



# **Environmental and Social Impact Assessment (ESIA) Final Report for the Proposed Regional Rice Resilient Value Chain Development Program (REWARD) Upper River Region, The Gambia**

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### TABLE OF CONTENTS



List of Figures -	-	-	-	-	-	-	-	-	-	ix
List of Tables -	-	-	-	-	-	-	-	-	-	xi
List of Plates -	-	-	-	-	-	-	-	-	-	xiii
List of Abbreviations and Acronyms	-	-	-	-	-	-	-	-	-	xiv
Units of Measurements-	-	-	-	-	-	-	-	-	-	xix
Executive Summary	-	-	-	-	-	-	-	-	-	xx

## CHAPTER ONE: INTRODUCTION

1.1	Project Background	-	-	-	-	-	-	-	-	1-1
1.2	ESIA Consultant	-	-	-	-	-	-	-	-	1-3
1.3	Rationale and Need for Regional Rice Reliant Value Chains Development (REWARD)									
	Programme	-	-	-	-	-	-	-	-	1-3
1.4	Scope and Objectives of the ESIA	-	-	-	-	-	-	-	-	1-4
1.4.1	Scope of ESIA -	-	-	-	-	-	-	-	-	1-4
1.4.2	Objectives of the ESIA-	-	-	-	-	-	-	-	-	1-6
1.5	Study methodology	-	-	-	-	-	-	-	-	1-6
1.6	Assumptions and Limitations	-	-	-	-	-	-	-	-	1-14
1.7	ESIA Study Team	-	-	-	-	-	-	-	-	1-15
1.7.1	Site Surveys and Specialist Studies	-	-	-	-	-	-	-	-	1-16
1.8	Structure of the Report -	-	-	-	-	-	-	-	-	1-17

## CHAPTER TWO: LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

2.1	General	-	-	-	-	-	-	-	-	2-1
2.2	The Relevant National Policies	-	-	-	-	-	-	-	-	2-1
2.3	Relevant National Legislation				-	-	-	-	-	2-5
2.4	The Institutional Framework for Implementing the Project -	-	-	-	-	-	-	-	-	2-8
2.5	The Relevant International Conventions and Protocols						-	-	-	2-12
2.6	African Development Bank's Environmental and Social Standards	-	-	-	-	-	-	-	-	2-13
2.6.1	Applicable Policies of the AfDB	-	-	-	-	-	-	-	-	2-15
2.6.2	Other Applicable Guidelines	-	-	-	-	-	-	-	-	2-15

## CHAPTER THREE: PROJECT DESCRIPTION

3.1	Project Background and Rationale	-	-	-	-	-	-	-	-	3-1
3.1.1	Program Objectives and Expected Outcomes	-	-	-	-	-	-	-	-	3-2
3.1.2	Implementation Mechanisms	-	-	-	-	-	-	-	-	3-3



3.2	The Gambia REWARD Program	-	-	-	-	-	-	3-4
3.2.1	Components of the Gambian REWARD Program	-	-	-	-	-	-	3-4
3.3	Project Sites and Locations	-	-	-	-	-	-	3-10
3.4	Project Phases and Components	-	-	-	-	-	-	3-12
3.4.1	Pre-construction Phase	-	-	-	-	-	-	3-12
3.4.1.1	Land Development	-	-	-	-	-	-	3-12
3.4.1.2	Land Preparation	-	-	-	-	-	-	3-12
3.4.2	Construction Phase	-	-	-	-	-	-	3-12
3.4.3	Operation and maintenance	-	-	-	-	-	-	3-13
3.4.3.1	Agricultural activities	-	-	-	-	-	-	3-13
3.4.3.2	Rice Processing Plants	-	-	-	-	-	-	3-16
3.4.3.3	Mechanization	-	-	-	-	-	-	3-18
3.4.4	Decommissioning and Restoration Phase	-	-	-	-	-	-	3-23
3.5	Power Supply Arrangements	-	-	-	-	-	-	3-24
3.6	Waste Generation and Management	-	-	-	-	-	-	3-25

#### **CHAPTER FOUR: ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS**

4.1	Introduction	-	-	-	-	-	-	4-1
4.2	Field Survey	-	-	-	-	-	-	4-1
4.3	Physical Environment	-	-	-	-	-	-	4-3
4.3.1	Topography, Relief and Drainage	-	-	-	-	-	-	4-3
4.3.2	Geology	-	-	-	-	-	-	4-5
4.3.3	Overview of Climate at The Gambia	-	-	-	-	-	-	4-5
4.3.3.1	Overview of Climate at the Upper River Region (URR)	-	-	-	-	-	-	4-6
4.3.3.2	Micro Climate/Meteorology (Field Observation)	-	-	-	-	-	-	4-10
4.3.4	Air Quality Assessment	-	-	-	-	-	-	4-11
4.3.5	Noise Quality	-	-	-	-	-	-	4-16
4.3.6	Water Quality	-	-	-	-	-	-	4-17
4.3.6.1	Surface Water Quality	-	-	-	-	-	-	4-19
4.3.6.2	Groundwater Quality	-	-	-	-	-	-	4-25
4.3.7	Soil Quality	-	-	-	-	-	-	4-29
4.3.8	Climate Change and Natural Disasters	-	-	-	-	-	-	4-33
4.3.9	GHG Emissions	-	-	-	-	-	-	4-35



4.3.9.1 Introduction	-	-	-	-	-	-	-	-	4-35
4.3.9.2 Methodology	-	-	-	-	-	-	-	-	4-35
4.3.9.3 GHG Emissions Assessment (Construction Phase)	-	-	-	-	-	-	-	-	4-36
4.3.9.4 GHG Emissions Assessment (Operational Phase)	-	-	-	-	-	-	-	-	4-38
4.3.9.4.1 Stationary Combustion	-	-	-	-	-	-	-	-	4-39
4.3.9.4.2 Mobile Combustion	-	-	-	-	-	-	-	-	4-39
4.3.10 Land Use/land cover	-	-	-	-	-	-	-	-	4-40
4.3.11 Ecology and Biodiversity	-	-	-	-	-	-	-	-	4-43
4.3.11.1 Habitat Types	-	-	-	-	-	-	-	-	4-44
4.3.11.2 Biodiversity Survey approach	-	-	-	-	-	-	-	-	4-48
4.3.11.3 Floristic Analysis	-	-	-	-	-	-	-	-	4-49
4.3.11.4 Alien Invasive species	-	-	-	-	-	-	-	-	4-54
4.3.11.5 Mammals	-	-	-	-	-	-	-	-	4-54
4.3.11.6 Avifauna	-	-	-	-	-	-	-	-	4-55
4.3.11.7 Herpetofauna	-	-	-	-	-	-	-	-	4-58
4.3.11.8 Ecosystem Services	-	-	-	-	-	-	-	-	4-60
4.3.11.9 Habitat Sensitivity	-	-	-	-	-	-	-	-	4-61
4.4 Socioeconomics and Health Survey	-	-	-	-	-	-	-	-	4-62
4.4.1 Project Affected Communities (PAC)	-	-	-	-	-	-	-	-	4-62
4.4.2 Socio-economic Survey Methodologies	-	-	-	-	-	-	-	-	4-62
4.4.3 Focus Group Discussions in the Host Communities	-	-	-	-	-	-	-	-	4-63
4.4.4 Target Population	-	-	-	-	-	-	-	-	4-63
4.4.5 Consultations	-	-	-	-	-	-	-	-	4-64
4.4.6 Project Awareness	-	-	-	-	-	-	-	-	4-65
4.4.7 Summary of Community Concerns and Perception	-	-	-	-	-	-	-	-	4-66
4.5 Demographic Characteristics of the Gambia	-	-	-	-	-	-	-	-	4-67
4.6 Demographic Characteristics of the Upper River Region (URR)	-	-	-	-	-	-	-	-	4-69
4.7 Demographic Characteristics of the Host Communities	-	-	-	-	-	-	-	-	4-70
4.8 Access to basic social services and related infrastructure	-	-	-	-	-	-	-	-	4-72
4.9 Sanitation Practices within the Project Areas of Influence (AoI)	-	-	-	-	-	-	-	-	4-82
4.10 Livelihood Practices in the Study Area	-	-	-	-	-	-	-	-	4-84
4.10.1 Land Tenure and Ownership	-	-	-	-	-	-	-	-	4-84



4.11	Settlement Patterns, Housing, and Property Ownership	-	-	-	-	-	-	4-89
4.12	Health Profile and Access to Healthcare Services	-	-	-	-	-	-	4-91

## CHAPTER FIVE: PROJECT ALTERNATIVES

5.1	Evaluation of Project Options	-	-	-	-	-	-	5-1
5.1.1	No-Project Scenario Alternatives	-	-	-	-	-	-	5-1
5.2	Irrigation Method Alternative	-	-	-	-	-	-	5-2

## CHAPTER SIX: STAKEHOLDER ENGAGEMENT

6.1	Background to the Project Stakeholder Engagement	-	-	-	-	-	-	6-1
6.2	Objectives of the Stakeholder Engagement Plan	-	-	-	-	-	-	6-2
6.3	Stakeholder Engagement and Consultations	-	-	-	-	-	-	6-3
6.4	Stakeholders Engagement Activities Conducted as Part of ESIA	-	-	-	-	-	-	6-3
6.5	Approach to the Project SEP	-	-	-	-	-	-	6-8
6.6	Proposed methods for future Engagement	-	-	-	-	-	-	6-8
6.7	Proposed Stakeholder Engagement Programme	-	-	-	-	-	-	6-8
6.8	Grievance Mechanism	-	-	-	-	-	-	6-10
6.8.1	Scope and Objectives of Grievance Mechanism	-	-	-	-	-	-	6-11
6.8.2	Structure of the GRM	-	-	-	-	-	-	6-11
6.8.2.1	Stages of the GRM Structure for the Project	-	-	-	-	-	-	6-12
6.8.3	Process of GRC	-	-	-	-	-	-	6-13
6.9	Periodic Review and Documentation / Operational Budget	-	-	-	-	-	-	6-17
6.10	Monitoring the Grievance Process	-	-	-	-	-	-	6-18
6.10.1	Roles and Responsibilities	-	-	-	-	-	-	6-18

## CHAPTER SEVEN: ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

7.1	General	-	-	-	-	-	-	-	7-1
7.2	Impact Assessment Methodology	-	-	-	-	-	-	-	7-1
7.2.1	Predicting the magnitude of impacts	-	-	-	-	-	-	-	7-1
7.2.2	Impact Significance Rating	-	-	-	-	-	-	-	7-2
7.2.3	Sensitivity/vulnerability/importance of resources and receptors	-	-	-	-	-	-	-	7-3
7.2.4	Assessment of impact significance	-	-	-	-	-	-	-	7-3
7.2.5	Impact Identification	-	-	-	-	-	-	-	7-5
7.2.6	Mitigation measures	-	-	-	-	-	-	-	7-7



7.2.7	Residual impacts significance	-	-	-	-	-	-	-	7-8
7.3	Screening / Identification of Impacts	-	-	-	-	-	-	-	7-9
7.4	Preliminary Assessment of Impacts	-	-	-	-	-	-	-	7-15

## **CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)**

8.1	Introduction	-	-	-	-	-	-	-	8-1
8.2	ESMP Objectives	-	-	-	-	-	-	-	8-2
8.3	Scope of Environmental and Social Management Plan (ESMP)	-	-	-	-	-	-	-	8-3
8.4	Environmental Management Measures	-	-	-	-	-	-	-	8-4
8.4.1	Mitigation Measures during the Pre-Construction Phase	-	-	-	-	-	-	-	8-4
8.4.2	Mitigation Measures during the Construction Phase	-	-	-	-	-	-	-	8-10
8.4.3	Mitigation Measures during the Operational Phase	-	-	-	-	-	-	-	8-30
8.4.4	Mitigation Measures during the Decommissioning Phase	-	-	-	-	-	-	-	8-44
8.5	Air Quality Management Plan (AQMP)	-	-	-	-	-	-	-	8-49
8.6	Noise Management Plan (NMP)	-	-	-	-	-	-	-	8-53
8.7	Groundwater Management Plan (GWMP)	-	-	-	-	-	-	-	8-55
8.8	Surface Water Management Plan (SWMP)	-	-	-	-	-	-	-	8-58
8.9	Biodiversity Management Plan (BMP)	-	-	-	-	-	-	-	8-61
8.10	Consultation and Public Involvement Plan	-	-	-	-	-	-	-	8-63
8.11	Social-cultural Management Plan (SMP)	-	-	-	-	-	-	-	8-64
8.12	Waste Management Plan (WMP)	-	-	-	-	-	-	-	8-64
8.12.1	Waste Inventory and Classification	-	-	-	-	-	-	-	8-65
8.12.2	Waste-Management Structure and Responsibility	-	-	-	-	-	-	-	8-65
8.12.3	Waste Handling Guidelines	-	-	-	-	-	-	-	8-65
8.12.4	Waste Segregation Guidelines	-	-	-	-	-	-	-	8-66
8.12.5	Waste Transport	-	-	-	-	-	-	-	8-66
8.12.6	Traffic and Transport Management Principles	-	-	-	-	-	-	-	8-67
8.13	Sourcing, Procurement and Recruitment Management Plan	-	-	-	-	-	-	-	8-68
8.14	Emergency Response Management Plan (ERMP)	-	-	-	-	-	-	-	8-69
8.14.1	Hazard identification and risk assessment programme	-	-	-	-	-	-	-	8-70
8.14.2	Emergency Communications and Coordination Plan	-	-	-	-	-	-	-	8-70
8.14.3	Response to Incidents	-	-	-	-	-	-	-	8-70
8.14.4	Environmental Emergency Procedures	-	-	-	-	-	-	-	8-71





8.14.5	Evacuation Procedure	-	-	-	-	-	-	-	8-71
8.14.6	Verification and Monitoring of ERMP	-	-	-	-	-	-	-	8-72
8.14.7	Training on Emergency Response	-	-	-	-	-	-	-	8-72
8.14.8	Fire and Explosion Guideline	-	-	-	-	-	-	-	8-72
8.14.9	Fire Fighting Plan	-	-	-	-	-	-	-	8-73
8.15	Security Guideline/Plan	-	-	-	-	-	-	-	8-73
8.16	Soil Management Plan (SMP)	-	-	-	-	-	-	-	8-74
8.16.1	Soil Contamination Management Plan	-	-	-	-	-	-	-	8-75
8.16.2	Soil Erosion Management Plan	-	-	-	-	-	-	-	8-75
8.17	Pest Management Plan (PMP)	-	-	-	-	-	-	-	8-76
8.18	Harvest and Storage Management Plan (HSMP)	-	-	-	-	-	-	-	8-76
8.19	Health, Safety, Security and Environmental (HSE) Plan	-	-	-	-	-	-	-	8-77
8.20	Spill Prevention and Control Measures	-	-	-	-	-	-	-	8-78
8.20.1	Spill Prevention Measures	-	-	-	-	-	-	-	8-78
8.20.2	Spill Control measures	-	-	-	-	-	-	-	8-78
8.21	Environmental Monitoring Programme	--	-	-	-	-	-	-	8-78
8.22	Environmental Audit and Review	-	-	-	-	-	-	-	8-83
8.23	Decommissioning and Abandonment Plan	-	-	-	-	-	-	-	8-84
8.24	Revegetation and Rehabilitation Plan	--	-	-	-	-	-	-	8-84
8.24.1	Principles	-	-	-	-	-	-	-	8-85
8.24.2	Topsoil Management	-	-	-	-	-	-	-	8-85
8.24.3	Seeding	-	-	-	-	-	-	-	8-85
8.24.4	Transplants	-	-	-	-	-	-	-	8-86
8.24.5	Monitoring Requirements	-	-	-	-	-	-	-	8-86
8.25	Regulatory Compliance	-	-	-	-	-	-	-	8-86
8.25.1	Identification of all regulatory and other requirements	-	-	-	-	-	-	-	8-86
8.25.2	Evaluation of Project Components and Activities	-	-	-	-	-	-	-	8-87
8.25.3	Approval or Rejection	-	-	-	-	-	-	-	8-87
8.26	Awareness Creation and Training	-	-	-	-	-	-	-	8-87
8.26.1	Induction Briefing	-	-	-	-	-	-	-	8-87
8.26.2	Weekly Safety and Environmental Forum	-	-	-	-	-	-	-	8-87
8.27	Manpower Development Guidelines	-	-	-	-	-	-	-	8-88





8.28	Chance Find Procedure-	-	-	-	-	-	-	-	-	8-89
------	------------------------	---	---	---	---	---	---	---	---	------

**CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS**

9.1	Conclusion	-	-	-	-	-	-	-	-	9-1
9.2	Recommendations	-	-	-	-	-	-	-	-	9-1

**REFERENCES**

**APPENDICES**



## LIST OF FIGURES

Figure 1.1:	Locational Map of the Gambia -	-	-	-	-	-	-	1-2
Figure 1.2:	Map of The Gambia highlighting the Project Areas	-	-	-	-	-	-	1-3
Figure 1.3:	The Gambian National Environment Agency (NEA) ESIA Process	-	-	-	-	-	-	1-8
Figure 3.1:	Map of the Gambia Showing the Project Sites at the Upper River Region (URR)	-	-	-	-	-	-	3-11
Figure 3.2:	Tractor -	-	-	-	-	-	-	3-19
Figure 3.3:	Power Tillers	-	-	-	-	-	-	3-20
Figure 3.4:	Combine Harvesters	-	-	-	-	-	-	3-21
Figure 3.5:	Seeders-	-	-	-	-	-	-	3-22
Figure 3.6:	Transplanters	-	-	-	-	-	-	3-22
Figure 3.6:	Sprayers and Dusters	-	-	-	-	-	-	3-23
Figure 4.1:	Sampling Map of the Upper River Region	-	-	-	-	-	-	4-2
Figure 4.2:	Topographic Map of Upper River Region (URR)	-	-	-	-	-	-	4-4
Figure 4.3:	Schematic streamlines of near-surface flow in the Global Tropics	-	-	-	-	-	-	4-6
Figure 4.4:	Average Mean Monthly Temperature (1993-2022)	-	-	-	-	-	-	4-7
Figure 4.5:	Average Mean Monthly Rainfall (1993-2022)	-	-	-	-	-	-	4-8
Figure 4.6:	Mean Monthly Relative Humidity (1993-2022)	-	-	-	-	-	-	4-10
Figure 4.7:	Land cover classes associated with the project area in Dampha Kunda	-	-	-	-	-	-	4-41
Figure 4.8:	Land cover classes associated with the project area in Limbambulu Bambo	-	-	-	-	-	-	4-42
Figure 4.9:	Percentage of the Land Use Land Cover Classes in Dampha Kunda	-	-	-	-	-	-	4-42
Figure 4.10:	Percentage of the Land Use Land Cover Classes in Limbambulu Bambo	-	-	-	-	-	-	4-43
Figure 4.11:	Project awareness level at URR	-	-	-	-	-	-	4-66
Figure 4.12:	Population Growth of the Gambia	-	-	-	-	-	-	4-67
Figure 4.13:	Age and Gender Composition of The Gambia	-	-	-	-	-	-	4-68
Figure 4.14:	Population Composition of Upper River Region (URR)	-	-	-	-	-	-	4-69
Figure 4.15:	Gender Composition at the project communities	-	-	-	-	-	-	4-70
Figure 4.16:	Marital Status at the project communities	-	-	-	-	-	-	4-71
Figure 4.17:	Ethnic Composition at the project communities	-	-	-	-	-	-	4-72
Figure 4.18:	Access to Public Electricity	-	-	-	-	-	-	4-73
Figure 4.19:	Source of energy for home lighting	-	-	-	-	-	-	4-74
Figure 4.20:	Access to ICT	-	-	-	-	-	-	4-75
Figure 4.21:	Source of drinking water within the project communities	-	-	-	-	-	-	4-76



Figure 4.22:	Access to public water at the project communities	-	-	-	-	4-77
Figure 4.23:	Means of Transportation at the project communities	-	-	-	-	4-78
Figure 4.24:	Educational Attainment	-	-	-	-	4-80
Figure 4.25:	Literacy level at the Project communities	-	-	-	-	4-82
Figure 4.26:	Waste disposal methods at the project communities	-	-	-	-	4-83
Figure 4.27:	Types of toilet system at the project communities	-	-	-	-	4-84
Figure 4.28:	Economic Activities at the project communities	-	-	-	-	4-86
Figure 4.29:	Types of Crop cultivated at Project communities	-	-	-	-	4-87
Figure 4.30:	Housing Type	-	-	-	-	4-90
Figure 4.31:	Prevalent disease at the project communities	-	-	-	-	4-91
Figure 4.32:	Access to Public Health Services	-	-	-	-	4-92
Figure 6.1:	Grievance Mechanism flowchart	-	-	-	-	6-17
Figure 8.1	Level of Risk and ALARP	-	-	-	-	8-2
Figure 8.2	Waste Management Hierarchy	-	-	-	-	8-66
Figure 8.2	Chance Find Procedure Flow Diagram	-	-	-	-	8-92



## LIST OF TABLES

Table 1.1:	Impact Characteristic Terminology	-	-	-	-	-	-	-	1-10
Table 1.2:	Impacts significance matrix	-	-	-	-	-	-	-	1-12
Table 1.3:	Team Members	-	-	-	-	-	-	-	1-15
Table 2.1:	Relevant National Policies	-	-	-	-	-	-	-	2-1
Table 2.2	National Acts and Regulations relevant to the Project	-	-	-	-	-	-	-	2-5
Table 2.3	Institutional framework relevant to implementation of the Project	-	-	-	-	-	-	-	2-9
Table 2.4	International, Regional, and Sub-Regional Conventions, Treaties, and Agreements	-	-	-	-	-	-	-	2-12
Table 2.5	Applicable AfDB Operational Safeguards (OS)	-	-	-	-	-	-	-	2-13
Table 3.1:	Waste stream and management at different phases of the project	-	-	-	-	-	-	-	3-25
Table 4.1:	Results of on-site Meteorological conditions measurement	-	-	-	-	-	-	-	4-10
Table 4.2:	IFC/WHO air quality standards	-	-	-	-	-	-	-	4-11
Table 4.3:	Air Quality Monitoring location	-	-	-	-	-	-	-	4-14
Table 4.4:	Results of the Air Quality Monitoring	-	-	-	-	-	-	-	4-14
Table 4.5:	Results of the Noise Monitoring	-	-	-	-	-	-	-	4-17
Table 4.6:	Method for Water Analysis	-	-	-	-	-	-	-	4-18
Table 4.7:	Surface water sampling location	-	-	-	-	-	-	-	4-20
Table 4.8:	Surface Water Quality Analysis	-	-	-	-	-	-	-	4-21
Table 4.9:	Groundwater sampling location	-	-	-	-	-	-	-	4-26
Table 4.10:	Groundwater Quality Analysis	-	-	-	-	-	-	-	4-27
Table 4.11:	Location of Soil Samples	-	-	-	-	-	-	-	4-30
Table 4.12:	Soil Quality at Upper River Region (URR)	-	-	-	-	-	-	-	4-31
Table 4.13a:	Activity Data	-	-	-	-	-	-	-	4-37
Table 4.13b:	Global Warming Potential of the GHG	-	-	-	-	-	-	-	4-37
Table 4.13c:	Operational Phase equipment and machineries	-	-	-	-	-	-	-	4-38
Table 4.13d:	GHG Emissions for the Stationary combustion during the operational phase of the project	-	-	-	-	-	-	-	4-39
Table 4.13e:	Estimated GHG Emissions for the Mobile combustion during the operational phase of the project	-	-	-	-	-	-	-	4-39
Table 4.14:	Flora species recorded in the project area	-	-	-	-	-	-	-	4-51
Table 4.15:	Mammal species recorded the project area during the field assessment	-	-	-	-	-	-	-	4-54
Table 4.16:	Avifauna species recorded the project area during the field assessment	-	-	-	-	-	-	-	4-55



Table 4.17:	Herpetofauna species recorded in the project area during the field assessment-	4-59
Table 4.18:	Ecosystem services identified within the project area - - - -	4-60
Table 6.1:	Summary of stakeholders' feedback, concerns, and expectations - -	6-4
Table 6.2:	Cost Breakdown for Grievance Redress Mechanism (GRM) Activities-	6-17
Table 6.3:	Roles and Responsibilities - - - - - - - -	6-18
Table 7.1	Impact Characteristic Terminology - - - - - - - -	7-2
Table 7.2	Significance Matrix - - - - - - - - - -	7-4
Table 7.3	Environmental/Social Components, Sensitivity and Associated Impact Indicators	7-6
Table 7.4	Hierarchy of options for mitigation - - - - - - - -	7-8
Table 7.5	Ranking of residual impacts - - - - - - - - - -	7-8
Table 7.6	Environmental Impacts Screening Matrix for the Regional Rice Resilient Value Chains Development Program (REWARD)- - - - - - - -	7-10
Table 7.7	Environmental Impacts during Pre-Construction and Construction Phases -	7-16
Table 7.8	Environmental Impacts during Operational Phase - - - - -	7-30
Table 7.9	Environmental Impacts during Decommissioning Phase - - - - -	7-50
Table 8.1	Mitigation measures for Pre-construction phase impacts for the REWARD Project	8-5
Table 8.2	Mitigation measures for Construction phase impacts for the REWARD Project.	8-11
Table 8.3	Mitigation measures for Operational phase impacts for the REWARD Project	8-31
Table 8.4	Mitigation measures during Decommissioning phase of the REWARD Project.	8-45
Table 8.5	Responsible Parties and their Responsibilities for AQMP - - - - -	8-51
Table 8.6	Responsible Parties and their Responsibilities for GWMP - - - - -	8-57
Table 8.7	Responsible Parties and their Responsibilities for SWMP - - - - -	8-59
Table 8.8	Responsible Parties and their Responsibilities for BMP - - - - -	8-62
Table 8.9	Monitoring Plans for the Proposed Regional Rice Resilient Value Chains Development Program (REWARD) - - - - - - - - - -	8-80
Table 8.10	Policy, Legal and Regulatory Framework - - - - - - - - - -	8-90



## LIST OF PLATES

Plate 4.1	Air Quality Measurement	-	-	-	-	-	-	4-15
Plate 4.2	Meteorological reading-	-	-	-	-	-	-	4-15
Plate 4.3a	Groundwater sampling -	-	-	-	-	-	-	4-26
Plate 4.3b	Groundwater in-situ testing	-	-	-	-	-	-	4-26
Plate 4.4a	Impact of drought on aquatic fauna	-	-	-	-	-	-	4-34
Plate 4.4b	Impact of drought on aquatic fauna	-	-	-	-	-	-	4-34
Plate 4.4c	Impact of drought on aquatic fauna	-	-	-	-	-	-	4-34
Plate 4.5	The riparian habitat and rice fields observed in the project area	-	-	-	-	-	-	4-45
Plate 4.6	Mosaic modified grassland and fallow land habitats	-	-	-	-	-	-	4-46
Plate 4.7	Woodland savannah forest and grassland habitats observed in the project area	-	-	-	-	-	-	4-47
Plate 4.8	Transformed habitat from housing and road infrastructure within the project area	-	-	-	-	-	-	4-48
Plate 4.9	A selection of plant species observed within the project area:	-	-	-	-	-	-	4-50
Plate 4.10	Mammals observed in the project area: Ground squirrel ( <i>Xerus erythropus</i> ) and green monkey ( <i>Chlorocebus sabaeus</i> )	-	-	-	-	-	-	4-55
Plate 4.11	Some avifauna observed in the project area	-	-	-	-	-	-	4-58
Plate 4.12	Herpetofauna observed in the project area: Common Agama ( <i>Agama agama</i> )	-	-	-	-	-	-	4-59
Plate 4.13	Consultation with the men and women groups	-	-	-	-	-	-	4-70
Plate 4.14	Mosque at URR: Limbambulu Bambo (Left); Dampha Kunda (Right)	-	-	-	-	-	-	4-71
Plate 4.15	Electricity Poles in the study areas	-	-	-	-	-	-	4-73
Plate 4.16	Solar Panel installed in the Project Area	-	-	-	-	-	-	4-74
Plate 4.17	Source of energy for cooking in the Project Communities	-	-	-	-	-	-	4-75
Plate 4.18	Source of drinking water in the communities	-	-	-	-	-	-	4-77
Plate 4.19	Means of Transportation at the Project areas	-	-	-	-	-	-	4-79
Plate 4.20	Some Educational facilities at Project communities	-	-	-	-	-	-	4-81
Plate 4.21	Solid waste and sanitary conditions observed at the Project communities	-	-	-	-	-	-	4-83
Plate 4.22	Agricultural activities observed within the project area	-	-	-	-	-	-	4-87
Plate 4.23	Trading activities in the study area	-	-	-	-	-	-	4-89
Plate 4.24	Housing types in the Project communities	-	-	-	-	-	-	4-90
Plate 6.1	Stakeholders Engagement Photolog	-	-	-	-	-	-	6-7



## LIST OF ABBREVIATIONS AND ACRONYMS

<b>ABS</b>	Agribusiness Services Unit
<b>AES</b>	Agricultural Engineering Unit
<b>AfDB</b>	African Development Bank
<b>ALARP</b>	As Low As Reasonably Practicable
<b>ANR</b>	Agriculture and Natural Resources
<b>ANRWG</b>	Agriculture and Natural Resources working group
<b>AOI</b>	Area of Influence
<b>APHA</b>	American Public Health Association
<b>AQMP</b>	Air Quality Management Plan
<b>AQS</b>	Air Quality Standards
<b>ARDP</b>	Agriculture and Rural Development Policy
<b>BMP</b>	Biodiversity Management Plan
<b>BOD</b>	Biological Oxygen Demand
<b>Br</b>	Bromine
<b>Ca<sup>2+</sup></b>	Calcium
<b>CBOs</b>	community-based organizations
<b>CEC</b>	Cation Exchange Capacity
<b>CEES</b>	Communication Extension Education Service Unit
<b>Cl-</b>	Chloride
<b>CMS</b>	Conservation of Migratory Species
<b>CO</b>	Carbon Monoxide
<b>Co</b>	Cobalt
<b>COD</b>	Chemical Oxygen Demand
<b>CPCU</b>	Central Project Coordinating Unit
<b>CSS</b>	Climate Safeguards System
<b>cT</b>	Tropical-Continental
<b>DES</b>	District Extension Supervisors
<b>DO</b>	Dissolved Oxygen





<b>DOA</b>	Department of Agriculture
<b>DoF</b>	Department of Forestry
<b>DPWM</b>	Department of Parks and Wildlife Management
<b>DSA</b>	Deep Sandstone Aquifer
<b>DWR</b>	Department of Water Resources
<b>E&amp;S</b>	Environmental and Social
<b>EAR</b>	Environmental Audit Report
<b>EC</b>	Electrical Conductivity
<b>EHS</b>	Environment, Health and Safety
<b>EIA</b>	Environmental Impact Assessment
<b>EPA</b>	Environmental Protection Agency
<b>EPRP</b>	Emergency Preparedness and Response Procedure
<b>ERMP</b>	Emergency Response Management Plan
<b>ESAP</b>	Environmental and Social Assessment Procedures
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>ESMP</b>	Environmental and Social Management Plan
<b>ESMS</b>	Environmental and Social Management System
<b>ETP</b>	Effluent Treatment Plant
<b>Fe<sup>2+</sup>/Fe<sup>3+</sup></b>	Iron
<b>FTS</b>	Food Technology Unit
<b>GAMSIF</b>	Gambia Agricultural Sustainable Investment Framework
<b>GBV</b>	Gender-Based Violence
<b>GBVH</b>	Gender-Based Violence and Harassment
<b>GEAP</b>	Gambia Environment Action Plan
<b>GHG</b>	Greenhouse Gases
<b>GIIP</b>	Good International Industry Practice
<b>GIS</b>	Geographical Information System
<b>GNAIP</b>	Gambia National Agricultural Investment Policy



<b>GoTG</b>	Government of The Gambia
<b>GPS</b>	Global Positioning System
<b>GRC</b>	Grievance Redress Committee
<b>GRM</b>	Grievance Redress Mechanism
<b>GW</b>	Groundwater
<b>GWMP</b>	Groundwater Management Plan
<b>H&amp;S</b>	Health and Safety
<b>HIV</b>	Human Immunodeficiency Virus
<b>HSE</b>	Health Safety and Environment
<b>HSMP</b>	Harvest and Storage Management Plan
<b>HTS</b>	Horticulture Technical Services Unit
<b>IEHS</b>	International Environmental Health and Safety
<b>IFC</b>	International Finance Corporation
<b>IFIs</b>	International Financial Institutions
<b>ILO</b>	International Labour Organisation
<b>ISP</b>	Integrated Safeguards Policy
<b>ISS</b>	Integrated Safeguards System
<b>IWRMP</b>	Integrated Water Resources Management Policy
<b>K<sup>+</sup></b>	Potassium
<b>MECCNR</b>	Ministry of Environment, Climate Change and Natural Resources
<b>Mg</b>	Magnesium
<b>Mn</b>	Manganese
<b>mT</b>	Tropical-Maritime
<b>MV</b>	Means of Verification
<b>NAMA</b>	Nationally Appropriate Mitigation Actions
<b>NAPA</b>	National Adaptation Plan of Action
<b>NARI</b>	National Agricultural Research Institute
<b>NAWFA</b>	National Agency for Women Farmers Association
<b>NBR</b>	North Bank Region



<b>NBSAP</b>	The National Biodiversity Strategy and Action Plan
<b>NDP</b>	National Development Programme
<b>NEA</b>	National Environment Agency
<b>NEMA</b>	National Environmental Management Act
<b>NEMC</b>	National Environment Management Council
<b>NGOs</b>	Non-Governmental Organizations
<b>Ni</b>	Nickel
<b>NMP</b>	Noise Management Plan
<b>NO<sub>2</sub>-</b>	Nitrite
<b>NO<sub>3</sub>-</b>	Nitrate
<b>NO<sub>x</sub></b>	Nitrogen Oxides
<b>NPAGW</b>	National Policy for the Advancement of Gambian Women
<b>NRA</b>	National Roads Authority
<b>NSPP</b>	National Social Protection Policy
<b>NSPS</b>	National Social Protection Secretariat
<b>OA</b>	Office of Accountability
<b>ODS</b>	Ozone Depleting Substances
<b>OS</b>	Operational Safeguards
<b>OVI</b>	objectively verifiable monitoring indicators
<b>PACs</b>	Project-Affected Communities
<b>PAGE</b>	Programme for Accelerated Growth & Employment
<b>Pb<sup>2+</sup></b>	Lead
<b>PIU</b>	Project Implementation Unit
<b>PMP</b>	Pest Management Plan
<b>PO<sub>4</sub><sup>2-</sup></b>	Phosphate
<b>PPE</b>	Personal Protective Equipment
<b>PPS</b>	Plant Protection Services
<b>PS</b>	Performance Standards
<b>PSU</b>	Planning Services Unit



<b>RAD</b>	Regional Agricultural Directorates
<b>REWARD</b>	Regional Rice Resilient Value Chains Development Program
<b>RSA</b>	Road Safety Audit
<b>RVCP</b>	Rice Value Chain Transformation Programme
<b>SDGs</b>	Sustainable Development Goals
<b>SEA</b>	Strategic Environment Assessment
<b>SEP</b>	Stakeholder Engagement Plan
<b>SH</b>	Sexual Harassment
<b>SLM</b>	Sound Level Meter
<b>SMP</b>	Social-cultural Management Plan
<b>SO<sub>2</sub></b>	Sulphur Dioxide
<b>SoER</b>	State of the Environment Report
<b>SRS</b>	Social Responsibility Staff
<b>SS</b>	Soil Sample
<b>SSA</b>	Shallow Sand Aquifer
<b>SWMS</b>	Soil and Water Management Services
<b>SWMU</b>	Soil and Water Management Unit
<b>TAC</b>	Technical Advisory Committees
<b>TDS</b>	Total Dissolved Solids
<b>TSS</b>	Total Suspended Solids
<b>TSU</b>	technical services units
<b>UNCBD</b>	UN Convention on Biological Diversity
<b>UNCCD</b>	UN Convention to Combat Desertification
<b>UNDP</b>	United Nations Development Programme
<b>UNFCCC</b>	UN Framework Convention on Climate Change
<b>URR</b>	Upper River Region
<b>VAC</b>	Violence against Children
<b>VDC</b>	Village Development Committee
<b>VEWs</b>	Village Extension Workers



<b>WBG</b>	World Bank Group
<b>WBG</b>	World Bank Group
<b>WCR</b>	West Coast Region
<b>WHO</b>	World Health Organization
<b>WMP</b>	Waste Management Plan
<b>Zn</b>	Zinc



## UNITS OF MEASUREMENTS

%	Percentage
<	Less Than
≤	Less Than/Equal to
>	Greater Than
≥	Greater Than/Equal to
°C	Degree Celsius
G	Grammes
g/l	Grammes per litre
kg	Kilogramme
Km	Kilometer
m	Metre
mg/l	Milligramme per litre
µg/m <sup>3</sup>	Microgramme per metre cubic
°C	Degrees Celcius
S	Second



## EXECUTIVE SUMMARY

### ES1: INTRODUCTION

The Regional Rice Resilient Value Chains Development (REWARD) Program is a regional rice development program designed in response to the African Development Bank's (AfDB) commitment to financing the implementation of countries' food and Agriculture Compacts as presented at the Feed Africa II themed "Feed Africa: Food Sovereignty and Resilience", that was held in Dakar in January 2023. The program is targeted at 15 West African countries, to progressively cover a total area of 750,000 hectares of irrigated land.

The Government of The Gambia (GoTG) through the Gambian Ministry of Agriculture in collaboration with the African Development Bank (AfDB) proposes the implementation of the Regional Rice Reliant Value Chains Development (REWARD) Programme in the country. The initiative aims to propel the rice sector towards a market-driven, commercialized model, fostering private sector engagement in production, processing, and marketing.

The REWARD's overarching goal of the project is to contribute to food and nutrition security, reduce rice imports, and stimulate economic growth. Specific goals include increasing rice production, promoting market-driven farming, and enhancing the role of the private sector in the rice value chain.

### *ESIA Objectives*

The overall objective of this ESIA study is to ensure that environmental and social considerations of the Project are considered during decision-making for environmental sustainability. The specific objectives of the ESIA are:

- Identification and assessment of the potential environmental and social impacts of the project activities, (including the different stages- design, construction, operation and routine maintenance).
- Identification of all potential environmental and social impacts as well as actions to mitigate negative impacts on Gender-related issues
- Identification of all potential climate change risks and impacts, including collection of baseline climate information to climate-proof the project, and a recommendation of key climate change adaptation and mitigation measures to off-set the identified climate risks
- Preparation of a well costed Environmental and Social Management Plan (ESMP) in line with the AfDB ISS and the National Environment Agency (NEA) requirements, and to ensure that project-affected persons are meaningfully consulted and given opportunities to participate in the project decision-making process to maintain credibility of the Project developers and funders.
- Prepare a culturally appropriate grievance redress mechanism to address potential grievances and propose cost requirements for its implementation

Generally, the Gambian REWARD implementation will consist of four (4) components, which are:

**Component 1:** Development of Sustainable Climate-Resilient Rice Production Systems to Ensure Adequate Production of Quality Rice Paddy to Supply Millers, consisting of the following sub-components:

- **Sub-component 1.1:** climate-resilient irrigation schemes and irrigation management services
- **Sub-component 1.2:** Improving the availability of, and access to, climate-resilient quality inputs, mechanization services, and knowledge for Climate Smart Agriculture





**Component 2: Processing & Marketing:** Development of rice processing clusters, agribusiness and market links for trade facilitation, consisting of the following sub-components:

- **Sub-component 2.1:** Developing/modernizing processing infrastructure and strengthening capacities of smallholders and commercial players along the value chain
- **Sub-component 2.2:** Developing information systems, innovative technologies (incl. digital) and consumer-oriented branding to improve access to markets
- **Sub-component 2.3:** Promoting private sector investment by supporting business, especially run by women/youth, and improving availability of finance across the value chain to facilitate lending to processors, farmers, and other businesses

**Component 3: Policy & Governance:** Support to policy/regulatory reforms and harmonization at regional/national level to ensure competitive rice value chain to imports, consisting of the following sub-components:

- **Sub-component 3.1:** Support to policy reforms and harmonization at regional/national scale.
- **Sub-component 3.2:** Enhancement of control and regulations for agricultural inputs at regional/national levels.
- **Sub-component 3.3:** Regional and National management and monitoring systems based on digital technologies in line with ECOWAS Rice Observatory (ERO).

**Component 4: Program Coordination and Management.**

## **Project Phases and Activities**

### ***Pre-construction Phase***

This stage involves carrying out various studies to ascertain the economic, financial and environmental viability of the proposed REWARD project. Also, included in this stage are land development, land preparation, designing, feasibility studies, socio-economic surveys and community engagement etc. for the proposed project.

### ***Construction Phase***

The construction phase will involve works such as development and rehabilitation of rural feeder roads, foundation work as well as factory and warehouse structure erection and installation. The construction of the processing plant and support facilities will be executed in accordance with a standard planning framework that will be reviewed as it becomes expedient by CPCU to ensure:

- Maximum efficiency in construction;
- Minimum adverse environmental and health impacts;
- Earliest completion time
- Compliance with the laws of the land and all regulatory requirements; and
- Compliance with AfDB Integrated Safeguards System ISS and project ESMP.

### ***Operation and maintenance***

The rice fields, and processing plants will be operated and maintained directly by the Project Implementation Unit (PIU) in collaboration of other parties involved. However, it is expected that specialist contractors to whom the contract for the construction of the plant is awarded will be engaged in maintenance activities for the specified retention period and as the need arises afterwards to conduct repairs and provide



other specialist's services. All maintenance and operation contracts will take into account the provisions of the relevant Gambian and AfDB regulations.

### ***Agricultural activities***

The process that will be involved in the mechanized rice farming include Seed selection and preparation, Seedbed Preparation, Sowing, Use of Agrochemicals (Fertilizers and Pesticides), Irrigation System, Pest and Pesticides Management, Harvesting, Threshing and Drying.

### ***Rice Processing Description***

The Rice processing plant comprises of 4 major components including the following:

1. In-take and pre-cleaning section
2. Silo section
3. Boiling and Drying section
4. Milling section

The process is designed to take in the paddy sourced from the rice fields and processed into the finished products.

### ***Mechanization***

The REWARD Program will provide equipment support for mechanization services support through private sector agro-service providers. It is planned that there will be three Mechanization Service Centers which will be equipped with: 30 tractors & Accessories, 45 power tillers – Buffalo Power Tillers & accessories, three low loader–rams, 15 rice transplanters, six fertilizer spreaders and six rice seeders.

### ***Decommissioning and Restoration Phase***

At the expiration of the useful life of the project, adequate arrangements will be made to remove all movable assets. When the life span of the project comes to an end, the rice fields and processing facilities would be decommissioned and put off use. A decommissioning process or plan would be activated. Decommissioning activities will include equipment site securitisation, equipment clean-up, dismantlement of equipment and structures, as well as clean-up of site surfaces in line with applicable regulatory requirements.

The following steps would be undertaken in decommissioning the project:

- Regulatory Compliance and Approval;
- Site Preparation and Clearing;
- Uninstallation of facility components;
- Materials disposal; and
- Site Restoration

### ***Power Supply***

The success of the REWARD project will heavily relies on a reliable and sustainable power supply. In alignment with the principles of climate-smart agriculture, the project will integrate a hybrid power supply system utilizing the renewable energy and a fuel-powered generator. This approach not only ensures uninterrupted power supply but also contributes to reducing greenhouse gas emissions and fostering sustainability in the agricultural value chain.

### ***Waste Generation and Management***

The waste management principles will be based on an integrated approach which will involve adopting a combination of techniques and programs to manage waste holistically through a site-specific Waste



Management Plan (WMP). This approach shall adopt the principles of the 5Rs of waste management hierarchy i.e. Reduce, Repair, Re-use, Recycle and Recover with disposal being the last option for any waste generated.

### **Project Options**

In proposing the project, a number of project options/alternatives were examined and reviewed.

#### ***‘No project option’***

This option was rejected; seeing that this option can pose a major setback on the industrialization and economic growth of the nation.

#### ***‘Delay-Project option’***

This option is rejected for this project, since there is an existing technically, environmentally and economically sustainable plan for implementing the project.

#### ***‘Go-ahead-with-project Option’***

This was therefore the preferred option.

### **Project Alternatives**

#### ***No-Project Alternatives***

The REWARD project aims to ultimately improve the economy of the project area and the Gambia at large, through job creation, improvement in livelihood of small-holder rice farmers, greater productivity of the rice fields and competitiveness of the local rice production. The no-go alternative means that the project will not be executed, thereby retaining the status quo rice production at the selected project intervention communities.

This option is the most suitable alternative from a conservative environmental perspective as it ensures non-interference with the existing environmental conditions. Thus, the No Project Option is not considered to be a viable development option.

#### ***Irrigation Method Alternative***

Several factors are put into consideration in selecting the potential irrigation method for the project at the various project intervention sites. The choice of irrigation methods will depend on; the energy cost in terms of fuel consumption or from national grid, water availability, water supply need of the fields, topography of the sites, soil infiltration capacity, the growing seasons and the rain and water regimes etc.

Also, majority of the existing rice fields within the selected project intervention sites already have in place surface irrigation infrastructure either based on the pumped or tidal system. This will require low-cost for execution for the project as this will require rehabilitation of the existing infrastructure in most cases. The sprinkler irrigation system will obviously more expensive to execute. Considering these, the surface irrigation system is the most preferred option for the project.

## **ES2: PROJECT SITES AND BASELINE CONDITIONS**

The choice and selection of the project sites have primarily been based on the production potential (availability of fresh water throughout the year) as well as the high potential in pump irrigable lands that will enhance agricultural production in the country, and thus prioritizing investment in areas with high market potential as well as areas with low risk of crop failure and high market potential.



The project sites are located at the Upper River Region (URR). There are two (2) intervention sites identified in the region, namely: Dumpha Kunda and Limbambulu Bambo

The environmental baseline characteristics are required to establish the existing environmental status of the proposed project area and also serve as a reference data for future studies and environmental monitoring. The data will also be used as a baseline for which the anticipated impacts of the project would be determined for appropriate mitigation measures to be put in place.

### ***Methodology of Study***

A multi-disciplinary approach was employed in the acquisition of environmental baseline data of the proposed project area. The environmental baseline data for the proposed project was obtained through desktop research, field observation, sampling and measurements as well as laboratory analyses of biological, chemical and physical characteristics of the valued environmental components (VECs) (including surface water, hydrogeology, soil, air and noise, flora and fauna (biodiversity), socio-economic and health characteristics).

### ***Site Visit***

The ESIA including site surveys undertaken from 22nd January to 5th February, 2024 to cover a number of baseline studies in the project's area of influence for the project. Where relevant, the results of the monitoring are reported in this report. Richflood provided a team of specialists to conduct the fieldwork for all of the studies.

### ***Air Quality and Noise Assessment at the Proposed Project Area***

A total of ten (10) air quality sampling points were established within the proposed project area. Ten (10) from the Upper River Region (URR). The pollutants monitored in relation to air quality are; Ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), suspended particulate matter (SPM), ammonia (NH<sub>3</sub>), hydrogen sulphide (H<sub>2</sub>S), carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs).

### ***Hydrogeology***

A total of two (2) groundwater samples were collected during the study. The two (2) samples were collected from different sampling points for physico-chemical, microbial and heavy metal analysis. The groundwater samples were collected in clean plastic bottles for physico-chemical analysis, after rinsing with portion of the water samples to be collected. Samples for microbiological analysis were collected in Mc Cartney bottles while samples for heavy metals were collected in glass bottles acidified with concentrated sulphuric acid.

### ***Surface water***

The inflow of water into the project site depends to a large extent on the contribution of the River Gambia and its tributaries, seasonal rainfall and to a less extent on the runoff from the immediate surroundings of the project area. Five (5) surface water samples were collected (upstream, midstream and downstream) within the project area of influence, from the Upper River region (URR).

### ***Soil Studies***

From the field sampling plan, which was based on the project location map and reconnaissance visit to the area, a total of nine (9) soil sample stations were established, spreading within and around the project location. At each of the sample stations, at least, three random spots were augered at two depth levels (Top



Sample; 0 – 15cm); (Sub Soil; 15- 30 cm), with the aid of 9cm diameter dutch auger at about the centre of the sample station.

### ***Biodiversity Studies***

The assessment of the ecological and biodiversity features of the Project area was conducted in order to characterize the biophysical environment, thereby providing information on some aspects of the flora and fauna composition, habitat status as well as economic plants including any plant of medicinal value.

### ***Flora Studies***

Rapid assessment of the various habitats within the area revealed an array of biodiversity features within the area. Sampling of flora species in the area was carried-out using line transect method within the various habitats in the area. Ten (10) transects of 500m each and 20 x 20m quadrat along each of the transect, were laid in each of the habitats for tree species sampling. Flora species were identified, enumerated and recorded along each transect, based on their floristic and structural attributes.

### ***Fauna Studies***

Opportunistic search of the various habitats using the direct and indirect survey method, was the approach adopted for fauna survey. Fauna species sighted in the area were recorded and formed the direct survey method, while indirect method involved the recording of the significant signs indicating presence of fauna species. A transect walk was carried out with ten (10) minutes stop at every 50m interval to observe, listen to calls along transect and recording of all the species along transect. Indirect survey method involved taking note of signs of fauna species presence in the area such as burrow, faecal droppings, footprints and interview with the locals.

### ***Land Use Land Cover***

The Land Use Land Cover analysis of the 5Km Buffer around Limbambulu Bambo shows that an area of 9% is covered by Built up, 38% by Farmlands, 38% by Riparian Vegetation, 11% by Secondary Forests and 4% by Water body. Similarly, the Land Use Land Cover analysis of the 5Km Buffer around Dampha Kunda shows that an area of 22% is covered by Built up, 17% by Farmlands, 34% by Riparian Vegetation, 19% by Secondary Forests and 8% by Water body.

### ***Socioeconomic Studies***

As part of the primary data collection, a structured questionnaire was developed and deployed using a Computer Assisted Personal Interviewing System. This involved the designing of the questionnaire, deployment to the server and data collection in the field using Android mobile phones. The questionnaire was administered randomly to household members within the selected host communities, in order to generate information on socio-economic and demographic characteristics of communities such as; age, sex, marital status, family size, their farming experience, size of households, their major and subsidiary occupations, among others.

The sampling approach involved a multistage random sampling within the project impacted communities in the project area of influence (AoI). This involved drawing up a list of the project impacted communities within the project area of influence (AoI). A spatial boundary of 5km was used for Socio-economic and Health Impact Analysis. Visitations were also made to existing basic facilities e.g. educational and health facilities.



### **ES3: THE RELEVANT INSTITUTIONAL AND LEGAL FRAMEWORK FOR IMPLEMENTATION OF THE PROJECT**

- **National Environment Management Act, NEMA, 1994**

The NEMA is essentially the national law in environmental management. It provides the legal basis for the Environmental Impact Assessment. Part V of NEMA provides for certain projects listed under Schedule A to be considered for EIA. The REWARD Project falls under Class A requiring a full ESIA.

- **The Agriculture and Natural Resources Policy (ANR 2017-2026)**

The Ministry of Agriculture formulated and adopted the ANR Policy 2009-2015. The Policy aims to reduce poverty, enhancement of food, income, and nutrition securities through the optimal utilization of the resources of the sector consistent with safeguarding the integrity of the environment.

- **National Climate Change Policy (2016 – 2025)**

This policy provides the framework for managing climate risks and building institutions, capacities, and opportunities for climate-resilient development. The policy outlines a summary of climate impacts and vulnerabilities in the various agricultural sector, such as declining soil fertility, reduced productivity of rice, risk of flooding, coastal erosion, and increased salinization due to rising sea level.

- **Applicable AfDB Operational Safeguards (OS)**

From the point of view of the AfDB, the relevant policies are the Operational Safeguard (OS) 1, 3, 4 and 5.

#### **Organizational Responsibilities in the Implementation of the Project**

##### ***Institutions/Implementing Entities***

The following institutions will have important roles to play in the implementation of this Project:

- ***National Environment Agency (NEA)***

Evaluates the ESIA/ESMP; grants Environmental Approval for the Project; monitors the implementation to ensure compliance with environmental legislation and compliant with the ESMP.

- ***The Project Implementation Team***

For the REWARD Project, the overall responsibility will be controlled by the Central Project Coordinating Unit (CPCU), and more specifically, the Project Implementation Unit (PIU) shall prepare activity reports and monitor the implementation of all proposed project activities.

- ***Ministry of Environment, Climate Change and Natural Resources***

It oversees the NEA and implementation of environmental laws and policies of The Gambia.

- ***The Grievance Redress Committee (GRC)***

A Grievance Redress Committee (GRC) will be put in place by the Project and will play a crucial role in the Plan's implementation process by addressing complaints and concerns raised resulting from the Project activities.

- ***Governor's Office (URR)***





Oversee the region's Regional Technical Advisory Committees (TACs). The TACs will support the implementation and monitoring processes at the Regional levels.

- ***Other National Institutions***

These include the Ministry of Agriculture, Department of Water Resources, Ministry of Employment and Trade, Ministry of Lands and Regional Governments, Ministry of Gender and Children Affairs, Department of Forestry, Department of Fisheries, Department of Parks and Wildlife Management and Department of Social Welfare.

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The Ministry of Agriculture formulated and adopted the ANR Policy 2009-2015. The Policy aims to reduce poverty, enhancement of food, income, and nutrition securities through the optimal utilization of the resources of the sector consistent with safeguarding the integrity of the environment.

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These include the Ministry of Agriculture, Department of Water Resources, Ministry of Employment and Trade, Ministry of Lands and Regional Governments, Ministry of Gender and Children Affairs, Department of Forestry, Department of Fisheries, Department of Parks and Wildlife Management and Department of Social Welfare.

#### **ES4: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS**

The assessment process involved looking at the environmental baseline features, uniqueness, potential vulnerabilities and the nature, location, and duration of construction activities, and project design features in effect throughout the operation. An understanding of the nature of the impacts, the proposed Regional Rice Resilient Value Chains Development Program (REWARD) activities or operations would have on the natural and human environment is vital to decision-making on the path of both the communities and the government.

Some of the potential environmental and social impacts in the **Pre-construction and Construction phase** include:

- Business opportunities for local contractors sub-contracting activities
- Improved in the economic situation of the staff recruited
- Loss of habitats to animal species
- Introduction of alien/invasive species
- Land acquisition and ownership transfer
- Land development and changes of the land Modalities
- Restriction in the usage of Land
- Loss of access to asset/farmlands
- Increased road accidents due to unsafe driving habits; Occupational accidents around the construction areas
- Increase in Noise levels and excessive vibrations with the associated disturbance to communities and fauna
- Lack of adequate PPEs will lead to minor injuries and accidents
- Risk of Child labour and Violence against Children (VAC)

Some of the potential impacts in the **Operational phase** include:



- Job creation, training and business opportunities
- Risks of Gender Based Violence (GBV), Sexual Abuse and Harassment
- Applying artificial fertilizer may alter the soil nutrients in the long run
- Water pollution from agro-chemicals such as fertilizers and pest control substances which can leach into the soil and get carried into the water by runoff. Aquatic life would be affected
- Acceleration of Soil acidification due to use of fertilizers containing ammonium salts or urea which could restrict the ability of roots of plants to reach nutrients and water
- Dust generation resulting from the movement of vehicles along dirt roads, and fumes from machinery/equipment
- Impacts on Community Health and Safety
- Exposure of workers to excessive noise on the farmland as a result of the mechanized agricultural activities
- There will be a large waste of rice Husk and other residues
- Water abstraction could affect the availability and hydrological regime within the project area
- Heaps of rice stems and shafts after harvest will house rodents and snakes
- Generate Employment for locals
- Enhanced production of quality rice in The Gambia
- Improved economic situation of the people recruited
- Rice mill will boost the conversion of rice kernel into food varieties
- Risk of infestation by the pests and insects living in rice grains.

Some of the potential impacts in the **Decommissioning and Restoration** phase include:

- Impact on human health associated with air pollutant emissions
- Impact on human health associated with increased dust and vehicular emissions from demolition activities
- Removal of vegetation in the area as well as direct mortalities due to habitat loss
- Degradation of soil resources/vegetation associated with ecosystem services
- Loss of site aesthetic qualities due to abandoned and dilapidated structure
- Discontinuation of budget allocations to local development initiatives

## **ES5: PUBLIC CONSULTATIONS AND STAKEHOLDER ENGAGEMENT**

The Stakeholder Engagement Plan (SEP) provides REWARD with an operational guideline for stakeholder engagement for the proposed project operations and ongoing community engagements. The plan aims to offer REWARD a means to manage its stakeholder engagement activities as part of a business function; providing a well-defined engagement strategy with clear objectives and responsibilities.

### ***Consultations/Stakeholders Engagement Activities***

In the process of developing the Project preparation documents and safeguard instruments (Environmental and Social Impact Assessment, Pest Management Plan) numerous consultations were undertaken as part of the ESIA process for the proposed project. Stakeholder engagements and Key Informant Interviews were undertaken at various locations around the Project site from the 22nd January to 30th January 2024. This was followed up by an online Stakeholder engagement meeting on the 21st March, 2024. The



objectives of these engagements were to disclose project-related information and obtain issues and/or comments from the stakeholders.

The Project Affected Peoples (PAPs) and the stakeholders are presented in table below:

S/N	Particular	Location	Date
1	RVCTP (PIU)	RVCTP Office	23/01/2024
2	CPCU Coordinating Members	CPCU Office, Banjul	24/01/2024
3	The Governor of Upper River Region (URR) and the Technical Advisory Committee (TAC)	URR Governor's office	25/01/2024
4	National Environmental Agency (NEA), National Agency for Women Farmers Association (NAWFA), National Farmers platform, Plant Protection Services (PPS), Department of Forestry (DoF),	RVCTP Office	29/01/2024
5	Members of Dampha Kunda Community, Traditional ruler, Men group, Women group, Youth group, Religious leaders	Chief's residence, Dampha Kunda	25/01/2024
6	Members of Limbambulu Bambo Community, Traditional ruler, Men group, Women group, Youth group, Religious leaders	Chief's residence, Limbambulu Bambo	25/01/2024
7	Department of Parks and Wildlife Management (DPWM), Department of Water Resources (DWR), National Environmental Agency (NEA), African Development Bank (AfDB), Soil and Water Management Services (SWMS) of the Department of Agriculture, Agricultural Engineering Services (AES), Gambia Department of Labour, Ministry of Employment and Trade, Ministry of Gender and Children Affairs, Traditional leaders, Representatives of local groups including youth and women group	Online (Zoom)	21/03/2024

The consultations generated valuable contributions to the proposed development. All stakeholders support the idea of the project to be developed in the proposed project areas taking into consideration the potential for the growth of economic activities in the region and the country at large. The views and major concerns raised by participants included:

- Fears that the project might impact water quality, specifically pesticide and saltwater intrusion.
- Lack of pumping machines poses a challenge to irrigation needs.
- Flash floods from upstream water sources present risks to project areas.
- Fear of project failure due to past experiences
- Concerns about increased risks to the environment related to waste management and the use of agrochemicals.
- Stakeholders are concerned about gender-based abuse, particularly affecting females.



- Child labour whereby children under the custody of religious leaders are sent into the rice farms to work.
- Mosquito prevalence in rice fields during the rainy season hinders work.
- Deforestation, windstorms, and biodiversity impacts require mitigation measures.
- Grazing conflicts between farmers and nomadic cattle rearers
- Sexual exploitation and abuse by previous contractors during land development.
- Engaging in strenuous activities during ploughing, especially for women due to lack of tractors.

The key expectations of the stakeholders are as follows:

- Provision of PPEs for machine operators, farmers, and during fertilizer applications
- Integration of local knowledge in the setup of the irrigation system and other infrastructure for the project
- Project stakeholders anticipate environmental sustainability and technological advancements.
- Stakeholders expect support for quality seedlings, farming maintenance, and machinery.
- Stakeholders anticipate market diversification resulting from the project.
- Stakeholders expect the project to enhance foreign exchange savings.
- Stable market creation for local farmers, ensuring a consistent outlet for produce, is a key expectation.
- Stakeholders expect the project to stimulate business growth and development in the locality.
- Stakeholders anticipate increased rice production and enhanced food security.
- Quest for access to more land for women are anticipated
- Utilization of by-products such as converting rice husk into biofuel and using bran for animal feed is expected.
- Enhanced production of quality rice in The Gambia is a shared expectation.
- The presence of agro-processing plants is seen as motivation for youth engagement in rice farming.
- Employment generation and income opportunities for locals are anticipated outcomes of the project.

Food security and grazing resources for animals are key expectations from the project. The REWARD Team expressed their commitment in ensuring the overall wellbeing of the stakeholders and especially the members of the host communities who will be directly impacted by the proposed project

#### **ES6: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)**

This Environmental and Social Management Plan (ESMP) was prepared on the basis of the results of the ESIA for the Regional Rice Resilient Value Chains Development Program (REWARD). Its aim is to meet the requirements of the Environment Code in The Gambia. It has also been developed with the aim of complying with international good practices applicable to impact studies, meeting the requirements of AfDB's Integrated Safeguards System (ISS).

One of the key objectives of this ESIA is to identify and define socially and environmentally acceptable, technically feasible and cost-effective mitigation measures. Mitigation measures are developed to avoid, reduce, remedy or compensate for the significant negative impacts identified during the ESIA process, and to create or enhance positive impacts such as environmental and social benefits. In this context, the term



mitigation measures include operational controls as well as management actions. Where a significant impact is identified, a hierarchy of options for mitigation is explored.

### Hierarchy of options for mitigation

- ***Avoid at Source*** – avoiding or reducing at source through the design of the Project
- ***Abate on Site*** – add something to the design to abate the impact
- ***Abate at Receptor*** – if an impact cannot be abated on-site then control measures can be implemented off-site
- ***Repair or Remedy*** – some impacts involve unavoidable damage to a resource and these impacts can be addressed through repair, restoration or reinstatement measures.
- ***Compensate in Kind*** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate

### Impact Mitigation Measures

The mitigation (preventive, reduction and control) measures and alternatives considered to ensure that the associated and potential impacts of the Proposed Project on the ecological and socio-economic environment are eliminated or reduced to as low as reasonably practicable (ALARP), thus preserving the ecological integrity of the existing environment.

The approaches to the mitigation measures include enhancement (for the positive impacts), prevention, reduction, avoidance and compensation (for the significant negative impacts). The mitigation measures for each (significant and adverse) impact of the proposed project activities were generally identified based on the associated effect to the environment and human health/safety. Subsequently, the specific mitigation measures satisfying the mitigation requirement were established, putting into consideration available resources and competencies, on-site conditions, public concerns and technology.

Mitigation measures were subsequently proffered for adverse significant potential impacts. These measures were developed for the adverse impacts through a review of industry experience (past project experience), consultations and expert discussion with multi-disciplinary team of engineers and scientists. Based on the impact assessment matrix in the previous section, the overall ratings of impact significance **High** or **Medium** or **Low** was established for each identified impact. The proffered mitigation measures and the expected final residual impact rating for the identified potential significant impacts.

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect on the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).



The ESMP of the proposed REWARD project is designed in line with its Health, Safety and Environment (HSE) policy and in accordance with ISO 14001 Environmental Management System specifications.

### Significance Matrix

Sensitivity / Vulnerability/ Importance	Magnitude of Impact			
	Negligible	Small	Medium	Large
Low	<i>Negligible</i>	<i>Negligible</i>	<i>Minor</i>	<i>Moderate</i>
Medium	<i>Negligible</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>
High	<i>Negligible</i>	<i>Moderate</i>	<i>Major</i>	<i>Major</i>

- An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be ‘imperceptible’ or is indistinguishable from natural background variations.
- An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
- An impact of **moderate** significance has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Designing an activity so that its effects only just avoid breaking a law and/or causing a major impact is not the best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
- An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resources/receptors. The aim of impact assessment is to ensure that the Project does not have any major residual impacts, however, for some aspects, there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied).

For impacts that are initially assessed during the ESIA process to be of *Major* significance, a change in design is usually required to avoid, reduce or minimise these, followed by a reassessment of significance. For impacts assessed during the ESIA process to be of *Moderate* significance, where appropriate the discussion explains the mitigation measures that have been considered, the one selected and the reasons (e.g. in terms of technical feasibility and cost-effectiveness) for that selection. Impacts assessed to be of *Minor* significance are usually managed through good industry practice, operational plans and procedures.





The ESIA is intended to help decisions on projects to be made in full knowledge of their likely impacts on the environment and society. The residual impacts and their significance reported in this report are based on the proposed Regional Rice Resilient Value Chains Development Program (REWARD) as described, i.e. inclusive of all proposed mitigation.

### ***Impact Identification***

Impact identification aims to account for the entire potential and associated biophysical, social and health impacts making sure that both significant and insignificant impacts are accounted for. *ISO 14001* requires the identification, evaluation and registration of environmental aspects associated with the proposed project activities.

As with a project of this nature, the impactable components of the environment that will be affected by the proposed projects as well as impact indicators for the sensitivity of each component of the environment are shown in *Table* below.

#### **Environmental and Social Components, Sensitivity and Associated Impact Indicators**

<b>Environmental/Social Components</b>	<b>Potential Sensitivity of Impact Identified</b>	<b>Associated Impact Indicators</b>
Climate	Climate change	Humidity, Temperature, Rainfall, Wind
Air Quality	Dust generation, gaseous emission (exhaust gases/fumes)	Particulate matter, CO, NO <sub>2</sub> , CO <sub>2</sub> , SO <sub>2</sub> , VOCs
Noise & Vibration	Wildlife disturbance, hearing loss, communication interference.	Construction activities, machinery operations
Water Quality	Water pollution/contamination, exceedance of standard limit per quality parameter	TDS, Turbidity, DO, Toxicity, pH, Heavy metals, Temperature, Colour, Odour, BOD, Hardness, Nutrients, Microbial content, etc.
Hydrogeology	Changes in Physio-chemical processes due to disturbance of hydrogeological material, etc.	Groundwater Level and Quality
Soil/Land Use/ Topography	Alteration in existing Landscape, soil loss, changes in aesthetics, etc.	Erosion, Farming, Recreation, Land use pattern, land-use conflicting interest
Flora and Fauna	Destruction/loss of habitat/species, habitat fragmentation, contamination, etc.	Diversity and abundance of flora and fauna species, threat to sensitive areas
Community Health and Safety	Deterioration of farmlands, nuisance from noise and vibration, land-ownership conflicts, unmet community expectations, poor waste disposal, occupational health hazards, HIV, Hygiene	Unemployment rate, crime rate, education statistics, proximity of settlements, compensation packages, community agreements, social harmony, population dynamics, income levels, infrastructure development, disease prevalence, literacy rates, housing conditions, health and safety metrics





<b>Environmental/Social Components</b>	<b>Potential Sensitivity of Impact Identified</b>	<b>Associated Impact Indicators</b>
Occupational Health and Safety	Employment of local labour and skills acquisition for workers taking advantage of new opportunities. Incident/accident resulting from the use of farming machinery	Grievance redress mechanism, wages/salary remuneration, Accident/incident management, workplace safety in sensitive areas.
Archaeology, Cultural Resources and Protected Areas	Conflicts over the sacredness of the Burial grounds/Shrines/Monuments, National Parks	Cultural relics/sites, historical knowledge, Nature conservation.
Socio-Economic Conditions	Changes in land ownership, economic disruptions, changes in income levels, job creation	Employment rates, income levels, land ownership records, economic activity levels, poverty rates
Education	Impact on local education facilities due to population influx or construction activities	School enrollment rates, quality of education, teacher-student ratios, availability of educational resources
Gender and Vulnerable Groups	Impact on women and vulnerable groups' participation in the project, potential for gender-based discrimination, access to project benefits	Gender employment ratios, participation rates of vulnerable groups, incidences of discrimination, access to project resources
Social Cohesion and Community Dynamics	Changes in community relationships, potential for social conflicts, impacts on traditional practices and community values	Incidences of social conflict, changes in community engagement, preservation of traditional practices, community feedback
Public Infrastructure and Services	Strain on existing public infrastructure (roads, healthcare, water supply) due to increased population and project activities	Availability and quality of public services, infrastructure condition, access to healthcare, traffic congestion levels

The first step in identifying impacts associated with the project is the development of an interaction matrix which shows the relationship/interaction between the project's environmental components and planned project activities. The full list of project activities used in the interaction matrix has been summarized in four (4) phases; pre-construction, construction, operation and decommissioning. Based on these interactions, the identified negative impacts were rated as High, Medium and Low. Positive impacts arising from the project were not further classified.

The development of the checklist was carried out using the Gambia National Environmental requirements, the African Development Bank (AfDB) Integrated Safeguards System and other relevant standard codes for the agricultural sector.



### Responsible Parties and their Responsibilities for AQMP

S/N	Responsible Personnel	Roles and Responsibilities
1.	<b>Central Coordinating Unit (CPCU)</b>	<ul style="list-style-type: none"> <li>Responsible for leading the development and formulation of the Air Quality Management Plan, Coordinating with various stakeholders and expert</li> <li>Facilitate training programs and capacity-building initiatives for relevant agencies and stakeholders involved in air quality management</li> <li>Promote public awareness and education regarding air quality issues, the importance of the management plan, and community roles in improving air quality</li> </ul>
2.	<b>Project Implementing Unit (PIU)</b>	<ul style="list-style-type: none"> <li>Responsible for enforcing the management/monitoring measures described in this AQMP.</li> <li>Develop contingency plans and response strategies for air quality emergencies</li> <li>Establish systems for collecting, analyzing, and disseminating air quality data</li> <li>Prepare and submit regular reports on the progress of AQMP implementation to regulatory authorities and other stakeholders</li> </ul>
3	<b>National Environment Agency (NEA)</b>	<ul style="list-style-type: none"> <li>Regular monitor air quality levels through a network of monitoring stations to assess the concentration of pollutants</li> <li>Ensure that the AQMP aligns with the national and international regulations, standards, and guidelines.</li> <li>Endure that the AQMP aligns with existing environmental regulations and standards.</li> <li>Raise public awareness about air quality issues, health impacts, and ways to reduce air pollution</li> <li>Ensure the compliance with air quality regulations through inspections, permits, and enforcement measures.</li> </ul>
4.	<b>Environmental Safeguard Officer</b>	<ul style="list-style-type: none"> <li>Responsible for stakeholder engagement applicable with this AQMP</li> </ul>
5.	<b>Operation Manager</b>	<ul style="list-style-type: none"> <li>Together with the PIU, is responsible for staffing, planning and day-to-day execution of the management measures described under the operational phase of this AQMP.</li> </ul>



S/N	Responsible Personnel	Roles and Responsibilities
		<ul style="list-style-type: none"> <li>As needed, he will develop and propose staff plans and contractual language to ensure that these measures are implemented.</li> </ul>
6.	<b>Contractors (Construction and Operations)</b>	<ul style="list-style-type: none"> <li>Responsible for following the air quality procedures and requirements indicated in construction and operational sections of this AQMP.</li> </ul>

Some of the environmental and social management plans include:

#### **Groundwater Management Plan (GWMP)**

- The Project Implement Unit (PIU) will establish and enforce spill prevention measures following industry best practices.
- Procedures for spill clean-up, sewage handling, and treatment will be implemented.
- Regular training sessions for project personnel on spill response protocols will be conducted.
- Chemicals and fuels will be stored in designated areas equipped with containment structures.
- Emergency spill response equipment will be stationed strategically.
- Parameters such as pH, heavy metals, and other contaminants will be analyzed to ensure compliance with water quality standards.
- Ongoing monitoring of groundwater abstraction during the operational phase will be a priority.
- Flow meters will be installed to accurately measure abstraction rates and detect any anomalies promptly.

#### **Surface Water Management Plan (SWMP)**

- The Project Implement Unit (PIU) will institute stringent procedures to prevent surface water contamination, including spill response, sewage handling, and treatment protocols aligned with industry best practices.
- Adequate storage facilities for chemicals and fuels will be established, equipped with containment structures to prevent any potential runoff into adjacent surface water bodies.
- Regular training sessions will be conducted for project personnel to enhance their awareness of spill response and prevention measures.
- Community awareness programs will be organized to educate local populations about potential impacts on surface water, encouraging their active participation in safeguarding water quality.
- Monitoring stations strategically placed will track water flow, turbidity, temperature, and other relevant parameters, ensuring timely identification of any deviations from baseline conditions.
- The Environmental Compliance Officer will coordinate ongoing community engagement activities, facilitating dialogue with local communities to address concerns and provide regular updates on monitoring results.



- Public information campaigns will be conducted to ensure communities understand the importance of their role in preserving surface water quality.
- Emergency response drills and simulations will be conducted periodically to test the effectiveness of response mechanisms.

#### **Biodiversity Management Plan (BMP)**

- Direct Loss and Degradation of Habitat, through infrastructure and possible increased human influx.
- Loss of threatened Faunal Species, through inappropriate development of infrastructure and cultural alterations
- A Biodiversity Protection Statement to conserve plants and animals will be developed, and made applicable to all staff, contractors and other personnel associated with the Project.
- Maintenance of floral and faunal Species inventory.
- Implement an Animal Rescue Plan.
- Develop and Implement Awareness Programmes focused on Biodiversity

#### **Social-cultural Management Plan (SMP)**

- Develop and implement community relations and engagement plan.
- Plan activities in recognition of indigenous cultural activities.
- Provide accommodation for some construction workers (not from surrounding communities) to minimise pressure on existing infrastructure.
- Specify and implement the behaviour standards expected from all construction workers. This shall be formalised in a code of conduct that shall be agreed to and signed by every employee and sub-contractor.

#### **Waste Management Plan (WMP)**

- Transport vehicles will cater for the type, class and quantity of waste being transported.
- Loading and unloading procedures shall be followed to avoid waste loss.
- Employees will be trained in the correct procedure to address accidents and emergencies.
- All transport vehicles will be equipped with suitable materials or equipment to contain, manage and remove accidental spillages.
- Vehicles carrying hazardous wastes shall be labelled appropriately.

#### **Soil Management Plan (SMP)**

- The Project Implement Unit (PIU) will implement stringent procedures to prevent soil contamination, including spill response protocols, proper waste disposal, and adherence to recognized industry standards.
- Storage areas for construction materials, chemicals, and fuels will be designed with containment measures to prevent accidental spills and runoff.
- Erosion control measures, such as the installation of sedimentation ponds and silt fences, will be implemented to minimize soil erosion and sedimentation during construction activities.



