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Report No: PAD4386

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED CREDIT

IN THE AMOUNT OF EUR 67 MILLION
(US$75 MILLION EQUIVALENT)

A PROPOSED GRANT
IN THE AMOUNT OF SDR 53.8 MILLION
(US$75 MILLION EQUIVALENT)

AND A PROPOSED SCALE-UP FACILITY CREDIT
IN THE AMOUNT OF JPY 17,331.8 MILLION
(US$150 MILLION EQUIVALENT)

TO THE

REPUBLIC OF RWANDA

FOR A

COMMERCIALIZATION AND DE-RISKING FOR AGRICULTURAL TRANSFORMATION PROJECT

March 25, 2022

Agriculture and Food Global Practice
Eastern and Southern Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective February 28, 2022)

Currency Unit =	U.S. Dollars (US$), Euro (EUR), and Japanese Yen (JPY)
EUR 0.89 =	US$1
JPY 115.55 =	US$1
SDR 0.72 =	US$1

FISCAL YEAR
July 1 - June 30

Regional Vice President:	Hafez M. H. Ghanem
Country Director:	Keith Hansen
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Task Team Leaders:	Åsa Giertz, Brice Gakombe

ABBREVIATIONS AND ACRONYMS

AGRA	Alliance for Green Revolution in Africa
Agri-PPD	Agriculture Public and Private Dialogue
AIF	Africa Improved Foods
AFIRR	Access to Finance for Recovery and Resilience Project
ASSAR	Rwanda Insurers' Association
AYII	Area Yield Index Insurance
BCR	Benefit-Cost Ratio
BDF	Business Development Fund
BIA	Biodiversity Impact Assessment
BLW	Bridge Landing Window
BRD	The Development Bank of Rwanda
CAGR	Compound Annual Growth Rate
CCE	Crop Cutting Experiments
CDAT	Commercialization and De-risking for Agricultural Transformation
CERC	Contingent Emergency Response Component
CHC	Custom Hiring Center
CIA	Cumulative Impact Assessment
CIP	Crop Intensification Program
COHSP	Construction-Occupational Health and Safety Plans
COVID-19	Coronavirus Disease 2019
CPF	Country Partnership Framework
CPSD	Country Private Sector Diagnostic
CSA	Climate Smart Agriculture
CSAF	Council on Smallholder Agricultural Finance
DA	Designated Account
DAC	Development Assistance Committee
DAT	Disruptive Agricultural Technologies
E&S	Environmental and Social
EBA	Enabling the Business of Agriculture
ECABREN	Eastern and Central Africa Bean Research Network
EFA	Economic and Financial Analysis
EFI	Equitable Growth, Finance and Institutions
EHS	Environment, Health and Safety
EHSG	Environmental, Health and Safety Guidelines
EIRR	Economic Internal Rate of Return
EPP	Emergency Preparedness Plan
ERP	Emergency Response Plan
ERR	Economic Rate of Return
ESCP	Environment and Social Commitment Plan
ESF	Environment and Social Framework
ESG	Environmental, Social, and Guidance
ESHS	Environmental, Social Health and Safety
ESIA	Environmental and Social Impact Assessments

ESMF	Environmental and Social Management Framework
ESMS	Environmental and Social Management System
ESRS	Environmental and Social Review Summary
ESS	Environmental and Social Standards
EX-ACT	EX-Ante Carbon Balance Tool
FAO	Food and Agriculture Organization
FI	Financial Institution
FM	Financial Management
FRR	Financial Rate of Return
GAP	Good Agricultural Practices
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIIP	Good International Industry Practices
GoR	Government of Rwanda
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
HCI	Household Commercialization Index
HDI	Human Development Index
HDM	Highway Development and Management Model
IA	Implementing Agency
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
ICF	Innovation Challenge Fund
ICT	Information and Communications Technology
IDA	International Development Association
IFC	International Finance Corporation
IFMIS	Integrated Financial Management Information System
IFR	Interim Financial Report
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
IPSAS	International Public Sector Accounting Standards
IRP	Independent Review Panel
ISM	Implementation Support Mission
ISTA	International Seed Testing Association
JICA	Japan International Cooperation Agency
LMP	Labor Management Procedures
LWH	Land Husbandry, Water Harvesting and Hillside Irrigation Project
M&E	Monitoring and Evaluation
MFI	Microfinance Institution
MIDIMAR	Ministry of Disaster Management and Refugee Affairs
MINAGRI	Ministry of Agriculture and Animal Resources
MINECOFIN	Ministry of Finance and Economic Planning
MINICOM	Ministry of Trade and Industry
MPCI	Multi-Peril Crop Insurance

MSME	Micro, Small, and Medium Enterprise
MTEF	Medium-Term Expenditure Framework
NAEB	National Agriculture Export Development Board
NAIS	National Agriculture Insurance Scheme
NCB	National Competitive Bidding
MFD	Mobilizing Finance for Development
NGO	Non-Governmental Organization
NPL	Non-Performing Loan
NPV	Net Present Value
NST	National Strategy for Transformation
O&M	Operation and Maintenance
OAG	Office of the Auditor General
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational Health and Safety
OPRC	Operational Procurement Regional Committee
OSHA	Occupational Safety and Health Administration
PAD	Project Appraisal Document
PAH	Project Affected Households
PCG	Partial Credit Guarantee
PCM	Private Capital Mobilization
PDO	Project Development Objective
PEFA	Public Expenditure and Financial Accountability
PFI	Participating Financial Institution
PFM	Public Financial Management
PforR	Project for Results
PIM	Project Implementation Manual
PMP	Pest Management Plan
PPD	Public-Private Dialogue
PPP	Public-Private Partnership
PPSD	Project Procurement Strategy for Development
PRAMS	Procurement Risk Assessment and Management
PSTA	Strategic Plan for Agriculture Transformation
QCBS	Quality and Cost-Based Selection
RAB	Rwanda Agriculture and Animal Resources Development Board
RAP	Resettlement Action Plan
RFQ	Request for Quotation
RPF	Resettlement Policy Framework
RPPA	Rwanda Public Procurement Authority
RSSP	Rural Sector Support Project
RWF	Rwandan Franc
SACCO	Savings and Credit Cooperative
SAIP	Sustainable Agricultural Intensification and Food Security Project
SBD	Standard Bidding Documents
SC	Steering Committee
SCD	Systematic Country Diagnostics
SEP	Stakeholders Engagement Plan

SME	Small and Medium-Sized Enterprise
SOE	Statement of Expenditure
SORT	Systematic Operations Risk-Rating Tool
SPC	Shadow Price of Carbon
SPIU	Single Project Implementation Unit
SPS	Sanitary and Phytosanitary
SSIT	Small-Scale Irrigation Technology
SSP	Sector Strategic Plan
STEP	Systematic Tracking of Exchanges in Procurement
SUF	Scale-Up Facility
TA	Technical Assistance
tCO_2e	Tonnes of Carbon Dioxide Equivalent
TSU	Technical Support Unit
UAI	Unit Area of Insurance
USD	United States Dollar
VCP	Value Chain Platform
VfM	Value for Money
WAMCAB	Water Management Capacity Building Project
WII	Weather Index Insurance
WSC	Water Supply Company
WUA	Water User Associations

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Rwanda	Commercialization and De-Risking for Agricultural Transformation Project	
Project ID	**Financing Instrument**	**Environmental and Social Risk Classification**
P171462	Investment Project Financing	Substantial

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[✓] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[✓] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	[ ] Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
15-Apr-2022	30-Apr-2027
Bank/IFC Collaboration	**Joint Level**
Yes	Complementary or Interdependent project requiring active coordination

Proposed Development Objective(s)

The Project Development Objectives are to increase the use of irrigation and commercialization among producers and agribusiness firms in supported value chains, and to increase access to agricultural finance.

Components

Component Name	Cost (US$, millions)
Value Chain and Infrastructure Development	210.00
Agricultural Finance and Insurance	35.00
Project Management	15.00
Contingency Emergency Response Component	0.00

Organizations

Borrower:	Republic of Rwanda
Implementing Agency:	Development Bank of Rwanda Rwanda Agriculture and Animal Resources Development Board

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	302.00
Total Financing	302.00
of which IBRD/IDA	300.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	300.00
IDA Credit	300.00

Non-World Bank Group Financing

Commercial Financing	2.00
Unguaranteed Commercial Financing	2.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
Rwanda	225.00	75.00	0.00	300.00
National PBA	75.00	75.00	0.00	150.00
Scale-up Facility (SUF)	150.00	0.00	0.00	150.00
Total	**225.00**	**75.00**	**0.00**	**300.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2022	2023	2024	2025	2026	2027
Annual	0.00	26.00	52.00	90.00	90.00	42.00
Cumulative	0.00	26.00	78.00	168.00	258.00	300.00

INSTITUTIONAL DATA

Practice Area (Lead)

Agriculture and Food

Contributing Practice Areas

Finance, Competitiveness and Innovation

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Moderate
6. Fiduciary	Substantial

7. Environment and Social	Substantial
8. Stakeholders	Moderate
9. Other	Moderate
10. Overall	Substantial

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
Cultural Heritage	Not Currently Relevant
Financial Intermediaries	Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description
Schedule 2, Section I. D 7 of the Financing Agreement

(a) The Recipient shall, no later than three [3] months after the Effective Date, establish and maintain throughout project implementation a Project Steering Committee or "PSC" with adequate resources, facilitation and hierarchic level of membership to among other things provide strategic guidance for project implementation and approve Annual Work Plans and Budgets and Project Reports.

(b) The PSC shall be chaired by MINAGRI and co-chaired by MINECOFIN and include representatives of the ministries and agencies involved in project implementation, as well as private sector and other stakeholders' representatives. The PSC shall be supported by the RAB- SPIU acting as the Secretariat of the PSC.

Sections and Description
Schedule 2, Section 2 of the Financing Agreement

The Recipient shall furnish to the Association each Project Report not later than forty-five (45) days after the end of each calendar semester, covering the calendar semester.

Sections and Description
Schedule 2, Section I. D 3 of the Financing Agreement

If 60 days prior to the Closing Date, the Association determines that there are measures and actions specified in the ESCP which will not be completed by the Closing Date, the Recipient shall cause each Project Implementing Entity to not later than 30 days before the Closing Date, prepare and present to the Association, an action plan satisfactory to the Association on the outstanding measures and actions, including a timetable and budget allocation for such measures and actions (which action plan shall be deemed an amendment of the ESCP); and (b) thereafter, implement the action plan in accordance with its terms and in a manner acceptable to the Association.

Sections and Description
RAB Project Agreement: Schedule Execution of the Project Implementing Entity's Respective Part of the Project, Section I. A. 1

Without limitation to the provisions of Section I.A.1(a)(i) of this Schedule, the Project Implementing Entity shall recruit for the RAB-SPIU, no later than three (3) months after Effective Date, the following additional staff dedicated for the Project, each with terms of reference, qualification and experience acceptable to the Association, not later than the corresponding deadlines indicated below: (i) one financial management specialist; (ii) one internal auditor; (iii) two procurement specialists; (iv) one additional environmental and one additional social risk management specialists.

Sections and Description
BRD Project Agreement: Schedule Execution of the Project Implementing Entity's Respective Part of the Project, Section I. A. 1

Without limitation to the provisions of Section I.A.1(a)(i) of this Schedule, the Project Implementing Entity shall recruit for the BRD-SPIU, no later than three (3) months after the Effective Date, the following additional staff dedicated for the Project, each with terms of reference, qualification and experience acceptable to the Association, not later than the corresponding deadlines indicated below: (i) one project coordinator; (ii) one environmental specialist; (iii) one social specialist; (iv) one procurement specialist; and (v) one accountant.

Sections and Description
RAB Project Agreement: Schedule Execution of the Project Implementing Entity's Respective Part of the Project, Section I. B. 4. (a)

For the implementation of Part 1.3(c) of the Project, the Project Implementing Entity shall, or shall cause BDF to, develop and adopt, no later than three (3) months after the Effective Date, a manual on the basis of terms of

reference acceptable to the Association, containing selection criteria (and exclusions) and modalities, assessment requirements and procedures, and templates for the extension, assessment, monitoring and evaluation of grants to be provided by the fund to be established in accordance with Section I.B.2(b), all in form and substance acceptable to the Association and in sufficient details to support compliance with the Project Implementing Entity's obligations under this Agreement and the Recipient's obligations under the Financing Agreement (the "Innovation Challenge Fund Manual").

Sections and Description
BRD Project Agreement: Schedule 2, Section 1. B. 3. (a)

For the implementation of Part 2.1(a) of the Project, the Project Implementing Entity shall develop and adopt, no later than three (3) months after the Effective Date, a manual on the basis of terms of reference acceptable to the Association, containing selection criteria (and exclusions) and modalities, assessment requirements and procedures, and templates for the extension, assessment, monitoring and evaluation of lines of credit to be provided under Part 2.1(a) of the Project, as well as details of the conditions stated in Section III.B.1(b)(vii) of Schedule 2 to the Financing Agreement, all in form and substance acceptable to the Association and in sufficient details to support compliance with the Project Implementing Entity's obligations under this Agreement and the Recipient's obligations under the Financing Agreement (the "Line of Credit Manual").

Sections and Description
RAB Project Agreement: Schedule Execution of the Project Implementing Entity's Respective Part of the Project, Section 1. B. 3. (a)

For the implementation of Part 1.3(a) of the Project, the Project Implementing Entity shall, or shall cause BDF to, develop and adopt, no later than three (3) months after the Effective Date, a manual on the basis of terms of reference acceptable to the Association, containing selection criteria (and exclusions) and modalities, assessment requirements and procedures, and templates for the extension, assessment, monitoring and evaluation of grants to be provided under Part 1.3(c) of the Project, all in form and substance acceptable to the Association and in sufficient details to support compliance with the Project Implementing Entity's obligations under this Agreement and the Recipient's obligations under the Financing Agreement (the "Matching Grant Manual").

