construction materials around the project area

Target No	UTM (WGS1984)		Approximate distance from Airport boundary	Lithological Unit	Type of Construction Material to be mined	Remark	Surface area of exposed rock
	Easting	Northing					
T-1	474090	964850	3.5km	-Massive basalt -Vesicular basalt	-Crushed aggregate -Sub base	New identified	2970m ²
T-2	484048	970412	7.2km	-Massive basalt -Scoraceous basalt	-Crushed aggregate -Sub base	New identified	3230m ²
T-3	472448	969455	8.2km	-Massive basalt -Vesicular basalt	-Crushed aggregate -Sub base	New identified	2083m ²
T-4	476484	988090	35km	-Massive basalt	-Crushed aggregate	Existing	3520m ²
T-5	477009	986209	34.3km	-Massive basalt	-Crushed aggregate	Existing	4750m ²
T-6	476570	986509	34.1km	-Massive basalt	-Crushed aggregate	Existing	3980m ²
T-7	482604	989463	36.3km	-Massive basalt	-Crushed aggregate	Existing	2827m ²
T-8	482029	989869	36.6km	-Massive basalt	-Crushed aggregate	Existing	3435m ²
T-9	491590	964500	10.3km	-Scoria	-Red ash/selected material for road	Existing	138,108m ²
T-10	474250	964820	3.4km	-Scoria	-Red ash/selected material for road	Existing	36,186m ²
T-11	475800	972790	12.7km	-Scoria -Scoraceous basalt	-Red ash/selected material for road	New identified	19,793m ²
T-12	478732	958400	70m	-Trachite	-Dimension stones	New identified	10,585m ²
T-13	478087	957786	400m	-Trachyte	-Dimension stones	New identified	13,409m ²
T-14	473192	965362	4.3km	-Ignimbrite	-Dimension stones	New identified	6111m ²
T-15	516625	948015	39km	-River sand	-Concrete	Existing	Unlimited
T-16	520223	945434	42.4km	-River sand	-Concrete	Existing	Unlimited



Location map of prospective quarry sites for geological construction materials

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

- ❖ Results of analysis of preliminary geological survey carried out in the surrounding of Bishoftu International Airport lead to the following conclusion.
- ❖ The area is dominantly part of the rift and south Addis Ababa volcanic rocks which are widely used in various construction applications in many parts of Ethiopia.
- ❖ There are new identified and existing prospective sites for quarrying geological construction materials. Fresh, fine-grained, jointed and strong basalts are good source for crushed concrete aggregates, whereas scoracious and highly weathered basalts are good source of selected material which is suitable for sub base or as natural gravel. The red ash from scoria deposits are also to be used for access road, base courses and lightweight concrete. The less weathered trachy-basalt can be used as

masonry and dimension stones which only need cutting and shaping into specific sizes to be used for retaining walls, blocks, slabs and for other purposes.

- ❖ The new identified sites for quarrying construction materials are located within approximately 13km radius from Airport boundary and accessible with all-weather gravel roads while the existing quarry sites in use for crushed aggregates and sand are concentrated around southern Addis Ababa City and Mojo Town respectively.

5.2 Recommendations

Keeping in mind that the finding for the new identified prospective sites is based only on preliminary surface geological observation using conventional field assessment, it further needs physico-mechanical tests of rock samples and petrographic examination of thin sections to characterize compressive strength, porosity, water absorption, density and etc. Drilling core tests or Geophysical investigation methods will also be required to map thickness of the geological units so as to calculate reserve estimation of each quarry sites.

ANNEX 16: COMPANY COMPETENCY CERTIFICATE

		ቁጥር/Ref.No <u>002/11/508/2017</u>
		ቀን/Date <u>13/12/2017 ዓ.ም</u>
		Trucking #: <u>EPA/1720/250815/1</u>
	በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ የአካባቢ ጥበቃ ባለስልጣን	
	FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA ENVIRONMENTAL PROTECTION AUTHORITY	
	የብቃት ማረጋገጫ ምስክር ወረቀት CERTIFICATE OF COMPETENCE	
የተሰጠበት ቀን: 13/12/2017 ዓ.ም የሚያበቃበት ቀን: 12/12/2019 ዓ.ም	Issue date: 08/19/2025 G.C Expire date: 08/18/2027 G.C	
የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት የማመልከት አገልግሎት ብቃት ለ: ኢ.ቲ.ጂ ዲዛይነር እና አማካሪዎች አ.ማ የብቃት ደረጃ: I ተሰጥቷል።	ENVIRONMENTAL PROTECTION AUTHORITY, BY PROCLAMATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES CONSULTANCY CERTIFICATE OF COMPETENCE. TO: ETG DESIGNERS AND CONSULTANTS SHARE COMPANY COMPETENCE LEVEL: I	
ከሰላምታ ጋር 	WITH REGARDS,	
የአካባቢ ጥበቃ ባለስልጣን Environmental Protection Authority Addis Ababa MESOB Center Back Office	 	
	የዘጋጀው Prepared by	የፀደቀው Approved by
www.epa.gov.et	info@epa.gov.et	+25111170 4138 /4064 /4065



በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ
የአካባቢ ፣ ደንና አየር ንብረት ልውጥ ሚኒስቴር
The Federal Democratic Republic of Ethiopia
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

ቀን 20/2/2011
Date
ቁጥር 11/11/7089/11
Ref. No.

ለሚመለከተው ሁሉ

ጉዳዩ፡ የአካባቢ ተፅዕኖ ግምገማ ጥናት አማካሪ ድርጅቶችን ስለማሳወቅ

ከዚህ በፊት በድርጅት ደረጃ የብቃት ማረጋገጫ ሰርተፊኬት የወሰዱ የድርጅቶችን ዝርዝር የላክንላቸው መሆኑ ይታወሳል።

በዚህም መሰረት የስም ዝርዝራቸው ከተላኩት ድርጅቶች በተጨማሪ ለኢ.ቲ.ጂ. ዲቫይዘንቶችና አማካሪዎች አማካኝነት በአካባቢ ተፅዕኖ ግምገማ ጥናት ዘርፍ የማማከር አገልግሎት በደረጃ አንድ (1) በቀን 20/02/2011 በቁጥር 11/11/7078/10 የብቃት ማረጋገጫ ሰርተፊኬት መውሰዳቸውን እየገለፅን በእናንተ በኩል የተለመደውን ትብብር እንድታደርጉላቸው እንጠይቃለን።



ከወላምታ ጋር

ሥላሴ ሸፈራው ነጋሽ

የአካባቢና ማህበረሰብ ተፅዕኖ ግምገማና የአካባቢ ፍቃድ መስጠት ዳይሬክተር ጆኔራል

☎ 251-(0)11-170-42-12
251-(0)11-170-40-39

TELE FAX: 251-(0)11-170-4158/45
or 12760
አዲስ አበባ፡ ኢትዮጵያ

Website: www.epa.gov.et
Addis Ababa-Ethiopia

ANNEX 17: EXPERTS COMPETENCY CERTIFICATES





የኢትዮጵያ ጥበቃ ባለስልጣን
ENVIRONMENTAL PROTECTION AUTHORITY

ቁጥር/Ref.No 002/11/1415/2017
 ቀን/Date 02/12/2017
 Trucking #: EPA/1719/250808/3

በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ የአካባቢ ጥበቃ ባለስልጣን

**FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
ENVIRONMENTAL PROTECTION AUTHORITY**

የባለሙያ የጥበቃ ማረጋገጫ ምስክር ወረቀት
EXPERT COMPETENCY CERTIFICATE

የታደሰበት ቀን: 02/12/2017 ዓ.ም የሚያበቃበት ቀን: 01/12/2020 ዓ.ም	Renewal Date: 08/08/2025 G.C Valid until : 08/07/2028 G.C
--	---

የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበራዊ ተፅእኖ ግምገማ የማማከር አገልግሎት ሰጪ ማረጋገጫ ምስክር ወረቀት፡-

ለ: አቶ ተወልደበርሃን ወ/ገሪማ ገዢ

የሙያ ዘርፍ: የውሃ እና የሃይል አጠቃቀም አጥኝ ባለሙያ እና የአካባቢ ብክለት ተንታኝ ባለሙያ

የብቃት ደረጃ: ከፍተኛ ተሰጥቷል፡፡

ENVIRONMENTAL PROTECTION AUTHORITY, BY PROCLAMATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTANCY CERTIFICATE OF COMPETENCE;

TO: Mr. TEWOLDEBIRHAN W/GERIMA ZAHEGN

FIELD: WATER AND ENERGY USE ANALYST
EXPERT AND ENVIRONMENTAL POLLUTION ANALYST EXPERT

COMPETENCY LEVEL: SENIOR

ከሰላምታ ጋር


 ሀወኒ ሀበተሙ አያሌው
 የአካባቢ ጥበቃ ባለስልጣን መሰብ ማዕከል ባክ ኦፊስ
 Haweni Habetamu Ayalew
 Environmental Protection Authority
 MESOB Center Back Office



WITH REGARDS,


 አያሌ ማይዳ ተፋሪ
 የአካባቢ ጥበቃ ባለስልጣን መሰብ ማዕከል ባክ ኦፊስ እና ማከራከሪ
 Ayale Mindaye Tefers
 Environmental Protection Authority MESOB
 Center Back Office & Coordinator
 የፀደቀው