- Crop rotation and soil moisture management practices will be employed to maintain soil health and fertility.
- Regular soil sampling and analysis will be conducted to monitor key soil quality indicators, including nutrient levels, pH, and organic matter content.
- Monitoring stations may be established to track changes in soil conditions over time.

### **Management of Chance Find**

If during the construction, operations, or closure phases of this Project, any farmer, field worker, contractor, subcontractor, or service provider finds any artefact of cultural significance, work at the site of the find must cease. The find must be reported to the immediate supervisor, who will then inform the senior on-site manager.

### **Pest Management Plan (PMP)**

- Application of pesticide or insecticide on infested spots of the rice plant to avoid damage and reduce contamination of soil.
- Training their staff on the best Pest control management techniques on how best to use pesticides and insecticides.
- Recommendation bio-pesticides, such as extract of neem seed oil, for controlling Brown plant hopper, Rice bug and Rice Stem Borer.

### **Health, Safety, Security and Environmental (HSE) Plan**

- Establishment of a well-equipped site Medical Clinic;
- Establishment of an on-site Health, Safety and Environment (HSE) Manager;
- Provision of site Medical Practitioners;
- Provision of a standby emergency Evacuation Vehicle (Ambulance).
- The security, safety, health, and environmental performance shall be monitored in accordance with the project and corporate procedures and reported to the project management team.
- Monthly/Quarterly audits shall be executed.
- Monthly reports shall be prepared on health, security, environment and safety performance along incidents and corrective actions undertaken.
- Conduct sensitization on STD to local farmers and workers.
- Implementing safe practices provide regular testing, and fostering open communication is essential for risk management.

Some of the key ESMP implementation indicators to monitor include:

- i. Compliance with Regulatory Standards
- ii. Environmental Performance
- iii. Social Performance
- iv. Stakeholder Engagement



## v. Incident Reporting and Response

This project will also consist of three levels for the grievance Redress Mechanism (GRM):

- local (work site level);
- Project level; and
- National legal level.

The general process is that a complainant should first raise a grievance at the work site level. At this level the complaint will be addressed the traditional way; if it is not resolved at this level, it is referred to the Grievance Redress Committee (GRC) located at the Project Implementation Unit (PIU) to be addressed through the formal and administrative manner. Where traditional and administrative procedures fail to resolve the disputes, the aggrieved party can take the matter to the courts following the Constitution of The Gambia and other applicable national laws.

The estimated overall budget for the implementation of all environmental and social is USD 445,400 (30,233,752 Gambian Dalasi).

### ES7: GRIEVANCE REDRESS MECHANISM (GRM)

The proposed Grievance Redress Mechanism (GRM) of the project is presented in table below.

Structure	Responsible Grievance Redress Committee	Composition of Committee	Grievance Redress Committee Task	Location of the Committee
Level I: Local level or at the project site	Local Grievance Redress Committee (Local GRC)	Village head, the village development committee chairperson, the youth representative, the religious leader (imam), the women representative and the district chief as the chairperson of the local committee	<ul style="list-style-type: none"> <li>• Receive and register a grievance/complaint at the site.</li> <li>• Investigate and internally review the grievance/complaint.</li> <li>• Propose a resolution for the grievance/complaint.</li> <li>• Report the grievance/complaint and proposed resolution to the regional level.</li> </ul>	Rice fields and work site for the new irrigation system
Level II: Regional level:	Regional Grievance Redress Committee (Regional GRC)	Members of the Technical Advisory Committee (TAC) (staff representative of the national institutions such as Department of Agriculture, Department of Forestry, National Environment Agency,	<ul style="list-style-type: none"> <li>• Establish a procedure for receiving and logging complaints.</li> <li>• Resolve disputes and verify grievances and their merits.</li> <li>• Communicate decisions to complainant and provide necessary documentation.</li> <li>• Implement and monitor redress actions.</li> <li>• Record grievances, categorize them, and prioritize those to be</li> </ul>	Regional Governor's Office



Structure	Responsible Grievance Redress Committee	Composition of Committee	Grievance Redress Committee Task	Location of the Committee
		Ministry of Youths and Sports, Ministry of Gender, Women and Children Department of water resources, Department of livestock and the security forces etc.) Headed by the Regional Governor	resolved by the Committee. <ul style="list-style-type: none"> <li>• Maintain records, including registers, meeting minutes, and correspondence, for reference and inspection.</li> <li>• Document all received complaints and the progress of remediation for future reference.</li> <li>• Report to the National Level where grievances cannot be handled at the Regional level.</li> <li>• Provide update grievances on regular basis to the REWARD CPCU.</li> </ul>	
Level III: National Level	The Gambian Judiciary and Courts	National Legal structure	Arbitrate between Project and complainant as the last resort in the grievance redress process	Law courts

## ES: CONCLUSION AND RECOMMENDATIONS

The field samplings and detailed laboratory analyses based on the fieldwork of the ESIA study of the proposed Regional Rice Resilient Value Chains Development (REWARD) Program were conducted in accordance with the required Local, National (NEA) and international (AfDB) standards. The baseline data gathered were used to characterize the project environment. Based on the results obtained from the fieldwork, key environmental sensitivities were identified within the project area in terms of the natural environment and the socio-cultural characteristics that may be impacted by the project.

Overall, the results, analyses, and interpretations were used to identify all potential environmental impacts that may result from the proposed activity. With the impact prediction, therefore, appropriate mitigation measures and environmental management/monitoring plans have been proffered.

From the results and the predicted associated impacts of the project, the proposed REWARD program in the Upper River Region (URR) could be carried out successfully with minimal environmental effects if all the identified mitigation measures proposed in the report are applied and the suggested monitoring requirements are complied with.

### *Recommendations*

The CPCU and PIU shall follow the principles/ precepts/ guidelines of the NEA and AfDB and others as listed in this ESIA report. All mitigation measures shall also be carried out promptly to avoid accumulation/backlog of appropriate measures. The PIU shall ensure that the members of the host communities are carried along if and where required to avoid any unrest.





## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Project Background**

The Gambia's economic recovery, evidenced by a projected growth of 5.2% in 2023 and 5.6% in 2024, underscores resilience despite challenges like the impact of the Covid-19 pandemic, Russia's invasion of Ukraine, and seasonal flooding. However, high inflation, particularly in food and fuel prices, has exacerbated food insecurity and poverty rates. Recognizing agriculture as pivotal for economic stability, the National Development Plan (NDP) emphasizes its role in poverty reduction.

The Green Recovery-Focused NDP (2023-2027) outlines Gambia's development priorities, aligning with Agenda 2030 and the African Union Agenda 2063. The Regional Rice Resilient Value Chain Development Program (REWARD) significantly contributes to three NDP strategic priorities: stabilizing the economy, modernizing agriculture, and empowering the private sector. With rice as a flagship value chain, REWARD aligns with SDGs 1, 2, 10, and 13, addressing food security, employment, inclusive growth, and climate resilience.

The project aligns with the Bank's Country Strategy Paper (CSP) 2021-2025, emphasizing agricultural value chain modernization for inclusive growth. REWARD, fully aligned with the Bank's strategic frameworks, addresses key outcomes of the Feed Africa Strategy, Jobs for Youth Strategy, Gender Strategy, and Fragility and Resilience Strategy. Moreover, it supports climate-smart agriculture, reflecting the Bank's commitment to climate change and green growth.

The program is integral to the Gambia Agriculture and Food Delivery Country Compact, presented at the Feed Africa High-level Summit (DAKAR 2), and is considered a key output from the Gambia Delivery Compact. Leveraging resources earmarked for Phase II of the Rice Value Chain Transformation Project (RVCTP-II), the REWARD responds to the Rice Self-Sufficiency Initiative for West Africa, championed by the Bank President. It builds on gains from RVCTP-I, aligning with the National Rice Development Strategy (NRDS II, 2022-2030) and the Continental Investment Plan for Self-Sufficiency in Africa (CIPRiSSA, 2019-2029) to achieve rice self-sufficiency in Gambia by 2030.

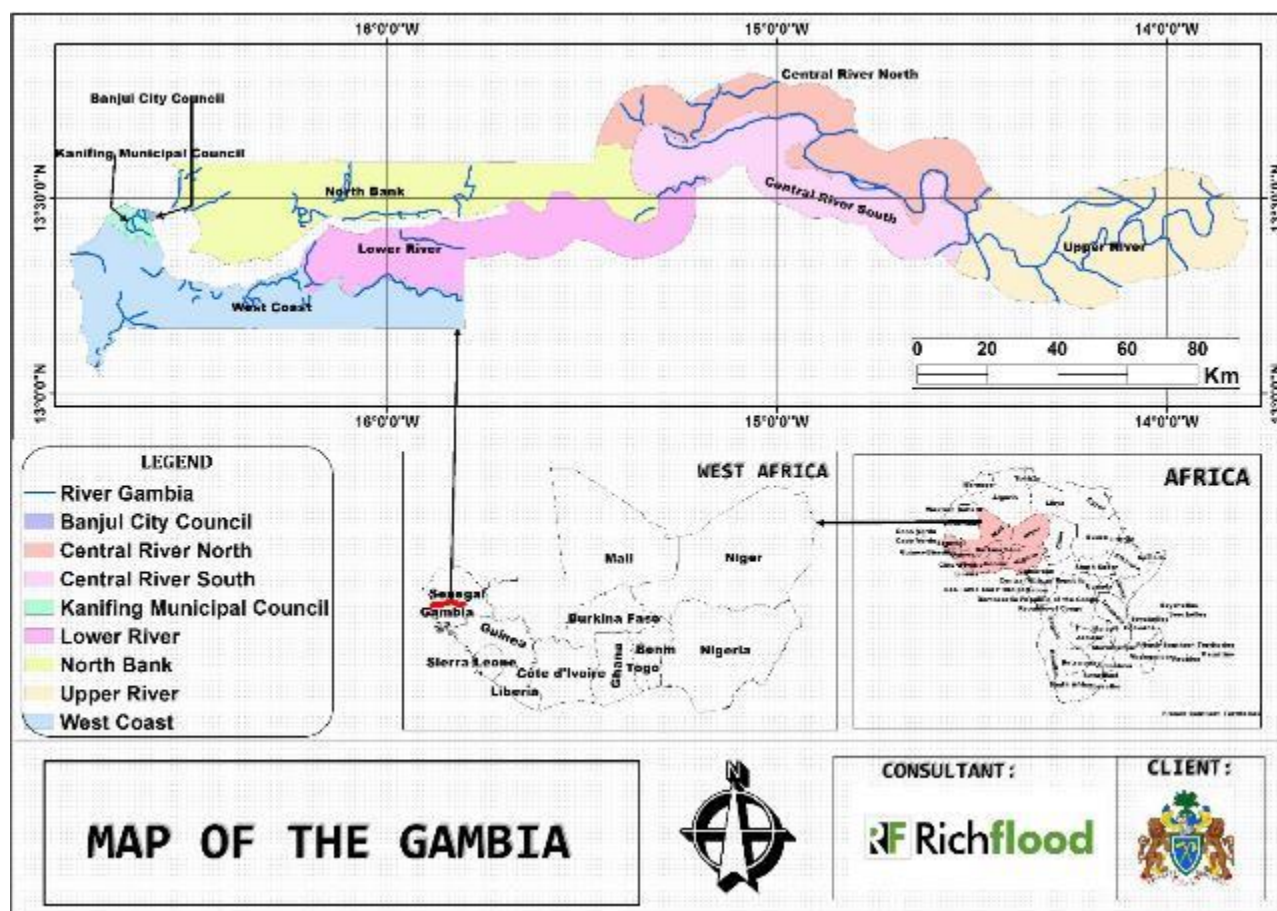
The program's development objective is to attract investment, upscale successful models, and enhance rice productivity, production, processing, and marketing. Aimed at bridging the rice



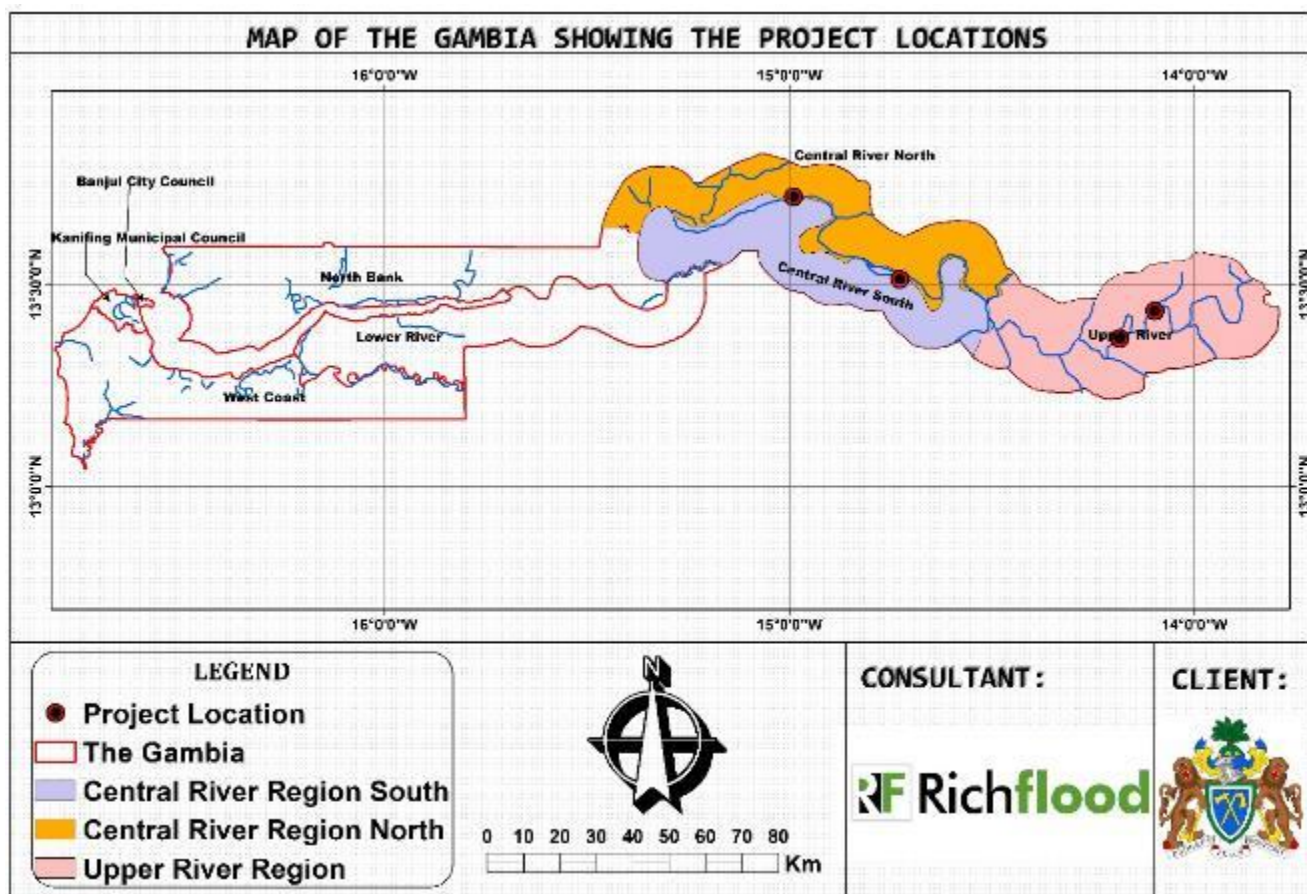


self-sufficiency gap, reducing imports, and creating employment, especially for youth and women in the ECOWAS region by 2028, specific objectives include boosting rice productivity, improving land and water management, mechanization, extension services, promoting value addition, marketing, and local consumption. REWARD, a private-public sector-driven intervention, addresses critical areas like access to land and water, seed and mechanization services, and commercial rice production intensification.

The Ministry of Agriculture (MoA), in collaboration with the African Development Bank (AfDB) and the Government of The Gambia (GoTG), proposes the implementation of the Regional Rice Reliant Value Chains Development (REWARD) Programme. The Central Project Coordinating Unit (CPCU) of the MoA will oversee the project implementation through a dedicated Project Implementation Unit (PIU). The project will be executed in the rice fields and valleys of the Upper River Region (URR) to bolster the development of irrigation channels, mechanization, and capacity improvements for farmers. The locational map of the Gambia and the Project Sites at the Upper River Region (URR) is depicted in Figure 1.1 and Figure 1.2.



**Figure 1.1: Locational Map of the Gambia**  
Source: Richflood GIS Unit, 2024



**Figure 1.2: Map of The Gambia highlighting the Project Areas**

Source: Richflood GIS Unit, 2024

## 1.2 ESIA Consultant

The Ministry of Agriculture appointed Richflood Limited as the consultant to carry out the Environmental and Social Impact Assessment (ESIA) and develop Pest and Pesticides Management Plan (PPMP) for the proposed project. Richflood is an African Indigenous Company established in 2009, with its headquarters in Abuja, Nigeria. Richflood also has partnerships in the United Kingdom and the United States of America. Richflood is a leading continental provider of Environmental and Social Due Diligence (ESDD), Environmental and Social Impact Assessment (ESIA), and Environmental, Health, and Safety (EHS) services for investments in Africa serving public and private sectors.

## 1.3 Rationale and Need for Regional Rice Reliant Value Chains Development (REWARD) Programme

The proposed program aligns with the National Rice Development Strategy (NRDS II, 2022-2030) and the Continental Investment Plan for Self-Sufficiency in Africa (CIPriSSA, 2019-



2029), which seeks to attain rice self-sufficiency in Gambia by 2030. The REWARD is considered by the Gambian Government as one of the key projects to be implemented as an output of the implementation of the Gambia Delivery Compact. Prior to the Dakar 2, the Government of Gambia had submitted a request letter to the Bank for the Phase II of the Rice Value Chain Transformation Project (RCVTP-II, subsequent to which a Project Concept Note (PCN) was developed. The Gambia Government bought into the initiative by the Bank and leveraged additional resources including those earmarked for Phase II of the RVCTP for the REWARD. It is a culmination of the successful gains from the RVCTP-I and as a response to building a resilient food system for Gambia's staple commodity, rice, against future shocks and towards rice self-sufficiency.

The main objective of the REWARD program is to help attract more investments and upscale successful models with the view to increasing rice productivity, production, processing and marketing, bridging the rice self-sufficiency gap, reducing import bills, and creating gainful employment, particularly for women and the youth within the ECOWAS region by 2028, with increased regional networking and cross-border market opportunities.

The Gambia REWARD Program is very crucial in ensuring food sufficiency, economic empowerment of farmers and the overall national economy. The project will be executed in communities situated in the rice fields and valleys of the Upper River Region (URR).

## **1.4 Scope and Objectives of the ESIA**

### **1.4.1 Scope of ESIA**

This ESIA report covers the following component of the Regional Rice Resilient Value Chains Development (REWARD) Programme at the Gambia:

- *Infrastructure Enhancement*: Turnaround maintenance, overhauling, and rehabilitation of existing irrigation infrastructure. Resizing of main canals, concrete lining, fixing of gates, and construction of a perimeter protection dike. Levelling of rice fields and construction/rehabilitation of waiting sheds;
- *Production Support*: Land development, preparation, provision of seeds, and use of agrochemicals (fertilizer and pesticides);
- *Mechanization*: Provision of tractors and combine harvesters;
- *Post-Harvest Management*: Construction of drying floors and renovation of seed stores.

This ESIA is aimed at addressing the following lender requirements:

- ❖ International Standards and Guidelines:



- African Development Bank (AfDB) Integrated Safeguards Systems (ISS)
  - African Development Bank's Operational Safeguard
  - AfDB Civil Society Engagement Framework (2012)
  - The African Development Bank's Integrated Safeguards Policy (ISP);
  - The African Development Bank's Agriculture and Rural Development Policy (ARDP);
  - The African Development Bank's Integrated Water Resources Management Policy (IWRMP);
  - The African Development Bank's Integrated Environmental and Social Impact Assessment Guidelines
  - International Finance Corporation (IFC) Performance Standards;
  - World Bank Group (WBG) General Environmental Health and Safety (EHS) Guidelines;
  - EHS Guidelines - Food and Beverage Processing, 2007;
  - EHS Guidelines: Environmental Air Emissions and Ambient Air Quality, 2007;
  - IFC Good Practice Handbooks and Notes:
  - IFC Good Practice Note Addressing Grievances from Project-Affected Communities;
  - Good Practice Note: Managing Contractors' Environmental and Social Performance
  - All International Labour Organisation (ILO) conventions signed and ratified by the Gambia, all ILO conventions covering core labour standards, and all ILO conventions covering the basic terms and conditions of employment;
- ❖ Good Practice Guidance
- Good International Industry Practice (GIIP);
  - Stakeholder Engagement: A Good Practice Handbook for Companies doing Business in Emerging Markets;
  - Good Practice Note on Contractor E&S Management;
  - IFC's / EBRD Worker Accommodation: Processes and Standards
  - IFC's Use of Security Forces: Assessing and Managing Risks and Impacts;
  - UN Voluntary Principles on Security and Human Rights;
  - Good Practice Note: Managing Risks Associated with Modern Slavery; and
  - Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector.





### **1.4.2 Objectives of the ESIA**

The overall objective of this ESIA study is to ensure that environmental and social considerations of the Project are considered during decision making for environmental sustainability. The specific objectives of the ESIA are:

- Identification and assessment of the potential environmental and social impacts of the project activities, (including the different stages- design, construction, operation and routine maintenance).
- Identification of all potential environmental and social impacts as well as actions to mitigate negative impacts on Gender-related issues
- Identification of all potential climate change risks and impacts, including collection of baseline climate information to climate-proof the project, and a recommendation of key climate change adaptation and mitigation measures to off-set the identified climate risks
- Preparation of an Environmental and Social Management Plan (ESMP) in line with the AfDB ISS and the National Environment Agency (NEA) requirements, and to ensure that project-affected persons are meaningfully consulted and given opportunities to participate in the project decision-making process to maintain credibility of the Project developers and funders.

### **1.5 Study Methodology**

The ESIA Report has been prepared using an integrated approach, where data and information evaluation, field investigations, consultations among the team of experts, interviews and discussions with relevant stakeholders and affected peoples were undertaken the methodology adopted for the ESIA study is briefly described in the following paragraphs:

#### *Literature Review*

The study was initiated with an intensive document and literature review on the proposed developments to be undertaken for the REWARD Project. This consisted of the review of relevant national policies and legislation, AfDB Operational Policies, relevant international conventions, and treaties to which The Gambia is a Party, among others. The legislation and policies reviewed have guided the ESIA study to identify the legal scope of the process and ensure that the issues highlighted are given due consideration during the study.

#### *Field Visits and Scoping*

Extensive field visits were conducted at the proposed project sites, where the physical



evaluation of the proposed sites focused on the biophysical and socio-economic aspects. These included:

- Existing rice fields at each of the proposed intervention sites
- Office of the Governor of Upper River Region
- The Regional Agricultural Director (RAD) of the Upper River Region
- The communities within the project's area of influence

During the visit to above-mentioned sites, the team made a physical evaluation, assessment and focused on the biophysical and socio-economic aspects which included sensitive environmental and social receptors, biodiversity, land use and development trends, hydrology, physiographical features, and climatic conditions in the proposed sites.

The visits provided the opportunity to analyze possible alternatives, and possible methodologies, among other issues, in order to reduce the negative environmental and social impacts. The field visits will also assist to:

- Define and locate precise the borders/limits of the Project areas of influence.
- Assess the current state of the environment.
- Identify the activities of economic operators likely to be affected by the Project.

### ***Consultations***

During field visits, consultations were undertaken using mainly unstructured methods, which included public meetings, focus group discussions, and individual (one-to-one) meetings. The socio-economic status was also assessed through organized consultative meetings at the administrative and community levels to collect perceived information on the impacts associated with the biophysical and socio-economic dimensions of project implementation. Meetings and consultations were held with Government institutions, parastatals and association such as National Environment Agency (NEA); Department of Forestry (DoF); Department of Water Resources (DWR); National Farmers Forum; Department of Parks and Wildlife Management (DPWM); Representatives of the Upper River Region (URR); Central Project Coordinating Unit (CPCU); Soil and Water Management Services (SWMS) of the Department of Agriculture, Agricultural Engineering Services (AES), Plant Protection Service (PPS), National Agency for Women Farmers Association (NAWFA), Gambia Department of Labour, Ministry of Employment, National Farmers Platform (NFP), Rice Farmers Cooperative Society. NGOs, CBOs and private sectors were also consulted.

The details of the consultation are presented in chapter 6 and Annex 1 of this Report.

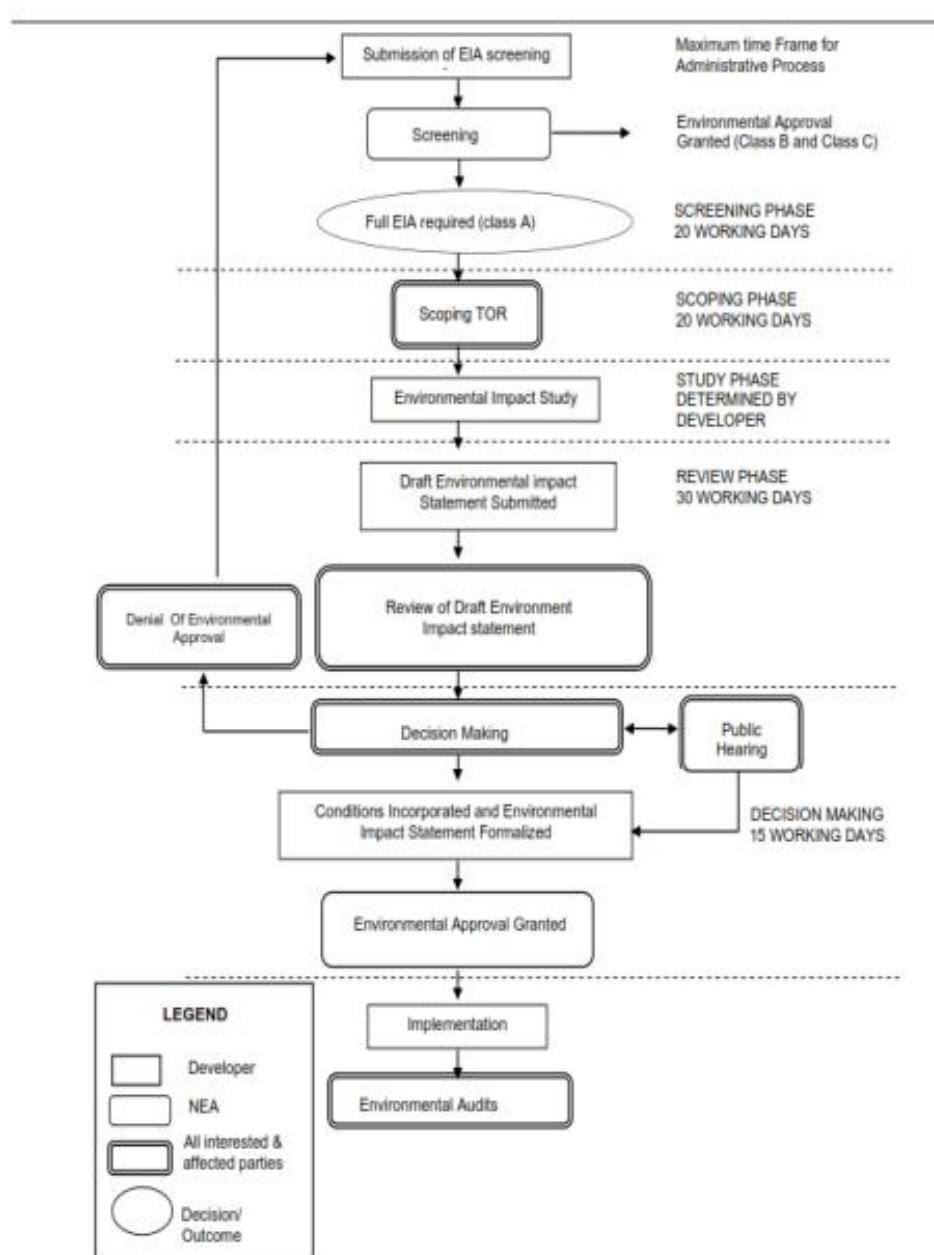


## Impact Assessment

The impact assessment phase consists of an analysis of potential sources of impacts arising from the Project, together with an analysis of the sensitivity of the receiving natural and human environment. This draws from data captured through:

- baseline studies (to determine the sensitivity of the receiving environment); and
- interactions with the Project team, to develop a Project description, analyze how the Project may generate sources of E&S impacts, and (where relevant) analyze feasible alternatives to the Project.

The overall impact assessment (IA) approach is illustrated in Figure 1.3.



**Figure 1.3: The Gambian National Environment Agency (NEA) ESIA Process**



Impact assessment is designed to ensure that decisions on Projects are made in full knowledge of their likely impacts on the environment and society, but as important to identify measures that can be taken to ensure impacts are as low as technically and financially feasible.

For impacts that are initially assessed during the ESIA process to be of Major significance, a change in design is usually required to avoid, reduce or minimize these, followed by a reassessment of significance. For impacts assessed during the ESIA process to be of Moderate significance, where appropriate the discussion explains the mitigation measures that have been considered, the one selected and the reasons (e.g. in terms of technical feasibility and cost-effectiveness) for that selection. Impacts assessed to be of Minor significance are usually managed through good industry practice, operational plans and procedures.

The ESIA is intended to help decisions on projects to be made in full knowledge of their likely impacts on the environment and society. As noted below, the residual impacts and their significance reported in this report are based on the proposed development as described, i.e. inclusive of all proposed mitigation.

### ***Mitigation Measures***

- Avoidance at source: Develop the project such that the characteristic causing an impact is eliminated at the design stage (elimination of waste materials flow, for example).
- Reducing at source: Modify the design of the project or operational procedures to reduce the impact. For example, measures used to process effluent and waste materials fall into this category.
- Reducing at the receptor level: If an impact cannot be reduced on-site, measures can be implemented off-site (e.g. noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals from straying onto the site).
- Repairing or correcting: Some impacts imply damage to a resource that is unavoidable (e.g. loss of agricultural land and forestry due to creating access, work camps or materials storage areas). Repair mainly involves restoration and re-establishment type measures.
- Compensation in kind: When other mitigation methods are either not possible or are not entirely efficient, compensation can be adapted, to a certain extent, to losses (e.g. planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

### ***Environmental and Social Management Plans***

After conducting an analysis of impacts and identifying appropriate mitigation measures, these findings can be consolidated within a management plan. This plan serves as a comprehensive





framework for addressing environmental and social impacts throughout the project's lifecycle. Stakeholder engagement is integral to the entire ESIA process, starting from early screening and scoping phases, all the way through to the establishment and implementation of management plans. This allows for:

- informing stakeholders on the Project;
- collecting appropriate information on the baseline environment;
- understanding the concerns and expectations of various stakeholders with regards to the Project, so that these can be accounted for in the ESIA, and addressed in the impact assessment and mitigation phase; and
- supporting the Project's public acceptance process by demonstrating an appropriate level of consideration of stakeholders' input in the Project's plan for managing environmental and social aspects.

## **1.5 Assumptions and Limitations**

This report is based on the following assumptions and limitations:

- As part of the assessment, a dry season field investigation was conducted during the last week of January and first week of February, during which seasonal variations in the various taxonomic groups, including migratory faunal species and flowering season of flora species could not be accounted for. A more comprehensive assessment would require that assessments take place in the dry and wet seasons;
- The limitations due to the seasonal and time constraints during the field assessment were accounted for by comparing the site observations with desktop literature;
- Due to the nature of sampling and the secretive habits of most faunal taxa, it is unlikely that all species would have been observed during the field assessment coupled with the limited duration during the dry season. Some species and taxa within the footprint area may therefore have been missed during the assessment.

## **1.6 ESIA Study Team**

The Richflood ESIA team is largely made up of staff from Richflood's Nigerian offices, as well as RVCTP team from The Gambia. The key team members and their roles are outlined in Table 1.1 below. Richflood is the overall Project manager for the ESIA process and has provided reporting expertise, given insight on interpretation of the relevant guidelines and standards, and coordinated liaison with the client's project team.



**Table 1.3: Team Members**

Name	Role	Qualifications
<b>Project Management Team</b>		
Comfort Asokoro-Ogaji	Environmental Lead/Quality Assurance, Environmental and Social Safeguards Expert	Principal Environmental Scientist; PhD Environmental Resource Management; FIEMA
Adeola Adewale-Olajugbagbe	Project Manager, Environmental Assessment Practitioner, Integrative writer	Principal Environmental Scientist, PhD. Ecology and Environmental Science, MSc. Environmental Control and Management
Mofoluso A. Fagbeja	Air Quality/GIS Expert	Principal Scientist, PhD. Air Quality Management, MSc. Geographical Information System
Sunday Ojo	Air Quality and Noise Impact Assessment, Integrative writer, GIS	Environmental Scientist, Air Quality and Noise, BSc (Hons).
Oye Ideki	Climate Change expert	Principal Scientist, PhD. Climatology, MSc. Hydrology and Environmental Management,
Emuobonuvie, Amy, Emerhi	Forester/Agricultural specialist	Principal Scientist, PhD Forestry
Ukeme Yellow	Biodiversity Survey and Impact Assessment, Integrative writer	Environmental Scientist and Biodiversity specialist, MSc (Wildlife Management)
Salami Michael	Environmental Assessment Practitioner, Integrative writer	Environmental Scientist, MSc (Wildlife Ecology and Management)
Ignatius Ani Madu	Socio- Economist	Senior Social Scientist, PhD Rural Geography, M.Sc. Geography, BSc Geography
Eke, Mary Unoh	Socio-economist and Gender	Social Scientist, BSc (Hons). Sociology
Rita Babatunde	Social and Economic Impact Assessment, Stakeholder Engagement specialist	Social Scientist, M.Sc (Guidance and Counselling)
Ishaya Joel	Social Impact Assessment	Social Scientist, BSc (Hons). Geography
Isinguzo Nnadozie Sunday	Microbiologist / Soil Scientist	Principal Scientist, PhD Microbiology, MSc Soil Science
Nse Michael	Environmental Assessment Water Resources	Environmental Scientist and Analyst, BSc (Hons)
	Environmental Assessment	Environmental Scientist and



Name	Role	Qualifications
Daniel Eric	(Soil)	Analyst, BSc (Hons)
Prince Ijioma	Project Management Office (Admin)	Business Administration, BSc (Hons)
<b>Support Staff</b>		
<ul style="list-style-type: none"> <li>• Mariam Adebimpe</li> <li>• Adesuyi O. Adeteye</li> <li>• Ognenenyore Erhurhu</li> <li>• Anthony Ahweyevu</li> </ul>	Social, Economic, Gender and Child Labour Impact Assessment  Management Plans	BSc (Hons)
<b>RVCTP Team</b>		
<ul style="list-style-type: none"> <li>• Ebrima Ceesay</li> <li>• Lamin Camara</li> <li>• Ansmama Njie</li> </ul>	Field project coordination team	Social Safeguard Officer Environmental and Social Safeguard Agronomist

### 1.6.1 Site Surveys and Specialist Studies

The ESIA included site surveys undertaken from 22<sup>nd</sup> January to 5<sup>th</sup> February, 2024 to cover a number of baseline studies in the project's area of influence for the project. Where relevant, the results of the monitoring are reported in this report. Richflood provided a team of specialists to conduct the fieldwork for all of the studies. The following specialist studies were conducted as part of ESIA:

- Air quality – baseline measurements;
- Biodiversity (terrestrial) – field investigation and desktop assessment;
- Groundwater – desktop and baseline measurements;
- Noise – baseline measurements;
- Socioeconomic including gender assessment and child labour impact assessment – household surveys and detailed assessment;
- Surface water – Desktop and baseline assessment;
- Weather and Climate – desktop and baseline measurements

Where standalone specialist study reports have been compiled, these are attached as appendices and are integrated into the body of the ESIA report.

### 1.7 Structure of the Report

This report is divided into nine chapters:



**Chapter 1: Introduction** – Introduces the project and the scope of this report.

**Chapter 2: Institutional and Regulatory Framework** – Provides the legislative and regulatory context for the project based on the relevant national and international requirements and guidelines

**Chapter 3: Project Description** – Describes the various elements of the proposed project, including the processing plant and associated facilities

**Chapter 4: Environmental and Social Baseline** – Gives an overview of the affected biophysical and socio-economic environment in the area of the project.

**Chapter 5: Analysis of Project Alternatives** – Outlines the analysis of alternatives for the proposed project.

**Chapter 6: Stakeholders Engagement** – Describes the process of public consultation and disclosure adopted for the project and summarise the issues raised during such consultations. Also describes the mechanism for recording and addressing grievances raised by the public and stakeholders

**Chapter 7: Potential Environmental and Social Impacts** – Describes and rate the significance of the potential impacts identified, both before and after the successful implementation of the recommended mitigation measures.

**Chapter 8: Environmental & Social Management Plan (ESMP)** – Provides the recommended mitigation and management measures to mitigate negative impacts and enhance positive ones, for each phase of the project. Provides a plan for ongoing monitoring and management of environmental impacts, specifying timeframes, reporting requirements and responsibility for each measure.

**Chapter 9: Summary and Conclusions** – Summarises the key findings of the ESIA

**References**

**Appendixes**



## CHAPTER TWO

### LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

#### 2.1 General

This chapter provides an overview of the legal, regulatory, and institutional framework pertinent to environmental management policy, Environmental Impact Assessment (EIA) legislation and procedures in the Gambia, and the Integrated Safeguards System (ISS) of the African Development Bank triggered by the project. Additionally, it outlines relevant international conventions, treaties, and protocols ratified by the country, as well as the African Development Bank's (AfDB) Operational Safeguards policies and standards that will guide the development and implementation of the Environmental and Social Impact Assessment (ESIA).

The specific objectives of the regulatory framework review include:

- Identifying policies, acts, and regulations relevant to environmental, health, safety, human rights, and social aspects of the project and the conduct of the ESIA.
- Identifying environmental standards prescribed under national legislation pertinent to the project, such as pollution control, waste management, wastewater discharge, and air emissions.
- Identifying international conventions, treaties, and protocols to which The Gambia is a signatory that are relevant to the project.
- To identify the African Development Bank's Operational Safeguards policies and standards that are relevant to the Project

#### 2.2 The Relevant National Policies

The relevant national policies that will guide the project implementation are given in Table 2.1.

**Table 2.1: Relevant National Policies**

Policy	Description	Relevance to the Project	Focal Institution
Gambia Environment Action Plan, GEAP (2021-2030)	The principal environmental and natural resources policy in the country that aims to achieve integrated environment and natural resources management	Provides guidance in General environmental planning and natural resources management	National Environmental Agency (NEA)
The Agriculture and Natural Resources Policy	The Policy aims to reduce poverty, enhance food, income, and nutrition	The policy ensures sustainability development which is the	Department of Agriculture



<b>Policy</b>	<b>Description</b>	<b>Relevance to the Project</b>	<b>Focal Institution</b>
(ANR 2017-2026)	securities through the optimal utilization of the resources of the sector consistent with safeguarding the integrity of the environment.	priority of the proposed project. This leads to the enhancement of food and poverty reduction.	
National Climate Change Policy (2016 – 2025)	The policy provides the framework for managing climate risks, building institutions, capacities, and opportunities for climate-resilient development	Project investments will potentially be impacted by climate change. Thus, need to put in place sound and equitable adaptation and mitigation measures to reduce vulnerability to climate change impacts, and reduce greenhouse gas emissions, to achieve sustainable agricultural activities	Department of Water Resources
The National Health Policy, (2021-2023)	Protects public and environmental health including nuisance and other risks associated with this Project	Relevant to the Project since dust, noise and other risks can be associated with the Projects activities such as field development using tractors, rehabilitation and construction of irrigation systems and other infrastructure	Department of Health Services
National Malaria Policy, 2020–2025	The National Malaria Policy provides a framework for the eradication of malaria	Relevant to this project since this policy will provide the guiding principles and basis for effective interventions to meet 2020 malaria elimination stage.	Ministry of Health and Social Welfare
The National Biodiversity Strategy and Action Plan (NBSAP), (2015- 2020)	The NBSAP provides the framework for the conservation and sustainable use of biodiversity	Relevant to the REWARD project as it provides a framework for integrating biodiversity conservation and sustainable use into the project's sustainable, climate-resilient rice	Department of Parks and Wildlife Management (DPWM)



Policy	Description	Relevance to the Project	Focal Institution
		production systems.	
National Policy for the Advancement of Gambian Women and Girls (1999-2009)	Policy provides a legitimate point of reference for addressing gender inequalities at all levels of government and all stakeholders	Relevant to this Project since it will benefit both men and women equitably.	Department of Social Welfare
Gambia National Gender & Women Empowerment Policy (2010–2020)	To mainstream gender in national and sectoral planning and programming to ensure equity and equality	Women will be consulted widely, and will be involved in the local monitoring and evaluation process during project implementation	Ministry of Gender and Women's Affairs
National Development Plan (2023-2027)	This is the principal national Policy blueprint that provides the overall direction for the country from 2018-2021. It emphasizes priority areas for development within this planned period	The project aims to propel the rice sector towards a market-driven, commercialized model, fostering private sector engagement in production, processing, and marketing. This aids in the improvement of the national economy and improved livelihoods	Office of the Vice President
Fisheries Policy	The policy aims to achieve, among others, a rational and long-term utilization of fish resources; the use of fish as a means of improving the nutritional standards of the population; increasing employment opportunities in the sector; increasing foreign exchange earnings	The Project will potentially make use of water bodies in the region for irrigation purposes which could impact fishery resources.	Department of Fisheries
Development Control Regulations, 1995	This further prescribes the requirements for development control.	All planning and construction phases of the Project must consider these Regulations.	Department of Physical Planning and Housing
Forestry Policy (2010-2019)	The policy was aimed at improving the living	The Project must ensure that forest resources are	NEA





<b>Policy</b>	<b>Description</b>	<b>Relevance to the Project</b>	<b>Focal Institution</b>
	standards of the citizenry through poverty reduction and forest resource enhancement initiatives.	well protected and managed during all phases.	
National Adaptation Plan of Action (NAPA) on Climate Change (2007)	The policy is a multi-sectoral national policy that aims to address urgent and significant climate threats through actions that deliver immediate adaptation benefits, contribute to building local and national adaptive capacities, and create awareness and build foundations for maximizing long-term adaptation benefits.	The project aimed at improving the commercialization of the rice sector and the critical need for the expansion of rice production to ensure sufficiency and support the national economy. To reduce the impacts of climate change, new technologies will be introduced and practices that would help adapt to the changing climate and improve yields.	Ministry of Environment, Climate Change and Natural Resource (MECCNR); Department of Water Resources
National Social Protection Policy 2015-2025 (NSPP)	The policy is to contribute towards alleviating poverty and vulnerability in the country, in line with the Government of The Gambia's Vision and National Development Plan.	This policy is relevant to the project. It is to facilitate the reform of the national social protection system by ensuring more efficient and effective use of resources, strengthened management and administrative systems, and progress towards a more inclusive form of social protection that makes basic income and social services available to The Gambia's poorest and most vulnerable people.	Department of Social Welfare
Strategic Environment Assessment (SEA) Policy 2016 – 2021	The SEA aims to integrate environmental and broader sustainability factors into national and regional policies, plans, and programs. The SEA policy aims to	This is relevant as it applies when developing policies, plans, or programs in all sectors, including agriculture.	NEA





Policy	Description	Relevance to the Project	Focal Institution
	ensure environmental sustainability.		
The National Nutrition Policy 2010-2020	The policy has several objectives, including reducing the morbidity and mortality rates related to iron deficiency anaemia in all age groups, improving the food control system in The Gambia, and promoting optimal infant and young child feeding practices.	This is relevant to the project as it is centred on agriculture, leading to good nutrition, which is a basic building block of human capital and, as such, contributes to economic development	Department of Health Services
The Gambia National Water Policy (2006)	It aims to maintain an equitable balance between universal access to water supplies and the needs of individual users, strengthen and develop human capital and build the economy of the country, and negotiate and discharge international responsibilities in a spirit of goodwill and cooperation.	The project is a water-intensive activity, and it is essential to manage water resources efficiently to ensure sustainable rice cultivation. The policy also emphasizes sustainable water resources management.	Department of Water Resources

### 2.3 Relevant National Legislation

The national legislations that will guide the implementation of the ESMP are given in Table 2.2.

**Table 2.2: National Acts and Regulations relevant to the Project**

Legislation	Interpretation of Legislation	Relevance to the Project	Enforcing institution
National Environment Management Act, NEMA, 1994	Principal legislation in Environmental management; Part V of NEMA provides for certain projects listed under Schedule A to be considered for EIA	The Project falls under Schedule A, requiring a full environmental and social impact assessment	National Environmental Agency (NEA)
Environmental Impact Assessment	The EIA Regulations elaborate on the requirements for the EIA	The Regulations provide more details about the development and	NEA



<b>Legislation</b>	<b>Interpretation of Legislation</b>	<b>Relevance to the Project</b>	<b>Enforcing institution</b>
Regulations, 2014	procedure, environmental impact statements, approval, environmental monitoring, and so on	implementation of the ESIA	
Environmental Quality Standards Regulations, 1999	Declare standards set out in Schedule 1 in respect of ambient air, saline waters, surface fresh waters and groundwater	The Project will likely generate pollution and nuisance that will need to be well-managed	NEA
Environmental Discharge (Permitting) Regulations, 2001	Require that a permit be obtained from the NEA for most discharges that have the potential to pollute the environment	The project will likely discharge hazardous waste during the construction of infrastructure and facilities and operation	NEA
Anti-littering Regulations, 2007	Address waste management and pollution issues concerning environmental health and hygiene	The Project must ensure that all waste produced during all phases is well managed and that indiscriminate dumping is avoided	NEA
Environmental Quality Standards Regulations (1999)	Require that a permit be obtained from the NEA for Noise and Excessive Vibration.	The Project must ensure that noise and vibration are within the permissible limit.	NEA
Biodiversity and Wildlife Act, 2003	Provides for the establishment of protected areas for the protection of in-situ and ex-situ biodiversity	The Project must ensure that biodiversity is well protected and managed during all phases.	DPWM
State Lands Act, 1990	Regulates land tenure and property rights as well as general land administration in state land areas.	All lands in URR are administered under this Act, which includes the Project site.	Department of Lands and Surveys
Physical Planning and Development Control Act, 1991	Ensure that developments in The Gambia are in line with land use planning and construction standards.	The Project construction activities need to be in line with national land use and planning rules	Department of Physical Planning and Housing
National Center for Arts and Culture Act, 2003	Act empowers the Center to assume control and preserve, restore any monument, cultural relic, ethnographical article, or	There is a possibility of finding cultural heritage by chance, particularly during land clearing. These may be	Ministry of Tourism and Culture



Legislation	Interpretation of Legislation	Relevance to the Project	Enforcing institution
	other article of archaeological, ethnographical, or historical relevance	disturbed or lost due to a lack of knowledge in managing cultural heritage discovered by chance	
Public Health Act, 1990	Protects public and environmental health including abatement of nuisances and conditions injurious to health.	Noise and other public health and safety risks associated with the project must be prevented or reduced. Health structures are also controlled under this Act.	Department of Health Services
Labour Act, 2007	Provides a legal framework for the administration of labour, recruitment and hiring of labour, and protection of wages.	The Project hiring and management of its labour force needs to adhere to this Act.	Department of Labour
The Children's Act, 2005	Sets out the rights and responsibilities of children and provides for their care, protection and maintenance.	Children must be protected against the impacts of the Project, including prohibition of access to construction sites, child labour and violence against children (VAC)	Department of Social Welfare
Women's Act, 2010	Aims to advance women's rights to promote their economic and social empowerment	Relevant to this Project, given the need to avoid gender-based violence (GBV) and sexual exploitation and abuse (SEA), Sexual Harassment during all phases	Ministry of Gender and Women's Affairs
Sexual Offences Act, 2013	Updates the law and procedures regarding the trial of rape, other sexual offences, and related matters.	This Act is relevant due to the need to protect vulnerable persons within the Project site and project-related activities against sexual offences as defined in the Act.	Department of Social Welfare
Gambia Roads Technical Services Authority Act, 2003	Created the National Roads Authority (NRA) to be responsible for the maintenance, construction, and safety of the national road network, and road reserves.	Relevant due to the need to upgrade the access roads to the rice field and main roads within the region	NRA



<b>Legislation</b>	<b>Interpretation of Legislation</b>	<b>Relevance to the Project</b>	<b>Enforcing institution</b>
Local Government Act (2002)	This act establishes the framework for the administration of local government authorities in The Gambia. It outlines the powers, responsibilities, and structure of local government bodies.	This Act facilitates collaboration between local authorities and rice farmers, aiding sustainable cultivation, resource access, and rural infrastructure development for rice production.	Ministry of Lands and Regional Government
Food Safety and Quality Act (2011)	This act regulates food safety and quality standards in The Gambia. It establishes mechanisms for ensuring that food products meet specified safety and quality criteria to protect public health.	This Act regulates handling, processing, and distribution to ensure safety standards, bolstering consumer confidence and market competitiveness through quality control measures.	Department of Health Services
Hazardous Chemicals and Pesticides Control and Management Act (1994)	This act governs the control, management, and regulation of hazardous chemicals and pesticides in The Gambia. It aims to safeguard human health and the environment from the adverse effects of these substances.	The Act regulates agrochemical use in rice farming to mitigate environmental and health risks, promoting safer pest management practices.	NEA
Hazardous Chemicals Regulations (1999)	These regulations provide detailed guidelines for the implementation of the Hazardous Chemicals and Pesticides Control and Management Act (1994). They specify procedures for the import, export, storage, handling, and disposal of hazardous chemicals and pesticides.	The Act provides detailed guidelines for the safe handling, storage, transportation, and disposal of hazardous chemicals used in rice production, safeguarding stakeholders and the environment.	NEA

## 2.4 The Institutional Framework for Implementing the Project

NEA, as the lead agency responsible for conducting Environmental and Social Impact Assessments (ESIA), oversees the entire EIA process and collaborates closely with the multi-sector EIA Working



Group to ensure effective implementation, and also advises the NEA Executive Director on the approval or otherwise of environmental impact statements. Table 2.3 below indicates the institutional framework relevant to implementing this Project.

**Table 2.3: Institutional framework relevant to the Implementation of the Project**

<b>Institutions/ Implementing Entity</b>	<b>Specific Roles and Responsibilities</b>	<b>Interests and roles in this Project Implementation</b>	<b>Level of intervention</b>
National Environment Agency (NEA)	The NEA enforces the NEMA (1994) and EIA Regulations (2014) and coordinates all multi-sector environmental issues	Evaluate the ESIA/ESMP; grant Environmental Approval for the Project; monitor the implementation to ensure compliance with environmental legislation and compliance with the ESMP	All phases of the Project, from planning and design to the construction and operation and decommissioning; conduct compliance monitoring for the ESMP
Department of Forestry	Management and conservation of forest resources	Ensures sustainable use of forest resources; evaluates impact on forests; advises on reforestation and conservation measures	Planning, design, and construction phases; monitoring during operation phase
Department of Water Resources	Management of water resources and regulation of water usage	Ensures sustainable use and management of water resources; evaluates water-related impacts; monitors water quality and availability	All phases of the project, from planning and design to construction and operation
Department of Agriculture	Development and implementation of agricultural policies and programs	Provides expertise on agricultural practices; supports sustainable agricultural development; advises on crop management and soil conservation	Planning, design, construction, and operation phases
Department of Labour	Enforces employment laws and combats child labour violations	Protection of employee rights; Protection against child labour; Response to complaints and reports such as accidents, abuse and discrimination at work	Construction, and operation phases
Ministry of	Promotion of	Ensures job creation and fair	Planning, construction,



<b>Institutions/ Implementing Entity</b>	<b>Specific Roles and Responsibilities</b>	<b>Interests and roles in this Project Implementation</b>	<b>Level of intervention</b>
Employment and Trade	employment opportunities and regulation of trade	trade practices; supports labour market development; advises on employment policies and trade regulations	and operation phases
Ministry of Gender and Children Affairs	Promotion of gender equality and protection of children's rights	Ensures gender considerations are integrated; protects the rights and welfare of children; addresses gender and child-related issues in the project	All phases of the project, with emphasis on planning, design, and construction to ensure gender and child protection measures are implemented
Ministry of Agriculture (REWARD Project Implementation Unit (PIU)/ Central Project Coordinating Unit (CPCU))	Review and validation of the ESIA report	Evaluate the ESIA/ ESMP; support and advise NEA on implementation of ESMP; collaborate with NEA during compliance monitoring. Responsible for coordinating the implementation of all activities of this Project, including the management of E&S safeguards.	All phases of the Project, from planning and design to the construction operation and decommissioning; conduct compliance monitoring during ESMP
Ministry of Environment, Climate Change and Natural Resources	Oversees the NEA and implementation of environmental laws and policies of The Gambia	Policy guidance; oversees the Department of Parks and Wildlife Management	As required during any phase of the project (planning and design to construction and operation)
Governor's Office (URR)	Oversee the region's Regional Technical Advisory Committees (TACs) (URR).	The TACs will support the implementation and monitoring processes at the Regional levels	All project phases
Ministry of Lands and Regional Governments	Oversees all the local government authorities. Its regional representatives are the TACs located in the Regional	This Ministry will support the coordination of land administration and land use.	All phases of the Project



<b>Institutions/ Implementing Entity</b>	<b>Specific Roles and Responsibilities</b>	<b>Interests and roles in this Project Implementation</b>	<b>Level of intervention</b>
	Governors' offices.		
National Social Protection Secretariat (NSPS)	Under the Office of the Vice President, NSPS provides leadership and coordination across social protection efforts in The Gambia	NSPS is the executor of this Project in The Gambia And coordinates and monitors the Project ESMP implementation.	All phases of the Project
Department of Fisheries	Responsible for the development and management of fisheries resources in The Gambia for sustainability	Advises on potential impacts of the Project on the fishing community at the fish landing site, close to one of the proposed sites for the relocation of the ferry terminal	Support in mobilization and advice within the context of the EIA Working Group
Department of Parks and Wildlife Management (DPWM)	Responsible for the conservation of wildlife, and the development of national parks and reserves	Advises on the control and management of the wildlife, including birds and Hippopotamus	Preconstruction, construction, and operation phases of the Project
National Roads Authority	Responsible for overall planning, construction, maintenance, and management of roads	Advises on road development, specifically, the Bund Road near the wetland	Preconstruction and construction and operational phases of the Project
Women's Bureau	Under the Ministry of Women, Children and Social Welfare, the Women's Bureau specifically promotes gender equity and women's	Ensures that the rights of women affected by the Project are protected, and participates in sensitization on gender issues	Preconstruction, construction, and operation phases





<b>Institutions/ Implementing Entity</b>	<b>Specific Roles and Responsibilities</b>	<b>Interests and roles in this Project Implementation</b>	<b>Level of intervention</b>
	empowerment in The Gambia		
Department of Social Welfare	Protects and promotes the rights of vulnerable people such as children, women, and people with disabilities	Supports and guides the process during related grievances and participates in sensitization on GBV, SEA, VAC and so on	Preconstruction, construction, and operation phases
NGOs and Civil Societies	These voluntary groups or organizations are determined to protect the community's rights and promote awareness creation.	Support the community to ensure that the right thing is done in terms of project implementation and advocate for zero incidents, no environmental degradation, and social disorder.	All phases of the project

## 2.5 The Relevant International Conventions and Protocols

The Gambia is committed to various international, regional, and sub-regional conventions, treaties, and agreements relevant to this project. The ones relevant to the project are presented in Table 2.4 below:

**Table 2.4: International, Regional, and Sub-Regional Conventions, Treaties, and Agreements**

<b>Treaty, Agreement, Convention</b>	<b>Relevance to the project</b>
UN Convention on Biological Diversity (UNCBD)	The project may impact biodiversity through agricultural activities and land use changes. Project planning would ensure that the project takes appropriate measures to minimize potential impacts on biodiversity.
UN Convention to Combat Desertification (UNCCD)	The proponent will implement measures to prevent and mitigate desertification in project areas.
UN Framework Convention on Climate Change (UNFCCC)	The proponent will incorporate climate change adaptation measures into water resource management plans for the project.





Convention on Wetlands of International Importance (RAMSAR Convention)	Project will be implemented by complying with RAMSAR Convention guidelines to protect wetlands and their associated biodiversity in the project areas.
Common CILSS Regulation	Pesticide management will be implemented to regulate/minimize adverse impacts on ecosystems and human health by the project proponent.
Convention on the Conservation of Migratory Species of Wild Animals (CMS Convention)	The Project proponent will implement measures to protect these species and their habitats following CMS Convention obligations.

## 2.6 African Development Bank's Environmental and Social Standards

Regional Rice Resilient Value Chains Development Program (REWARD) expects that the Project will be financed with the participation of international financial institutions (IFIs), the African Development Bank (AfDB), and the Government of the Gambia (GoTG). Such IFIs will likely require the Project to comply with applicable international environmental and social sustainability standards.

The AfDB has articulated a comprehensive approach to integrate environmental and social considerations into the implementation of development projects. Ensuring environmental and social sustainability is pivotal for achieving successful development outcomes, and the AfDB is committed to systematically mainstreaming these considerations into its Program and Project Management Cycles.

This commitment is formalized through the Integrated Safeguard System (ISS), which encompasses various policies and strategies designed to guide the Bank and its clients in addressing environmental and social aspects throughout the project cycle. The ISS is supported by key documents, including Environmental and Social Assessment Procedures with accompanying guidelines. These guidelines provide clear directives for both the Bank and its borrowers or clients, outlining the specific procedures to uphold operational safeguards (OS) and meet the conditions required.

Furthermore, the ISS incorporates Sectoral Directives, offering technical guidance on methodological approaches, standards, and management measures essential for complying with operational safeguards.



The ISS consolidates the five specific safeguard criteria that Bank clients must adhere to when managing environmental and social impacts and risks. These criteria align with five Operational Safeguards (SOs), concise policy statements that delineate the operational conditions for Bank-financed operations. Table 2.5 below presents an overview of the relevant Operational Safeguards and their significance to the project.

**Table 2.5: Applicable AfDB Operational Safeguards (OS)**

<b>AfDB Operational Safeguards</b>	<b>Description</b>	<b>Relevance to the Project</b>
OS 1: Environmental Assessment	Sets out the Bank's overarching requirements to identify, assess, and manage potential environmental and social risks and impacts of a project. Requirements include climate change vulnerability assessment; public consultation; appraisal and treatment of vulnerable groups; and grievance procedures. OS1 requires that the siting, design, construction, and operation of projects should avoid significant damage to cultural heritage (both physical and intangible). These include culturally sensitive sites such as mosques, cemeteries, historical relics, and artefacts.	The project aligns with OS1 by necessitating thorough environmental and social impact assessments, incorporating climate change vulnerability assessments, and ensuring public consultation.
OS 2: Involuntary resettlement Land acquisition, population displacement and compensation	Seeks to ensure displaced persons due to Project activities are treated fairly, equitably, and in a socially and culturally sensitive manner; that they receive compensation and resettlement assistance so that their standards of living, income-earning capacity, production levels, and overall means of livelihood are	This OS is not triggered by the operations and activities of REWARD as there will be no involuntary resettlement, displacement, and compensation.  This ESIA includes a socio-economic impact assessment, where the impacts (negative and positive) of the proposed



<b>AfBD Operational Safeguards</b>	<b>Description</b>	<b>Relevance to the Project</b>
	improved; and that they share in the benefits of the project.	project on the communities around the project area have been assessed.
OS 3: Biodiversity and Ecosystem Service	The policy prescribes requirements to identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats.	The project aligns with OS3 by incorporating measures to identify and implement opportunities for biodiversity conservation and sustainable use of ecosystems, recognizing the importance of preserving natural habitats.
Climate Safeguards System (CSS)	The CSS provides a set of decision-making tools and guides to enable the Bank to screen projects for risks associated with climate change.	The project aligns with the CSS by utilizing decision-making tools to assess and address climate change risks, ensuring its resilience to climate-related challenges.
OS 4: Pollution prevention and control, hazardous materials and resource efficiency	This safeguard covers the range of impacts of pollution, waste, and hazardous materials for which there are agreed international conventions and comprehensive industry-specific standards, particularly the Environment Health and Safety (EHS) Guidelines <sup>1</sup>	The project aligns with OS4 by adhering to international conventions and industry-specific standards for pollution prevention, waste management, and resource efficiency, particularly following the EHS Guidelines.
OS 5: Labour conditions, health and safety	The policy outlines the need for contractors and other actors to: protect workers' rights; establish, maintain, and improve the employee-employer relationship; protect the workforce from inequality, social exclusion, child labour, and forced labour;	The project aligns with OS5 by prioritizing the protection of workers' rights, ensuring a healthy and safe working environment, and preventing issues such as child labour and forced labour. It emphasizes maintaining positive employee-employer

<sup>1</sup> It is important to note that when national legislation and regulations differ from the standards and measures presented in the EHS Guidelines, whichever is more stringent would prevail.



<b>AfDB Operational Safeguards</b>	<b>Description</b>	<b>Relevance to the Project</b>
	establish requirements to provide safe and healthy working conditions.	relationships and protecting the workforce from social inequalities.

### 2.6.1 Applicable Policies of the AfDB

The Project design and recommended mitigation will endeavour to uphold international best practices and maintain or reduce impacts to ALARP (as low as reasonably practical) levels. The following international requirements and standards have been considered within the ESIA process and are described below;

- The African Development Bank's Integrated Safeguards Systems (ISS);
- AfDB Civil Society Engagement Framework (2012)
- The African Development Bank's Integrated Safeguards Policy (ISP);
- The African Development Bank's Agriculture and Rural Development Policy (ARDP);
- The African Development Bank's Integrated Water Resources Management Policy (IWRMP);
- The African Development Bank's Integrated Environmental and Social Impact Assessment Guidelines;

### 2.6.2 Other Applicable Guidelines

- IFC Performance Standards (PS) on Environmental and Social Sustainability, 2012;
- IFC/World Bank Group (WBG) International Environmental Health and Safety (IEHS) Guidelines;
- EHS Guidelines – Food and Beverage Processing, 2007;
- EHS Guidelines: Environmental Air Emissions and Ambient Air Quality, 2007;
- IFC Good Practice Note: Addressing Grievances from Project-Affected Communities;
- IFC Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets;
- IFC Good Practice Handbook: Use of Security Forces: Assessing and Managing Risks and Impacts;
- IFC Good Practice Note: Managing Risks Associated with Modern Slavery;
- IFC Good Practice Note: Addressing Gender-Based Violence and Harassment (GBVH) Emerging Good Practice for the Private Sector;
- Good Practice Note: Managing Contractors' Environmental and Social Performance



## CHAPTER THREE

### PROJECT DESCRIPTION

#### 3.1 Project Background and Rationale

The inception of the Regional Rice Resilient Value Chains Development (REWARD) Program stems from a commitment made by the African Development Bank (AfDB) during the Feed Africa II conference in Dakar, January 2023. At the conference, themed "Feed Africa: Food Sovereignty and Resilience," the AfDB articulated its dedication to financing countries' food and Agriculture Compacts.

The REWARD Program, tailored for 15 West African nations, aims to encompass 750,000 hectares of irrigated land progressively. Its primary focus is on empowering approximately 1 million rice farmers, with a notable 30% being female, along with 50,000 other stakeholders across the rice value chain, also with 30% representation from women. These efforts directly address the challenges prevailing in the rice sector, with approximately 160,000 households and other stakeholders benefiting indirectly.

Aligned with the Bank's Country Strategy Paper (CSP) 2021-2025, the REWARD Program resonates with the overarching goal of modernizing agricultural value chains for inclusive growth. Specifically, it contributes to the first strategic outcome of increasing agricultural productivity and value addition by fostering a commercial rice production environment enabled by the private sector.

Moreover, the REWARD Program is intricately woven into the fabric of various strategic frameworks and initiatives, including the Bank's Feed Africa Strategy for Agricultural Transformation (2016 – 2025), Jobs for Youth Strategy (2016-2025), Gender Strategy (2021-2025), and the Bank Group's Strategy for Addressing Fragility and Building Resilience in Africa (2022-2026). Additionally, it aligns with the Bank's Strategic Framework on Climate Change and Green Growth (2021-2030) and its Climate Change and Green Growth Action Plan (2021-2025), emphasizing investments in climate-smart agriculture to bolster adaptation in the agricultural sector.

At the national level, the REWARD Program mirrors the objectives outlined in the National Rice Development Strategy (NRDS II, 2022-2030) and the Continental Investment Plan for Self-



Sufficiency in Africa (CIPRISSA, 2019-2029), particularly targeting rice self-sufficiency in Gambia by 2030.

For the Gambian Government, the REWARD Program holds paramount importance, emerging as a key component of the Gambia Delivery Compact's implementation. Stemming from the success of the Rice Value Chain Transformation Project (RVCTP-I), the REWARD Program represents a strategic response to fortify Gambia's food security by enhancing the resilience of its staple commodity, rice, against future shocks while advancing towards self-sufficiency. The Government of Gambia's endorsement of the initiative is evident in its utilization of resources earmarked for Phase II of the RVCTP to bolster the REWARD Program, thereby solidifying its commitment to the initiative.

### **3.1.1 Program Objectives and Expected Outcomes**

The overarching goal of the REWARD Program is to catalyze the transformation of rice production, processing, and marketing across the ECOWAS region, fostering regenerative practices and bolstering the ecosystems supporting modern and commercial agriculture. By 2028, the program aims to achieve substantial progress towards increasing rice productivity, production, processing, and marketing, narrowing the rice self-sufficiency gap, curbing import bills, and generating employment opportunities, especially for women and youth.

The REWARD Program is anticipated to yield several key outcomes:

- i. **Enforcement of Policy and Regulatory Measures:** Implementation of policies and regulations to enhance the productivity and competitiveness of the rice value chain in West Africa.
- ii. **Development of Finance and Public-Private Partnerships:** Establishment of mechanisms to stimulate the development of the rice value chain through financial support and partnerships.
- iii. **Knowledge Sharing and Management:** Creation and dissemination of knowledge to enhance the rice sector's performance in the region.
- iv. **Efficient Rice Trade and Marketing Systems:** Establishment of effective trade and marketing systems along the rice value chain to reduce rice importation in West Africa.



### ***Alignment with Strategic Initiatives***

The REWARD Program aligns with the Bank's Strategy for Addressing Fragility and Building Resilience in Africa (2022-2026) and contributes to the achievement of ADF-16 indicator targets and policy commitments. Additionally, it accelerates the implementation of the ECOWAS Regional Offensive for the Sustainable Revival of Rice Farming in West Africa (2014-2025).

### ***Specific Objectives***

The specific objectives of the REWARD project are outlined as follows:

- i. **Increase Rice Productivity and Intra-Regional Trade:** Enhance productivity levels and promote trade within the ECOWAS region.
- ii. **Strengthen Regional Structural Organization:** Consolidate the structural organization of the regional rice ecosystem.
- iii. **Ensure Access to Resources:** Provide access to certified seeds, fertilizers, mechanization, extension services, and credit through innovative public-private partnership (PPP) financing models.
- iv. **Support Rice Processing and Storage:** Facilitate the establishment and enhancement of rice processing and storage facilities.
- v. **Enhance Processing and Marketing:** Improve processing and marketing strategies to enhance the competitiveness of local rice compared to imports.

### **3.1.2 Implementation Mechanisms**

The REWARD Program will support the governments of the 15 participating countries by utilizing a combination of financing tools, including grants, sovereign and non-sovereign lending. This financing will cover both hardware (production and post-harvest infrastructure) and software components (extension services, policy reforms, etc.) of the integrated rice value chain. By creating a conducive national and regional environment, the program aims to attract significant private sector investments in the rice sector.

Efforts by the AfDB will be complemented by a coalition of traditional and non-traditional multinational development banks, including the Islamic Development Bank, the World Bank, the





International Fund for Agricultural Development (IFAD), among others, to ensure sustained support for the REWARD Program's objectives.

### **3.2 The Gambia REWARD Program**

The Gambian Ministry of Agriculture is set to embark on the implementation of the Regional Rice Resilient Value Chain Development Project (REWARD) within the nation. Funded by the African Development Bank (AfDB) and the Government of the Gambia (GoTG), this project will be overseen by the Central Project Coordinating Unit (CPCU) through the Project Implementing Unit (PIU). The initiative aligns with the country's priorities regarding food sufficiency, sovereignty, and security, as well as existing fertilizer and seed policies.

The Gambia REWARD Program builds upon the foundations laid by Phase I of the Rice Value Chain Transformation Project (RVCTP) and aims to enhance existing structures while maximizing the gains achieved thus far. Key interventions under the REWARD Program include the development and expansion of new areas, rehabilitation of existing irrigation schemes, land preparation, mechanization throughout the value chain, improved post-harvest management, and the establishment of a streamlined seed system. These initiatives are poised to establish a sustainable rice production system in the Gambia.

This program holds significant importance in ensuring food sufficiency, empowering farmers economically, and bolstering the national economy. Implementation will primarily focus on communities situated in the rice fields and valleys of the Upper River Region (URR), with efforts directed towards enhancing infrastructure, mechanization, and farmer capacity. By enhancing national sufficiency and export potential, the project aims to position the Gambia as a prominent player in West African food markets, ultimately contributing to food and nutrition security and economic growth while reducing rice importation.

#### **3.2.1 Components of the Gambian REWARD Program**

##### **Component 1: Development of Sustainable Climate-Resilient Rice Production Systems to Ensure Adequate Production of Quality Rice Paddy to Supply Millers**

This component is dedicated to establishing sustainable climate-resilient rice production systems. It encompasses rehabilitation and development of irrigation schemes, social infrastructure facilities such as rural roads, environmental and social safeguards, and access to climate-resilient



inputs and services. Capacity building initiatives will ensure the sustainable management of irrigation schemes and foster community engagement through a Grievance Redress Mechanism (GRM).

## **Component 1**

### **Development of Sustainable Climate-Resilient Rice Production Systems to Ensure Adequate Production of Quality Rice Paddy to Supply Millers**

This component aims at the development of sustainable climate-resilient rice production systems to ensure adequate production of quality rice paddy to supply millers comprising rehabilitation/new land development; social infrastructure facilities including rural roads; tackle fragility and enforcing environmental and social safeguards; improving access to climate-resilient quality inputs and services; and capacity building.

#### ***Sub-component 1.1: Sustainable climate-resilient irrigation schemes and irrigation management services***

This subcomponent seeks to support sustainable climate-resilient irrigation schemes and irrigation management services through rehabilitation for Smallholder Farms (tidal) of 1010 hectares, rehabilitation for smallholder farms (pump) of 658 ha; new land development for private commercial farmers (Pump) of 600 ha; new land development for private commercial farmers (rainfed) of 2,900 ha to be eventually transformed into a pump. To enhance capacity in management, REWARD will support the establishment and training of eight irrigation committees to ensure the sustainable management of irrigation schemes.

Furthermore, the subcomponent will support social infrastructure development including support to the development of rural feeder roads comprising new feeder/access roads (for single surface dressing) of 34 Km; rehabilitation of existing feeder/access roads (double layer gravel and single surface dressing of 20 Km; and, survey and design for private sector land development and supervision of land development.

The subcomponent will support tackling fragility and enforcing environmental and social safeguards and will develop and implement a locally based Grievance Redress Mechanism (GRM). Key activities will include the development of safeguard instruments including an Environmental and Social (E&S) audit, the development of a Gender Action Plan (GAP), Integrated Pest



Management (IPM) plan, Environmental and Social Management Plan (ESMP) development, sensitization, and awareness creation on ESMP and IPM, Monitoring of ESMPs and IPM and the development and implementation of the locally based GRM.

***Sub-component 1.2: Improving the availability of, and access to, climate-resilient quality inputs, mechanization services, and knowledge for climate-smart Agriculture***

This sub-component seeks to support improving the availability of, and access to, climate-resilient quality inputs, mechanization services, and knowledge for climate-smart agriculture. It will involve the development of seed systems in two folds. Firstly, the project through TAAT, will strengthen the capacity of the National Seed Secretariat (NSS) to carry out its primary role of quality control and certification of breeder, foundation, and certified seeds. The NSS will support and guide the commercial farmers and seed grower cooperatives to produce certified seeds of climate-resilient, high-yielding (specifically on salient and drought tolerance that are acclimatised with the Gambian agroecology) and consumer-preferred rice varieties.

The project will ensure linkages to seed growers and promote the private seed-producing businesses and agro-input dealers to fully undertake the production and marketing of the certified seeds in accordance with the Government input subsidy scheme, using the successful voucher distribution system piloted in phase 1 of RVCTP. In this regard, REWARD will facilitate the availability of climate resilient seed comprising of breeder seed of .25Mt, foundation seed of 20 Mt, certified seed of 400 Mt and the hybrid seed of 4 Mt. In a similar vein, the program will support the evacuation and distribution of inputs and the Seed Traders Association.

The subcomponent will support improvements in productivity through enhanced fertilizers and pest control management systems. This will entail support for fertilizer provision through competent private dealers. Some limited support will be provided for Pesticide use including its prudent management. Similarly, support will be provided for equipment for mechanization services support through private-sector agro-service providers. There will be three Mechanization Service Centers which will be equipped with 30 tractors & Accessories, 45 power tillers – Bufallo Power Tillers & accessories, three low loader–rams, 15 rice transplanters, six fertilizer spreaders and six rice seeders.



### ***Sub-component 1.3: Institutional Capacity Strengthening/Capacity Building***

The intervention under this subcomponent is to improve national capacity and knowledge in rice agronomy, seed production and quality control. Key activities include curriculum development for rice agronomy for the Gambia College School of Agriculture, strengthening and training (Training of Trainers/ToT) extension services (Rice Agronomy, GAP & SRI) - 15 staff/session, training extension agents on rice agronomy – TAAT (AfricaRice) - six staffs/ sessions, attachment of NSS Staff to National Agriculture Seed Council (NASC) Nigeria (6 months), attachment of NARI staff to AfricaRice in St. Louis- Senegal (6 months), long-term training- Breeder MSc, hand on exercise to build the capacity of NARI and NSS Breeder and Foundation Seed Production as well as Seminars & Workshops.

Under this subcomponent, support will be provided to implementing partners and technical units. These will include monitoring and evaluating rice cultivation development by a team of 4, strengthening Farmer Field/ Business School into viable production Units, extension delivery on Goods Agricultural Practices (GAP), National Seeds System in quality control, National Agricultural Research Institute (NARI), Gambia National Bureau of Standards (GNBS) and Food Safety and Quality Authority (FSQA) in rice standards and regulations, Department of Cooperative Development (DoCD) in entrepreneurship strengthening and the Central Projects Coordinating Unit (CPCU) for overall coordination.