Conditions

Type	Financing source	Description
Disbursement	IBRD/IDA	No withdrawal for the first disbursement shall be made under Category (1), unless and until: (A) the RAB Subsidiary Agreement has been duly executed and delivered in accordance with Section I.B.1(a) and 2 of Schedule 2 to this Agreement and the Association has received a legal opinion satisfactory to the Association confirming on behalf of the Recipient and the Project Implementing Entity that the RAB Subsidiary Agreement has been duly authorized by, and executed and delivered on behalf of, such party, and is

		legally binding upon such party in accordance with its terms; (B) the pesticide management plan has been adopted, consulted upon and disclosed all in form, manner and substance consistent with the requirements stated or referred to in the ESCP and acceptable to the Association; and (C) the master emergency response plan has been adopted and disclosed, all in form, manner and substance consistent with the requirements stated or referred to in the ESCP and acceptable to the Association.
Type Disbursement	Financing source IBRD/IDA	Description No withdrawals shall be made under Category (2), unless and until: (A) the RAB Subsidiary Agreement has been duly executed and delivered in accordance with Section I.B.1(a) and 2 of Schedule 2 to this Agreement and the Association has received a legal opinion satisfactory to the Association confirming on behalf of the Recipient and the Project Implementing Entity that the RAB Subsidiary Agreement has been duly authorized by, and executed and delivered on behalf of, such party, and is legally binding upon such party in accordance with its terms; and (B) the Matching Grant Manual has been adopted in accordance with the provisions of Section I.B.3(a) of the Schedule to the RAB Project Agreement.
Type Disbursement	Financing source IBRD/IDA	Description No withdrawal for the first disbursement shall be made under Category (5), unless and until (A) BRD's Environmental and Social Management System in form and substance consistent with the requirements stated in the ESCP has been approved by BRD's management and adopted by BRD in a manner acceptable to the Association; and (B) the Line of Credit Manual has been adopted by BRD in accordance with the provisions of Section I.B.3(a)(i) of the Schedule to the BRD Project Agreement.
Type Disbursement	Financing source IBRD/IDA	Description No withdrawal for the first disbursement shall be made under Category (3), unless and until the unless and until: (A) the RAB Subsidiary Agreement has been duly executed and delivered in accordance with Section I.B.1(a) and 2 of Schedule 2 to this Agreement and the Association has received a legal opinion satisfactory to the Association confirming on behalf of the Recipient and the Project Implementing Entity that the RAB Subsidiary Agreement has been duly authorized by, and executed and

		delivered on behalf of, such party, and is legally binding upon such party in accordance with its terms; and (B) the Innovation Challenge Fund Manual has been adopted in accordance with the provisions of Section I.B.4(a) of the Schedule to the RAB Project Agreement.
Type Disbursement	Financing source IBRD/IDA	Description No withdrawal for the first disbursement shall be made under Category (4), unless and until: (A) the BRD Subsidiary Agreement has been duly executed and delivered in accordance with Section I.B.1(a) and 2 of Schedule 2 to this Agreement and the Association has received a legal opinion satisfactory to the Association confirming on behalf of the Recipient and the Project Implementing Entity that the RAB Subsidiary Agreement has been duly authorized by, and executed and delivered on behalf of, such party, and is legally binding upon such party in accordance with its terms; and (B) BRD's environmental and social management system has been established in form and substance consistent with the requirements stated in the ESCP, approved by BRD's management and adopted by BRD in a manner acceptable to the Association;
Type Disbursement	Financing source IBRD/IDA	Description No withdrawal for the first disbursement shall be made under Category (6) for Emergency Expenditures, unless and until all of the following conditions have been met in respect of said expenditures: (A) (AA) the Recipient has determined that an Eligible Crisis or Emergency has occurred, and has furnished to the Association a request to withdraw Financing amounts under Category [6]; and (BB) the Association has agreed with such determination, accepted said request and notified the Recipient thereof; and (B) the Recipient has adopted the CERC Manual and Emergency Action Plan, in form and substance acceptable to the Association.
Type Effectiveness	Financing source IBRD/IDA	Description The Administrative, Financial and Accounting Procedure Manual has been adopted by the Recipient in accordance with Section I.E of Schedule 2 to this Agreement, BRD in accordance with Section I.B.1(a) of the Schedule to the BRD Project Agreement and by RAB in accordance with Section I.B.1(a) of the Schedule to the RAB Project Agreement

Type	Financing source	Description
Disbursement	IBRD/IDA	No withdrawal for the first disbursement shall be made under Category (7) unless and until all of the following conditions have been met in a manner acceptable to the Association and further described in the Line of Credit Manual: (A) the percentage of the funds originally allocated to Category (5) which have been disbursed or committed to Eligible Expenditures exceeds the percentage specified for this purpose in the Line of Credit Manual; (b) BRD has demonstrated that the implementation of Part 2.1(a) of the Project has been successful; and (C) BRD has demonstrated that there is a sufficient market to support the scaling up of Part 2.1(a) of the Project.

1. STRATEGIC CONTEXT

Country Context

1. **Rwanda has sustained its economic growth by consistently increasing public investments since the early 2000s.** Strong growth has improved social indicators and decreased poverty rates from 77 percent in 2001 to around 55.5 percent in 2017 (based on the US$1.90 per day international poverty line). Nevertheless, in 2020, Rwanda ranked number 160 of 189 countries on the Human Development Index (HDI).[1]

2. **Rwanda, as one of the world's fastest growing economies with an average annual Gross Domestic Product (GDP) growth of 10.8 percent during the last 25 years, has bold ambitions**. Rwanda's vision[2] to become an upper-middle income country by 2035 and a high-income country by 2050 requires an annual growth rate of higher than 12 percent. A modern and high performing agriculture sector, well integrated into regional and global supply chains, is one of the country's key drivers of growth[3]. The required transformation in agriculture needs to be built on competition and innovation and achieve higher productivity rates through private sector-led investment and development.

3. **However, Corona Virus Disease 2019 (COVID-19) has pushed Rwanda's economy into its first contraction since 1994 and onto a slower growth trajectory**. The lockdown and social distancing measures, which were critical to limiting infections, sharply curtailed economic activities. GDP in real terms fell by 3.4 percent in 2020, compared to an expansion of 8 percent anticipated before the COVID-19 outbreak. GDP increased by 10.1 percent year-on-year in the third quarter of 2021, mainly driven by an increase in services, while industrial and agricultural output rose to a lesser extent. However, in the absence of major policy intervention, Rwanda's long-term growth is likely to be significantly lower than the pre-pandemic trajectory. A quick recovery in Rwanda's strategic growth sector is unlikely due to the continued prevalence of COVID-19 in the developed economies, as well as the unpredictable environment that is likely to remain after the crisis. Further, there is considerable potential for a persistent impact on capital accumulation and productivity, as observed in similar crises in the past.

B. Sectoral and Institutional Context

4. **The agri-food sector is considered a main vehicle for growth in Rwanda and a key sector for achieving ambitious poverty reduction, food security, and human capital targets.** Over the past decade, annual growth in agriculture has averaged six percent. and is still the dominant source of livelihood in Rwanda. About 80 percent of Rwanda's population still resides in rural areas and 66 percent of the labor force is employed in agriculture.[4][5] The sector is particularly important for women as about 80 percent of Rwanda's female labor force is employed in the sector. Similarly, the sector has an important role for young people, which is the most under-employed

[1] UNDP: Human Development Report 2020
2 As per Rwanda's Vision 2050 document adopted in 2019
3 Alongside with (i) highly developed human capital, (ii) trade and regional integration, (iii) competitive domestic enterprises, (iv) well-managed urbanization, and (v) capable and accountable institutions (World Bank, Future Drivers of Growth in Rwanda – Innovation, Integration Agglomeration and Competition, 2019).
[4] National Institute of Statistics Rwanda:
file:///C:/Users/wb311143/Downloads/Gross%20Domestic%20Product_2020_webnote_r_fnl.pdf
[5] MINAGRI, Report for Backward Looking Agriculture Joint Sector Review, FY 2020/2021

group in Rwanda. In rural areas, 77 percent of the population constitute youth (15-34 years) and 50 percent of young people work in farming.[6] The most recently published food insecurity data shows that over 18 percent of the population remain moderately or severely food insecure[7] and as of 2020, 33.1 percent of children under 5 are stunted (down from 44.3 percent in 2010).[8] Important drivers of food insecurity are small land lots with low yields and vulnerability to agricultural risks, while chronic malnutrition is linked to income levels as well as local availability and affordability of nutritious food.[9] Growth in diverse food production and income generating activities, along with job creation in rural areas, will be important to address these challenges. While significant investments have been made in the sector over the past years and important results have been achieved, there is a realization that a shift from subsistence farming to a more commercially oriented sector is necessary for incentivizing private investments, job creation, and continued sustained growth in the sector.

5. **In agriculture, future growth hinges primarily on productivity-enhancing innovations, technological improvement, and allocative efficiency in resource use. This will only be possible if critical constraints such as weak market and value chain linkages, weak institutional capacities, low input quality and availability, limited access to finance, and insufficient skills and knowledge are addressed.** In Rwanda, where area-based growth has limited potential due to land constraints, the expansion of the irrigation network is the only way to expand the effective land area. Risks, especially climate-related production risks, will have to be managed through improved technologies and practices so that future agricultural growth is not jeopardized. All these elements will need to be addressed so that Rwandan agriculture can transform from a subsistence sector to a knowledge-based value-creating sector. The private sector would need to play a key role, while public sector investments including in irrigation, infrastructure, and services, will need to be linked more effectively to agricultural development and value-addition.

6. **Area growth has been a major driver of agriculture growth in the past, but its residual potential is limited unless the irrigated area increases**. Rwanda is one of the most densely populated African countries, and access to farmland has deteriorated markedly due to demographic pressure and slow transition from farm to off farm livelihoods. The share of households with less than 0.3 hectares of land has increased by about 10 percentage points from 2011 to 2017 (Systematic Country Diagnostic, World Bank, 2019). In addition, only about 62,000 ha of land are irrigated against a potential 500,000 ha (Irrigation Master Plan, 2019). Only 10 percent of households used any irrigation in 2017, and two thirds of them relied on traditional methods. While the country made some good progress on improving the regulatory environment for irrigation, irrigation development, water use efficiency and reforms need to continue with a greater focus on leveraging investments and institutional changes to facilitate increased uptake at the farm level.

7. **Yield growth through input intensification and total factor productivity growth has much more room to expand**. After sharp increases in the early 2000s, agricultural yields have plateaued or even dropped since 2013 and crop and livestock productivity levels are low by international comparison. This is largely due to the slow shift to commercial production, low adoption of knowledge and technology, weak market linkages, limited access to

[6] MINAGRI, Gender and Youth Mainstreaming Strategy, April 2019
[7] World Food Programme: Comprehensive Food Security & Vulnerability Analysis, December 2018
[8] National Institute of Statistics of Rwanda: Demographic and Health Survey, 2019-20
[9] Weatherson et. al. (2019) Stunting, food security, markets, and food policy in Rwanda: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7208-0

inputs and mechanization, lack of finance, and a high exposure to production risks. Limited off farm opportunities have also led to a high number of people per land area and labor productivity being significantly lower than in other domestic sectors, such as construction, transport, manufacturing, and mining.[10]

8. **As such, there is a significant potential to improve farmer skills, boost the use of fertilizers and machinery, and increase farmers' access to quality seeds**. The uptake of technology and innovation in Rwandan agriculture is generally low. For instance, in 2020 (season A), only 35 percent of the agricultural households used improved seeds, while only 21 percent used pesticides. The government, through subsidies and centralized procurement, remains heavily involved in key inputs markets, especially seeds and fertilizers, even though there is a private fertilizer distribution network contracted by the Rwanda Agriculture and Animal Resources Development Board (RAB). Cumbersome quality control and new product registration processes are some of the main regulatory challenges facing seeds and agro-chemicals supplies.

9. **More progress can also be made in increasing the allocative efficiency and improving the market and institutional structures in agriculture**:

(a) *There is considerable potential to increase horizontal coordination of production across farms* (using the cooperative model). Much of Rwanda's agriculture is small-scale and poorly organized and not effectively linked to the market. In 2017, 57.5 percent of the crop producing households were involved in market-oriented activities to a limited degree. 75 percent were selling only at local markets and only 4.2 percent had any contract farming arrangements. Despite some progress, organization of agricultural producers remains low with only 12.5 percent of agricultural households reporting membership in a cooperative or association.

(b) *Rwanda has significant potential to move up agri-food value chains and enhance producer access to markets*. Agribusiness is one of two key sectors (the other being housing) that offer short-term opportunities for market creation with strong development impact[11]. Despite impressive progress in some value chains over the last two decades, technological and logistical challenges persist. For instance: (i) insufficient access to quality seeds and poor value chain organization are key factors affecting Irish potatoes; (ii) low access to quality inputs (seeds, agro-chemicals, soil information) and equipment, and poor post-harvest practices are contributing to quality issues such as aflatoxin contamination in maize, and, consequently, to low marketability; and (iii) low irrigation uptake limits the growth of the commercial rice sector, targeting mainly the domestic market, as well as the expansion of high value added commodities, such as horticulture, with good export potential.

10. **Greater access to formal finance would help overcome these constraints, commercialize agricultural production, and move up the agribusiness value chain.** A 2014 study concluded that improved access to credit could help increase Rwandan agriculture production yield by at least 17 percent by facilitating the intensive use of inputs such as high-quality seeds and fertilizer.[12] Yet the amount of credit extended to the sector is limited. While credit for agriculture production, especially from micro-finance institutions (MFIs), increased significantly in 2019 thanks to the crop insurance pilot, its share in the total credit was 4.2 percent, much lower than sector's contribution to the national economy. According to the Agricultural Household Survey 2020, about 80 percent of

[10] Rwanda Systematic Country Diagnostic 2019, World Bank
[11] Rwanda Country Private Sector Diagnostic (CPSD), 2019
[12] World Bank, Credit Constraints and Agricultural Productivity: Evidence from Rural Rwanda, 2014

the farming households requested loans from informal sources (saving groups, family, and friends) while less than 20 percent of them approached formal sources (commercial banks, MFIs and SACCOs). Interviews with producer organizations and agribusiness SMEs identified a strong need for investments to grow, innovate and become more competitive. For this, more financial products and services are required for the adoption of appropriate practices, equipment, technology, and infrastructure for value chain development.