የረጋገጠው

Checked by

www.epa.gov.et info@epa.gov.et +25111170 4138 /4064 /4065

Approved by





የአካባቢ ጥበቃ ባለስልጣን
ENVIRONMENTAL PROTECTION AUTHORITY

ቁጥር/Ref.No መደ/ሀ/414/2017

ቀን/Date 02/12/2017

Trucking #:EPA/1721/250808/1

በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የአካባቢ ጥበቃ ባለስልጣን

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
ENVIRONMENTAL PROTECTION AUTHORITY

የባለሙያ የብቃት ማረጋገጫ ምስክር ወረቀት
EXPERT COMPETENCY CERTIFICATE

የተሰጠበት ቀን: 02/12/2017 ዓ.ም
የሚያበቃበት ቀን: 01/12/2020 ዓ.ም

Issued date: 08/08/2025 G.C
Expire date: 08/07/2028 G.C

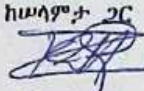
የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበራዊ ተፅዕኖ ግምገማ የማሳካት አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት:-

ለ: ዶ/ር ያፌድ ግርማ ወርቁ

የሙያ ዘርፍ: የአካባቢ ብክለት ተንታኝ ባለሙያ እና የአየር ንብረት ለውጥ ተንታኝ ባለሙያ

የብቃት ደረጃ: ከፍተኛ ተሰጥቷል::

ከሠላምታ ጋር


 ሀወኒ ሀበተሙ አሃለው
 የአካባቢ ጥበቃ ባለስልጣን መስሪያ ቤት
 Haweni Habetamu Ayalew
 Environmental Protection Authority
 MESOB Center Back Office

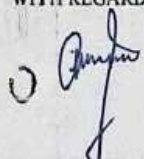
ENVIRONMENT PROTECTION AUTHORITY, BY PROCLAMATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTANCY CERTIFICATE OF COMPETENCE;

TO: Dr. YARED GIRMA WORKU

FIELD: ENVIRONMENTAL POLLUTION ANALYST
EXPERT AND CLIMATE CHANGE ANALYST EXPERT

COMPETENCY LEVEL: SENIOR

WITH REGARDS,

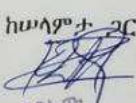
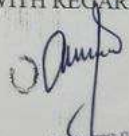

 አሃለ ሙያዊ ተፈራ
 የአካባቢ ጥበቃ ባለስልጣን መስሪያ ቤት
 ሃይለ ምስክር ወረቀት
 Ayele Mindaye Tefera
 Environmental Protection Authority MESOB
 Center Back Office & Coordinator