## **Component 2**

### **Processing & Marketing: Development of rice processing clusters, agribusiness and market links for trade facilitation**

The component will contribute to value addition and marketing through support to processing and marketing development of rice processing clusters, agribusiness and market links for trade facilitation.

#### ***Sub-component 2.1: Developing/modernizing processing infrastructure and strengthening capacities of smallholders and commercial players along the value chain***

This subcomponent will support the development/modernization of processing infrastructure and strengthen the capacities of smallholders and commercial players along the rice value chain. In this regard, the project will provide six heavy-duty combine harvesters, three milling units powered



by solar each with an accompanying parboiling centre, 15 mini threshers, construct six drying floors, construct and rehabilitate six storage facilities, carry out maintenance of project offices and supervise civil works. Similarly, the development/modernization of the rice packaging infrastructure and marketing systems will be supported with the provision of packaging materials as well as labelling and branding.

The subcomponent will also support digital innovations and undertake extensive capacity building and training of smallholders and commercial players with up to 30 sessions per annum; and also build the capacity of local rice millers and processors on rice milling technology, quality control and process management grading with 20 sessions per annum.

***Sub-component 2.2: Developing information systems, innovative technologies (incl. digital) and consumer-oriented branding to improve access to markets***

This subcomponent will develop information systems, innovative technologies (including digital) and consumer-oriented branding to improve access to markets through: the conduct of national/regional fairs to enhance networking and access to markets by smallholders and commercial players - Markets/Market Fairs/Exhibitions; strengthen national Market Information Systems (MIS) for rice based on digital & mobile solutions. It will also support the annual operating cost of the MIS as well as promote nutrition and diet diversification within the rice value chain.

***Sub-component 2.3: Promoting private sector investment by supporting businesses, especially those run by women/youth, and improving the availability of finance across the value chain to facilitate lending to processors, farmers, and other businesses***

This subcomponent will promote private sector investment by supporting businesses, especially those run by youth/women and improving the availability of finance across the value chain to facilitate lending to processors, farmers and businesses. Key interventions in this regard include: strengthening cost-sharing access to mechanization and equipment, equipment and inputs; promoting reliable and affordable access to Financial Services for both production and processing; supporting entrepreneurial development of youth- and women-led cooperatives/SMEs in the rice value chain on product development and innovations; and, promoting B2B and B2C linkages (incl. national/regional events).



### **Component 3**

#### **Policy & Governance: Support to policy/regulatory reforms and harmonization at the regional/national level to ensure a competitive rice value chain for imports**

This component will focus on policy and governance and will support policy/regulatory reforms and harmonization at the regional/national level to ensure a competitive rice value chain for imports.

##### ***Sub-component 3.1: Support to policy reforms and harmonization at regional/national scale***

This subcomponent will provide support to policy reforms and harmonization at the regional/national level. Key interventions include: supporting the harmonization of import tariffs for rice-seed and grain, developing and harmonising policy reforms and regulatory measures, raising awareness among rice value chain players of best practices in Public Private Partnership (PPP) and other prevailing financing models and options, supporting the development and harmonization of regional food safety and quality standards, organize a roundtable of the ECOWAP/CAADP Donors Group, and facilitate PPP in Rice Value Chain.

##### ***Sub-component 3.2: Enhancement of control and regulations for agricultural inputs at regional/national levels***

This subcomponent will contribute to the enhancement of control and regulations for agricultural inputs at regional/national levels. Interventions will hinge on supporting efficient trade and marketing systems along the rice value chain in West Africa, supporting the implementation of the ECOWAS Regional Seed Regulation, supporting the implementation of the ECOWAS Regional Pesticides Regulation, and, supporting the implementation of the ECOWAS Regional Fertilizer Regulation.

##### ***Sub-component 3.3: Regional and National management and monitoring systems based on digital technologies in line with ECOWAS Rice Observatory (ERO)***

This subcomponent will ensure the establishment of Regional and National management and monitoring systems based on digital technologies in line with the ECOWAS Rice Observatory (ERO). Key interventions will be to: strengthen ERO's economic intelligence capacities towards rice self-sufficiency, support ERO in developing a regional rice information and knowledge-sharing system, promote on-site visits and bench-marking exchanges amongst countries,



strengthen regional coordination on the rice value chain ecosystem and governance, strengthen the regional stakeholder engagement platform, promote digital tools for rice data collection and management at country/basin / scheme level - Rice Advice and, support ERO in mapping and developing a rapid gender appraisal.

#### **Component 4: Program Coordination and Management**

The objective of this component is to ensure swift and efficient implementation of project activities and attainment of objectives. The component will support regional and national coordination, monitoring and evaluation and facilitate results management and reporting on the implementation of the project. Specific activities will comprise reporting (including fiduciary), operations (including procurement and day-to-day management), communication and visibility enhancement (TV and other mass media) and knowledge management; as well as monitoring and evaluation (Mid-term Review and Project Completion Report). It will also cater for vehicles, motorcycles and office equipment.

Specifically, the Gambia REWARD project is aimed at addressing the following critical areas:

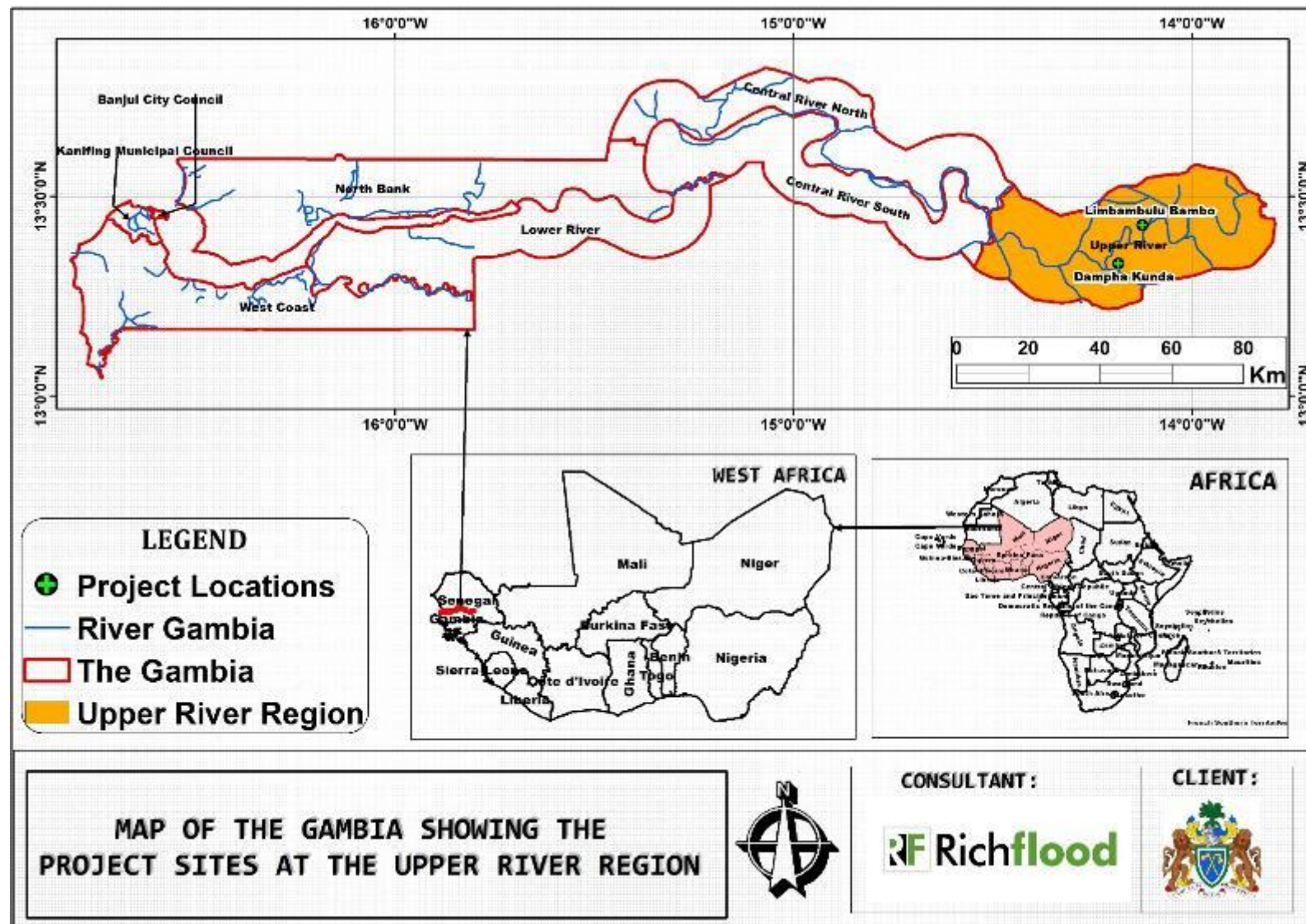
1. Enhancing access to develop land and water management, seed and mechanization services,
2. Boost commercial production of rice through a private-public sector-driven intervention.
3. Promote value addition, and marketing, of local rice competitiveness.

#### **3.3 Project Sites and Locations**

The choice and selection of the project sites have primarily been based on the production potential (availability of fresh water throughout the year) as well as the high potential in pump irrigable lands that will enhance agricultural production in the country thus prioritizing investment in areas with high market potential as well as areas with low risk of crop failure and high market potential.

There are two (2) intervention sites identified and selected in the Upper River Region. They include Dumpha Kunda and Limbambulu Bambo.





**Figure 3.1:** Map of the Gambia Showing the Project Sites at the Upper River Region (URR)

*Source: Richflood GIS Unit, 2024*



### **3.4 Project Phases and Components**

#### **3.4.1 Pre-construction Phase**

This stage involves carrying out various studies to ascertain the economic, financial and environmental viability of the proposed REWARD project. Also, included in this stage are land development, land preparation, designing, feasibility studies, socio-economic surveys, community engagement etc. for the proposed project.

##### **3.4.1.1 Land Development**

This involves land improvement that could enhance rice production and productivity. This includes land levelling, land development and rehabilitation of production infrastructure, water management and irrigation systems. Efficient water management systems, including canals, pumps, and reservoirs, are established to provide adequate water supply throughout the rice cultivation cycle.

Additionally, the project will support the production of improved and climate-resilience seed varieties, to ensure that farmers receive quality seeds. The project will provide fertilizers to conduct demonstrations that create mass awareness of the benefits of fertilizer use.

##### **3.4.1.2 Land Preparation**

Land preparation is a critical step that precedes rice cultivation. It involves several activities aimed at creating an ideal seedbed for planting. This includes ploughing, harrowing, and puddling. Ploughing breaks the soil, making it easier to work with and facilitating better root penetration. Harrowing further refines the soil structure, removing clods and levelling the surface. Puddling involves saturating the soil with water to create a firm seedbed, which helps in controlling weeds and conserving water during subsequent irrigation.

#### **3.4.2 Construction Phase**

The construction phase will involve works such as the development and rehabilitation of rural feeder roads, foundation work as well as factory and warehouse structure erection and installation. The construction of the processing plant and support facilities will be executed in accordance with a standard planning framework that will be reviewed as it becomes expedient by CPCU to ensure:



- Maximum efficiency in construction;
- Minimum adverse environmental and health impacts;
- Earliest completion time
- Compliance with the laws of the land and all regulatory requirements; and
- Compliance with AfDB HSE policy and quality.

### ***Construction Materials***

All materials to be used in the construction shall be tested in accordance with the appropriate International Standards and requirements to verify their suitability for the purpose. The actual quantities of the various bulk materials required will vary depending on the outcome of the detailed design exercise, yet to be carried out. Sourcing of the materials is the responsibility of the Engineer, Procure, construct, and Commission (EPC) contractor, subject to any constraints imposed by this ESIA report.

## **3.4.3 Operation and Maintenance**

The rice fields and processing plants will be operated and maintained directly by the Project Implementation Unit (PIU) in collaboration with other parties involved. However, it is expected that specialist contractors to whom the contract for the construction of the plant is awarded will be engaged in maintenance activities for the specified retention period and as the need arises afterwards to conduct repairs and provide other specialist services. All maintenance and operation contracts will take into account the provisions of the relevant Gambian and AfDB regulations.

### **3.4.3.1 Agricultural Activities**

A detailed description of the processes involved in mechanized rice farming is given in the sections below:

#### ***Seed selection and preparation***

Seed selection and preparation are paramount to ensure a bountiful harvest. High-quality seeds from a reliable source should be chosen for optimal germination and yield. Pre-germinating seeds by soaking them in water for 24-48 hours or until sprouts appear enhances germination rates and ensures uniformity in plant growth.



The selection of high-quality seeds and inputs is essential for achieving optimal rice yields. This involves choosing suitable rice varieties based on factors such as climate, soil type, and market demand. Quality seeds with desirable traits such as high yield potential, disease resistance, and tolerance to environmental stress are selected.

The project will ensure linkages to seed growers and promote the private seed-producing businesses and agro-input dealers to fully undertake the production and marketing of the certified seeds in accordance with the Government input subsidy scheme, using the successful voucher distribution system piloted in phase I of RVCTP. In this regard, REWARD will facilitate the availability of climate resilient seed comprising of breeder seed of .25Mt, foundation seed of 20 Mt, certified seed of 400 Mt and the hybrid seed of 4 Mt. In a similar vein, the program will support the evacuation and distribution of inputs and the Seed Traders Association.

### ***Seedbed Preparation***

Once the seeds are prepared, the next step is seedbed preparation. Tilling the soil to a fine texture and creating rows or beds with proper spacing for sowing seeds is crucial. Applying organic manure or fertilizers enriches the soil and provides essential nutrients for plant growth.

### ***Sowing***

Sowing the seeds marks the beginning of the growing cycle. Pre-germinated seeds should be broadcast evenly over the seedbed and covered lightly with soil. Maintaining optimal seed spacing prevents overcrowding and ensures proper nutrient uptake and sunlight exposure for each plant.

### ***Use of Agrochemicals (Fertilizers and Pesticides)***

Agrochemicals, including fertilizers and pesticides, play a crucial role in optimizing rice production by addressing nutrient deficiencies and managing pests and diseases. Fertilizers are applied to replenish essential nutrients in the soil, such as nitrogen, phosphorus, and potassium, which are vital for rice growth and development. The application of fertilizers is based on soil test results and crop nutrient requirements, ensuring balanced nutrition throughout the growing season. Integrated Pest Management (IPM) practices are implemented to minimize pesticide usage and mitigate environmental risks while effectively controlling pests and diseases. This includes the use



of biopesticides, cultural practices, and pest-resistant rice varieties to reduce reliance on chemical pesticides and promote sustainable pest management strategies.

The REWARD project will support improvements in productivity through enhanced fertilizers and pest control management systems. This will entail support to fertilizer provision through competent private dealers. Some limited support will be provided for Pesticide use including its prudent management.

### ***Irrigation System***

Irrigation offers a reliable and consistent water supply, mitigating the risks associated with rainfall variability and enabling farmers to cultivate rice year-round. By providing water during dry periods, irrigation systems can ensure optimal growing conditions, leading to increased productivity and improved crop yields.

Furthermore, irrigation facilitates the adoption of modern agricultural practices such as controlled water management, fertilizer application, and pest control, leading to enhanced crop quality and profitability for farmers. Additionally, irrigation systems will support the cultivation of high-yielding rice varieties that require specific water management regimes, thereby further improving productivity and sustainability in rice cultivation. By providing a reliable water supply, irrigation systems will address the challenges posed by the country's climatic conditions, improve productivity, and contribute to food security, economic growth, and climate resilience.

The project will support sustainable climate-resilient irrigation schemes and irrigation management services through the following

- i. Rehabilitation for Smallholder Farms (tidal) of 1,010 hectares
- ii. Rehabilitation for smallholder farms (pump) of 658 hectares
- iii. New land development for private commercial farmers (Pump) of 600 hectares
- iv. New land development for private commercial farmers (rainfed) of 2,900 hectares to be eventually transformed into pump.

To enhance capacity in management, REWARD will support the establishment and training of eight irrigation committees to ensure the sustainable management of irrigation schemes.





### ***Pest and Pesticides Management***

A comprehensive and well-detailed pest and pesticide management plan has been developed for the project.

### ***Harvesting***

Harvesting is the culmination of the cultivation process. Monitoring the crop for maturity and harvesting when the grains are fully matured but still slightly moist is crucial for quality grain production. Using appropriate tools such as sickles or mechanical harvesters ensures efficient harvesting while minimizing crop damage.

### ***Threshing and Drying***

Threshing and drying are essential post-harvest activities. Threshing the harvested rice separates grains from the straw, while sun drying ensures proper moisture content for storage. Regularly turning the grains during drying prevents mold growth and ensures uniform drying.

## **3.4.3.2 Rice Processing Plants**

### ***Rice Processing Description***

The Rice processing plant comprises 4 major components including the following:

5. In-take and pre-cleaning section
6. Silo section
7. Boiling and Drying section
8. Milling section

The process is designed to take in the paddy sourced from the rice fields and processed into the finished products.

The processing section and stages are described below:

#### ***1. In-Take and Pre-Cleaning Section***

The rice paddy from the rice field will be received through the Receiving Bin at the Intake section to commence the milling process. Pre-cleaning is the first activity in the processing line where the paddy will be cleaned to remove foreign materials such as straw, weed, mud balls/soil, stones, metal particles, threads and other non-grain materials. Pre-cleaning is crucial to help remove these materials to improve the efficiency of the milling process and to prevent these foreign materials



from clogging and damaging the plant. An aspiration channel is also attached to this section to emit these waste materials through connection pipes to the husk storage room.

## ***2. Silo Section***

After cleaning, the clean paddy is conveyed to the silos through a system of elevators. The purpose of the storage silos is to store clean paddy while the operation silos temporarily hold paddy to feed the boiler section. The silo system ensures there is clean paddy in storage for the boiler and dryer section to ensure the system is not disrupted. The silos are made of corrugated steel storage bins and as such offer a sanitary way to store raw paddy

## ***3. Boiling and Drying Section***

Parboiling involves partial boiling of the paddy before milling to increase its nutritional value, change the texture of cooked rice and reduce breakage in the milling process. Parboiling is done in three steps, namely: Soaking the paddy in water; Steaming the paddy through the application of heat; and Drying the paddy. Parboiling causes a gelatinization of the starch during the boiling and during cooling the amylase molecules re-associate with each other and form a tightly packed structure.

The kernels are harder and appear glassier after the parboiling process. The parboiling process also moves micro-nutrients contained in the bran, which is usually removed in the whitening process in the rice mill, to the endosperm thereby making parboiled rice more nutritious than white rice. Parboiling also mends little cracks that might have developed in the endosperm during post-harvest processing and therefore rice recoveries of parboiled paddy are higher.

At the drying section, the drying of paddy rice is done after parboiling to remove moisture before the rice is fed into the mill. The drying process ensures the moisture is removed from the raw products of boiling so that it is possible to store rice safely for longer and prevent loss. The drier has low energy consumption, ensures gentle and uniform drying and zero dust emission is ensured through a system of highly efficient aspiration channels which removes dust (including moist dust) into the husk storage room. Following drying, the paddy is stored in the Harvest Bins which holds the paddy and feeds the mill to commence the milling activities.

## ***4. Milling Section***





Milling is a crucial step in the post-production of rice. The basic objective of a rice milling system is to remove the husk and the bran layers to produce an edible, white rice kernel that is sufficiently milled and free of impurities. Milling is achieved by the gentle action of the rubber rollers installed in the milling machine to remove the husk and bran layers from the paddy. At this stage, the husk aspirators attached to the mill separate the husk from the rice through air aspiration. The milling section is located in an enclosed multi-storey building containing a network of milling and grinding equipment. The husks and other impurities are then moved to the husk storage room through aspiration pipes where they are stored. As part of the plant, a husk bunker has been installed which will process the husks and other impurities to generate energy which will be used to power the boiler and dryer system.

### ***5. Packaging and Storage***

Packaging is the final step in the process, crucial for preserving the quality and integrity of the rice product. Clean, dry, and pest-proof containers are used to store the milled rice, protecting it from spoilage and contamination. Proper labelling and packaging materials will be employed to ensure compliance with safety standards and consumer preferences. After packaging, the bagged rice is sent directly to the warehouse for storage.

#### **3.4.3.3 Mechanization**

Component 2 of the REWARD project focuses on the provision of necessary machinery and equipment to streamline and optimize various activities involved in rice cultivation. Mechanization plays a pivotal role in modernizing agricultural practices and enhancing productivity within the rice value chain. Mechanization revolutionizes traditional farming methods by introducing efficient, time-saving, and labor-reducing technologies. By mechanizing various stages of rice cultivation, farmers can significantly increase their output while minimizing manual labour requirements.

This not only boosts productivity but also improves the overall efficiency and profitability of rice production. Mechanization will also address labour shortages, particularly in the areas where rural-to-urban migration has led to a decline in the agricultural workforce. Furthermore, it will promote sustainable farming practices by optimizing resource utilization and reducing the environmental footprint associated with traditional farming methods.

The REWARD Program will provide support for equipment for mechanization services through private-sector agro-service providers. It is planned that there will be three Mechanization Service Centers which will be equipped with 30 tractors & Accessories, 45 power tillers – Buffalo Power Tillers & accessories, three low loader–rams, 15 rice transplanters, six fertilizer spreaders and six rice seeders.

Some of the machinery and equipment that will be used for the project are described below:

- ❑ **Tractors:** Tractors are versatile agricultural vehicles equipped with high horsepower engines capable of performing a wide range of tasks. For this project, tractors will be used for land preparation, including ploughing, harrowing, and levelling. Also, they will facilitate the efficient and timely completion of these tasks, ensuring optimal seedbed preparation for rice planting.



**Figure 3.2: Tractor**  
*Source: Tractor Junction*

- ❑ **Power Tillers:** Power tillers, also known as walking tractors, are compact and versatile machines ideal for small-scale rice farmers. These lightweight yet powerful machines are primarily used for land preparation, puddling, and weeding in rice fields. Power tillers are manoeuvrable and can navigate through narrow and uneven terrain, making them suitable for smallholder farmers with limited land holdings.



**Figure 3.3: Power Tillers**

***Source: Tractor Junction***

- ❑ ***Combine Harvesters:*** Combine harvesters revolutionize the rice harvesting process by mechanizing the harvesting, threshing, and winnowing operations into a single integrated process. These large machines are equipped with cutting and threshing mechanisms, allowing for the efficient harvesting of mature rice crops. Combine harvesters will significantly reduce harvesting time and labour requirements while minimizing post-harvest losses, thus improving overall efficiency and profitability.



**Figure 3.4: Combine Harvesters**

*Source: Jiangsu Machinery Co. Limited*

- ❑ **Seeders and Transplanters:** Seeders and transplanters automate the process of planting rice seeds or transplanting rice seedlings into the field. These machines ensure uniform seed spacing and planting depth, resulting in optimal crop establishment and higher yields. By mechanizing the planting process, seeders and transplanters will enable farmers to achieve timely and precise planting, enhancing crop uniformity and reducing seed wastage.





**Figure 3.5: Seeders**

*Source: KisanKraft*



**Figure 3.6: Transplanters**

*Source: KisanKraft*

- ❑ **Sprayers:** Sprayers are used for the application of fertilizers, pesticides, and herbicides in rice fields. The machine ensures accurate and uniform application, minimizing chemical wastage and reducing the environmental impacts of agrochemical usage. By mechanizing the application of agrochemicals, sprayers will improve the effectiveness of pest and weed control measures while optimizing input costs.



**Figure 3.7: Sprayers and Dusters**

*Source: KisanKraft*

#### **3.4.4 Decommissioning and Restoration Phase**

At the expiration of the useful life of the project, adequate arrangements will be made to remove all movable assets. When the life span of the project comes to an end, the rice fields and processing facilities will be decommissioned and put off use. A decommissioning process or plan would be activated. Decommissioning activities will include equipment site securitisation, equipment clean-



up, dismantlement of equipment and structures, as well as clean-up of site surfaces in line with applicable regulatory requirements.

The following steps would be undertaken in decommissioning the project:

- Regulatory Compliance and Approval;
- Site Preparation and Clearing;
- Uninstallation of facility components;
- Materials disposal; and
- Site Restoration

A restoration plan will be implemented for the project area unless otherwise requested by the communities within the AoI. This would be done after a fully documented agreement has been reached. If this situation arises, the information will be included in the restoration and post-impact assessment reports.

Site recovery shall include taking steps to restore the project site to its original conditions by promoting the growth of lost natural vegetation to make the area accessible to local inhabitants. All installations and structures shall be completely removed and sold or moved to another factory. Almost all the equipment and machinery shall be re-used for other industrial purposes. All plant facilities and machinery that are not deemed to be of further use will be sold off as scrap or recycled at metal depots.

### **3.5 Power Supply Arrangements**

The success of the REWARD project will heavily rely on a reliable and sustainable power supply. In alignment with the principles of climate-smart agriculture, the project will integrate a hybrid power supply system utilizing renewable energy and a fuel-powered generator. This approach not only ensures an uninterrupted power supply but also contributes to reducing greenhouse gas emissions and fostering sustainability in the agricultural value chain.

This will involve a comprehensive assessment of energy requirements, followed by the design and installation of solar infrastructure and the setup of a fuel-powered generator. Regular monitoring and maintenance will be conducted to ensure optimal performance and longevity of the power supply system.





### 3.4 Waste Generation and Management

The waste streams envisaged during the construction phase are typical construction wastes. The waste management principles will be based on an integrated approach which will involve adopting a combination of techniques and programs to manage waste holistically through a site-specific Waste Management Plan (WMP). This approach shall adopt the principles of the 5Rs of waste management hierarchy i.e. Reduce, Repair, Re-use, Recycle and Recover with disposal being the last option for any waste generated. A non-exhaustive list of indicative waste streams which will be generated during the construction and operation phases of the development is presented in Table 3.1 below.

Table 3.1: Waste stream and management at different phases of the project

Project Phase	Activities	Waste Expected	Management
Construction Phase	<ul style="list-style-type: none"> <li>Civil and concrete works including Excavation and Earthworks for drainages and landscaping.</li> <li>Plumbing and drainage.</li> <li>Electromechanical Works.</li> </ul>	<ul style="list-style-type: none"> <li>Non-Hazardous: Top-soil</li> <li>Spoils.</li> <li>Vegetal waste</li> </ul>	<ul style="list-style-type: none"> <li>Vegetal waste shall be supplied to local farmers for use as compost.</li> <li>Woody vegetal waste shall be supplied to host communities for domestic uses including as fuel wood for cooking.</li> <li>Topsoil and spoils shall be securely kept and reused for filling and landscaping.</li> </ul>
	<ul style="list-style-type: none"> <li>Operation of equipment.</li> <li>Concrete mixing.</li> <li>Electrical works</li> </ul>	Non-Hazardous: Waste Packaging and Dunnage such as scrap wood, scrap metal, steel, glass, plastic, paper and cardboard, and empty metal containers.	<ul style="list-style-type: none"> <li>Scraps and other materials shall be segregated and stored on-site to be collected at least once a week for reuse or recycling through licensed third-party facilities</li> <li>Non-recyclables shall be removed by an approved waste contractor for onward Disposal at approved sites</li> </ul>
		Hazardous: WEEE, used batteries, chemical containers, cement bags etc	<ul style="list-style-type: none"> <li>Store on-site in closed containers with secondary containment and transfer to a registered waste contractor with off-site permitted hazardous waste treatment, storage, or disposal facilities.</li> </ul>



Project Phase	Activities	Waste Expected	Management
Operation Phase	Operation of Processing plant	Rice husk, dust and other organic impurities	<ul style="list-style-type: none"> <li>Husk and other impurities shall be removed through the aspiration system and stored in the Husk Storage Room.</li> <li>The waste shall be processed to generate heat to power the Boiler System through the aid of the installed Husk Bunker.</li> </ul>
		Effluent from the Boiler Section	<ul style="list-style-type: none"> <li>An Effluent Treatment Plant (ETP) shall be installed to ensure the treatment of all effluents before discharge into the environment through the site stream/ Site drainage system.</li> <li>The site drainages will be equipped with interceptors before discharge into the environment.</li> </ul>
	Rice Cultivation	Waste Packaging and such as scrap wood, scrap metal, steel, glass, plastic, paper and cardboard, empty metal containers.	<ul style="list-style-type: none"> <li>Scraps and other materials shall be segregated and stored on-site to be collected at least once a week for reuse or recycling through licensed third-party facilities</li> <li>Non-recyclables shall be removed by an approved waste contractor for onward Disposal at approved sites</li> </ul>
	Operation and maintenance of the Processing plant and supporting infrastructure	Hazardous: spent oil, grease, fuel, obsolete batteries, etc.	The PIU shall liaise with the contractor/manufacturer to take back obsolete parts including batteries and spent oils during maintenance and repair. Alternatively, waste vendors licensed by NEA shall be employed to evacuate and process hazardous waste.
		Non-Hazardous: Obsolete parts of equipment and machines,	The PIU shall liaise with the contractor/manufacturer to take back obsolete parts. Alternatively, waste vendors licensed by NEA shall be employed to evacuate and process hazardous waste.



## **CHAPTER FOUR**

### **ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS**

#### **4.1 Introduction**

This chapter provides an overview of the physical, biological, and social baseline conditions within the project area. It encompasses descriptions of the environmental factors, including habitats, climate change considerations, and natural disaster risks, as well as the socio-economic and health profile of the project area.

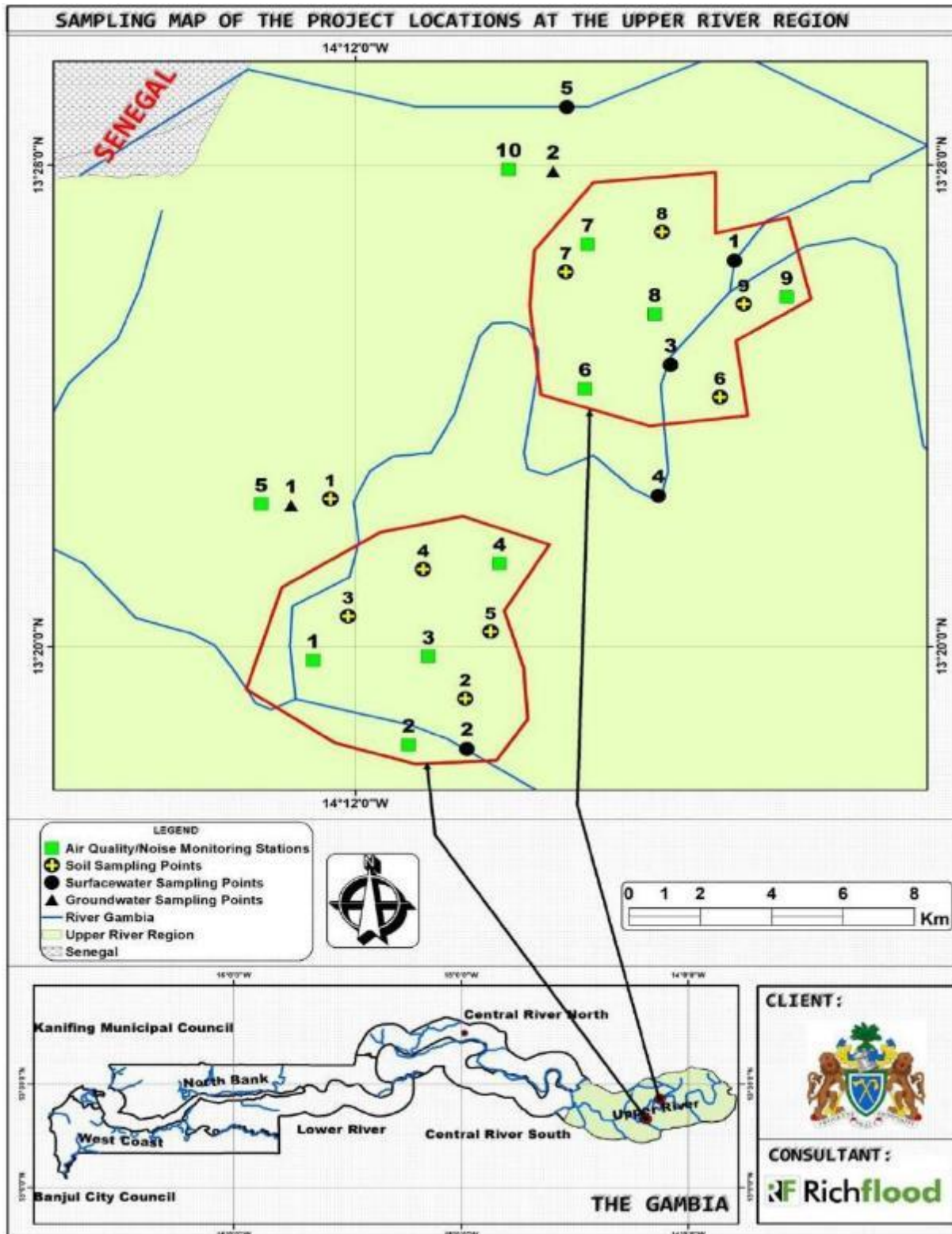
The information presented is derived from a comprehensive review of available desktop data, complemented by field visits conducted in January and February 2024. These field visits aimed to gather accurate and current information about the environmental components pertinent to the project. Additionally, a detailed field study of the project site was undertaken to identify and understand the main environmental sensitivities that could be impacted by the project.

The baseline description incorporates insights from national, regional, and local sources. It also takes into account the specific context of the project area, providing a detailed overview of the environmental conditions within the project's area of influence (AOI) for each relevant aspect.

#### **4.2 Field Survey**

Field surveys were conducted for the project by Richflood between January 22nd and February 5th, 2024. These surveys involved both qualitative and quantitative analyses of the biophysical environment and ecosystems, alongside public consultations. Main community authorities were consulted to gain insights into the socio-economic conditions and social dynamics of the project area (for further details, refer to Chapter 6 on Stakeholder Engagement).

The field surveys produced geo-referenced data on infrastructure, land boundaries, and road networks within the project area. Figure 4.1 below presents a sampling map indicating the locations where data were obtained.



**Figure 4.1: Sampling Map of the Upper River Region**

*Source: Richflood GIS Unit, 2024*



## 4.3 Physical Environment

### 4.3.1 Topography, Relief and Drainage

Generally, Gambia's topography is mainly flat and low-lying. Nearly 50 percent of its total land area is less than 20 metres above mean sea level, one-third at or below 10 metres above sea level, and 10 to 20 percent seasonally or diurnally flooded especially within the riverine and estuarine areas (GoTG, 2007).

The River Gambia, not wider than 30 km, splits the country into two strips of land. The flow of the River is seasonal, and during the dry season, seawater intrudes about 200km upriver. More than 48% of the total land area of The Gambia is below 20m high with almost one-third of the country, at or below 10m above sea level. Only 4% of the country's land area is above 50m and no part of the land is 60m high above sea level as shown in Figure 4.2. These landforms indicate that The Gambia is generally low-lying flat land.

Moving outward the River Gambia, the topography of the country can be categorized into three topographic regions, namely, the valley bottom, the dissected plateau, and the sandstone plateau. The valley bottom is the area adjacent to the River Gambia which represents 39% of the total land area. It is the area immediately along the Gambia River and its tributaries. This topographic region is characterized by poorly drained alluvial sediment formations which are subjected to regular seasonal flooding. The combination of low-lying topography, poorly drained soils, and abundant water provides unique and diverse habitats. Seasonally, inundated swamps (known as "Faro" in Mandinka) appear on both sides of the river which extend for more than 2km away from the river. In the areas where the river water is salty or brackish, the only vegetation that thrives is mangrove forest. The "Banto Faros" are normally found beyond the mangrove and brackish water. Whereas, in the freshwater areas, the natural vegetation that dominates the area are swamp grass and marshes. This area is fertile and is the main centre for rice production in The Gambia.

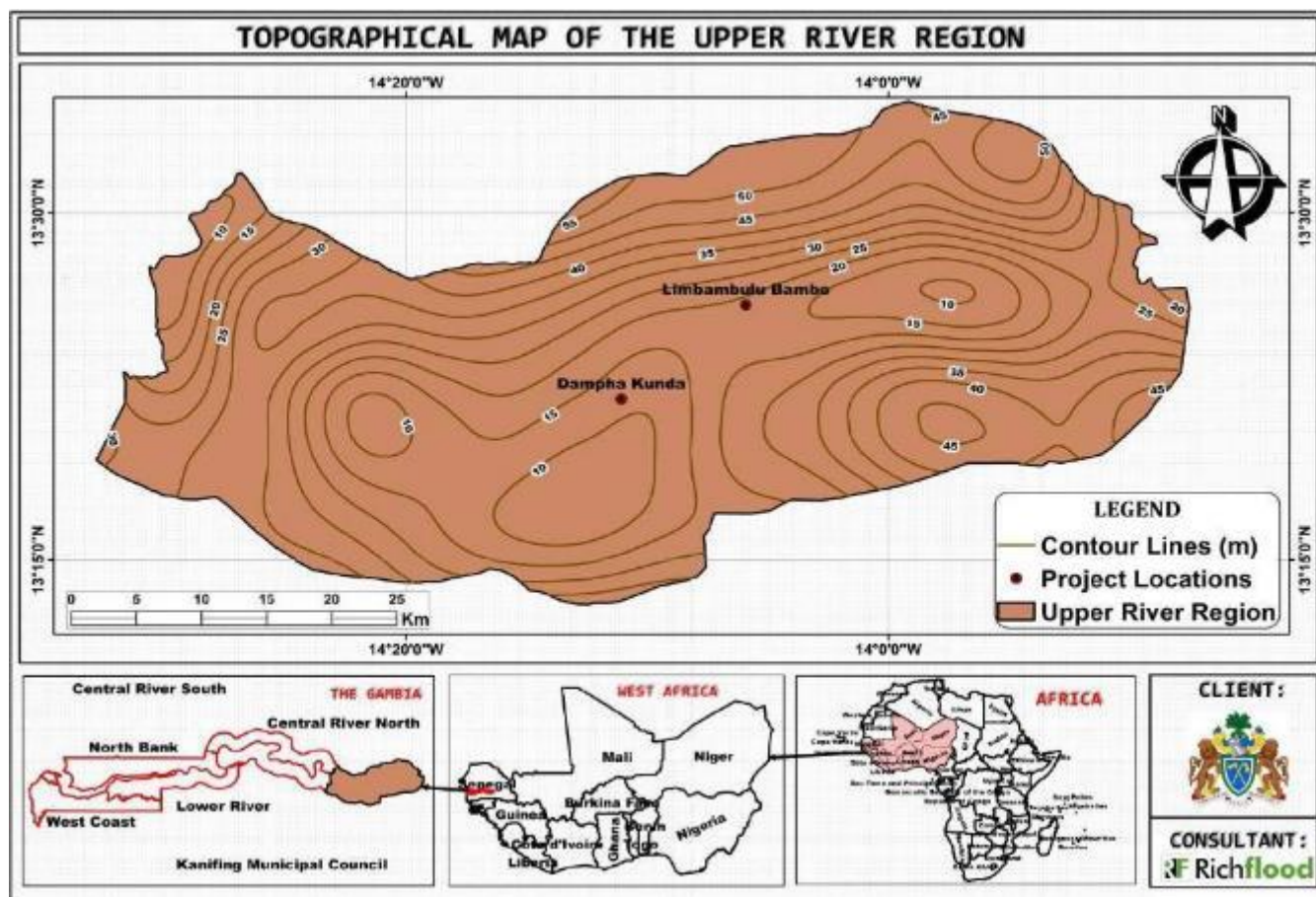
The dissected plateau exists predominantly in the upland Gambia with gentle rolling sandy hills alternating with shallow valleys. The plateau is broken up by a few flattop latent sandy hills in Central and Eastern Gambia. Natural vegetation in the plateau is along a precipitation gradient, ranging from trees and shrub savannah in the northeast to multi-story tropical forest in the southwest. All but a few pockets of the original vegetation of the plateau areas are modified or





converted for cropland expansion, settlement, and wood collection. The plateau is the center for groundnut (the country's number one cash crop) and coarse-grains (millet and sorghum) production.

The sandstone plateau occupies about 4% of the total land with rocky sandstone hills. This type of topography is found in the eastern region of the country and they are mostly unproductive, uncultivated, and un-vegetated.



**Figure 4.2: Topographic Map of Upper River Region (URR)**

*Source: Richflood GIS Unit, 2024*



#### **4.3.2 Geology**

##### ***Geology of Gambia Republic***

The geology of the Gambia is defined by thick and comparatively recent sequences of sediments and sedimentary rocks, deposited in the last 66 million years. The country is underlain almost entirely by geologically recent Cenozoic sedimentary rocks. Much deeper basement rocks are likely present, although they are not well understood. Most research has focused on oil and groundwater exploration.

The oldest rock units recognized in the west of the country, along the Gambia River, are sandstones and kaolinitic claystones from the Oligocene, Miocene or Pliocene. Ironstone, including iron oxides, gravel, clay and sand dating to the Pleistocene are found in the east of the Gambia, while coastal sands, salt, silt and clay are common dating to the Holocene (Schlüter, 2008).

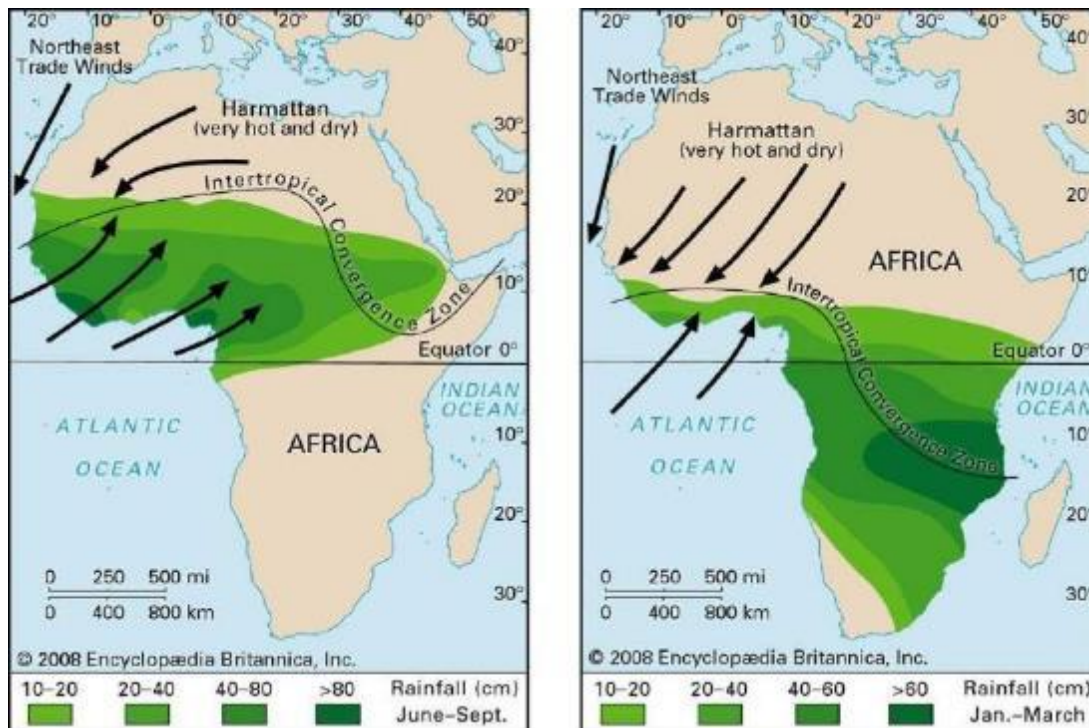
##### ***Hydrogeology***

According to the British Geological Survey reports, the Gambia has extensive surface water which is rarely used for drinking water. At the mouth of the river, high salinity is a problem in surface water supplies. The shallow sand aquifer encompasses almost the entire country, made up of Holocene sediments and an underlying, partially confined Pliocene aquifer. The sand aquifer ranges between five and 25 meters thick. The country also has a deep sandstone aquifer, with fossil water of as much as 40,000 years confined at depths of 250 to 450 meters. Out of a total storage of 650,000 cubic meters only 80,000 cubic meters is believed to be potable.

#### **4.3.3 Overview of Climate at The Gambia**

Generally, the climate in the Gambia is influenced by the Inter-Tropical Convergence Zone (ITCZ) north and south of the equator and is characterized by wet and dry conditions controlled by the north-south movements of the Inter-Tropical Convergence Zone around the equatorial line. The country has a Sudano-Sahelian climate with two distinct seasons: a hot rainy season from June to October, and a dry season from November to May with rare occurrence of rainfall. July, August, and September are the highest rainfall months usually accompanied by strong winds, heavy downpours, and severe lightning flashes; October is the hottest month.





**Figure 4.3: Schematic streamlines of near-surface flow in the Global Tropics**

*Source: Encyclopaedia Britannica (2022)*

#### 4.3.3.1 Overview of Climate at the Upper River Region (URR)

To comprehensively assess the climatic conditions in the Upper River Region (URR), 30-year (1993 to 2022) meteorological data was obtained from the Department of Water Resources, Ministry of Environment and Climate Change in The Gambia. The analysed data present a holistic understanding of key climatic factors, encompassing temperature, rainfall, and relative humidity essential for planning and implementing the proposed project, as well as in the climate risk assessment.

##### Mean Annual Temperature

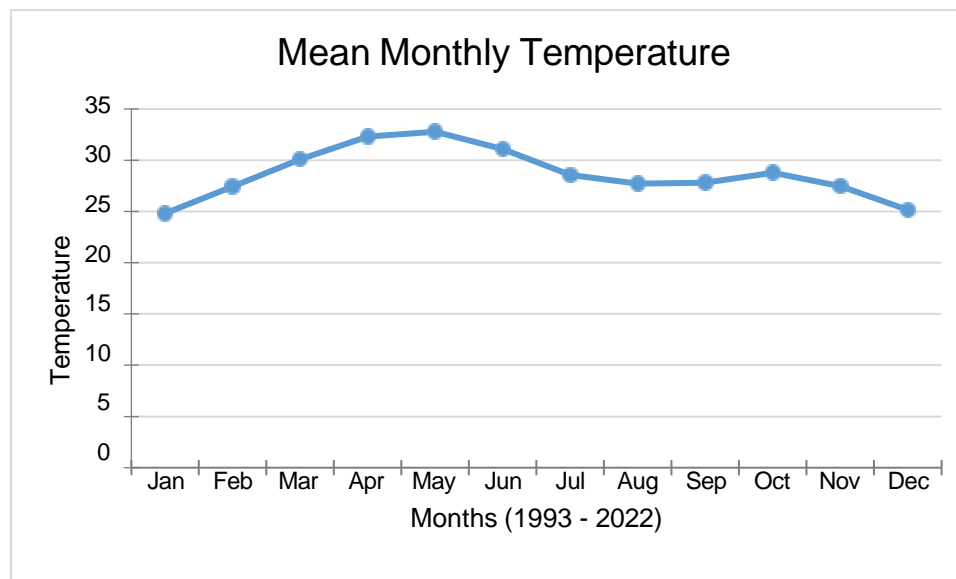
Over the three decades under study, the annual average temperatures in the URR exhibit noticeable fluctuations, ranging from 27.6°C to 29.8°C. This variability underscores the dynamic nature of the region's climate. Noteworthy observations include peak temperatures in 1998, 2004, and 2015, reaching 29.8°C, 29.0°C, and 29.2°C, respectively. Conversely, 2021 and 2017 experienced relatively lower temperatures, with averages of 27.6°C and 28.3°C. The highest recorded annual average temperature occurred in 2015, while 2021 witnessed the lowest in the analyzed period.



### Mean Monthly Temperature

The mean monthly temperatures across the 30-year (1993 to 2022) period showcase distinctive patterns, reflecting the seasonal variability in the URR's climate. The warmest months are typically April (32.3°C), May (32.8°C), and June (31.1°C), emphasizing URR's tendency to experience elevated temperatures during the middle of the year. In contrast, the cooler months include December (25.1°C), January (24.8°C), and February (27.4°C), indicating a drop in temperatures during the latter part of the year and the beginning of the dry season.

The months of July (28.6°C) and August (27.7°C) also exhibit lower temperatures, aligning with the peak of the rainy season when increased cloud cover and precipitation contribute to a reduction in temperature. September (27.8°C) marks a transitional period as the rainy season wanes, with temperatures remaining relatively stable before the onset of the dry season.



**Figure 4.4: Average Mean Monthly Temperature (1993-2022)**

*Source: Department of Water Resources, Ministry of Environment and Climate Change, 2024*

### Mean Annual Precipitation

From 1993 to 2022, the annual rainfall averages in the region exhibited notable variations, highlighting the dynamic nature of the local climate. The data reveals a range of annual rainfall values, with the highest recorded average at 116.2 mm in 2018 and the lowest at 52.2 mm in 1993.

Throughout the analyzed period, several years experienced above-average rainfall, such as 1999 (114.7 mm), 2015 (85.8 mm), and 2022 (100.9 mm). Conversely, some years witnessed below-

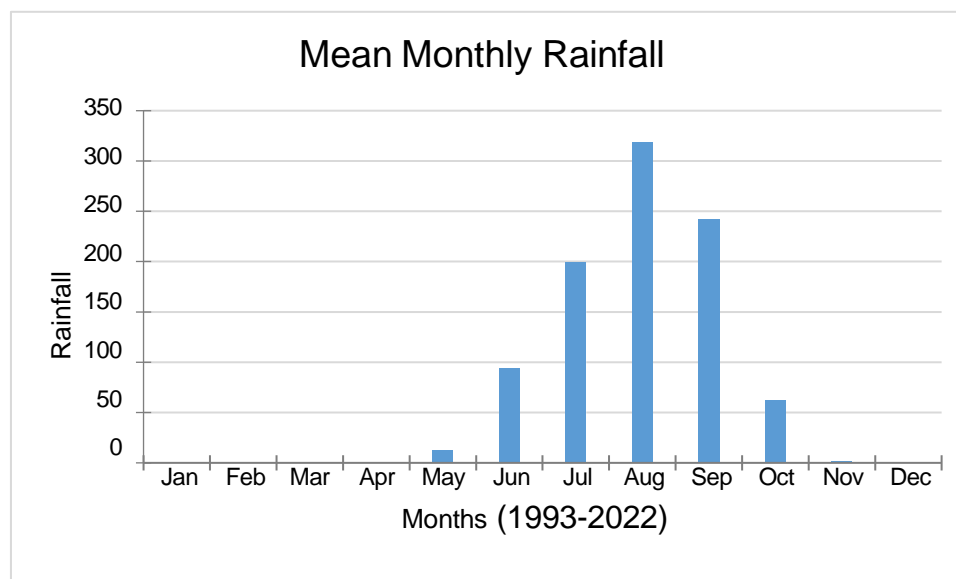


average rainfall, with 1993, 2001, and 2016 being notable examples. The year 2018 stands out as the wettest year in the analyzed period, marked by a significant increase in annual rainfall compared to the surrounding years.

### Mean Monthly Precipitation

Across the span of 1993 to 2022, the Upper River Region (URR) has witnessed diverse patterns in mean monthly rainfall. January and February consistently recorded minimal rainfall, with averages of 0.2 mm and 0.1 mm, respectively. March similarly exhibited low precipitation at 0.1 mm. April witnessed a near absence of rainfall, registering at 0.0 mm. The onset of the rainy season in May marked a notable increase, with an average rainfall of 12.5 mm. Subsequently, June and July experienced a substantial surge in precipitation, recording mean monthly values of 93.7 mm and 198.8 mm, respectively. These months are indicative of the peak of the rainy season in the URR.

August maintained the high rainfall trend with an average of 318.4 mm, emphasizing the region's susceptibility to intense precipitation during this period. September, following closely, recorded an average of 242.6 mm, contributing to the overall abundance of rainfall during the late summer months. As the region transitions towards the end of the rainy season, October experiences a reduction in precipitation with an average of 62.4 mm. November and December return to lower rainfall levels, recording means of 1.7 mm and 0.2 mm, respectively.



**Figure 4.5: Average Mean Monthly Rainfall (1993-2022)**

*Source: Department of Water Resources, Ministry of Environment and Climate Change, 2024*



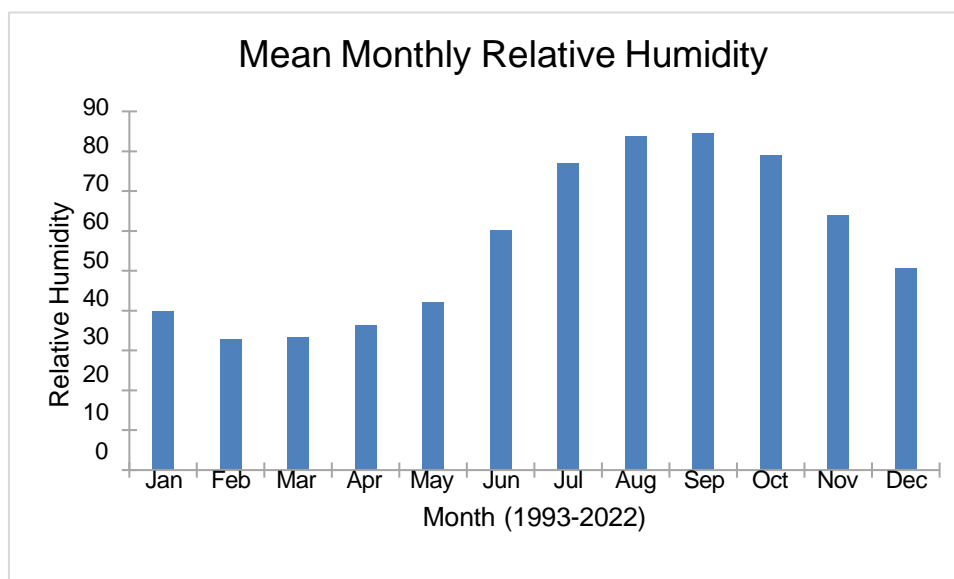
### Average Annual Relative Humidity

Across the years, relative humidity values fluctuated, showcasing the region's sensitivity to environmental factors. Notable observations include the years 1993, 1998, and 2021, which recorded lower average relative humidity values of 54.2%, 54.1%, and 52.5%, respectively. Conversely, 2008, 2016, and 2019 stand out with relatively higher average relative humidity values of 60.7%, 56.6%, and 60.4%, respectively. Throughout the analyzed period, the URR maintained a relatively stable range of annual average relative humidity, with values typically falling between 52.5% and 60.7%.

### Mean Monthly Relative Humidity

In the early months of the year, January and February exhibit lower mean relative humidity values at 39.9% and 32.8%, respectively, indicating drier conditions. March experienced a slight increase to 33.4%, marking the beginning of a transition toward higher humidity levels. May records an average of 42.1%, signifying an increase in atmospheric moisture content. June and July experience a significant rise, reaching 60.2% and 77.0%, respectively, reflecting the peak of the rainy season when humidity levels are typically elevated. August maintains this trend with a mean relative humidity of 83.8%, indicative of the continued influence of the rainy season. September, with an average of 84.4%, further emphasizes the region's high humidity during this period.

As the URR transitions to the latter part of the year, mean relative humidity values gradually decrease. October records an average of 79.0%, reflecting a reduction in atmospheric moisture content. November and December experience a further decline in humidity, with averages of 63.9% and 50.5%, respectively, as the region enters the dry season.



**Figure 4.6: Mean Monthly Relative Humidity (1993-2022)**

*Source: Department of Water Resources, Ministry of Environment and Climate Change, 2024*

#### 4.3.3.2 Micro Climate/Meteorology (Field Observation)

To compliment the data received from the Department of Water Resources, Ministry of Environment and Climate Change meteorological measurement was conducted during the field survey at various locations within the rice fields and communities in the URR. Parameters such as; temperature, wind speed, relative humidity, dew point, wet bulb and atmospheric pressure were observed and the obtained results are presented in *Table 4.1* below.

**Table 4.1: Results of on-site Meteorological conditions measurement**

Code	Monitoring location	Temp (°C)	Dew Point (°C)	Wet Bulb (°C)	Relative Humidity (%RH)	Atmospheric Pressure (HPA)	Wind Speed(m/s)
MET <sub>1</sub>	Dampha Kunda (Rice field)	46.8	11.9	21.3	14	1007.4	0
MET <sub>2</sub>	Dampha Kunda (Rice field)	45.5	11.1	21.9	14.9	1008.6	0.3
MET <sub>3</sub>	Dampha Kunda (Rice field)	34.1	7.5	17.8	18	1013.3	0
MET <sub>4</sub>	Dampha Kunda (Rice field)	42.6	10.3	20.5	16.2	1019.4	0.1
MET <sub>5</sub>	Dampha Kunda (Community)	41.9	8.9	18.4	15.6	1009.2	0
MET <sub>6</sub>	Limbambulu Bambo (Rice field)	33.6	11.5	20.9	14.8	1000.9	0.1



Code	Monitoring location	Temp (°C)	Dew Point ( °C)	Wet Bulb (°C)	Relative Humidity (%RH)	Atmospheric Pressure (HPA)	Wind Speed(m/s)
MET <sub>7</sub>	Limbambulu Bambo (Rice field)	49.2	9.3	19.5	17.1	1010.7	0.2
MET <sub>8</sub>	Limbambulu Bambo (Rice field)	39.4	10.3	22.8	16.3	946.2	0.3
MET <sub>9</sub>	Limbambulu Bambo (Rice field)	44.7	11.1	18.9	15.3	10001.4	0.1
MET <sub>10</sub>	Limbambulu Bambo (Community)	35.2	10.9	21.4	15.2	1012.6	0.1

#### 4.3.4 Air Quality Assessment

Air quality varies with the season due to the variations in temperature, humidity, and rainfall. During the dry season, dust that is suspended in the near-ground air layers may cause frequent, but not significant, hazes, which reduce visibility. However, during the wet season, rainfall removes dust from the atmosphere and reduces particulate matter pollution levels. The dry season is characteristic of very dry and dusty conditions in the proposed project area.

##### *Air Quality Standards (AQS)*

The World Health Organization (WHO) (2021) set guidelines for ambient air quality. Table 4.2 presents international air quality standards, for the following pollutants: NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub>. The international standards set by the IFC Environmental, Health, and Safety (EHS) Guidelines for Air Emissions and Ambient Air Quality published in 2021 refer to the WHO Air Quality Guidelines.

**Table 4.2:** IFC/WHO air quality standards

Parameter	Time Weighted Average	IFC/WHO Guidelines Value
SO <sub>2</sub> (µg/m <sup>3</sup> )	Daily (24-hour)	125 (Interim target 1)
		50 (Interim target 2)
		<b>40 (AQG Level)</b>
	10-minute	500 (AQG)
CO (mg/m <sup>3</sup> )	Daily (24-hour)	7 (Interim target 1)
		<b>4 (AQG level)</b>



Parameter	Time Weighted Average	IFC/WHO Guidelines Value
	8-hour	10 (AQG)
	1-hour	35 (AQG)
	15-minute	100 (AQG)
NO <sub>2</sub> (µg/m <sup>3</sup> )	Annual	40 (Interim target 1)
		30 (Interim target 2)
		20 (Interim target 3)
		<b>10 (AQG level)</b>
	Daily (24-hour)	120 (Interim target 1)
		50 (Interim target 2)
		<b>25 (AQG level)</b>
	1 hour	200 (AQ)
O <sub>3</sub> (µg/m <sup>3</sup> )	Peak Season (6 months)	100 (Interim target 1)
		70 (Interim target 2)
		<b>60 (AQG level)</b>
	Daily (8-hour)	160 (Interim target 1)
		120 (Interim target 2)
		<b>100 (AQG level)</b>
PM <sub>10</sub> (µg/m <sup>3</sup> )	Annual	70 (Interim target 1)
		50 (Interim target 2)
		30 (Interim target 3)
		20 (Interim target 4)
		15 (AQG level)
	Daily (24-hour)	150 (Interim target 1)
		100 (Interim target 2)
		75 (Interim target 3)
		50 (Interim target 4)





Parameter	Time Weighted Average	IFC/WHO Guidelines Value
		<b>45 (AQG level)</b>
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Annual	35 (Interim target 1)
		25 (Interim target 2)
		15 (Interim target 3)
		10 (Interim target 4)
		<b>5 (AQG level)</b>
	Daily (24-hour)	75 (Interim target 1)
		50 (Interim target 2)
		37.5 (Interim target 3)
		25 (Interim target 4)
		<b>15 (AQG level)</b>

*Source: IFC EHS Guidelines for Air Emissions and Ambient Air Quality, 2021*

### ***Air Quality Monitoring***

During the field survey, baseline air quality monitoring was conducted. Given the limited time for the study and the absence of long-term monitoring data, the baseline survey reflects only a snapshot of the existing air quality conditions. For future impact assessments, a full year's (12 months) continuous monitoring would be preferable to determine baseline conditions across the seasons. This will highlight any seasonal changes, which may influence the mitigation strategy. The pollutants that are of primary concern are SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub>. The result provides some insights into the current air quality on-site.

A total of 10 monitoring stations (AQ<sub>1</sub> to AQ<sub>10</sub>) were established within the proposed project site and surrounding communities in the Upper River Region (URR) area. The GPS coordinates as well as the descriptions of the monitoring stations are shown in Table 4.3, while Table 4.4 presents the monitoring results as obtained during the survey.



**Table 4.3: Air Quality Monitoring location**

Code	Location Description	Coordinates	
		Latitude (N)	Longitude (W)
AQ/N <sub>1</sub>	Dampha Kunda (Rice field)	13° 41' 43.91"	15° 01' 57.40"
AQ/N <sub>2</sub>	Dampha Kunda (Rice field)	13° 41' 05.98"	15° 00' 19.78"
AQ/N <sub>3</sub>	Dampha Kunda (Rice field)	13° 40' 58.40"	14° 58' 14.52"
AQ/N <sub>4</sub>	Dampha Kunda (Rice field)	13° 41' 47.93"	14° 57' 03.08"
AQ/N <sub>5</sub>	Dampha Kunda (Community)	13° 42' 54.16"	14° 59' 45.30"
AQ/N <sub>6</sub>	Limbambulu Bambo (Rice field)	13° 44' 36.29"	15° 00' 51.33"
AQ/N <sub>7</sub>	Limbambulu Bambo (Rice field)	13° 45' 12.84"	14° 59' 21.84"
AQ/N <sub>8</sub>	Limbambulu Bambo (Rice field)	13° 43' 53.71"	14° 57' 14.09"
AQ/N <sub>9</sub>	Limbambulu Bambo (Rice field)	13° 45' 53.72"	14° 55' 41.80"
AQ/N <sub>10</sub>	Limbambulu Bambo (Community)	13° 46' 37.48"	15° 00' 39.24"

*Source: Richflood field survey, 2024*

**Table 4.4: Results of the Air Quality Monitoring**

Code	O <sub>3</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	H <sub>2</sub> S (µg/m <sup>3</sup> )	CO <sub>2</sub> (µg/m <sup>3</sup> )	VOCs ppm	SPM (µg/m <sup>3</sup> )	
								PM <sub>2.5</sub>	PM <sub>10</sub>
AQ <sub>1</sub>	0.014	BDL	BDL	BDL	BDL	506	387.5	0.068	0.358
AQ <sub>2</sub>	0.016	BDL	BDL	BDL	BDL	502	85.4	0.014	0.216
AQ <sub>3</sub>	0.023	BDL	BDL	BDL	BDL	494	228.7	0.031	0.192
AQ <sub>4</sub>	BDL	BDL	BDL	BDL	BDL	491	164.9	0.023	0.22
AQ <sub>5</sub>	0.01	BDL	BDL	BDL	BDL	488	235.7	0.95	0.072
AQ <sub>6</sub>	0.012	BDL	BDL	BDL	BDL	492	100.4	0.013	0.018
AQ <sub>7</sub>	BDL	BDL	BDL	BDL	BDL	501	208.4	0.034	0.036
AQ <sub>8</sub>	0.013	BDL	BDL	BDL	BDL	509	216.3	0.024	0.025
AQ <sub>9</sub>	0.016	BDL	BDL	BDL	BDL	484	228	0.021	0.312
AQ <sub>10</sub>	0.02	BDL	BDL	BDL	BDL	492	153.4	0.043	0.293

[Note: *BDL* - Below Detection Limit of the Equipment (*BDL* = <0.0)]

*Source: Richflood field survey, 2024*



**Plate 4.1: Air Quality Measurement**



**Plate 4.2: Meteorological reading**

*Source: Richflood filed survey, 2024*

### Result Discussion

**SPM:** In the Upper River Region (URR), the ambient air quality monitoring revealed  $PM_{2.5}$  concentrations ranging from  $<0.013$  to  $0.95\mu g/m^3$ . Similarly,  $PM_{10}$  concentrations, recorded in the range of  $<0.018$  to  $0.358\mu g/m^3$ .

**SO<sub>2</sub>:** In the Upper River Region (URR), sulfur dioxide ( $SO_2$ ) concentrations were consistently recorded as  $<0.01\mu g/m^3$  across all monitoring stations. The findings indicate that the generation of  $SO_2$  concentrations resulting from the proposed operations in URR has a low potential to cause nuisance or negatively impact the health of nearby communities.

**NO<sub>2</sub> :** In the Upper River Region (URR), nitrogen dioxide ( $NO_2$ ) concentrations were consistently recorded as  $<0.01\mu g/m^3$  across all monitoring stations. The results indicate that the generation of  $NO_2$  concentrations resulting from the proposed operations in URR has a low potential to cause nuisance or negatively impact the health of nearby communities.



**CO:** In the Upper River Region (URR), carbon monoxide (CO) concentrations were consistently recorded as  $<0.01\text{mg/m}^3$  across all monitoring stations. These results indicate that the generation of CO concentrations resulting from the proposed operations in URR has a low potential to cause nuisance or negatively impact the health of nearby communities.

**O<sub>3</sub>:** In the Upper River Region (URR), ozone (O<sub>3</sub>) concentrations were recorded within a range of  $<0.01 - 0.023\mu\text{g/m}^3$ . The findings indicate that the levels of O<sub>3</sub> resulting from the monitored operations in URR are well within acceptable limits, ensuring that the air quality adheres to established international standards.

**H<sub>2</sub>S:** In the Upper River Region (URR), hydrogen sulfide (H<sub>2</sub>S) concentrations were consistently recorded as  $<0.01\mu\text{g/m}^3$  across all monitoring stations. The findings indicate that the concentrations of H<sub>2</sub>S are consistently low at all monitored locations in URR.

**VOCs:** In the Upper River Region (URR), volatile organic compounds (VOCs) concentrations were recorded in the range of  $85.4 - 387.5\mu\text{g/m}^3$ . These results indicate a varied range of VOC levels in URR due to the methane content. Over the rice paddies, the VOC measurement is mainly due to the methane released from the cultivation of rice.

**CO<sub>2</sub>:** In the Upper River Region (URR), Carbon dioxide (CO<sub>2</sub>) concentrations were recorded in the range of  $484 - 509 \mu\text{g/m}^3$ . These results indicate a varied range of CO<sub>2</sub> levels in URR.

#### **4.3.5 Noise Quality**

To assess the current noise level at the proposed project area, ambient environmental noise monitoring was undertaken at 10 locations at URR in and around the proposed site. The objective of the baseline noise assessment was to evaluate the noise character and ascertain typical levels of pre-development ambient noise in the REWARD noise study area.

The IFC HSE guidelines for industrial and commercial ambient noise levels prescribe an absolute level of 70 dB(A) during the daytime and night-time. This value makes reference to noise from



facilities and stationary noise sources, and is commonly applied as design standards for industrial facilities; IFC has indicated that these limits are not directly applicable to transport or mobile noise sources. The results from the day-time noise monitoring conducted are presented in Table 4.5 below:

**Table 4.5:** Results of the Noise Monitoring

<b>Code</b>	<b>Average Noise [dB (A)]</b>
N <sub>1</sub>	49.4
N <sub>2</sub>	51.3
N <sub>3</sub>	50.8
N <sub>4</sub>	51.6
N <sub>5</sub>	52.4
N <sub>6</sub>	53.4
N <sub>7</sub>	51.9
N <sub>8</sub>	50.4
N <sub>9</sub>	49.3
N <sub>10</sub>	53.6
<b>WHO/IFC Guidelines</b>	<b>70</b>

*Source: Richflood field survey, 2024*

In the Upper River Region (URR), noise levels were recorded in the range of 49.3-53.6 decibels (dB). The recorded noise levels in URR were compared against the typical day-time guideline for noise in industrial and commercial areas, specifically the IFC Noise Limits, set at 70 dB(A). The results indicate that the recorded noise levels in URR fall within the acceptable range according to the established guidelines.

#### 4.3.6 Water Quality

Water sampling and analysis were undertaken to understand the overall baseline water quality characteristics of the surface and groundwater in Project AOI. The surface water sampling was based on the identification of the major surface water body and its interaction with the project e.g. River Gambia. Groundwater sampling locations were selected to obtain representative water samples from various zones within the AOI. The samples were collected from existing boreholes (hand pumps being used by the villagers) and wells.



### ***Approach and Methods***

A total of Seven (7) water samples were collected, Five (5) surface water and Two (2) groundwater were collected at the Upper River Region (URR). The water samples were collected in 500ml PET bottles for general Physico-chemical analysis. Samples for heavy metals analysis were collected separately in plastic containers acidified with concentrated Nitric acid. Pre-sterilized 50ml McCartney bottles were used for samples meant for microbial analysis. In-situ measurements of fast degrading parameters including pH, Conductivity, Total Dissolved Solids (TDS), Temperature, and Dissolved Oxygen (DO) were taken at each location using a calibrated Bante 900P-UK Multiparameter Water Quality Meter. All samples collected were preserved on an ice chest and transported to the Laboratory for further analysis.

The samples were analysed for parameters covering physical, chemical and microbiological characteristics, which include certain heavy metals, trace elements and toxic constituents. The samples were analyzed as per the standard procedure/method given in Standard Method for Examination of Water and Wastewater Edition 22, published by the American Public Health Association (APHA). Details of the analysis method and protocol are presented in Table 4.6.

The quality of surface water was compared with the US Environmental Protection Agency (EPA) surface quality water guidelines for *Aquatic Life* and *Human Health for Consumption and Organism*. The groundwater was compared with the World Health Organization (WHO) *Drinking Water Standard* for comparison.

**Table 4.6: Method for Water Analysis**

S/N	Parameter	Method	Protocol
1.	Colour	Visual Comparison	APHA 2120B
2.	Odour	Threshold Odour Test	APHA 2150B
3.	Temperature	Thermometric	APHA 2550B
4.	pH	Electrometric	APHA 2120B
5.	Dissolved Oxygen	Electrometric	APHA 4500-O G
6.	Total Dissolved Solids	Electrometric	APHA 2540C
7.	Electrical Conductivity	Electrometric	APHA 2510B
8.	Salinity	Electrometric	APHA 2520C
9.	Total Suspended Solid	Gravimetric	APHA 2540D
10.	Turbidity	Nephelometric	APHA 2130B
11.	Total Alkalinity	Titrimetric	APHA 2320B





S/N	Parameter	Method	Protocol
12.	Total Hardness	EDTA Titrimetric	APHA 2340C
13.	Chemical Oxygen Demand	Colorimetric	APHA 5220D
14.	Biochemical Oxygen Demand	BOD 5 day	APHA 5210B
15.	Nitrate (NO <sub>3</sub> <sup>-</sup> )	Colorimetric	APHA 4500-NO <sub>2</sub> <sup>-</sup> B
16.	Nitrite (NO <sub>2</sub> <sup>-</sup> )	Colorimetric	APHA 4500-NO <sub>3</sub> <sup>-</sup> B
17.	Phosphorus (P)	Colorimetric	APHA 4500-P C
18.	Chloride (Cl <sup>-</sup> )	Argentometric	APHA4500Cl <sup>-</sup>
19.	Total Nitrogen	Persulfate	APHA4500N
20.	Total Chlorine /Free chlorine	DPD Colorimetric	APHA 4500- Cl G
21.	Total Pesticides	Gas Chromatography	APHA 6630B
22.	Total Herbicides	Gas Chromatography	APHA 6640B
23.	Fluoride (F <sup>-</sup> )	SPANDS	APHA4500F <sup>-</sup> D
24.	Zinc (Zn)	Atomic Absorption Spectroscopy	APHA 3500-Zn
25.	Calcium(Ca)	Atomic Absorption Spectroscopy	APHA 3500-Ca B
26.	Potassium (K)	Atomic Absorption Spectroscopy	APHA 3500-K B
27.	Arsenic (As)	Atomic Absorption Spectroscopy	APHA 3500-As B
28.	Manganese (Mn)	Atomic Absorption Spectroscopy	APHA 3500-Mn B
29.	Iron (Fe)	Atomic Absorption Spectroscopy	APHA 3500-Fe B
30.	Copper (Cu)	Atomic Absorption Spectroscopy	APHA 3500-Cu C
31.	Lead (Pb)	Atomic Absorption Spectroscopy	APHA 3500-Pb B
32.	Total Coliform Count	Multiple Tube Technique	APHA 9225
33.	Total Bacteria Count	Pour Plate	APHA 9215
34.	Fecal coliform	Fecal coliform Procedure	APHA 9221- E

Source: Laboratory Report, February, 2024

#### 4.3.6.1 Surface Water Quality

The main water body within the project area is River Gambia rising in the Republic of Guinea and flowing westward through The Gambia into the Atlantic Ocean. Its major tributaries are the Sandougou and the Sofianiama. It constitutes a unifying factor for the independent state of The Gambia, which consists of a narrow strip of land along both banks of the river. From its sources in the Highlands of the Fauta Djallon, the Gambia follows a winding course to its mouth, which is a ria or drowned estuary. The river is joined by numerous creeks called bolons. Dense mangrove swamps fringe the lower river for 60 miles (97 km) inland, after which freshwater swamps and salt flats on low-lying stretches alternate with dense clumps of small trees and shrubs that line the cliffs. On the higher slopes of the riverbank, swamps and shrubs give place to parkland and tall





grass. The wild oil palm grows along the valley bottom. The swampy region closest to the river, with its dense masses of mangrove trees often growing more than 100 feet (30 m) high, abounds in wildlife but has been of little use for either agriculture or human settlement.

Surface water samples were collected from River Gambia. Five (5) of the samples were collected at the Upper River Region (URR). The surface water sampling location coordinate is summarized in Table 4.7.