11. **For most lenders, based on historical performance, agricultural production is considered high risk and entails high transaction costs to hold a significant credit portfolio**. The risk of doing business in the agriculture sector is reflected in the high non-performing loan (NPL) ratio. Adverse climate events in the past, coupled with low farmer resilience, have damaged their lending portfolios. Moreover, the increase in NPLs in 2016-17 exceeding 18 percent resulted in the reduction of commercial bank lending for agriculture production. Some banks and MFIs concentrate on well-organized value chains such as maize, rice and potatoes by tapping into the linkages with off-takers and providing loans to agribusinesses, especially those in processing. The growth of agriculture credit from commercial banks including agribusiness has been slower than that of total private sector credit for the last five years. Most lenders, especially MFIs and savings and credit cooperatives (SACCOs) lack expertise and products in serving the agriculture sector.

12. **Public institutions are actively promoting agriculture finance by providing loans directly and indirectly and offering de-risking mechanisms**. The Development Bank of Rwanda (BRD) is the largest retail lender in the agriculture sector especially agribusiness and manages wholesale credit lines for banks and MFIs. The Business Development Fund (BDF) credit guarantee scheme prioritizes the agriculture sector. The government piloted a crop insurance scheme that prompted a significant increase in agriculture lending, but the penetration of insurance is still limited. While overall insurance uptake is rapidly increasing in Rwanda, only 1 percent was for agriculture insurance and the attributed main barriers to uptake remain affordability and lack of awareness[13]. International experience shows that bundling agriculture credit with carefully designed agriculture insurance products, reduces production risk from the rural lending equation and can thereby unlock access to seasonal credit for farmers who were previously considered not creditworthy. Furthermore, by reducing risk, agriculture insurance provides incentives to farmers to invest their own savings in advanced farming methods and thereby increase their productivity and incomes.

13. **The uptake of information and communications technology (ICT) holds the potential for leapfrogging innovation milestones in agriculture and bypassing some market or institutional failures**. Rwanda has embarked on a forward-looking digital transformation as outlined in the National ICT Strategy and Plan, NICI - 2015. Currently, 67 percent of all households (and 62 percent of all rural households) have at least one mobile phone, whereas 17 percent of the households (versus 12 percent in rural areas) have internet access, primarily through mobile devices. In agriculture, ICT can facilitate timely delivery of information (e.g., markets, weather), advice and extension (e.g., soil analysis, animal health), and importantly for low-income farmers, drive down transaction costs (e.g., through mobile banking or other e-services). Rwanda is using a digital platform, the Smart Nkunganire System, to deliver agricultural input subsidies to farmers. Rwanda's ICT infrastructure provides a good foundation for diffusion of technology and information, but the country needs to continue improving its regulatory environment; ICT is rated relatively low in the Enabling the Business of Agriculture (2019), with Rwanda falling one rank behind both the regional and income group averages.

[13] FinScope Rwanda Survey conducted in 2019/20.

14. **To reach the growth potential for the sector, the existing gender gaps must be closed.** Rwanda is widely recognized for its commitment to gender equality. The Government of Rwanda (GoR) has put in place a strong legal and policy framework, including a legal mandate for gender-responsive planning and reporting through Gender Budget Statements, to support and advance gender equality. For the agriculture sector, efforts to address gender disparities include implementation of the 2019 Rwanda Agriculture Gender and Youth Mainstreaming Strategy; gender-sensitive land reform, with joint titling of female and male partners' land; and gender equality in inheritance reforms. Nevertheless, gender disparities persist, and a review of the strategy shows that implementation has been slow. For example, female-managed farms are 12 percent less productive than male farms with 50 percent of the gender gap in productivity due to lower access to productive inputs and services, and fewer women than men cultivated on land that is protected against soil erosion and on irrigated land. Representation in institutions have been identified as a key constraint in accessing irrigation but consultations during the Commercialization and De-risking for Agriculture Transformation (CDAT) preparation indicate that there is a perception that women do not produce financially viable crops that benefit from irrigation.[14] There are also large discrepancies between men and women in their access to finance, partly due to lack of financial literacy and knowledge of financial services[15]. During the preparation of CDAT, participating actors confirmed that the share of female applicants is lower than that of male applicants for loans at commercial banks. Further, female-managed farms are on average 10.5 percent smaller in land, female farmers participate to a lesser extent in agricultural value chains, receive lower prices for their produce at markets and are less represented in off-farm employment. Table 1 provides an overview of discrepancies between men and women in the agricultural sector.

[14] Rwanda Development Organization: *Assessing the Implementation, Accountability of "Gender and Youth mainstreaming strategy in agriculture 2019-2026"*, December 2021, unpublished

[15] Women's empowerment in Rwanda, Oxfam 2015: https://oxfamilibrary.openrepository.com/bitstream/handle/10546/550099/er-womens-empowerment-rwanda-effectiveness-review-260315-en.pdf;jsessionid=C424AEB81A28233B41AD8126F616DDBF?sequence=2

Table 1: Discrepancies between men and women in Rwanda's agricultural sector

Access to/use of:	Women	Men
Improved seeds	8%	18%
Inorganic fertilizers	15%	20%
Organic fertilizers	45%	no data
Irrigation	6.4%	11.5%
Cultivating on land protected against soil erosion	62.5%	70.2%
Bank account (approx.)	20%	33%
Savings & Credit Cooperatives (among bank account holders)	66%	57%
Commercial financial institutions (among bank account holders)	26%	33%
Loans from a formal source	3%	6%
Loans in the size of ≤ 5000 RWF*	30%	17%
Loans in the size of 200,000-500,000 RWF*	18%	23%
Loans for agricultural inputs	1.5%	3.3%

Sources: Rwanda Agriculture Gender and Youth Mainstreaming Strategy, 2019, and *Assessing the Implementation, Accountability of "Gender and Youth mainstreaming strategy in agriculture 2019-2026"*, 2021
* Among those receiving a loan from a formal source

15. **For growth to be sustainable, risks must be managed**. Climate change poses one of the biggest risks to the Rwandan agri-food system. Rwanda is increasingly vulnerable to the impacts of climate change and is ranked 153rd in terms of its vulnerability to climate change (Notre Dame Global Adaptation Index)[16]. Temperature increases with greater interannual variability have been observed from 1971 to 2016, showing a rise in mean temperature between 1.4°C and 2.6°C, and more common and longer-lasting heat waves. Rainfall has become more intense thereby increasing the incidence of floods, hailstorms, and landslides; and unpredictable with shorter rainy seasons and longer dry seasons, with the variability predicted to increase to 10 percent. The significant increase in extreme weather frequency, variability and severity has impacted agriculture, in particular food production, as agriculture is mostly rainfed (less than 5 percent of all land used for production is currently irrigated—an estimated 7.5 percent of irrigable potential). This is compounded by high levels of soil erosion, especially given the country's hilly terrain, shifting agroecosystem boundaries, and use of poor farming techniques. These climate events can: (i) significantly erode crop nutritional quality and reduce crop and livestock productivity; (ii) damage irrigation and on-farm infrastructure; (iii) increase pests, crop, and livestock diseases; (iv) reduce land availability; and (v) bring new risks for food safety and need for enhanced sanitary and phytosanitary (SPS) measures. Combined, these disasters impact food security, and drive down farming household incomes and export earnings[17]. In addition, they constrain investment in advanced farming techniques, as farmers are less willing to invest their hard-earned savings into their farms, and formal external finance is limited. Since most Rwandan farmers are small and subsistence-oriented, they are particularly vulnerable and ill-equipped to deal with such shocks.

16. **Reducing farmers' vulnerabilities to climate risks requires incorporating targeted resilience and**

[16] World Bank Country Partnership Framework for Rwanda FY21-FY26
[17] Potential annual economic loss of up to US$132 million (MIDIMAR, 2015)

adaptation approaches in agriculture investments. The proposed project uses a multi-pronged approach to reduce climate vulnerabilities in the targeted value chains (maize, rice, horticulture, Irish potatoes, cassava, and beans), which are particularly vulnerable to drought, flooding, and moisture and heat stress. The project will incorporate the use of locally appropriate Climate Smart Agriculture (CSA) approaches as appropriate across all value chains, both at production and post-production stages, and other proposed investments. This would include among others supporting the use of climate smart technologies (e.g., solar irrigation, adapted plant varieties). The project will also provide vulnerable farmers and herders with appropriate agriculture insurance products. This approach aims to: (i) achieve the triple CSA wins of sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing greenhouse gas (GHG) emissions; as well as (ii) crowd in private sector credit and insurance services in the agricultural sector. Collectively, the approach contributes to Rwanda's aim to become a climate resilient economy.

17. **After an initial contraction, the agricultural sector has proven to be a source of economic resilience during the COVID 19 pandemic**[18]. Growth in agriculture has partially offset declines in industry and services. Boosted by robust food production of Seasons B and C, the agricultural sector reported growth in the second half of 2020 after bad performance in the first half as heavy rains and floods destroyed part of the production of some important food crops in Season A. Harvests then improved, and food production increased by 2.6 percent in both third and fourth quarters, which led to improvements in food prices over the second half of 2020. Output of export crops experienced declines in the first three quarters of 2020 and saw some recovery in the fourth quarter as the production of both tea and coffee recorded good performance. Good performance of export crops continued in the first quarter of 2021, and together with robust food production led the overall growth in agriculture to 6.7 percent. On average, agriculture grew with 6 percent in 2021, supported by favorable weather conditions, robust growth in livestock, and an eventual recovery in export crops.

18. **Rwanda's Fourth Strategic Plan for Agriculture Transformation (PSTA-4), 2018-2024, articulates a bold vision for the country's agricultural development**. Accordingly, Rwanda's agriculture must transform "from a subsistence sector to a knowledge-based value creating sector, that contributes to the national economy and ensures food and nutrition security in a sustainable and resilient manner". Such a transformation is to be achieved through programs and actions grouped into four pillars: (i) innovation and extension; (ii) productivity and resilience; (iii) inclusive markets and value addition; and (iv) enabling environment and responsive institutions. The proposed project would, therefore, directly contribute to the PSTA-4 strategic goals with a focus on strengthening inclusive markets and value addition for targeted value chains; it would also selectively contribute to the other three strategic pillars. Moreover, the project would contribute to a recent government initiative to tackle challenges and reduce risks faced by the agriculture sector and support the extension of agricultural finance - the Rwanda Agriculture De-Risking and Financing Facility. Finally, modernizing agriculture and increasing its productivity is a key strategic intervention and priority area under the seven-year (2017 – 2024) government program – the Rwanda's National Strategy for Transformation (NST-1). The project would help achieve this NST-1 goal through irrigation infrastructure development, agricultural mechanization, increasing private sector participation, boosting value addition, and processing, and increasing access to finance.

[18] World Bank, Rwanda Economic Update, June 2021.

C. Relevance to Higher Level Objectives

19. **The World Bank Group Country Partnership Framework (CPF) for Rwanda, FY21-26 Report No. 148876-RW, discussed by the Executive Directors on July 9, 2020, has five objectives, of which increased agricultural productivity and commercialization is one.** In this context, modernizing the agri-food sector and increasing its responsiveness to market signals are key avenues to promote high levels of growth. Moving up agribusiness value chains, leveraging more private sector investment, enabling the delivery of improved services and commercialization, promoting nutrition-sensitive and climate-resilient technologies and infrastructures as well as policy and institutional reforms are critical for achieving these goals. The World Bank Group agri-food sector interventions under the CPF will fully embed these priorities to support the sector development objectives and the delivery of the PSTA-4 results. The project is fully aligned with the CPF and is grounded on strong World Bank Group analytical work. Its key focus is on promoting agriculture commercialization and increasing access to financial products and services for selected agriculture value chains, while benefiting from a strong partnership between the World Bank and International Finance Cooperation (IFC).

20. **The project complements other World Bank-financed interventions in Rwanda's agriculture and financial sectors**. In the agriculture sector, the Rwanda Sustainable Agricultural Intensification and Food Security Project (SAIP, P164520) aims to improve productivity, food security and market access of beneficiaries in selected value chains (horticulture, maize, Irish potatoes, and beans). Additional financing for the SAIP (P175912, approved in June 2021) is building on and scaling up ongoing activities, while also helping mainstream COVID-19 containment measures in select project sites to reduce the spread of the virus during project implementation. While SAIP has a primary focus on smallholder beneficiaries and on increasing their productivity and food and nutrition security, the proposed project has an integrated focus on promoting agri-food commercialization using Small-Scale Irrigation Technology (SSIT) selectively in value chains and geographies where it has the potential to expand marketable volumes through commercial production. The Transformation of Agriculture Sector Program for Results Phase 2 (PforR-2 P161876) is supporting the implementation of Rwanda's PSTA-4, which aims to strengthen the capacity of the Ministry of Agriculture and Animal Resources (MINAGRI) to create an enabling environment that would encourage greater private sector investments and increased commercialization across Rwanda's key agriculture value chains. The current project was requested to further support agricultural transformation and commercialization. Although important reforms have been made in the sector, including through PforR-2, private investments in value chain development have not materialized to the extent that was anticipated, and the GoR is therefore seeking to address key constraints through a complementary IPF.