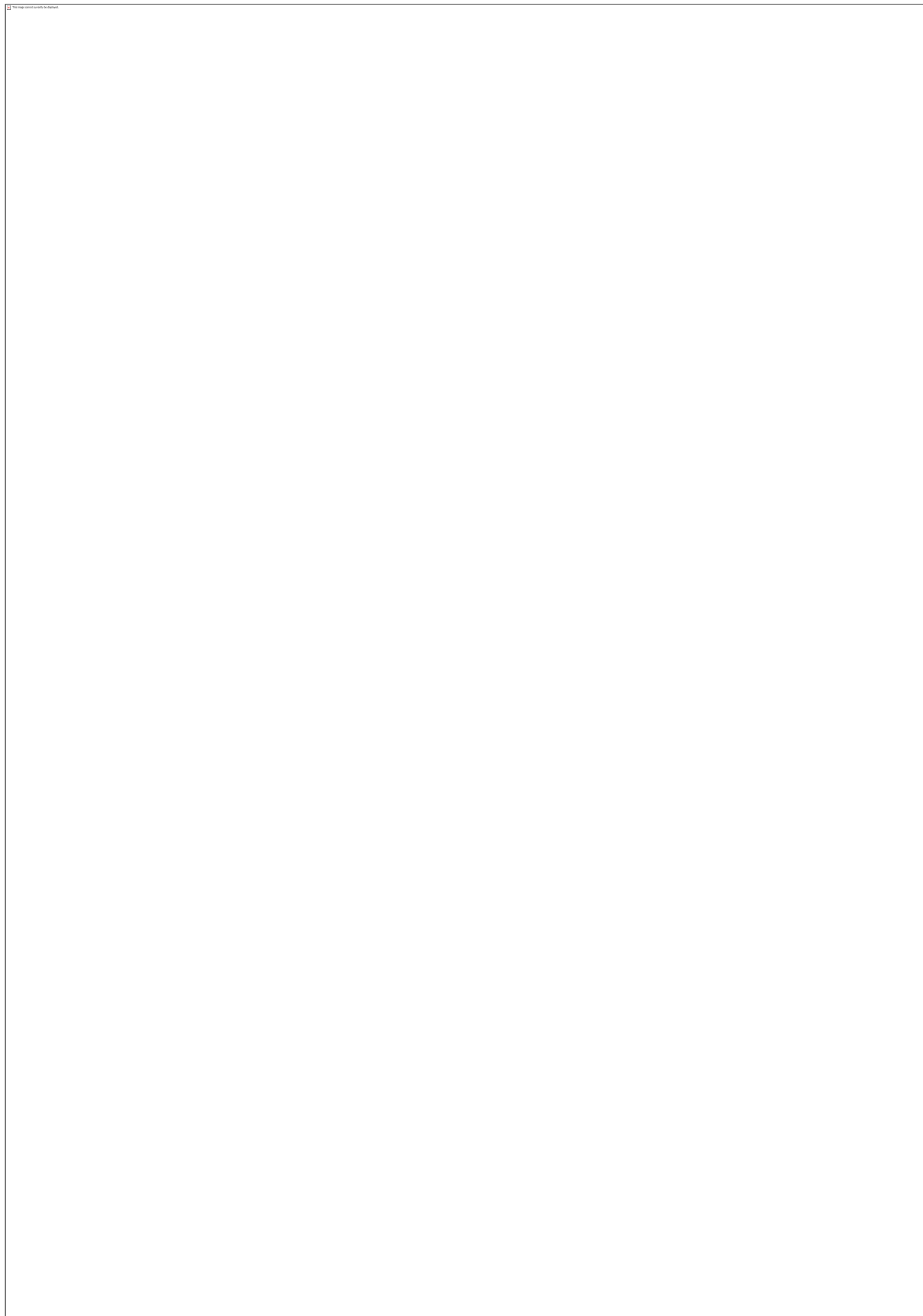

 ያረጋገጠው
 Checked by

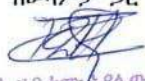
www.epa.gov.et

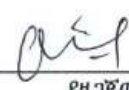
ያህደቀው
 Approved by

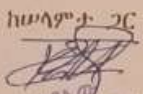
info@epa.gov.et +2511170 4138 /4064 /4065

		ቁጥር/Ref.No <u>መ/አ/1/1/453/2017</u>
		ቀን/Date <u>06/12/2017</u>
		Tracking #: EPA/1721/250812/2
	በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ የአካባቢ ጥበቃ ባለስልጣን	
	FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA ENVIRONMENTAL PROTECTION AUTHORITY	
	የባለሙያ የብቃት ማረጋገጫ ምስክር ወረቀት EXPERT COMPETENCY CERTIFICATE	
የተሰጠበት ቀን: 06/12/2017 ዓ.ም የሚያበቃበት ቀን: 05/12/2020 ዓ.ም	Issue Date: 08/12/2025 G.C Valid date: 08/11/2028 G.C	
የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበራዊ ተፅዕኖ ግምገማ የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት፡- ለ: ዶ/ር አስፋው መሀመድ ኢብራሂም የሙያ ዘርፍ: የማህበራዊ ጉዳዮች ተንታኝ ባለሙያ እና የአየር ንብረት ለውጥ ተንታኝ ባለሙያ የብቃት ደረጃ: ከፍተኛ ተሰጥቷል፡፡	ENVIRONMENTAL PROTECTION AUTHORITY, BY PROCLAMATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTANCY CERTIFICATE OF COMPETENCE; TO: Dr. ASFAW MOHAMED IBRAHIM FIELD: SOCIAL AFFAIRS ANALYST EXPERT AND CLIMATE CHANGE ANALYST EXPERT COMPETENCY LEVEL: SENIOR	
ከሰላምታ ጋር  ሀውኒ ዘበተሙ አያሌው የአካባቢ ጥበቃ ባለስልጣን መከባ ማዕከል ባዝ አፈላ Haweni Habetamu Ayalew Environmental Protection Authority MESOB Center Back Office		WITH REGARDS,  አምላካዊ ጥበቃ ባለስልጣን መከባ ማዕከል በዚ እና አስተባባሪ Mindaye Tefera Environmental Protection Authority MESOB Center Back Office & Coordinator
	ያረጋገጠው Checked by www.epa.gov.et	ያፀደቀው Approved by +25111170 4138 /4064 /4065