**Table 4.7:** Surface water sampling location

Code	Location Description	Coordinates	
		Latitude (N)	Longitude (W)
SW <sub>1</sub>	Limbambulu Bambo (River Gambia)	13° 26' 24.45"	14° 06' 16.07"
SW <sub>2</sub>	Dampha Kunda (River Gambia)	13° 24' 40.66"	14° 07' 14.07"
SW <sub>3</sub>	Limbambulu Bambo (Rice field)	13° 22' 30.23"	14° 07' 24.86"
SW <sub>4</sub>	Limbambulu Bambo (Rice field)	13° 18' 17.64"	14° 10' 18.79"
SW <sub>5</sub>	Limbambulu Bambo (control)	13° 28' 57.53"	14° 08' 47.88"

*Source: Richflood field survey, 2024*

The results of the analysis are presented in Table 4.8 below



**Table 4.8: Surface Water Quality Analysis**

S/N	PARAMETER	UNIT	RESULT					STANDARD	
			SW <sub>1</sub> Limbambulu Bambo (River Gambia)	SW <sub>2</sub> Dampha Kunda (River Gambia)	SW <sub>3</sub> Rice Field Limbambulu Bambo	SW <sub>4</sub> Limbambulu Bambo (River Gambia)	SW <sub>5</sub> Dampha Kunda (River Gambia)	US EPA Aquatic Life Criteria (Chronic)	US EPA Human Health for Consumption and Organism
IN-SITU ANALYSIS									
1.	Colour	TCU	Colourless	Colourless	Turbid	Turbid	Turbid	NS	NS
2.	Odour	TN	Odourless	Odourless	Odourless	Odourless	Mild-Offensive	NS	NS
3.	Turbidity	NTU	0.04	0.02	0.40	2.00	0.50	NS	NS
4.	Temperature	°C	30.20	23.40	23.40	24.10	25.20	NS	NS
5.	pH	-	7.10	7.07	7.25	7.04	7.18	6.50 - 9.00	5.00 – 9.00
6.	Dissolved Oxygen	mg/L	2.23	2.18	2.09	1.77	5.45	NS	NS
7.	Total Dissolved Solids	mg/L	14.47	14.71	33.90	25.60	32.20	NS	250.00
8.	Electrical Conductivity	µS/cm	29.60	29.50	66.80	52.10	64.60	NS	NS
9.	Salinity	mg/L	1.93	2.37	2.11	2.14	0.04	NS	250.00
CHEMICAL ANALYSIS									
10.	Total Suspended Solid	mg/L	2.00	4.00	58.00	149.00	36.00	NS	NS
11.	Total Alkalinity	mgCaCO <sub>3</sub> /L	100.00	50.00	150.00	50.00	50.00	20.00	NS
12.	Total Hardness	mgCaCO <sub>3</sub> /L	250.00	70.0	90.00	70.00	120.00	NS	NS
13.	Chloride	mg/L	249.992	224.930	204.936	209.935	19.994	230.00	NS
14.	Chemical Oxygen Demand	mg/L	2.376	11.880	33.264	35.640	35.640	NS	NS
15.	Biochemical Oxygen Demand	mg/L	<0.01	<0.01	<0.01	0.47	<0.01	NS	NS
16.	Nitrate (NO <sub>3</sub> <sup>-</sup> )	mg/L	4.100	4.900	3.550	1.675	3.975	NS	10.00
17.	Nitrite (NO <sub>2</sub> <sup>-</sup> )	mg/L	0.024	0.024	0.019	0.048	0.078	NS	NS
18.	Total Nitrogen	mg/L	4.229	4.937	3.664	1.920	4.014	NS	NS
19.	Fluoride	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	NS	NS
20.	Phosphorus (P)	mg/L	3.267	1.520	1.500	1.416	1.271	NS	NS
21.	Free Chlorine	mg/L	0.07	0.11	1.16	0.80	0.37	NS	NS
22.	Total Chlorine	mg/L	0.08	0.13	0.71	1.01	0.37	0.011	NS
METALS/HEAVY METAL ANALYSIS									



S/N	PARAMETER	UNIT	RESULT					STANDARD	
			SW <sub>1</sub> Limbambulu Bambo (River Gambia)	SW <sub>2</sub> Dampha Kunda (River Gambia)	SW <sub>3</sub> Rice Field Limbambulu Bambo	SW <sub>4</sub> Limbambulu Bambo (River Gambia)	SW <sub>5</sub> Dampha Kunda (River Gambia)	US EPA Aquatic Life Criteria (Chronic)	US EPA Human Health for Consumption and Organism
23.	Potassium (K)	mg/L	0.674	0.211	2.420	0.077	0.503	NS	NS
24.	Iron (Fe <sup>2+</sup> / Fe <sup>3+</sup> )	mg/L	0.098	<0.001	<0.001	0.121	<0.001	1.00	NS
25.	Copper (Cu)	mg/L	0.001	<0.001	0.046	0.066	<0.001	NS	1.30
26.	Zinc (Zn)	mg/L	0.074	0.021	0.881	0.112	0.267	0.12	7.40
27.	Lead (Pb)	mg/L	<0.001	<0.001	<0.001	<0.001	0.261	0.0025	NS
28.	Manganese ( Mn)	mg/L	<0.001	<0.001	0.247	0.047	0.132	NS	0.05
29.	Calcium (Ca)	mg/L	16.821	8.409	8.410	8.411	8.410	NS	NS
30.	Arsenic (As)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.15	NS
<b>MICROBIOLOGICAL ANALYSIS</b>									
31.	Total Bacteria Count	CFU/ml	$0.1 \times 10^1$	$1.3 \times 10^1$	$0.3 \times 10^1$	$1.12 \times 10^2$	$6.4 \times 10^1$	NS	NS
32.	Total Coliform Count	MPN/100ml	Absent	$0.2 \times 10^1$	$3.9 \times 10^1$	$1.6 \times 10^1$	$3.0 \times 10^1$	NS	NS
33.	Faecal coliform	CFU/ml	Absent	Absent	Absent	Absent	Absent	NS	NS

**MPN** - Most Probable Number, **CFU** - Colony forming unit, **NS** - Not Specified, **TN** - Threshold Number, **TCU** - True Colour Unit, Detection Limits (<0.01; <0.001)

**Source:** Richflood Laboratory, February 2024.

**Limit Source:** United State Environmental Protection Agency



### ***Surface Water Quality***

The quality of surface water was assessed against the guidelines established by the US Environmental Protection Agency (EPA) for both Aquatic Life and Human Health for Consumption and Organisms. The detailed analysis results are presented in Table 4.7, and specific water analysis parameters are discussed below:

**pH:** The pH analysis of surface water in the sampled locations of the Upper River Region (URR) demonstrates adherence to the permissible limits set by the US EPA. All pH results in URR fall within the acceptable range of 6.50 to 9.00 for Aquatic Life and 5.00 to 9.00 for Human Health, indicating neutral conditions.

**Dissolved Oxygen (DO):** Across all five samples, the DO values ranged from 0.00 to 8.37 mg/L, reflecting a diverse range of oxygen concentrations in the surface water.

**Biochemical Oxygen Demand (BOD):** Across the samples, the BOD values span from 3.41 to 11.33 mg/L, indicating a relatively higher organic pollution load in the surface water.

**Chloride:** Specifically, at SW<sub>1</sub> (Limbambulu Bambo, River Gambia), the chloride level measured at 249.992 mg/L exceeded the US EPA surface water limit of 230.00 mg/L for aquatic life. However, other locations within URR registered chloride content within the permissible range. The elevated chloride levels at SW<sub>1</sub> could be attributed to factors such as rock salt (NaCl) runoff, septic tank effluent, animal waste, water softener regeneration, or potash fertilizer.

**Total Alkalinity:** The analysis of Total Alkalinity in surface water samples from the sampled locations in the Upper River Region (URR) reveals elevated levels, surpassing the US EPA surface water standard limit for Aquatic Life Criteria of 20.00 mg/L. In URR, the total alkalinity ranges from 50.00 to 150 mg/L, which can be attributed to various factors such as geological influences (presence of alkaline minerals like limestone), chemical weathering of rocks, human activities (agricultural runoff, sewage discharge, and industrial effluents), natural processes (photosynthesis), and the accumulation of dissolved solids in reservoirs. The higher total alkalinity levels in URR may have implications for aquatic ecosystems, necessitating further investigation into the specific sources and impacts of elevated alkalinity.

**Nitrate:** The analysis of nitrate levels in surface water samples from the sampled locations in the Upper River Region (URR) indicates compliance with the US EPA permissible standard of 10



mg/L for Human Health for Consumption and Organism. In URR, the nitrate level was below the detection limit, confirming that the surface water meets the required standards.

**Total Chlorine:** The surface water samples from the sampled locations in the Upper River Region (URR) demonstrate elevated Total Chlorine levels, surpassing the US EPA permissible limit of 0.011 mg/L. In URR, the chlorine levels ranged from 0.01 to 0.37 mg/L. This elevation could potentially be attributed to agricultural activities, including the use of chlorine-based pesticides, herbicides, and other chemicals that enter surface water through runoff.

**Coliform levels:** The Total bacteria count ranges from  $0.1 \times 10^1$  to  $1.12 \times 10^1$  CFU/ml, with absent Faecal Coliform and Total Coliform at SW1 (Limbambulu Bambo, River Gambia). However, other sampled points in URR show values ranging from  $0.2 \times 10^1$  to  $3.9 \times 10^1$  MPN/100ml, indicating the presence of coliform bacteria in some locations.

**Iron:** The analysis of iron content in surface water samples from the sampled locations in the Upper River Region (URR) indicates compliance with the US EPA permissible standard of 1 mg/L for Aquatic Life. In URR, the iron content ranged from 0.00 to 0.098 mg/L. These results suggest that the iron levels in URR surface water are within acceptable limits, ensuring a favourable environment for aquatic life.

**Copper:** The analysis of copper levels in surface water samples from the sampled locations in the Upper River Region (URR) indicates adherence to the US EPA guideline value of 1.30 mg/L for Human Consumption and Organisms. In URR, copper levels ranged from <0.001 to 0.066 mg/L.

**Zinc:** At SW1, SW2, and SW4 in URR, zinc levels ranged from 0.074, 0.021 to 0.112 mg/L. However, at SW3 and SW5, zinc levels exceeded the US EPA permissible standard of 0.12 mg/L for Aquatic Life.

**Lead:** The analysis of lead levels in water samples from the sampled locations in the Upper River Region (URR) indicates variations in concentrations. Lead levels ranged from <0.001 to 0.261 mg/L, with the lead content at SW5 exceeding the US EPA permissible standard limit of 0.0025 mg/L for Aquatic Life.

**Manganese (Mn):** Manganese levels ranged from <0.001 to 0.247 mg/L, with the content at SW3 and SW5 exceeding the US EPA permissible standard of 0.05 mg/L for Human Consumption and Organism.



**Arsenic:** The analysis of Arsenic levels in surface water samples from the sampled locations in the Upper River Region (URR) indicates that the concentrations were below the detection limit. This conformance with the US EPA guideline value of 0.15 mg/L for Aquatic Life suggests that the Arsenic levels in the surface water of URR are within acceptable limits, posing no immediate concerns for aquatic life.

#### **4.3.6.2 Groundwater Quality**

Within The Gambia, groundwater is tapped mostly from two main groundwater sources; the Shallow Sand Aquifer (SSA) and the Deep Sandstone Aquifer (DSA).

##### **A. The Shallow Sand Aquifer (SSA) System:**

The Shallow Sand Aquifer (SSA), found throughout The Gambia and much of Senegal, is essentially where the local hand-dug wells tap their supply within the potential target communities of the GAFSP. This aquifer system from the Mio-Pliocene age occurs at depths between 15 and 120m below ground level. Within the country, the SSA is subdivided into two, the Upper Phreatic Aquifer and the Lower Semiconfined Aquifer. The two are separated by a clay-silt aquitard. The SSA is composed of on average medium to coarse sand.

**The Upper Phreatic Aquifer:** This aquifer comprises mainly fine-to-medium-grained quartz sands with intercalations of silt and clay. The relatively thin aquifer (with a thickness of 1m and 20m) occurs at depths between 10m and 30m which is mostly the depths of local wells within the proposed Project sites. Indeed, all hand-dug wells and some shallow boreholes feed from this aquifer.

**The Lower Semi-confined Aquifer:** This aquifer depth varies between 10m and 50m below ground level, and the groundwater level is generally found at a depth between 10m to 20m. The groundwater generally flows from South to North, and the transmissivity values range from 100 m<sup>2</sup>/day to over 750 m<sup>2</sup>/day. The hydraulic conductivity ranges from 5 to 20 m/day. The majority of boreholes (mostly provided by the Government as portable water for the communities, as well as in communal women's vegetable gardens) in the various communities targeted by the Project tap this aquifer. It is constituted of mainly yellow-white fine-to medium-grained sands.



## B. The Deep Sandstone Aquifer (DSA) System

The Deep Sandstone Aquifer (DSA), is constituted of Palaeocene and Maestrichtian sandstones; it underlies the whole of the Gambia and a large part of Senegal. It is confined by a 200m to 300m thick sequence of mainly clays and marls. The groundwater in this aquifer moves from east to west; it is of fossil origin and is 4,000 to 40,000 years old. This aquifer is tapped in most countries in the sub-region. However, it is not used for drinking water supply in The Gambia.

A total of two (2) groundwater samples were collected at the Upper River Region (URR). The groundwater sampling location coordinate is summarized in Table 4.9.

**Table 4.9:** Groundwater sampling location

Code	Location Description	Coordinates	
		Latitude (N)	Longitude (W)
GW <sub>1</sub>	Dampha Kunda (Borehole)	13° 22' 20.58"	14° 12' 58.10"
GW <sub>2</sub>	Limbambulu Bambo (Borehole)	13° 27' 53.80"	14° 09' 00.53"

*Source: Richflood field survey, 2024*



**Plate 4.3a:** Groundwater sampling



**Plate 4.3b:** Groundwater in-situ testing

*Source: Richflood field survey, 2024*

The results of the analysis are presented in Table 4.10 below



**Table 4.10: Groundwater Quality Analysis**

S/N	PARAMETER	UNIT	RESULT		WHO Drinking Water Standard
			GW <sub>1</sub> Dampha Kunda (Borehole)	GW <sub>2</sub> Limbambulu Bambo (Borehole)	
IN-SITU ANALYSIS					
1.	Colour	TCU	Colourless	Colourless	Colourless
2.	Odour	TN	Odourless	Odourless	Odourless
3.	Turbidity	NTU	0.02	0.01	5.00
4.	Temperature	°C	29.00	33.10	NS
5.	pH	-	7.09	7.12	6.50- 8.50
6.	Dissolved Oxygen	mg/L	2.18	1.95	NS
7.	Total Dissolved Solids	mg/L	6.55	11.17	NS
8.	Electrical Conductivity	μS/cm	13.59	22.40	NS
9.	Salinity	mg/L	0.02	0.02	NS
CHEMICAL ANALYSIS					
10.	Total Suspended Solid	mg/L	3.00	<0.01	NS
11.	Total Alkalinity	mgCaCO <sub>3</sub> /L	100.00	50.00	NS
12.	Total Hardness	mgCaCO <sub>3</sub> /L	140.00	90.00	NS
13.	Chloride	mg/L	19.994	22.193	NS
14.	Chemical Oxygen Demand	mg/L	5.940	23.760	NS
15.	Biochemical Oxygen Demand	mg/L	6.65	8.37	NS
16.	Nitrate (NO <sub>3</sub> <sup>-</sup> )	mg/L	4.550	5.025	50.00
17.	Nitrite (NO <sub>2</sub> <sup>-</sup> )	mg/L	0.024	0.018	3.00
18.	Total Nitrogen	mg/L	4.677	5.077	NS
19.	Fluoride	mg/L	<0.01	<0.01	1.50
20.	Phosphorus (P)	mg/L	1.389	1.302	NS
21.	Free Chlorine	mg/L	<0.01	0.05	5.00
22.	Total Chlorine	mg/L	0.03	0.07	NS
METALS/HEAVY METAL ANALYSIS					
23.	Potassium (K)	mg/L	0.773	0.260	NS
24.	Iron (Fe <sup>2+</sup> / Fe <sup>3+</sup> )	mg/L	<0.001	<0.001	NS
25.	Copper (Cu)	mg/L	0.358	<0.001	2.00
26.	Zinc (Zn)	mg/L	0.042	0.203	NS
27.	Lead (Pb)	mg/L	0.327	0.317	0.01
28.	Manganese ( Mn)	mg/L	<0.001	<0.001	0.08
29.	Calcium (Ca)	mg/L	8.412	8.411	NS
30.	Arsenic (As)	mg/L	<0.001	<0.001	0.01
MICROBIOLOGICAL ANALYSIS					
31.	Total Bacteria Count	CFU/ml	Absent	Absent	0.00
32.	Total Coliform Count	MPN/100ml	Absent	Absent	0.00
33.	Faecal coliform	CFU/ml	Absent	Absent	0.00

**MPN**- Most Probable Number, **CFU** - Colony forming unit, **NS** - Not Specified, **TN** - Threshold Number, **TCU** - True Colour Unit, Detection Limit (<0.01, <0.001)

**Source:** Richflood Laboratory, February 2024.

**Limit Source:** World Health Organization Guidelines for Drinking Water Quality, 2024 and United States Environmental Protection Agency (EPA).



## Result Discussion

The quality of groundwater was assessed against the guidelines established by the World Health Organization Standards for drinking water. The detailed analysis results are presented in Table 4.9, and specific water analysis parameters are discussed below:

**pH:** The pH analysis of groundwater in the sampled locations of the Upper River Region (URR) demonstrates compliance with relevant standards. All pH results in fall within the World Health Organization's permissible limits of 6.50 to 8.50, applicable for both Aquatic Life and drinking water standards.

**Dissolved Oxygen (DO):** The Dissolved Oxygen (DO) levels in water samples from the Upper River Region (URR) ranged from 1.95 to 2.18 mg/L. These results indicate a relatively narrow range of DO concentrations in URR, suggesting consistent oxygen levels in the sampled locations.

**Biochemical Oxygen Demand (BOD):** The Biochemical Oxygen Demand (BOD) levels in water samples from the sampled locations in the Upper River Region (URR) varied from 6.65 to 8.37 mg/L.

**Chloride:** The chloride content of groundwater in the sampled locations of the Upper River Region (URR) ranged from 19.994 to 22.193 mg/L. These results indicate a specific range of chloride concentrations in the sampled locations of URR.

### Total Alkalinity

The total alkalinity of groundwater samples in the sampled locations of the Upper River Region (URR) exhibited a consistent range, spanning from 50.00 to 100.00 mg/L.

**Nitrate:** The analysis of nitrate content in groundwater samples from the sampled locations in the Upper River Region (URR) indicates levels below the World Health Organization (WHO) permissible standard of 50 mg/L. The nitrate content in URR ranges from 4.550 to 5.025 mg/L, suggesting compliance with established standards.

**Free Chlorine:** The analysis of free chlorine content in groundwater samples from the sampled locations in the Upper River Region (URR) indicates levels well below the World Health Organization (WHO) permissible standard for drinking water. The free chlorine content in URR ranges from <0.01 to 0.05 mg/L, ensuring compliance with established standards.



**Coliform levels:** In the Upper River Region (URR), groundwater samples meet the drinking water standard requirement, as the levels of total bacteria, total coliform, and faecal coliform were found to be absent, with a count of 0 number/100ml.

**Iron:** In the Upper River Region (URR), the iron content of groundwater was consistently below the detection limit of the equipment in all samples.

**Copper:** In the Upper River Region (URR), the analysis of copper levels in groundwater indicates concentrations well below the World Health Organization (WHO) permissible standard of 2.00 mg/L for drinking water. The copper content in URR ranges from <0.001 to 0.358 mg/L.

**Zinc:** In the sampled locations of the Upper River Region (URR), the zinc levels in groundwater ranged from 0.042 to 0.203 mg/L.

**Lead:** In the sampled locations of the Upper River Region (URR), the analysis of lead levels in groundwater indicates concentrations ranging from 0.317 to 0.327 mg/L. These values exceed the World Health Organization (WHO) standard limit of 0.01 mg/L for drinking water. The elevated lead content in the sampled locations of URR is likely attributed to geological formations and mineral deposits in the project area.

**Manganese (Mn):** In the sampled locations, the analysis of manganese levels in groundwater indicates concentrations below the detection limits, specifically <0.01 mg/L, in all the samples. This suggests that manganese is not detected or is present at extremely low levels in the groundwater of the URR.

**Arsenic:** Within the Upper River Region (URR), assessments of arsenic levels in groundwater have revealed concentrations consistently below the detection limits, specifically <0.01 mg/L. Arsenic was either undetected or present at exceedingly low levels in all groundwater samples collected in URR. This adherence to the World Health Organization (WHO) guideline value of 0.01 mg/L for drinking water signifies that arsenic concentrations.

#### 4.3.7 Soil Quality

##### *Sampling Methodology and Locations*

The soil sampling strategy was designed to assess the existing soil quality over the study area. Samples were collected from a total of Nine (9) locations in the Upper River Region (URR). The



detail of the sampling locations is presented in Table 4.11. A composite sampling technique was used for soil sampling from each location. At each location, soil samples were collected from three spots and homogenized. The homogenized samples were collected following the quartering technique and then packed in polythene plastic jars and sealed. The sealed samples were sent to the laboratory for analysis.

**Table 4.11: Location of Soil Samples**

Code	Location Description	Coordinates	
		Latitude (N)	Longitude (W)
SS <sub>1</sub>	Dampha Kunda	13° 22' 27.12"	14° 12' 22.74"
SS <sub>2</sub>	Dampha Kunda	13° 19' 07.99"	14° 10' 20.17"
SS <sub>3</sub>	Dampha Kunda	13° 20' 14.75"	14° 09' 57.32"
SS <sub>4</sub>	Dampha Kunda	13° 20' 30.23"	14° 12' 06.59"
SS <sub>5</sub>	Dampha Kunda	13° 21' 16.82"	14° 10' 58.53"
SS <sub>6</sub>	Limbambulu Bambo	13° 24' 08.71"	14° 06' 29.27"
SS <sub>7</sub>	Limbambulu Bambo	13° 26' 13.52"	14° 08' 49.16"
SS <sub>8</sub>	Limbambulu Bambo	13° 26' 53.42"	14° 07' 21.75"
SS <sub>9</sub>	Limbambulu Bambo	13° 25' 41.35"	14° 06' 07.53"

*Source: Richflood field survey, 2024*

### ***Analysis Results and Discussions***

The analysis results of physico-chemical parameters of soil samples are presented in Table 4.12 below.



**Table 4.12: Soil Quality at Upper River Region (URR)**

S/NN	PARAMETER	UNIT	SS <sub>1</sub> Dampha Kunda (Community)	SS <sub>2</sub> Dampha Kunda	SS <sub>3</sub> Dampha Kunda	SS <sub>4</sub> Dampha Kunda	SS <sub>5</sub> Dampha Kunda	SS <sub>6</sub> Limbambulu Bambo	SS <sub>7</sub> Limbambulu Bambo	SS <sub>8</sub> Limbambulu Bambo	SS <sub>9</sub> Limbambulu Bambo
<b>PHYSICAL ANALYSIS</b>											
1.	pH	-	7.14	6.98	7.08	7.77	7.66	7.45	7.25	7.20	6.85
2.	Electrical Conductivity	μS/cm	235.00	123.40	99.50	157.81	160.5	70.30	69.30	58.30	36.80
3.	Colour	μS/cm	Strong Red 5YR5/8	Light Brown 7.5YR6/3	Light Brown 7.5YR6/3	Reddish Yellow 7.5YR7/6	Light Brown 7.5YR6/3	Light Brown 7.5YR6/4	Reddish Yellow 7.5YR6/6	Reddish Yellow 7.5YR7/6	Yellow 7.5YR7/6
4.	Temperature	°C	27.10	29.50	30.10	25.90	31.10	27.70	30.50	28.90	26.60
5.	Texture	Sandy	57.00	56.50	71.20	60.00	60.90	52.60	58.50	43.20	61.40
		Clay	9.80	14.20	6.90	22.70	17.10	18.50	24.70	35.50	9.40
		Silt	33.20	29.30	21.90	17.30	22.00	28.90	16.80	21.30	29.00
6.	Porosity	g/cm <sup>3</sup>	28.57	37.50	38.30	37.50	44.44	37.50	28.57	41.18	38.00
7.	Bulk Density	-	0.90	0.94	0.90	1.18	0.90	1.10	1.13	1.09	0.91
8.	Permeability	%	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
9.	Moisture Content	%	8.89	2.89	7.70	1.75	3.22	4.27	3.98	2.60	2.58
<b>CHEMICAL ANALYSIS</b>											
10.	Phosphorus	mg/kg	1.882	2.524	1.503	2.499	2.499	2.475	3.020	2.079	3.034
11.	Total Nitrogen	mg/kg	4.400	7.335	5.474	5.219	2.967	1.075	6.456	5.055	1.381
12.	Nitrate	mg/kg	3.625	3.300	4.175	4.050	2.200	0.425	5.250	4.400	0.426
13.	Nitrite	mg/kg	0.064	0.165	0.114	0.096	0.126	0.004	0.059	0.135	0.087
14.	Chloride	mg/kg	29.991	39.988	49.985	39.990	39.988	30.990	29.991	31.990	28.991
15.	Fluoride	mg/kg	1.50	0.21	0.38	0.35	1.41	1.28	0.23	0.02	0.15
<b>METALS/HEAVY METAL ANALYSIS</b>											
16.	Iron (Fe)	mg/kg	0.070	1.060	0.033	2.274	0.847	1.312	1.372	0.530	0.502
17.	Potassium(K)	mg/kg	8.063	9.655	18.353	8.539	11.823	11.562	8.156	10.327	3.454
18.	Copper (Cu)	mg/kg	0.739	3.490	<0.001	<0.001	1.588	1.203	2.372	1.823	4.963





S/NN	PARAMETER	UNIT	SS <sub>1</sub> Dampha Kunda (Community)	SS <sub>2</sub> Dampha Kunda	SS <sub>3</sub> Dampha Kunda	SS <sub>4</sub> Dampha Kunda	SS <sub>5</sub> Dampha Kunda	SS <sub>6</sub> Limbambulu Bambo	SS <sub>7</sub> Limbambulu Bambo	SS <sub>8</sub> Limbambulu Bambo	SS <sub>9</sub> Limbambulu Bambo
19.	Zinc (Zn)	mg/kg	14.217	1.790	3.542	6.132	2.513	2.085	0.139	3.590	3.535
20.	Lead (Pb)	mg/kg	0.381	3.490	<0.001	<0.001	1.588	1.205	2.372	1.823	4.965
21.	Manganese(Mn)	mg/kg	1.307	15.258	14.615	7.252	6.198	9.963	12.408	20.090	13.979
22.	Calcium (Ca)	mg/kg	42.053	9.253	8.663	8.831	8.717	8.662	8.579	8.580	8.410
23.	Arsenic (As)	mg/kg	0.011	0.009	0.013	0.011	0.012	0.012	0.009	0.009	0.003
<b>MICROBIOLOGICAL ANALYSIS</b>											
24.	Total Heterotrophic Bacteria	CFU/g	$0.2 \times 10^1$	$8.2 \times 10^1$	$0.5 \times 10^1$	$0.9 \times 10^1$	$6.6 \times 10^1$	$1.10 \times 10^2$	$0.8 \times 10^1$	$0.1 \times 10^1$	$2.0 \times 10^1$
25.	Faecal Coliform	CFU/g	Absent	Absent	$2.0 \times 10^1$	Absent	$0.2 \times 10^1$	Absent	Absent	Absent	Absent
26.	Fungi Count	CFU/g	$4.6 \times 10^1$	$8.0 \times 10^1$	$5.0 \times 10^1$	$3.0 \times 10^1$	$2.5 \times 10^2$	$3.4 \times 10^1$	$3.5 \times 10^1$	$6.2 \times 10^1$	$8.2 \times 10^1$

CFU - Colony Forming Unit, NA: Not Applicable

Source: Richflood Laboratory; February 2024.



### ***Physical Characteristics of Soil***

#### ***pH of Soil***

Upon evaluating soil samples obtained from the project site in Dampha Kunda, the results indicated a slightly acidic pH level. In contrast, soil samples collected from Dampha Kunda (Community) and Limbambulu exhibited neutral pH conditions within the Upper River Region (URR).

#### ***Soil Minerals and Nutrients***

Key components influencing soil fertility include Nitrate, Phosphorus, and Potassium. Within the Upper River Region (URR), the observed phosphorus content spanned from 1.882 mg/kg to 3.034 mg/kg. Nitrate content exhibited a range from 0.425 mg/kg to 5.250 mg/kg, while Potassium content varied from 3.454 mg/kg to 18.353 mg/kg across the sampled area.

#### ***Metals in the Soil***

Analysis of soil samples revealed the presence of Iron, Potassium, Copper, Zinc, Lead, Manganese, Calcium, and Arsenic. Notably, within the Upper River Region (URR), the concentrations of Potassium, Manganese, and Calcium were observed to be the highest among these metals.

#### **Coliform levels:**

The presence of faecal coliform was noted at SS3 and SS5, with counts ranging from  $0.2 \times 10^1$  to  $2.0 \times 10^1$  CFU/g. Notably, faecal coliform was absent at the other sampled points. The presence of fecal coliform at sampling sites SS3 and SS5, indicates localized contamination, likely from human or animal waste sources. The absence of fecal coliform at other sampling points suggests that these contamination incidents are not widespread.

### **4.3.8 Climate Change and Natural Disasters**

Climate risks pose significant challenges to rice fields at URR with key concerns including drought which may be caused as a result of changes in precipitation patterns, extreme temperature leading to evaporation, soil moisture depletion, and inadequate irrigation systems in the rice fields at Upper River Region. While the primary impact of these climate risks on rice fields leads to physical damage and a reduction in productivity; the overall economic risk associated with climate change is substantial. Implementing effective adaptation measures becomes crucial to mitigate these risks. Long-term planning and strategic timing of adaptation



measures are imperative for reducing the economic vulnerability of rice fields to climate change impacts. Some observed impacts of drought on aquatic fauna are presented in Plate 4.5.



**Plate 4.4a:** Impact of drought on aquatic fauna



**Plate 4.4b:** Impact of drought on aquatic fauna



**Plate 4.4c:** Impact of drought on aquatic fauna

Other climate risks and natural disasters to the proposed project at URR based on the Climate Vulnerability Stress Test are;

- Drought
- Extreme Temperature
- Changes in Precipitation pattern
- The discharge of River Gambia
- Water Availability and Quality
- Extreme wind
- Floods
- Pest and Disease dynamics



### 4.3.9 GHG Emissions

#### 4.3.9.1 Introduction

The GHG emissions calculation has been carried out in accordance with the Greenhouse Gas Protocol and therefore considers Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O), Sulphur hexafluoride (SF<sub>6</sub>), Hydrofluorocarbons (HFCs), and Perfluorocarbons (PFCs). Emissions are reported as tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e).

For the purpose of this ESIA, emission estimates for the baseline and future activities of the project cover those activities that have been determined and are under the direct operational control of REWARD. IFC PS3 states that ‘the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the project’. Therefore, this GHG emissions estimation will focus on Scope 1 emissions only, during the construction and operational phase of the Project of the activities at the four (4) proposed project locations across the Upper River Region (URR).

Moreso, the total emissions estimated were calculated together for all the project activities for all the project locations. This is due to the limited information available regarding the total land usage, as well as the specific number and types of equipment, machinery and equipment that will be used at each of the project locations.

#### 4.3.9.2 Methodology

A Carbon Footprint is a measure of the estimated GHG emissions produced directly and indirectly by an individual, organization, facility, or product. The calculation of a carbon footprint generally involves the following equation:

$$\text{Carbon footprint emissions} = \text{Activity data} \times \text{Emissions factor} \times \text{Global warming potential}$$

- Activity data relates to the emission-causing activity, e.g. the on-site combustion of fossil fuels;
- Emission factors (EFs) convert the activity data into estimates of GHG emissions (e.g., CO<sub>2</sub> per litre of diesel fuel consumption); and
- Global warming potentials (GWPs) are applied to convert the different GHG emissions to a common metric: carbon dioxide equivalent (CO<sub>2</sub>e).



Given that this Project involves the estimation of a future carbon footprint for activities yet to begin, a series of assumptions have been made in order to forecast the activity data required to undertake this calculation. While the activity data of the Scope 1 emissions for the construction phase of the project have been estimated based on the available data provided by the Gambia REWARD, the activity data for the Scope 1 emissions for the operational phase of the Project have been estimated for 5 years of operation (2024-2028), which is the timeline of the project.

Indirect Scope 2 emissions from the consumption of purchased electricity are not applicable as power for the Project would be generated onsite from a hybrid of solar and fuel-powered generators. The following methodologies have been used to estimate the GHG emissions from the proposed project.

1. **GHG Protocol:** Corporate Accounting & Reporting Standard (World Resources Institute/World Business Council for Sustainable Development), and
2. **Intergovernmental Panel on Climate Change (IPCC)** 2006 GHG Inventory guidelines.

#### **4.3.9.3 GHG Emissions Assessment (Construction Phase)**

GHG emissions during the construction phase of the Project will result primarily from the mobile combustion of vehicles that will be used in conveying materials to and from the fields, as well as stationary combustion of equipment and machinery to be used in land preparation and construction activities.

The assumption of the fuel consumption for the mobile and stationary combustion sources was estimated based on a similar project. It is assumed that the only fuel to be used for the vehicles and other stationary equipment will be diesel fuel. Thus, a total of 98,500 litres of diesel was used to calculate the mobile and stationary combustion of the construction vehicles and equipment respectively.

Activity Data is calculated from total diesel fuel consumption in tons whereas the emission factors are extracted from the IPCC Guideline. According to the IPCC Guideline, CH<sub>4</sub>, N<sub>2</sub>O and CO<sub>2</sub> are expected to be generated due to combustion of diesel fuel.

The fuel consumption information and expected emission types are given in Table 4.13a below:





**Table 4.13a: Activity Data**

Item	Value/Amount	Units
Total Diesel Volume Use	98,500	L
Density of Diesel Oil	0.85	kg/L
Total Diesel Volume Use	= 98,500 L * 0.85 kg/L = 83,725	kg
Net Calorific Value	43 (default)	TJ/Gg
Activity Data	= 83,725 * 10 <sup>-6</sup> * 43 =3.6	TJ
Expected Emissions	CH <sub>4</sub> , N <sub>2</sub> O, CO <sub>2</sub>	-

GHG emission = Activity Data \* Default Emission Factor (table 2), so;

- CO<sub>2</sub> Emission = 3.6 \* 74,100 = 266,760 kg CO<sub>2</sub>
- CH<sub>4</sub> Emission = 3.6 \* 3 = 10.8 kg CH<sub>4</sub>
- N<sub>2</sub>O Emission = 3.6 \* 0.6 = 2.16 kg N<sub>2</sub>O

To calculate CO<sub>2</sub>-equivalent, the global warming potential of the expected GHG emissions should be used which is given in table 4.13b below:

**Table 4.13b: Global Warming Potential of the GHG**

Green House Gasses	Global Warming Potential	Emission Factor (Default)
CO <sub>2</sub>	1	74,100
CH <sub>4</sub>	28	3
N <sub>2</sub> O	265	0.6

Accordingly, the expected GHG emissions in CO<sub>2</sub>-equivalent is calculated below.

- From CO<sub>2</sub>: 266,760 kg CO<sub>2</sub> \* 1 = 266,760 kg CO<sub>2</sub> equivalent
  - From CH<sub>4</sub>: 10.8 kg CH<sub>4</sub> \* 28 = 302.4 kg CO<sub>2</sub> equivalent
  - From N<sub>2</sub>O: 2.16 kg N<sub>2</sub>O \* 265 = 572.4 kg CO<sub>2</sub> equivalent
- Total = 267,634.8 kg CO<sub>2</sub> equivalent

The estimated GHG emission to be generated from mobile and stationary combustion of diesel fuel is approximately **266.8 tons of CO<sub>2</sub> equivalent**.



#### 4.3.9.4 GHG Emissions Assessment (Operational Phase)

The Scope 1 emission sources for the project during the operational phase of the project include:

1. Mobile Combustion (from farm machineries, vehicles, motorcycles)
2. Stationary combustion (by fuel combustion of the processing plants and other stationary equipment)

*\*N.B: Estimation Methane emission from rice cultivation was not included because of inadequate information on the quantity of rice to be planted as well as the sizes of the rice fields to be used for rice cultivation.*

As applicable to the construction phase calculations, emission factors in IPCC guidelines and 5-year fuel usage were considered to estimate the GHG emissions. The GHGs to be released include: CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O.

The list and quantities of equipment and machineries that will be used during the operational phase of the project are presented in table 4.13c below:

**Table 4.13c: Operational Phase equipment and machineries**

S/N	Item	Quantity
1	Tractors	28
2	Power Tillers	30
3	Heavy Duty Combine Harvester	6
4	Load Loader Ram	3
5	Station Wagon vehicle	2
6	Double Cabin Pick-ups vehicle	5
7	Motorcycles	6
8	Rice Transplanter	6
9	Fertilizer Spreader	3
10	Mini Threshers	15
11	Seed Drills	6

Source: Gambia REWARD



#### 4.3.9.4.1 Stationary Combustion

**Table 4.13d: GHG Emissions for the Stationary combustion during the operational phase of the project**

Item	Value/Amount	Units
Annual Diesel Volume Use	2,388,293	L
Density of Diesel Oil	0.85	kg/L
Annual Diesel Volume Use	= 2,388,293 L * 0.85 kg/L= 2,030,049.05	kg
Net Calorific Value	43 (default)	TJ/Gg
Activity Data	= 2,030,049.05 * 10 <sup>-6</sup> * 43 =87.29	TJ
Expected Emissions	CH <sub>4</sub> , N <sub>2</sub> O, CO <sub>2</sub>	-

GHG emission = Activity Data \* Default Emission Factor, so;

- CO<sub>2</sub> Emission = 87.29 \* 74100 = 6,468,189 kg CO<sub>2</sub>
- CH<sub>4</sub> Emission = 87.29 \* 3 = 261.87 kg CH<sub>4</sub>
- N<sub>2</sub>O Emission = 87.29 \* 0.6 = 52.374 kg N<sub>2</sub>O

Accordingly, the expected GHG emissions in CO<sub>2</sub>-equivalent is calculated below:

- From CO<sub>2</sub>: 6,468,189 kg CO<sub>2</sub> \* 1 = 6,468,189 kg CO<sub>2</sub> equivalent
- From CH<sub>4</sub>: 261.87 kg CH<sub>4</sub> \* 28 = 7,332.36 kg CO<sub>2</sub> equivalent
- From N<sub>2</sub>O: 52.374 kg N<sub>2</sub>O \* 265 = 13,879.11 kg CO<sub>2</sub> equivalent

Total = 6,489,400.47 kg CO<sub>2</sub> equivalent

The estimated GHGs emission to be generated from mobile combustion of diesel fuel during the operational phase is approximately **6,489.4 tons of CO<sub>2</sub> equivalent**.

#### 4.3.9.4.2 Mobile Combustion

**Table 4.13e: Estimated GHG Emissions for the Mobile combustion during the operational phase of the project**

Item	Value/Amount	Units
Annual Diesel Volume Use	3,000,000	L



Item	Value/Amount	Units
Density of Diesel Oil	0.85	kg/L
Annual Diesel Volume Use	= 3,000,000 L * 0.85 kg/L= 2,550,000	kg
Net Calorific Value	43 (default)	TJ/Gg
Activity Data	= 2,550,000 * 10 <sup>-6</sup> * 43 =109.65	TJ
Expected Emissions	CH <sub>4</sub> , N <sub>2</sub> O, CO <sub>2</sub>	-

GHG emission = Activity Data \* Default Emission Factor, so;

- CO<sub>2</sub> Emission = 109.65\* 74100 = 8,125,065 kg CO<sub>2</sub>
- CH<sub>4</sub> Emission = 109.65 \* 3 = 328.95 kg CH<sub>4</sub>
- N<sub>2</sub>O Emission = 109.65 \* 0.6 = 65.79 kg N<sub>2</sub>O

Accordingly, the expected GHG emissions in CO<sub>2</sub>-equivalent is calculated below.

- From CO<sub>2</sub>: 8,125,065 kg CO<sub>2</sub> \* 1 = 8,125,065 kg CO<sub>2</sub> equivalent
  - From CH<sub>4</sub>: 261.87 kg CH<sub>4</sub> \* 28 = 9,210.6 kg CO<sub>2</sub> equivalent
  - From N<sub>2</sub>O: 52.374 kg N<sub>2</sub>O \* 265 = 17,434.35 kg CO<sub>2</sub> equivalent
- Total = 8,151,709.95 kg CO<sub>2</sub> equivalent

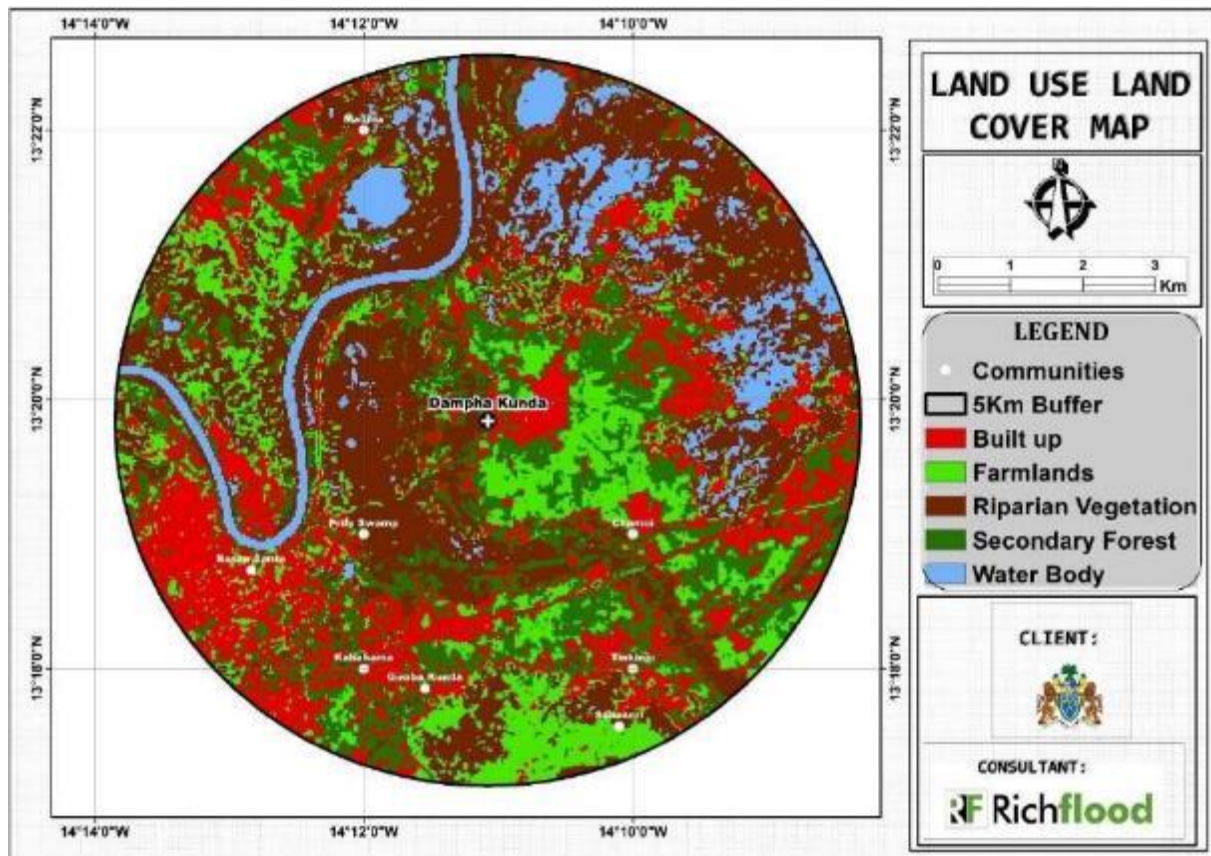
The estimated GHGs emission to be generated from mobile combustion of diesel fuel during the operational phase of the project is approximately **8,151.7tons of CO<sub>2</sub> equivalent**.

Thus the total estimated scope 1 GHG emissions for the project is (266.8 + 6,489.4 + 8,151.7) **14,907.9 tons of CO<sub>2</sub> equivalent**.

#### 4.3.10 Land Use/Landcover

Current land uses within the surrounding area are dominated by subsistence agricultural uses, mostly consisting of crop cultivation and livestock grazing. To define land-use in the project area, the Landsat 9 Operational Land Imager (OLI) imagery data (dated February 2024) was considered as a land cover spatial representation for the project area. The land use/cover assessment was undertaken for the proposed project within a 5km buffer around the project site in the Dampha Kunda and Limbambulu Bambo communities in the URR. According to this dataset, five (5) land cover/habitat classes were delineated based on a classification operation

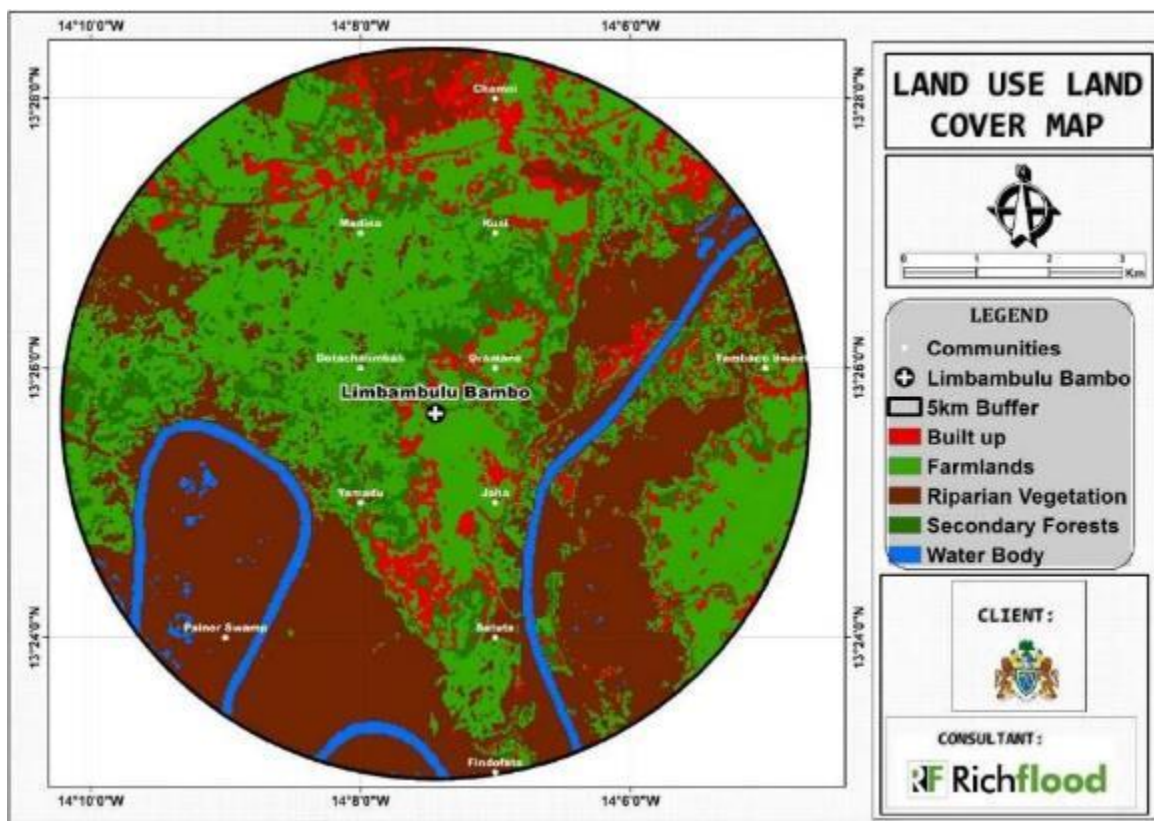
of the Landsat 9 imagery of the project area which includes; Woodland Forest, Farmlands, transformed area, riparian vegetation area and Water body (Figure 4.7 and 4.8). Villages are present within all the surrounding areas and are associated with the land use in the area.



**Figure 4.7:** Land cover classes associated with the project area in Dampha Kunda

*Source: Richflood GIS Unit, 2024*

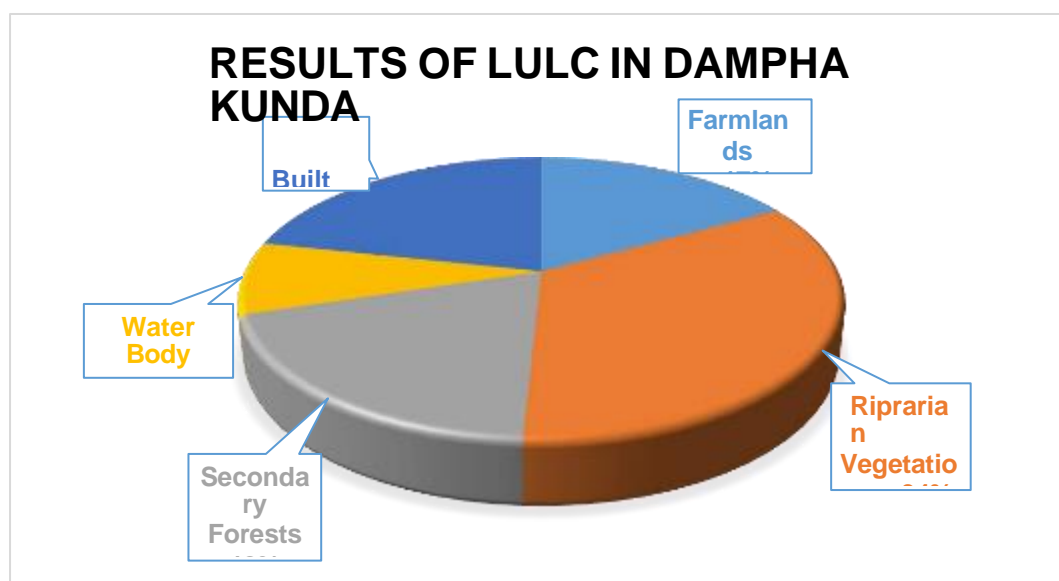




**Figure 4.8:** Land cover classes associated with the project area in Limbambulu Bambo

*Source: Richflood GIS Unit, 2024*

The result of the classification scheme for the project area around Dampha Kunda indicates the Woodland Forest makes up about 19%, Farmlands (17%), transformed area (22%), riparian vegetation area (34%) and Water body (8%).



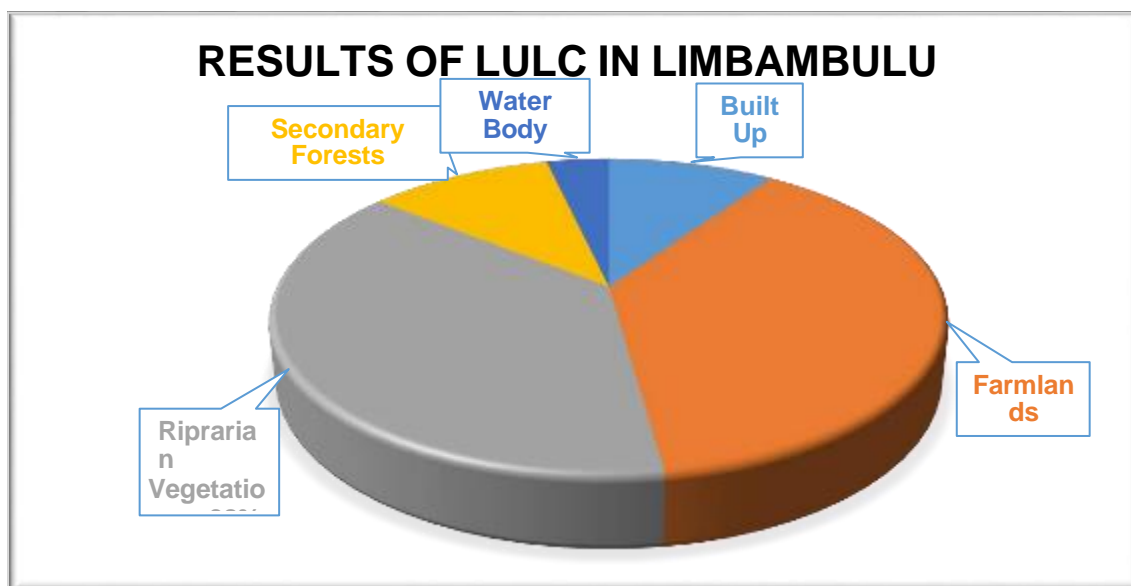
**Figure 4.9:** Percentage of the Land Use Land Cover Classes in Dampha Kunda

*Source: Richflood GIS Unit, 2024*





Similarly, the classification scheme for the project area around Limbambulu Bambo communities indicates the Woodland Forest makes up about (11%), Farmlands (38%), transformed area (9%), riparian vegetation area (38%) and Water body (4%). These form the basis for habitat delineation of detailed ecological assessment and sensitivity of the project area in the subsequent section.



**Figure 4.10.** Percentage of the Land Use Land Cover Classes in Limbambulu Bambo

*Source: Richflood GIS Unit, 2024*

#### 4.3.11 Ecology and Biodiversity

A site visit was undertaken to the project area in the URR and field survey of the existing as well as proposed rice fields. This provided information on the baseline ecological and biodiversity resources as well as conditions in the project area. Ecologically, much of The Gambia lies within the West Sudan–Guinea Savannah biome, where the climax vegetation is undifferentiated dry savannah woodland with a moderate diversity of trees and shrubs above a layer of tall, perennial grasses (Robinson, 2024). This ecoregion is a dry wooded area that constitutes mostly of larger trees such as *Combretum*, *Terminalia*, *Senegalia* and *Vachellia*, while the understory is made up of grasses, shrubs and herbs (Onearth, 2024). The vegetation unit harbour lower grasses and trees not exceeding 15 meters, most of which are small leaved and thorn bearing (Department of Parks and Wildlife Management, 2014). The ecoregion is regarded as Endangered or Critically Endangered based on the threats it experiences from agriculture, fire, over-hunting and tree clearance with its associated charcoal production (Magin, 1998).



The main project areas which are within the URR is associated with Sudan savannah vegetation type and characterised by a mosaic of savannah woodland forest and grassland. The vegetation unit consists of a tree layer, comprised mainly of Grey Camel Thorn *Acacia nicolita*, Camel Thorn *Faidherbia albida*, Silver Cluster-Leaf *Zizipus spina-christi* and Velvet Brandybush *Baliantes aegyptiaca*, with a grassland consisting mainly of perennial grass species including Lehmann Lovegrass *Eragrostis lehmanniana* and Bushman Grass *Stipagrostis uniplumis*.

Shrubland is scattered in patches throughout the project sites within the proposed and existing rice fields and consists of thorny shrubs, especially various *Acacia* and *Zizipus* species. The existing rice fields across the project sites is dominated by water lily within the wetland areas. The overall flora diversity at the project sites within the existing rice fields is considered low and there is little variation in the vegetation present. Considering the wetlands within the region, the stretch of the river Gambia and its islands hold roosts of large numbers of wildfowl, herons, egrets and storks, which feed on the adjacent marshes and rice fields. These include *Leptoptilos crumeniferus*, *Casmerodius albus*, *Egretta ardesiaca*, *Nycticorax nycticorax* and *Bubulcus ibis*. Generally, the landscape of the project area within the URR is associated with a relatively dense grass layer and flat topography across the project sites.

#### **4.3.11.1 Habitat Types**

Four (4) habitat types were delineated for the project footprint area and the associated AoI. These habitats are briefly discussed below.

##### ***Riparian and Rice fields***

The riparian habitat constitutes the low-lying wetlands as well as gallery forest along the river Gambia and flood plain channels traversing the project AoI. The river Gambia was observed within the project area and significantly influences the ecosystem dynamics of the project area from the network of streams and drainage lines draining the project area and providing riparian habitat conditions. As observed within the project area and other surroundings within the AoI, drainage lines also occur forming canals within the rice fields. In low-lying areas, the river Gambia and its tributaries were observed to provide wetland conditions for rice farming which is a major subsistent agricultural activity in the area. The wetland conditions and supply of the water within the various canals and tributaries are influenced by the low tide and high tide of the river.



In some parts of the project area, the agriculture activities which is majorly rice cultivation are done right on the edge of the rivers. The riparian habitat plays a crucial role as a water source for the local communities. However, these areas have been infringed upon and utilised extensively. The agricultural activity from rice cultivation and the abstraction of water through the pump irrigation system leave the habitat in a constant state of disturbance. This habitat, even though somewhat degraded, is still important as a movement corridor for several faunal species, especially birds, reptiles and mammals (hippopotamus) and plays a vital role as a water resource not only for the biodiversity but also for the local community. This habitat unit can be regarded as highly important, not only within the local landscape but also regionally. The habitat sensitivity is considered moderate.



**Plate 4.5:** The riparian habitat and rice fields observed in the project area

**Source:** Richflood field survey, 2024





### ***Modified Grassland and Fallow Land***

This habitat consists mostly of fallow land (arable land used for rotational crop cultivation) in various states of utilisation and recovery. In between these areas, some small patches of modified grassland can still be found. These small patches have been modified by livestock grazing. This habitat type has thus undergone large direct impacts associated with the local community. The vegetation found here consists of a few grass and herbaceous species that are known to grow in more disturbed areas. Some larger trees which spread out through the area can also be found. The trees found all have medicinal as well as food properties and evidence of harvesting can be seen in some instances. No IUCN Red-listed plant species were recorded within this habitat.



**Plate 4.6:** Mosaic modified grassland and fallow land habitats  
**Source:** Richflood field survey, 2024



### ***Woodland savannah forest***

This habitat forms part of the Sudan savannah biome and constitutes a mosaic of savannah woodland as well as grassland as observed within the project AoI. The habitat consists mostly of dry savannah forests and modified grassland resulting from the loss of the natural savannah forest ecosystem. The mosaic woodland and grassland habitat has undergone a variable level of anthropogenic pressure including the harvest of wood for charcoal production, bush fire, and use of timber associated with the local community. The vegetation unit found here consists of scattered woodland tree species and shrubs as well as grasses that are known to grow in more disturbed areas. The trees all have medicinal and food properties and evidence of harvesting can be seen in some instances. No IUCN Red-listed plant species were recorded within this habitat.



**Plate 4.7:** Woodland savannah forest and grassland habitats observed in the project area

**Source:** Richflood field survey, 2024

### ***Transformed***

This habitat is characterised by areas cleared of natural vegetation mainly for housing and business infrastructure as well as some of the larger roads. Vegetation structure consist of short shrubland including garden plants as well as some non-native crops and weeds. No IUCN Red Data plants were recorded within this habitat unit. This habitat is assigned a low sensitivity.





**Plate 4.8:** Transformed habitat from housing and road infrastructure within the project area  
**Source:** Richflood field survey, 2024

#### **4.3.11.2 Biodiversity Survey Approach**

A literature review and data sourcing exercise was undertaken as part of the assessment to identify relevant information on flora and fauna species as well as potential habitats present within the project area. The focus of the assessment was the proposed and existing rice fields, with special attention to habitat types as well as the occurrence of any IUCN red list-data species. This was followed by a site visit for the biodiversity survey.

##### **A. Flora Assessment Approach**

During the site visit the following activities were undertaken:

- The different biodiversity features, habitat, vegetation and landscape units present at the site were identified and mapped.
- Walk-through surveys were conducted across the site. All flora and fauna species that were observed were recorded.
- The entire project area footprint was surveyed. In addition, opportunistic observations were made while moving through the project area.

##### **B. Faunal Assessment Approach**

To ensure a better understanding of the faunal species composition and habitat conditions present in the proposed project area, a desktop review was undertaken for the project area. The faunal desktop assessment included the following:

- Compilation of expected and identified species lists;





- Identification of any Red Data or species of conservation concern (SCC) present or potentially occurring in the area; and
- Emphasizing the probability of occurrence of species of conservation importance.

#### i. **Mammals & Avifauna**

The desktop assessment was subsequently followed by a field assessment. The field fauna assessment for the proposed project was undertaken by adopting the direct and indirect approach. The sampling techniques utilised for the field survey component of the assessment include but are not limited to the following:

- Direct assessment which includes visual observation with eyes, binoculars and digital cameras. Identification of avifauna especially was undertaken using field guides.
- Indirect assessment through; identification through calls, identification of tracks, trails, burrows and signs; and
- Utilization of local knowledge through interviews with members of local communities.

#### ii. **Herpetology (Reptiles & Amphibians)**

The herpetofauna assessment of the project area was undertaken by utilising a variety of active and passive techniques. The cryptic nature and habits of herpetofauna species imply that certain species within the assessment area could not have been recorded.

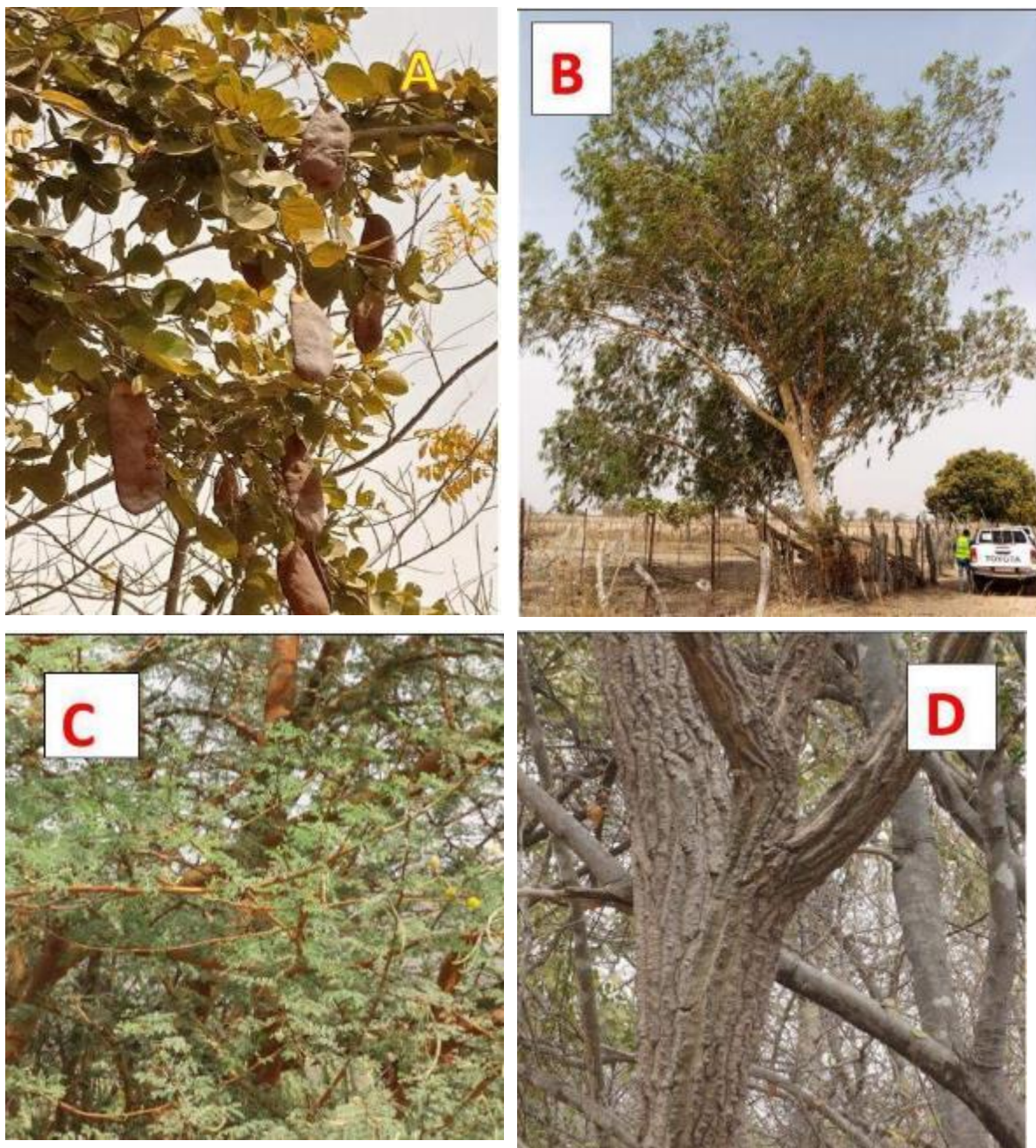
The herpetological field survey comprised the following techniques:

- Diurnal active hand searches - used for reptile species that shelter in or under micro-habitats such as woody debris, leaf litter, peeling bark etc; and
- Visual searches - typically undertaken for fast-moving species that are difficult to detect by hand-searches. This involved using binoculars to view species from a distance without them being disturbed.

### **4.3.11.3 Floristic Analysis**

A total of 33 plant species were observed during the field survey and are provided in Table 4.14. Plants were recorded across 21 families, with *Fabaceae* having the highest proportion of species followed by *Malvaceae*, *Arecaceae* and *Apocynaceae*. All of the species have at least one known secondary ecosystem service that they provide to the local community. The three main categories of ecosystem services are medicine, food sources or construction materials (e.g. thatch or wood).

All the species recorded were endemic and none were Species of Conservation Concern (SCC), which speaks to the disturbed nature of the project area. Based on the recorded species during the field survey, the dominant growth forms within the project area consist of trees (43%) and shrubs (24%) followed by herbs (15%) and grasses (12%).



**Plate 4.9:** A selection of plant species observed within the project area: (A) *Piliostigma thonningii* (B) *Eucalyptus tereticornis* (C) *Acacia nilotica* and (D) *Bombax costatum*

**Source:** Richflood field survey, 20



**Table 4.14:** Flora species recorded in the project area

Scientific Name	Common Name	Family	IUCN Status	Endemic Status	Growth Form	Uses
<i>Parkia biglobosa</i>	African locust bean	Mimosoideae	LC	Non-Endemic	Tree	Food and medicine
<i>Blepharis linariifolia</i>		Acanthaceae	LC	Non-Endemic	Shrub	Food, medicine and craftwork
<i>Amaranthus spinosus</i>		Amaranthaceae	LC	Non-Endemic		Food and medicine
<i>Magnifera indica</i>	Mango	Amaranthaceae	LC	Non-Endemic	Tree	Food and medicine
<i>Calotropis procera</i>	Swallow wort	Apocynaceae	LC	Non-Endemic	Shrub	Medicinal use
<i>Leptadenia hastata</i>		Apocynaceae	LC	Non-Endemic	Climber	Food
<i>Pergularia tomentosa</i>		Apocynaceae	LC	Non-Endemic	Shrub	Medicinal use
<i>Borassus aethiopum</i>	African fan palm	Arecaceae	LC	Non-Endemic	Tree	Food and craftwork
<i>Hyphaene thebaica</i>	Doum palm	Arecaceae	LC	Non-Endemic	Tree	Food and medicine
<i>Phoenix dactylifera</i>	Date palm	Arecaceae Phoenix	LC	Non-Endemic	Tree	Food and medicine
<i>Tamarindus indica</i>	Tamarind	Caesalpinioidae	LC	Non-Endemic	Tree	Medicinal use, ingredient for local drink
<i>Centaurea senegalensis</i>		Asteraceae	LC	Non-Endemic	Herb	Medicinal use
<i>Balanites aegyptiaca</i>	Soapberry tree	Balanitaceae	LC	Non-Endemic	Shrub	Food and medicine
<i>Adansonia digitata</i>	Baobab	Bambacaceae	LC	Non-Endemic	Tree	Food and medicine
<i>Guiera senegalensis</i>		Combretaceae	LC	Non-Endemic	Tree	Food and medicine
<i>Ficus vogelii</i>		Combretaceae	LC	Non-Endemic	Tree	Food and medicine



Scientific Name	Common Name	Family	IUCN Status	Endemic Status	Growth Form	Uses
<i>Ipomoea asarifolia</i>		Convolvulaceae	LC	Non-Endemic	Climber	Medicine, dye & tying material
<i>Euphorbia serpium</i>	Balsam spurge	Euphorbiaceae	LC	Non-Endemic	Shrub	Food and medicine
<i>Chamaecrista mimosoides</i>	Fishbone cassia	Fabaceae	LC	Non-Endemic	Herb	Medicinal use
<i>Crotalaria pallida</i>	Small Rattlebox	Fabaceae	LC	Non-Endemic	Shrub	Medicinal use
<i>Cymbopogon giganteus</i>		Fabaceae	LC	Non-Endemic	Grass	Medicinal & Building
<i>Faidherbia albida</i>	Winter thorn	Fabaceae	LC	Non-Endemic	Tree	Food and medicine
<i>Mimosa pigra</i>	Black Mimosa	Fabaceae	LC	Non-Endemic	Shrub	Medicinal & Erosion control
<i>Ceiba pentandra</i>	Silk cotton tree	Bombacaceae	LC	Non-Endemic	Tree	Consumed as food and used for construction
<i>Mesosphaerum suaveolens</i>	Wide Spikenard	Lamiaceae	LC	Non-Endemic	Herb	Medicinal use
<i>Bombax costatum</i>	Red kapok tree	Malvaceae	LC	Non-Endemic	Tree	Medicines, food & timber
<i>Sida acuta</i>	Broom weed	Malvaceae	LC	Non-Endemic	Grass	Medicinal use
<i>Azadirachta indica</i>	Neem tree	Meliaceae	LC	Non-Endemic	Herb	Medicinal use
<i>Piliostigma thonningii</i>	Camel's foot	Caesalpinioideae	LC	Non-Endemic	Tree	Medicinal purpose
<i>Acacia nilotica</i>	Egyptian mimosa	Mimosaceae	LC	Non-Endemic	Herb	Medicinal use
<i>Eucalyptus tereticornis</i>	Forest redgum	Myrtaceae	LC	Non-Endemic	Tree	Medicines
<i>Cenchrus biflorus</i>	Hedgehog grass	Poaceae	LC	Not Endemic	Grass	Consumed as food





Scientific Name	Common Name	Family	IUCN Status	Endemic Status	Growth Form	Uses
<i>Themeda triandra</i>	Kangaroo grass	Poaceae	LC	Not Endemic	Grass	Used as thatch and medicine
<i>Ziziphus mauritiana</i>	Jujube tree	Rhamnaceae	LC	Not Endemic	Tree	Consumed as food
<i>Gardenia erubescens</i>		Rubiaceae	LC	Not Endemic	Tree	Food and medicine
<i>Anacardium occidentale</i>	Cashew tree	Anacardiaceae	LC	Non-Endemic	Herb	Consumed as food
<i>Gmelina arborea</i>	Gmelina	Verbenaceae	LC	Non-Endemic	Tree	Timber

**Source:** Richflood field survey, 2024



#### 43.11.4 Alien Invasive species

In terms of alien invasive plants, broadleaf cattail (*Typha latifolia*) is common in the project area and are known to colonise rice fields with little or no control in the project area. These plants which are associated with the wetland habitat in the rice field were found in abundance and spread out through the project area.

Scientific Name	Common Name	Family	IUCN Status	Endemic Status	Growth Form
<i>Typha latifolia</i>	Broadleaf cattail	Typhaceae	LC	Non-Endemic	Grass

Source: Richflood field survey, 2024

#### 43.11.5 Mammals

As a large portion of the project area consist of agricultural field, mainly rice, cereals and vegetable cultivation. Nevertheless, the surrounding project AoI also harboured remnants of woodland savannah forest and modified grassland. These habitats provided refugia for some mammal species in the area. There were wide reports of hippopotamus in the project area by the locals, which cause destruction to the rice fields.

During the field observations, a total of seven (7) mammal species were observed in the project area. The result of the field observation is likely due to the unique habitat conditions in the area despite the disturbed nature of the area from human anthropogenic activities with the resultant loss of habitat and utilisation as a food source. A critical habitat assessment for mammals found no critical habitats to be present within the project area.

**Table 4.15:** Mammal species recorded the project area during the field assessment

Scientific Name	Common Name	IUCN Status	Endemic Status
<i>Chlorocebus sabaeus</i>	Green monkey	LC	Non-endemic
<i>Papio papio</i>	Guinea Baboon	LC	Non-endemic
<i>Cercopithecus campbelli</i>	Campbell monkey	LC	Non-endemic
<i>Xerus erythropus</i>	Ground squirrel	LC	Non-Endemic



<i>Hippopotamus amphibius</i>	Common Hippopotamus	LC	Non-Endemic
<i>Cricetomys gambianus</i>	Giant Rat	LC	Non-Endemic
<i>Thryonomys swinderianus</i>	Grasscutter	LC	Non-Endemic

**Source:** Richflood field survey, 2024



**Plate 4.10:** Mammals observed in the project area: Ground squirrel (*Xerus erythropus*) and green monkey (*Chlorocebus sabaeus*)

**Source:** Richflood field survey, 2024

#### 4.3.11.6 Avifauna

A total of forty-nine (49) species were observed during the field assessment and are listed in Table 4.16. Most of the species are regarded as generalist common species that are well adapted to human disturbances.

During the assessment, it was discovered that the wetlands within the rice fields harbours a rich species of aquatic avifauna. Also, the riparian habitat is regarded as important bird area for avifauna. None of the species recorded is species of conservation concern.