21. **In the financial sector, the World Bank has provided support to the Ministry of Finance and Economic Planning (MINECOFIN) and MINAGRI through a series of in-depth Advisory Services and Analytics, aimed at expanding access to high quality financial services in the agriculture sector**. These include the Rwanda Agriculture Finance Diagnostic (World Bank, 2018), Rwanda: National Agricultural Insurance Scheme (NAIS) – Situation Analysis and Options for Strengthening Policy Note and Technical Report (World Bank, 2019), and Re-Energizing Agriculture through Solar Power in Rwanda (World Bank, 2019). On the lending side, in response to the COVID-19 pandemic, the World Bank with the Government designed the Access to Finance for Recovery and Resilience (AFIRR) Project (P175273) to support businesses affected by COVID19 to access finance in the main economic sectors including agriculture. The project interventions include (a) a credit line for agro-processing companies under BRD; (b) enhancement of the guarantee scheme operated by the BDF which helps financial institutions manage risks including in agriculture finance and thus complement the proposed CDAT project; and

(c) a Bridge Lending Window (BLW) designed to cushion Micro, Small, and Medium Enterprises (MSMEs) against climatic shocks. The BLW will also have an insurance backstopping mechanism to protect its capital against severe climatic shocks. In the event of severe shocks, the insurance payout will capitalize the BLW thus benefiting many agri-MSMEs. The BLW will be managed by BDF and will target agri-MSMEs.

22. **The project contributes to the Private Capital Mobilization (PCM) agenda.** Component 2.1 will leverage the capital of private financial institutions and will help mobilize US$2 million in private capital financing through requirements for private sector counterparty financing.

2. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

23. The objectives of the project are to increase the use of irrigation and commercialization among producers and agribusiness firms in supported value chains and to increase access to agriculture finance.

24. The target beneficiaries will be farmers' cooperatives, commercial farmers and small and medium-sized agri-enterprises (agri-SMEs).

PDO Level Indicators

25. The Project Development Objective-level indicators are the following:

(i) Increase in share of agricultural produce sold by participating producers.
(ii) Increase in the cultivated area being irrigated in new and rehabilitated schemes.
(iii) Increase in value of agricultural production quantities procured by participating aggregators (cooperative and contract buyers).
(iv) Increase in number of borrowers obtaining agricultural loans from participating financial institutions.
(v) Total number of benefitting households reached by the project.

B. Project Components

26. **The project will aim to consolidate and expand the results obtained through previous and ongoing World Bank-funded operations, while complementing more traditional productivity enhancing and food security project interventions.** Past projects include the Land Husbandry, Water Harvesting and Hillsides Irrigation (LWH) Project (P114931), the Rural Sector Support Projects (RSSP, P126440), and SAIP (P164520) and the PfoR-2 (P161876) are under implementation. To a significant extent, these operations have laid the foundation for: (i) increasing agricultural production and productivity in key value chains (such as rice, maize, beans, horticulture), and nutrition through investments in irrigation, terracing, post-harvest equipment and infrastructures; and (ii) strengthening value chain linkages through interventions that helped improve

organization (especially through cooperatives) and greater private sector participation (by adopting a Private Sector Leveraging Strategy aimed at incentivizing agri-food public-private partnerships and operationalizing value chain dialogue platforms). The project also aims to address the need identified in the World Bank's 2018 Rwanda Agricultural Finance Diagnostic, to increase access to agricultural finance and enhance the capacity of financial institutions. In addition, as identified in the World Bank's 2019 review of agricultural insurance in Rwanda, the project intends to de-risk the agricultural sector by strengthening agricultural insurance provision thereby incentivizing financing institutions to increase their lending to the agricultural sector.

27. **Building on these results, the project will focus on generating marketable volumes and facilitating their access to markets**, **while also de-risking and leveraging private sector investment in value-generating agri-food activities**. At the heart of these interventions are cooperatives and agri-SMEs that aggregate production and services, and that can effectively establish links upstream and downstream their respective value chains. Through its explicit focus on post-harvest activities, marketing, and access to financial services, the project will directly contribute to the enhanced private sector participation, food systems transformation and increased availability of diverse foods in Rwanda.

28. **The project will have four components**. Component 1 focuses on strengthening market and value chain linkages and improving land use efficiency for commercial production using a climate adaptation and mitigation lens. It is also building demand for financial services that can unlock investments to modernize and grow the agri-food sector. Component 2 addresses the supply-side of financial services for agriculture, by leveraging and deploying private sector capital and strengthening the provision of instruments to de-risk the sector. Component 3 covers project management. Component 4 allows for the rapid reallocation of uncommitted funds in the event of an eligible emergency.

29. **The productive investments under the project are expected to benefit some 235,977 households, cooperatives, and agribusiness firms while at least 575,000 households will benefit from insurance services.** Around 235,977 households, or 11 percent of Rwanda's 2.1 million farming households[19], will benefit from the value chain and infrastructure development activities under Component 1. Under Component 2, the project will provide agricultural finance through private finance institutions that directly or indirectly lend to approximately 2,232 beneficiaries over five years. The crop and livestock insurance anticipates benefitting 575,000 and 75,000 farmers, respectively. In total, it is estimated that about 82,000 hectares of arable land will benefit from project interventions, of which 17,673 ha will benefit from rehabilitated and new irrigation infrastructure.

Component 1: Value Chain and Infrastructure Development (US$210 million equivalent)

30. **This component has three sub-components and will aim to increase marketable volumes in supported value chains and provide targeted climate sensitive infrastructure support**. The component will finance public goods such as irrigation infrastructure, land husbandry, extension provision, and research and development of improved seeds. The component will also finance a competitive grants program and an innovation challenge fund.

31. **The public investments under this component will initially prioritize six value chains: horticulture, beans, maize, cassava, Irish potatoes and rice. To be able to respond to changing market opportunities, the project will be flexible in investing in other value chains (based on clear evidence) during project**

[19] SAS, 2019

implementation. These value chains will allow the project to build on results of previous operations and where there is demonstrated market and growth potential, domestically and/or internationally but where private sector investments are nascent or struggling to take off. Therefore, mature sectors such as tea and coffee, which are already benefiting from significant investment from the private sector, are not being considered for support under the project. The Rwanda Country Private Sector Diagnostic (CPSD) shows that the country has comparative advantages in traditional crops such as maize, cassava, Irish potatoes and beans (and rice at the margin). In addition, relatively young sectors such as horticulture exhibit high international competitiveness and great potential for expansion. The CPSD concluded that these products would have important positive impacts on employment and growth, through backward and forward linkages, and that increased private sector investment would help unleash these effects and contribute to youth employment. The public investments under the project will prioritize these value chains and address obstacles for private investments to take off. The type of support provided to each of the *prioritized value chains* will depend on the identified investment gap and returns for the specific value chain.

32. **Each selected value chain already exhibits strong commercial orientation.** In rice, farmers sell more than 79 percent of their harvest[20], indicating rice cultivation has become a valuable source of income. In maize, earnings from flour processing and exports have been growing, largely thanks to the emergence of large processing units. The maize sector has been highly profitable both for producers and processors. For cassava, overall demand in the domestic and regional markets has been rising significantly, while opportunities for product diversification (such as cassava starch and refined bakery flour) hold significant potential for commercialization. In horticulture, domestic and global demand (including for processed products) has been growing sharply, indicating high potential for commercializing the sector; and, indeed, the overall income from horticulture exports has grown from US$0.3 million in 1994 to about US$30 million in 2020[21]. In Irish potatoes, the regional market demand for fresh produce and diversified value-added products (such as processed chips and crisps) has been rising. Farmers have been earning high incomes, indicating that Irish potato cultivation has become a major source of income generation for them. In the beans sector, the domestic demand and consumption for beans has been consistently growing over the years. The processed beans market (for products like precooked and canned beans) is also increasing and attracting investments from processors, such as Farm Fresh, and generating important incomes and profits for the producing farmers.

33. **The selected value chains display high levels of competitiveness.** In horticulture, mild, tropical-highland-climate and fertile soil have been favorable for production. Rwanda has already made substantial public investments along the horticulture value chain, especially in key irrigation and cold chain infrastructure. In this context, horticulture and floriculture products will offer significant opportunities for value addition through diversification of exports, and through the growing domestic demand resulting from the increased urbanization in Kigali and other secondary cities. Maize production increased by over 70 percent between 2013 and 2021, mainly due to the Crop Intensification Program (CIP) policies and the Government campaign for domestic seed production. The increased supply on the local market is expected to progressively substitute the regional maize imports. The emergence of new and large maize processing facilities has also facilitated an increase of maize flour exports, significantly higher than the regional average, with the target market being mostly the Democratic Republic of Congo[22] In cassava, Rwanda enjoys suitable weather and soil conditions for cassava production.

[20] NISR seasonal agricultural survey 2021
[21] NAEB reports
[22] IGC, Maize value chains in Africa, 2016.

Rwandan cassava yields have been among the highest in the region (achieving a yield of over 14 tons/ha in 2021[23] competitive against other producer countries. In rice, the prices of domestically produced rice have been lower than the imported rice from Pakistan and Tanzania. Cheaper prices of rice have provided an opportunity for local producers to expand in the domestic markets. In Irish potato, Rwanda has comparative advantage due to its low domestic resource cost (between 0.21 and 0.69), rich volcanic soils and favorably high altitude. Although they are still significantly below their potential levels, Rwanda's potato yields (at about 9 mt/ha in 2021[24]) have been higher than regional competitors. In beans, Rwanda has been witnessing fast growth in production and output[25], but also in exports, indicating the rising competitiveness of the sector.

Subcomponent 1.1: Irrigation rehabilitation and development (US$154 million equivalent)

34. **Irrigation is critical to increase productivity and commercialization and the objective of the subcomponent is to expand the irrigated area and increase marketable output from irrigated agriculture**. This sub-component will finance pre-feasibility and feasibility studies, preparation of detailed designs, construction supervision and quality assurances, construction of irrigation water abstraction, delivery, distribution, and drainage structures. Further, the sub-component will finance technical assistance to establish, organize, and strengthen irrigation Water User Associations (WUAs), and to incentivize farmers to adopt energy-saving technologies for water management such as use of solar powered pumps. The supported irrigation schemes will be selected based on their commercial potential and will benefit from market linkages supported through the other two subcomponents. Crop and scheme selection will also take into consideration the related climate vulnerabilities and ensure the use of appropriate mitigation measures.

35. **Irrigation development in Rwanda is constrained by the ubiquitous presence of long narrow valleys with very limited areas that can be efficiently developed for irrigation**. Where there is enough base flow in the streams, many of these valley floors have been developed for rice irrigation. In some valleys where flow is insufficient, dams have been constructed to increase the irrigated areas. Much of this work was led by the previous World Bank funded RSSP. With a vision to expand the irrigation areas beyond the narrow valley floors, the previous World Bank funded RSSP and LWH projects developed gravity irrigation of hillsides from stream diversions of valley dams.

36. **The project will rehabilitate and improve existing gravity-fed and pressurized irrigation sites and develop new ones.** A total of 37 sites have tentatively[26] been identified with a combined command area of 17,673 ha (there are also other schemes with a total command area of 1,652.4 ha that have been placed on a waiting list). The project will invest in three types of schemes: hillside, marshland, and SSIT.[27] The hillside areas are already

[23] NISR, Seasonal Agricultural Survey 2021
[24] NISR, Seasonal Agricultural Survey 2021
[25] Beans' output has been recorded at 12.6 percent CAGR in real value between 2008 and 2019.
[26] The list will be updated following the pre-feasibility and feasibility studies.
[27] **Hillside irrigation** is mostly characterized by pressurized and gravity systems developed on hillside land. The pressurized schemes have been typically designed as five-hectare plots with common irrigation infrastructure managed by a group of farmers owning pieces of land within the plot boundary. As far as gravity schemes are concerned, they are made of a hillside large earth dam with storage capacity up to 2 Mm3, buried pipe network to the individual farm edge. Technologies such as sprinkler, drip, horse pipe and improved surface systems are predominant in the hillside schemes. **Marshland irrigation** schemes have been developed by improving swamp area. Marshlands are

cultivated mainly with maize, bean, cassava, and horticulture crops, and are also highly suitable for horticulture export crops such as French beans. The rehabilitation of marshlands will lead to increased productivity and are expected to result in greater revenues from the sale of rice grains to domestic markets and neighboring countries like DRC and Burundi. Overall, the investments in schemes are expected to significantly increase the volume of crop produce for consumption and commercialization, including for exports.

37. **The planning, design, and installation of irrigation systems will be in line with climate resilient design standards to protect the investments from likely climate risks.** The provision of the irrigation systems in the proposed project areas will help Rwanda adapt to changing rainfall patterns and drought events by providing regular supply of water for agriculture. This will enable farmers to switch from rainfed agriculture to irrigated agriculture, thereby adapting to changing rainfall patterns and drought events in the lowland. Since access to irrigation will significantly boost productivity, the investment in irrigation will also reduce emission intensity per ha of land and thereby contribute to climate change mitigation. Dams constructed and rehabilitated under the project will help store water and control erosion, and pipelines and lined canals will help reduce the loss of water and control soil erosion. The irrigation schemes have not been designed as typical open canal systems where flows are difficult to manage and result in high volumes of spilled water. Instead, they will combine lined canals as the primary supply to regulating reservoirs with pipelines as the secondary supply, resulting in a system which is almost as water efficient as a fully piped system. The following features will be included to make sure that these irrigation schemes sites are considered *climate smart* investments in agriculture: a) the main canals on either side of the valley are concrete lined, relatively small and easy to manage, and end at regulating reservoirs where all extra water is stored instead of being spilled; b) all irrigation outlets from the canal and downstream of the reservoirs are pipelines and provide on-demand supply to farmers from hydrants with valves; and c) any pressurized irrigation system can be used depending on the choice of the farmer and the available pressure. Near the canals or regulating reservoirs where pressure is lower, the farmer may choose to irrigate from his hydrant with hose pipes, lay-flat hose, portable gated-pipe, drip, or low-pressure sprinklers. Lower on the hillsides where there is more pressure any type of pressurized irrigation can be used including portable impact sprinklers or even rain guns. In the schemes to be rehabilitated, these enhanced features are expected to increase the water use efficiency to more than 90 percent from the existing average of 30 to 35 percent, providing environmental and socio-economic benefits. High irrigation efficiency is becoming increasingly important due to the current decrease in available water resources and growing populations that drive expansion of agricultural activities The adoption of solar powered irrigation systems is also among the proposed innovative practices to strengthen the value chain while ensuring the sustainability of the water management schemes.