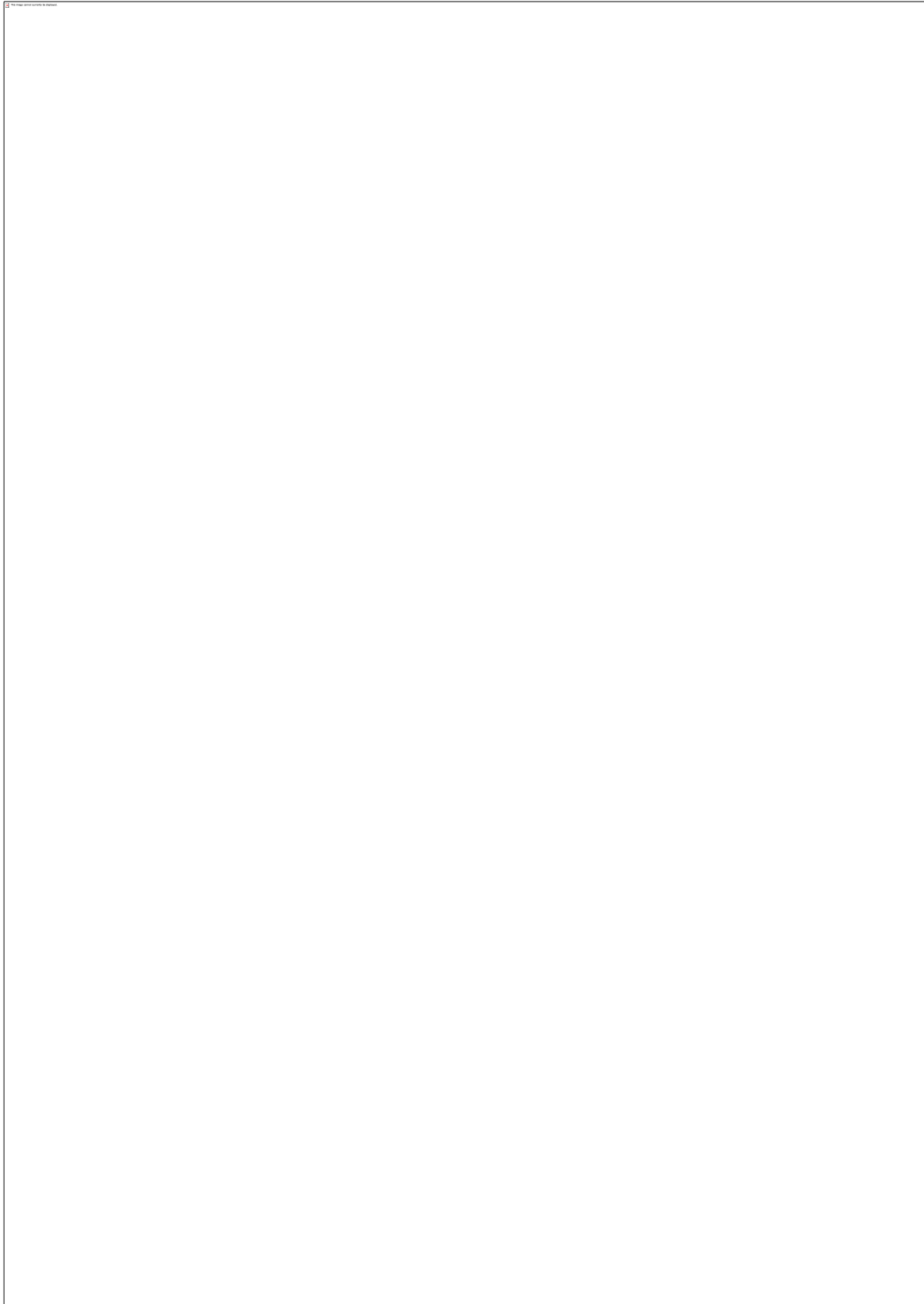


	 የአካባቢ ጥበቃ ባለስልጣን ENVIRONMENTAL PROTECTION AUTHORITY	ቁጥር/Ref.No <u>2024/11/40/2017</u> ቀን/Date <u>26/10/2017</u> Trucking #: EPA/1719/250702/2
በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ የአካባቢ ጥበቃ ባለስልጣን FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA ENVIRONMENTAL PROTECTION AUTHORITY		
የባለሙያ የብቃት ማረጋገጫ ምስክር ወረቀት EXPERT COMPETENCY CERTIFICATE		
የታደሰበት ቀን: <u>25/10/2017</u> ዓ.ም የሚያበቃበት ቀን: <u>24/10/2020</u> ዓ.ም	Renewal date: <u>07/02/2025</u> G.C Expire date: <u>07/01/2028</u> G.C	
የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበራዊ ተፅእኖ ግምገማ የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት፡-	ENVIRONMENT PROTECTION AUTHORITY, BY PROCLAMINATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTANCY CERTIFICATE OF COMPETENCE; TO: Mr. GETACHEW ABRHA TESFAMARIAM FIELD: WATER AND ENERGY USE EXPERT AND ENVIRONMENTAL POLLUTION ANALYST EXPERT COMPETENCY LEVEL: SENIOR	
ለ: አቶ ጌታቸው አብርሃም ተስፋማርያም የሙያ ዘርፍ: የውሃ እና የኃይል አጠቃቀም ተንታኝ ባለሙያ እና የአካባቢ ብክለት ተንታኝ ባለሙያ የብቃት ደረጃ: ከፍተኛ ተሰጥቷል፡፡	WITH REGARDS,	
ከሠላምታ ጋር  ሀወኒ ዘበተሙ አያሌው የአካባቢ ጥበቃ ባለስልጣን መሥሪያ ቤት ማዕከል ባክ አፊስ Haweni Habetamu Ayalew Environmental Protection Authority MESOB Center Back Office		አዋጅ ተፈጻሚ የአካባቢ ጥበቃ ባለስልጣን መሥሪያ ቤት ባክ አፊስ እና አስተባባሪ Ayele Mindaye Tefera Environmental Protection Authority MESOB Center Back Office & Coordinator
	ያረጋገጠው Checked by	ያሰጸቀው Approved by
www.epa.gov.et info@epa.gov.et +25111170 4138 /4064 /4065		

 	ቁጥር/Ref.No <u>111.1/8242/17</u> ቀን/Date <u>5/6/2017</u> Trucking #: EPA/1719/250205/4
በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ የአካባቢ ጥበቃ ባለስልጣን FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA ENVIRONMENTAL PROTECTION AUTHORITY የባለሙያ የብቃት ማረጋገጫ ምስክር ወረቀት EXPERT COMPETENCY CERTIFICATE	
የታደሰበት ቀን: 30/5/2017 ዓ/ም የሚያበቃበት ቀን: 29/5/2020 ዓ/ም	Renewal date: 02/07/2025 GC Expire date: 02/06/2028 GC
የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበራዊ ተፅእኖ ግምገማ የማሳካር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት:- ለ: አዶ ተስፋዬ ቤጋለ ተክለ የሙያ ዘርፍ: የአካባቢ ብክለት ተንታኝ ባለሙያ [EP-0016] እና የብክለት ሕይወት እና የስርዓተ ምህዳር ተንታኝ ባለሙያ [BE-0013] የብቃት ደረጃ: ከፍተኛ ተስፋፊ::	ENVIRONMENTAL PROTECTION AUTHORITY, BY PROCLAMINATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTANCY CERTIFICATE OF COMPETENCE; TO: <u>Mr. Tesfaye Bogale Tekla</u> FIELD: <u>Environmental Pollution Analyst[EP-0016]</u> <u>And Biodiversity and Ecosystem Analyst [BE-0013]</u> COMPETENCY LEVEL: <u>Senior</u>
ከሠላምታ ጋር  የዘጋጀው Prepared by	WITH REGARDS  የፀደቀው Approved by  Checked by
 www.epa.gov.et	info@epa.gov.et +25111170 4138

		#TC/Ref.No. 002/11/433/2017
		#Y/Date 05/12/2017
		Trucking #: EPA/1447/250810/3
	በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ የአካባቢ ጥበቃ ባለስልጣን	
FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA ENVIRONMENTAL PROTECTION AUTHORITY		
የባለሙያ የብቃት ማረጋገጫ ምስክር ወረቀት EXPERT COMPETENCY CERTIFICATE		
የታደሰበት ቀን: 05/12/2017 ዓ.ም	Renewal date: 08/11/2025 G.C	
የሚያበቃበት ቀን: 04/12/2020 ዓ.ም	Expire date: 08/10/2028 G.C	
የአካባቢ ጥበቃ ባለስልጣን በአዋጅ ቁጥር 299/1995 እና መመሪያ ቁጥር 1005/2016 መሠረት የአካባቢ እና ማህበራዊ ተፅዕኖ ግምገማ የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት፡-	ENVIRONMENT PROTECTION AUTHORITY, BY PROCLAMATION NO. 299/2002 AND DIRECTIVE NO. 1005/2024, HAS ISSUED THIS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTANCY CERTIFICATE OF COMPETENCE;	
ለ: ዶ/ር ስለሺ አሳዛው መንገሻ የሙያ ዘርፍ: የብዝሃነት ሕይወትና የስርዓተ-ምህዳር ተንታኝ ባለሙያ እና የማህበራዊ ጉዳዮች ተንታኝ ባለሙያ የብቃት ደረጃ: ከፍተኛ ተሰጥቷል፡፡	TO: SILESHI AZAGEW MENGESHA(PhD) FIELD: BIODIVERSITY AND ECO SYSTEM ANALYST EXPERT AND SOCIAL AFFAIRS ANALYST EXPERT COMPETENCY LEVEL: SENIOR	
ከሰላምታ ጋር  ሀወን ሀብታሙ አያሌወ የአካባቢ ጥበቃ ባለስልጣን መስሪያ ቤት Haweni Habetamu Ayalew Environmental Protection Authority MESOB Center Back Office		WITH REGARDS,  አያሌ ማይዳይ ተፎራ የአካባቢ ጥበቃ ባለስልጣን መስሪያ ቤት Ayale Mindaye Tefeca Environmental Protection Authority MESOB Center Back Office & Coordinator
	የረገጠው Checked by	ያፀደቀው Approved by
www.epa.gov.et info@epa.gov.et +25111170 4138 /4064 /4065		