**Table 4.16:** Avifauna species recorded the project area during the field assessment

Scientific Name	Common Name	IUCN Status	Endemic Status
<i>Polyboroides typus</i>	African Harrier Hawk	LC	Not endemic
<i>Tockus erythrorhynchus</i>	Western Red-billed Hornbill	LC	Not endemic



Scientific Name	Common Name	IUCN Status	Endemic Status
<i>Cinnyris venustus</i>	Variable Sunbird	LC	Not endemic
<i>Vidua chalybeata</i>	Village Indigobird	LC	Not endemic
<i>Bubulcus ibis</i>	Western Cattle Egret	LC	Not endemic
<i>Euplectes ardens</i>	Red-collard Widowbird	LC	Not endemic
<i>Estrilda caerulescens</i>	Lavender Waxbill	LC	Not endemic
<i>Vidua orientalis</i>	Sahel Paradise Whydah	LC	Not endemic
<i>Chrysococcyx caprius</i>	Diederik Cuckoo	LC	Not endemic
<i>Sarkidiornis melanotos</i>	Knob-billed Duck	LC	Not endemic
<i>Lamprotornis caudatus</i>	Long-tailed Glossy Starling	LC	Not endemic
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC	Not endemic
<i>Streptopelia vinacea</i>	Vinaceous Dove	LC	Not endemic
<i>Oena capensis</i>	Namaqua Dove	LC	Not endemic
<i>Ploceus cucullatus</i>	Village Weaver	LC	Not endemic
<i>Lamprotornis purpureus</i>	Purple Glossy Starling	LC	Not endemic
<i>Pogoniulus chrysoconus</i>	Yellow-fronted Tinkerbird	LC	Not endemic
<i>Corvus albus</i>	Pied Crow	LC	Not endemic
<i>Camaroptera brevicaudata</i>	Grey-backed Camaroptera	LC	Not endemic
<i>Pycnonotus barbatus</i>	Common Bulbul	LC	Not endemic
<i>Vanellus spinosus</i>	Spur-winged Lapwing	NT	Not endemic
<i>Tringa totanus</i>	Senegal Coucal	LC	Not endemic
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC	Not endemic
<i>Dendrocygna viduata</i>	White-faced Whistling Duck	LC	Not endemic
<i>Passer griseus</i>	Northern Grey-headed Sparrow	LC	Not endemic
<i>Cypsiurus parvus</i>	African Palm Swift	LC	Not endemic
<i>Butorides striata</i>	Green-backed Heron	LC	Not endemic



Scientific Name	Common Name	IUCN Status	Endemic Status
<i>Laniarius barbarus</i>	Yellow-crowned Gonolek	LC	Not endemic
<i>Accipiter tachiro</i>	African Goshawk	LC	Not endemic
<i>Pternistis bicalcaratus</i>	Double-spurred Francolin	LC	Not endemic
<i>Actophilornis africanus</i>	African Jacana	LC	Not endemic
<i>Ardea intermedia</i>	Intermediate Egret	LC	Not endemic
<i>Coracias abyssinicus</i>	Abyssinian Roller	LC	Not endemic
<i>Halcyon malimbica</i>	Blue-breasted Kingfisher	LC	Not endemic
<i>Eurystomus glaucurus</i>	Broad-billed Roller	LC	Not endemic
<i>Ardea cinerea</i>	Grey Heron	LC	Not endemic
<i>Spermestes cucullata</i>	Bronze Mannikin	LC	Not endemic
<i>Columba guinea</i>	Speckle Pigeon	LC	Not endemic
<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC	Not endemic
<i>Numida galeatus</i>	Helmeted Guineafowl	LC	Not endemic
<i>Cossypha niveicapilla</i>	Snowy-crowned Robin Chat	LC	Not endemic
<i>Poicephalus senegalus</i>	Senegal Parrot	LC	Not endemic
<i>Psittacula krameri</i>	Rose-ringed Parakeet	LC	Not endemic
<i>Himantopus Himantopus</i>	Black-winged Stilt	LC	Not endemic
<i>Ardea purpurea</i>	Purple Heron	LC	Not endemic
<i>Ardea alba</i>	Great Egret	LC	Not endemic
<i>Ardeola ralloides</i>	Squacco Heron	LC	Not endemic
<i>Scopus umbretta</i>	Hamerkop	LC	Not endemic
<i>Bostrychia hagedash</i>	Hadada Ibis	LC	Not endemic
<i>Mesopicos goertae</i>	Grey Woodpecker	LC	Not endemic

Source: Richflood field survey, 2024



**Plate 4.11:** Some avifauna observed in the project area: Yellow-crowned Gonolek (*Laniarius barbarus*), Spur-winged Lapwing (*Vanellus spinosus*), Western Red-billed Hornbill (*Tockus erythrorhynchus*) and Rose-ringed Parakeet (*Psittacula kramera*)

**Source:** Richflood field survey, 2024

#### 4.3.11.7 Herpetofauna

During field observations, relatively few species of herpetofauna were recorded within the project AoI, with only five (5) observed during the survey period (Table 4.17). The species recorded comprised of three (3) reptiles and two (2) amphibian species. The relatively low richness of herpetofauna was likely due to the synergistic effect of habitat degradation due to anthropogenic activities. Furthermore, no herpetofauna species of global conservation concern were recorded, and none of the species recorded are regarded as endemic.



**Table 4.17:** Herpetofauna species recorded in the project area during the field assessment

Scientific Name	Common Name	IUCN Status	Endemic Status
<b>Reptile</b>			
<i>Agama agama</i>	Common Agama	LC	Non-endemic
<i>Hemidactylus angulatus</i>	House Gecko	LC	Non-endemic
<i>Echis ocellatus</i>	West African Viper	LC	Non-endemic
<b>Amphibians</b>			
<i>Hyperolius spatzi</i>	African reed frog	LC	Non-Endemic
<i>Leptopelis viridis</i>	Rusty Forest Tree frog	LC	Non-Endemic

**Source:** Richflood field survey, 2024



**Plate 4.12:** Herpetofauna observed in the project area: Common Agama (*Agama agama*)

**Source:** Richflood field survey, 2024



#### 4.3.11.8 Ecosystem Services

Ecosystem services are outputs, processes, and or conditions which directly or indirectly benefit humans or enhance social welfare. They include provisioning (food, water, raw materials, etc.), regulating (flood / erosion control) and cultural services (spiritual & recreational services).

The ecosystem services identified within the project area are summarized in Table 4.18. Some of the obvious uses of forest species which includes construction (roofing material), firewood, timber and charcoal clearly have been recognized and incorporated into local lifestyle among the locals. Other, less apparent products (foods, oils, medicines) play major roles in traditional usage amongst local people.

**Table 4.18:** Ecosystem services identified within the project area

Ecosystem Services	Description
General farming and foraging activities	<ul style="list-style-type: none"> <li>• Fruits</li> <li>• Various plant species</li> <li>• Fishing</li> <li>• Cultivation of crops</li> </ul>
Raw materials from the Environment	<ul style="list-style-type: none"> <li>• Timber</li> <li>• Fuelwood and Charcoal</li> </ul>
Fresh water	<ul style="list-style-type: none"> <li>• Domestic use</li> <li>• For human consumption</li> <li>• For hygiene</li> </ul>
Medicinal Resources	<ul style="list-style-type: none"> <li>• Various plants (see Table 4.54)</li> </ul>
Air Quality Regulation	<ul style="list-style-type: none"> <li>• From vegetation</li> </ul>
Water flow regulation & Erosion control	<ul style="list-style-type: none"> <li>• The river Gambia riparian area</li> <li>• From ephemeral watercourses</li> </ul>
Habitat	<ul style="list-style-type: none"> <li>• All the habitat types present within the project AoI terrestrial ecology</li> </ul>





#### **4.3.11.9 Habitat Sensitivity**

Habitats provide ecosystem services in the form of food and aesthetic value. The riparian areas within the river Gambia and the various wetland constituting the rice field in the project area are rated as moderately sensitive. The habitat has already been modified by impacts such as replacement for rice cultivation agriculture.

Areas that are classed as sensitive are generally those which are considered to be in a natural condition or were found to contain (or provide habitat for) threatened faunal or floral species. The following classifications are used to describe the possible sensitivity rankings:

- Low – insignificant amounts of natural habitat or vegetation present. Existing habitat has been extensively transformed. Remaining vegetation dominated by alien invasive plant species;
- Low-Moderate – existing habitats have been heavily transformed and little natural vegetation or habitats are present. Species diversity is considered low. Area may be considered otherwise moderately important (such as a movement corridor for fauna);
- Moderate – existing habitats have been modified or transformed but an equal percentage of natural vegetation and habitats remain. Species diversity is considered moderate. Such habitat is considered to have a strong chance of successful rehabilitation if left to restore through natural succession processes;
- Moderate-High – the majority of area is considered to be in a near-natural state. Species diversity is high, and the ecosystem function is healthy. Minor impacts may be present; and
- High – the area is considered to be in a largely natural condition with high levels of species diversity and also a good probability of Critical Habitat classification. Alternatively, an area may be regarded as having a high sensitivity (even if the habitat is modified) but is found to be habitat, or a breeding area, for any Species of Conservation Concern.

Each habitat unit was assessed and assigned a habitat sensitivity rating.



#### **4.4 Socio-economics and Health Survey**

This section examines various issues in the socio-economic and health environment including demographic conditions, natural resources and endowments, and exploitation of natural resources for sustenance, livelihoods and quality of life. It also covered health conditions, prevalent diseases, the infrastructural facilities and its functional statuses, settlement patterns and housing conditions, socio-cultural resources and migration trends in the community. Others are proposed project sensitivities such as perceptions, concerns and expectations of residents in relation to the project. The socio-economic baseline description was focused on a local level, i.e. within the Dampha Kunda, and Limbambulu Bambo communities in Upper River Region (URR). This is because it is expected that the proposed project will result in macroeconomic benefits at a national level, and the primary socio-economic impacts of the Project will be experienced at the local level.

##### **4.4.1 Project Affected Communities (PAC)**

The Project Affected Communities (PAC) for this proposed project are the various communities that will be affected by the project's activity. PAC constitutes areas that may experience direct, induced or cumulative impacts from the project. The project Zone or Area of Influence (ZoI / AoI) defines the project area, as well as the most directly affected communities closest to the project site. The project-affected communities as considered within the 5km radius for this project comprise communities in Upper River Region (URR) of the Gambia. They include Dampha Kunda, and Limbambulu Bambo Communities.

##### **4.4.2 Socio-economic Survey Methodologies**

The socio-economic survey of the proposed project was designed with the aim of extracting relevant socio-economic information on the communities within the project area. Both qualitative and quantitative study techniques were employed for data collection. Data were collected from both primary and secondary sources;

The study design adopted for the socio-economic study includes;

- Conducting literature searches and reviews;
- Conducting field visits to the project area;
- Designing and deployment of household questionnaire/ appraisal tools for the study;
- Determining target population and sample size for household survey and interviews;



- Conducting consultations and socio-economic surveys such as; Focus Group Discussions (FGDs), and In-Depth Interviews (IDI) with various stakeholder groups and interviews with key informants in the host communities;
- Interviewing key stakeholders involved with the project;
- Direct observations;
- Collating and analysing data obtained from all the sources; and
- Report preparation.

As part of the primary data collection, a structured questionnaire was developed and deployed using a Computer Assisted Personal Interviewing (CAPI) tool. This involved the designing of the questionnaire, deployment to the server and data collection in the field using Android mobile phones. The questionnaire was administered randomly to residents within the selected host communities, to generate information on socio-economic and demographic characteristics of communities such as; age, sex, marital status, family size, major and other sources of income (occupations), and size of households, among others.

The sampling approach involved multistage random sampling within the project-impacted communities in the project area of influence (AoI). This involved drawing up a list of the project-impacted communities within the project area of influence (AoI).

#### **4.4.3 Focus Group Discussions in the Host Communities**

The objectives of the meetings were to disclose, interact and enlighten them about the proposed project and its impact on the host communities and the livelihood of the people. Vital information about the entire project area was elicited from community members during the FGD meeting. Chapter 6 presented the Focus Group Discussion with various groups within the host communities and viewed participants.

#### **4.4.4 Target Population**

The target population for this study was essentially indigenes of the communities aged above 18 years. The age was carefully chosen to capture the groups that would be most directly impacted and also most active, physically, socially, economically and health-wise. Generally, the target groups are:

- Community/Village Heads



- Youth Associations
- Other community-based organizations (Men group, women group etc)
- Individuals/household
- Vulnerable or marginalized groups

#### **4.4.5 Consultations**

Consultation is an important element of socio-economic assessment and an integral component of an entire ESIA process. This is because appropriate and adequate consultations will ensure smooth project implementation and guarantee the economic and commercial sustainability of the proposed project. The consultation incorporates all stakeholders that may be directly or indirectly affected by the proposed project. It involves information dissemination and interaction/dialogues with identified stakeholders (including communities within the project vicinity) on the ESIA of the proposed project.

Interaction with people and eliciting feedback allowed the affected populations to raise issues that should be considered before, during and after the project operation. The overall result would be the optimization of the potential of the proposed project and the maximization of its benefits. The key objectives of consultation for the ESIA of the proposed project are to:

- Ensure that the communities and all stakeholders are given early and adequate information on the ESIA of the proposed project;
- Provide a framework for improving the understanding of the potential impacts of the proposed project on the ecological, social and health environment;
- Include stakeholders' views and concerns as part of the ESIA execution especially as it concerns the potential impacts;
- Identify alternative sites or designs, and mitigation measures, to improve environmental and social soundness;
- Clarify values and trade-offs associated with these different alternatives;
- Identify contentious issues in the proposed project execution;
- Establish transparent procedures for carrying out the proposed project; and
- Create accountability and a sense of local ownership during project implementation thus minimizing community conflicts and project delays that may result thereof.



### ***Levels of Consultation***

There are two broad levels of consultation in this study:

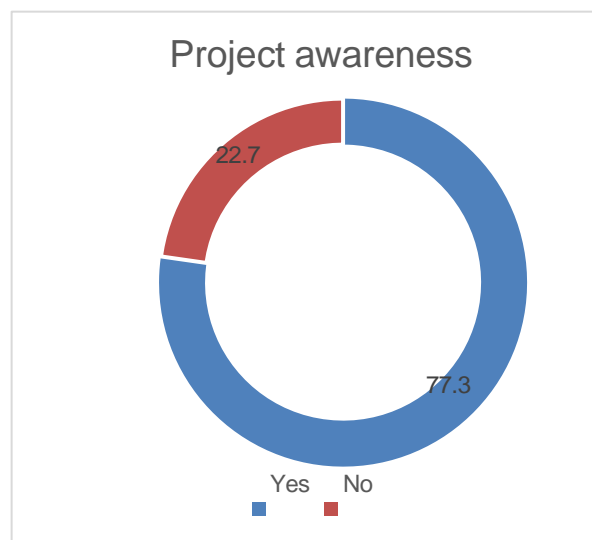
***Institutional Consultation:*** This level of consultation is intended to engage relevant regulatory authorities, government and non-governmental institutions based on their concerns about the proposed project. The stakeholders consulted for this project are;

- National Environment Agency (NEA),
- Department of Parks and Wildlife Management (DPWM),
- Department of Forestry (DoF);
- Department of Water Resources (DWR);
- Soil and Water Management Services (SWMS) of the Department of Agriculture;
- Agricultural Engineering Services (AES);
- Ministry of Gender and Children Affairs;
- Gambia Department of Labour
- Ministry of Employment and Trade
- Representatives of the Upper River Region (URR); and
- CPCU Coordinating Members

***Procedure for Primary Stakeholders Consultation:*** The procedure employed in the primary stakeholders' consultation was a participatory approach, where public meetings were held with the traditional rulers of the host communities (i.e. the Dampha Kunda, and Limbambulu Bambo), and members of the traditional institution cabinet as well as other groups in the community. The primary impacted stakeholders are members of the host communities which are directly affected by the proposed project, within the regions.

#### **4.4.6 Project Awareness**

The data regarding project awareness in the project communities revealed substantial levels of awareness within the sampled populations. At the project communities, 77.3% of respondents indicated awareness of the projects, while 22.7% reported a lack of awareness. See Figure 4.11. These findings underscored the overall high levels of project awareness in the region, highlighting the successful dissemination of information about ongoing initiatives within the sampled populations.



**Figure 4.11:** Project awareness level at URR

See Chapter 6 for detailed stakeholders' feedback, concerns, and expectations.

#### **4.4.7 Summary of Community Concerns and Perception**

During the discussion with the men, youths and women, the Project components and associated impacts were carefully explained. The reaction was positive as the participants believe that there is an impending economic advantage for them in terms of temporary jobs on-site during the construction and operation of the rice processing plant. The farmers from the communities anticipate that the project would create an opportunity for increased production and direct sales of quality rice to other countries.

While the acceptance rate of the proposed project was 100%, some of the other expectations of the communities in terms of benefits and development are:

- Employment
- Building/renovation of schools
- Provision of equipment for primary healthcare centres
- Construction of access road
- Skills acquisition
- Provision of potable water



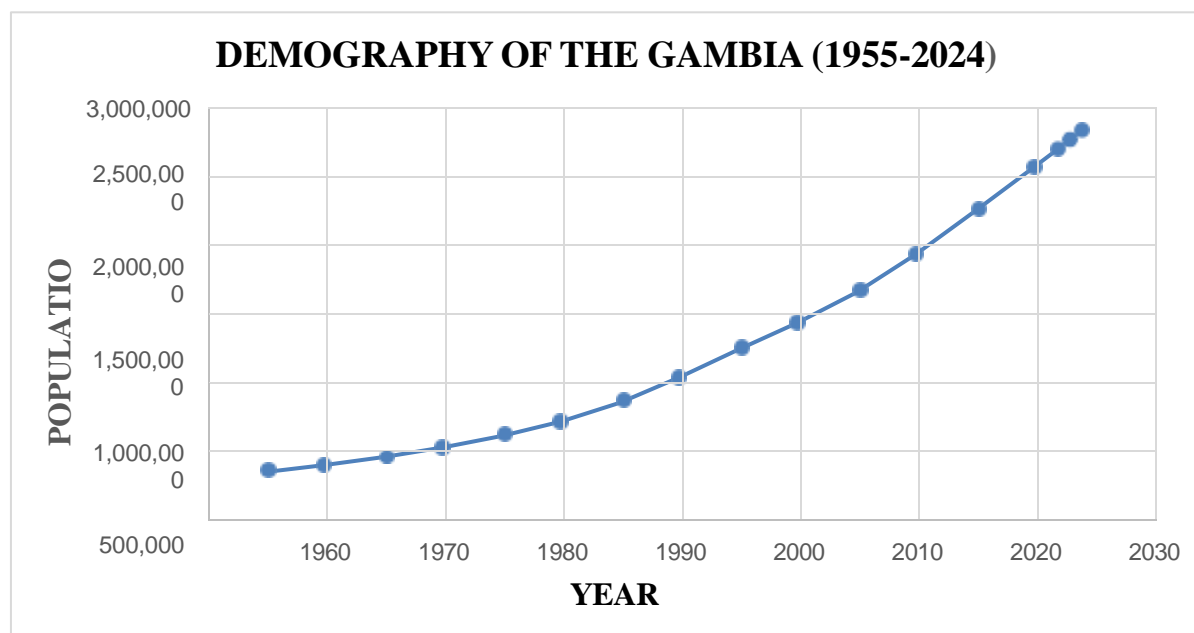


#### 4.5 Demographic Characteristics of the Gambia

The demographic characteristics of the population of The Gambia are known through national censuses, conducted in ten-year intervals, and analyzed by The Gambian Bureau of Statistics (GBOS) since 1963. The latest census was conducted in 2013. The population of The Gambia at the 2013 census was 1.8 million. The population density is 176.1 people per square kilometer, and the overall life expectancy of 64.1 years. Since 1963, the population has grown by an average of 43.2% every decade. The birth rate consistently exceeds the death rate, resulting in a positive natural growth rate.

The Gambia's current population stands at 2,841,803, as per (World Bank, 2023). This figure represents approximately 0.03% of the total global population. The country exhibits a population density of 281 persons per square kilometer (or 710 persons per square mile) within a land area of 10,120 square kilometers (equivalent to 3,907 square miles). The Gambia encompasses diverse geographical features. Notably, 58.0% of the population resides in urban areas, totaling 1,609,155 persons as of (World Bank Report, 2023). This urbanization trend underscores the evolving demographic landscape within the nation.

There is a steady increase in the demography of the Gambia from over the years as shown in the figure 4.12 below.



**Figure 4.12: Population Growth of the Gambia**

Source: *United Nations, 2024*

➤ **Age and Gender Structure**

In terms of age structure, The Gambia is dominated by the 15 -24-year-old segment, constituting 57.6% of the population. The median age of the population is 19.9 years, and the gender ratio of the total population is 98. At birth, the sex ratio is slightly higher at 103 males per 100 females. For the 15–64 age group, it's 96 males per 100 females. Among those aged 65 and over, it's 90 males per 100 females.

The population age breakdown is as presented below:

- 0–14 years: This segment constitutes 37.44% of the population.
- 15–64 years: The majority falls within this age group, accounting for 59.08% of the population.
- 65 and over: The elderly population comprises 3.48%.
- The median age of the population is 19.9 years.



**Figure 4.13: Age and Gender Composition of The Gambia**

Source: *The Gambia Bureau of Statistics (web) 2013*

➤ **Ethnic Composition**



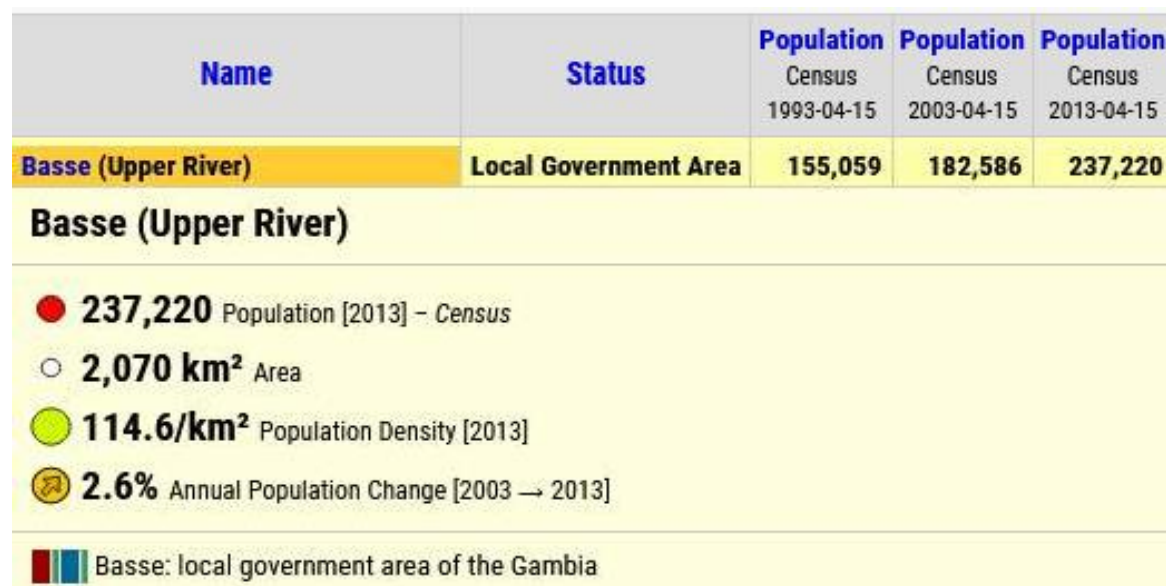
A variety of ethnic groups live in The Gambia, each preserving its own language and traditions. The Mandinka ethnic group is the most numerous, followed by the Fula, Wolof, Jola/Karoninka, Serahule / Jahanka, Serers, Manjago, Bambara, Aku Marabou, Bainunka and others, such as Tukolor. The Krio people, locally known as Akus, constitute one of the smallest ethnic minorities in The Gambia. They descend from Sierra Leone Creole people and have traditionally concentrated in the capital.

#### ➤ Religion

Approximately 96% of the population identify as Sunni Muslims, mostly Malikite Sufi, 3% are Christians, and 1% are traditionalists. Article 25 of the constitution protects the rights of citizens to practice any religion that they choose and intermarriage between Muslims and Christians is common.

### 4.6 Demographic Characteristics of the Upper River Region (URR)

According to The Gambia's 2013 population and housing census conducted by the Gambia Bureau of Statistics (GBoS), the Upper River Region (URR) had an estimated population of 237,220, with an annual growth rate of 2.6%. In 2013, 15.4% of the URR population consisted of children under five, 31% were aged five to 14 years, and 53.5% were aged 15 years and above. Figure 4.14.



**Figure 4.14: Population Composition of Upper River Region (URR)**

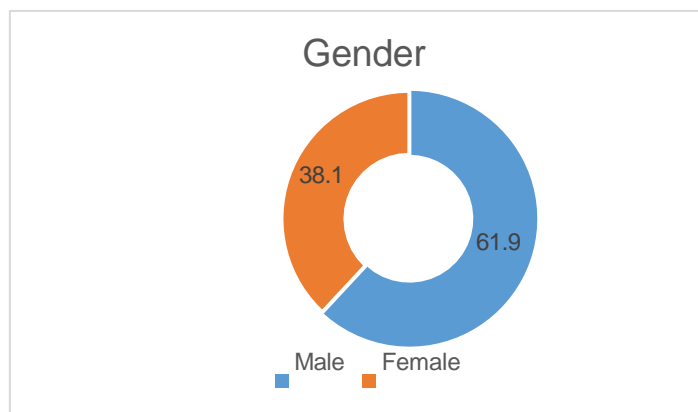
*Source: The Gambia Bureau of Statistics (web) 2022*

## 4.7 Demographic Characteristics of the Host Communities

### Gender

The gender distribution in the project communities reveals distinct patterns among the sampled populace. Males constitute 61.9%, and females make up 38.1%, indicating a relatively balanced gender distribution among the sampled populace (Figure 4.15). Efforts to actively engage a large number of women in the host communities to participate in consultation proved abortive due to the socio-cultural setting in the communities. Plate 4.16a and b depict the consultation with the men and women groups respectively.

In the project areas, traditional gender roles and responsibilities are prevalent. Based on our survey findings, women owns most of the rice plots in the area. However, men play a dominant role in other agricultural practices, with a significant majority involved in farming and related activities. Additionally, women take on a more significant role in managing household responsibilities, with a larger proportion of women engaged in domestic work, childcare, and other related tasks. Men's involvement in household management is relatively limited. The survey also revealed that men predominantly hold leadership positions within the community, with few women in decision-making roles. Moreover, the survey findings revealed that men have more control over other essential resources like water, financial services, education and agricultural inputs.



**Figure 4.15:** Gender Composition at the Project Communities

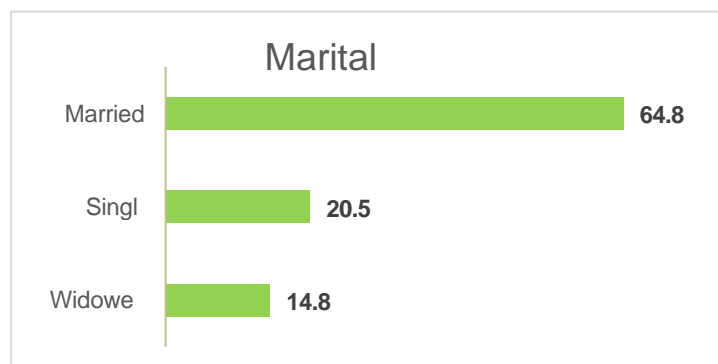
*Source: Richflood Field survey, 2024*



**Plate 4.13: Consultation with the youth, men and women groups within the project communities**  
*Source: Richflood Field survey, 2024*

### ***Marital Status***

The marital status distribution within the sampled populace of the Upper River Region (URR) reflected distinct patterns. 14.8% of respondents are widowed, 20.5% are single, and the majority, 64.8%, are married (figure 4.16).



**Figure 4.16: Marital Status at the project communities**

*Source: Richflood Field survey, 2024*



## Religion

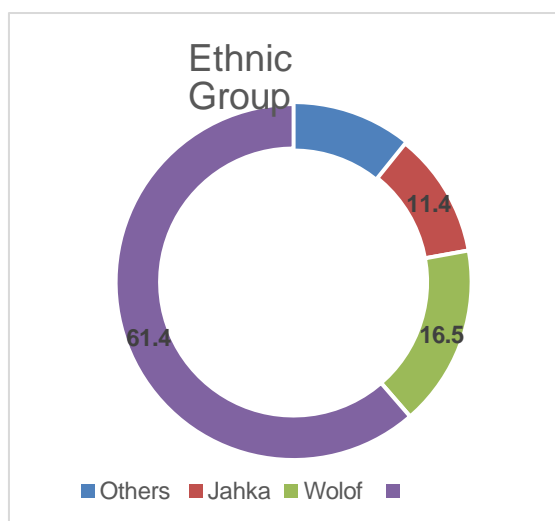
The religious composition within the sampled populace at the project communities is homogeneous, with 100% of respondents identifying as followers of Islam. See Plate 4.13 for pictures of some mosques sighted during the field survey.



**Plate 4.14:** Mosque at URR: Limbambulu Bambo (Left); Dampha Kunda (Right)  
*Source: Richflood Field survey, 2024*

## Ethnic Group

The ethnic composition among the sampled population indicates diverse cultural backgrounds. Mandinka is the predominant ethnic group at 61.4%, followed by Wolof at 16.5%, Jahka at 11.4%, and other ethnic groups collectively at 10.8% (Figure 4.17).



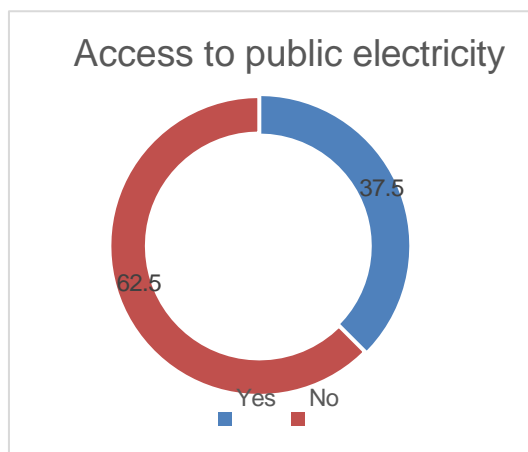
**Figure 4.17:** Ethnic Composition at URR  
*Source: Richflood Field survey, 2024*



#### 4.8 Access to basic social services and related infrastructure

##### *Access to Electricity*

At the project communities, there are variations in electrification levels among the sampled population. 37.5% of respondents reported having access to public electricity, while 62.5% stated a lack of such access (See Figure 4.18). Plate 4.14 showed the electricity poles in the project communities.



**Figure 4.18:** Access to Public Electricity

*Source: Richflood Field survey, 2024*

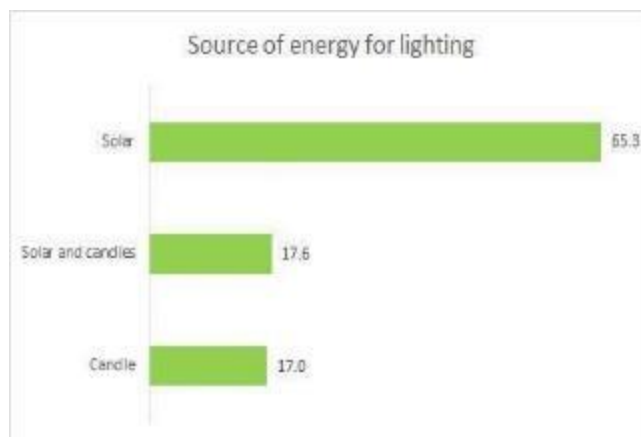


**Plate 4.15** Electricity Poles in the Study Areas

*Source: Richflood Field survey, 2024*

### ***Source of Home Lightning***

The sources of energy for lighting highlight variations in the reliance on different energy forms. 17.6% of the sampled population utilizes a combination of solar and candles, 65.3% rely solely on solar energy, and 17.6% use candles. (See Figure 4.19 and Plate 4.15).



**Figure 4.19:** Source of energy for home lighting

*Source: Richflood Field survey, 2024*

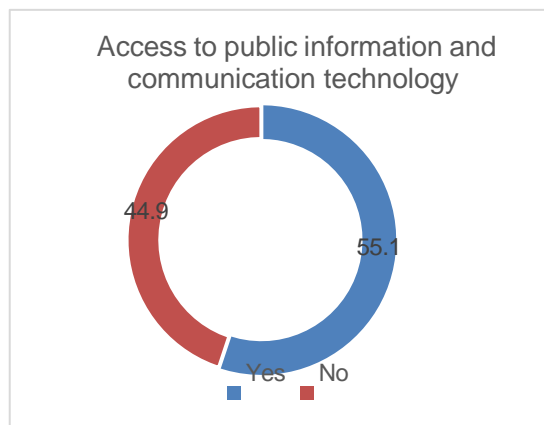


**Plate 4.16:** Solar Panel installed in the Project Area

*Source: Richflood Field survey, 2024*

### ***Information Communication and Technology (ICT)***

Access to public information and communication technology (ICT) in the URR demonstrated patterns within the sampled population. 55.1% of respondents reported having access to public ICT, while 44.9% indicated a lack of such access. (See Figure 4.20).



**Figure 4.20:** Access to ICT

*Source: Richflood Field survey, 2024*

### ***Household Cooking Fuel Preferences***

The source of energy for cooking at the project communities is uniformly reliant on wood, with 100% of the sampled population utilizing wood as the primary cooking fuel (Plate 4.16).



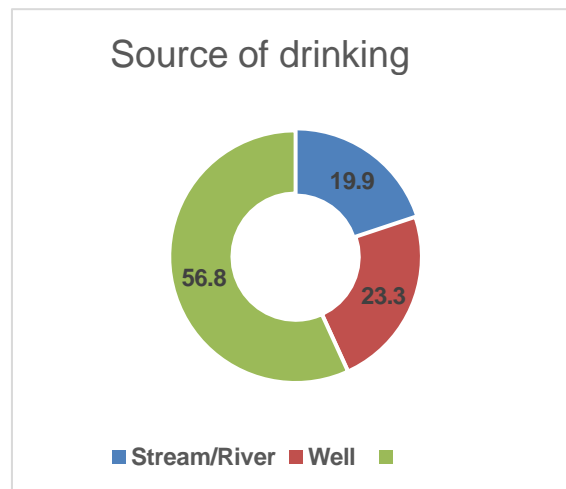


**Plate 4.17:** Source of energy for cooking in the Project Communities

*Source: Richflood Field survey, 2024*

#### ***Access to Water Sources in the Surveyed Communities***

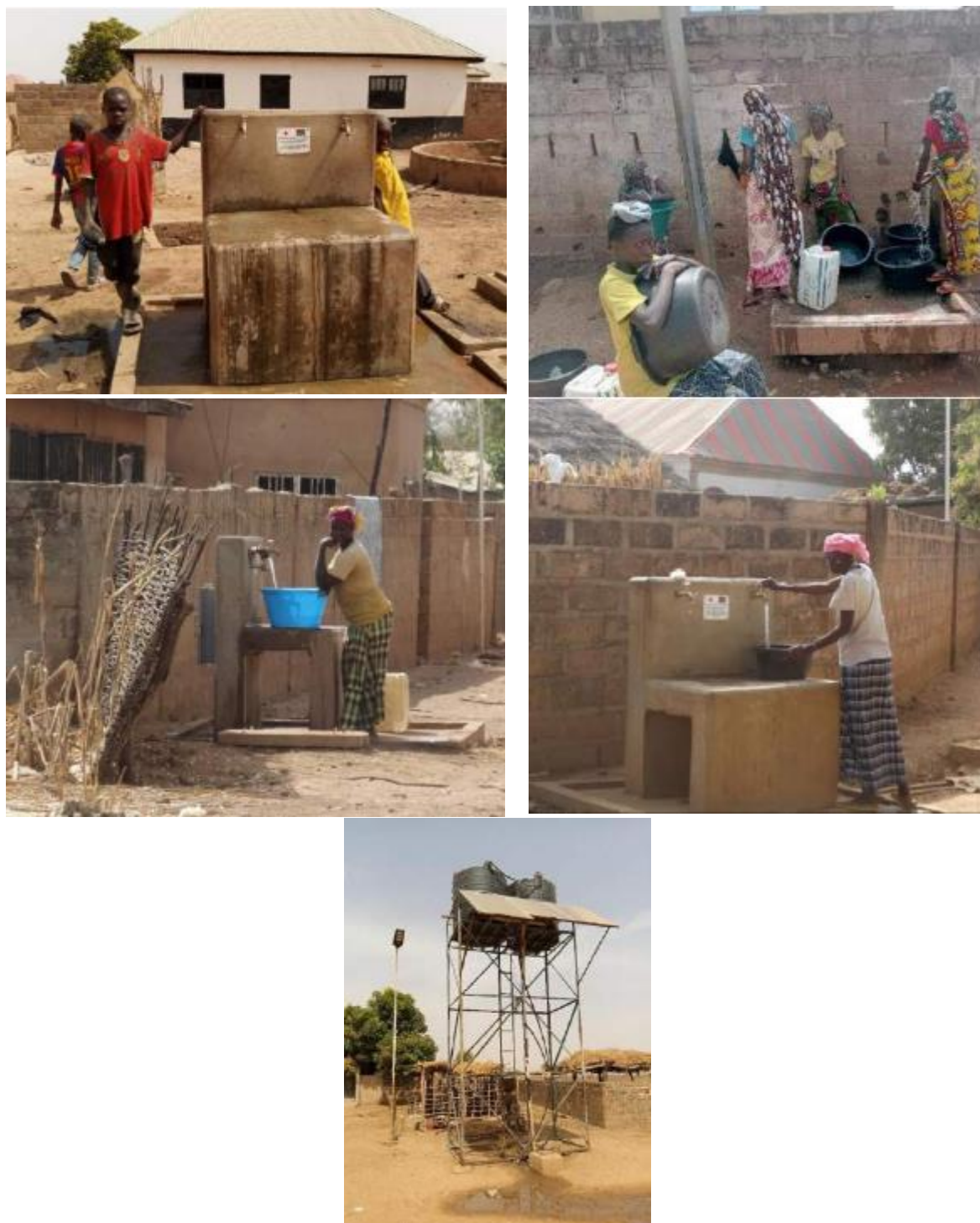
The sources of drinking water in the project communities highlight differences in access to water infrastructure. 19.9% relied on streams or rivers, 23.3% used wells, and the majority, 56.8%, accessed water from boreholes. (See figure 4.21 and Plate 4.17).



**Figure 4.21:** Source of drinking water within the project communities

*Source: Richflood Field survey, 2024*



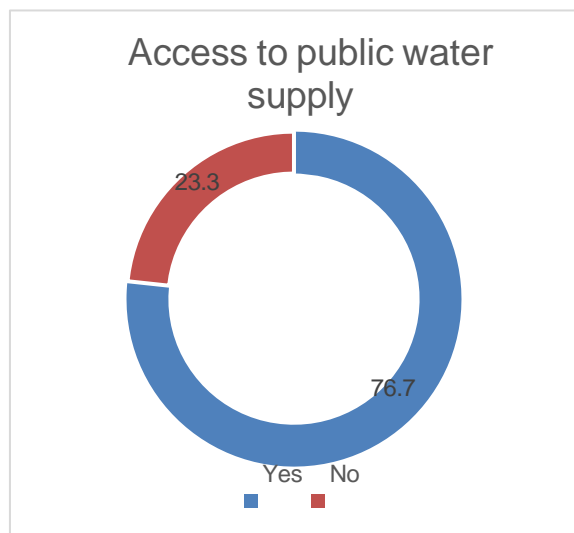


**Plate 4.18:** Source of drinking water in the communities

*Source: Richflood Field survey, 2024*

### ***Access to public water supply***

At the project communities, there are distinct disparities in access to public water supply among the sampled population. 76.7% of respondents reported having access, while 23.3% indicated a lack of such access (See figure 4.22).



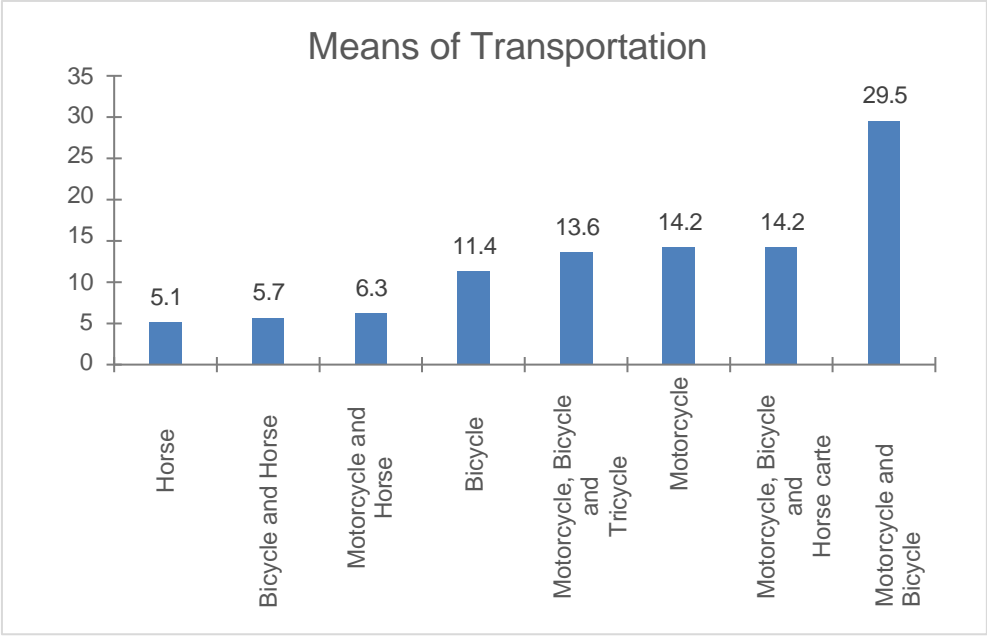
**Figure 4.22:** Access to public water at the project communities

*Source: Richflood Field survey, 2024*

### ***Transportation and Road Infrastructure Assessment***

The means of transportation at the project communities showcased diverse mobility options. The most prevalent means among the sampled population are the combination of motorcycle and bicycle at 29.5%, followed by motorcycle, bicycle, and horse carte at 14.2%. Other modes, such as motorcycle alone (14.2%), motorcycle, bicycle, and tricycle (13.6%), and bicycle alone (11.4%), are also reported. (Figure 4.23 and Plate 4.18).





**Figure 4.23:** Means of Transportation at the project communities  
*Source: Richflood Field survey, 2024*

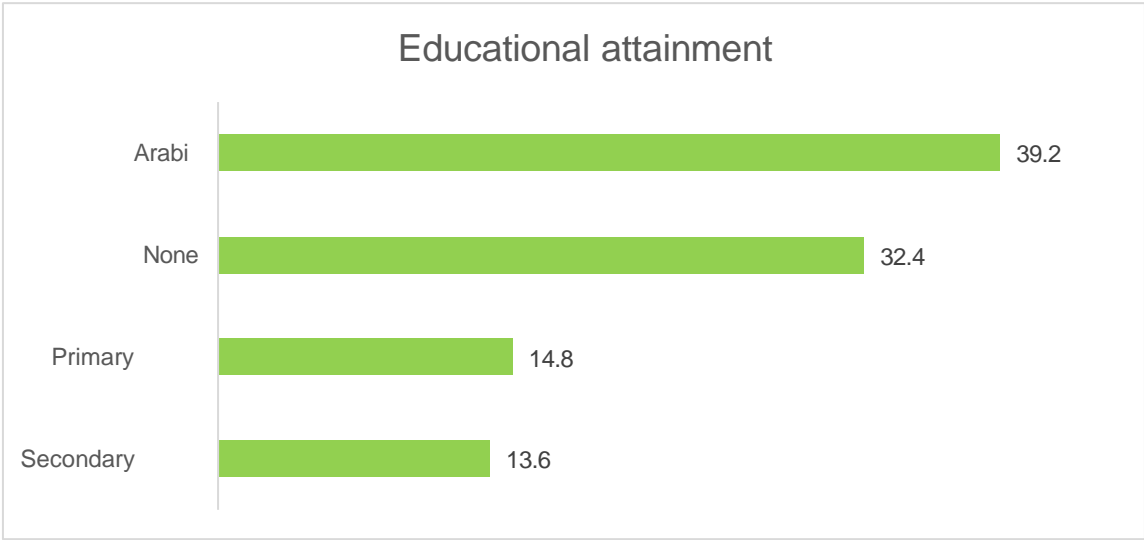




**Plate 4.19:** Means of Transportation at the Project areas  
*Source: Richflood Field survey, 2024*

**Education Access and Qualifications in the Study Area**

The educational status of the sampled populace at the project communities reveals diverse trends. 13.6% have attained a secondary school education, 14.8% have completed primary school, 32.4% have no formal education, and 39.2% have received education in Arabic. (Figure 4.24 and Plate 4.19). An analysis of education levels and skills training reveals a gender gap, with male students outnumbering female students.



**Figure 4.24:** Educational Attainment  
*Source: Richflood Field survey, 2024*

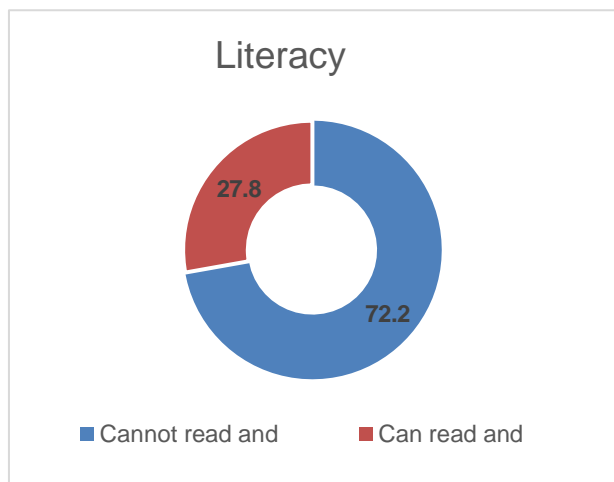


**Plate 4.20:** Some Educational facilities at Project Communities

*Source: Richflood Field survey, 2024*

### ***Literacy Levels and Educational Attainment***

At the project communities, a significant portion, 72.2%, reported being unable to read and write, while only 27.8% indicated the ability to read and write (Figure 4.25).



**Figure 4.25:** Literacy level at the Project Communities

*Source: Richflood Field survey, 2024*

## **4.9 Sanitation Practices within the Project Areas of Influence (AoI)**

### ***Methods of Waste Disposal***

The methods of waste disposal at the project communities showcased differences in waste management practices. At the project communities, 22.2% of respondents reported burying waste, 26.7% opted for open disposal (in the bush or water), and the majority, 51.1%, indicated burning as their disposal method (Figure 4.26). Plate 4.20 depicts the open disposal of waste in the communities.





**Figure 4.26:** Waste disposal methods at the project communities

*Source: Richflood Field survey, 2024*

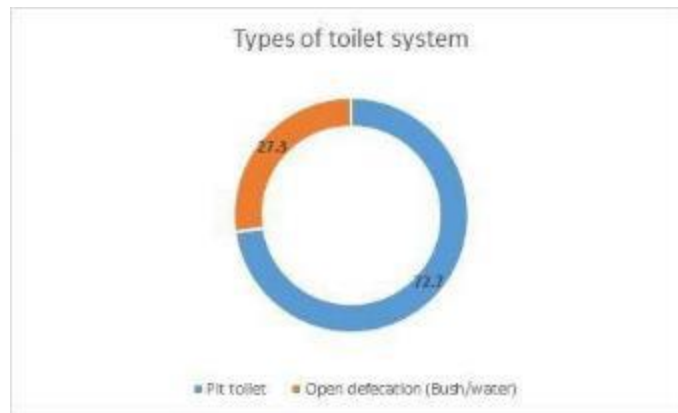


**Plate 4.21:** Solid waste and sanitary conditions observed at the Project Communities

*Source: Richflood Field survey, 2024*

### ***Types of toilet systems***

At the project communities, the majority, 72.7%, rely on pit toilets, while 27.3% resorted to open defecation in the bush or water. These findings highlight variations in sanitation infrastructure, emphasizing the prevalence of pit toilets as the primary sanitation method in this region (see figure 4.27).



**Figure 4.27:** Types of toilet system at the project communities

*Source: Richflood Field survey, 2024*

## 4.10 Livelihood Practices in the Study Area

### 4.10.1 Land Tenure and Ownership

The Gambia's land tenure system is primarily based on customary, statutory, and Islamic laws.

**Customary Land Tenure:** Customary land tenure is prevalent in rural areas of The Gambia. Land is often held communally by families or clans, and ownership is determined by customary practices and traditions. These practices vary among different ethnic groups and communities. In customary tenure systems, land rights are often passed down through generations, and disputes are typically resolved within the community by traditional leaders.

**Statutory Land Tenure:** The Gambian government also recognizes statutory land tenure, which is governed by formal laws and regulations. Under statutory tenure, individuals or entities can acquire land through leasehold or freehold arrangements. Leasehold grants temporary rights to use the land for a specified period, while freehold grants permanent ownership rights. The government controls and regulates the allocation of land under statutory tenure through various agencies such as the Department of Physical Planning and Housing and the Department of Lands and Surveys.

**Islamic Land Tenure:** In addition to customary and statutory systems, Islamic land tenure principles influence land ownership in The Gambia, especially in areas where Islamic law (Sharia) is applied. Islamic law recognizes private property rights and regulates transactions such as sales, leases, and inheritance according to Islamic jurisprudence.



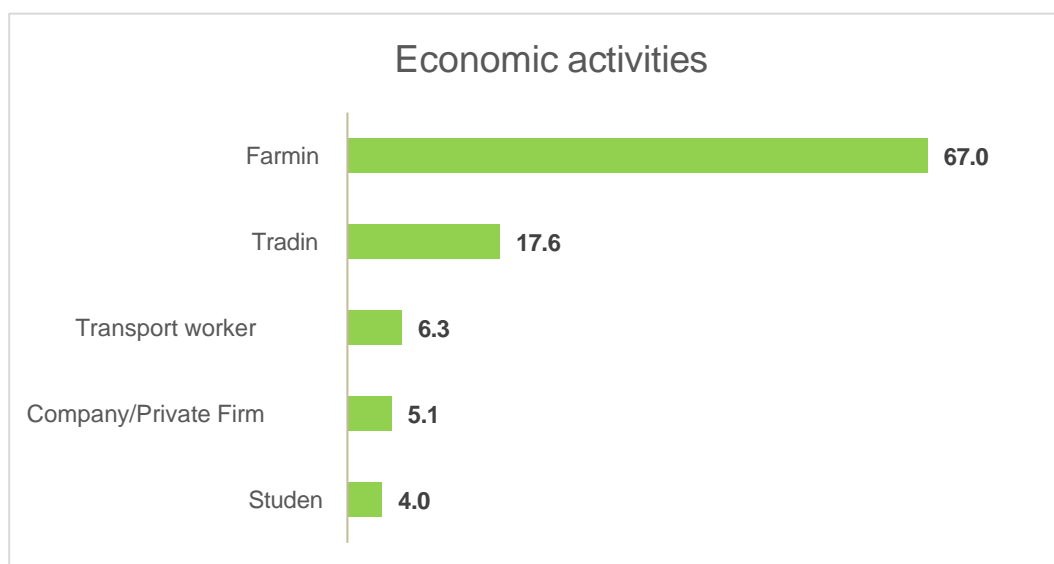


The Land Tenure System in The Gambia is intricate and delicate, predominantly characterized by communal ownership in most communities. This complexity arises from a dual system rooted in the country's colonial history, which introduced both statutory title and customary tenure (UNDP). Under the Lands (Region Act), provisions are made for the maintenance of lands in the regions for public benefit, with the Minister empowered to designate lands as state-owned. In the Upper River Region (URR), the customary land tenure system strictly adheres to traditional ownership practices dictated by customs and traditions. According to customary laws, when a piece of land is cleared by a Kabilo (a group of families), ownership is vested in the Alkalo head. This system has evolved and is predominantly rural.

Within this framework, women typically hold user rights and can cultivate the land, although communal ownership prevails, and individual ownership rights are limited. The land is owned by the clans (Kabilo), with male leaders making decisions on land matters.

The land type of the proposed project area of influence is a customary land tenure system. The land is often held communally by families or clans, and ownership is determined by customary practices and traditions. These practices vary among different ethnic groups and communities. Land rights are often passed down through generations, and disputes are typically resolved within the community by traditional leaders/Alkalos. The existing land use in the proposed area is mainly for agricultural purposes.

Within the host communities under examination, various livelihood activities play a pivotal role in the economic sustenance of the residents. These activities encompass farming, trading, private service, and artisanship, but farming took centre stage as one of the primary occupations for most inhabitants. At the project communities, various livelihood activities contributed to the economic sustenance of the residents. The majority, 67.0%, are engaged in farming, followed by trading at 17.6%, transport work (6.3%), working for companies or private firms (5.1%), and students (4.0%) (See Figure 4.28).



**Figure 4.28:** Economic Activities at the host communities  
*Source: Richflood Field survey, 2024*

## Agriculture

Farming serves as a fundamental livelihood activity within the study area, primarily undertaken by men in collaboration with their family members. The crops cultivated by these farmers are rice, groundnuts, maize, and millet, among others. The harvested produce serves a dual purpose—some is sold in local markets, while the rest is consumed within the family.

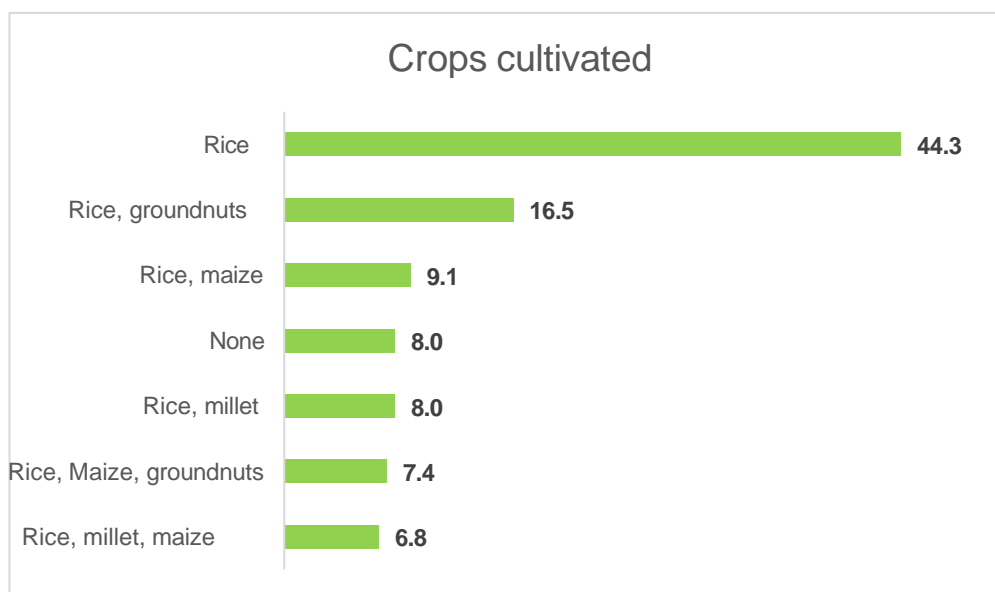
Furthermore, fishing and animal rearing hold a significant place in the agricultural landscape of these communities, contributing to both sustenance and economic activity. Notably, the majority of farmers employed traditional farming techniques, with mixed cropping being the dominant method (56.0%). Other farming practices are mono-cropping (29.0%), and mixed farming (15.0%). Labor-intensive in nature, farming activities predominantly involved the farmers themselves and their family members. The resulting farm products are rice, groundnuts, maize, millet etc find their way to designated markets using either public transport or private cars/motorcycles. The months with the highest sales were reported to be January and February, while the months with the lowest sales were June, July and August (See plate 4.21).



**Plate 4.22:** Agricultural activities observed within the project area  
*Source: Richflood fieldwork, 2024*

### ***Crops Cultivated***

The crops cultivated at the project communities revealed variations in agricultural practices. Among the sampled population at the project communities, only rice is the predominant crop farming, with 44.3% of respondents cultivating it, followed by a combination of rice and groundnuts at 16.5%, and rice and maize at 9.1%. Additionally, combinations of rice with other crops such as millet, maize, and groundnuts are reported at various proportions (Figure 4.29).



**Figure 4.29:** Types of crops cultivated at Project Communities  
*Source: Richflood fieldwork, 2024*

### ***Trading Activities and Economic Exchange in the Communities***

The communities under study exhibit a vibrant culture of economic exchange, where the trading of goods and services thrives at various scales. This exchange permeates every corner, from the street hawkers to the local kiosks and bustling markets, making it a ubiquitous activity within the community fabric.

One striking aspect of this economic exchange is its inclusivity; it knows no gender boundaries. Men and women actively participate in both the selling and buying of goods, whether in the marketplaces or the community at large. The spectrum of trading activities encompasses individuals operating kiosks in front of their homes to those engaged in large-scale buying and selling endeavours within designated markets.

Trading activities commence in the morning and extend into the evening, reflecting the dynamic nature of these exchanges. A diverse array of products finds their way into these markets, including staples like rice, garden eggs, bread, lettuce, groundnut, maize, and potatoes, as well as fish, meats, peppers, tomatoes, leafy vegetables, onions and various other food supplements.

Plate 4.22 visually portrays the multifaceted trading landscape, affirming the integral role of these economic activities in the daily lives and livelihoods of the community members.



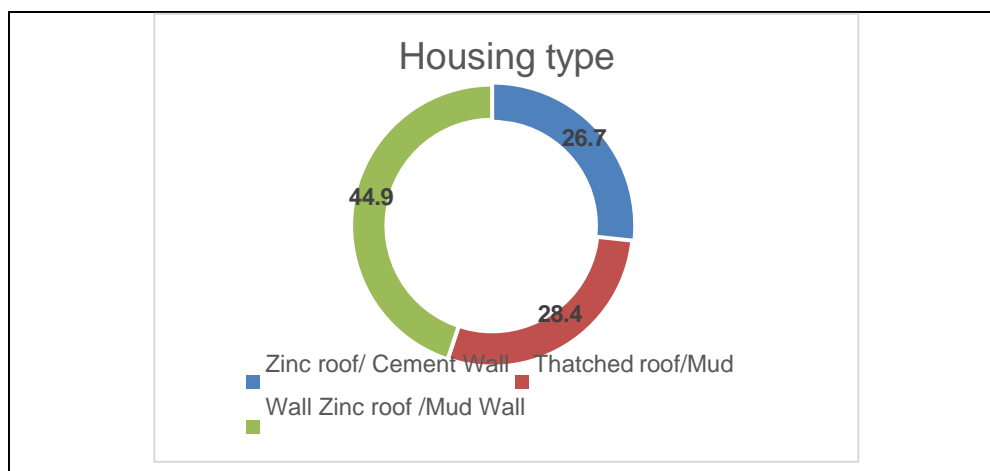


**Plate 4.23:** Trading activities in the study area

**Source:** Richflood fieldwork, 2024

#### 4.11 Settlement Patterns, Housing, and Property Ownership

In the surveyed communities, various housing structures are observed, including multiple-room bungalows, single-room bungalows, and single huts, as depicted in Plate 4.23. These housing units are designed with adequately sized windows to ensure proper ventilation and improve overall living conditions. 26.7% of the sampled population resided in houses with zinc roofs and cement walls, 28.4% in structures with thatched roofs and mud walls, and the majority, 44.9%, lived in dwellings featuring zinc roofs and mud walls (See Figure 4.30).



**Figure 4.30:** Housing Type

**Source:** Richflood fieldwork, 2024





**Plate 4.24: Housing types in the Project Communities**

*Source: Richflood fieldwork, 2024*

#### **4.12 Health Profile and Access to Healthcare Services**

The Department of State for Health and Social Welfare is responsible for the management of the health sector, which includes health services provision, regulation, resource mobilization including human resource development and health research. The Health Services Provision is divided into the Public Health Sector (Community Health Posts, Minor Health Centre, Major Health Centres, General Hospital and Teaching and Specialist Hospital) and Private Health Sector (Traditional Healing System).

##### ***Prevalent Diseases***

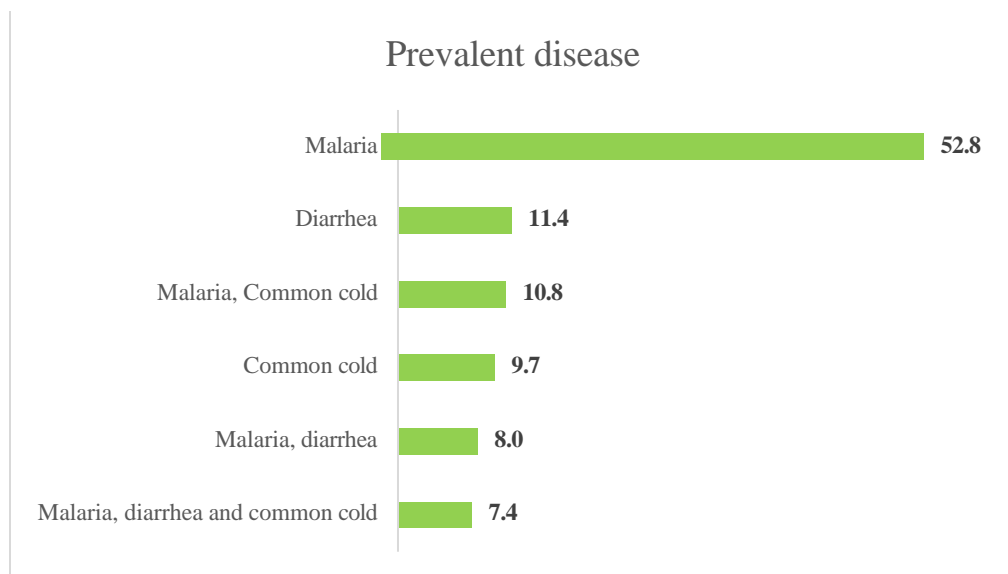
The health assessment survey conducted within the Area of Influence (AoI) of the project has provided valuable insights into the healthcare landscape of the communities. Notably, there exist clinics, ensuring healthcare accessibility for the residents. The survey further revealed the prevalent demand for specific medications within the communities, with malaria drugs emerging





as the most sought-after pharmaceuticals. Additionally, health issues such as dysentery, cough, and the common cold are common occurrences among the community members.

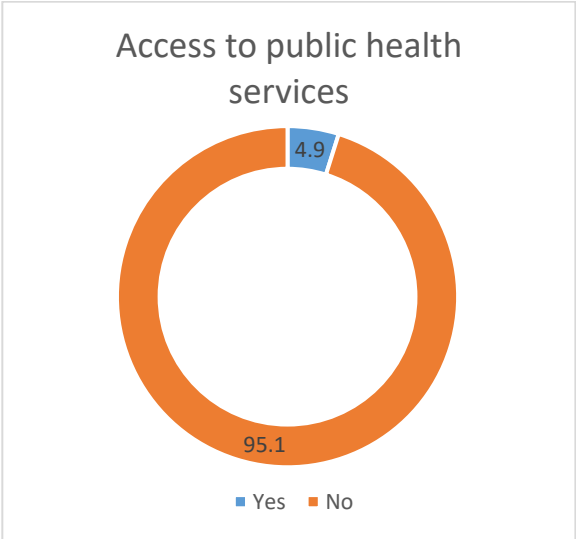
At the project communities, malaria is the most frequently mentioned disease at 52.8%, followed by diarrhoea at 11.4%, and common cold at 9.7%. Additionally, combinations of malaria with other ailments such as diarrhoea, common cold, and both diarrhoea and the common cold are reported at various proportions. (See Figure 4.31).



**Figure 4.31: Prevalent disease at URR**  
**Source: Richflood fieldwork, 2024**

### ***Access to public health services***

At the project communities, only 4.9% affirmed having access to public health services, with a notably higher percentage of 95.1% reporting a lack of access. This may be due to distance of the available health facilities to their villages especially remote areas or limited transportation options. Also, the inability to pay for health services remains a significant barrier. This financial constraint could be exacerbated by factors such as poverty and lack of health insurance coverage. The statistics from the Gambia Human Resources for Health Overview of 2023 indicate a concerning shortage of skilled health workers, with only 1.29 per 1000 population in the Central River Region (CRR). The report also highlights that no region in The Gambia has met the WHO-recommended threshold of 4.45 skilled health workers per 1000 population. These could contribute to the perception of inadequate access to health services by the respondents. (See Figure 4.32).



**Figure 4.35:** Access to Public Health Services at the project communities

**Figure 4.32:** Access to Public Health Services

**Source:** *Richflood fieldwork, 2024*



## **CHAPTER FIVE**

### **PROJECT ALTERNATIVES**

#### **5.1 Evaluation of Project Options**

During the project's design phase, various alternatives were evaluated to determine the most suitable options aligned with the needs of the project intervention communities and best practices applicable to agricultural activities. As part of this process, the project has considered alternatives concerning site location and irrigation design options. An analysis of these alternatives, including consideration of a no-project scenario, has been undertaken for the proposed project. The selection of the best alternative will be based on minimal negative impacts and a cost-benefit analysis.

The alternatives considered in the proposed REWARD project are discussed in terms of the no-project option and various irrigation system options.

##### **5.1.1 No-Project Scenario Alternatives**

The REWARD project aims to enhance the economy of the project area and the Gambia at large by creating jobs, improving the livelihoods of small-holder rice farmers, increasing rice field productivity, and enhancing the competitiveness of local rice production. In contrast, the no-project alternative implies that the project will not proceed, maintaining the status quo of rice production in the selected communities.

Under the no-project scenario, the site would remain unchanged, with no activities executed on the rice fields. Consequently, there would be limited economic growth for both commercial and small-holder rice farmers in the project area, potentially hindering overall rice production in the Gambia. This option could significantly setback efforts to increase rice production and economic growth in the country.

From a conservative environmental perspective, the no-project option may seem preferable as it avoids interference with existing environmental conditions. However, its drawbacks on economic growth and rice production make it an unviable development option. Therefore, while considering environmental concerns, it's essential to prioritize economic and social development objectives as well.



## **5.2 Irrigation Method Alternative**

Several factors are put into consideration in selecting the potential irrigation method for the project at the various project intervention sites. The choice of irrigation methods will depend on; the energy cost in terms of fuel consumption or from the national grid, water availability, water supply need of the fields, the topography of the sites, soil infiltration capacity, the growing seasons, and the rain and water regimes, etc.

The river Gambia serves as the major source of water for the existing irrigation schemes as well as potential irrigable areas for rice production in the Gambia. Therefore, the project would consider the surface and the sprinkler irrigation design in making water available for rice cultivation at the various project sites.

Considering that the project area is located in an area where there is an exceedance of water, and where the water source the river Gambia is located close to the existing and proposed rice fields, the surface irrigation method through the tidal and pump irrigation system applies to the project. The surface water in some areas will be channelled through canals and cemented farrow into the rice fields.

Also, the majority of the existing rice fields within the selected project intervention sites already have in place surface irrigation infrastructure either based on the pumped or tidal system. This will require low cost for execution for the project as this will require rehabilitation of the existing infrastructure in most cases. The sprinkler irrigation system will be more expensive to execute. Considering these, the surface irrigation system is the most preferred option for the project.



## CHAPTER SIX

### STAKEHOLDER ENGAGEMENT

#### 6.1 Background to the Project Stakeholder Engagement

The AfDB Operating Safeguard 1 (*OSI-Assessment and Management of Environmental and Social Risks and Impacts*) and OS 10 (*Stakeholder Engagement*) states that the borrower or client shall be responsible for carrying out and providing evidence of meaningful consultation (i.e. consultation that is free, prior and informed) with communities likely to be affected by environmental and social impacts, and with other local stakeholders. The key focus of meaningful consultation is inclusivity; namely, the approach taken needs to ensure that all groups (including those that are disadvantaged or vulnerable) are embraced within the consultation process on equal terms and that all groups are given the capacity to express their views with the knowledge that these views will be properly considered.

The Bank requires that stakeholder engagement starts at an early stage during project preparation and that it should continue throughout. The results of such engagement should be adequately reflected in project design, as well as in the preparation of project documentation. In all cases, consultation should be carried out after, or in conjunction with, the release of environmental and social information.

Similarly, the National Environmental Management Act (NEMA), 1994, is the principal legislation for managing the natural environment in Gambia. Relevant parts for the stakeholder engagement include Part II - Administration, which requires the Agency to promote public awareness of environmental issues (Section 10 (h)) and integrate public views into environmental policies through wide consultation (Section 19.1 (f)). Part IV - Environmental Planning mandates the Agency to consider public views in national planning by conducting open public consultations (Section 20 (4)). Additionally, Part V - Environmental Impact Assessment, Audits, and Monitoring specifies that the Agency must invite public comments on the environmental impact statement, consider these comments, and potentially hold public hearings (Section 24).

The Environmental Impact Assessment (EIA) Regulations, 2014, derived from NEMA, emphasize public participation in the EIA process for development projects. Part II - Environmental Impact Assessment Procedure requires developers to seek the views of affected communities and other interested parties, hold meetings to explain the project, and document these consultations (Section 16 (1) and 16 (2)). Part IV - Review of the Environmental Impact Statement mandates that developers must invite public comments on the draft environmental impact statement through media with national coverage (Section 20 (1) and 20 (2)). This inclusive



approach ensures that community concerns and feedback are integrated into environmental planning and decision-making, promoting transparency and accountability.

Therefore, in practice, the stakeholder engagement process involves employing measures to identify relevant stakeholders, share information with them, listen to their views, involve them in the processes of project planning and decision-making, contribute to their capacity-building and ultimately empower them to initiate, manage and control their self-development.

## **6.2 Objectives of the Stakeholder Engagement Plan**

The Stakeholder Engagement Plan (SEP) has been prepared as part of this ESIA and shall be updated throughout the Project implementation. The main purpose of the SEP is to define an appropriate approach that promotes consistent and coordinated Project consultation, participation and disclosure. The SEP also aims to ensure inclusiveness by taking into consideration the specific roles of the identified partners, existing knowledge, and information to be shared on the Project to empower stakeholders for informed decision-making. Objectives of the SEP include:

- identification of relevant Project stakeholders (including implementers, regulators, project-affected persons and persons generally interested in the Project);
- reference to the roles and responsibilities of the identified stakeholders;
- identification of an effective process to disseminate project information, and to ensure inclusiveness and transparency in consultations;
- the communication process shall provide stakeholders with an opportunity to influence project planning and design;
- building relationships with stakeholders for a lasting commitment to the Project;
- the need for orientation on the grievance redress mechanism of the Project;
- the opportunity to consider interlinked issues such as engagement of vulnerable persons/groups using methods that will ease and promote involvement;
- define reporting and monitoring measures to ensure the effectiveness of the SEP
- and periodic reviews of the SEP based on findings.

## **6.3 Stakeholder Engagement and Consultations**

### ***Stakeholder Identification***

The engagement of stakeholders in the ESIA process is a key success factor. Each stakeholder group may have different interests, concerns, and perspectives that would be considered in the development process. A preliminary list of project stakeholders was identified (refer to the project





SEP). These consist of individuals, groups, and organisations that may be affected by or may influence project development positively or negatively.

### ***Stakeholder Mapping and Analysis***

The stakeholders were mapped based on their level of influence, interest, and potential impact on the project. This helps prioritize engagement efforts and tailor communication strategies to different stakeholder groups. Stakeholders mapping was used in identifying and prioritizing stakeholders for the report (refer to the project SEP).

### ***Methods of Engagement***

The stakeholders mapped were engaged using various methods including public meetings, focus group discussions, surveys, interviews, and online platforms. This was based on the nature of the stakeholders, accessibility, cultural preferences, and the level of interaction required to ensure an inclusive engagement process. The feedback received from stakeholders was documented (See Annex).

## **6.4 Stakeholders Engagement Activities Conducted as Part of ESIA**

In the process of developing the Project preparation documents and safeguard instruments (Environmental and Social Impact Assessment, Pest Management Plan) numerous consultations were undertaken as part of the ESIA process for the proposed project. Stakeholder engagements and Key Informant Interviews were undertaken at various locations around the Project site from the 22<sup>nd</sup> of January to the 30<sup>th</sup> of January 2024. This was followed up by an online Stakeholder engagement meeting on the 21<sup>st</sup> of March, 2024. The objectives of these engagements were to disclose project-related information and obtain issues and/or comments from the stakeholders. Details of the Stakeholder engagements are provided in Table 6.1 below;

**Table 6.1: Previous Stakeholder Engagement Undertaken**

S/N	Particular	Location	Date
1	RVCTP (PIU)	RVCTP Office	23/01/2024
2	CPCU Coordinating Members	CPCU Office, Banjul	24/01/2024
3	The Governor of Upper River Region (URR) and the Technical Advisory Committee (TAC)	URR Governor's office	25/01/2024
4	National Environmental Agency (NEA), National Agency for Women Farmers Association (NAWFA), National Farmers	RVCTP Office	29/01/2024



S/N	Particular	Location	Date
	platform, Plant Protection Services (PPS), Department of Forestry (DoF),		
5	Members of Dampha Kunda Community, Traditional ruler, Men group, Women group, Youth group, Religious leaders	Chief's residence, Dampha Kunda	25/01/2024
6	Members of Limbambulu Bambo Community, Traditional ruler, Men group, Women group, Youth group, Religious leaders	Chief's residence, Limbambulu Bambo	25/01/2024
7	Department of Parks and Wildlife Management (DPWM), Department of Water Resources (DWR), National Environmental Agency (NEA), African Development Bank (AfDB), Soil and Water Management Services (SWMS) of the Department of Agriculture, Agricultural Engineering Services (AES), Gambia Department of Labour, Ministry of Employment and Trade, Ministry of Gender and Children Affairs, Traditional leaders, Representatives of local groups including youth and women group	Online (Zoom)	21/03/2024

#### 6.4.1 Opinion, Concerns and Expectations

During the consultations, stakeholders in all the potential Project sites were adequately sensitized on the following:

- Project background and components, the ESIA Process and studies;
- Processes procedures as well as the role of the stakeholders and institutions during the implementation of the Project
- Benefits of the Project to the entire country and specifically in the aspect of rice production
- Provision of additional capacity to meet current and future rice cultivation requirements including increased production capacity to enhance the country's global competitiveness in both regional and international markets.



At the same time, the Consultant indicated the potential environmental, social and economic impacts of the Project. These would include impacts on the environment (during rehabilitation of existing irrigation infrastructure, and use of agrochemicals) and Project facilities due to climate change, job creation, which could boost the local economy, improved livelihoods and economic opportunities through increased agricultural productivity and related agribusiness ventures etc.

In general, the stakeholders highly appreciated and welcomed the project. They highlighted the importance of the rice fields within the context of National development for the livelihoods of the people, as well as the numerous benefits they will get from the increased rice production capacity. These benefits they maintained would include their ability to engage in mechanized farming and new businesses that would raise their standard of living.

The opinions, concerns and expectations of the populations and persons likely to be affected by the Project have been provided in Table 6.2 below and the mitigative measures have been integrated into the ESMP.