38. The following table justifies the need to improve efficiency:

public (state) owned lands where farmers are allocated plots on lease. The improved surface irrigation systems used in the marshlands are gravity stream diversions or from valley dams used to supply canal networks for flooding basins planted with rice. The land holding in a marshland scheme is on average 0.1-1.0ha per farmer. Farmers in the marshland share common irrigation infrastructure. **Small Scale Irrigation** (SSI) focuses on small garden plots for individual farmers and tree nurseries where rainwater is harvested into small plastic lined ponds for irrigation with simple drip technologies or siphons. Promoted and driven by MINAGRI and its strategic private irrigation service providers, the farmer-based approach is aiming to promote widespread use of demand driven, affordable locally assembled SSIT. The small-scale irrigation technology includes ready to use 1ha, 5ha, and 10ha complete sprinkler, drip and rain-gun kits with portable diesel/petrol pump-units and pipes as well as the treadle pump and dam sheet technology.

Table 2: Efficiency in water conveyance for the proposed irrigation schemes

Names of schemes	Existing conveyance system /Unlined canal	Proposed conveyance system /Lined canal /pipe system (efficiency anticipated in comparison to the existing one)	Increment of production under lined canal/Pipe System (impact anticipated)
Bugarama	32%	90%	90%
Kageyo	32%	90%	90%
Agasasa	32%	90%	90%
Nyarubogo	32%	90%	90%
Gashora	15% (rainfed)	98 %	98 %
Cyohoha	15 % (rainfed)	98%	98%

39. **Detailed designs have already been completed for six of the proposed sites representing 8,860 ha (just over half of the targeted ha), meaning that rehabilitation and construction can be initiated immediately upon effectiveness.** Two sites totaling 690 ha are ready for immediate tendering while another four sites of a total of 8,170 ha have all designs completed since a few years but will require additional review before designs can be finalized. For sites requiring prefeasibility studies, the sites will be ranked according to their technical feasibility. The final decision will be made based on the feasibility study, which will assess the cost and benefits, technical, financial, and economic aspects. (Table 2.1 in Annex 2 breaks down identified sites into categories related to their stages of development.) All prefeasibility and feasibility studies will incorporate a climate and disaster risk screening process to ensure climate resilient constructions. The project will also finance climate resilient complementary infrastructure as needed (e.g., development of access roads within the schemes; on-farm infrastructure such as greenhouses, warehousing, cold chain and packhouses; mechanization and post-harvest support equipment; water and soil moisture sensors, precision agriculture, soil testing, etc. to improve productivity).

40. **Rwanda has gained extensive experience in developing relatively large irrigation schemes and small-scale irrigation technology through the completed RSSPs and the LWH Project, and the ongoing SAIP**. **Additionally, under the agriculture PforR-2, public-private partnerships (PPPs) are being developed in schemes** covering a total area of 2,940 ha. Important lessons have already been learned to inform future support of new irrigation schemes, such as: (i) the development of PPPs needs to recognize the context of the country, available private sector operators and the nature of investment required in these small schemes; (ii) improving access to marketing through long-term contracts with value chain operators contributes to sustainable production and de-risking of irrigation agriculture; (iii) commercial viability and feasibility studies are of critical importance especially in providing the private sector evidence of returns and thus garnering interest to invest; and (iv) recognition of Water User Associations (WUAs) as legal entities and their role in the management of schemes should be clearly defined and supported through policy. Empowering WUAs to collect user fees to fully or partially cover operation and maintenance costs also allows WUAs to enter contracts in PPP arrangements or with value chain operators. The implementation of RSSP and LWH projects confirmed that addressing value chain segments and actors consistently and systematically from inputs to market is essential for ensuring the smooth operation of the entire system and for laying the foundation for effective linkages between all participants. In this context, building formal, public-private partnerships with business actors proved essential for sustainability. Project investments in marketing and irrigation infrastructure turned into catalysts for agri-business investment and development of partnerships with smallholders. New value chain partnerships leveraged transmission of knowledge, financing and

technology from agribusinesses to farmers.

41. **The project will contribute to improving water governance through dedicated activities.** The sub-component will support the targeted beneficiaries to establish, organize, and strengthen irrigation WUAs in all of the 37 sites. Activities will also seek to incentivize farmers to adopt energy-saving technologies for water management such as use of solar pumps. To ensure financial sustainability and adequately cover for O&M of these schemes, the GoR with financial support from JICA and technical support from the World Bank, is developing an irrigation strategy for governance and institutional arrangements. The Project will in part implement this strategy through the TA provided to establish and strengthen WUAs and related governance structures for the irrigation infrastructure.

42. **The project will promote equality in accessing resources and services, taking into account women's, youth's, and men's priorities, and establish processes to elect women and youth representatives in key positions in the WUAs.** This should ensure reasonable levels of representation of all gender groups in management, water control and decision-making, thereby addressing a key constraint to women's access to irrigation (institutional representation). The project will bring in new and innovative approaches to support WUAs to sustainably manage the project-funded irrigation schemes. To increase ownership, activities will focus on: (i) establishing and strengthening the irrigation institutions from scheme to national level, with a focus on women and youth participation; and (ii) implementing national policies, strategies, and regulations related to sustainable management of irrigation schemes in Rwanda. An integrated agricultural water management system can help respond to climate risks and impacts. To harmonize interventions while avoiding overlap, the project will liaise with existing capacity building projects including the Water Management Capacity Building project (WAMCAB) under JICA as well as capacity building programs undertaken by other organizations.

Subcomponent 1.2: Land husbandry (US$19 million equivalent)

43. **The objective of this subcomponent is to protect the watershed areas that drain to the irrigation sites under Subcomponent 1.1, increase the productivity of these areas, and prevent soil erosion.** This sub-component will finance complementary land husbandry and climate smart agronomic measures for soil management (erosion prevention and control; improving fertility, structure, cover, organic matter) which will also help in carbon sequestration. The land husbandry work will cover 31 sites with a total area of 10,986 ha. Activities will enhance climate resilience among beneficiaries and are necessary to protect and ensure sustainability of the irrigation infrastructure developed under Subcomponent 1.1. Land husbandry studies will be carried out for each site during the feasibility study and detail design phases of the irrigation schemes. Activities under this subcomponent will include soil conservation measures and infrastructure appropriate to differing slope categories (e.g., bunding, green manuring, progressive and radical terracing, see Table 2.2 in Annex 2 for land husbandry measures proposed by slope category). Given the acidity of Rwandan soils, additional activities such as liming may be necessary. Agricultural productivity will be enhanced in irrigated and in non-irrigated areas by delivering a combined set of land husbandry techniques that include improvements in soil fertility such as use of improved seeds and composting, and increase farmers' capacity and knowledge. Beneficiaries will participate in the selection of appropriate climate sensitive practices and technologies. The project will seek to involve women in the activities under this sub-component to decrease the gender gap in the cultivation on erosion protected land.

Subcomponent 1.3: Innovation and services for agri-business value chain development (US$37 million equivalent)

44. **The objective of the subcomponent is to increase value addition and marketability by addressing critical constraints that directly affect the commercialization of the targeted value chains**. The project will finance matching grants to facilitate access to production and agribusiness assets, service provision and technical assistance to commercial producers and agribusinesses, and investments in the development of technology and capacity in the public seeds system that underpins the private seeds supply chains.

45. **Based on specific analyses for each value chain, the project will finance the interventions that support commercialization.** Annex 3 provides a non-exhaustive list of interventions that may be supported by the project. While public goods type of investments will initially be targeting the six *prioritized value chains*, investments in private goods and services under e.g., the grants program will be open to all value chains to be able to respond to changing market opportunities. All investments will be based on clear evidence of returns and intervention will address the market failure. Examples are: (i) *for rice*: improvement of commercialization of long grain rice, mainly on the domestic market; (ii) *for maize*: reduction in aflatoxins through improved processing and drying infrastructure, to expand access to domestic and regional markets; (iii) *for cassava*: increasing processing infrastructure to create diversified products such as cassava starch and refined flour, with a focus on domestic and regional markets; (iv) *for horticulture*: reducing post-harvest losses, promoting value addition for greater reach in domestic, regional and international markets; (v) for *Irish potatoes*: setting processing infrastructure to expand into sectors like potato processing, with a focus on the domestic and regional markets; and (vi) *for beans*: investments in new marketing models to target specific market niches for different varieties of beans and development of the processed bean products, including canned beans sector, for the domestic, regional and international markets. These interventions will be delivered through a mix of instruments, including a Matching Grant Scheme (which will finance up to 50 percent of the asset costs and can be complemented by the credit line under Component 2), service provision, and technical assistance. CSA approaches will be promoted under the different activities, as will the inclusion of women and youth.

46. **The project will support the development of a market-oriented seed system by strengthening the seed system in RAB.** Building a market-oriented seed system will lead to an increase in the adoption of innovative and climate resilient seeds production. The project will finance the following interventions in this area: (i) developing, testing, and establishing demo plots for new varieties of seeds and climate resilient agronomic practices; (ii) training and piloting new climate-smart technologies, including measures specifically targeting/involving women; and (iii) scaling up pre-basic and basic seeds production. To be more efficient, some interventions, such as development of seed laboratories to meet the standard of quality seeds, will be shared across value chains. The project will utilize RAB's regular services and RAB scientists to improve: (i) the capacity for disease assessment and management, (ii) on-field seed production practices, and (iii) climate-smart harvest and post-harvest practices across value chains. This will be in support of an enabling environment of an effective service delivery for strengthening the seed system that will be informed by the climate related risks and impacts, and greatly contribute towards the commercialization and competitiveness of the selected value chains. Wherever possible, the project will also leverage interventions to improve seed systems implemented by other projects (such as those implemented or supported by the Alliance for Green Revolution in Africa (AGRA), Hortinvest, Eastern and Central Africa Bean Research Network (ECABREN), HarvestPlus, SAIP, etc.). These interventions support the development,

release and dissemination of new, hybrid, drought resilient varieties of seed; development of seed laboratories to meet the standard of quality seeds; establishment of demo-plots and training of farmers on use of modern inputs and equipment among others.

47. **The project will strengthen market linkages and value addition** (such as through processing), to facilitate trade and increase value accrued to its beneficiaries. The project will finance the following interventions: (i) technical assistance to private value chain actors to meet SPS and other quality requirements of the market, with an additional focus on new food safety and SPS risks that may emerge from and be exacerbated by climate change; (ii) mainstream women and youth engagement in agriculture to enhance CSA appropriate innovative technology in production and commercialization of different value chains; (iii) fostering linkages between farmers and buyers, through support of good quality and bankable business plans development – plans incorporating training of farmers on and investments in climate resilient technologies, green technology and renewable energy (e.g., solar powered cold storage or driers) would be prioritized, improved post-harvest handling for reduced losses and waste; (iv) undertaking capacity building activities in post harvesting handling, processing, and marketing; and (v) technical support to value chains actors in marketing and for improved produce aggregation models for cooperatives. In addition, the project will also provide financial assistance in the form of matching grants that will be used for asset and service acquisition by the beneficiaries, to help modernize the sector.

48. **The matching grants will be managed by BDF**, considering its extensive experience in administering grants in Rwanda. Strong technical support would also be provided to the applicants to prepare viable business plans that incorporate CSA approaches and practices, which would increase their probability of accessing the grants and credit from financial institutions. It will cover up to 50 percent of the eligible capital investments that linked with long-term loans from financial institutions. The matching grant scheme would be open to commercial farmers, cooperatives, and SMEs in all agricultural value chains. To ensure the project is as inclusive as possible, a window for women and youth led proposals will be added in the various calls of proposals for projects to be supported by the facility. The technical assistance that will provided to women will increase financial literacy and awareness of financial services, thereby addressing one of the main constraints to women's access to finance. The matching grants would enable grantees to invest in high-cost productive capital assets (such as cold storages, processing infrastructure etc.), which beneficiaries found challenging to develop without public support. These assets would be instrumental in the commercialization of the selected value chains.

49. **The project will also finance the establishment and operation of an Innovation Challenge Fund**, which will increase access to finance through an open, competitive, and transparent application process. Beneficiaries will receive a grant of up to 70 percent of the costs and with the 30 percent beneficiary contribution being either in cash or in-kind. The objective is also to test or scale-up ideas developed by value chain actors and other service providers in the agri-food chains. An Innovation Challenge Fund Manual will be developed, laying out the detailed process of the program. The Fund will finance technologies in agri-food value chains, including digital agriculture technologies such as e-extension, traceability, fintech, digital market access services, etc. Eligible activities will also include disruptive solutions to address challenges existing in one or across different value chains. The Innovation Challenge Fund will be administered by BDF. The Innovation Challenge Fund will have various rounds of calls for proposals and projects will be competitively selected based on many criteria including potential impact, degree of innovation, use of climate adaptation and mitigation approaches, implementation capacity and sound business plans.

50. The project will finance interventions to: (i) support emerging Value Chain Platforms (VCPs); and (ii) improve VCP models to achieve better results and sustainability. Beneficiary value chain actors will be encouraged to join the regular Agriculture Public/Private Dialogues (Agri-PPDs) and VCP meetings at national and district level, through which business-enabling factors and challenges in the value chains are identified and addressed. Investments under the project will commence in the *prioritized value chains* but if successful, these investments may be scaled up to also cover other value chains. In addition to addressing the regulatory environment issues, these platforms will further strengthen the capacity of value chain actors, promote collaboration and development of joint agribusiness projects with other private sector actors and therefore, contribute to sustaining project outcomes. Overall, the planned scaling up of irrigation, climate-proofed feeder roads, storage and processing infrastructure, use of stress tolerant seed varieties, mechanization, value addition, markets and insurance services will support more effective adaptation to climate risks in these value chains.