ANNEX 18: LEGAL DOCUMENTS OF ETG DESIGNERS AND CONSULTANTS S.C





በአዲስ አበባ ከተማ አስተዳደር ንግድ ቢሮ

Addis Ababa City Administration Trade Bureau



የንግድ ሥራ ፈቃድ

በንግድ ምዝገባና ፈቃድ አዋጅ ቁጥር 980/2008 መሰረት ተሰጠ

1. የግለሰብ/ድርጅቱ ስም ኢትዲ ዲዛይንና ኮንሰልታንት አክሲዮን ማህበር
2. ዜግነት በኢትዮጵያ የተመዘገበ
3. የንግድ ስም _____
4. ሥራ አስኪያጅ ስም አቶ ዘካርያስ በቀለ ሻይ
5. የንግድ ድርጅቱ አድራሻ

ክልል	አዲስ አበባ	ዞን/ክፍለ ከተማ	ቂርቆስ
ወረዳ	08	ቀበሌ	---
የቤት ቁጥር	602/43	ስልክ ቁጥር	0911126312
ፋክስ	ኢ-ሜይል		
6. የንግድ ሥራ መስክ
(86312) Environmental auditing and environmental protection consultancy service

7. ካፒታል በኢት ብር 20,238,500.00
- ይህ የንግድ ፈቃድ ዛሬ 10/5/2016 በ አዲስ አበባ ተሰጠ

የሃላፊ ስም/Name of Official
ፊርማ/Signature

የንግድ ሥራ ፈቃድ
የተሰጠበት ቀን
10/5/2016

የጥበር ከፋይ መለያ ቁ. /TIN 0054396166
 የንግድ ምዝገባ ቁ. KK/AA/2/0010463/2009
 Principal Registration No. _____
 የቀድሞ ንግድ ፈቃድ ቁጥር _____
 Previous License No. _____
 የንግድ ሥራ ፈቃድ ቁጥር KK/AA/14/706/2500081/2011
 Business License No. _____
 ቀድሞ ተሰጠበት ቀን _____
 Previous Date of issuance _____
 የተሰጠበት ቀን 15/6/2011
 Date of issuance _____
 የታደሰበት ቀን: 10/5/2016
 Renewal Date _____

Business License

Issued Under Commercial Registration and Business license proc.No 980/2016

1. Owner/Company Name ETG DESIGNERS AND CONSULTANTS SHARE COMPANY
2. Nationality Registered in Ethiopia
3. Trade Name _____
4. General Manager Name Mr. ZEKARIAS BEKELE SHAYI
5. Business Address

Region	Addis Ababa	Zone/Sub City	Kirkos
Woreda	08	Kebele	---
House No.	602/43	Tel.No	0911126312
Fax	E-mail		
6. Field of Business
(86312) Environmental auditing and environmental protection consultancy service

7. Capital in ETB 20,238,500.00
- This Business License is issued in Addis Ababa
this day 1/19/2024

ለ 2016 ታዲላ

- ማሳሰቢያ- 1. ይህ የንግድ ፈቃድ በዓዋጅ ፈቃድ ቁጥር 980/2008 መሠረት እንደ የቢዬት ዓመቱ በአዋጅ በተወሰነው መሰረት መታደስ አለበት፡፡
- N.B. This License Shall be renewed in accordance with Proclamation No. 980/2008 as per the fiscal year.
2. ይህ የንግድ ፈቃድ የምስክር ወረቀት በዋስትና ወይም በአገልግሎት አይቸልም፡፡
- The holder of this License is forbidden for surety ship or debt