**Table 6.2: Stakeholders' Feedback, Concerns, and Expectations**

Comments, Issues and Views	Required Action / Response	Expectations
No drying floor and waiting shed from the sun and rain	The project will construct drying floors and waiting sheds to provide shelter and facilitate rice drying.	<ul style="list-style-type: none"> <li>• Provision of PPEs for machine operators, farmers, and during fertilizer applications</li> <li>• Integration of local knowledge in the setup of the irrigation system and other infrastructure for the project</li> <li>• Project stakeholders anticipate environmental sustainability and technological advancements.</li> <li>• Stakeholders expect support for quality seedlings, farming maintenance, and machinery.</li> <li>• Stakeholders anticipate market diversification resulting from the project.</li> <li>• Stakeholders expect the project to enhance foreign exchange savings.</li> <li>• Stable market creation for local farmers, ensuring a consistent outlet for produce, is a key expectation.</li> <li>• Stakeholders expect the project to stimulate business growth and development in the locality.</li> <li>• Stakeholders anticipate increased rice production and enhanced food security.</li> <li>• Quest for access to more land for women are anticipated</li> </ul>
Poor land development of rice fields from previous intervention projects	The project will conduct thorough assessments and incorporate lessons learned from past interventions to ensure improved land development practices. Detailed land development plans will be implemented, focusing on sustainable practices and community involvement, as outlined in the Environmental and Social Management Plan (ESMP) and the Environmental and Social Impact Assessment (ESIA). Additionally, continuous monitoring and evaluation mechanisms will be established to track progress and make necessary adjustments.	
Community members requested a clear and accessible mechanism for lodging complaints and grievances.	A comprehensive grievance redress mechanism (GRM) will be established to ensure timely and fair resolution of issues.	
Stakeholders raised concerns about wildlife attacks on rice farms by warthogs, hippopotamuses, and cattle.	The project will implement wildlife management strategies and protective measures to safeguard crops, as detailed in the ESMP.	
Concern for continuous engagement and open lines of communication.	Continuous stakeholder engagement and transparent communication channels will be maintained throughout the project, as detailed in the Stakeholder Engagement Plan (SEP).	
Fears that the project might impact water quality, specifically pesticide and saltwater intrusion.	A robust environmental management plan will be established to address water quality concerns, as outlined in the ESMP.	
Lack of pumping machines poses a challenge to irrigation needs.	The project will ensure the provision of pumping machines to support irrigation	



Comments, Issues and Views	Required Action / Response	Expectations
Flash floods from upstream water sources present risks to project areas.	This issue will be addressed in the ESMP.	<ul style="list-style-type: none"> <li>Utilization of by-products such as converting rice husk into biofuel and using bran for animal feed is expected.</li> <li>Enhanced production of quality rice in The Gambia is a shared expectation.</li> <li>The presence of agro-processing plants is seen as motivation for youth engagement in rice farming.</li> <li>Employment generation and income opportunities for locals are anticipated outcomes of the project.</li> <li>Food security and grazing resources for animals are key expectations from the project.</li> </ul>
Fear of project failure due to past experiences	Robust project management and monitoring frameworks will be established to ensure project success, guided by the ESIA recommendations.	
Concerns about increased risks to the environment related to waste management and the use of agrochemicals.	The project will implement a waste management plan and regulate the use of agrochemicals through the PMP	
Stakeholders are concerned about gender-based abuse, particularly affecting females.	Strict policies and training programs will be implemented to prevent gender-based abuse and ensure accountability	
Child labour whereby children under the custody of religious leaders are sent into the rice farms to work.	The project will enforce child labor laws and provide awareness programs to prevent child labor.	
Mosquito prevalence in rice fields during the rainy season hinders work.	Mosquito control measures will be implemented, and protective equipment will be provided to workers	
Deforestation, windstorms, and biodiversity impacts require mitigation measures.	Strategies to prevent deforestation and protect biodiversity will be developed and implemented	
Grazing conflicts between farmers and nomadic cattle rearers	Dialogue between stakeholders will be facilitated to develop mutually beneficial grazing agreements	
Sexual exploitation and abuse by previous contractors during land development.	Strict policies and training programs will be established to prevent sexual exploitation and abuse, ensuring accountability	
Engaging in strenuous activities during ploughing, especially for women due to lack of tractors	Mechanized farming equipment and training will be provided to reduce physical strain during ploughing activities, as outlined in the ESMP.	





**Deliberations at the CPCU Coordinating Meeting**



**RVCTP- Coordinating Meeting**



**Deliberations at the Governor's Office of URR**





**Consultation with the Men Group at Dampha Kunda**



**An Interview Section with an Elder at Limbambulu Bambo**



**Consultation with the Women Group at Dampha Kunda**



**Consultation with the traditional rulers at Dampha Kunda**



**Consultation with the Men Group at Limbambulu Bambo**



**Consultation with the Women Group at Limbambulu Bambo**



	
<p><b>Consultation with the Children at Limbambulu Bambo</b></p>	<p><b>Consultation with the Youth at Limbambulu Bambo</b></p>
	
<p><b>Focus Group Discussion with Women at Dampha Kunda</b></p>	<p><b>Group of Young Women at Limbambulu Bambo</b></p>

**Plate 6.1: Stakeholders Engagement Photolog**  
*Source: Richflood Field Survey, 2024*

## 6.5 Planned Stakeholder Engagement

Given the need for an effective and systematic approach to address the project's communication requirements to engage with stakeholders, an Action Plan (Table 6.3) has been developed indicating specific consultations that will be carried out in the course of the Project implementation.



**Table 6.3: Planned Stakeholder Engagement Action Plan**

Activities	Actions and topics	Audience	Frequency/date	Expected outcome
General awareness-raising campaigns	Information meetings/communications on the status of Project implementation, challenges and way forward	Affected populations, including vulnerable persons, local and regional authorities, PIU, technical entities, etc.	At least once monthly via progress reports, one-on-one discussions, FGDs, public information	<ul style="list-style-type: none"> <li>Better understanding of the Project to promote informed decisions by the PIU and stakeholders;</li> <li>Minutes and recommendations implemented;</li> <li>Monthly progress reports received by all identified recipients</li> </ul>
Prepare progress reports	<ul style="list-style-type: none"> <li>Information sharing on the status of Project implementation including achievements, issues, resolutions, risks and next steps;</li> <li>Recommend and take necessary corrective actions.</li> </ul>	Internal and external stakeholders (CPCU, PIU and other project teams /AfDB)	Monthly	<ul style="list-style-type: none"> <li>Progress on the project was tracked and compared against the original plan.</li> <li>Increased visibility of the project including team performance</li> </ul>
ESIA report implementation	<ul style="list-style-type: none"> <li>National disclosure of the final ESIA (public announcements and copies accessible from the NEA, MECCNAR, CPCU, RVCTP, and Gambia National Library Services Authority)</li> <li>Disclosure of the final ESIA on the AfDB website</li> </ul>	All stakeholders	Upon finalization of the ESIA report before any works	<ul style="list-style-type: none"> <li>Disclosures made within the stipulated timeframe</li> <li>ESMP implemented accordingly</li> </ul>



Activities	Actions and topics	Audience	Frequency/date	Expected outcome
Implementation of the Grievance Redress Mechanism	<ul style="list-style-type: none"> <li>Meetings of the GRC members;</li> </ul>	GRC, Complainants, interested persons, community organizations	Monthly	<ul style="list-style-type: none"> <li>Monthly social reports from the PIU including GRM updates</li> <li>All cases addressed within the proposed timeframe from the official receipt of the complaint (irrespective of the outcome)</li> </ul>
	<ul style="list-style-type: none"> <li>Local dissemination of the GRM;</li> </ul>		At least monthly	
	<ul style="list-style-type: none"> <li>Meetings of the GRC with identified specialized partners based on issues;</li> </ul>		As required	
	<ul style="list-style-type: none"> <li>Verification and investigative field visits</li> </ul>		As required	



## **6.6 Grievance Redress Mechanism (GRM)**

This section summarizes the Grievance Redress Mechanism presented in the REWARD GRM Manual. It provides an external Grievance Mechanism to be adopted and implemented by the REWARD project. The establishment of a grievance management system is a widely accepted international best practice for the management of stakeholder interactions and social impacts. It is a requirement of the project lenders, in this case, the African Development Bank (AfDB). The Grievance Redress Mechanism provides a clear description of the formal process whereby stakeholders can submit a grievance or report an incident regarding the REWARD project, through a defined process within a predictable timeframe and receive a response and resolution (where possible) to the grievance. This process should be adhered to by the REWARD CPCU/PIU and contractors executing projects as part of the REWARD project upon receipt of a complaint.

### **6.6.1 Objectives of Grievance Mechanism**

This grievance management system provides a formal way to register stakeholders' concerns to be addressed in good faith and through a transparent and impartial process.

This mechanism aims to:

- Establish a systematic approach to handle grievances related to the REWARD activities.
- Provide a clear and accessible process for stakeholders to report grievances.
- Ensure that incidents, complaints, and grievances are logged and managed consistently to build trust in the legitimacy and efficiency of the procedure and system;
- Assist in the resolution of grievances between and among stakeholders, such as the various government Ministries, Departments, Agencies, Non-Government Organisations, communities,
- Ensure that unwanted events with negative impacts on external stakeholders are dealt with swiftly and appropriately;
- Ensure that vulnerable people can log grievances in a non-threatening and accessible way;
- Allow REWARD to identify and correct problems before they recur or escalate into more serious problems;
- Allow REWARD to monitor and track stakeholder concerns, issues, and provide feedback;
- Provide an efficient and low-cost means of resolving disputes and providing control measures where appropriate; and
- Elevate the credibility and reputation of REWARD by efficiently demonstrating that the concerns of external stakeholders are taken seriously.



### 6.6.2 Structure of the GRM

The mechanism applies to the REWARD project in addressing complaints, grievances, and issues raised by stakeholders due to perceived project impacts and/or incidents including, but not limited to, socio-economic, environmental, health, or safety aspects. Following international good practice, the REWARD project will establish a specific mechanism for dealing with grievances that as much as possible do not involve court action, by establishing a Grievance Redress Committee (GRC)<sup>2</sup> at different levels to handle and address grievances following standard procedural steps.

The GRM for the REWARD project will be organized under the following structures;

- The Local levels;
- The Regional level; and
- The National level.

#### Level I – Local Level

At the local level, the grievance redress mechanism is managed by the local committee based in the village. This consists of the village head, the village development committee chairperson, the youth representative, the religious leader (imam), the women representative and the district chief as the chairperson of the local committee. The committee's primary responsibility involves handling grievances and complaints directly at the project site, which includes communities around the rice fields and work sites. They will work closely with the aggrieved stakeholders to clarify and resolve any misunderstanding that could give rise to conflicts or further complaints.

The local committee is responsible for receiving and registering grievances and complaints from the stakeholders within the local community. Upon receiving a complaint, the committee conducts an investigation and internally reviews the grievance to determine its merits. After a thorough review, the committee proposes a resolution and communicates it to the complainant. The local GRM Committee also has the responsibility to report the grievance and the proposed resolution to the regional level for further action and documentation.

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<sup>2</sup> The Grievance Redress Committee (GRC) involves already established committees among key stakeholder group representatives. The committee is intended to formalise a system for stakeholders to solve problems and/or issues related to the REWARD project collectively and to receive regular feedback from the REWARD CPCU/PIU on the project. It will serve as a forum for the project stakeholders to express and channel their concerns which affect them directly regarding important issues related to the project





## **Level II – Regional Level**

At the regional level, the grievance redress mechanism constitutes members of the Technical Advisory Committee (TAC) headed by the Regional Governor who is the supreme authority at the regional level. The TAC members primarily comprise staff representatives of national institutions such as the Department of Agriculture, Department of Forestry, National Environment Agency, Ministry of Youths and Sports, Ministry of Gender, Women and Children Department of Water Resources, Department of Livestock and the security forces etc.

The regional GRM will handle matters that the local GRM cannot be resolved at the local level. The committee is tasked with resolving disputes and verifying the merits of grievances reported by the local-level GRM committee. Once a grievance is reviewed, the committee communicates its decisions to the complainant and provides any necessary documentation to support the resolution process.

The committee also records all grievances, categorizes them, and prioritizes those that need immediate resolution. It maintains comprehensive records, including registers, meeting minutes, and correspondence, to ensure transparency and accountability. All received complaints and the progress of remediation are documented for future reference. The regional committee is also responsible for forwarding complaints and grievances that it fails to resolve at the regional level.

## **Level III – National Level**

At the National level, the grievance redress mechanism involves the Judiciary and Courts. This level is characterized by the national legal structure, which includes law courts tasked with arbitrating between the project and the complainant. The National legal structure is responsible for providing a formal legal platform to resolve disputes that cannot be settled at the local and regional level.

Grievances escalated to the national level are examined thoroughly by the courts, considering all the evidence and testimonies presented by both the complainant and the project representatives. The judiciary ensures that all parties receive a fair hearing and that the resolution complies with national laws and regulations. The role of the courts is critical in upholding justice and ensuring that the grievance redress mechanism operates with integrity and impartiality.

This structured approach, spanning from the local to the national level, ensures that grievances and complaints related to the project are addressed promptly and effectively, maintaining transparency, fairness, and accountability at every stage.

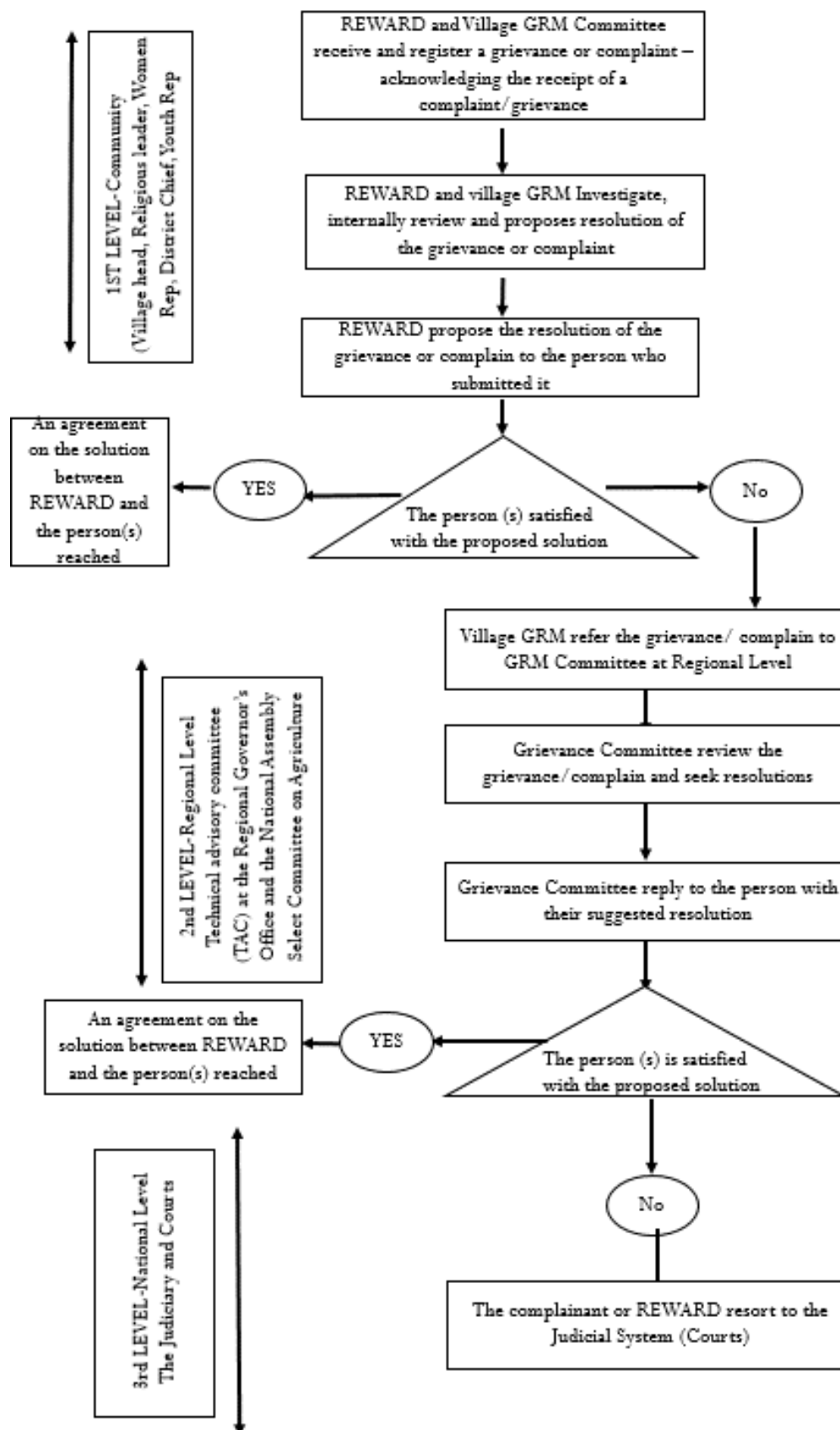


Figure 6.1: Grievance Mechanism Structure



## **6.7 REWARD Grievance Redress Mechanism - Procedural Steps**

The REWARD Program is committed to ensuring that all stakeholders have a clear, transparent, and effective process for addressing grievances related to its projects. Recognizing the potential for development initiatives to impact communities and individuals, the Grievance Redress Mechanism (GRM) has been established as a critical component of the project's commitment to accountability, transparency, and stakeholder engagement.

The purpose of this chapter is to outline the procedural steps for the GRM, detailing how grievances can be lodged, acknowledged, reviewed, and resolved. By providing a structured approach to grievance redress, REWARD aims to ensure that all complaints are handled promptly and fairly, minimizing any negative impacts and fostering positive relationships with all stakeholders.

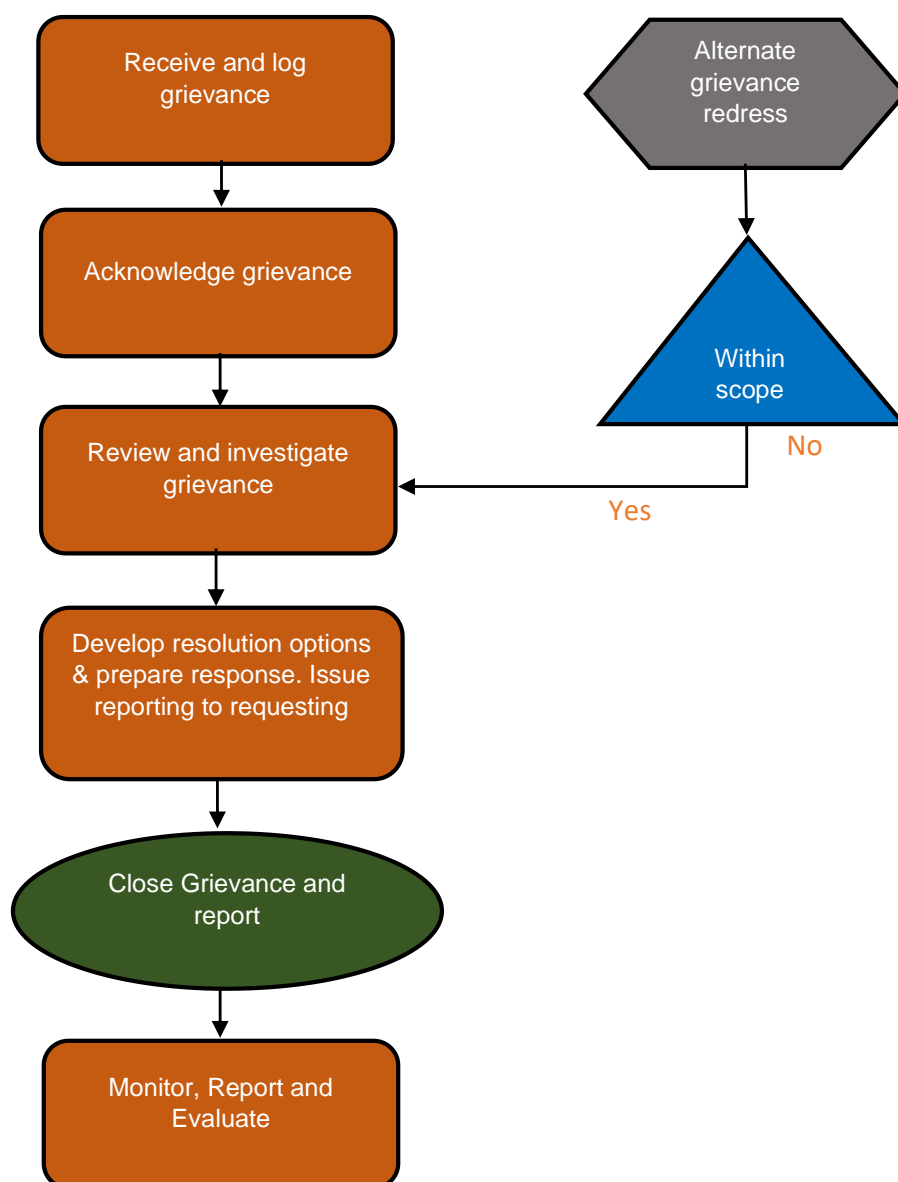
This mechanism not only addresses grievances but also serves as a feedback loop to improve project implementation and mitigate future issues. Through continuous monitoring, reporting, and evaluation, the GRM helps maintain high standards of environmental and social governance, ensuring that the REWARD Program operates in a manner that respects and responds to the needs and concerns of the communities it serves.

The following sections detail the specific procedural steps involved in the GRM, from the initial receipt and logging of a grievance to its resolution and closure, and the subsequent monitoring and evaluation of the grievance handling process. This comprehensive approach ensures that all grievances are given due attention and resolved in a manner that is satisfactory to all parties involved.

Affected parties may lodge/register a grievance using the following process:

1. Receive and log/register grievance
2. Acknowledge grievance
3. Review and investigate grievance
4. Develop resolution options and prepare a response
5. Close grievance
6. Monitor, report, and evaluate

*A detailed approach is provided in the REWARD GRM Manual*



**Figure 6.2:** Flow Diagram of Grievance Redress Procedural Steps

## 6.8 Grievance Handling Process

The table below outlines the grievance handling process and the responsible institution/person at each phase:

Phase	Process	Description	Completion Time Frame	Responsible Institution/Person
1	Receipt of Complaint	Document the date of receipt, name of the complainant, affected party, inform REWARD	1 day	REWARD/GRC



Phase	Process	Description	Completion Time Frame	Responsible Institution/Person
2	Acknowledgment of Grievance	By letter, email, phone	1-3 days	REWARD/GRC
3	Screen and Establish the Merit of the Grievance	Visit the site, listen to the complainant/community, assess the merit	3-7 days	REWARD/GRC
4	Implement and Monitor a Redress Action	Where the complaint is justified, carry out redress in line with what is agreed	10-15 days	REWARD/GRC
5	Extra Intervention as a Disadvantaged Situation	Review the redress steps and conclusions, provide intervention solution	2-4 weeks	REWARD/GRC/ Legal
6	Judicial Adjudication	Forward the complaint to the judicial system (courts) if unresolved: Intervention as a Disadvantaged Situation	Week 4 onwards	REWARD/GRC/ Legal
7	Completion or Termination of the Complaint	Satisfactory resolution or termination of the complaint with written acceptance of the decision	Week 4 onwards	REWARD/GRC/ Legal/GRM
8	Reporting	Once resolved, the resolution should be recorded in the grievance logbook	Within 10 working days	REWARD/GRC/ Legal/GRM
9	Archiving	Establish a physical and electronic filing system for all complaints received	Within 5 working days	REWARD/GRC

*\*Note: For cases of Gender-Based Violence (GBV), the procedure for receiving and treating the complaint differs from the general procedure outlined above and will follow a survivor-centred approach. The anonymity of the survivor will be maintained, and the confidentiality of the survivor's express consent will be upheld. The involved parties will not have their security breached.*

*A mechanism in the form of a Sexual Exploitation & Abuse (SEA) / Sexual Harassment (SH) Compliance Team will be set up to manage cases of SEA/SH as well as issues related to violence against children (VAC)\**



## 6.9 Periodic Review and Documentation / Operational Budget

The REWARD will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the Project's ability to prevent and address grievances. The operational budget for the GRC (costs involved in resolving complaints such as meetings, consultations, communication, and reporting/ information dissemination) will be borne by REWARD and is shown in Table 6.4 below.

**Table 6.4:** Cost Breakdown for Grievance Redress Mechanism (GRM) Activities

GRM Activities	Unit Cost (US \$)	Total (US \$)
Engagement and training of the Three GRC (local level) and Project GRC- at the PIU level	5,000	15,000
Information dissemination and sensitization of the GRM	5,000	15,000
Secretarial costs (for producing complaint forms and reports)	3,000	9,000
Communication costs of the Chairmen of the three Grievance Redress Committees (local level and PIU level)	2,500	7,500
Travel, verification, and investigation costs	1,500	18,000 (12 months)
<b>TOTAL</b>		<b>64,500</b>

## 6.10 Monitoring the Grievance Process

The grievance management system provides a formal mechanism for stakeholders to register concerns and for these to be addressed transparently, impartially, and in good faith. Effective monitoring of grievances is essential to identify any escalating conflicts or disputes early and ensure they are resolved promptly. The REWARD CPCU and Social Development Officer (SDO) will review the grievance mechanism and its effectiveness bi-annually. Based on the review outcomes, necessary amendments will be made, and the updated mechanism will be disclosed to the various Grievance Redress Committee (GRC) in a formal meeting.

## 6.11 Awareness and Accessibility of GRM

Ensuring that stakeholders are well-informed and have easy access to the Grievance Redress Mechanism (GRM) is fundamental to the success of the REWARD Program. A transparent, accessible, and effective GRM will foster trust and accountability between the program and the





communities it serves. Various measures and strategies have been outlined for implementation by the REWARD Program to raise awareness about the GRM and make it easily accessible to all stakeholders, including the most vulnerable groups. The REWARD Program is committed to providing clear, comprehensive information about the GRM and its processes. Stakeholders must understand their rights and the avenues available for addressing grievances.

By promoting awareness and ensuring accessibility, the REWARD Program aims to create an environment where stakeholders feel confident in voicing their concerns, knowing that they will be heard and addressed promptly and fairly. This proactive approach not only helps in mitigating potential conflicts but also contributes to the overall effectiveness and sustainability of the program.

## 6.12 Roles and Responsibilities

Effective management and monitoring of grievances require clear roles and responsibilities. Below is a detailed outline of these roles:

**Table 6.5: Roles and Responsibilities**

Role	Responsibility
Grievance Redress committee (Local and Regional committee).	<ul style="list-style-type: none"> <li>• Receive and record formal grievances in a grievance form provided.</li> <li>• Depending on the complexity of the grievance, the committee shall review and analyse the grievance at various levels.</li> <li>• Provide resolution and feedback to the complainant within the stipulated timeframe.</li> </ul>
REWARD CPCU/PIU	The GRC shall report the grievances in the registry to the REWARD CPCU/PIU on a bi-annual basis



## **CHAPTER SEVEN**

### **ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES**

#### **7.1 General**

A key part of the Environmental and Social Impact Assessment (ESIA) Study is the impact assessment analysis of how the Project may interact (positively and negatively) with environmental and socioeconomic resources or receptors. This chapter identifies and evaluates the actual and potential environmental consequences of the proposed project activities, with the potential for mitigation of negative impacts and enhancement of positive impacts.

The assessment process involved looking at the environmental baseline features, uniqueness, potential vulnerabilities and the nature, location, and duration of construction activities, and project design features in effect throughout the operation. An understanding of the nature of the impacts, the proposed Regional Rice Resilient Value Chains Development Program (REWARD) activities or operations at the Upper River Region (URR) would have on the natural and human environment is vital to decision-making on the path of both the communities and the government.

This chapter assesses both the associated and potential impacts of the Regional Rice Resilient Value Chains Development Program (REWARD). The methodology used for the assessment was designed to ensure a comprehensive and systematic evaluation of all positive and negative effects associated with the different phases of the project. The main goal of the assessment is to identify where mitigation is required to ensure that appropriate control measures and monitoring programs are developed to minimize the adverse effects.

#### **7.2 Impact Assessment Methodology**

The purpose of the impact assessment is to identify and evaluate the significance of potential impacts on identified receptors and resources; to develop and describe mitigation measures that will be taken to avoid or minimise any potential adverse effects and enhance potential benefits, and to report the significance of the residual impacts that remain following mitigation.

##### **7.2.1 Predicting the magnitude of impacts**

The term ‘magnitude’ covers all the dimensions of the predicted impacts on the natural and social environment including:

- The nature of the change (what resource or receptor is affected and how);



- The spatial extent of the area impacted or the proportion of the population or community affected;
- Its temporal extent (*i.e.* duration, frequency, reversibility); and
- Where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

## 7.2.2 Impact Significance Rating

Practicable management measures will be recommended that avoid, and if avoidance is not possible, then reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design. Impact matrices for the site preparation, construction and operation phases were created utilizing the following criteria:

**Table 7.1: Impact Characteristic Terminology**

Impact Magnitude	
<b>Type</b>	<p><b>Direct</b> – impacts that result from a direct interaction between the project and resource/receptor.</p> <p><b>Indirect</b> – impacts that follow from direct interactions between the project and its environment as a result of subsequent interactions.</p> <p><b>Induced</b> – impacts that result from other activities that happen as a consequence of the project.</p>
<b>Extent</b>	<p><b>Local</b> – impacts that are limited to the Regional Rice Resilient Value Chains Development Program (REWARD) in communities situated in the rice fields and valleys of the Upper River Region (URR).</p> <p><b>Regional</b> – impacts that are experienced beyond the local areas to the wider region.</p> <p><b>International</b> – impacts that are experienced at an international scale <i>i.e.</i> affecting another country.</p>
<b>Duration</b>	<p><b>Temporary</b> – predicted to last less than the project duration.</p> <p><b>Short-term</b> - predicted to last only for the duration of the construction activities (<i>i.e.</i> up to approximately one year).</p> <p><b>Medium-term</b> - predicted to last from one year to the end of the project life (<i>i.e.</i> 5 years).</p> <p><b>Long-term</b> - predicted to continue beyond the project life but will cease in time.</p> <p><b>Permanent</b> – impacts that cause a permanent change in the affected receptor or resource that endures substantially beyond the project lifetime.</p>



Impact Magnitude	
Frequency	<b>Continuous</b> – impacts that occur continuously or frequently.
	<b>Intermittent</b> – impacts that are occasional or occur only under specific circumstances
Likelihood*	<b>Unlikely</b> – the event is unlikely but may occur during the project.
	<b>Possible</b> – the event is likely to occur at some point during the project.
	<b>Likely</b> – the event will occur during the project (i.e. it is inevitable).

\* For unplanned events only.

Magnitude describes the actual change that is predicted to occur in the resource or receptor (*e.g.* the area and duration over which land take will occur; the degree of impact on the livelihoods of a local community; the probability and consequences in terms of accidental events). An assessment of the overall magnitude of an impact is, therefore, provided that takes into account all the dimensions of the impact described above to determine whether an impact is of small, medium or large magnitude.

### 7.2.3 Sensitivity/vulnerability/importance of resources and receptors

The significance of the impacts resulting from an impact of a given magnitude will depend on the characteristics of resources and receptors to that impact in terms of their sensitivity, vulnerability and importance.

The quality or importance of a resource will be judged by taking into account, for example, its national or international designation, its importance to the local or wider community, its ecosystem function or its economic value. The assessment of the sensitivity of human receptors will consider their likely response to the change and their ability to adapt to and manage the effects of the impact.

### 7.2.4 Assessment of impact significance

All human activity imposes some level of change on the natural and social environment, because of physical interactions with natural systems or other human activities. To provide information to decision-makers and other stakeholders on the importance of different project impacts, the ESIA team evaluates the significance of each such change.

There is no statutory definition of significance. Therefore, in the ESIA, the evaluation of significance is inherently subjective. It is based on the professional judgment of the ESIA team, informed by legal standards, national and regional government policy, the current industry good



practices and the views of stakeholders. Where specific standards are either not available or provide insufficient information on their own to allow grading of significance, evaluation of significance will take into account the magnitude of the impact and the quality, importance or sensitivity of the affected resource or receptor.

Magnitude and receptor quality/importance/sensitivity are assessed in combination to evaluate whether an impact is, or is not, significant and if so its degree of significance (defined in terms of Minor, Moderate or Major). Impacts ranked as Negligible include those that are slight or transitory and those that are within the range of natural environmental and social change.

**Table 7.2 Significance Matrix**

Sensitivity / Vulnerability / Importance	Magnitude of Impact			
	Negligible	Small	Medium	Large
Low	<i>Negligible</i>	<i>Negligible</i>	<i>Minor</i>	<i>Moderate</i>
Medium	<i>Negligible</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>
High	<i>Negligible</i>	<i>Moderate</i>	<i>Major</i>	<i>Major</i>

- An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be ‘imperceptible’ or is indistinguishable from natural background variations.
- An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
- An impact of **moderate** significance has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, designing an activity so that its effects only just avoid breaking a law and/or causing a major impact is not the best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed



effectively and efficiently.

- An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resources/receptors. The aim of IA is to ensure that Project does not have any major residual impacts, however, for some aspects, there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied).

For impacts that are initially assessed during the ESIA process to be of *Major* significance, a change in design is usually required to avoid, reduce or minimise these, followed by a reassessment of significance. For impacts assessed during the ESIA process to be of *Moderate* significance, where appropriate the discussion explains the mitigation measures that have been considered, the one selected and the reasons (*e.g.* in terms of technical feasibility and cost-effectiveness) for that selection. Impacts assessed to be of *Minor* significance are usually managed through good industry practice, operational plans and procedures.

The ESIA is intended to help decisions on projects to be made in full knowledge of their likely impacts on the environment and society. The residual impacts and their significance reported in this report are based on the proposed Regional Rice Resilient Value Chains Development Program (REWARD) as described, i.e. inclusive of all proposed mitigation.

### 7.2.5 Impact Identification

Impact identification aims to account for the entire potential and associated biophysical, social and health impacts making sure that both significant and insignificant impacts are accounted for. *ISO 14001* requires the identification, evaluation and registration of environmental aspects associated with the proposed project activities.

As with a project of this nature, the impactable components of the environment that will be affected by the proposed projects as well as impact indicators for the sensitivity of each component of the environment are shown in *Table 7.3* below.





**Table 7.3:** Environmental/Social Components, Sensitivity and Associated Impact Indicators

<b>Environmental/Social Components</b>	<b>Potential Environmental Sensitivity of Impact Identified</b>	<b>Associated Impact Indicators</b>
Climate	Climate change	Humidity, Temperature, Rainfall, Wind
Air Quality	Dust generation, gaseous emission (exhaust gases/fumes)	Particulate matter, CO, NO <sub>2</sub> , CO <sub>2</sub> , SO <sub>2</sub> , VOCs
Noise & Vibration	Wildlife disturbance, hearing loss, communication interference.	Construction activities, machinery operations
Water Quality	Water pollution/contamination, exceedance of standard limit per quality parameter	TDS, Turbidity, DO, Toxicity, pH, Heavy metals, Temperature, Colour, Odour, BOD, Hardness, Nutrients, Microbial content, etc.
Hydrogeology	Changes in Physio-chemical processes due to disturbance of hydrogeological material, etc.	Groundwater level and Quality
Soil/Land Use/ Topography	Alteration in existing Landscape, soil loss, changes in aesthetics, etc.	Erosion, Farming, Recreation, Land use pattern, land-use conflicting interest
Flora and Fauna	Destruction/loss of habitat/species, habitat fragmentation, contamination etc.	Diversity and abundance of flora and fauna species, threat to sensitive areas
Community Health and Safety	Disruption of means of livelihoods due to land-take, deterioration of farmlands, nuisance due to noise and vibration, land-ownership conflicts, misinterpretation of community's expectations, Creation of pits after mining, effects from poor waste disposal, occupational health hazards,	Unemployment rate, crime rate, education statistics, distance of closest settlement, compensation packages, Community Development Agreement, peaceful co-existence, population, income, infrastructural development, prevalence disease, literacy level, housing condition, health, safety and security.



<b>Environmental/Social Components</b>	<b>Potential Environmental Sensitivity of Impact Identified</b>	<b>Associated Impact Indicators</b>
	maternal health, reproductive health; etc.	
Occupational Health and Safety	Employment of local labour and skills acquisition for workers taking advantage of new opportunities. Incident/accident resulting from the use of machinery to transfer materials and equipment, falls from height, welding burns etc	Grievance redress mechanism, wages/salary remuneration, Accident/incident management, workplace safety in sensitive areas.
Child labour and Violence against Children (VAC)	Involvement of Child(ren) in field preparation, planting, transplanting, processing etc leading to psychological mental stress	Child labour and violence against children reports
Gender Based Violence (GBV), Sexual Abuse and Harassment	Employment of local workers especially women, leading to exploitation and abuse.	Grievance redress mechanism, abuse and sexual harassment reports
Archaeology, Cultural Resources and Protected Areas	Conflicts over the sacredness of the Burial grounds/ Shrines/ Monuments, National Parks	Cultural relics/sites, historical knowledge, Nature conservation.

The first step in identifying impacts associated with the project is the development of an interaction matrix which shows the relationship/interaction between the project's environmental components and planned project activities. The full list of project activities used in the interaction matrix has been summarized in four (4) phases; pre-construction, construction, operation and decommissioning. Based on these interactions, the identified negative impacts were rated as High, Medium and Low. Positive impacts arising from the project were not further classified.

The development of the checklist was carried out using the The Gambia National Environmental requirements and the African Development Bank (AfDB) Integrated Safeguards System and other relevant standard codes for the agricultural sector.



### 7.2.6 Mitigation Measures

One of the key objectives of this ESIA is to identify and define socially and environmentally acceptable, technically feasible and cost-effective mitigation measures. Mitigation measures are developed to avoid, reduce, remedy or compensate for the significant negative impacts identified during the ESIA process, and to create or enhance positive impacts such as environmental and social benefits. In this context, the term mitigation measures include operational controls as well as management actions. Where a significant impact is identified, a hierarchy of options for mitigation is explored (Table 7.4).

**Table 7.4 Hierarchy of options for mitigation**

<ul style="list-style-type: none"> <li>• <b><i>Avoid at Source</i></b> – avoiding or reducing at source through the design of the Project</li> </ul>
<ul style="list-style-type: none"> <li>• <b><i>Abate on Site</i></b> – add something to the design to abate the impact</li> </ul>
<ul style="list-style-type: none"> <li>• <b><i>Abate at Receptor</i></b> – if an impact cannot be abated on-site then control measures can be implemented off-site</li> </ul>
<ul style="list-style-type: none"> <li>• <b><i>Repair or Remedy</i></b> – some impacts involve unavoidable damage to a resource and these impacts can be addressed through repair, restoration or reinstatement measures.</li> </ul>
<ul style="list-style-type: none"> <li>• <b><i>Compensate in Kind</i></b> where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate</li> </ul>

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect on the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

### 7.2.7 Residual impacts significance

The degree of significance attributed to residual impacts indicates the level of importance that should be associated with each impact, in the decision-making process on the Project.



**Table 7.5      Ranking of residual impacts**

Impacts of *Major* significance, whether positive or negative, are considered to warrant substantial weight when compared with other environmental, social or economic costs and benefits; conditions will be expected to be imposed to control and, if necessary, monitor adverse impacts and deliver benefits.

Impacts of *Moderate* significance are considered to be of reduced importance to making decisions, but still warrant careful attention to conditions regarding mitigation and monitoring, to ensure the most appropriate (technically feasible and cost-effective) mitigation measures are used and to ensure benefits are delivered.

Impacts of *Minor* significance are brought to the attention of decision-makers but will be identified as warranting little if any weight in their decision; mitigation will be achieved using normal good practice and monitoring may be required to confirm that impacts are as predicted.

### **7.3      Screening / Identification of Impacts**

The initial stage of the assessment process is the screening of potential impacts. This was conducted based on a preliminary Project description and involved the production of a high-level, matrix of potential interactions between the proposed activities and the surrounding environment. The preliminary interaction matrix for the Project is included in Table 7.6.



**Table 7.6: Environmental Impacts Screening Matrix for the Regional Rice Resilient Value Chains Development Program (REWARD)**

Project Phases and Activities	Physical					Biological		Socio-Economic				
	Soils	Hydrology	Air Quality	Climate Change	Noise and Vibration	Biodiversity and nature conservation	Invasive / Alien species	Livelihood and Socioeconomic activities	Community Health & Safety	Landscape and Visual	Ecosystem Services	Occupational Health & Safety
<b>Pre-construction Phase</b>												
Preliminary survey								X				
Land Selection and Preparation	X							X	X	X		X
<b>Construction Phase</b>												
Job creation, training and business opportunities								X	X			
Land preparation/Seedbed preparation/Sowing/transplanting/Vegetation clearance/Habitat fragmentation/Habitat disturbance/Wildlife displacement	X	X	X		X	X	X			X		X
Excavation works/flood/Soil erosion and generation of site run-off/Construction of infrastructure (construction and rehabilitation of irrigation systems, processing plant etc.)	X	X	X		X	X		X	X	X		X
Chemical storage/solid waste generation/Dust/Wastewater generation/waste	X	X							X			X



Project Phases and Activities	Physical					Biological		Socio-Economic				
	Soils	Hydrology	Air Quality	Climate Change	Noise and Vibration	Biodiversity and nature conservation	Invasive / Alien species	Livelihood and Socioeconomic activities	Community Health & Safety	Landscape and Visual	Ecosystem Services	Occupational Health & Safety
storage and disposal												
Noise pollution					X				X			X
Equipment/material/worker transport			X	X	X				X			X
The physical presence of workers/Workers' safety									X			X
Risk of occupational accidents, injuries and diseases									X			X
Water demand and supply/ water management/		X							X			X
<b>Operational Phase</b>												
Job creation/ business opportunities/diversification of livelihoods								X	X			X
Accidental events (Increased potential for accidents, the Increased potential for oil spills)	X	X							X			X
Maintenance of landscaped vegetation	X	X				X	X		X	X	X	
Potential for expansion of the Rice fields				X		X		X		X		





Project Phases and Activities	Physical					Biological		Socio-Economic				
	Soils	Hydrology	Air Quality	Climate Change	Noise and Vibration	Biodiversity and nature conservation	Invasive / Alien species	Livelihood and Socioeconomic activities	Community Health & Safety	Landscape and Visual	Ecosystem Services	Occupational Health & Safety
Increased noise/odour pollution/pollutants in air	X	X	X		X	X			X		X	X
contamination of water source by fertilizer, herbicides and insecticides	X	X	X		X	X			X		X	X
Increased potential for oil spills (Equipment, irrigation pumps etc.)	X	X							X			X
Siltation of water from accumulated soil particles in water		X				X		X			X	X
Increased solid (straws, husk, bran and broken grain) and liquid wastes generation	X	X							X			X
Flora and Fauna (Habitat fragmentation)/						X	X					
Physical presence of workers/Workers safety								X	X			X
Site runoff (uncontaminated rainfall runoff and potentially contaminated drainage)	X	X							X			X
Water supply/ drainage management		X							X			X



Project Phases and Activities	Physical					Biological		Socio-Economic				
	Soils	Hydrology	Air Quality	Climate Change	Noise and Vibration	Biodiversity and nature conservation	Invasive / Alien species	Livelihood and Socioeconomic activities	Community Health & Safety	Landscape and Visual	Ecosystem Services	Occupational Health & Safety
Induced traffic			X	X	X				X			X
Potential for GBV and Sexual harassment of female workforce								X	X			X
Potential for Child Labour and Violence Against Children (VAC)								X	X			X
Increased potential for child labour across the Rice value chain								X	X			X
Increased occupational hazards e.g. Musculoskeletal disorders, pruritic dermatitis etc.									X			X
Improvement in the economic status of the host communities								X				
Equipment/material/worker transport			X	X	X				X			X
Accidental events (spills/uncontrolled releases)	X	X							X			X
Induced traffic			X	X	X				X			X
Increase noise level					X	X			X			X



Project Phases and Activities	Physical					Biological		Socio-Economic				
	Soils	Hydrology	Air Quality	Climate Change	Noise and Vibration	Biodiversity and nature conservation	Invasive / Alien species	Livelihood and Socioeconomic activities	Community Health & Safety	Landscape and Visual	Ecosystem Services	Occupational Health & Safety
Weed/Pest and Disease Management	X					X	X					
<b>Decommissioning Phase</b>												
Site restoration/rehabilitation	X							X		X		X
Decontamination of soil and water		X						X	X			X
Demolition of structures/equipment	X		X		X			X		X		
Waste disposal	X	X			X				X	X		



#### **7.4 Preliminary Assessment of Impacts**

From the information provided in the screening matrix above, a more detailed preliminary assessment was performed by assessing the potential interactions between the Project and environmental and social sensitivities to determine whether they are significant or not, based on the magnitude of impacts and the quality, importance or sensitivity of the receiving environment. Mitigation measures are taken into account in assessing the significance of the impact.

- Table 7.7 presents the preliminary assessment of the impacts associated with the Pre-construction and Construction phases of the Project;
- Table 7.8 presents the preliminary assessment of the impacts associated with the operational phase of the Project; and
- Table 7.9 presents the preliminary assessment of the impacts associated with the decommissioning phase of the Project.

Prepared by Richflood  
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**Table 7.7: Environmental Impacts during Pre-Construction and Construction phases**

Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
<b>Pre-Construction and Construction phases</b>					
<b>Land Take</b>	Land acquisition and Ownership transfer.	<ul style="list-style-type: none"> <li>Engage local communities to understand their needs and concerns.</li> <li>Ensure a fair and transparent land acquisition process.</li> <li>Facilitate voluntary land transactions with clear terms.</li> <li>Explore options for fair benefit sharing with affected communities.</li> <li>Implement the recommended complaint resolution procedure (Grievance Mechanism) to ensure that any complaints regarding project-related components are promptly and adequately investigated and resolved.</li> </ul>	<b>Small:</b> This will be limited to the project site	<b>Medium</b> – the site is a secondary forest with anthropogenic pressure of varying degrees that have modified the intrinsic value of the project site.	<b>Minor</b>
	Business opportunities for local contractors through sub-contracting activities	<ul style="list-style-type: none"> <li>Encourage contractors to sub-contract some of the works to the local contractors</li> </ul>	<b>Positive</b>	<b>Positive</b>	<b>Negligible</b>
<b>Field development</b>	Tractors may scrap organic top soil during clearing	<ul style="list-style-type: none"> <li>Field Clearing by farm machineries should be thoroughly monitored to avoid excessive topsoil cut.</li> <li>No burning of vegetation after clearing should be maintained.</li> </ul>	<b>Small</b> – increase in traffic during field clearing and transportation of workers and	<b>Low</b> - Traffic along the existing road leading to the project site is low	<b>Negligible</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
			materials.		
	Increased level of traffic due to heavy equipment and machinery transport; Increased road accidents due to unsafe driving habits; Occupational accidents around the construction areas.	<ul style="list-style-type: none"> <li>Optimization of routes and schedule of transport of goods and workers to avoid main traffic times to the extent possible.</li> </ul>	<b>Small</b> – increase in traffic during construction including the daily transport of workers and construction materials.	<b>Low</b> - Traffic along the existing road leading to the project site is low.	<b>Negligible</b>
	Aesthetic & Visual Impact	<ul style="list-style-type: none"> <li>Minimize the direct visual impact of the cultivation</li> <li>Design a planting patterns to create visual interest and reduce the stark appearance of large expanses of one crop</li> <li>Put into consideration cultural and historical aspects of the area when planning developments to preserve unique identity and aesthetics.</li> </ul>	<b>Small</b>	<b>Small</b>	<b>Minor</b>
	Improved economic situation of the people recruited	<ul style="list-style-type: none"> <li>Ensure employment and salary policy are in line with or more favourable than standard The Gambian practices.</li> </ul>	<b>Positive</b>	<b>Positive</b>	<b>Negligible</b>
	Exploitation of workers	<ul style="list-style-type: none"> <li>Develop transparent human resources policies and procedures for recruitment process, working conditions and Terms of Employment wages, worker-employer relations,</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Minor</b>





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>Grievance Mechanism, non-discrimination, monitoring, roles and responsibilities following the Gambia Labor Code.</p> <ul style="list-style-type: none"> <li>• Provide reasonable, and if applicable negotiated working terms and conditions.</li> <li>• Establish workers' grievance mechanisms, so that potential conflicts can be dealt with in an early and proper way.</li> </ul>			
	Increased inequalities between Households	<ul style="list-style-type: none"> <li>• Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Negligible</b>
	Reshaping of the field topography may alter drainage patterns leading to waterlogged or poor water retention in the field	<ul style="list-style-type: none"> <li>• Proper on-site supervision during work</li> </ul>	<b>Small:</b> This will be limited to the project site	<b>Medium</b> – the site is a secondary forest with anthropogenic pressure of varying degrees	<b>Minor</b>
	Introduction of alien/invasive species.	<ul style="list-style-type: none"> <li>• Implement strict quarantine measures and monitoring the movement of plants and seeds.</li> <li>• Establish monitoring programs to detect the presence of invasive species like <i>Typha latifolia</i> at an early stage.</li> <li>• Physically remove <i>Typha latifolia</i></li> </ul>	<b>High:</b> This will be limited to the project site	<b>Medium</b> – the site is a secondary forest with anthropogenic pressure of varying degrees	<b>Medium</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>plants from rice fields through manual pulling, cutting, or mowing.</p> <ul style="list-style-type: none"> <li>• Use machinery such as weed cutters, dredgers, or mechanical harvesters to cut or uproot invasive species.</li> <li>• Selective herbicides that target invasive species while minimizing harm to rice and other native plants should be chosen.</li> <li>• Application of Integrated Pest Management for the control of invasive species.</li> <li>• Educate farmers and stakeholders about the risks associated with invasive species and the importance of preventing their spread</li> </ul>			
	Removal of tree roots will create dishes of loose soils, and may result to erosion.	<ul style="list-style-type: none"> <li>• Grown trees should not be unnecessarily cut down during site clearance and re-vegetation of some protective and valuable trees/grasses should be encouraged. Examples are trees and grasses that have high resistance to erosion and those that have medicinal and economic values.</li> </ul>	<b>Small:</b> This will be limited to the project site	<b>Medium</b> – the site is a secondary forest with anthropogenic pressure of varying degrees	<b>Minor</b>
	Field ploughing will lead to excessive release of dust to the air.	<ul style="list-style-type: none"> <li>• Wetting of field during field clearing, and workers provided eye shields and nose masks</li> </ul>	<b>Small:</b> impacts on air quality will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Increase in Noise	<ul style="list-style-type: none"> <li>• Select recent, well-maintained</li> </ul>	<b>Small</b> – noise	<b>Medium</b> – The	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	levels and excessive vibrations with the associated disturbance to communities and fauna	<p>construction equipment and vehicles compliant with international best practices for noise emissions;</p> <ul style="list-style-type: none"> <li>• Prefer electrical power plant to mechanical alternatives, where feasible;</li> <li>• Use of power generators equipped with sound mufflers;</li> <li>• Enclosure of the main fixed sources of noise (power generators mainly);</li> <li>• Switch off equipment when not in use;</li> <li>• Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.</li> <li>• The number of equipment operating simultaneously should be reduced as far as practicable</li> </ul>	emissions will be temporary and limited to civil engineering works and site deliveries.	presence of sensitive receptors in the vicinity such as residential areas increases the sensitivity to this type of nuisance.	
	There will be loss of habitats to animal species	<ul style="list-style-type: none"> <li>• Conduct awareness on conservation of plant and animal species to farmers/communities</li> <li>• Noise mitigation measures should be followed, and machinery with lesser noise production should be used</li> <li>• Night-time work should be limited, and the use of lights at night should not disrupt the movement of nocturnal wildlife</li> </ul>	<b>Small:</b> This will be limited to the project site	<b>Medium</b> – the site is a secondary forest with anthropogenic pressure of varying degrees that have modified the intrinsic value of the project site.	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	Loss of Aquatic flora and Fauna	<ul style="list-style-type: none"> <li>Conduct awareness on conservation of Aquatic resources to farmers/communities</li> <li>Prevention of liquid waste (Fertilizers, herbicides, Pesticide into water body)</li> </ul>	Small	Medium –	Minor
	Loss or disturbance of habitats will leading to migration of animal species.	<ul style="list-style-type: none"> <li>Conduct awareness on conservation of wildlife to farmers/communities</li> <li>Rescue, rehabilitation, and relocation should be done for terrestrial fauna in cooperation with the Department of Parks and Wildlife Management when required.</li> <li>Disturbance and/or injury or death due to accidental events to wildlife should be monitored regularly.</li> </ul>	Small: This will be limited to the project site	Medium – the site is a secondary forest with anthropogenic pressure of varying degrees that have modified the intrinsic value of the project site.	Minor
	Deforestation in the rice field will contribute to global warming	<ul style="list-style-type: none"> <li>Re-vegetation of some protective and valuable trees/grasses should be encouraged</li> <li>Activities shall be limited to designated areas</li> </ul>	Small: This will be limited to the project site	Medium – the site is a secondary forest with anthropogenic pressure of varying degrees that have modified the intrinsic value of the project site.	Minor
	There may be Disturbance of National Parks and protected areas	<ul style="list-style-type: none"> <li>The Project Area of Influence is not within National Parks or Protected areas.</li> <li>Create awareness for the communities on the need for Protected areas'</li> </ul>	Small	Small	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<ul style="list-style-type: none"> <li>conservation</li> <li>Protect reserved areas in the community</li> </ul>			
	Oil and grease drops from the farm machinery will contaminate the soil and water bodies within the community	<ul style="list-style-type: none"> <li>Carry out periodic pre-mob of machinery</li> <li>Ensure that equipment and Machine are kept in good working condition</li> <li>Oil, chemical, lubricants, and fuel leakage or spillage should be contained and cleaned up immediately if any events occur.</li> <li>Spill containment and clean-up kits will be available onsite and clean-up from any spill will be appropriately contained and disposed of at an appropriate site.</li> <li>Refueling should be carried out in designated areas using strict protocols.</li> <li>Waste oil should be collected and stored for recycling or disposal through licensed vendors</li> <li>Workers will be trained in the use of designated areas/bins for waste disposal and encouraged to use toilets.</li> </ul>	<b>Small</b> – infiltration of pollutants with runoff water to a nearby stream with the project footprint is expected in the likely event of accidental spills.	<b>Medium</b> – Aquatic habitat and potential ecosystem services from the watershed	<b>Minor</b>
	There shall be poaching of animal and eventual extinctions of some species.	<ul style="list-style-type: none"> <li>Place visible warning sign that disallowed poaching.</li> <li>Conduct awareness on conservation of wildlife to farmers/communities</li> </ul>	<b>Small:</b> This will be limited to the project site	<b>Medium</b> – the site is a secondary forest with anthropogenic pressure of varying	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<ul style="list-style-type: none"> <li>Workers should not do any harm or death to wildlife.</li> <li>Disturbance and/or injury or death due to accidental events to wildlife should be monitored regularly.</li> </ul>		degrees that have modified the intrinsic value of the project site.	
	Loosen sediments will be carried by runoff and deposit to rivers and streams which shall lead to river siltation	<ul style="list-style-type: none"> <li>Carry out earthworks operations such that surfaces have mixed drainage patterns to control run-off and prevent sediment transportation</li> </ul>	<b>Small</b> – infiltration of pollutants with runoff water to nearby streams within the project footprint is expected in the likely event of accidental spills.	<b>Medium</b> - Aquatic habitat and potential ecosystem services from the watershed.	<b>Minor</b>
	Disruption to aquatic life due to increase in total suspended solid and turbidity of the receiving water bodies	<ul style="list-style-type: none"> <li>Prevent the spillage of chemicals in the field as all chemicals will be mixed at mixing stations which will be designed to contain spills during mixture and loading.</li> <li>Ensure that wastes are stored in secure waste receptacles where they will not be exposed to runoff.</li> </ul>	<b>Medium</b>	<b>Small</b>	<b>Minor</b>
	Women, youths, widows work in the fields on unfair contract employments	<ul style="list-style-type: none"> <li>Improve terms of employment of the vulnerable and other community members to</li> </ul>	<b>Medium</b>	<b>Small</b>	<b>Minor</b>
	Injuries due to lifting, carrying and	<ul style="list-style-type: none"> <li>Ensuring all H&amp;S measures are in place to prevent accidents and reduce</li> </ul>	<b>Small</b> – influx of workers will likely	<b>Medium</b> - potential accident and	<b>Minor</b>





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	improper sitting techniques (Ergonomics).	<p>the consequences of non-conformance events;</p> <ul style="list-style-type: none"> <li>• Provide training, awareness and supervision to ensure all of its construction workers comply with the OHS procedures;</li> <li>• Provide all appropriate resources i.e. personal protective equipment (PPE) to all workers onsite such as Rubber boots/waterproof shoes, Safety goggles, gloves and First Aid Kit etc. and ensure their usage;</li> <li>• An emergency response procedure and infrastructure will be available on-site to ensure the provision of first aid for personnel in case of an emergence</li> </ul>	lead to increased health risks and social vices around the project AOI	shortterm injury on site	
	Lack of adequate PPEs will lead to minor injuries and accidents.	<ul style="list-style-type: none"> <li>• Adequate provision of healthy living conditions should be ensured</li> <li>• The contractor should prepare Emergency Preparedness and Response Procedure (EPRP) and Occupational Health and Safety Management Plan.</li> <li>• Training on Health and Safety policy for the workers (both regular and contractual) should be provided.</li> <li>• Provide appropriate PPEs such as onsite such as Rubber boots/waterproof shoes, Safety</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
<b>Rehabilitation and Construction of Irrigation Systems</b>		goggles, gloves for workers. <ul style="list-style-type: none"> <li>Inspect that workers are wearing PPEs and correctly.</li> <li>Maintain principle of No PPEs No work.</li> </ul>			
	Deterioration of air quality from release of cement dusts and toxic fumes during construction of irrigation system such as irrigation gate and irrigation channel	<ul style="list-style-type: none"> <li>Provided eye shields and nose masks to workers</li> <li>Implement water spraying systems to suppress dust generation during construction activities.</li> <li>Apply dust suppressants or stabilizers on exposed soil surfaces.</li> <li>Cover materials and piles to prevent wind erosion and dust emissions.</li> <li>Implement best practices for material handling to minimize spillage and dust release.</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Minor</b>
	Noise and vibration from the use of machineries and motorized equipment will constitute nuisance to the neighbourhood	<ul style="list-style-type: none"> <li>Selection of site farther away from community settlement should be maintained.</li> <li>Provided ear mufflers to workers</li> <li>Use vibration isolation techniques such as anti-vibration mounts to minimize the transmission of vibrations to surrounding structures.</li> <li>Limit the operation of noisy machinery to specific hours of the day when residents are less likely to be affected,</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		such as during daytime hours.			
	Effects on the respiratory health of workers and nearby community residents due to dust generated from movement of vehicles and machinery activities as well as exhaust emissions from vehicles.	<ul style="list-style-type: none"> <li>• Ensure personnel wear appropriate PPEs (eye goggles, nose masks, rain boots etc.).</li> <li>• Make use of competent and well-trained personnel for construction works.</li> <li>• Ensure periodic medical checks are carried out on personnel</li> </ul>	Medium	Low	Minor
	Noise nuisance (including impulsive noise) from construction activities (Irrigation gates, irrigation channel etc.) resulting to temporary migration of animals	<ul style="list-style-type: none"> <li>• Ensure personnel wear appropriate PPEs (eye goggles, nose masks etc.).</li> <li>• Make use of competent and well-trained personnel for construction works.</li> <li>• Ensure periodic medical checks are carried out on personnel</li> </ul>	Medium	Low	Minor
	Soil contamination and loss of water resulting from leakages and/improper handling	<ul style="list-style-type: none"> <li>• Create bund wall to reduce spills overland</li> <li>• Train personnel on proper handling procedures to minimize the risk of leaks</li> <li>• Implement regular inspections of</li> </ul>	Medium	Low	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>equipment, pipelines, and storage facilities to identify and address potential issues before they lead to leaks.</p> <ul style="list-style-type: none"> <li>Conduct regular sampling and analysis of soil and groundwater in and around the storage and handling areas to monitor for any signs of contamination.</li> <li>Implement on-site treatment processes to remove contaminants from wastewater before disposal.</li> </ul>			
	Waste generation from such a bags and metal scraps, etc. resulting in an environmental health and safety hazard with effects on soil, air and water within the vicinity	<ul style="list-style-type: none"> <li>Develop procedures for waste disposal and ensure appropriate storage of waste to minimize risk of pollution.</li> <li>Promote the reuse of cement bags for secondary purposes, such as packaging or storage.</li> <li>Establish a system for collecting and redistributing reusable metal scraps</li> <li>Educate employees on the importance of segregating waste for recycling</li> </ul>	Medium	Low	Minor
	Contamination of surface and underground water from waste water and spillages of oil and other petroleum products through	<ul style="list-style-type: none"> <li>Create bund wall to reduce spills overland.</li> <li>Regular inspection and maintenance of storage tanks and pipelines to identify and address potential leaks</li> <li>Implementation of stringent safety</li> </ul>	Medium	Low	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	leakages and/improper handling.	protocols during handling and transportation of petroleum products.			
	Risk of HIV/AIDS and other STDs arising from the interactions with the community.	<ul style="list-style-type: none"> <li>• Conduct sensitization on STD to local farmers and workers.</li> <li>• Implementing safe practices provide regular testing, and fostering open communication is essential for risk management.</li> </ul>	Medium	Low	Minor
	Risk of respiratory and eye related problems from exposures to chemical hazards such as dusts and toxic fumes emanating from cement and concrete works	<ul style="list-style-type: none"> <li>• Ensure workers wear appropriate respiratory masks and eye protection.</li> <li>• Provide thorough training on chemical hazards and ensure adherence to safety protocols</li> <li>• Establish work procedures that minimize the generation and dispersion of dust and fumes.</li> <li>• Provide appropriate respiratory protection to workers based on the level of exposure.</li> <li>•</li> </ul>	Medium	Low	Minor
	Risk of Child labour and Violence against Children (VAC)	<ul style="list-style-type: none"> <li>• Children must not be employed by the Project (paid or unpaid), and the Project must comply with all relevant local legislation, including labour laws in relation to child labour and the Bank's safeguard policies on child labour and minimum age.</li> </ul>	Medium	Low	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<ul style="list-style-type: none"> <li>Create a clear system for identifying, responding to, and sanctioning VAC incidents</li> <li>Orientation on code of conduct on children's safety, protection and child labour, including for parents;</li> </ul>			
	Risk of skin related health problems from physical contacts with construction materials such as cement	<ul style="list-style-type: none"> <li>Provide suitable personal protective equipment to workers in cement section</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Minor</b>
	Lack of adequate PPEs will lead to minor injuries and accidents.	<ul style="list-style-type: none"> <li>Provide appropriate PPEs (such as waterproof shoes, safety helmets, safety goggles, gloves, dust masks etc) for workers.</li> <li>Inspect that workers are wearing PPEs and correctly.</li> <li>Maintain principle of No PPEs No work</li> </ul>	<b>Medium</b>	<b>Low</b>	<b>Minor</b>
	Introduction of vector borne and zoonotic diseases as well as their hosts (schistosomiasis, fasciolosis and other parasitic helminthes)	<ul style="list-style-type: none"> <li>Upgrade irrigation infrastructure to ensure efficient water delivery and minimize water stagnation, which can create breeding grounds for disease vectors.</li> <li>Implement proper water management techniques such as controlled flooding, intermittent irrigation, or drip irrigation to reduce standing water and</li> </ul>	<b>Medium:</b> This will be limited to the project site	<b>Low</b>	<b>Minor</b>





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		limit the proliferation of disease vectors. • Install water control structures such as gates, weirs, and channels to regulate water levels and flow, preventing excess water accumulation.			
	Generate Employment for locals	• Invest in training and skill development programs to enhance the employability of local residents, aligning with the needs of local industries • Ensure employment and salary policy are in line with or more favourable than standard The Gambia practice. • Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).	Positive	Positive	Negligible



**Table 7.8: Environmental Impacts during Operational phase**

Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
<b>Planting, Harvesting and Processing</b>					
	Applying artificial fertilizer may alter the soil nutrient in the long run.	<ul style="list-style-type: none"> <li>Regularly conduct soil tests to monitor nutrient levels and adjust fertilizer application accordingly</li> <li>Timely fertilizer applications to coincide with the crop's growth stages, optimizing nutrient uptake and minimizing excess accumulation</li> <li>Manage crop residues effectively to improve organic matter content and nutrient recycling within the soil</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Fertilizers and other agro-input through run-off may lead to excessive nutrients enrichment of adjoining water bodies causing eutrophication	<ul style="list-style-type: none"> <li>utilize precision agriculture like Site Specific Nutrient Management (SSNM) to apply fertilizers where needed, reducing runoff and eutrophication risk.</li> <li>Utilize slow-release fertilizers that release nutrients gradually over time, reducing the risk of leaching and runoff.</li> </ul> <p>Implement Pest/Vector Management Plan to regulate chemical use.</p>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<ul style="list-style-type: none"> <li>Use controlled irrigation to minimize runoff, preventing nutrient flow into water bodies and eutrophication.</li> <li>Educate farmers on nutrient runoff impacts and sustainable practices through outreach programs to mitigate eutrophication.</li> </ul>			
	Water pollution from agro-chemicals such as fertilizers and pest control substances which can leach into the soil and get carried into water by runoff. Aquatic life would be affected	<ul style="list-style-type: none"> <li>Develop and implement herbicide/pesticides/insecticides management plans based on scientific recommendations to ensure balance.</li> <li>Promote the use of Pest Management practices to reduce the reliance on chemical inputs.</li> <li>Employing targeted and selective application of pesticides, using only when necessary.</li> <li>Training farmers on correct application methods to minimize drift and runoff.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Increase in drought and reduction in	<ul style="list-style-type: none"> <li>Implement water-saving irrigation techniques like drip irrigation.</li> <li>Use drought-tolerant rice varieties.</li> </ul>	<b>Medium:</b> impacts will be field-specific and limited to the	<b>Medium</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	water availability for rice production	<ul style="list-style-type: none"> <li>Improve soil water retention through organic matter management</li> <li>Implement efficient water management practices to minimize evaporation losses.</li> <li>Adopt early maturing rice varieties to escape drought periods.</li> </ul>	project area of influence.		
	Increase in soil acidification due to use of fertilizers containing ammonium salts or urea which could restrict ability of roots of plants to reach nutrients and water.	<ul style="list-style-type: none"> <li>The use of natural fertilizers and compost as much as possible;</li> <li>That only approved and non-persistent chemicals are used where necessary.</li> <li>Regular soil testing and analysis are carried out to monitor chemical changes in the soil</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Increase in traffic density; impact on traffic safety, contaminate/ pollute air, land, plants, disturbance to wildlife Increased	<ul style="list-style-type: none"> <li>Application of the project's road safety policy to operator and contractor vehicles;</li> <li>optimization of routes and schedule of transport</li> <li>Development and implementation of a Traffic management plan.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	road accident/injuries	<ul style="list-style-type: none"> <li>Creating parking areas for vehicles.</li> <li>Conduct public awareness on road safety for the general public</li> <li>Enforce speed and exhaust limits</li> <li>Alcohol and substance abuse screening among drivers and machine operators</li> </ul>			
	Dust generation resulting from the movement of vehicles along dirt roads, and fumes from machinery/equipment	<ul style="list-style-type: none"> <li>Dust suppression measures are employed including site watering.</li> <li>Regular maintenance of vehicles and machines to ensure that emissions are within normal operating limits.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Poor waste management of domestic waste and grey waste from workers on the rice fields which will result in an environmental health and safety hazard with effects on soil,	<ul style="list-style-type: none"> <li>Implementation of an effective Waste Management System taking into account the various kinds of waste to be generated.</li> <li>Institution of monitoring system to ensure the compliance to the handling, storage and disposal measures put in place.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	air and water within the vicinity				
	Disturbances such as road kills and collisions. Removal of vegetation in the area. Direct mortalities due to habitat loss.	<ul style="list-style-type: none"> <li>• Speed limits must still be enforced to ensure that road killings are limited;</li> <li>• Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;</li> <li>• No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals.</li> <li>• An Erosion and Sediment Control plan must be compiled and implemented;</li> <li>• Area must be rehabilitated progressively to reduce the impact of erosion long term.</li> </ul>	<b>Small</b> - likely migration/loss of fauna from disturbance and habitat fragmentation over the project area extent	<b>Medium</b> – the surrounding area is made up of secondary forest with a comparative number of fauna and flora abundance	<b>Minor</b>





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	Impact on Community Health and Safety	<ul style="list-style-type: none"> <li>Dust control measures should be taken by the contractor along the site approach road and dust generation site.</li> <li>Training on community health and safety issues should be provided to the drivers.</li> <li>Only drivers having valid licenses should be employed in the project.</li> <li>Adequate sanitation facilities at labour camps should be ensured by the contractor to maintain hygiene and minimize the spread of diseases</li> <li>Wage discrimination between male and female workers should be minimized through a proper monitoring system.</li> <li>An active grievance mechanism should be developed.</li> <li>GBV/SEAH should be confidential, and more options will be created to submit the grievance against GBV/SEAH.</li> <li>Creating awareness about local</li> </ul>	Small	Medium	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>traditions and culture among outside migrants and encouraging respect for the same.</p> <ul style="list-style-type: none"> <li>• Providing awareness training regarding sexually transmitted diseases among the workers</li> </ul>			
	Impacts on Occupational Health and Safety	<ul style="list-style-type: none"> <li>• Adequate provision of healthy living conditions should be ensured in the rice fields</li> <li>• The project implementing unit (PIU) should have an Emergency Preparedness and Response Procedure (EPRP) and Occupational Health and Safety Management Plan.</li> <li>• Training on Environment, Health and social Safeguards measures for project benefitting communities, farmers and other ancillary workers at the various rice fields should be carried out through a well-coordinated farmer school system and extension services</li> <li>• Establish a grievance mechanism in place, to allow the farmers and</li> </ul>	Small	Medium	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>benefitting communities and workers to report any concern or grievance related to project activities.</p> <ul style="list-style-type: none"> <li>Child labour and forced labour during project construction should be prohibited.</li> <li>Adequate training should be provided to staff on raising awareness about the use of PPE and EPRP.</li> <li>PPEs such as rain boots, long-sleeved shirts and pants, gloves, dust masks, wide-brimmed hats etc. shall be mandatory at the rice field.</li> </ul>			
	Aesthetic and Visual Impact	<ul style="list-style-type: none"> <li>Planting buffer zones with visually appealing vegetation</li> <li>Implement proper irrigation techniques to avoid waterlogging</li> <li>Ensure community engagement and awareness programs to foster understanding and support.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Exposure of workers to excessive noise on	<ul style="list-style-type: none"> <li>The use of appropriate PPEs by workers while at work.</li> </ul>	<b>Small:</b> impacts will be very limited to the	<b>Medium</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	the farmland as a result of the mechanized agricultural activities	<ul style="list-style-type: none"> <li>The use of competent and well-trained personnel for construction works.</li> <li>That modern equipment are used which are fitted with noise suppression devices to prescribed standards.</li> </ul>	project area		
	There will be large waste of rice Husk and other residues	<ul style="list-style-type: none"> <li>Mark out a portion of land to dispose husk. It can be supplied to farm lands for manure</li> <li>Explore alternative uses for rice husk and other residues, such as in the production of bioenergy, biofuels, or as raw materials for other industries.</li> <li>Implement composting programs to convert organic residues into nutrient-rich compost</li> <li>Raise awareness among local communities about the importance of proper waste management and the potential uses of agricultural residues.</li> </ul>	<b>Small</b>	<b>Small</b>	<b>Minor</b>
	Burning of waste husk will release	<ul style="list-style-type: none"> <li>Provide suitable personal protective equipment to workers in milling</li> </ul>	<b>Medium:</b> impacts on air quality will be	<b>Low</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	gaseous emission that affects the quality of ambient air	section <ul style="list-style-type: none"> <li>Encourage the use of alternative disposal methods such as composting or mulching, which can help in converting waste husk into organic matter for soil improvement.</li> <li>Conduct awareness campaigns to educate communities about the environmental impacts of burning waste husk and promote alternative, eco-friendly disposal methods.</li> </ul>	limited to the project area		
	Dust emanating from debris of husk will lead to breathing problems	<ul style="list-style-type: none"> <li>Provide suitable personal protective equipment to workers in milling section</li> <li>Keep the husk debris damp to minimize dust generation.</li> <li>Train workers on the hazards of dust exposure and the proper use of protective measures.</li> <li>Implement routine cleaning schedules to control dust build-up on surfaces.</li> <li>Conduct regular air quality monitoring to assess dust levels and</li> </ul>	Medium	Small	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		identify areas requiring additional control measures.			
	Water abstraction could affect the availability and hydrological regime within the project area	<ul style="list-style-type: none"> <li>• Ensure that the surface and groundwater levels are monitored to check status.</li> <li>• Alternative water sources will be made available for the project and communities through the sinking of boreholes.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	High water retention on the rice field will lead to soil water saturation, swampy environment and may trigger flooding	<ul style="list-style-type: none"> <li>• Install efficient drainage systems to facilitate water runoff and prevent waterlogging</li> <li>• Implement contour ploughing to minimize water runoff and soil erosion</li> <li>• Select rice varieties that are tolerant to waterlogging and have better adaptability to wet conditions.</li> <li>• Implement a precise irrigation schedule to avoid overwatering and waterlogging.</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Flooding in the rice field will produce greenhouse gas	<ul style="list-style-type: none"> <li>• Maintain same level of water in the field. Fluctuations increase the chance of release of greenhouse</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	Medium	<b>Minor</b>