Table 3: Project support for private investments

Instruments	**Matching grant**	**Challenge fund**	**Credit line**	**Insurance premium subsidies**
Components	1.3	1.3	2.1	2.2
Target VCs	Open for all agriculture production and value chains			
Target investments	Capital investments by commercial farmers, cooperatives, and SMEs	Innovative investments by youth	Agriculture production and post-harvest finance	Agricultural production that are insured

Component 2: Agricultural Finance and Insurance (US$35 million equivalent)[28]

51. **Despite its critical importance for economic development and poverty reduction, the Rwandan agriculture sector lacks sufficient access to financial services** – below 5 percent of the agricultural GDP. This is in part due to the demand-side issues such as low productivity, limited usage of high-quality inputs, and market access. But at the same time, inefficiencies in the financial sector contribute to an inadequate supply of affordable financial products and especially credit. There is an acute market failure in the provision of financial services to agriculture producers, especially at the bottom of the pyramid with commercial banks focusing mainly on well-established and large agribusinesses such as processors and traders while most MFIs and SACCOs offer standard loan products that are not suitable for agriculture production. As a result, smallholder farmers mainly rely on informal finance sources such as savings groups, family, and friends.

52. **In this context, the project intends to set the foundation for facilitating private sector finance to transform the agriculture sector from largely subsistence farming to a more commercially oriented, value-creating sector.** The project complements the AFIRR Project which proposes a dedicated credit-line window of US$40 million for agro-processing companies. Together, the two projects will contribute to the GoR initiative to establish an Agriculture Finance Facility for the sustainable growth of the agriculture finance market in Rwanda.

53. **The objective of this component is to increase access to financial products and services to farmers and**

[28] Beyond the initial US$35 million allocation, the component can be scaled up via the unallocated component of US$40 million. There will be a market assessment and the component will be scaled up based on evidence for the successful implementation of component 2.1 and completion of the component workplan and budget.

cooperatives for the commercialization of the sector. The project will achieve this through a two-pronged approach: (i) reduce risks and challenges faced by agricultural value chains through strengthening market linkages and scaling up agriculture insurance; and (ii) boost the supply of agricultural finance by addressing financial market inefficiencies through enhanced use of credit market infrastructure, and through technical assistance for financial institutions to build institutional capacity and use of technology. The component will have two subcomponents:

Subcomponent 2.1: Scaling up agricultural finance (US$15 million equivalent)

54. **The subcomponent objective is to set the foundation for expanding the supply of affordable financial services and products,** especially credit in the agriculture sector, thereby enabling investment and, ultimately, agricultural transformation. The subcomponent will finance a credit line for production and post-harvest finance and institutional capacity development (TA) for participating financial institutions, which will contribute to a sustainable provision of financial services and products.

55. **The proposed interventions intend to address two primary supply-side constraints that led to limited access to financial services in the agricultural sector, especially credit**. Firstly, most Financial Institutions (Fis) have insufficient knowledge to lend effectively to the agriculture sector. Therefore, their risk management strategy is heavily skewed toward collateral, limiting the lending activities to relatively better-off businesses. This has an additional impact on women producers who often possess less collateral than men. Secondly, limited long-term finance hinders production and post-harvest investments and thus commercialization of the agriculture sector.

56. *Credit line for production and post-harvest finance*: The credit line will induce Participating Financial Institutions (PFIs) including commercial banks, MFIs and SACCOs to reach the agriculture sector. It will be managed by the BRD and channeled through PFIs. The target end-projects for PFIs are agriculture production and post-harvest by farmers and farmer cooperatives with priority given to female-led and climate smart projects. The credit line will be used for any commodities and businesses related to the agriculture sector in addition to the *prioritized value chains* targeted for the public investments under Component 1, from which potential financing opportunities will be introduced to the PFIs. The lending operations by PFIs will leverage the de-risking mechanisms covered under sub-component 2.2. PFIs will also leverage the BDF PCG scheme supported by the AFIRR project. The AFIRR project aims to strengthen and improve the design and operational efficiency of the partial credit guarantee (PCG) scheme through capital increase and technical assistance.

57. *Institutional capacity development:* The project will finance capacity building support for PFIs to finance agriculture production and post-harvest activities, while also supporting more efficient delivery of financial services at affordable costs. An efficient financial market will incentivize financial institutions to minimize costs of intermediation; encourage efficient mobilization and allocation of financial resources, leading to the sustainable supply of diverse and affordable financial products and services. Interventions will include the design of new products such as receivables financing, digitalization of financial services, financial literacy training, and will promote climate-smart agriculture. In response to the limited financial literacy and awareness of financial services among female farmers, the technical assistance will support Fis to tailor their financial products and communication strategy to addresses the gender gap. Interventions will also promote linkages with value chain development activities (subcomponent 1.3) and the use of risk management instruments such as crop insurance (subcomponent 2.2), the PCG scheme and the BLW supported by the AFIRR project.

58. **The credit line will use a blended finance mechanism with an objective to build the nascent agriculture finance market and over time transition to a market mechanism that can sustain and grow this further.** The wholesale credit will be blended with private capital, aiming to offer affordable terms to final beneficiaries. PFIs will be required to blend the project credit line funds with their own funds. The credit line share will be gradually reduced towards a greater share of market resources via a learning and review process on the product design. A review process and the revision of the blending ratio would be conducted semi-annually to ensure the pathway towards market pricing, while also factoring concerns on affordability. PFIs will be selected based on eligibility criteria including compliance with national prudential requirements, adequate appraisal standards, and capacity to meet project implementation requirements as will be further detailed in the Credit Line Manual. For their portion of the credit, PFIs will be allowed to set an interest rate which is sufficient to cover the costs, the risks inherent in lending, and an expected profit.

59. Since the product is novel, the initial disbursement from the component will require the satisfactory completion of the Credit Line Manual as well as development of an initial annual workplan and budget. Subject to a market assessment and the evidence for the successful implementation and completion of the previous workplan and budget, the component could possibly be scaled up using the unallocated proceeds. The details of this mechanism to identify the transition and scale up will be defined in the Credit Line Manual.

Subcomponent 2.2: Strengthening agricultural insurance (US$20 million equivalent)

60. **This subcomponent aims to strengthen the quality and effectiveness of agriculture insurance offered through the NAIS,** which seeks to de-risk the agricultural sector using market-based insurance mechanisms and fintech solutions. The focus will be to strengthen the NAIS, deploy fintech solutions and coordinate with activities supported under Component 1 to promote climate smart agriculture interventions. The World Bank (2019) identified the challenges facing the NAIS that included limited public and private sector capacity to design appropriate agriculture insurance products, limited availability of high-quality crop yield data and livestock data to develop insurance products and limited financial and insurance awareness among farmers. The subcomponent will seek to address these challenges by: (i) providing technical assistance to the private sectors to enhance their capacity to design and deliver appropriate agriculture insurance products to smallholder farmers through NAIS; (ii) supporting the public sector to strengthen agriculture data collection and storage and make it available for agriculture insurance use; (iii) investing in financial literacy and insurance awareness programs for Rwandan farmers with specific emphasis on reaching-out to women-headed farming households to ensure equal access to NAIS products and programs; and (iv) supporting deployment of fintech solutions. The agricultural insurance subcomponent will be implemented by the RAB Single Project Implementation Unit (SPIU), which will absorb the MINAGRI PIU team currently implementing NAIS.

61. **Agriculture insurance and fintech are expected to play an essential role in de-risking the agriculture sector and in enhancing credit uptake**. The project will promote bundling agriculture insurance with other services that include improved seeds, use of appropriate fertilizers and other technologies. The project will strengthen the linkages between credit and agriculture insurance to encourage financial institutions to increase credit to the agriculture sector, and thus help farmers adopt climate smart technologies. In addition, the project will support innovative digital technologies beyond the *targeted value chains*. The subcomponent will also seek to reduce the cost of financial service provision through fintech solutions.

62. **This subcomponent will finance the following activities**:

(i) *Support institutional strengthening, development, and delivery of appropriate agriculture insurance products*. Under this subcomponent, the project will finance investments to design high-quality insurance products and support institutional capacity building for the private sector. The project will support the development of appropriate insurance products beyond the value chains selected under CDAT, including for the livestock sector. Developed crop and livestock insurance products will include those responding to climate shocks. The private sector will be supported to deliver appropriate products in cost-effective ways through crowding in regional insurance actors[29]. The support provided will go towards strengthening agriculture data collection, including crop cutting experiments and establishing systems for livestock registration to speed up insurance uptake among farmers. The improved agriculture data will be available for other government planning purposes. The project will also strengthen the capacity of private sector and enhance the ability to deliver agriculture insurance in a cost-effective manner. In collaboration with agriculture insurance actors and Rwanda Insurers' Association (ASSAR) the project will examine a cost-effective way of delivering NAIS. The project will also promote active involvement of regional institutions in providing reinsurance services, thus strengthening local insurance retention.

(ii) *Premium co-financing*: The project will support increased agriculture insurance uptake through partial subsidies, in line with existing government program. The project will provide premium subsidies to farmers to encourage agriculture insurance uptake and enhance credit access. Subsidy access could be made conditional to adopting good farming practices, especially adoption of climate smart agriculture. The subsidy support will be offered in line with existing NAIS best practices. Women's access to the agriculture insurance and credit will be actively promoted through training and awareness creation that take into consideration their daily activity calendar. There is strong evidence that carefully designed or smart premium subsidy programs can be very effective in increasing demand for and uptake of agricultural insurance. (See Box 2 in Annex 4 for further details of the role of smart premium subsides in the context of Rwanda.) The project will promote bundling of agriculture insurance products with other services to ensure farmers have the right package of services necessary to improve their production.

(iii) *Awareness creation and outreach to both public and private agriculture insurance actors*: The project will fund activities aimed at increasing the pool of trained agriculture insurance underwriters, training of extension officers, developing and pilot-testing agriculture insurance training content for cooperatives, off-takers, and farmers. Awareness creation and training of farmers, farmer groups, farmer cooperatives will be undertaken through existing NAIS structures and use a gender lens. Special emphasis will be on women's participation through financial literacy programs that will be tailor-made to suit their daily activity calendar. This will address lower participation of women in insurance and credit programs through trainings that are women centric and fit their work schedule.

(iv) *Fintech solutions to enhance financial access.* The project will help establish a digital platform that will link producers and financial services. The objective of fintech solutions application will be to lower the cost of

[29] Rwanda is member of Common Market of Eastern and Southern Africa (COMESA) which has invested in reinsurance business through ZEP-Re whose mandate is to promote trade, development and integration in the insurance and reinsurance sector in Member countries. ZEP-Re has strong focus on agriculture sector having acquired majority shareholding of ACRE Ltd, a leading supplier of agriculture insurance products in Rwanda.

financial service delivery and strengthen the value chains' efficiency. The design of fintech solutions will consider specific challenges faced by women in accessing insurance products and services. The fintech solutions will allow smart contracts to increase transparency and openness in business transactions and enhance farmers' credit score thus increasing their access to finance and speeding up agriculture transformation.

Component 3: Project Management (US$15 million equivalent)

63. **This component will ensure the smooth implementation of the project**. As such, it will support all aspects of project management, such as: (i) project staffing and their training; (ii) procurement and financial management; (iii) environmental and social risk management and compliance; (iv) monitoring and evaluation; (v) equipment and operating costs; (vi) communication and knowledge management. The project will also finance technical assistance and analytics to address specific policy and regulatory framework aspects that are critical for unleashing opportunities in areas that fall under the scope of the project, e.g., competitiveness, commercialization, job creation, or attracting greater involvement of private sector, development of an appropriate policy framework for crop and livestock insurance in Rwanda that could provide clarity of subsidy targeting, product approval for subsidies and role and responsibilities of private and public sector players, etc.

Component 4: Contingency Emergency Response Component (CERC, US$0 million)

64. **This component will allow for rapid reallocation of the project's uncommitted funds in the event of an eligible emergency**. For the CERC to be activated, and financing to be provided, the Government will need: (i) to submit a request letter to the World Bank for CERC activation, and the evidence required to determine eligibility of the emergency, as defined in the CERC Annex to the Project Operations Manual; (ii) an Emergency Action Plan, including the emergency expenditures to be financed; and (iii) to meet the environmental and social requirements as agreed in the Emergency Action Plan and Environmental and Social Commitment (ESCP).

65. An amount equivalent to US$40 million is unallocated. This amount will be available for allocation during implementation to further support activities under the Project. For example, after a first pilot phase, supply of financial services and products in the agriculture sector could be scaled up, if successful implementation of Component 2.1 and supportive market assessment demonstrated its strong development impact and contribution to the Project development objectives. The details will be defined in the Credit Line Manual. If the scale up does not happen in full, the funds will be allocated to other project components or may be cancelled.

C. Project Beneficiaries

66. The target beneficiaries will be farmers, farmers' cooperatives, commercial farmers, and small and medium-sized agri-enterprises (agri-SMEs) across Rwanda. Beneficiary targeting criteria will include among others higher vulnerability of farmers to climate change and extreme weather events and volatility in agricultural production, as well as gender- or age-based needs and vulnerabilities.