		የኢትዮጵያ ፌዴራላዊ ዴሞክራሲያዊ ሪፐብሊክ የኢትዮጵያ ግብይትና ጉምሩክ ባለሥልጣን Federal Democratic Republic of Ethiopia ETHIOPIAN REVENUES AND CUSTOMS AUTHORITY	
የግብር ከፋይ መለያ ቁጥር: Taxpayer Identification Number:		የድርጅት/የግለሰብ ስም: Name of Business/Individual:	
የተመዘገበ አድራሻ/Registered Address:		የግብር ከፋይ ምዝገባ ሰርተፊኬት TAXPAYER REGISTRATION CERTIFICATE	
ክልል: Region:		0054396166	
ዞን/ክ/ከተማ: Zone/Sub City:		አ.ቲ.ጂ ዲዛይኖችና ኢንጅነሪንግ አክሲዮን ማዘብር ETG DESIGNERS AND CONSULTANTS SHARE COMPANY	
ወረዳ: Woreda:		አዲስ አበባ ADDIS ABABA	
ተባባሪ /በአማርኛ/: Kebele/Farmer's Assoc.:		ቲ.ቶስ KIRKOS	
የቤት ቁጥር: House No.:		WOREDA 08 WOREDA 08	
ESIC Sub-group: ESIC Sub-group:		602/43	
የሰጠው ተቋም: Issuing Authority:		86411 - Consultancy service on construction works	
የተሰጠበት ቀን: Date of Issuance:		የኢትዮጵያ ግብይትና ጉምሩክ ባለሥልጣን ETHIOPIAN REVENUES AND CUSTOMS AUTHORITY	
ይህ የምስክር ወረቀት የግብር ከፋይነት ምዝገባ ሰጪ ሆኖ የግብር ከፋይነት ምዝገባ ሰነዶች ካሉ በዚህ ሰነድ የተካተቱ መሆናቸውን አውግዛል፡፡ This certificate represents the sole and only registration as a taxpayer and supersedes all prior registration documentation.		27 GINBOT 2012 04-JUN-20	
ከፋይ በተመዘገበው መረጃ ላይ ማንኛውም እይነት ለውጥ በደረግ ግብር ከፋይ ለማመልከት የግብር ሰነዱን ማሻሻል ይገባል፡፡ The taxpayer is responsible for notifying the appropriate Tax Office of any changes to the above information.		የግብር ከፋይ መ/ቤት ማዘብ Seal of Issuing Authority	
የሰርተፊኬት ቁ.: Certificate No.:		1491184230002	



በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የኢትዮጵያ ገቢዎችና ጉምሩክ ባለሥልጣን
የተጨማሪ እሴት ታክስ
የምዝገባ የምስክር ወረቀት

The Federal Democratic Republic of Ethiopia
Ethiopian Revenues and Customs Authority

Value Added Tax

Registration Certificate

አቶ/ወ/ሮ ወይም የድርጅት ስም _____ አ.ተ.ጂ. ዲሞክራሲያዊ ዲሞክራሲያዊ ሪፐብሊክ
የግንድ ስም (ከሰላሳ) _____ አ.ተ.ጂ. ዲሞክራሲያዊ ዲሞክራሲያዊ ሪፐብሊክ
አድራሻ/ክልል/ _____ የግ/ ክፍለተማ ቁርቆስ ወረቀት 08
ቀበሌ/ግ/ግዛብ _____ የቤት ቁጥር 602/43 ስልክ ቁጥር 251911126312 ፖ.ሣ.ቁ _____
የግንድ ቁጥር 0054396166 የሚታወቁት በተሠማረ አሴት ታክስ አዋጅ ቁጥር 285/ 1994
አንቀጽ 16 ወይም አንቀጽ 18 መሰረት በተሠማረ አሴት ታክስ 12925290002 ከ 2010 ዓ.ም ጀምሮ ስለተሰጠበት
ይህ የምዝገባ ሰርተፊኬት ተሰጥቷል::

Mr./s or Company Name _____ ETG DESIGNERS AND CONSULTANTS SHARE COMPANY
Trade name /If any/ _____ ETG DESIGNERS AND CONSULTANTS SHARE COMPANY
Address (Region) _____ ADDIS ABABA Zone / Sub city _____ KIRKOS Woreda NO WOREDA-142
Kebele/Farmers Ass. _____ WOREDA 08 House No. 602/43 Telephone No. 251911126312 P.O. Box _____
Whose Taxpayer Identification Number (TIN) is _____ has been registered in accordance with VAT Proclamation No. 285/2002
Article 16 of Article 18 and hence, this VAT registration Number 12925290002 has been issued starting from 10-NOV-2017 .



04-JUN-2020/ 5559520002

የደንበኞች አገልግሎት ዳይሬክቶሬት
Customers' Service Directorate Director

ANNEX 19: INFRASTRUCTURE CONCEPT DESIGN