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	nitrous oxide.	gas			
	Constant water on rice will turn it to swamp and unfit for growing some crops in future	<ul style="list-style-type: none"> <li>• Drain water off after harvesting</li> <li>• Use organic manure to increase infiltration</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Breaking down of rice vegetation waste by microbes releases large volume of greenhouse gas Methane	<ul style="list-style-type: none"> <li>• Discourage lumping of vegetation waste into heaps</li> <li>• Spread thoroughly within the field to reduce large point source</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Heaps of rice stems and shafts after harvest will house rodents and snakes	<ul style="list-style-type: none"> <li>• Spread stems and shafts evenly on the field</li> <li>• Take rice waste to other crop farms to decompose to organic manure</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Burning of the waste stems and shafts after harvest will release gaseous emission that deteriorates the atmosphere.	<ul style="list-style-type: none"> <li>• Spread stems and shafts evenly on the field</li> <li>• Take rice waste to other crop farms to decompose to organic manure</li> </ul>	<b>Small:</b> impacts will be very limited to the project area	<b>Medium</b>	<b>Minor</b>
	Lack of adequate PPEs will lead to	<ul style="list-style-type: none"> <li>• Provide appropriate PPEs such as rain boots, long-sleeved shirts and</li> </ul>	<b>Small:</b> impacts will be very limited to the	<b>Medium</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	minor injuries and accidents.	<p>pants, gloves, dust masks, wide-brimmed hats etc for farmers.</p> <ul style="list-style-type: none"> <li>• Educate farmers on importance of PPEs</li> <li>• Inspect that farmers are wearing PPEs and correctly.</li> <li>• Maintain principle of No PPEs No work.</li> </ul>	project area		
	Risk of workplace accidents	<ul style="list-style-type: none"> <li>• Respect the measures put in place to ensure workers' safety: wearing personal protective equipment, and applying safety standards.</li> </ul>	Small	Low	Minor
	Invasion from intruders (thieves, herdsmen and cows)	<ul style="list-style-type: none"> <li>• Erection of Perimeter fencing (such as Barbed wire, Chain link fence, wooden fence, wire mesh, hedge/live fence etc.) on the project site.</li> <li>• Engagement of local security to help secure the project area</li> </ul>	Small	Low	Minor
	Risks of Gender Based Violence (GBV), Sexual Abuse and Harassment	<ul style="list-style-type: none"> <li>• Clauses prohibiting rape, defilement and other Gender Based Violence as well as child and forced labour should be inserted into works contracts</li> <li>• Communities need to be informed about the start of all works, at least 5</li> </ul>	Small	Low	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>days before, and the need for them to keep children away from the sites.</p> <ul style="list-style-type: none"> <li>• Create a clear system for identifying, responding to, and sanctioning GBV incidents.</li> <li>• Display on-site posters prohibiting sexual exploitation and harassment</li> <li>• Availability of female nodal officer for women's issues</li> <li>• Regular GBV/SEA sensitization &amp; training for all employees, workers, transporters, drivers and contractors</li> <li>• Inclusion of gender issues in code of conduct, and dissemination</li> <li>• Regular consultation/counselling of women employees and workers, including for survivors</li> </ul>			
	Diseases linked to health and hygiene conditions	<ul style="list-style-type: none"> <li>• The Project site development will lead to a reduction in stagnant water bodies at the site, hence contributing to malaria prevention in the local area</li> <li>• Supporting the authorities (particularly the local health department) and civil society</li> </ul>	Medium	Small	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		(especially NGOs) to implement hygiene awareness-raising campaign.			
	Risk of HIV/AIDS and other STDs arising from the interactions with the community.	<ul style="list-style-type: none"> <li>• Conduct sensitization on STD to local farmers and workers.</li> <li>• Implementing safe practices provide regular testing, and fostering open communication is essential for risk management.</li> </ul>	Small	Low	Minor
	Risk of Child labour and Violence against Children (VAC)	<ul style="list-style-type: none"> <li>• Children must not be employed by the Project (paid or unpaid), and the Project must comply with all relevant local legislation, including labour laws in relation to child labour and the Bank's safeguard policies on child labour and minimum age.</li> <li>• Create a clear system for identifying, responding to, and sanctioning VAC incidents</li> <li>• Orientation on code of conduct on children's safety, protection and child labour, including for parents;</li> <li>• Construction of waiting sheds for farmers. Workers and women with children in the rice fields.</li> </ul>	Small	Low	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	Conflicts with host communities and third-party agitation	<ul style="list-style-type: none"> <li>Adopt the grievance redress mechanism</li> </ul>	Small	Low	Medium
	Increase in traffic density; impact on traffic safety, contaminate/ pollute air, land, plants, disturbance to wildlife Increased road accident/ injuries	<ul style="list-style-type: none"> <li>Optimization of routes and schedule of transport</li> <li>Development and implementation of a Traffic management plan.</li> <li>Creating parking areas for vehicles.</li> <li>Conduct public awareness</li> <li>Enforce speed and exhaust limit</li> <li>Alcohol and substance abuse screening among drivers and machine operator</li> </ul>	Small	Medium	Minor
	Repetitive movements, Uncomfortable work on the rice field and Poor body positioning Joint pain, back pain, wrist pain, neck pain, shoulder pain etc.	<ul style="list-style-type: none"> <li>Provide personal protection equipment (PPE) like Long-sleeved shirts and pants, rain boots, wide-brimmed hats, gloves, dust masks, First Aid Kit etc. to the farmers.</li> </ul>	Small	Medium	Minor
	Accidents, Injuries and Occupational	<ul style="list-style-type: none"> <li>Conduct regular reorientation on the risks of machine use</li> </ul>	Medium: Limited to Project Area of	Small	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	hazards may occur due to failure or malfunction of the machineries such as irrigation pumps, generator etc.	<ul style="list-style-type: none"> <li>Implement a robust preventive maintenance program to ensure that machinery is regularly inspected, serviced, and repaired as needed.</li> <li>Keep detailed records of maintenance activities to track the condition of equipment.</li> <li>Provide comprehensive training for employees on the safe operation of machinery.</li> <li>Install and maintain safety devices such as emergency stops, guards, and interlocks on machinery to minimize the risk of accidents.</li> </ul>	Influence		
	Inequalities in access to healthcare	<ul style="list-style-type: none"> <li>Introduce awareness-raising, communication and information programs for women to facilitate their access to primary healthcare (for themselves and their children).</li> </ul>	Small	Small	Minor
	Inhaling of chemical preservatives will cause organs damage	<ul style="list-style-type: none"> <li>Ensure that nose masks are used while in the store house</li> <li>Use appropriate personal protective equipment such as masks, gloves, and eye protection.</li> </ul>	Small	Small	Minor





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<ul style="list-style-type: none"> <li>Ensure that individuals who may be exposed to chemical preservatives are educated on the potential risks and trained on proper handling procedures.</li> </ul>			
	Risk of infestation by the pest and insect living in rice grains.	<ul style="list-style-type: none"> <li>Wear protective clothes</li> <li>Use resistant or tolerant rice varieties when available.</li> <li>Properly clean and sanitize storage facilities, equipment, and machinery to minimize the risk of infestation.</li> <li>Ensure that the storage area is free of spilled grains, dust, and debris, as these can attract pests.</li> <li>Conduct regular inspections of stored rice for signs of pest activity, including the presence of live insects, damaged grains, or webbing.</li> </ul>	Small	Small	Minor
	Local development support: Improved health services	<ul style="list-style-type: none"> <li>Consider focusing project investment in the health sector:</li> <li>Involving the communities and local authorities when constructing basic infrastructure or implementing development projects to identify their</li> </ul>	Positive	Positive	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>exact needs (ensure the investment is included in the communes' local development plans); and</p> <ul style="list-style-type: none"> <li>Carrying out monitoring by implementing a health facility monitoring plan at the start of the project to ensure service quality is maintained and facilities are used appropriately.</li> </ul>			
	Increases rice output	<ul style="list-style-type: none"> <li>Invest in and promote the cultivation of high yielding and disease-resistant rice varieties</li> <li>Implement efficient irrigation systems, such as drip irrigation or precision farming, to ensure optimal water usage</li> <li>Implement Pest and Pesticides Management Plan to control pests and diseases without excessive reliance on chemical inputs.</li> </ul>	Positive	Positive	Negligible
	Generate Employment for locals	<ul style="list-style-type: none"> <li>Invest in training and skill development programs to enhance the employability of local residents, aligning with the needs of local industries</li> </ul>	Positive	Positive	Negligible



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<ul style="list-style-type: none"> <li>Ensure employment and salary policy are in line with or more favourable than standard The Gambia practice.</li> <li>Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>			
	Enhanced production of quality rice in The Gambia	<ul style="list-style-type: none"> <li>Quality rice production enhances the country's competitiveness in the attracting more consumers and meeting national food security.</li> <li>High-quality production reduces the risk of negative perception and minimizes financial loss.</li> </ul>	<b>Positive</b>	<b>Positive</b>	<b>Negligible</b>
	Improved economic situation of the people recruited	<ul style="list-style-type: none"> <li>Ensure employment and salary policy are in line with or more favourable than standard The Gambian practices.</li> </ul>	<b>Positive</b>	<b>Positive</b>	<b>Negligible</b>
	It shall boast income farmers directly and indirectly	<ul style="list-style-type: none"> <li>Increasing income for farmers directly contributes to poverty reduction, especially in developing economies where a significant portion of the population relies on agriculture for their livelihoods.</li> <li>This can lead to the development of</li> </ul>	<b>Positive</b>	<b>Positive</b>	<b>Negligible</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		local businesses, services, and infrastructure. • Potential for job creation both within the agricultural sector and in related industries.			
	Contribution to Community Development	• Making direct contributions as part of Corporate Social Responsibility (CSR) by supporting community development initiatives in areas such as education, health, water, road, etc.	Positive	Positive	Negligible
	Contribution to Community Development	• Making direct contributions as part of Corporate Social Responsibility (CSR) by supporting community development initiatives in areas such as education, health, water, road, etc.	Positive	Positive	Negligible
<b>Post-Harvesting</b>					
	Dust remnants from husk will cause cough and difficult breathing	• Provide suitable personal protective equipment to workers in milling section • Keep the husk debris damp to minimize dust generation. • Train workers on the hazards of dust exposure and the proper use of protective measures. • Implement routine cleaning schedules to control dust build-up on	<b>Medium:</b> impacts on air quality will be limited to the project area	Small	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>surfaces.</p> <ul style="list-style-type: none"> <li>Conduct regular air quality monitoring to assess dust levels and identify areas requiring additional control measures.</li> </ul>			
	Risk of infestation by the pest and insect living in rice grains.	<ul style="list-style-type: none"> <li>Wear protective clothes</li> <li>Use resistant or tolerant rice varieties when available.</li> <li>Properly clean and sanitize storage facilities, equipment, and machinery to minimize the risk of infestation.</li> <li>Ensure that the storage area is free of spilled grains, dust, and debris, as these can attract pests.</li> <li>Conduct regular inspections of stored rice for signs of pest activity, including the presence of live insects, damaged grains, or webbing.</li> </ul>	<b>Medium-</b> impacts on air quality will be limited to the project area.	<b>Small</b>	<b>Minor</b>
	Inhaling of chemical preservatives will cause cancer and organ damage	<ul style="list-style-type: none"> <li>Provide suitable personal protective equipment to workers</li> <li>Use appropriate personal protective equipment such as masks, gloves, and eye protection.</li> <li>Ensure that individuals who may be</li> </ul>	<b>Medium-</b> impacts on air quality will be limited to the project area.	<b>Small</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		exposed to chemical preservatives are educated on the potential risks and trained on proper handling procedures.			
	Contact with chemical preservatives will cause skin inflammation	<ul style="list-style-type: none"> <li>• Provide suitable personal protective equipment to workers</li> <li>• Use appropriate personal protective equipment such as masks, gloves, and eye protection.</li> <li>• Ensure that individuals who may be exposed to chemical preservatives are educated on the potential risks and trained on proper handling procedures.</li> </ul>	Medium-	Small	Minor
	Generation of waste bags that litters the environment	<ul style="list-style-type: none"> <li>• Provide information on the proper use of waste bags and the consequences of improper disposal</li> <li>• Ensure proper waste collection infrastructure, including regular pickup and disposal services.</li> </ul>	Small	Small	Minor
	Increases rice availability to households	<ul style="list-style-type: none"> <li>• Improves food accessibility and availability</li> <li>• Contribute to reduction of food insecurity in the Gambia</li> </ul>	Positive	Positive	Negligible





Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	Generate Employment and livelihoods	<ul style="list-style-type: none"> <li>Invest in training and skill development programs to enhance the employability of local residents, aligning with the needs of local industries</li> <li>Ensure employment and salary policy are in line with or more favourable than standard The Gambian practice.</li> <li>Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>	Positive	Positive	Negligible
	Bridge the gap between producers and consumers.	<ul style="list-style-type: none"> <li>Ensure food security and availability</li> <li>Improve local residence livelihoods</li> </ul>	Positive	Positive	Negligible



**Table 7.9: Environmental Impacts during Decommissioning phase**

<b>Project Activity</b>	<b>Potential Impact</b>	<b>Mitigation &amp; Management Measures</b>	<b>Impact Magnitude</b>	<b>Receptor Quality, Importance or Sensitivity</b>	<b>Residual Significance</b>
<b>Removal of Structures and Restoration</b>					
	Demolition of structures/equipment (waiting sheds, irrigation systems etc.)	<ul style="list-style-type: none"> <li>• Provide training for all personnel involved in the demolition process.</li> <li>• Implement measures to minimize the release of hazardous materials and pollutants.</li> <li>• Develop a waste management plan to properly handle and dispose of debris, hazardous materials, and other waste generated during demolition</li> <li>• The area should be cleaned and all domestic wastes, debris/waste metals, grease and oils must be cleaned up and disposed of in a manner approved.</li> </ul>	<b>Medium</b>	<b>Low-site/local</b>	<b>Minor</b>
	Impact on human health associated with air pollutant emissions	<ul style="list-style-type: none"> <li>• Maintain all equipment in good working order and do not leave running when not in use.</li> <li>• Develop and implement a complaints system and make the community aware of the complaints procedure.</li> <li>• Monitoring air quality during decommissioning.</li> </ul>	<b>Medium-</b> impacts on air quality will be limited to the project area.	<b>Small</b>	<b>Minor</b>
	Impact on human health associated	<ul style="list-style-type: none"> <li>• Maintain all equipment in good working order and do not leave</li> </ul>	<b>Medium-</b> impacts on air quality will be	<b>Small</b>	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
	with Increased dust and vehicular emissions from demolition activities	running when not in use. <ul style="list-style-type: none"> <li>Develop and implement a complaints system and make the community aware of the complaints procedure.</li> <li>Monitoring air quality during decommissioning.</li> </ul>	limited to the project area.		
	Increased dust and noise levels due to movement and operation of vehicles during closure	<ul style="list-style-type: none"> <li>That the vehicles are fitted with silencers or mufflers to help minimize the noise generated.</li> <li>Appropriate PPEs are provided to the workers.</li> </ul>	<b>Medium-</b> impacts on air quality will be limited to the project area.	<b>Small</b>	<b>Minor</b>
	Disturbances such as road kills and collisions. Removal of vegetation in the area. Direct mortalities due to habitat loss.	<ul style="list-style-type: none"> <li>Speed limits must still be enforced to ensure that road killings are limited;</li> <li>Workers should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the removal of structures such as waiting sheds, irrigation systems etc.</li> <li>The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;</li> <li>No trapping, killing or poisoning of any wildlife is to be allowed on farm,</li> </ul>	<b>Small</b> - likely migration/loss of fauna from disturbance and habitat fragmentation over the project area extent.	<b>Medium</b> – the surrounding area is made up of secondary forest with a few number of fauna and flora species	<b>Minor</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		including snakes, birds, lizards, frogs, insects or mammals. <ul style="list-style-type: none"> <li>Area must be rehabilitated progressively to reduce the impact of erosion long term.</li> </ul>			
	Degradation of soil resources/vegetation associated with ecosystem services	<ul style="list-style-type: none"> <li>Utilise topsoil in rehabilitation</li> <li>Re-vegetate the area with indigenous vegetation</li> </ul>	<b>Small</b> - likely loss of habitat over the project area extent	<b>Medium</b> – the surrounding area is made up of secondary forest with a comparative number of fauna and flora abundance	<b>Minor</b>
	Waste disposal	<ul style="list-style-type: none"> <li>Implementation of land Reclamation &amp; Rehabilitation Plan</li> <li>Implementation of Waste Management Plan</li> <li>Establish comprehensive recycling programs for various types of materials</li> <li>Raise public awareness about the importance of recycling and provide accessible recycling facilities.</li> </ul>	<b>Medium</b>	<b>Low-Site/Local</b>	<b>Minor</b>
	Aesthetic and Visual Impacts	<ul style="list-style-type: none"> <li>Integrate landscaping with native vegetation to soften the visual impact</li> <li>Develop and implement rehabilitation</li> </ul>	<b>Medium</b>	<b>Low-Site/Local</b>	<b>Moderate</b>



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		<p>plans focusing on restoring the natural environment and aesthetics</p> <ul style="list-style-type: none"> <li>Identify and preserve any cultural significant features in the area, maintaining historical and aesthetic value</li> <li>Implement decommissioning in stages, allowing for gradual changes to reduce sudden visual impact</li> </ul>			
	Farm restoration/rehabilitation	<ul style="list-style-type: none"> <li>Restore ecosystems affected by contamination to promote natural recovery processes.</li> </ul>	Medium	Low-Site/Local	Moderate
	Reduction in local employment opportunities	<ul style="list-style-type: none"> <li>supports local entrepreneurship through local community development strategy.</li> </ul>	Medium	Low-Site/Local	Moderate
	Impact on household income	<ul style="list-style-type: none"> <li>Community independence system should be developed with the involvement of the villages and must include a comprehensive stakeholder strategy and disclosure phase</li> </ul>	Medium	Low-site/local	Moderate
	Contamination of soil and water	<ul style="list-style-type: none"> <li>Properly manage and dispose of hazardous waste to prevent leaching into soil and water.</li> <li>Provide training for individuals on proper waste disposal and pollution</li> </ul>	Small	Small	Minor



Project Activity	Potential Impact	Mitigation & Management Measures	Impact Magnitude	Receptor Quality, Importance or Sensitivity	Residual Significance
		prevention.			
	Waste generation from bags, nylons waiting sheds, irrigation systems etc. may result in an environmental health and safety hazard with effects on soil, air and water within the vicinity.	<ul style="list-style-type: none"> <li>• Implementation of land Reclamation &amp; Rehabilitation Plan</li> <li>• Establish comprehensive recycling programs for various types of materials</li> <li>• Raise public awareness about the importance of recycling and provide accessible recycling facilities.</li> </ul>	<b>Medium</b>	<b>Low-Site/Local</b>	<b>Minor</b>
	Loss of land aesthetic qualities due to abandoned and dilapidated	<ul style="list-style-type: none"> <li>• Demolished should be used for other beneficial purposes to prevent decay</li> <li>• Integrate landscaping with native vegetation to soften the visual impact</li> <li>• Develop and implement restoration plans focusing on restoring the natural environment and aesthetics</li> </ul>	<b>Medium</b>	<b>Low-Site/Local</b>	<b>Minor</b>





## CHAPTER EIGHT

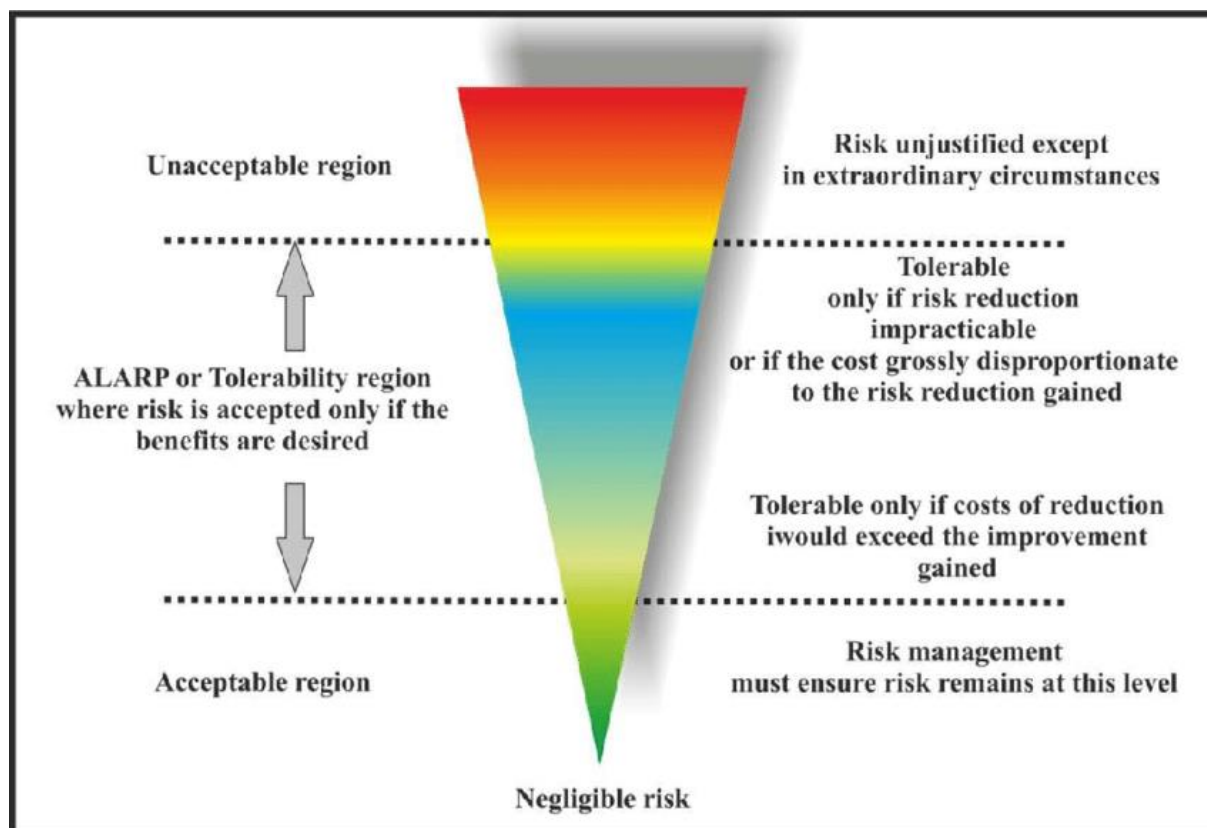
### ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

#### 8.1 Introduction

This Environmental and Social Management Plan (ESMP) was prepared on the basis of the results of the ESIA for the Regional Rice Resilient Value Chains Development Program (REWARD). Its aim is to meet the requirements of the Environment Code in The Gambia. It has also been developed with the aim of complying with international good practices applicable to impact studies, meeting the requirements of AfDB's Integrated Safeguards System (ISS).

The ESMP for the project shall be a “life document” which shall be reviewed periodically with the incorporation of various mitigation measures for potential impacts and shall form the basis for the actual project implementation. Thus, the ESMP will be a living document, which will continue to be developed during the design and construction phase to enable continuous improvement of the Project's social and environmental performance. The ESMP is applicable to all project implementation activities during the construction, operation and decommissioning of the proposed project.

The ESMP provides the assurance that the mitigation measures developed are adequate for reducing the effects of adverse and potential impacts to As Low As Reasonably Practicable (ALARP) as well as those proposed for enhancing beneficial impacts are implemented and maintained throughout the project lifecycle. Compliance with the legal standards on safety and environment is regarded as the minimum requirement, and must be satisfied during all phases of the Project development. In order to reduce the risk of an adverse effect on the environment to the lowest level that is reasonably practicable, an objective of the engineering design will be to apply the ALARP principle. Figure 8.1 illustrates this principle in details.



**Figure 8.1: Level of Risk and ALARP**

The ESMP of the proposed REWARD project is designed in line with its Health, Safety and Environment (HSE) policy and in accordance with ISO 14001 Environmental Management System specifications. The ESMP is therefore, an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of construction, operation and decommissioning are prevented and that the positive benefits of the projects are enhanced. Having this framework in place ensures a systematic approach to bringing environmental and social considerations into decision making and day-to-day operations. It establishes a framework for tracking, evaluating and communicating environmental and social performance and helps ensure that environmental risks and liabilities are identified, minimized and managed effectively.

## 8.2 ESMP Objectives

The ESMP is designed to:

- Ensure that all mitigation measures prescribed in the ESIA document for eliminating and minimizing the adverse impacts and enhancing the beneficial impacts of the project are fully implemented;



- Provide part of the basis and standards needed for overall planning, monitoring, auditing and review of environmental and socio-economic performance throughout the project activities; and
- Ensure good standards of practice are used throughout the project.

These objectives shall be achieved by:

- Ensuring compliance with all stipulated legislation on protection of the biophysical and socioeconomic environment;
- Promoting awareness on the management of the biophysical and socio-economic environment among workers;
- Integrating environmental and socio-economic issues fully into the project development and operational philosophies;
- Rationalizing and streamlining existing environmental activities to add value to efficiency and effectiveness;
- Ensuring that only environmentally and socially sound procedures are employed during the project implementation; and
- Continuous consultations with the relevant regulatory bodies, community leaders, youth leaders, community based organizations (CBOs), and other stakeholders throughout the project's lifecycle;

### **8.3 Scope of Environmental and Social Management Plan (ESMP)**

There is need for the development of an effective ESMP to facilitate better achievement and demonstration of sound environmental performance. Furthermore, environmental management is seen as the means to ensure that the commitments specified in this report are properly managed and that unforeseen or unidentified impacts of the proposed development are detected. Thus, the designed ESMP of the proposed project is in line with its Health, Safety and Environment (HSE) policy and in accordance with ISO 14001:2015 Environmental Management System specifications.

The principles adopted for developing the project ESMP are:

#### ***Protect and Enhance the Environment***

- Value and protect the diversity of nature, including limiting pollution to levels, which do not damage natural systems;



- Use energy, water and other natural resources efficiently and with care, including minimizing, re-use or recover through recycling of waste and sustainable disposal of waste

### ***Promote Economic Success***

- Create a vibrant local economy that provides satisfying and rewarding work without harm to the local, national or global environment;
- Encourage necessary access to facilities, services, goods and other people in ways that minimize impacts on the environment.

### ***Meet Social Needs***

- Protect human health and amenity through safe, clean, pleasant environments and emphasize health services focused on prevention as well as care;
- Empower all sections of the community to participate in decision-making and consider the social and community impacts of decision.

Thus, the ESMP is a dynamic working tool and shall take into consideration possible changes in prevailing circumstances, environmental regulations, guidelines and policies. In the event of new policies or guidelines from the Ministry of Environment, Climate Change and Natural Resources (MECCNAR), National Environment Agency (NEA) or the Ministry of Agriculture as well as other relevant government agencies, this document shall be reviewed to reflect these changes.

## **8.4 Environmental Management Measures**

As required by the Gambia ESIA guide, for each measure, objectively verifiable monitoring indicators (OVI), means of verification (MV) and the person in charge of implementing the measure are suggested. Therefore, management measures for the REWARD ESIA are presented here for completeness.

### **8.4.1 Mitigation Measures during the Pre-construction Phase**

The mitigation measures presented below are to be carried out by the project contractors, design team and project management team, during the Pre-construction of the REWARD Project.



**Table 8.1 Mitigation measures for Pre-construction phase impacts for the REWARD Project.**

Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
<b>Feasibility study, Land Surveys and Impact Assessment</b>							
Economy boost and Employment (positive Impacts)	<ul style="list-style-type: none"> <li>Number of local workers recruited</li> </ul>	<ul style="list-style-type: none"> <li>Encourage contractors to sub-contract some of the work to the local contractors</li> <li>The project will prioritize the engagement of local workers for the project in accordance with the capabilities and expertise of local firms and workers.</li> <li>As part of the engagement and disclosure activities, the project will provide prior information regarding upcoming opportunities in terms of employment or supplying products to the local community to allow them to take maximum benefits from the same.</li> </ul>	Hiring record Visual Observation	During Pre-construction phase	Project Implementation Unit (PIU), National Environment Agency (NEA) Central Project Coordinating Unit (CPCU)	Project Contractor	3,800
Land acquisition and Ownership transfer.	<ul style="list-style-type: none"> <li>Number of local communities engaged</li> </ul>	<ul style="list-style-type: none"> <li>Engage local communities to understand their needs and concerns.</li> <li>Ensure a fair and transparent land acquisition process.</li> <li>Facilitate voluntary land transactions with clear terms.</li> </ul>	Engagement records	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	3,200



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Explore options for fair benefit sharing with affected communities.</li> <li>Implement the recommended complaint resolution procedure (Grievance Mechanism) to ensure that any complaints regarding project-related components are promptly and adequately investigated and resolved</li> </ul>					
Business opportunities for local contractors through sub-contracting activities	Number of local contractors hired	<ul style="list-style-type: none"> <li>Encourage contractors to sub-contract some of the works to the local contractors</li> </ul>	Monitoring report	Throughout the Pre-construction Phase	CPCU, PIU, and NEA	Project Contractor	2,800
Increased pressure on existing social infrastructure. Gender-based violence (GBV), Sexual exploitation and abuse (SEA), Violence against Children (VAC).	Number of foreign workers recruited GBV, SEA, SH Complaint report Report on GBV/SEA/SH sensitization	<ul style="list-style-type: none"> <li>Provide additional accommodation (staff quarters) where required for in-migrant workers.</li> <li>Encourage the use of local labour from resident community members.</li> <li>Create forums for the integration of immigrant employees with community norms to avoid clashes with locals.</li> </ul>	Monitoring report/ Grievance report	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	4,500





Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Adhere to the length of the construction program to reduce the stay of in-migrant employees where applicable.</li> <li>Provide infrastructural facilities/ amenities in the community area to ease pressure on the existing amenities/ infrastructure.</li> </ul>					
Increase in social vices (like theft, prostitution) resulting from increased number of people in the area	Security report	<ul style="list-style-type: none"> <li>Maintain regular medical examinations for all staff.</li> <li>Educate its staff on the importance of abstinence/safe sex.</li> <li>Encourage the employment of indigenes.</li> </ul>	Monitoring report/ security report	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	4,000
Conflicts/community agitations over employment issues (quotas and methods)	Complaint report	<ul style="list-style-type: none"> <li>liaise with local Village Development Committee (VDC), community head and relevant local organizations to work out formula for recruitment from the host communities</li> </ul>	Monitoring report/ security report	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	4,900
Community agitations over land disputes, Memorandum of understanding, wrong stakeholder identification, leadership tussles, etc.	Complaint report	<ul style="list-style-type: none"> <li>Identify all relevant stakeholders/legacy issues and ensure early and regular stakeholders' engagement sessions are held to understand community perceptions, issues and concerns and all agreed issues properly documented and</li> </ul>	Monitoring report/ security report	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	3,800



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		addressed.					
Labour and Working Conditions	Number of locals employed	<ul style="list-style-type: none"> <li>Implement fair labour practices, ensuring compliance with national labour laws and international labour standards.</li> <li>Establish grievance redress mechanisms for workers to report concerns anonymously.</li> </ul>	Employment record	Labour and Working Conditions	CPCU, PIU, and NEA	Project Contractor	4,000
Nuisance (noise and vibrations) from movement of heavy-duty equipment and vehicles affecting site workers and wildlife.	Number of nights worked less than 20% of the total number of days worked	<ul style="list-style-type: none"> <li>Install vibration isolation for mechanical equipment with low noise and vibration capacity.</li> <li>Ensure mobilization vehicles etc. are maintained at optimal working condition in accordance with operating manual.</li> <li>Ensure reducing throttle settings and turn off equipment and plant when not in use.</li> <li>Ensure all personnel wear appropriate protective PPE such as earmuffs in area of high noise at work site.</li> <li>Conduct HSE awareness training routinely.</li> </ul>	Worksite register	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	3,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
Dust particles and vehicular emissions from increased movement	Monitoring of daily travel associated with the Project	<ul style="list-style-type: none"> <li>• Ensure site preparation and clearing are conducted in wet season.</li> <li>• Maintain all its work equipment at optimal operating conditions.</li> <li>• Minimize venting from vehicle and equipment using venturi or impingement scrubbers to control particulate matter emissions.</li> </ul>	Monitoring report	Throughout the Pre-construction phase	CPCU, PIU, and NEA	Project Contractor	5,400



#### **8.4.2 Mitigation Measures during the Construction Phase**

The mitigation measures presented below are to be carried out by the project contractors, design team and project management team, during the construction of the REWARD Project.

Prepared by Richflood  
June, 2024



**Table 8.2 Mitigation measures for Construction phase impacts for the REWARD Project.**

Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
<b>Field development</b>							
Land Degradation and Soil Erosion	Visual observation	<ul style="list-style-type: none"> <li>• Every care shall be taken to check soil erosion</li> <li>• Ensure management of excavation activities</li> <li>• Provide soil erosion control and conservation structures where necessary</li> <li>• In areas where construction activities have been completed and where no further disturbance would take place, rehabilitation and re-vegetation should commence as soon as possible.</li> <li>• Ground clearance should be minimized and if possible concentrated only to the specific development areas, and only when it is necessary</li> <li>• Prompt reclamation of exposed soils should be done.</li> </ul>	Monitoring report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,200
Tractors may remove organic top soil during clearing leading to land degradation and soil erosion	Visual observation	<ul style="list-style-type: none"> <li>• Field Clearing by farm machineries should be thoroughly monitored to avoid excessive topsoil cut.</li> <li>• No burning of vegetation after</li> </ul>	Monitoring report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,600



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		clearing should be maintained.					
Increased level of traffic due to heavy equipment and machinery transport; Increased road accidents due to unsafe driving habits; Occupational accidents around the construction areas.	Vehicle maintenance Visual observation	<ul style="list-style-type: none"> <li>Optimization of routes and schedule of transport of goods and workers to avoid main traffic times to the extent possible.</li> </ul>	Monitoring report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,900
Aesthetic & Visual Impact	Visual observation	<ul style="list-style-type: none"> <li>Minimize the direct visual impact of the cultivation</li> <li>Design a planting patterns to create visual interest and reduce the stark appearance of large expanses of one crop</li> <li>Put into consideration cultural and historical aspects of the area when planning developments to preserve unique identity and aesthetics.</li> </ul>	Monitoring and recording	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,400
Improved economic situation of the people recruited during the field development	Monitoring of the number of local employees of the Project	<ul style="list-style-type: none"> <li>Ensure employment and wage policy are in line with or more favourable than standard The Gambian practices.</li> </ul>	Recruitment plan / policy. Recruitment policy. Before the start of the works and checks during the construction work.	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,800





<b>Description of Potential Impacts</b>	<b>Verifiable monitoring of indicators (OVI)</b>	<b>Mitigation/Enhancement Measures</b>	<b>Means of verification (MV)</b>	<b>Timetable for Implementation</b>	<b>Monitoring</b>	<b>Implementation Responsibility</b>	<b>Estimated Implementation Cost (USD)</b>
Disruption to aquatic life due to increase in total suspended solid and turbidity of the receiving water bodies	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Prevent the spillage of chemicals in the field as all chemicals will be mixed at mixing stations which will be designed to contain spills during mixture and loading.</li> <li>Ensure that wastes are stored in secure waste receptacles where they will not be exposed to runoff.</li> </ul>	Assessment Report	Daily	CPCU, PIU, and NEA	Project Contractor	5,500
Alteration of the natural hydrological cycle due to reduction in evapotranspiration in the area.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Ensure the planting of cover crops and mulching to reduce the impact of the rainfall on the soil.</li> </ul>	Assessment Report	Monthly	CPCU, PIU, and NEA	Project Contractor	5,200
Sedimentation in water bodies within the area due to increase in surface runoff	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Ensure the implementation of erosion prevention measures including ground cover (grass and other ground cover plants), the installation of sediment traps and storm water collection channels/settling ponds.</li> <li>Ensure that wastes are stored in secure waste receptacles where they will not be exposed to runoff.</li> </ul>	Monitoring Report	Daily	CPCU, PIU, and NEA	Project Contractor	6,100
Soil compartment due to heavy	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Minimize the use of heavy machinery on sensitive soil areas.</li> <li>Implement soil aeration techniques</li> </ul>	Monitoring and Assessment report	Throughout the construction	CPCU, PIU, and NEA	Project Contractor	5,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
machine		such as subsoiling. <ul style="list-style-type: none"> <li>Establish designated access routes to minimize soil disturbance.</li> <li>Utilize construction techniques that minimize soil compaction</li> </ul>		phase			
Exploitation of workers	Numbers of Work-related complaint	<ul style="list-style-type: none"> <li>Develop transparent human resources policies and procedures for recruitment process, working conditions and Terms of Employment wages, worker-employer relations, Grievance Mechanism, nondiscrimination, monitoring, roles and responsibilities following the Gambia Labour Code.</li> <li>Provide reasonable, and if applicable negotiated working terms and conditions.</li> <li>Establish workers' grievance mechanisms, so that potential conflicts can be dealt with in an early and proper way.</li> </ul>	Monitoring report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	3,800
Increased inequalities between Households	Numbers of household complaints	<ul style="list-style-type: none"> <li>Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>	Monitoring and recording	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,800



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
Reshaping of the field topography may alter drainage patterns leading to waterlogged or poor water retention in the field	Visual Observation and Assessment	Proper on-site supervision during work	Monitoring and Reporting	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	3,800
Removal of tree roots will create dishes of loose soils, and may result to erosion.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Grown trees should not be unnecessarily cut down during site clearance and re-vegetation of some protective and valuable trees/grasses should be encouraged. Examples are trees and grasses that have high resistance to erosion and those that have medicinal and economic values.</li> </ul>	Monitoring and Reporting	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	5,000
Field ploughing will lead to excessive release of dust to the air.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Wetting of field during field clearing, and workers provided eye shields and nose masks</li> </ul>	Monitoring and Reporting	Daily	CPCU, PIU, and NEA	Project Contractor	5,200
Increase in noise levels within the project area particularly as a result of construction and other mechanized activities.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Ensure that personnel wear appropriate PPEs (eye goggles, nose masks, ear muffs etc.).</li> <li>Make use of competent and well-trained personnel for construction works.</li> <li>Maintain positive community</li> </ul>	Monitoring and Reporting	Daily	CPCU, PIU, and NEA	Project Contractor	5,700



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<p>relations to keep public informed of operational activities when noise levels will be noticeably higher.</p> <ul style="list-style-type: none"> <li>Construction and other activities will be restricted to the daylight hours in order to minimize effect on communities</li> </ul>					
Increase in Noise levels and excessive vibrations with the associated disturbance to communities and fauna	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Select recent, well-maintained construction equipment and vehicles compliant with international best practices for noise emissions;</li> <li>Prefer electrical power plant to mechanical alternatives, where feasible;</li> <li>Use of power generators equipped with sound mufflers;</li> <li>Enclosure of the main fixed sources of noise (power generators mainly);</li> <li>Switch off equipment when not in use;</li> <li>Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.</li> <li>The number of equipment operating simultaneously should</li> </ul>	Monitoring and Reporting	Daily	CPCU, PIU, and NEA	Project Contractor	6,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		be reduced as far as practicable					
There will be loss of habitats to animal species	Monitoring and Reporting	<ul style="list-style-type: none"> <li>• Conduct awareness on conservation of plant and animal species to farmers/communities</li> <li>• Noise mitigation measures should be followed, and machinery with lesser noise production should be used</li> <li>• Nighttime work should be limited, and the use of lights at night should not disrupt the movement of nocturnal wildlife</li> </ul>	Monitoring and Reporting	Monthly	CPCU, PIU, NEA, and Parks and Wildlife	Project Contractor	7,000
Loss of Aquatic flora and Fauna	Monitoring and Reporting	<ul style="list-style-type: none"> <li>• Conduct awareness on conservation of Aquatic resources to farmers/communities</li> <li>• Prevention of liquid waste (Fertilizers, herbicides, Pesticide into water body)</li> </ul>	Monitoring and Reporting	Monthly	CPCU, PIU, NEA, and Parks and Wildlife	Project Contractor	6,300
Loss or disturbance of habitats will lead to migration of animal species.	Monitoring and Reporting	<ul style="list-style-type: none"> <li>• Conduct awareness on conservation of wildlife to farmers/communities</li> <li>• Rescue, rehabilitation, and relocation should be done for terrestrial fauna in cooperation</li> </ul>	Monitoring and Reporting	Monthly	CPCU, PIU, NEA, and Parks and Wildlife	Project Contractor	5,500



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<p>with the Department of Parks and Wildlife Management when required.</p> <ul style="list-style-type: none"> <li>Disturbance and/or injury or death due to accidental events to wildlife should be monitored regularly</li> <li>Re-vegetation of some protective and valuable trees/grasses should be encouraged</li> <li>Activities shall be limited to designated areas</li> </ul>					
Oil and grease release from the farm machinery will contaminate the soils and water bodies within the community	Number of problems observed and results of groundwater and surface water monitoring campaigns.	<ul style="list-style-type: none"> <li>Carry out periodic pre-mob of machinery</li> <li>Ensure that equipment and Machine are kept in good working condition</li> <li>Oil, chemical, lubricants, and fuel leakage or spillage should be contained and cleaned up immediately if any events occur.</li> <li>Spill containment and clean-up kits will be available onsite and clean-up from any spill will be appropriately contained and disposed of at an appropriate site.</li> <li>Refueling should be carried out in designated areas using strict protocols.</li> </ul>	Environmental monitoring report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	7,800





Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Waste oil should be collected and stored for recycling or disposal through licensed vendors</li> <li>Workers will be trained in the use of designated areas/bins for waste disposal and encouraged to use toilets.</li> </ul>					
Risks of poaching of animals and eventual extinctions of some species.	Visual observation and Assessment	<ul style="list-style-type: none"> <li>Place visible warning sign that disallowed poaching.</li> <li>Conduct awareness on conservation of wildlife to farmers/communities</li> <li>Workers should not do any harm or death to wildlife.</li> <li>Disturbance and/or injury or death due to accidental events to wildlife should be monitored regularly.</li> </ul>	Monitoring and reporting	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	6,200
Loosen sediments will be carried by runoff and deposit to rivers and streams which shall lead to river siltation	Visual observation and Assessment	<ul style="list-style-type: none"> <li>Carry out earthworks operations such that surfaces have mixed drainage patterns to control run-off and prevent sediment transportation</li> </ul>	Monitoring and reporting	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	8,100
Women, youths, widows work in the fields may be subjected to unfair contract employments	Number of grievances recorded	<ul style="list-style-type: none"> <li>Promote Gender, Diversity Equity and Social Inclusion Initiatives</li> <li>Establishment of Fair Employment Standards</li> </ul>	Monitoring and Reporting	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	
Lack of adequate	Monitoring and	<ul style="list-style-type: none"> <li>Adequate provision of healthy</li> </ul>	Monitoring report	Throughout	CPCU, PIU, and	Project	4,900



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
PPEs will lead to minor injuries and accidents.	reporting	<p>living conditions should be ensured</p> <ul style="list-style-type: none"> <li>The contractor should prepare Emergency Preparedness and Response Procedure (EPRP) and Occupational Health and Safety Management Plan.</li> <li>Training on Health and Safety policy for the workers (both regular and contractual) should be provided.</li> <li>Provide appropriate PPEs for workers.</li> <li>Educate farmers and other workers on the importance of PPEs</li> <li>Inspect that workers are wearing PPEs and correctly.</li> <li>Maintain principle of No PPEs No work.</li> </ul>		the construction phase	NEA	Contractor	
Occupational Health and Safety	Visual Observation and Site Assessment	<ul style="list-style-type: none"> <li>Construction worker safety shall be in accordance with contractor prepared site specific health and safety plan that identifies site specific risks, safety equipment, decontamination procedures, action plans.</li> <li>Daily site inspections should be</li> </ul>	Monitoring report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	5,800



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<p>done to ensure safe work practices are adhered</p> <ul style="list-style-type: none"> <li>All workmen should be provided with personal protective equipment</li> </ul>					
Generate Employment for locals	Monitoring of the number of local employees of the Project	<ul style="list-style-type: none"> <li>The contractor should give priority to local people to cover manual (unskilled labour) work;</li> <li>Invest in training and skill development programs to enhance the employability of local residents, aligning with the needs of local industries</li> <li>Ensure employment and salary policy are in line with or more favourable than standard The Gambia practice.</li> <li>Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>	Monitoring and Report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	2,000
Informal and Local Business Growth	Numbers of local businesses growth	<ul style="list-style-type: none"> <li>The contractor shall make arrangements with local service providers such as guest house owners to render their services to construction workers on terms that are conducive to both parties</li> <li>Contractors shall promote purchase</li> </ul>	Monitoring Report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	3,400



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		of construction materials available locally					
<b>Rehabilitation, Construction of Irrigation Systems and Processing Plants</b>							
The siting of processing plants may result in a reduction of farmland	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Engage in community consultations</li> <li>Prioritize obtaining the free, prior, and informed consent of affected communities before initiating any land acquisition or development activities</li> </ul>	Monitoring and Report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	6,600
Loss of access to farmland due to construction and rehabilitation of existing irrigation systems	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Engage in community consultation</li> <li>Encourage community involvement in decision-making processes related to land use.</li> <li>Create alternative access to farmlands</li> </ul>	Monitoring and Report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	6,700
Temporary strain on local infrastructure and services (e.g., roads, healthcare, and water supply)	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Invest in temporary or permanent upgrades to roads, healthcare facilities, and water supply systems to accommodate increased demand during construction.</li> <li>Implement traffic management plans to minimize disruption to local traffic flow caused by construction activities.</li> <li>Provide additional healthcare services or facilities to meet the</li> </ul>	Monitoring Report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,500



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<p>increased demand from workers and local residents.</p> <ul style="list-style-type: none"> <li>Implement water conservation measures and temporary water supply solutions to ensure adequate access to clean water during construction.</li> <li>Engage with local communities to inform them about potential disruptions to infrastructure and services during construction.</li> <li>Work closely with local authorities to coordinate infrastructure upgrades and service provision in alignment with construction timelines. This may involve obtaining permits, coordinating road closures, and ensuring timely response to infrastructure issues.</li> <li>Continuously monitor the impact of construction activities on local infrastructure and services and adjust mitigation measures as needed.</li> </ul>					
Deterioration of air quality from release of cement dusts and toxic fumes during construction of concrete structures	Visual observation and Assessment	<ul style="list-style-type: none"> <li>Provided eye shields and nose masks to workers</li> <li>Implement water spraying systems to suppress dust generation during construction activities.</li> <li>Apply dust suppressants or</li> </ul>	Monitoring and reporting	Daily	CPCU, PIU, and NEA	Project Contractor	8,800



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		stabilizers on exposed soil surfaces. <ul style="list-style-type: none"> <li>Cover materials and piles to prevent wind erosion and dust emissions.</li> <li>Implement best practices for material handling to minimize spillage and dust release.</li> </ul>					
Noise and vibration from the use of machineries and motorized equipment will constitute nuisance to the neighbourhood	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Selection of site farther away from community settlement should be maintained.</li> <li>Provided ear muffers to workers</li> <li>Use vibration isolation techniques such as anti-vibration mounts to minimize the transmission of vibrations to surrounding structures.</li> <li>Limit the operation of noisy machinery to specific hours of the day when residents are less likely to be affected, such as during daytime hours.</li> </ul>	Environmental monitoring report (section on noise)	Daily	CPCU, PIU, and NEA	Project Contractor	8,300
Effects on the respiratory health of workers and nearby community residents due to dust generated from movement of vehicles and	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Ensure personnel wear appropriate PPEs (eye goggles, nose masks etc.).</li> <li>Make use of competent and well-trained personnel for construction works.</li> </ul>	Monitoring and Recording Report	Throughout the construction phase	CPCU, PIU, and NEA	Project Contractor	4,300





Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
machinery activities as well as exhaust emissions from vehicles.		<ul style="list-style-type: none"> <li>Ensure periodic medical checks are carried out on personnel</li> </ul>					
Noise nuisance (including impulsive noise) from construction activities resulting to temporary migration of mammals and rodents	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Ensure personnel wear appropriate PPEs (eye goggles, nose masks etc.).</li> <li>Make use of competent and well-trained personnel for construction works.</li> <li>Ensure periodic medical checks are carried out on personnel</li> </ul>	Environmental monitoring report (section on noise)	Daily	CPCU, PIU, and NEA	Project Contractor	6,400
Soil contamination and loss of water resulting from leakages and/improper handling	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Create bund wall to reduce spills overland</li> <li>Train personnel on proper handling procedures to minimize the risk of leaks</li> <li>Implement regular inspections of equipment, pipelines, and storage facilities to identify and address potential issues before they lead to leaks.</li> <li>Conduct regular sampling and analysis of soil and groundwater in and around the storage and handling areas to monitor for any signs of contamination.</li> <li>Implement on-site treatment</li> </ul>	Monitoring report	Weekly	CPCU, PIU, and NEA	Project Contractor	8,800



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		processes to remove contaminants from wastewater before disposal.					
Waste generation from such a bags and metal scraps, etc. resulting in an environmental health and safety hazard with effects on soil, air and water within the vicinity.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• Develop procedures for waste disposal and ensure appropriate storage of waste to minimize risk of pollution.</li> <li>• Promote the reuse of cement bags for secondary purposes, such as packaging or storage.</li> <li>• Establish a system for collecting and redistributing reusable metal scraps</li> <li>• Educate employees on the importance of segregating waste for recycling</li> </ul>	Monitoring report	Weekly	CPCU, PIU, and NEA	Project Contractor	4,200
Contamination of surface and underground water from waste water and spillages of oil and other petroleum products through leakages and/improper handling.	Daily water volume and discharged	<ul style="list-style-type: none"> <li>• Create bund wall to reduce spills overland.</li> <li>• Regular inspection and maintenance of storage tanks and pipelines to identify and address potential leaks</li> <li>• Implementation of stringent safety protocols during handling and transportation of petroleum products.</li> </ul>	Undertake monthly monitoring up-gradient and down gradient of the discharge point.	Daily	CPCU, PIU, and NEA	Project Contractor	5,100



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
Risk of HIV/AIDS and other STDs arising from the interactions with the community.	Number of infections reported	<ul style="list-style-type: none"> <li>Conduct sensitization on STD to local farmers and workers.</li> <li>Implementing safe practices provide regular testing, and fostering open communication is essential for risk management.</li> </ul>	Monthly reports	Throughout the operational phase	CPCU, PIU, and NEA	Project Contractor	5,000
Risk of respiratory and eye related problems from exposures to chemical hazards such as dusts and toxic fumes emanating from cement and concrete works	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Ensure workers wear appropriate respiratory masks and eye protection.</li> <li>Provide thorough training on chemical hazards and ensure adherence to safety protocols</li> <li>Establish work procedures that minimize the generation and dispersion of dust and fumes.</li> <li>Provide appropriate respiratory protection to workers based on the level of exposure.</li> <li>Ensure workers wear eye protection to prevent eye irritation and injuries.</li> </ul>	Monitoring Report	Throughout the project	CPCU, PIU, and NEA	Project Contractor	5,100
Risk of Child labour and Violence against Children (VAC)	Number of Children in the workforce	<ul style="list-style-type: none"> <li>Children must not be employed by the Project (paid or unpaid), and the Project must comply with all relevant local legislation, including labour laws in relation to child labour and the Bank's safeguard policies on child labour</li> </ul>	Monitoring and Recording	Daily	CPCU, PIU, and NEA	Project Contractor	3,500



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		and minimum age. <ul style="list-style-type: none"> <li>• Create a clear system for identifying, responding to, and sanctioning VAC incidents</li> <li>• Orientation on code of conduct on children's safety, protection and child labour, including for parents</li> </ul>					
Risks of Gender Based Violence (GBV), Sexual Abuse and Harassment	Number of GBV and Sexual Abuse and Harassment in the workforce	<ul style="list-style-type: none"> <li>• Contact numbers of representatives on the Grievance Redress Committee and GBV Service Providers should be pasted around the project site and within the immediate project zone</li> <li>• Discuss issues of Gender Based Violence at daily Toolbox meetings</li> <li>• Display on site posters prohibiting sexual exploitation and harassment</li> <li>• Create a clear system for identifying, responding to, and sanctioning GBV incidents</li> <li>• Availability of female nodal officer for women's issues</li> <li>• Regular GBV/SEA sensitization &amp; training for all employees, workers, transporters, drivers and contractors</li> </ul>	Monitoring Report	Throughout the project	CPCU, PIU, and NEA	Project Contractor	4,300



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Inclusion of gender issues in code of conduct, and dissemination</li> <li>Regular consultation/counseling of women employees and workers, including for survivors</li> </ul>					
Lack of adequate PPEs will lead to minor injuries and accidents.	Visual Observation	<ul style="list-style-type: none"> <li>Provide appropriate PPEs for workers.</li> <li>Inspect that workers are wearing PPEs and correctly.</li> <li>Maintain principle of No PPEs, No work.</li> </ul>	Monitoring and Recording	Throughout the Operational Phase	CPCU, PIU, and NEA	Project Contractor	3,400



### **8.4.3 Mitigation Measures during the Operational Phase**

The mitigation measures presented below are to be carried out by the project contractors, design team and project management team, during the Operation of the REWARD Project.

Prepared by Richflood  
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**Table 8.3 Mitigation measures for Operational phase impacts for the REWARD Project**

Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
<b>Planting, Harvesting and Processing</b>							
Applying artificial fertilizer may alter the soil nutrient in the long run.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Regular conduct soil tests to monitor nutrient levels and adjust fertilizer application accordingly</li> <li>Timely fertilizer applications to coincide with the crop's growth stages, optimizing nutrient uptake and minimizing excess accumulation</li> <li>Manage crop residues effectively to improve organic matter content and nutrient recycling within the soil</li> </ul>	Fertilizer application register and monitoring report	Throughout the Project	CPCU, PIU, NEA and Plant Protection Unit	Project Contractor	9,000
Water pollution from agro-chemicals such as fertilizers and pest control substances which can leach into the soil and get carried into water by runoff. Aquatic life would be affected	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Precision Agriculture methods will be employed with regard to crop nutrition, and fertilizer will only be applied in the required amounts, so that the contamination of surface water is greatly reduced.</li> <li>Chemicals i.e. Herbicides and pesticides will be used only as required or when particular pest thresholds are reached. Develop and implement herbicide/pesticides/insecticides management plans based on scientific recommendations to ensure balance.</li> <li>Promote the use of Pest Management</li> </ul>	Undertake monthly monitoring up-gradient and down-gradient of the discharge point.	Throughout the Project	CPCU, PIU, NEA and Plant Protection Unit	Project Contractor	7,700



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<p>practices to reduce the reliance on chemical inputs.</p> <ul style="list-style-type: none"> <li>• Employing targeted and selective application of pesticides, using only when necessary.</li> <li>• Training farmers on correct application methods to minimize drift and runoff.</li> </ul>					
Increase in soil acidification due to use of fertilizers containing ammonium salts or urea which could restrict ability of roots of plants to reach nutrients and water.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• The use of natural fertilizers and compost as much as possible;</li> <li>• That only approved and non-persistent chemicals are used where necessary.</li> <li>• Regular soil testing and analysis are carried out to monitor chemical changes in the soil.</li> </ul>	Fertilizer application register and monitoring report	Throughout the Project	CPCU, PIU, NEA and Plant Protection Unit	Project Contractor	7,500
Use of Herbicides, insecticides is injuries to health. Frequent inhaling may cause cancer and failure of bronchitis	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• Ensure that farmers and pesticide applicators use appropriate protective gear, such as gloves, masks, and goggles, to minimize direct contact with chemicals</li> <li>• Provide comprehensive training on the safe handling and application of herbicides and insecticides</li> <li>• Emphasize accurate and precise application of pesticides to minimize overspray or overuse</li> </ul>	Herbicides application register and monitoring report	Throughout the Operational Phase	CPCU, PIU, NEA and Plant Protection Unit	Project Contractor	4,300



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Promote and explore alternative, less harmful pest control methods</li> </ul>					
Air quality deterioration due to power generating plants operation.	Visual Observation Assessment	<ul style="list-style-type: none"> <li>Regular maintenance of processing plants to ensure that emissions are within normal operating limits.</li> </ul>	Environmental monitoring report (section on Air quality)	Daily	CPCU, PIU, and NEA	Project Contractor	6,200
Dust generation resulting from the movement of vehicles along dirt roads, and fumes from machinery/equipment.	Visual Observation Assessment	<ul style="list-style-type: none"> <li>Dust suppression measures are employed including site watering.</li> <li>Regular maintenance of vehicles and machines to ensure that emissions are within normal operating limits.</li> </ul>	Environmental monitoring report (section on Air quality)	Daily	CPCU, PIU, and NEA	Project Contractor	6,900
Poor waste management of domestic waste and grey waste from farm camps which will result in an environmental health and safety hazard with effects on soil, air and water within the vicinity	Visual Observation Assessment	<ul style="list-style-type: none"> <li>Implementation of an effective Waste Management System taking into account the various kinds of waste to be generated during this phase.</li> <li>Institution of monitoring system to ensure the compliance to the handling, storage and disposal measures put in place.</li> </ul>	Monitoring and recording	Daily	CPCU, PIU, and NEA	Project Contractor	7,000
Exposure of workers to excessive noise from the processing plant	Health and Safety Assessment	<ul style="list-style-type: none"> <li>Ensure that modern equipment are used which are fitted with noise suppression devices to prescribed standards.</li> </ul>		Throughout the Project	CPCU, PIU, and NEA	Project Contractor	2,500



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Maintain processing plant system at optimal operating conditions.</li> </ul>					
Exposure of workers to excessive noise on the farmland as a result of the mechanized agricultural activities	Visual Observation Assessment	<ul style="list-style-type: none"> <li>The use of appropriate PPEs by personnel while at work.</li> <li>The use of competent and well-trained personnel for construction works.</li> <li>That modern equipment are used which are fitted with noise suppression devices to prescribed standards.</li> </ul>	Monitoring and reporting	Throughout the Operational Phase	CPCU, PIU, and NEA	Project Contractor	2,000
Water abstraction could affect the availability and hydrological regime within the project area	Volume of water consumed.	<ul style="list-style-type: none"> <li>Ensure that the surface and groundwater levels are monitored to check status.</li> <li>Alternative water sources will be made available for the project and communities through the sinking of boreholes.</li> </ul>	Monitoring and reporting	Throughout the Operational Phase	CPCU, PIU, and NEA	Project Contractor	3,000
High water retention on the rice field will lead to soil water saturation, swampy environment and may trigger flooding	Visual Observation	<ul style="list-style-type: none"> <li>Install efficient drainage systems to facilitate water runoff and prevent waterlogging</li> <li>Implement contour plowing to minimize water runoff and soil erosion</li> <li>Select rice varieties that are tolerant to waterlogging and have better adaptability to wet conditions.</li> <li>Implement a precise irrigation schedule to avoid overwatering and waterlogging.</li> </ul>	Monitoring and Reporting	Throughout the Operational Phase	CPCU, PIU, and NEA	Project Contractor	5,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Regular monitor water levels in the field and adjust irrigation practices accordingly</li> </ul>					
Flooding in the rice field will produce greenhouse gas nitrous oxide.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Maintain same level of water in the field. Fluctuations increase the chance of release of greenhouse gas</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	3,500
Constant water on rice will turn it to swamp and unfit for growing some crops in future	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Drain water off after harvesting</li> <li>Use organic manure to increase infiltration</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	4,500
Breaking down of rice vegetation waste by microbes releases large volume of greenhouse gas Methane	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Discourage lumping of vegetation waste into heaps</li> <li>Spread thoroughly within the field to reduce large point source.</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	4,000
Heaps of rice stems and shafts after harvest will house rodents and snakes	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Spread stems and shafts evenly on the field</li> <li>Take rice waste to other crop farms to decompose to organic manure</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	3,500
Burning of the waste stems and shafts after harvest will release gaseous emission that deteriorates the atmosphere.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Spread stems and shafts evenly on the field</li> <li>Take rice waste to other crop farms to decompose to organic manure</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	4,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
Lack of adequate PPEs will lead to minor injuries and accidents.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Provide appropriate PPEs for workers.</li> <li>Inspect that workers are wearing PPEs and correctly.</li> <li>Maintain principle of No PPEs No work.</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	4,500
Risk of workplace accidents	Numbers of work-related Accidents	<ul style="list-style-type: none"> <li>Respect the measures put in place to ensure workers' safety: wearing personal protective equipment, and applying safety standards.</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	3,000
Invasion from intruders (thieves, herdsmen and cows)	Numbers of unrest reported, Visual Observation	<ul style="list-style-type: none"> <li>Erection of 'No trespassing' signage at the major boundaries of the project site.</li> <li>Engagement of local security to help secure the project area</li> </ul>	Monitoring and Reporting	Throughout the Project	CPCU, PIU, and NEA	Project Contractor	3,800
Risks of Gender Based Violence (GBV), Sexual Abuse and Harassment	Number of GBV reported in the workforce	<ul style="list-style-type: none"> <li>Clauses prohibiting rape, defilement and other Gender Based Violence as well as child and forced labour should be inserted into works contracts</li> <li>Communities need to be informed about the start of all works, at least 5 days before, and the need for them to keep children away from the sites.</li> <li>Create a clear system for identifying, responding to, and sanctioning GBV incidents.</li> </ul>	Monitoring and Reporting	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	2,500





Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>Display on-site posters prohibiting sexual exploitation and harassment</li> <li>Availability of female nodal officer for women's issues</li> <li>Regular GBV/SEA sensitization &amp; training for all employees, workers, transporters, drivers and contractors</li> <li>Inclusion of gender issues in code of conduct, and dissemination</li> <li>Regular consultation/counseling of women employees and workers, including for survivors</li> </ul>					
Risk of Child labour and Violence against Children (VAC)	Number of Children in the workforce	<ul style="list-style-type: none"> <li>Children must not be employed by the Project (paid or unpaid), and the Project must comply with all relevant local legislation, including labour laws in relation to child labour and the Bank's safeguard policies on child labour and minimum age.</li> <li>Create a clear system for identifying, responding to, and sanctioning VAC incidents</li> <li>Orientation on code of conduct on children's safety, protection and child labour, including for parents;</li> <li>Establishment of a 'crèche' for workers' children within the facility;</li> </ul>	Monthly reports from the community	Throughout the operational phase	CPCU, PIU, and NEA	Project contractor	2,000



<b>Description of Potential Impacts</b>	<b>Verifiable monitoring indicators (OVI)</b>	<b>Mitigation/Enhancement Measures</b>	<b>Means of verification (MV)</b>	<b>Timetable for Implementation</b>	<b>Monitoring</b>	<b>Implementation Responsibility</b>	<b>Estimated Implementation Cost (USD)</b>
Conflicts with host communities and third-party agitation	Numbers of compliant and received	<ul style="list-style-type: none"> <li>Adopt the grievance redress mechanism</li> </ul>	Monitoring and Reporting	Throughout the Operational Phase	CPCU, PIU, and NEA	Project contractor	1,500
Increase in traffic density; impact on traffic safety, contaminate/ pollute air, land, plants, disturbance to wildlife Increased road accident/ injuries	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Optimization of routes and schedule of transport</li> <li>Development of a Traffic management plan.</li> <li>Creating parking areas for vehicles.</li> <li>Conduct public awareness</li> <li>Enforce speed and exhaust limit</li> <li>Alcohol and substance abuse screening among drivers and machine operator</li> </ul>	Monitoring and Reporting	Throughout the Operational Phase	CPCU, PIU, and NEA	Project contractor	3,400
Falls, temperature, and other factors which can harm the worker without necessarily touching are the major physical hazards inducing fear among workers. Dermatitis and dry skin in workers Repetitive movements, Uncomfortable	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Notice boards with all safety measures to be taken within the site and accident-prone areas will be displayed at all strategic locations within the site.</li> <li>All workers shall be trained on basic ergonomics principles.</li> <li>This should cover the correct lifting, carrying and setting down techniques to prevent incidences of hernias, sprains, strains, back injuries and other muscular-skeletal disorders due to improper handling of objects.</li> </ul>	Monitoring and Reporting	Throughout the Operational Phase	CPCU, PIU, and NEA	Project Contractor	4,500



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
workplace and Poor body positioning Joint pain, back pain, wrist pain, neck pain, shoulder pain etc.							
Public, Occupational Health and Safety	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• Maintain safe workplaces and work systems;</li> <li>• Provide information, instruction and training enabling employees to work without hazards;</li> <li>• Consult with employee-elected health and safety representatives and/ or other employees about occupational health, safety and welfare</li> <li>• Provide adequate personal protective clothing and equipment</li> <li>• Ensure all work procedures are undertaken without exposing workers to hazards.</li> <li>• Staffs need to be educated on preventing infection by thorough hand washing after work</li> <li>• Diseases transmission by other vectors such as vermin and insects should be controlled with effective pest control management measures.</li> <li>• Ensure chemicals are stored in a designated enclosed area, and material</li> </ul>	Monitoring and Reporting	Throughout the Operational phase	CPCU, PIU, and NEA	Project Contractor	5,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		safety data sheets (MSDS) are within easy reach of these chemicals.					
Increases rice output	Visual observation and Market survey	<ul style="list-style-type: none"> <li>Invest in and promote the cultivation of high yielding and disease-resistant rice varieties</li> <li>Implement efficient irrigation systems, such as drip irrigation or precision farming, to ensure optimal water usage</li> <li>Employ integrated pest management strategies to control pests and diseases without excessive reliance on chemical inputs.</li> </ul>	Market survey and monitoring report	Throughout the project	CPCU, PIU, and NEA	Project contractor	4,700
Generate Employment for locals Generate Employment for locals	Number of local workers	<ul style="list-style-type: none"> <li>Invest in training and skill development programs to enhance the employability of local residents, aligning with the needs of local industries</li> <li>Ensure employment and salary policy are in line with or more favourable than standard The Gambia practice.</li> <li>Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>	Recruitment plan / policy	Throughout the project	CPCU, PIU, and NEA	Project contractor	5,500
Enhanced production of quality rice in The Gambia	Market survey, livelihood improvement	<ul style="list-style-type: none"> <li>Quality rice production enhances the country's competitiveness in the attracting more consumers and meeting national food security.</li> </ul>	Market survey, monitoring and reporting	Throughout the project	CPCU, PIU, and NEA	Project contractor	1,000



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		<ul style="list-style-type: none"> <li>High-quality production reduces the risk of negative perception and minimizes financial loss.</li> </ul>					
Contribution to Community Development	Visual Observation, livelihood improvement	<ul style="list-style-type: none"> <li>Making direct contributions as part of Corporate Social Responsibility (CSR) by supporting community development initiatives in areas such as education, health, water, road, etc.</li> </ul>	Monitoring and reporting	Throughout the Operational phase	CPCU, PIU, and NEA	Project Contractor	1,000
<b>Rice Marketing</b>							
Dust remnants from husk will cause cough and difficult breathing	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Provide suitable personal protective equipment to workers in milling section</li> <li>Keep the husk debris damp to minimize dust generation.</li> <li>Train workers on the hazards of dust exposure and the proper use of protective measures.</li> <li>Implement routine cleaning schedules to control dust build-up on surfaces.</li> <li>Conduct regular air quality monitoring to assess dust levels and identify areas requiring additional control measures.</li> </ul>	Monitoring and reporting	Daily	CPCU, PIU, and NEA	Project Contractor	4,500
Risk of infestation by the pest and insect living in rice grains.	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Wear protective clothes</li> <li>Use resistant or tolerant rice varieties when available.</li> <li>Properly clean and sanitize storage facilities, equipment, and machinery to</li> </ul>	Monitoring and reporting	Daily	CPCU, PIU, and NEA	Project Contractor	2,200



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		minimize the risk of infestation. <ul style="list-style-type: none"> <li>• Ensure that the storage area is free of spilled grains, dust, and debris, as these can attract pests</li> <li>• Conduct regular inspections of stored rice for signs of pest activity, including the presence of live insects, damaged grains, or webbing.</li> </ul>					
Inhaling of chemical preservatives will cause cancer and organ damage	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• Provide suitable personal protective equipment to workers</li> <li>• Use appropriate personal protective equipment such as masks, gloves, and eye protection.</li> <li>• Ensure that individuals who may be exposed to chemical preservatives are educated on the potential risks and trained on proper handling procedures.</li> </ul>	Monitoring and reporting	Weekly	CPCU, PIU, and NEA	Project Contractor	3,500
Contact with chemical preservatives will cause skin inflammation	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• Provide suitable personal protective equipment to workers</li> <li>• Use appropriate personal protective equipment such as masks, gloves, and eye protection.</li> <li>• Ensure that individuals who may be exposed to chemical preservatives are educated on the potential risks and trained on proper handling procedures.</li> <li>• Provide suitable personal protective</li> </ul>	Monitoring and reporting	Throughout the project	CPCU, PIU, and NEA	Project Contractor	4,500



Description of Potential Impacts	Verifiable monitoring indicators (OVI)	Mitigation/Enhancement Measures	Means of verification (MV)	Timetable for Implementation	Monitoring	Implementation Responsibility	Estimated Implementation Cost (USD)
		equipment to workers <ul style="list-style-type: none"> <li>• Use appropriate personal protective equipment such as masks, gloves, and eye protection.</li> <li>• Ensure that individuals who may be exposed to chemical preservatives are educated on the potential risks and trained on proper handling procedures.</li> </ul>					
Generation of waste bags that litters the environment	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>• Provide information on the proper use of waste bags and the consequences of improper disposal</li> <li>• Ensure proper waste collection infrastructure, including regular pickup and disposal services.</li> </ul>	Monitoring and reporting	Daily	CPCU, PIU, and NEA	Project Contractor	3,000
Increases rice availability to households	Household surveys and livelihoods improvement	<ul style="list-style-type: none"> <li>• Invest in training and skill development programs to enhance the employability of local residents, aligning with the needs of local industries</li> <li>• Ensure employment and salary policy are in line with or more favourable than standard The Gambian practice.</li> <li>• Ensure economic opportunities are available for the maximum number of directly impacted households (or districts).</li> </ul>	Monitoring and reporting	Throughout the project	CPCU, PIU, and NEA	Project Contractor	3,800
Bridge the gap between producers and consumers.	Market Assessment and Survey	<ul style="list-style-type: none"> <li>• Ensure food security and availability</li> <li>• Improve local residence livelihoods</li> </ul>	Monitoring report	Throughout the project	CPCU, PIU, and NEA	Project Contractor	4,000





#### **8.4.4 Mitigation Measures during the Decommissioning Phase**

The mitigation measures presented below are to be carried out by the project contractors, design team and project management team, during the Decommissioning of the REWARD Project.

Prepared by Richflood  
June, 2024



**Table 8.4 Mitigation measures during Decommissioning phase of the REWARD Project.**

<b>Description of Potential Impacts</b>	<b>Verifiable monitoring indicators (OVI)</b>	<b>Mitigation/Enhancement Measures</b>	<b>Means of verification (MV)</b>	<b>Timetable for Implementation</b>	<b>Monitoring</b>	<b>Implementation Responsibility</b>	<b>Estimated Implementation Cost (USD)</b>
<b>Removal of structures and Restoration</b>							
Risk of pollution from agrochemicals following closure	Visual Observation Types of Agrochemical used	<ul style="list-style-type: none"> <li>Taking water quality tests on surface water bodies and implementing treatment if required.</li> <li>That post closure monitoring are carried out for at least 3 years.</li> </ul>	Maintenance report	At the end of the project	CPCU, PIU, and NEA	Project Contractor	3,000
Impact on human health associated with Increased dust and vehicular emissions from demolition activities	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Maintain all equipment in good working order and do not leave running when not in use.</li> <li>Develop and implement a complaints system and make the community aware of the complaints procedure.</li> <li>Monitoring air quality during decommissioning.</li> </ul>	Maintenance report	At the end of the project	CPCU, PIU, and NEA	Project Contractor	4,200
Increased dust and noise levels due to movement and operation of vehicles and machinery during closure	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>That the vehicles and machinery are fitted with silencers or mufflers to help minimize the noise generated.</li> <li>Appropriate PPEs are provided to the workers.</li> </ul>	Monitoring report	At the end of the project	CPCU, PIU, and NEA	Project Contractor	2,000
Risk of accident and injury to workers during demolition of structures	Numbers of work-related accidents	<ul style="list-style-type: none"> <li>Implement the recommendations in the decommissioning Plan.</li> <li>Ensure alignment of all stakeholders (regions, Communities etc).</li> <li>Clear and clean all excavations to acceptable limits and have then</li> </ul>	Monitoring report	At the end of the project	CPCU, PIU, and NEA	Project Contractor	3,000



<b>Description of Potential Impacts</b>	<b>Verifiable monitoring indicators (OVI)</b>	<b>Mitigation/Enhancement Measures</b>	<b>Means of verification (MV)</b>	<b>Timetable for Implementation</b>	<b>Monitoring</b>	<b>Implementation Responsibility</b>	<b>Estimated Implementation Cost (USD)</b>
		backfilled. <ul style="list-style-type: none"> <li>Remove all wall fences and structures as advised by the decommissioning team.</li> <li>Clean contaminated soils to acceptable limit</li> </ul>					
Degradation of soil resources/vegetation associated with ecosystem services	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Utilise topsoil in rehabilitation</li> <li>Re-vegetate the area with indigenous vegetation</li> </ul>	Monitoring report	At the end of the project	CPCU, PIU, and NEA	Project Contractor	3,500
Demolition of structures/equipment	Visual Observation and Assessment	<ul style="list-style-type: none"> <li>Provide training for all personnel involved in the demolition process.</li> <li>Implement measures to minimize the release of hazardous materials and pollutants.</li> <li>Develop a waste management plan to properly handle and dispose of debris, hazardous materials, and other waste generated during demolition</li> <li>Disposal of equipment, machinery, mill, houses, vehicles, spare parts, chemicals and other materials and remediate and restore impacted sites.</li> <li>The area should be cleaned and all domestic wastes, debris/waste metals, grease and oils must be</li> </ul>	Monitoring report	At the end of the project	CPCU, PIU, and NEA	Project Contractor	4,800



<b>Description of Potential Impacts</b>	<b>Verifiable monitoring indicators (OVI)</b>	<b>Mitigation/Enhancement Measures</b>	<b>Means of verification (MV)</b>	<b>Timetable for Implementation</b>	<b>Monitoring</b>	<b>Implementation Responsibility</b>	<b>Estimated Implementation Cost (USD)</b>
		cleaned up and disposed of in a manner approved.					
Reduction in household income	Numbers of locals disengaged and household survey	<ul style="list-style-type: none"> <li>Community independence should be developed with the involvement of the villages and must include a comprehensive stakeholder strategy and disclosure phase</li> </ul>	Monitoring and reporting	At the end of the project	CPCU, PIU, and NEA	Project Contractor	2,000
Contamination of soil and water	Visual observation and Assessment	<ul style="list-style-type: none"> <li>Properly manage and dispose of hazardous waste to prevent leaching into soil and water.</li> <li>Provide training for industries and individuals on proper waste disposal and pollution prevention.</li> </ul>	Monitoring and reporting	At the end of the project	CPCU, PIU, and NEA	Project Contractor	3,500
Waste generation from such a bags and metal scraps, etc. resulting in an environmental health and safety hazard with effects on soil, air and water within the vicinity.	Visual observation and reporting	<ul style="list-style-type: none"> <li>Implementation of site-specific Land Reclamation &amp; Rehabilitation Plan Implementation of Waste Management Plan</li> <li>Establish comprehensive recycling programs for various types of materials</li> <li>Raise public awareness about the importance of recycling and provide accessible recycling facilities.</li> </ul>	Monitoring and reporting	At the end of the project	CPCU, PIU, and NEA	Project Contractor	2,000
Loss of site aesthetic qualities due to abandoned and dilapidated structure	Visual observation and reporting	<ul style="list-style-type: none"> <li>Available structures and building not demolished should be used for other beneficial purposes to prevent decay</li> </ul>	Monitoring and reporting	At the end of the project	CPCU, PIU, and NEA	Project Contractor	4,500



<b>Description of Potential Impacts</b>	<b>Verifiable monitoring indicators (OVI)</b>	<b>Mitigation/Enhancement Measures</b>	<b>Means of verification (MV)</b>	<b>Timetable for Implementation</b>	<b>Monitoring</b>	<b>Implementation Responsibility</b>	<b>Estimated Implementation Cost (USD)</b>
		<ul style="list-style-type: none"> <li>• Integrate landscaping with native vegetation to soften the visual impact</li> <li>• Develop and implement restoration plans focusing on restoring the natural environment and aesthetics</li> <li>• Identify and preserve any cultural significant features in the area, maintaining historical and aesthetic value</li> <li>• The contractor shall ensure that demolished waste is removed from the site and properly disposed of in designated location.</li> <li>• Implement decommissioning in stages, allowing for gradual changes to reduce sudden visual impact</li> </ul>					
Site restoration/rehabilitation	Visual observation and reporting	<ul style="list-style-type: none"> <li>• Restore ecosystems affected by contamination to promote natural recovery processes.</li> </ul>	Monitoring and reporting	At the end of the project	CPCU, PIU, and NEA	Project Contractor	4,000



## 8.5 Air Quality Management Plan (AQMP)

### *Construction Phase*

**Potential Impacts:** Emissions of dust and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

#### **Action Plans:**

- At the early phases of construction wetting of unpaved roads surfaces will be carried out as a short-term mitigation of dust emissions; localized dampening or activity specific dampening will be used to reduce localized emissions of dust.
- If it becomes evident that dust emissions are resulting in an impact to any receptors within the Project Area, wind breaks will be erected.
- A speed limit of 32km/hour will be maintained on gravel roads where surface binding agents encrusting have not been applied.
- Where feasible, surface binding agents will be used on exposed open earthworks.
- Stockpiling of material, for example, rocks, sand and soils will be minimized.
- Stockpiles will be located as far away from receptors as possible and will be enclosed or sheeted as much as possible.
- Drop heights of material will be minimized.
- The use of localized water sprays to attenuate dust emissions;

### *Operation Phase*

**Potential Impacts:** The key impacts resulting in atmospheric emissions are associated with:

- Traffic through the Project Area;
- The processing of the rice; and the generation of power by emergency generators.