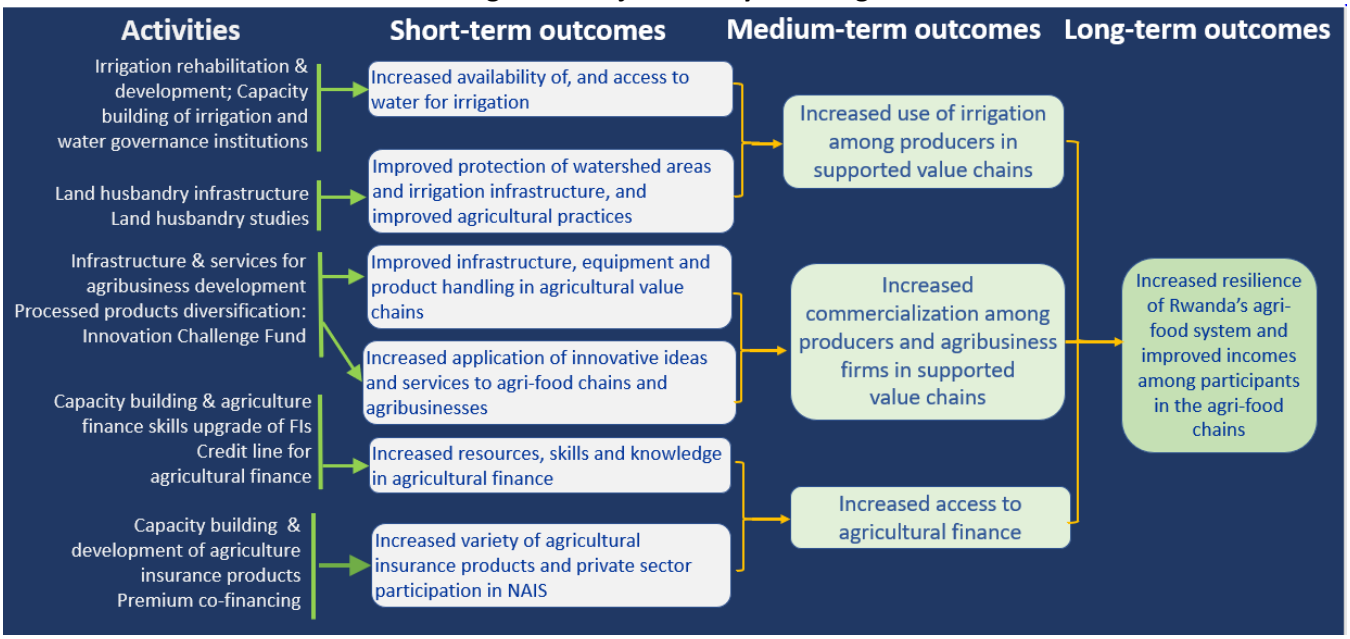
67. **The project offers an opportunity for gender, youth, and disability-inclusion**. It will apply a gender, youth, and disability inclusion lens both in design and implementation, with the aim to ensure that access to productive assets, financial services and information is adequately prioritized for these groups. As such, the scope

of project activities and eligibility criteria will be reflective of the relevant gender and age specificities or disability needs. The results framework will ensure that the indicators include relevant disaggregation, where applicable. Most importantly, the project design and implementation will be fully informed by the Government's Gender and Youth Mainstreaming Strategy (April 2019) in agriculture, which includes specific provisions on how to address gender gaps across five priority areas: (i) financial services; (ii) markets and value chain representation; (iii) extension support, inputs, and technologies; (iv) institutional mainstreaming capacity; and (v) empowerment and decision-making. Under both the scaling-up of agricultural finance and strengthening of agricultural insurance sub-components of the project, measures will be implemented to ensure that female and young farmers have equal access to these financial services.

D. Results Chain

68. **The project theory of change combines two transformative pathways to generate more marketable volumes in supported value chains.** The first pathway is through capital accumulation and consolidation driven by increased access to finance and use of innovative agricultural knowledge, CSA technologies and advisory services by farmers' cooperatives, independent commercial farmers and small and medium agri-enterprises (agri-SMEs) coupled with expansion of the productive base and land-use efficiency for commercial agriculture, through intensification and development of sustainable production systems in irrigated marshlands. The second is through de-risking farm and agri-enterprise investments and innovations by scaling up long-term credit for agri-business growth, strengthening linkages between credit and agricultural insurance, and building inclusive and durable market linkages that lead to greater access to finance. Together, these will foster the commercialization of selected value chains in the agricultural sector and, more broadly, contribute to improved resilience, livelihoods, and economic growth in Rwanda. Increase in volume or value of production sold within a given farm population over time is a reliable indicator of commercialization. The intended benefits of the project, therefore, have been sufficiently clearly defined and appropriate indicators identified, as presented in the Results Framework, to be used to assess whether these benefits are being realized during implementation. For the objectives to be met fully, it is important that the political and macroeconomic framework that has been stable in the past decade continues to be maintained, especially with the ongoing global COVID-19 pandemic that is posing a threat to Rwanda's economic model and the growth of the domestic and international market. Furthermore, a high level of coordination is required, given the complex and innovative nature of the project design associated with the multi-sectoral nature of the project design necessitating the combined technical expertise from several government agencies and non-state actors – MINAGRI, MINECOFIN, the Ministry of Trade and Industry (MINICOM), RAB, National Agricultural Export Development Board – NAEB, BRD, etc.), private sector, and other stakeholders.

Figure 1: Project Theory of Change



E. Rationale for Bank Involvement and Role of Partners

69. The World Bank is well positioned to provide financing and technical support for such a comprehensive operation.

70. **First, the World Bank can take advantage of its unique cross-sectoral expertise mix**; the Agriculture and Food Global Practice, the Finance, Competitiveness, and Innovation Global Practice, as well as from the IFC. The IFC is expected to be a collaborative partner to the project through engagement in Advisory Services technical assistance. This IFC work would support agriculture firms and businesses in agriculture value chains and the government in the areas of knowledge, capacity building and regulatory and legal reforms – especially where work will crowd in private sector engagement, facility investment and to open or create markets.

71. **Second, the World Bank has been successfully financing comparable, holistic value chain approaches in several countries**, such as the Angola Commercial Agriculture Development Project (P159052), the Republic of Congo Commercial Agriculture Project (P159979), the Sri Lanka Agriculture Modernization Project (P156019), the Mexico Grain Storage and Information for Agricultural Competitiveness Project (P160570), the India Assam Agribusiness and Rural Transformation Project (P155617), and the Mozambique Landscape Project (P149620.

72. **Third, the World Bank Group has significant experience with leveraging private sector participation and investment in the agri-food sector**, both on a larger scale (particularly through its various IFC operations) and on a smaller scale (through its various IDA and IBRD operations), in which de-risking the sector through various approaches is paramount.

73. **The World Bank is a leader in promoting disruptive technologies and innovation in agriculture** (e.g., fintech or agri-tech innovations), **with a focus on benefiting smaller producers and businesses**. One such example

is the recent Kenya Digital Challenge, facilitated by the World Bank which aims to bring one million Kenyan farmers onto an impactful digital platform over the next three years to enhance their productivity, profitability, and resilience.

74. To ensure financial sustainability and adequately cover for Operation and Maintenance (O&M) of irrigation schemes, including those developed or rehabilitated under the Project, the GoR with financial support from JICA and technical support from the World Bank, will develop an irrigation strategy for improved governance and institutional arrangements. The TA will undertake, among others, an in-depth assessment of: (i) Rwanda's Irrigation Schemes Management and Governance and Cost recovery; (ii) current water management/governance practices/policies for climate resilience and identify areas for improvement; (iii) ownership, and O&M arrangements for irrigation dams (at all levels of Government); (iv) collate relevant best practices and experience from other countries on these issues; and (v) provide recommendations and policy briefs for improving the sustainability of irrigation schemes.

75. The project will benefit from on-going interventions supported by other donor organizations and government initiatives in agricultural value chains. The interventions from these on-going projects address gaps currently existing in the value chains.

76. The project will converge with some of the donor projects and government initiatives which are highlighted. The on-going project AGRA supports the release and the dissemination of maize hybrid varieties with superior traits, the maintenance and the breeder's seed production from these varieties. The Rapid Breeding Project aims to deliver new genotypes of common bean, with higher nutrient value and to train African plant breeders in a new rapid method of plant breeding based on optimal mating designs. The Horticulture Development Project in Rwanda supports forwards and backward linkages, establishment of demo-plots and training of farmers on use of modern inputs and equipment. Another project that can be leveraged is the SAIP. The interventions made by SAIP pertain to establishment of horticulture demonstration plots and model farms across the project sites, capacity building of horticulture farmers in good agricultural practices, enhancing market linkages and supporting investments in primary production and postharvest facilities through matching grants.

F. Lessons Learned and Reflected in the Project Design

77. **Irrigation sustainability and strong market linkages are paramount**. Despite tremendous achievements by the completed LWH and RSSP projects in increasing productivity and profitability of hillside and marshland agriculture, their implementation has shown that further and more sustainable results could be achieved by refocusing on better and innovative irrigation management and cost recovery mechanisms for irrigation sustainability, by interventions leading to increased and stronger market linkages for farmers.

78. **In a favorable policy environment, critical interventions targeted at relevant actors can turn value chains around and set them on a path of sustainable performance, while unlocking multiplier effects in rural areas**. LWH, RSSP and the ongoing SAIP have demonstrated that such interventions should work along the entire value chain, both upstream (e.g., through irrigation and seed multiplication) and downstream (through post-harvest handling and organization of producers); and enabling the increased and higher quality production to reach markets. Comprehensive and bundled value chain interventions, and PPPs can facilitate the achievement of even better and sustainable results. Such investments, including those in marketing and irrigation infrastructure,

can turn into catalysts for agri-business investment and development of partnerships with farmers. These new value chain partnerships can then leverage transmission of knowledge, financing, and technology from agribusinesses to farmers, thereby effectively demonstrating the merits of the Government's PSTA4 commitment of turning from a market-actor into a market-enabler.

79. **Strong focus must continue to be placed on environmental and social risk management**. During the LWH and RSSP implementation, there were two project related fatalities. The contractor enhanced safety measures around the site to prevent more accidents. The SPIU, in response to these fatalities, adopted several recommendations to prevent future accidents, one of which included undertaking an environmental, health and safety audit of all project dam sites. The audit is intended to propose measures and actions to prevent accidents during the operation of these infrastructure. It is equally important for the new operation to ensure that contractors have adequate Occupational Health and Safety (OHS) plans in place and undertake training of their staff before the start of civil works to avoid similar incidents in the new operation.

80. **Good practices regarding social risk management should be replicated in this new operation**. In terms of resettlement, resettlement action plans (RAPs) were developed for irrigation subproject sites, however compensation was extended to sites without an irrigation component to pay for marginal land acquired for post-harvest infrastructures in the form of willing sellers and willing buyers. All compensation was done as per the RAPs before the start of civil works and Project Affected Households (PAHs) were offered employment opportunities during the terracing phase, as one of the livelihood restorations measures. The project offered equal opportunities for men and women, and youth. For gender, the project ensured that for any compensation to be made, the land titles and the bank accounts were issued in the names of both spouses as per the Rwandan law requirements. The Project established and operationalized Grievance Redress Committees (GRCs) in all subproject sites that helped in handling community complaints on time.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

81. **RAB will ensure the overall coordination of the project, through its current SPIU**. It will also be responsible for the implementation of Component 1 and subcomponent 2.2 activities. BRD will be responsible for the implementation of subcomponent 2.1. BRD will sign a memorandum of understanding or an implementation agreement with RAB to undertake this work.

82. **Given the multi-sectoral interfaces of this project and the long-standing practice in Rwanda, a Steering Committee (SC) will be established to provide strategic guidance during project implementation**. The Committee, chaired by MINAGRI and co-chaired by MINECOFIN, will meet quarterly and will include representatives of relevant government agencies (such as Ministry of Trade and Industry, RAB, NAEB, BRD, etc.), private sector, and other stakeholders. While a Secretariat will support the works of the SC, it will not be permanent and will not require dedicated staff. Instead, it will draw from the existing staff of the RAB SPIU and BRD. The RAB SPIU will head the Secretariat.

83. **RAB and BRD have been responsible for implementing several World Bank-funded projects in a satisfactory manner**. These include LWH and RSSP 3 (both closed), SAIP (ongoing), as well as the Renewable

Energy Fund Project, the Housing Finance Project, the Socio-economic Inclusion of Refugees and Host Communities in Rwanda Project, and the AFIRR project.

B. Results Monitoring and Evaluation Arrangements

84. **The M&E design for CDAT builds on the strong framework developed under the previous (RSSP & LWH) and current (SAIP) World Bank-funded projects in agriculture. It is also fully embedded into the MINAGRI M&E system and will be integrated into the data collection infrastructure under the Common Data Warehouse framework being developed for Rwanda's agricultural sector**. The indicators proposed in the CDAT results framework relate to key strategic indicators used for tracking the effectiveness of the PSTA. The project will rely on several data collection methods. To monitor implementation progress, uniform data collection tools and protocols pertaining to each indicator in the results framework will be developed and introduced. Project monitoring shall be coordinated by the RAB SPIU with input from BRD, to maintain interagency coordination within national and project components for M&E. Responsibilities for M&E activities will be assigned to appropriate units/staff teams within the implementing agencies and the project will ensure that the skills exist to monitor and evaluate projects according to the adopted blueprints. Reporting will be optimized to meet the different needs of different implementing and supervising agencies and organizations without unnecessary additional effort. A consolidated project progress report will be submitted to the World Bank every six months.

85. **To facilitate the necessary learning processes for policy makers and other key stakeholders, a "theory-based" approach (in conjunction with the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) criteria) will be adopted as the evaluation framework for the project**. The theory-based approach follows an iterative process of design, evaluation, and redesign based on lessons learned about whether specific interventions are successful or not, why they succeeded or failed and how they can be improved. The World Bank, through its Implementation Support Missions (ISMs), will provide guidance to MINAGRI/RAB/BRD on the key steps in theory-based evaluation; the principles for developing indicators (with specific reference to indicators in the project Results Framework); the need for indicator monitoring plans, and the importance of independent verification. The OECD Development Assistance Committee criteria are relevance, efficiency, effectiveness, impact, and sustainability and provide a framework with which to organize evaluations.

86. **The project, through the SC Secretariat, will maintain a knowledge sharing ecosystem that increases connectivity and interaction internally and among key stakeholders, partners, and clients; and improves the dissemination of information and advice**. Overall, the project's knowledge management plan will support a goal of providing project stakeholders and beneficiaries useful knowledge, when they need it, to support their implementation work and maximize impact.