#### **Action Plans**

Concerning impacts associated with the transport of the farm produce during the operational phase of the Project, the following management actions will be implemented:

- Vehicles and farm machineries will be maintained in good working order, to ensure that exhaust emissions are minimized. When not in use, vehicles will be powered down, where practical.
- Product will be loaded into silo trailers through the use of an overhead cone storage silo load out. This will result in zero product loss and no tyre entrainment.
- With the emergency generator set power plant, engines will be checked to ensure on-going compliance with AfDB and IFC emission standards.



### ***Decommissioning and Closure Phase***

**Potential Impacts:** The closure and decommissioning of the Project has the potential to result in impacts that are associated with emissions of dust and particulate matter due to:

- The deconstruction of buildings and process installations;
- Transport of materials from the site by trucks;
- Earthworks for restoration of the site; and
- Decommissioning and restoration of the project area.

### ***Action Plans***

Based on the assumption that the internal haul roads will be removed but that the main haul road will remain, the management and mitigation measures are similar to those for the construction phase. As such, the management actions that will be adopted during the decommissioning and closure phase of the Project will be those that are detailed for during the construction phase

### ***Verification and Monitoring of AQMP***

The monitoring programme includes the following elements:

- Real time monitoring of PM<sub>10</sub>;
- Real time monitoring of meteorological parameters;
- Passive monitoring of dust deposition; and
- Passive monitoring of Nitrogen dioxide (NO<sub>2</sub>), Carbon monoxide (CO), Hydrogen Sulphide (H<sub>2</sub>S) and Sulphur dioxide (SO<sub>2</sub>).

### ***PM<sub>10</sub> Monitoring***

- Real time monitoring of PM<sub>10</sub> will be undertaken upwind and downwind of the farmland and processing plant during construction, operational and decommissioning/closure phases. The difference in the upwind and downwind concentrations of PM<sub>10</sub> will be used to ascertain the contribution to ambient PM<sub>10</sub> from the site. On this basis the site will be required to employ one upwind monitoring location and two downwind monitoring locations during construction and operation.
- During the construction phase the monitoring data will be reviewed on a daily basis; and during the operational phase will be considered on a monthly basis. Where PM<sub>10</sub> emissions associated with the site are above the action levels, investigations will be made into the sources of emissions and measures implemented to manage emissions.





- PM<sub>10</sub> monitoring will be undertaken using devices that are recognized by a suitable international standard as being suitable for purpose. The equipment will be serviced by a competent party on a monthly basis to ensure effective operation.
- Techniques based upon the principle of light scattering will be employed.

### **Meteorological Monitoring**

- Meteorological data will be reviewed on a daily basis, during construction along with the PM<sub>10</sub> data to ascertain those conditions under which significant impacts arise; this will include consideration of wind direction in terms of the migration of emissions towards sensitive receptors in addition to wind speed.
- During the operational phase, the meteorological data will be reviewed on a monthly basis, along with the PM<sub>10</sub> and dust deposition data.
- This will be the role of the Environmental and Social Manager, or nominated representative.

The roles and responsibilities for the implementation of the AQMP are presented in Table 8.5 below

**Table 8.5: Responsible Parties and their Responsibilities for AQMP**

S/N	Responsible Personnel	Roles and Responsibilities
1.	<b>Central Project Coordinating Unit (CPCU)</b>	<ul style="list-style-type: none"> <li>• Responsible for leading the development and formulation of the Air Quality Management Plan, Coordinating with various stakeholders and expert</li> <li>• Facilitate training programs and capacity-building initiatives for relevant agencies and stakeholders involved in air quality management</li> <li>• Promote public awareness and education regarding air quality issues, the importance of the management plan, and community roles in improving air quality</li> </ul>
2.	<b>Project Implementing Unit (PIU)</b>	<ul style="list-style-type: none"> <li>• Responsible for enforcing the management/monitoring measures described in this AQMP.</li> <li>• Develop contingency plans and response strategies for air quality emergencies</li> <li>• Establish systems for collecting, analyzing, and disseminating air quality data</li> <li>• Prepare and submit regular reports on the progress of AQMP implementation to regulatory authorities and other stakeholders</li> </ul>



S/N	Responsible Personnel	Roles and Responsibilities
3	<b>National Environment Agency (NEA)</b>	<ul style="list-style-type: none"> <li>Regular monitor air quality levels through a network of monitoring stations to assess the concentration of pollutants</li> <li>Ensure that the AQMP aligns with the national and international regulations, standards, and guidelines.</li> <li>Endure that the AQMP aligns with existing environmental regulations and standards.</li> <li>Raise public awareness about air quality issues, health impacts, and ways to reduce air pollution</li> <li>Ensure the compliance with air quality regulations through inspections, permits, and enforcement measures.</li> </ul>
4.	<b>Community Liaison Officer (CLO)</b>	<ul style="list-style-type: none"> <li>Responsible for stakeholder engagement applicable with this AQMP</li> </ul>
5.	<b>Operation Manager</b>	<ul style="list-style-type: none"> <li>Together with the PIU, is responsible for staffing, planning and day-to-day execution of the management measures described under the operational phase of this AQMP.</li> <li>As needed, he will develop and propose staff plans and contractual language to ensure that these measures are implemented.</li> </ul>
6.	<b>Contractors (Construction and Operations)</b>	<ul style="list-style-type: none"> <li>Responsible for following the air quality procedures and requirements indicated in construction and operational sections of this AQMP.</li> </ul>

### ***Grievance Redress Mechanism regarding AQMP***

- Records of any complaints associated with dust emissions and noise will be kept and captured on a grievance register, identifying the nature of the complaint, the particular activity, plant and/or equipment that initiated the complaint and documenting the action taken. All complaints will be investigated and feedback provided to the complainant.
- Complaints arising from construction and site establishment works or from farming and processing operations will be treated sensitively and in a manner that recognizes the potential for noise to cause environmental impacts.

### ***Reporting and Documentation of AQMP issues***

reports will be summarized from the data collected through the monitoring programme, identifying any occasions when the action levels were triggered and the remedial action that was taken. The



reports will also include the findings of the visual observations, and will include a record of the activities resulting in impacts and any remedial actions taken, and the likelihood of a repetition of impact. A non-technical community audience will be developed and disclosed on a six monthly basis. This report will focus upon graphical representation of information, and in particular outcomes of any community complaints and those actions taken to remedy significant impacts.

## **8.6 Noise Management Plan (NMP)**

### ***Construction Phase***

Project noise emission sources influencing the noise impacts at Noise Sensitive Receptors (NSR) are attributable to construction activities located in the area of the proposed project site.

### **Action Plans**

The following measures will be applied to all construction works undertaken within 1000m of any NSR.

- A one-page summary of applicable noise criteria that relate to relevant work practices and nearby receptors will be developed. This summary will be placed on a notice-board so that all site operators can quickly reference noise information.
- Site managers will periodically check the site and nearby residences for noise related issues so that solutions can be efficiently and quickly applied.
- Where feasible and reasonable, the dropping of materials from height and metal-to-metal contact on equipment, mobile equipment clustering near residences and other sensitive land uses will be avoided.
- Ensure that periods of respite are provided in the case of unavoidable maximum noise level events. These respite periods will be negotiated with the relevant local stakeholders.
- All potentially impacted receptors will be informed of the nature of works to be carried out, the expected noise levels and duration, as well as contact details of representative to be contacted in the event of a complaint.
- For all construction works undertaken within 600m of any NSR, the following noise control mitigation measures will be implemented:
  - ✓ Plant /machinery will be positioned as to minimise noise transmission towards NSRs.
  - ✓ The most effective mufflers, enclosures and low-noise tool bits and blades will be selected, where necessary.



- ✓ Less annoying alternatives to conventional audible reversing alarms will be considered such as; visual and/or broadband noise emitting models.
- ✓ Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be periodically checked.
- ✓ Provide relevant personnel with training in noise control procedures and equipment operation.

### ***Operation Phase***

Project noise emission sources influencing the noise impacts at NSRs are attributable to operational activities at the Processing Plant and through the use of trucks to transport product.

### ***Action Plans***

- Establish permanent signage around the site e.g. at site offices, that is visible to all personnel, which identifies the need to limit noise.
- Where feasible and reasonable, equipment/machinery with lower sound power levels will take preference and Silencers will be installed on all fans if necessary.
- Suitable mufflers will be installed on engine exhausts and compressor components.
- Acoustic enclosures will be constructed for equipment radiating significant noise.
- Where necessary, noise emissions will be minimised and controlled through the installation of noise containments, with enclosures and curtains at or near the source equipment (e.g. crushers, grinders, and screens).
- Noise emission levels for trucks in either sound pressure level at a given distance or sound power level will be sourced from the suppliers of the trucks.
- Additional or upgraded exhaust mufflers on the product haul trucks will be considered.
- Given that the trucks and tractors will also be spending considerable amount of time unloaded, there is potential for noise to be generated from unladen suspension – such as spring rattle and bounce over uneven surfaces. As such there will be consideration for dampening springs and brushes or the use of airbag suspension to assist in the reducing noise from unladen trailers.
- Provide relevant personnel with training in noise control procedures and equipment operation.

### ***Decommissioning and Closure Phase***

Project noise emission sources influencing the noise impacts at NSR are mainly attributed to decommissioning of the processing plant.



### Action Plan

Management actions associated with the decommissioning and closure phase of the Project will be similar to those undertaken during the construction phase. As a result, the mitigation measure that will be adopted during the decommissioning and closure phase of the Project will be those that are detailed for during the construction phase.

### *Verification and Monitoring of NMP*

For each noise monitoring event, a report will be prepared and communicated to relevant stakeholders. Measurements will be undertaken at least 3.5m from any reflecting structure other than the ground, with the Sound Level Meter (SLM) microphone placed at 1.5 meters above the ground.

Noise and vibration generated by the facilities and equipment shall meet the ergonomic requirement of AfDB codes of practice and statutory regulations. Where noise level exceeds the stipulated limits, it shall be treated as nuisance and adequate mitigation measures shall be put in place to ensure the situation is properly addressed. All personnel working for a long period in high noise area (e.g milling, polishing and generator area) shall be required to use ear muffs at all times. Permanent warning signs shall be posted at the boundaries of these restricted areas. Noise levels shall be established for each noise source and targets. The personnel that shall be affected by any established noise source shall be provided or equipped with appropriate protective or corrective device to ameliorate noise effect.

The Central Project Coordinator Unit (CPCU) through the Project Implementing Unit (PIU) Site supervisor and HSE Officers at work sites shall ensure full implementation of this plan.

## **8.7 Groundwater Management Plan (GWMP)**

### *Construction Phase*

- The Project Implement Unit (PIU) will establish and enforce spill prevention measures following industry best practices.
- Procedures for spill clean-up, sewage handling, and treatment will be implemented.
- Regular training sessions for project personnel on spill response protocols will be conducted.
- Chemicals and fuels will be stored in designated areas equipped with containment structures.
- Emergency spill response equipment will be stationed strategically.



- Routine inspections and maintenance of storage facilities will be carried out to minimize the risk of leaks or spills.
- Prompt excavation and rehabilitation of areas affected by soil contaminants will occur, ensuring remediation to the depth of contamination.
- Soil and groundwater sampling will be conducted to assess the effectiveness of remediation measures.
- Local communities will be informed about the construction phase's potential impact on groundwater.
- Informational sessions and the dissemination of educational materials will be organized to raise awareness about groundwater protection.

### ***Operation Phase***

- Continuous monitoring using water level loggers will track groundwater levels.
- Monthly manual measurements will complement automated monitoring, ensuring a comprehensive understanding.
- Real-time data will be made available to relevant stakeholders for transparency and accountability.
- Quarterly groundwater quality monitoring, including water sampling, will be conducted systematically.
- Parameters such as pH, heavy metals, and other contaminants will be analyzed to ensure compliance with water quality standards.
- Ongoing monitoring of groundwater abstraction during the operational phase will be a priority.
- Flow meters will be installed to accurately measure abstraction rates and detect any anomalies promptly.
- Regular communication and engagement with local communities will foster awareness of the groundwater management plan.
- Feedback mechanisms will be established to address community concerns and incorporate local knowledge.
- Community members will be encouraged to report any observed changes in groundwater quality or availability.
- The groundwater management plan will undergo periodic reviews to incorporate advancements in technology and evolving environmental standards.
- Adaptations will be made based on lessons learned and emerging best practices.



- The findings from monitoring activities will inform adaptive management strategies.
- Regular drills and simulations will be conducted to test the efficiency of emergency response procedures.
- This proactive approach ensures that the project team is well-prepared for any unforeseen groundwater-related incidents.

### ***Groundwater Monitoring***

Groundwater monitoring requirements for the Project include the following:

- Continuous groundwater level monitoring using water level loggers, as well as monthly manual groundwater level measurements;
- Quarterly groundwater quality monitoring (water sampling);
- On-going groundwater abstraction monitoring during the operational phase

**Table 8.6: Responsible Parties and their Responsibilities for GWMP**

S/N	Responsible Personnel	Roles and Responsibilities
1.	Central Project Coordinating Unit (CPCU)	<ul style="list-style-type: none"> <li>• Establish and enforce spill prevention measures during the construction phase.</li> <li>• Oversee spill clean-up, sewage handling, and treatment procedures.</li> <li>• Ensure storage of chemicals and fuels in designated areas with proper containment structures.</li> <li>• Station emergency spill response equipment strategically.</li> <li>• Conduct regular training sessions for project personnel on spill response protocols.</li> <li>• Promptly excavate and rehabilitate areas affected by soil contaminants during construction.</li> <li>• Organize community awareness programs about potential groundwater impacts.</li> </ul>
2.	Project Implementing Unit (PIU)	<ul style="list-style-type: none"> <li>• Implement continuous groundwater level monitoring using water level loggers.</li> <li>• Conduct monthly manual measurements to complement automated monitoring.</li> <li>• Analyze and interpret real-time data on groundwater levels.</li> <li>• Conduct quarterly groundwater quality monitoring and analyze water samples.</li> <li>• Assess and report any anomalies in groundwater quality promptly.</li> <li>• Install and maintain flow meters for accurate measurement of groundwater abstraction rates.</li> </ul>





S/N	Responsible Personnel	Roles and Responsibilities
		<ul style="list-style-type: none"> <li>Engage with local communities to communicate monitoring results and address concerns.</li> <li>Facilitate emergency response drills and simulations.</li> </ul>
3	National Environment Agency (NEA)	<ul style="list-style-type: none"> <li>Ensure compliance with spill prevention and clean-up procedures.</li> <li>Monitor storage of chemicals and fuels, verifying adherence to containment measures.</li> <li>Verify the effectiveness of soil and groundwater contamination remediation efforts.</li> <li>Conduct regular inspections of storage facilities for leaks or spills.</li> <li>Coordinate community engagement activities regarding environmental impacts.</li> <li>Review and update the groundwater management plan periodically.</li> </ul>
4.	Community Liaison Officer (CLO)	<ul style="list-style-type: none"> <li>Participate in community awareness programs on groundwater protection.</li> <li>Report observed changes in groundwater quality or availability.</li> <li>Provide feedback on the effectiveness of the groundwater management plan.</li> </ul>
5.	Contractors (Construction and Operations)	<ul style="list-style-type: none"> <li>Responsible for following the procedures and requirements indicated in the construction and operational sections of this GWMP.</li> </ul>

## 8.8 Surface Water Management Plan (SWMP)

### *Construction Phase*

- The Project Implement Unit (PIU) will institute stringent procedures to prevent surface water contamination, including spill response, sewage handling, and treatment protocols aligned with industry best practices.
- Adequate storage facilities for chemicals and fuels will be established, equipped with containment structures to prevent any potential runoff into adjacent surface water bodies.
- Immediate actions will be taken to address and rehabilitate areas affected by surface water contaminants. This includes soil excavation and appropriate rehabilitation to minimize environmental impact.
- Regular training sessions will be conducted for project personnel to enhance their awareness of spill response and prevention measures.



- Community awareness programs will be organized to educate local populations about potential impacts on surface water, encouraging their active participation in safeguarding water quality.
- The project will actively engage with local communities to gather traditional knowledge about water resources and incorporate community perspectives into the surface water management strategy.

### ***Operational Phase***

- Implement continuous monitoring of surface water quality, utilizing advanced techniques and regular sampling to assess potential changes.
- Monitoring stations strategically placed will track water flow, turbidity, temperature, and other relevant parameters, ensuring timely identification of any deviations from baseline conditions.
- The Environmental Compliance Officer will coordinate ongoing community engagement activities, facilitating dialogue with local communities to address concerns and provide regular updates on monitoring results.
- Public information campaigns will be conducted to ensure communities understand the importance of their role in preserving surface water quality.
- Emergency response drills and simulations will be conducted periodically to test the effectiveness of response mechanisms.
- Adaptive management strategies will be developed based on monitoring results, ensuring prompt adjustments to unforeseen changes in surface water conditions.
- The Environmental Compliance Officer will conduct regular reviews of the surface water management plan, ensuring alignment with evolving regulatory standards, technological advancements, and project-specific requirements.
- Implementation of sustainable practices, such as green infrastructure and eco-friendly materials, will be explored to further minimize the project's environmental footprint.

**Table 8.7: Responsible Parties and their Responsibilities for SWMP**

S/N	Responsible Personnel	Roles and Responsibilities
1.	Central Project Coordinating Unit (CPCU)	<ul style="list-style-type: none"> <li>• Develop and enforce procedures for preventing surface water contamination during the construction phase.</li> <li>• Implement measures for spill response, sewage handling, and treatment related to surface water.</li> <li>• Ensure proper storage of chemicals and fuels, equipped with containment structures to prevent runoff.</li> </ul>



S/N	Responsible Personnel	Roles and Responsibilities
		<ul style="list-style-type: none"> <li>Conduct regular training sessions for project personnel on spill response protocols related to surface water.</li> <li>Promptly address and rehabilitate areas affected by surface water contaminants.</li> <li>Organize community awareness programs about potential impacts on surface water.</li> </ul>
2.	Project Implementing Unit (PIU)	<ul style="list-style-type: none"> <li>Implement continuous monitoring of surface water quality, including regular sampling and analysis.</li> <li>Assess and report any anomalies or changes in surface water quality promptly.</li> <li>Install and maintain monitoring stations to track water flow and quality parameters.</li> <li>Engage with local communities to communicate monitoring results and address concerns related to surface water.</li> <li>Conduct periodic inspections of surface water discharge points and runoff areas.</li> <li>Facilitate emergency response drills and simulations related to surface water management.</li> </ul>
3	National Environment Agency (NEA)	<ul style="list-style-type: none"> <li>Monitor compliance with procedures for preventing surface water contamination.</li> <li>Verify the effectiveness of spill response and treatment measures for surface water.</li> <li>Conduct regular inspections of storage facilities to prevent runoff of hazardous materials.</li> <li>Coordinate community engagement activities regarding environmental impacts on surface water.</li> <li>Review and update the surface water management plan periodically.</li> </ul>
4.	Community Liaison Officer (CLO)	<ul style="list-style-type: none"> <li>Participate in community awareness programs on protecting surface water.</li> <li>Report observed changes in surface water quality or any concerns related to water runoff.</li> <li>Provide feedback on the effectiveness of the surface water management plan.</li> </ul>
5.	Contractors (Construction and Operations)	<ul style="list-style-type: none"> <li>Responsible for following the procedures and requirements indicated in the construction and operational sections of this SWMP.</li> </ul>



## **8.9 Biodiversity Management Plan (BMP)**

### ***Construction Phase***

The key impacts during the construction phase are associated with:

- Direct Loss and Degradation of Habitat, through infrastructure and possible increased human influx.
- Loss of threatened Faunal Species, through inappropriate development of infrastructure and cultural alterations

### **Action Plans**

- Avoid the loss of Sensitive Habitats: A minimum of a 50m buffer around sensitive habitats will not be disturbed and development of borrow pits will be located as far away from any of the fringe habitats as possible to avoid drainage disturbances.
- Containment of Construction activities and avoiding Footprint Creep.
- Linear infrastructure (viz. roads, irrigation canal, power lines, pipelines and any near underground cables) will be grouped to follow the same route adjacent to one another wherever possible and appropriate to minimise the footprint of these disturbances.
- Irrigation canals, Pipelines, roads and other linear infrastructure will include facilities that allow the underpass or overpass of fauna, such as culverts, so as to prevent unnecessary fragmentation of habitats.
- The edges of the evaporation ponds will be inspected on a weekly basis to remove any carcasses resulting from exhausted migrating birds.

### ***Operational, Decommissioning Phase***

- The importance of the natural environment and the local biodiversity will be incorporated into Induction Programmes rice field farmers, communities and plants staff and contractors working in the Project Area.
- A Biodiversity Protection Statement to conserve plants and animals will be developed, and made applicable to all staff, contractors and other personnel associated with the Project.
- Maintenance of floral and faunal Species inventory.
- Implement an Animal Rescue Plan.
- Develop and Implement Awareness Programmes focused on Biodiversity
- Provision and implementation of Bird Scare Cannon Gun in the rice field to wade off wild animals such as Quelea Birds, monkeys etc



- A detailed inventory and photo library of plant and animal species present within and around the rice fields will be kept. The species within this inventory will be classified into taxonomic groups and families.

### ***Responsible Parties and Responsibilities of the BMP***

The roles and responsibilities for the implementation of the BMP are presented in Table 8.8 below

**Table 8.8: Responsible Parties and their Responsibilities for BMP**

<b>S/N</b>	<b>Responsible Parties</b>	<b>Roles and Responsibilities</b>
1.	Central Project Coordinating Unit (CPCU)	<ul style="list-style-type: none"> <li>• Review monthly biodiversity report.</li> <li>• Oversee the Implementation of a comprehensive BMP in alignment with national and international conservation goals.</li> <li>• Work with Project Implement Unit (PIU) to identify necessary improvements.</li> <li>• Establish mechanisms to monitor progress, evaluate the effectiveness of conservation efforts, and adapt strategies based on feedback and results.</li> <li>• Collect, manage, and disseminate relevant biodiversity data to support decision-making and reporting.</li> <li>• Addressing conflicts that may arise between conservation that may arise between conservation goals and other interests, working to find solutions that balance biodiversity preservation with other societal needs.</li> </ul>
2.	Project Implementing Unit (PIU)	<ul style="list-style-type: none"> <li>• Engage with relevant stakeholders, including local communities, government agencies, and NGOs to gather input, address concerns, and foster support for the BMP</li> <li>• Facilitate coordination among various project components, ensuring seamless integration of biodiversity conservation measures into the overall project activities.</li> <li>• Implement monitoring and evaluation mechanisms to assess the effectiveness of biodiversity management actions.</li> <li>• Provide biodiversity information at local level.</li> <li>• Identify potential risks to biodiversity conservation efforts and develop strategies to mitigate or address these risks</li> <li>• Communicate effectively with internal and external stakeholders, raising awareness about the importance of biodiversity conservation and the measures being implemented.</li> </ul>
3.	Parks and Wildlife	<ul style="list-style-type: none"> <li>• Identify and preserve critical habitats for various species, ensuring their ecological integrity</li> <li>• Monitor and manage populations of endangered or threatened species, including habitat restoration and protection measures</li> <li>• Providing educational programs to raise awareness about biodiversity conservation and engaging with local communities.</li> </ul>



S/N	Responsible Parties	Roles and Responsibilities
		<ul style="list-style-type: none"> <li>Initiating and overseeing projects focused on habitat restoration, reforestation, and other activities aimed at enhancing biodiversity</li> <li>Respond to environmental emergencies such as natural disasters or diseases outbreaks to mitigate their impact on biodiversity.</li> </ul>
4.	Community Liaison Officer	<ul style="list-style-type: none"> <li>Provide biodiversity information at local level and liaise with potentially affected communities.</li> <li>Keep detailed records of stakeholder communication and actions.</li> <li>Perform inspections after major events (i.e. heavy rains, excavations, etc.)</li> </ul>
5.	Contractors (Construction and Operations)	<ul style="list-style-type: none"> <li>Together with the Environmental and Social Manager is responsible for staffing, planning and day-to-day execution of the management measures described under this plan during the operational phase of this Project.</li> <li>As needed, this individual will develop and propose staff plans and contractual language to ensure that these measures are implemented PIU and contractors throughout the operational phase of the Project.</li> </ul>

### 8.10 Consultation and Public Involvement Plan

There shall be cordial community relations in its area of operation, through consultation with the host communities in Upper River Region (URR). During the various consultations, Project Implementing Unit (PIU) anticipates that the host communities shall use the consultation meetings to familiarize themselves with their operations and also enumerate their interests. The consultation process shall be made functional and regular during the project life span. Community development packages associated with the proposed project shall always be discussed at the meetings.

The following objectives shall be achieved through the Consultation Techniques:

- Holding informal field visits and courtesy calls on the village heads (Alkalo) and other stakeholders to discuss the effectiveness of the addressed social issues on the lives of the stakeholders.
- Direct contact with the affected population on their opinion (through questionnaire, interviews and visual observations) on the project;
- Holding Focus Group Discussion to discuss welfare, clarify misconception and address new issues as regards the project and;
- Holding Focus Group Discussion aimed at identifying new ways of rendering socio-economic assistance to the local people.

### *Managing Stakeholders Perceptions*

Public interest is expected to be high. The project will have impacts on the surrounding communities through disturbance during construction and operation (e.g. noise, traffic, dust,



emissions etc.) and through the influx of workforce. Effective and realistic measures have been put in place to mitigate these impacts. Nevertheless, stakeholders' perceptions are bound to persist. This project shall manage these perceptions by employing and sustaining dialogue as well as involvement of the communities and other stakeholders in all phases of the project.

***Also, the PIU shall:***

- Ensure that the Contractors fully involve the stakeholders of the host communities in the environmental monitoring and management plan for this project.
- Use available records on Village Development Committee and other community-based activities as evidence of a good corporate neighbour.

### **8.11 Social-cultural Management Plan (SMP)**

This is essentially concerned with the Socio-economic and cultural conditions of the host communities. SMP outlines measures designed to mitigate/ameliorate the identified adverse social impacts (as has been detailed in the project report).

***Social-Cultural Management Plan Objectives:***

- To ensure that there are no adverse effects on the region's cultural values;
- To minimise social and/or community impacts associated with all work activities;
- To maximise opportunities for local engagement and business opportunities.

***PIU shall:***

- In order to reduce the potential for social crimes/youth restiveness, shall provide employment opportunities, meet with social groups, promote public enlightenment and cultivate good community relations.
- Develop and implement community relations and engagement plan.
- Plan activities in recognition of indigenous cultural activities.
- Provide accommodation for some construction workers (not from surrounding communities) to minimise pressure on existing infrastructure.
- Specify and implement the behaviour standards expected from all construction workers. This shall be formalised in a code of conduct that shall be agreed to and signed by every employee and sub-contractor.

### **8.12 Waste Management Plan (WMP)**

***Objective:***

The objectives of WMP is to effectively reduce waste, recycling non-hazardous wastes and transportation of waste from source to disposal/recycling facilities.





### ***8.12.1 Waste Inventory and Classification***

Liquid and solid wastes would be generated during the construction and operational activities of the development of field construction of irrigation systems and processing plant. An inventory of waste generated shall be maintained. Weighing scales or measuring devices shall be provided to measure quantities of waste generated/discharged. Records of waste generated, treated and sent for disposal shall be maintained on site. Part of the robust procedure to be implemented in the WMP includes waste tracking system and documentation.

### ***8.12.2 Waste-Management Structure and Responsibility***

There would be guidance and support for the various departments in the farm and the processing plant. The PIU will be responsible to develop unit/department specific Waste Management Plan (WMP) that will align with the overall Project WMP. The PIU will initiate periodic reviews and updates of waste management strategies to assist in ensuring compliance or adherence to Hwaste management standards and legal requirements, and ensures availability of suitable training programmes for staff and third part personnel.

Waste shall be managed in accordance with Ministry of Environment, Climate Change and Natural Resource guidelines waste management procedures. The principle of waste reduction, recycling, recovery and reusing shall be adopted. The management shall ensure that this commitment is translated into the necessary resources to develop, operate and maintain an effective Waste Management System. The PIU shall ensure full implementation of the waste management policy objectives by overseeing the day to day handling and disposal of waste generated and shall ensure wastes are appropriately disposed.

The departmental/unit heads/managers/supervisors are responsible for ensuring that all wastes generated within their units are properly sorted out, weighed, or received before final disposal. They shall ensure that good house-keeping is maintained at all sites. Cleaners shall be responsible for the collection, sorting, weighing and removal of wastes generated to areas where they would be use, recycled or deposited before final disposal.

### ***8.12.3 Waste Handling Guidelines***

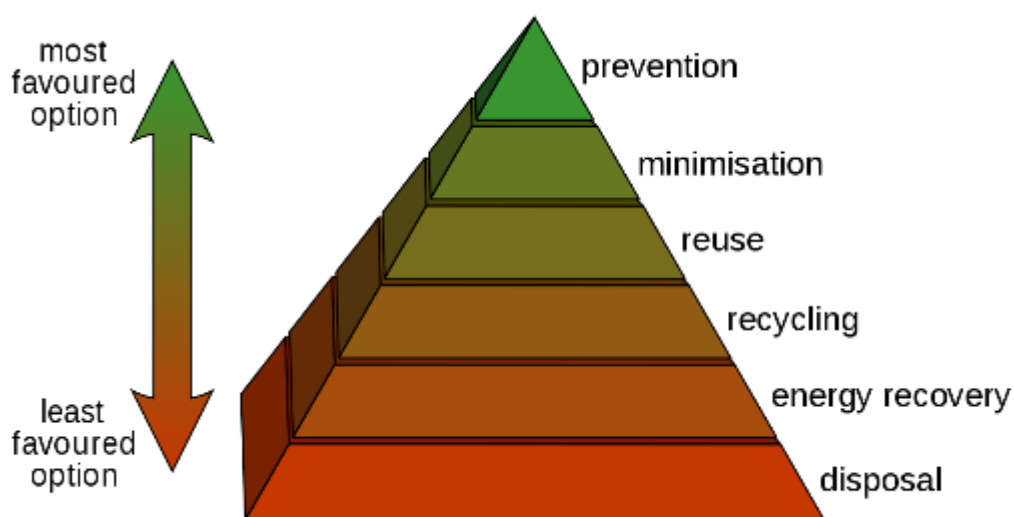
Wastes handling and disposal procedures shall be well defined at source and a waste inventory register kept. The waste contractor shall define and document appropriately all wastes generated and transferred in the course of his work.



For proper handling and disposal, wastes shall be well defined at source and the definition transmitted along with the waste to the final disposal points. Project contractor shall define and document all wastes generated during all operational processes.

The general information required, as a minimum, for adequate definition of wastes include:

- Waste stream identification;
- Proper waste categorization;
- Waste segregation;
- Appropriate handling and disposal practice; and
- Recommended Management practices.



**Figure 8.2: Waste Management Hierarchy**

#### ***8.12.4 Waste Segregation Guidelines***

All wastes to be generated from the various units and departments in project site shall be segregated at source, into clearly designated bins at strategic locations.

Container or waste bins at source will be collected as required by the General Services Department and emptied at the Waste Management Facility for sorting. If any bin is full before the usual collection day, the General Services Department will be informed of such and earlier collection will be arranged.

#### ***8.12.5 Waste Transport***

- Transport vehicles will cater for the type, class and quantity of waste being transported.



- Waste consignment notes and waste transfer agreements will be prepared and signed by the waste generators and accredited waste management contractor
- Loading and unloading procedures shall be followed to avoid waste loss.
- Employees will be trained in the correct procedure to address accidents and emergencies.
- All transport vehicles will be equipped with suitable materials or equipment to contain, manage and remove accidental spillages.
- Vehicles carrying hazardous wastes shall be labelled appropriately.

In order to verify performance of personnel and implementation of this WMP, regular site inspections (to ensure good day-to-day housekeeping) and formal documented audits will be undertaken by the PIU.

#### ***8.12.6 Traffic and Transport Management Principles***

The following principles will be adhered to during the applicable phases of the Project:

- Conduct a road condition survey in order to gauge the damage to the road as a result of the intensive heavy traffic.
- The risk assessment of the proposed project improvements should be the subject of a Road Safety Audit (RSA).
- All employees must attend an environmental training programme which will include details of approved access roads and speed limits.
- Adjacent landowners must be notified of the construction and operation schedule.
- Flagging must be provided at access points to the site and must be maintained until construction is completed.
- All vehicles must be maintained in good condition.
- Speed restrictions must be established prior to commencement of construction and enforced over all construction traffic.
- The movement of all vehicles within the site must be on designated roadways.
- If abnormal loads are required, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact on other road users.
- A designated access point to the site must be created and clearly marked to ensure safe entry and exit.
- Signs must be placed along construction roads and at the entrance to the site to identify speed limits, travel restrictions and other standard traffic control information and road markings.



- Where possible, construction vehicles should avoid travelling on the public roadway during the morning and late afternoon commute time, to reduce the impact on other road users.
- All internal and access roads that will be used during the operational phase of the Project must be maintained.

### **8.13 Sourcing, Procurement and Recruitment Management Plan**

The key impacts during the construction phase are associated with:

- Creation of employment opportunities and skills enhancement;
- Procurement of goods and services.

#### ***Action Plans***

##### ***1. Creation of Employment Opportunities and Skills Enhancement***

- The economically active population of the villages shall receive equal access to opportunities in terms of local recruitment, training, small business development, procurement and community outreach programmes.
- There will be development and implementation of training policy and relevant programs.

##### ***2. Procurement of Goods and Services***

- Prior to the commencement of construction, the management will develop and implement a Procurement Plan. The Plan will be designed to encourage capacity building and competition amongst suppliers in the Project supply chain.
- Improve communication of the procurement program.
- Training plans will be developed according to each employee's work agreement and relevant to their job description in the Operational Phase.

The decommissioning and closure of the project will result in the termination of many procurement contracts and retrenchment of employees associated with operations. This may cause positive impacts associated with income generating opportunities to cease. As a worst case scenario, consequence of the loss of income conditions may return to baseline or worsen including reduced access to services and infrastructure, reduced standards of living and increased food insecurity and nutritional shortages.

#### ***Action Plans***



- Establishment of a retrenchment plan and processes for implementation related to completion of construction and operations phases. This plan will include timely stakeholder engagement efforts to discuss with local stakeholders prior to retrenchment.
- In the years preceding decommissioning and closure, there shall be re-skilled of employees,
- Over the life of the project, there shall be support for alternative livelihoods development (in collaboration with relevant partners). This action is expected to reduce the reliance of the local population on employment and economic opportunities linked to the proposed Project.

#### **8.14 Emergency Response Management Plan (ERMP)**

In the event of an emergency, emergency plan clearly identifies the actions to be taken. This includes communication facilities to be used, the individual responsibilities of key personnel and the procedures for reporting such events to the authorities and arrangement of logistics for extra labour as may be needed.

The emergency plan is based upon the location and level of the event. This takes care of the possibility of explosion and fire emergency plan. The plan requires that the project site be designed and facilities put in place in such a manner as to prevent fire outbreak. This plan covers all phases of project development with the inclusion of catchment systems in all designs in order to minimize domino effects.

The implementation and operation of any project is faced with possible hazards irrespective of the good intentions of the operator. The Management recognises this fact and has put in place all necessary plans and measures to ensure compliance with standards, codes and specifications, operations and maintenance activities associated with the Proposed Project. The probable causes of accidents in the execution of this project are equipment failure, negligence and sabotage. A contingency plan has been put in place to handle such emergency and accidental situations. Emergency Plan, consistent to identified hazardous conditions would include the following conditions:

- Fire/explosion
- Evacuation
- Serious accidents/fatalities
- Equipment failures
- Infringement of safety zone



- Serious injury or illness;
- Hydrocarbon or chemical spills;
- Land vehicle mishaps; and
- Security issues

The plan would also include:

- The response procedures to the above situations
- Reporting requirements
- Post incident monitoring
- Procedures for personnel briefing exercise and,
- Mechanisms for updating the emergency/contingency plan (if necessary).

#### ***8.14.1 Hazard identification and risk assessment programme***

Hazard identification risk assessment shall be developed which will involve a baseline risk assessment of the Project, from construction to decommissioning/closure.

The PIU will co-ordinate the Project emergency response process and will engage communities and local government to inform them of the emergency response planning and processes.

#### ***8.14.2 Emergency Communications and Coordination Plan***

- In any emergency situation where there is an immediate threat to communities, personnel or the environment, PIU shall be notified immediately. The PIU will dispatch the Emergency Response Coordinator who will determine the appropriate plan of action depending on the severity of the emergency, the people affected and the need to evacuate.
- If there is a developing emergency or unusual situation, where an emergency is not imminent, but could occur if no action is taken, the Project Implementing Unit is to be informed immediately. Once the emergency or unusual situation has been managed, the correct incident/near miss must be reported on to the PIU.
- If an emergency situation poses a direct threat to communities in the area, there shall be notifications in the vicinity of the emergency to evacuate people due to the potential risk. The appropriate authorities will immediately be notified of such an emergency evacuation.

#### ***8.14.3 Response to Incidents***

The reporting and investigation of all potential and actual incidents that could have a detrimental impact on human health, the natural environment or property is required so that remedial and preventive steps can be taken to reduce the potential or actual impacts as a result of all such



incidents. The actions resulting from any formal or informal investigations will be used to update this ERMP.

#### ***8.14.4 Environmental Emergency Procedures***

There shall be procedures/plans that deal with response management to incidents and/or risks associated with aggressive (armed) attack; kidnapping; detainment; hijacking; bombs / explosive remnants of war; and medical. These procedures/plans will be documented within the overall Environmental Management System and will be updated to include detailed response management to the following additional emergency events:

- Fire
- Chemical/Fuel Spills.

#### ***The following emergency procedures must be implemented during fire occurrence;***

- The Emergency Response Coordinator must be notified.
- Personnel in the immediate vicinity of the fire, including the designated Evacuation personnel must be immediately notified.
- All persons located in the area in which the fire is located must be evacuated.
- All doors and windows of buildings and vehicles that are in the immediate vicinity of the fire will be closed.
- The fire shall be contained with the correct extinguisher only by those trained to do so.
- Those requiring assistance must be assisted and first aid must be rendered only by those trained to do so.

#### ***8.14.5 Evacuation Procedure***

All workers must be aware of the possible escape routes prior to the emergency situation. Always ensure safety of the assembly point prior to evacuation. The procedure associated with an evacuation event is detailed below:

- The Emergency Response Coordinator will give instruction or the alarm will sound to evacuate a specific area.
- All workers appointed as Evacuation Officers must assist with the evacuation.
- All personnel onsite must follow the instructions of the Evacuation Officer.
- Personnel must follow the directional pointers to the nearest emergency exit.
- Evacuation must be undertaken in accordance to the emergency lay out plan.
- Employees on wheel chair must be the first to be evacuated followed by the frail and the injured.





- Visitors that are not familiar with the evacuation procedure must be assisted.
- A daily record of staff and visitors must be kept.
- The evacuation officer must be the last one to leave the area.
- All personnel onsite must report directly to the allocated assembly point.
- Personnel must not leave the assembly point until it has been deemed safe to do so.

#### ***8.14.6 Verification and Monitoring of ERMP***

The Manager has been tasked with the responsibility for auditing the Project and implementation of emergency response procedures associated with all phases of the Project. The execution of emergency drills will be included in emergency response procedures.

Reporting and monitoring requirements for the ERMP will include:

- Monthly inspections and audits;
- Quarterly report of accidents/incidents;
- Reporting at the time of any environmental incidents;
- Bi-annual emergency response drills;
- Annual reporting on training.

#### ***8.14.7 Training on Emergency Response***

Training all employees and contractors in emergency response procedures within one month of their start-date. The Management shall distribute the ERMP (together with the associated Emergency Evacuation Plan) to all parties in charge of ensuring the plans implementation. All relevant information in the ERMP (and associated Emergency Evacuation Plan) shall be communicated to employees and contractors. Training is to include, but not limited to Firefighting, First Aid, Emergency Evacuation and Medical and Environmental Emergencies.

#### ***8.14.8 Fire and Explosion guideline***

Sources of ignition within the work site may be as follows; electric sparks, frictional heat, hot surfaces, overheated materials, open flames, spontaneous heating, welding and cutting, combustion particles etc. All possible fire causes shall be considered during design and operation to reduce or eliminate such causes.

***As a minimum, the following shall be considered:***

- Proper layout of facilities within project site – location of facilities shall be in a manner to allow sufficient physical separation to limit the property, facilities and materials that could become involved in a fire;



- The normal prevailing wind, location of emergency escape routes and accessibility for the fire men; and
- Proper selection of materials of construction to limit the ability of fire to spread combustible materials shall be avoided as much as possible.

#### **8.14.9 Fire Fighting Plan**

The overall goal of the fire system shall be to:

- Continuously monitor all processes and be prepared to counter any emergency situations;
- Oversee installation such as where possibility of fire hazard may exist, fuel storage and flammable product storage facilities; and
- Reduce the risk of fire to personnel and equipment by implementing the automated firefighting systems.

There will be fire detectors (smoke, heat, flame, fire, gas etc.) alarms and control systems in the event of any fire outbreak in order to minimize injury and property damage. Fire shall be detected by the quickest and most reliable means. Fire extinguishers shall be provided and position in strategic locations within the facilities most especially the fuel/diesel and explosive storage units.

Arrangement/ location of muster points shall be made after due risk assessment of the facility layout. The extent of protection required for personnel mustering will be defined based on the hazard scenarios to which personnel could be exposed to.

#### **8.15 Security Guideline/Plan**

Security is the absence of danger to life and property. There is a believe that security of Rice farmers, employees, assets and documents are imperative and a fundamental responsibility to the successful operation of its business.

Adequate security arrangements shall be made to handle security-related incidents effectively at all phases of the proposed project. The project team shall identify, evaluate and manage the risks to personnel and property arising from malicious practices, crime, civil disorder or armed conflict. The security activities shall be coordinated from a common viewpoint by all stakeholders and shall be in line with security guidelines.

In addition, major contractors shall be required to prepare a project security plan and submit for review and approval before mobilization to site. There shall be talks to further identify, evaluate and recommend contingency plans for all security risks.



This guideline implies that:

- All personnel are particularly vigilant about the risk/hazard of anticipated or potential security issues in all intended activities.
- All security of staff, document and assets are identified, assessed and controlled.
- All reasonable efforts are made to ensure good security in all business operation.
- All staff understands that security of staff, document, assets and material is good business.

## **8.16 Soil Management Plan (SMP)**

Soil is the basis for farming, providing water, nutrients and a medium for plant growth. Thus, this SMP has been prepared to provide procedures to guide soil management during pre-construction/construction and operational phase of the project. It describes how the soil will be managed to ensure good structure.

### ***Construction Phase***

- The Project Implement Unit (PIU) will implement stringent procedures to prevent soil contamination, including spill response protocols, proper waste disposal, and adherence to recognized industry standards.
- Storage areas for construction materials, chemicals, and fuels will be designed with containment measures to prevent accidental spills and runoff.
- Erosion control measures, such as the installation of sedimentation ponds and silt fences, will be implemented to minimize soil erosion and sedimentation during construction activities.
- Regular inspections and maintenance of erosion control structures will be conducted to ensure their effectiveness.
- Areas affected by soil contamination or compaction will be identified and rehabilitated promptly using appropriate soil restoration techniques.
- Soil replacement or enrichment with organic matter will be considered to enhance soil fertility and structure.

### ***Operational Phase***

- Conservation practices, including cover cropping, agroforestry, and contour plowing, will be integrated into agricultural activities during the operational phase to prevent soil erosion and degradation.



- Crop rotation and soil moisture management practices will be employed to maintain soil health and fertility.
- Regular soil sampling and analysis will be conducted to monitor key soil quality indicators, including nutrient levels, pH, and organic matter content.
- Monitoring stations may be established to track changes in soil conditions over time.
- Community awareness programs will be conducted to educate local populations about responsible soil management practices.
- Collaboration with local farmers will be encouraged to promote sustainable agricultural techniques.
- The project will explore the use of organic farming practices, green manure, and sustainable agricultural technologies to enhance soil fertility and minimize the use of chemical inputs.
- Measures for reclaiming disturbed lands and restoring soil functionality will be considered, aiming to return areas to their pre-project ecological state.
- Regular reviews of the Soil Management Plan will be conducted, with adjustments made based on monitoring results, technological advancements, and evolving best practices.
- Conduct workshops and training programs for local farmers on soil health management, sustainable agricultural practices, and the importance of soil conservation.
- Explore and implement innovative technologies such as precision agriculture, soil moisture sensors, and GIS mapping to optimize soil management practices.

#### ***8.16.1 Soil Contamination Management Plan***

The Management shall:

- Train operators on safe handling of chemicals and enforce the implementation of safe work practices/procedures.
- Train personnel on the right quantity of fertilizer to be applied to the rice fields. In order to avoid excessive use of fertilizer.
- Provide emergency and spills response equipment and training of personnel on effective and timely use.
- Respond quickly to identified contaminated area to be cleaned up, reported and monitored in accordance with regulatory and project approved requirements.

#### ***8.16.2 Soil Erosion Management Plan***

To ensure the management of soil erosion, the following shall be considered:



- Cover crop between rice fields to help soil improvement by reducing weed infestations, increases soil pH, organic carbon content, and total nitrogen.
- To protect the soil surface, reduce runoff and erosion, recommendations include covering the soil surface with mulch, such as crop residues, or growing cover crops.

### **8.17 Pest Management Plan (PMP)**

The rice farming project has a risk of attack by pests and diseases. Common rice pests are Brown Plant hopper (*Nilaparvata lugens*), Rice Stem Borer (*Chilo suppressalis*), Rice leaf folder (*Cnaphalocrocis medinalis*) and Rice Blast (*Magnaporthe oryzae*). When pest or disease management measures become necessary, a strategy of non-chemical control shall be considered before any decision is taken to use pesticide or insecticide. Furthermore, planting materials that are of varieties with tolerance or resistance to the most important rice diseases and pests, and are free of disease symptoms and signs of pest attacks will be used.

***Also, there shall be:***

- Application of pesticide or insecticide on infested spots of the rice plant to avoid damage and reduce contamination of soil.
- Training their staff on the best Pest control management techniques on how best to use pesticides and insecticides.
- Recommendation bio-pesticides, such as extract of neem seed oil, for controlling Brown plant hopper, Rice bug and Rice Stem Borer.

### **8.18 Harvest and Storage Management Plan (HSMP)**

This plan is necessary to ensure that the Rice is well harvested and stored. Rice is typically harvested when the grains reach full maturity. Harvesting methods include manual harvesting, workers cut the rice stalks with sickles or knives. Mechanized methods involve the use of combine harvesters, which streamline the process by cutting, threshing, and winnowing in one operation. Once harvested, the rice undergoes drying to reduce moisture content, enhancing storage quality. Proper storage is crucial to prevent post-harvest losses and maintain rice quality.

***Also, PIU shall:***

- Ensure that rice gains are harvest when fully matured to maximize yield and quality.
- Ensure thorough drying of harvested rice to reduce moisture content, preventing mold and ensuring better storage conditions.
- Maintain cleanliness during harvest and storage to prevent contaminants that could compromise rice quality



- Handle rice with care during harvesting, transport, and storage to prevent physical damage to the grains.
- Implement cool storage practices to slow down aging processes and maintain the quality of stored rice.
- Utilize airtight containers or bags to create a pest-resistant environment, preventing insect infestations
- Periodically inspect stored rice for signs of pests, mold, or other issues, taking prompt action if any problems are detected.
- Implement safe pest control measures, such as using insect-resistant storage containers or applying approved pesticides, to protect against insect damage

### **8.19 Health, Safety, Security and Environmental (HSE) Plan**

*The objectives of HSE Plan include to:*

- Ensure compliance with relevant national and international rules and regulations;
- Provide a safe, healthy and conducive working environment for all personnel and nearby community;

*Action by PIU will include:*

- The Project contractor shall be required to prepare a project specific Security, Health, Safety, and environmental Management Plan to ensure safety of workers
- Site specific Environmental Management Plan to be prepared by the Project contractors will be developed prior to construction activities, after specific areas have been determined for project activities to ensure appropriate environmental management strategies.
- All workers on the project shall go through a compulsory orientation programme before they start work.
- Environmental, Health, Safety, and Security plans, programs, and regulations governing the project would be implemented and complied with.
- In addition, Project contractor will be required to prepare and submit the project security plan for review and approval before mobilisation to site.
- The project team will also organise a security workshop to identify, evaluate and recommend contingency plans for all security risks.

*The Action for the HSE Plan shall include:*

- ❖ Establishment of a well-equipped site Medical Clinic;
- ❖ Establishment of an on-site Health, Safety and Environment (HSE) Manager;



- ❖ Provision of site Medical Practitioners;
- ❖ Provision of a standby emergency Evacuation Vehicle (Ambulance).

***Monitoring and Reporting:***

- ✓ The security, safety, health, and environmental performance shall be monitored in accordance with the project and corporate procedures and reported to the project management team.
- ✓ Monthly/Quarterly audits shall be executed.
- ✓ Monthly reports shall be prepared on health, security, environment and safety performance along incidents and corrective actions undertaken.

## **8.20 Spill Prevention and Control Measures**

### ***8.20.1 Spill Prevention Measures***

To prevent the likelihood of spill event, workers shall trained on proper methods for transporting, transferring and handling substances that could result to spillage like hydrocarbon, lubricants form irrigation pumps and other equipment etc.

### ***8.20.2 Spill Control measures***

The following spill control and countermeasures will be followed in the event of a spill incident:

- ✓ Maintenance of updated emergency contact information list at all spill response kits locations.
- ✓ Document availability of specific personal protective equipment and the necessary training needed to respond to different potential spills.
- ✓ Maintenance of spill response kits on all Project fuel and lubrication sites and vehicles.

## **8**

## **8.21 Environmental Monitoring Programme**

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. Monitoring parameters are included in the ESMP. Monitoring methodologies or processes must be put in place in order to ensure the efficacy of the mitigation measures identified in the ESIA.

Monitoring methodologies is established to address the following:

- Alteration to the biological, chemical, physical, social and health characteristics of the recipient environment;





- Alterations in the interactions between project activities and environmental sensitivities, and interactions among the various sensitivities;
- To monitor the effectiveness of the mitigation measures;
- Determination of long term and residual effects; and
- Identification of Project specific cumulative environmental effects.

The Ministry of Environment, Climate Change and Natural Resources (MECCNAR) guidelines require an environmental monitoring plan as part of an ESIA. The aim of the monitoring programme is to ensure that the negative environmental impacts identified in this ESIA are effectively mitigated during the pre-construction, construction, installation, operations and decommissioning stages of the proposed Project. It also instils confidence in the host communities, the proponent of the project and regulatory bodies that the identified impacts are adequately mitigated.

Environmental monitoring of this project is therefore advocated in order to ensure that the mitigation processes put in place would adequately take care of the predicted impacts. Project activities shall be monitored in order to: ensure that the ESMP is implemented; assess the efficiency of mitigation actions; and provide updates where necessary.

PIU shall monitor the project from mobilisation through operation stages to keep track of the entire project development life cycle. The monitoring plans for the project including the environmental components, parameters and frequency of monitoring as well as responsibilities are presented in Table 8.9.



**Table 8.9: Monitoring Plans for the Proposed Regional Rice Resilient Value Chains Development Program (REWARD)**

S/N	Environmental Component	Impact/Aspect	Indicator Parameter	Monitoring Method and Location	Timeline/ Frequency	Responsibility	ESMP Implementation Cost (USD)
1	Air quality	Air pollution	Gaseous emissions (SO <sub>2</sub> , CO <sub>2</sub> , NO <sub>2</sub> , CO, H <sub>2</sub> S, VOCs etc.), SPM	Use of Air-sampling instrument/ Point measurements on the farmland, processing area, offices, camps etc.	Annual Audit	MECCNAR, NEA, Environmental consultant	7,500
2	Noise level and Vibration	High levels of noise and earth vibration effects	Noise decibels	Use of a Noise-monitoring meter on the Farmland and processing area. Nearby structures to be inspected for effects of vibration	Monthly	MECCNAR, NEA, Environmental consultant	12,500
3	Vegetation and Wildlife Status (Biodiversity)	Loss of flora and fauna	Presence or extinct of rare or native vegetation and wildlife	Vegetation (sample) collection by use of 10m by 10m quadrants around the entire project area; and Wildlife Sampling through interviews of reputed hunters, and walking through the area to ascertain the presence of animals by sighting and correlation of cries and footprints	Annual Audit	MECCNAR, NEA, Environmental consultant	5,000
4	Surface (and ground) water quality	Water pollution	Temp., pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb) etc.	Sample collection (and analysis) from water sources (of closest surface waterbody or borehole)	Annual Audit	MECCNAR, NEA, Environmental consultant	8,500
5	Soil (and sediment) quality	Soil contamination	Heavy metals in soil, crop productivity	Soil-sample collection/analysis (esp. around fuel storage areas)	Annual Audit	MECCNAR, NEA, Environmental consultant	8,500



S/N	Environmental Component	Impact/Aspect	Indicator Parameter	Monitoring Method and Location	Timeline/ Frequency	Responsibility	ESMP Implementation Cost (USD)
6	Socio-cultural	Social-life Impact	Cultural conflicts, norms, social vices, project perception of community leaders, hospitality of indigenes	The continuous effort of Consultations (at all levels); assessment of land acquisition documents; and review of the grievance redress mechanism	Quarterly	MECCNAR, NEA, Environmental consultant	8,400
7	Community Health	Health Impact	Common/prevalent diseases in the host communities	Use of questionnaires within the host communities as well as collection of health statistics from clinics and hospitals within the area	Annual Audit	MECCNAR, NEA, Environmental consultant	7,200
8	Demographic pattern	Economic Impact	Accommodation; markets; social infrastructure; industrialization;	Use of questionnaires within the host communities, as well as data-gathering from interviews, observations and consultation	Annual Audit	MECCNAR, NEA, Environmental consultant	7,000
9	Occupational health	Hazard-exposure to workforce	Frequent illness in the workforce, workplace accident, medical fitness	Observation, interviews, and the use of Job-Hazard-Analysis report	Every 6 months	MECCNAR, NEA, Environmental consultant	5,500
10	Child labour and Violence against Children (VAC)	Risks of Child labour in Rice planting, harvesting and processing	Impacts on child psychological and social development	Observation, interviews	Every 6 months	MECCNAR, NEA, Environmental consultant	6,000



S/N	Environmental Component	Impact/Aspect	Indicator Parameter	Monitoring Method and Location	Timeline/ Frequency	Responsibility	ESMP Implementation Cost (USD)
11	Gender-Based Violence (GBV), Sexual Abuse and Harassment	Risk of Gender Based Violence (GBV), Sexual Abuse and exploitation	Impact on social and mental well-being, the spread of STDs	Use of questionnaires within the host communities, as well as data-gathering from interviews, observations and consultation	Every 6 months	MECCNAR, NEA, Environmental consultant	6,000
12	Environmental nuisance	Aesthetic/Visual impact	Dust raise, waste littering, effluent discharge, degradation of land formation	Observations and findings during a site audit of project operations	Annual Audit	MECCNAR, NEA, Environmental consultant	6,500
13	Hydro-biological components (plankton, fisheries, benthos)	Marine life impact	Abnormalities of Indicators of Water Parameters	Sample collection of closest water source and analysis	Annual Audit	MECCNAR, NEA, Environmental consultant	7,000

*\*N.B: Monthly ESMP implementation reports are to be forwarded to the AfDB for review, advice and clearance*



## 8.22 Environmental Audit and Review

Periodic HSE audits (monthly/quarterly/annually, etc) of the activities of the project area will be conducted in order to ascertain extent of compliance with policy and regulatory requirements. The audits shall be carried out by certified auditors and in accordance with ISO 14001 guidelines.

The scope of the audits must include the following, as a minimum:

- ✓ Compliance with all regulatory requirements, codes, standards and procedures;
- ✓ Examine line management systems, plant operations, monitoring practices etc.;
- ✓ Identify current and potential environmental problems especially during the operational phase of the project;
- ✓ Check the predictions in ESIA and assure implementations and application of recommended practices and procedures; and
- ✓ Make recommendation for the improvement of the management system of the operation.

After every audit exercise, the environmental auditor shall produce an Environmental Audit Report (EAR) which shall be submitted for review.

The EAR shall be reviewed to verify the effectiveness of environmental control and to highlight areas of weakness in environmental management. The audits and reviews will be focused on areas of the proposed project operation which are perceived as giving the highest risk.

An integrated audit and review plan will be in place. Specifics will be developed and renewed annually but will initially include both a pre and post start-up HSE audits. The future programme will be designed so that all business activities are addressed at least every two years. External audits of the operations will also be undertaken as this will tend to:

- Identify prevalent environmental issues;
- Evaluate periodic management practices and monitor standards;
- Compare environmental status with established baseline condition and national/international regulatory standards and requirements; and
- Recommend areas of improvement in the ESMP.

Also, as part of audit and review, this ESMP shall be reviewed annually to determine its adequacy/suitability for continuous use.



### **8.23 Decommissioning and Abandonment Plan**

Decommissioning strategies shall be set up to checkmate project decommissioning. In the unfortunate event of abandonment, a project abandonment plan shall be prepared in line with applicable national and international legislative requirements, in addition to implementing measures to mitigate the impact of such abandonment. The design of the farm and the processing plant shall take due recognition of the need to decommission any ancillary facilities at the end of their operational life.

Decommissioning would involve removal of all site facilities that are no longer relevant for the operation of the project which may pose some degree of safety hazards to the general public and personnel with the base. The hazards and safety risks posed by the abandoned facilities shall have long-term effect. However, decommissioning shall make the acquired equipment/material available for alternative uses.

Consequently, the following measures are to be ensured during the decommissioning aspect of the project:

- ❖ Develop a detailed decommissioning programme, which shall address the use and management of the equipment/materials after decommissioning.
- ❖ Facilities that cannot be removed from site shall be clearly marked as danger zone to warn people.
- ❖ Ensure the decommissioning is done with the same care and respect for the environment with the way the project was designed, constructed and operated.
- ❖ Assessment of the residual impacts that the project has had on the environment during its lifespan.
- ❖ Restoring the environment to the original condition.

### **8.24 Revegetation and Rehabilitation Plan**

The purpose of this plan is to ensure that areas cleared or impacted during construction activities of the proposed project are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores ecosystem function.



The purpose of the rehabilitation at the site can be summarised as follows:

- To achieve long-term stabilisation of all disturbed areas to minimise erosion potential;
- To re-vegetate all disturbed areas with suitable local plant species;
- To minimise visual impact of disturbed areas;
- To ensure that disturbed areas are safe for future uses; and

#### **8.24.1 Principles**

The following guidelines provide a clear and practical means of implementing such rehabilitation once construction activities have ceased.

#### **General Recommendations**

- Progressive rehabilitation is an important element of the rehabilitation strategy and would be implemented where feasible.
- Once revegetated, areas should be protected to prevent trampling and erosion.
- No construction equipment, vehicles or unauthorised personnel would be allowed onto areas that have been vegetated.
- Fencing should be removed once a sound vegetative cover has been achieved.

#### **8.24.2 Topsoil Management**

Effective topsoil management is a critical element of rehabilitation, particularly in arid areas where soil properties are a fundamental determinant of vegetation composition and abundance. Where any excavation or topsoil clearing is required, the topsoil should be used immediately where possible and later used to cover cleared and disturbed areas.

- Topsoil will be retained on site in order to be used for site rehabilitation. Topsoil must be excavated to the correct depth. It is recommended that no more than the top 10cm of topsoil are stored and used for rehabilitation.
- Wherever possible, stripped topsoil will be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil.
- If direct transfer is not possible, the topsoil will be stored separately from other soil heaps until construction in an area is complete. The soil will not be stored for extended periods and will be used as soon as possible.

#### **8.24.3 Seeding**





In some areas, the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required. Seed will be collected from plants present at the site and would be used immediately or stored appropriately and used at the start of the following wet season. Seed can be broadcast onto the soil, but would preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of much.

#### **8.24.4 Transplants**

The primary purpose of using transplants is not to restore plant cover to its former levels, but rather to provide nodes of biological activity and a source of propagules that can spread and recover disturbed areas on their own. As such transplants would be planted in clumps rather than as isolated individuals. Transplants will be placed within a similar environment from where they came in terms of aspect, slope and soil depth. Transplants must remain within the site and may not be transported off the site. As required, additional rehabilitation of the pipeline servitude will be undertaken using the relevant locally indigenous species that are additional to those used in the Search and Rescue process. This work will be undertaken by a contractor with relevant horticultural experience who has access to suitable locally grown species.

#### **8.24.5 Monitoring Requirements**

As rehabilitation success is unpredictable, monitoring and follow-up actions are important to achieve the desired cover and soil protection. Re-vegetated areas would be monitored every 6 months for the first 18 months. Re-vegetated areas showing inadequate surface coverage (less than 10% within 12 months after re-vegetation) would be prepared and revegetated. Any areas showing erosion would be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

### **8.25 Regulatory Compliance**

Effective Programme will be developed to ensure that all activities that shall be undertaken during the proposed project are in compliance with applicable regulations, standards and codes. This involved:

- 1) Identification of all regulatory and other requirements;
- 2) Comprehensive evaluation of project components and activities; and



### 3) Consideration of project components for approval.

#### **8.25.1 Identification of all regulatory and other requirements**

Relevant checklist of health, safety and environment related regulation applicable to the proposed project including those contained in this ESIA report of shall be identified and developed. The specific requirements of each of the regulations, standards or codes shall also be clearly defined in a checklist. The checklist shall be available to every member of the project team as necessary.

#### **8.25.2 Evaluation of Project Components and Activities**

All major components of the proposed project as well as project activities shall be evaluated against the regulatory requirements established above, to ensure that such components or activities are in line with the specified requirements.

#### **8.25.3 Approval or Rejection**

A written approval shall only be offer for a project component or activity after it has been confirmed by due evaluation that the component or activity is not contravening any regulatory requirement. In the event that the component or activity under evaluation is found to be contrary to a regulatory requirement, A responsible officers shall be urged to develop mitigation measure(s) that will ensure compliance. If compliance cannot be achieved by any cost-effective mitigation measure then the specific component or activity concerned will be rejected. Such components or activities may be reconsidered for approval after re-design and relocation.

### **8.26 Awareness Creation and Training**

During the construction phase of the project, the following environmental awareness and trainings shall be conducted:

#### **8.26.1 Induction Briefing**

An induction briefing to every construction worker to be engaged in the project shall be provided by the contractors. The briefing shall include:

- The proposed tasks for new workers;
- Worker and safety consciousness;



- Importance of the use of personal protective equipment and warning notices;
- Personal hygiene and site sanitation issues;
- Environmental protection concerns; and
- Hazard recognition and incident reporting.

#### **8.26.2      *Weekly Safety and Environmental Forum***

There shall be a weekly environmental and safety awareness forum for construction workers during the various activities at the project site.

During the operation phase of the project, Workers shall be educated on environment, health, and safety issues using the following means to disseminate information to staff and workers:

- Staff and workers' meetings; and
- Local area network and the internet; and

#### **8.27      *Manpower Development Guidelines***

Training is an investment for the wellbeing of the project. In order to ensure high HSE competence and awareness, the project management team shall ensure that employees and other parties that will be engaged throughout the project lifespan, undergo appropriate and competency training for various aspects of the projects, especially in HSE critical activities. The competency requirements for contract staff shall be stipulated in the contract document. The project team shall be subjected to periodic competence gap analysis from which training needs can be derived for the current/future phases of the project. The training/manpower development programme shall be reviewed on an on-going basis as the project progresses such as:

- HSE induction course;
- Electrical maintenance Training;
- Detection and Control of Flammable Substance Training;
- Emergency First Aid-Level A CPR Training;
- Incident and Accident Investigation Training;
- Oil/diesel spill prevention and pollution control Training;
- Conflict resolution/management; and



- First aid administration.

Institutional personnel such as the regulators on site shall be incorporated into the training programme so as to improve their capacity to supervise the project and proceedings shall be documented.

All Contractor employees and subcontractors involved in the project will be given a comprehensive induction before they start work. This environmental training will take place in conjunction with safety awareness training.

The environmental aspects will include:

- An overview of the Environmental Management Plan, goals and objectives.
- Awareness in relation to the risk, consequences and methods of avoiding noise pollution, oil/diesel spills, disturbance to wildlife and disturbance to fisher-folk on the water ways.
- Awareness of individual environmental responsibilities and environmental constraints to specific jobs.
- Location and sensitivity of the proposed project area.

All personnel who have attended the Environmental Induction will sign a Register which will be kept on the Project Files. Toolbox talks, based on the specific activities being carried out, will be given to personnel by the nominated project representative. These will be based on the specific activities being carried out. These talks will take place either on the appropriate accommodation facility on-site and will include environmental issues particular to the proposed project, namely:

- Oil/diesel spill prevention including safe refueling practice.
- Emergency response procedures used to deal with an oil/diesel spill.
- Minimising disturbance to wildlife.

## **8.28 Chance Find Procedure**

Chance Finds are ‘objects of potential cultural heritage significance recovered during any site work, commonly related to archaeological sites and/or historic sites including surface or sub-surface artefacts e.g. stones, bones, pottery, metalwork, iron slag, enclosures etc., individual



burials and/or graveyards. It also refers to unique environmental features and cultural knowledge, as well as intangible forms of culture embodying traditional lifestyles that should be preserved for current and future generations.

Physical cultural resources may be located in urban or rural settings and may be above or below the ground or underwater. Their cultural interest may be at the local, provincial or national level or within the international community. During the period of the construction of the Project infrastructure which involves excavations and land clearing, that chance may be encountered. These may include the following:

- An archaeological heritage which has remained unnoticed in the past.
- An encounter with a grave containing human remains which the residents may not have mentioned.
- An encounter with a sacred site which was not mentioned at the survey stage.

*All field workers and contractors must have the authorisation to halt work if they suspect they may have encountered objects of cultural heritage interest.*

## Purpose

The purpose of this Procedure is to ensure the protection of sacred sites and underground cultural heritage property within the project area including potential archaeological finds discovered during the implementation phase of the REWARD Project.

## *Policy, legal and regulatory framework*

**Table 8.10: Policy, Legal and Regulatory Framework**

NO	National	International
1	NCAC Act, 2003	AfDB OS 1- Physical cultural heritage
2		IFC Performance Standard 8-Cultural heritage



### **Responsibilities of all field workers (including Contractors)**

If a Chance Find is observed and/or disturbed, all field workers (including Contractors) will prevent the illegal disturbance of archaeological material by:

- ❖ Immediately stopping work in the area of the Chance Find, in a safe manner.
- ❖ Demarcating the discovered site or artefact (in-situ).
- ❖ Photographing the discovery (if possible).
- ❖ Immediately reporting the discovery to the Project Implementing Unit (PIU) Environmental Specialist (ES).
- ❖ Follow any instructions issued by the PIU-ES to protect the site, including arranging for security to prevent any loss of removable objects (e.g. overnight).

### **Responsibilities of Project Implementing Unit Environmental Specialist**

The PIU Environmental Specialist is required to notify the CPCU and produce a Chance Find Memo within 48 hours capturing the following details:

- ❖ The date and time of the Chance Find.
- ❖ The location of the Chance Find site (obtained using a GPS).
- ❖ The details of the discovery team (names, roles, nature of activity).
- ❖ Estimated nature of the site/artefacts observed.
- ❖ The temporary protection (demarcation/security) measures implemented (e.g. overnight patrol), and
- ❖ The dates of the next steps to be implemented.

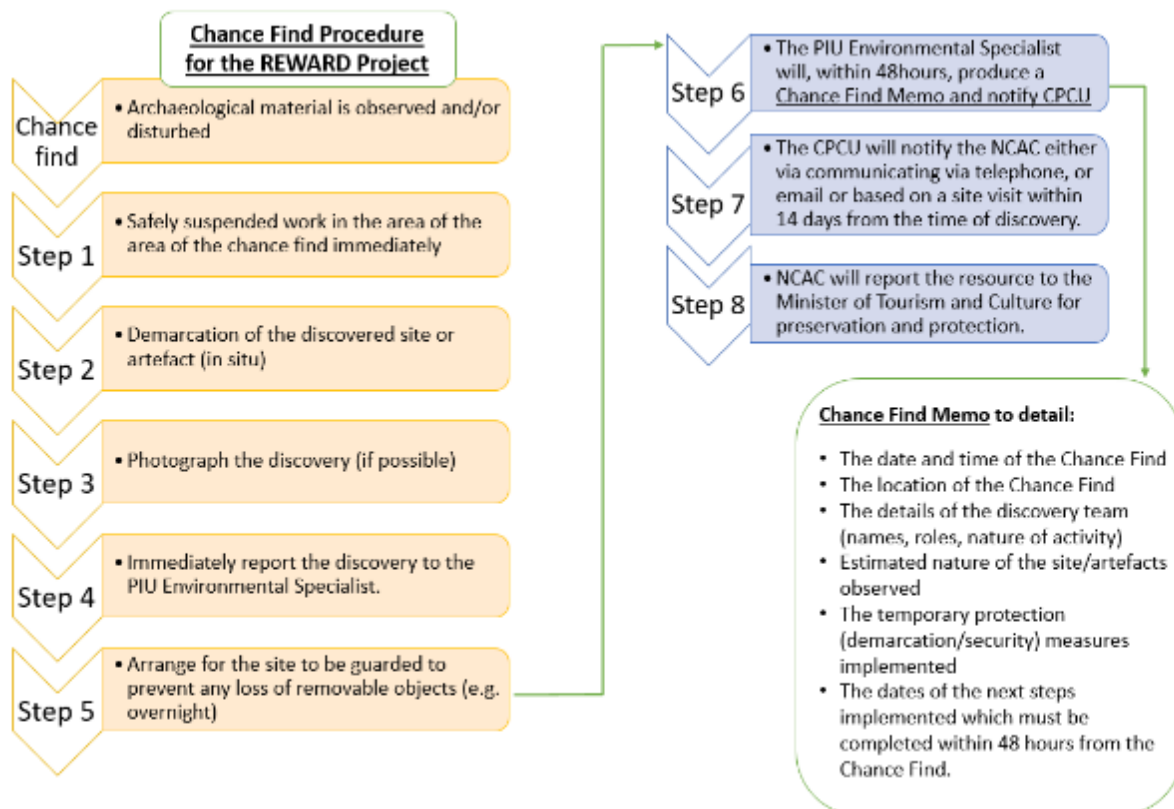
### **Responsibilities of Central Project Coordinating Unit (CPCU)**

Following the receipt of the Chance Find Memo from PIU-ES, the CPCU shall notify the National Center for Arts and Culture (NCAC) either via communication via telephone, or email or based on a site visit within 14 days from the time of discovery.

### **Responsibility of the National Center for Arts and Culture (NCAC)**



Should the NCAC confirm that the discovered resource falls within the heritage description, the chance to find the resource will be reported to the Minister of Tourism and Culture for preservation and protection. Rescue excavation or in-situ conservation will be proposed based on the disturbance likely to be caused by the Project or in relation to cost viz-a- viz the value of the heritage resource. In the case of in-situ conservation, the site will be managed and open to the communities and tourists that access the Project area.



**Figure 8.3: Chance Find Procedure Flow Diagram**

## Exception

If the chance find is a small, isolated (singular) object (e.g. a pottery sherd), the PIU Environmental Specialist may use their professional judgement to decide that a Chance Find observed can be sensitively recorded and removed so that the work can continue. In this instance, the following steps should be implemented and recorded within a Chance Find Memo in detail:





- ❖ The date and time of the Chance Find.
- ❖ The location.
- ❖ Photographs of the Chance Find in situ (if possible).
- ❖ The method and rationale of collection and location of the collected find, including the location of appropriate safe storage, and
- ❖ The details of the discovery team (names, roles, nature of activity).

### **Suspension of Work**

In the event of significant findings, and following the Gambian law, NCAC experts may wish to carry out a more detailed analysis. In this instance, they will propose a scheme of work to the Proponent before taking steps to potentially request the temporary suspension of project works in the vicinity of the discovery site for an agreed period. Work should only resume once approval is received.



## **CHAPTER NINE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **9.1 Conclusion**

The field samplings and detailed laboratory analyses based on the fieldwork of the ESIA study of the proposed Regional Rice Resilient Value Chains Development (REWARD) Program were conducted in accordance with the required Local, National (NEA) and international (AfDB) standards. The baseline data gathered were used to characterize the project environment. Based on the results obtained from the fieldwork, key environmental sensitivities were identified within the project area in terms of the natural environment and the socio-cultural characteristics that may be impacted by the project.

Overall, the results, analyses, and interpretations were used to identify all potential environmental impacts that may result from the proposed activity. With the impact prediction, therefore, appropriate mitigation measures and environmental management/monitoring plans have been proffered.

From the results and the predicted associated impacts of the project, the proposed REWARD program could be carried out successfully with minimal environmental effects if all the identified mitigation measures proposed in the report are applied and the suggested monitoring requirements are complied with.

#### **9.2 Recommendations**

The CPCU and PIU shall follow the principles/ precepts/ guidelines of the NEA and AfDB and others as listed in this ESIA report. All mitigation measures shall also be carried out promptly to avoid accumulation/backlog of appropriate measures. The PIU shall ensure that the members of the host communities are carried along if and where required to avoid any unrest.



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