C. Sustainability

87. **The project will focus on consolidating the results obtained from LWH, RSSP3, SAIP and PforR-2 and ensuring their sustainability**. These projects played a very central role in identifying the technical options, organizing farmers, constructing the infrastructure, and linking farmers to markets. The proposed project follows a market-driven approach to further expand, add value to and commercialize the selected value chains. At the same time, it focuses on strengthening private sector participation and partnerships throughout its interventions, in line with the principles and approaches that are outlined in MINAGRI's Leveraging Private Sector Strategy

(October 2019). Special consideration will also be given to youth to stimulate profitable engagement in agriculture and agribusinesses, through developing skills and promotion entrepreneurship. In addition, technical assistance for financial institutions intends to upgrade their financial products and risk management skills in agriculture finance, enhancing the supply of financial services for the sector beyond the project time frame.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis (if applicable)

88. **Economic and financial analysis (EFA)**. The EFA determines the viability of project activities from both the private (financial analysis) and the social (economic analysis) perspectives. The analysis from both perspectives is needed, as private and social costs and benefits of agri-food investments may diverge, owing to market failures or policy-induced distortions that may bias perceptions by economic actors in the selected value chain(s). Given the uncertainty about future price and production levels (due to external impacts such as climate change), special emphasis is placed on risk and sensitivity analysis. The following has been performed: (i) estimates of project profitability for those activities that can be subjected to quantified analysis: gross margin and cash-flow analysis, Net Present Value (NPV), Financial Rate of Return (FRR), Economic Internal Rate of Return (EIRR), as well as benefit-cost ratio (BCR) and switching values; (ii) sensitivity analysis of the project's viability and sustainability under differing time lags, cost and revenue scenarios; and (iii) summary of the key issues affecting economic and financial returns, including environmental and social externalities such as GHG emissions. The economic analysis results, when using a 6 percent discount rate, return a NPV of US$374.67 million, an EIRR of 23.7 percent and a BCR of 1.99, over a 20-year discount period. Sensitivity analysis demonstrates that the project can absorb substantial negative impacts – including delays in the start of the project benefits. The project is expected to reach an adoption rate of 11 percent by Rwandan farmers, while a minimum adoption rate of 6 percent is estimated for the project to return a positive NPV. Under the baseline scenario, the project is projected to reach payback in year 9 of the analysis. More details on the EFA conducted for this project can be found in Annex 5.

89. **Climate change and GHG accounting**. The project proposes several activities that can be captured with the GHG accounting tool EX-ACT. Under component 1 the project aims to invest in irrigation, land husbandry and innovation and services for agri-business development. Changes in the current, without-project and with-project scenario are presented with the project's investments incorporated, using aggregate figures for land use, as per the economic and financial analysis. First results show that the project emits a minor net amount of **224,945 tCO_2e** equivalent over 20 years, **11,247 tCO_2e** annually, due to increases in fertilizer usage and increased cropping intensity that are offset by climate smart agricultural practices. Net emissions from annual crops decrease by -190,321 tCO_2e over 20 years (-9,516 tCO_2e/year), while from improved input it increases by 632,851 over 20 years (31,643 tCO_2e/year). More details on the GHG accounting conducted for this project can be found in Annex 6.

90. **Mobilizing Finance for Development (MFD):** Rwanda is committed to developing a market enabling economy based on private sector engagement and investment. The project is therefore designed to directly support this approach by addressing private sector constraints, following the structured MFD cascade approach that will include a number of actions, such as: (i) improving the policy and regulatory environment for private sector investments in the agribusiness sector; (ii) support the development of a pipeline of scalable agribusiness investment opportunities; (iii) where applicable support PPP investments that are inclusive and enable SME integration; (iv) using public financing to enhance private sector investments to reduce transaction costs and risks

by; supporting partnerships between agribusiness and cooperatives, emerging small and medium enterprises and lead firms; strengthening and scaling up public and private institutions and schemes for agriculture finance; and working with innovative agri–services start-ups and producers to expand services provision; and (v) leveraging private sector capabilities through the use of matching grants, blended financing, and insurance products to scale-up investments where agreed. A menu of actions to operationalize the MFD approach will include:

(a) *Analysis*, *diagnostics, and research*: to conduct deep dive analyses on the selected value chains and develop concrete recommendations.

(b) *Providing support in policy reform*: to support the client to design and implement adequate policy reforms.

(c) *De-risking agriculture*: to identify and mobilize tools, techniques, and partners to develop creative ways to de-risk across the supply chain segments to transition to a commercialized agribusiness approach, this will include innovative easy to access financing models and crop insurance.

(d) *Facilitating multi-stakeholder collaboration*: to build multi-ministerial or multi-sector platforms to create direct collaboration and partnerships with the private sector through workshops, roundtables, conferences, and other modalities.

91. **Nutrition sensitive agriculture and food security.** The project will invest in improved nutritious food production, mainly through promoting high-value products and improving quality and safety along the supported value chains. Considering that food security has four pillars: (a) availability; (b) access; (c) stability; and (d) utilization, most project activities directly help strengthen food availability and access through a focus on expanding commercial agricultural output and strengthening market linkages. This will be particularly important as part of the post-COVID recovery, considering the disruption the pandemic caused across agri-food value chains. At the same time, activities that help reduce or manage risks related to agricultural production (e.g., irrigation development, expansion of agricultural insurance) are expected to have a positive effect on stability by reducing vulnerability to weather shocks.

B. Fiduciary

Financial Management

92. Based on an assessment conducted for CDAT, **the Financial Management (FM) risk is substantial**. The objective of the assessment was to determine whether the implementing entities have acceptable financial management arrangements, which will ensure: (a) that funds are used for the intended purposes in an effective, efficient, and economical way; (b) financial reports will be prepared in a reliable, accurate and timely manner; and (c) project assets will be appropriately safeguarded. The assessment covered the RAB SPIU and BRD. The assessment complies with World Bank policy and directives on investment financing.

93. **The key risks identified are**: (a) the innovative and complex nature of some activities thus increasing chances that some funds may not be used for their intended purpose; (b) staffing gaps in FM and internal audit to absorb the additional workload generated by the project; and (c) inadequate and delayed implementation of external and internal audit recommendations.

94. **The proposed mitigating measures are**: (a) developing detailed FM guidelines for the project as part of the Project Implementation Manual (PIM); (b) recruiting a dedicated FM Specialist and Internal Audit Specialist for this project at RAB-SPIU and a Project accountant at BRD with Terms of Reference to be agreed with the World Bank; and (c) enrolling the project into the Integrated Financial Management Information System (IFMIS) at RAB SPIU and the Bank FM System at BRD.

95. **The arrangements for project oversight and accountability are acceptable**. These arrangements comprise management oversight (i.e., Committee, RAB SPIU and BRD), internal oversight bodies (i.e., internal audit, audit committee), external oversight bodies (i.e., Office of the Auditor General, OAG, in relation to RAB SPIU and a Private Audit Firm recognized by the Institute of Public Certified Accountants of Rwanda in relation to BRD) and Parliament, which reviews the OAG's audit reports and approves the government's budget, including that of the project. Monthly consolidated financial reports are to be prepared by RAB SPIU and submitted to MINECOFIN for internal monitoring. RAB SPIU is experienced in World Bank-financed projects (e.g., SAIP). The existing FM arrangements of BRD provide reasonable assurance that the financing proceeds will be used for intended purpose in a transparent, effective, and efficient manner. The BRD PIU is experienced in World Bank-financed projects (Renewable Energy Fund, Rwanda Housing Finance Project and Social-Economic Inclusion of Refugees and Host Communities in Rwanda Project).

96. The overall FM residual risk rating is **Substantial**.

Procurement

97. Procurement for the proposed project will be carried out in accordance with the 'World Bank Procurement Regulations for Borrowers under Investment Project Financing', dated November 2020, hereafter referred to as 'Procurement Regulations'. The project will be subject to the World Bank's Anticorruption Guidelines, dated July 1, 2016 and beneficiary disclosure requirements.

98. The Project Procurement Strategy for Development (PPSD) is developed to understand the project implementation context, market situation, and associated potential risks to achieve value for money and the Project Development Objective. The PPSD has set out the selection methods to be followed in the procurement of Goods, Works, and Non-Consulting and Consulting Services financed under the project. The PPSD describes the overall project operational context, market situations, implementing agencies capacity and identifies possible procurement risks and mitigation measures. Following the market analysis, based on information obtained from the industry, and the implementing agencies' prior experience, the PPSD advised whether there is risk of supply market or not and concluded that there is adequate market in the country. The underlying Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

99. The proposed project will use Systematic Tracking of Exchanges in Procurement (STEP), a planning and tracking system that will provide data on procurement activities, establish benchmarks, monitor delays, and measure procurement performance.

100. A procurement capacity and risk assessment has been carried out by the World Bank for RAB and BRD as

the implementing agencies. The RAB-SPIU has adequate experience to administer and supervise procurement activities under World Bank financed projects. However, it has limited experience in selection and contract management of consultancy services. This is envisaged to have impact on procurement of consultancy services of the project including, feasibility studies, design studies, supervision consultancy services, and Technical Assistance. BRD has two full time qualified procurement specialists. Given the anticipated volume of project procurement, one additional procurement specialist will be recruited to assist CDAT in executing procurement activities in a timely manner. This will strengthen BRD's procurement and operational capacity in project implementation. Risks associated to project procurements are: (a) lengthy consultant selection processes and poor-quality deliverables from consultants due to limited experience of RAB-SPIU and BRD in managing consultancy contracts; and (b) inefficiency in procurement processes due to additional workload with recent increase of number of projects implemented by BRD and under staffing of RAB. Recommended risk mitigation measures are: (a) RAB in coordination with the World Bank will organize tailored training on selection of consultants; and (b) hire two additional procurement specialists in RAB and one additional procurement specialist in BRD.

101. Based on above outlined risks, recommended mitigation measures, and the wealth of experience at RAB and BRD in implementing World Bank-financed projects in recent years, the project procurement risk is rated "**Moderate**". The first Procurement Risk Assessment and Management System (PRAMS) at appraisal stage was done on April 2, 2021 and project procurement risk is rated "**Moderate**".

C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	Yes
Projects in Disputed Areas OP 7.60	No

D. Environmental and Social

102. Generally, the potential environmental, health and safety impacts under this project are expected to be site specific, local, reversible, and temporary and can be mitigated through appropriate mitigation measures. However, the project's risk rating is assessed as substantial for both environment and social risks due to the wide scope and complexity of the project structures and institutions involved, as well as presence of a relatively higher risk component that will support irrigation infrastructure (including dams). Overall, the project will undertake infrastructure works that could include irrigation infrastructure, both large and small-scale irrigation technology, solar pumps, water meters, on-farm infrastructure, such as greenhouses, warehousing, cold chain and pack-houses, processing, and value addition infrastructure such as dryers, shellers, or mills that will help increase commercialization.

103. The potential environmental and social risks and impacts from the project activities, both at construction and operation phases, are expected to be consistent with those generally envisaged during construction and infrastructure operation works and activities, including noise, dust emissions, vegetation clearance, soil erosion, accidents, and injuries etc. The envisaged intensified use of agrochemicals on consolidated farmlands presents associated risks like surface and underground water pollution, non-targeted

species loss, soil pollution and human poisoning. Other environmental concerns are the sustainability of water for irrigation, aquatic biodiversity consideration (ecological flow), competing demand for water for other purposes (provisioning ecosystem services), siltation of wetland, rivers, and water reservoir due to erosion from steep slopes, likely effluent discharge to the environment and air pollution from the agri-processing facilities. Additionally, in terms of social impacts, the project may involve some agricultural encroachers in the marshland areas considered government land who will need to be compensated or resettled in accordance with Environmental and Social Standard 5 (ESS5) if identified.

104. RAB will ensure the overall project coordination and will also be responsible for component 1 and subcomponent 2.2, while BRD will implement subcomponent 2.1.

105. Under component 1 (more specifically subcomponent 1.2) that will be managed by RAB, the project will finance rehabilitation and development of irrigation infrastructure, which would include construction of new and rehabilitation of existing dams (expected to be small dams). This subcomponent is a major contributor to the project's overall substantial E&S risk rating. More specifically, the construction of irrigation schemes may result in adverse health and safety and impact on affected communities as governed by ESS4, as well as adverse impacts on biodiversity and ecosystem services. It is noted that the project has positive environmental and climate change interventions in subcomponent 1.2 promoting land husbandry measures, protection of watershed areas and promoting soil conservation measures.

106. There are 37 potential irrigation schemes that have been identified with a combined command area of 17,673 ha. However, the final decisions on which schemes to include will be made based on feasibility and detailed design studies. For some of the schemes on the indicative list, detailed designs have already been prepared along with initial Environmental and Social Impact Assessments (ESIAs) during 2008-2018 in line with either national regulations or the World Bank's previous safeguard policies. In case any of these projects are selected for financing, they will be required to update these ESIAs and prepare other corresponding management plans in line with the World Bank Environment and Social Framework (ESF). This is included in the ESCP for the project. Any subprojects currently without an existing assessment would be required to prepare a new ESIA in line with the World Bank ESF. Additionally, where applicable, Resettlement Action Plans (RAPs) will be prepared and completed before subprojects can be released for tendering. All instruments will be consulted upon and disclosed by RAB before any tender can begin and included in the tender to ensure contractors are bound by the same requirements and costs of environmental and social risk management included in the overall costs.

107. Under component 2, the project also includes financing through BRD (through commercial Fis, MFIs, and SACCOs) to farmers and farmer cooperatives that require financing. As opposed to component 1 that focuses on the selected six priority supply chains, component 2 will extend financing for any commodities and businesses related to the agriculture sector in addition to the target value chains from which potential financing opportunities will be introduced to the PFIs. This substantially expands the scope of environmental and social risks to be screened for, assessed, and mitigated. The risks will be exacerbated by overall low capacity of the Fis for environmental and social risk assessment in the agricultural sector. Because component 2 will support existing agri-SMEs and there is a likelihood that these may have ongoing environment, labor (including child labor), health and safety (EHS) issues/risks like inappropriate use of agrochemicals, poor waste management practices, air, and water pollution etc.

108. Component 2 supports, via BRD, Fis including commercial banks, microfinance institutions and SACCOs whose Environmental and Social Management Systems (ESMSs) will need to be established, assessed, and strengthened in line with ESS9 during project implementation as a condition of accessing financing from BRD. In the case of SACCOs, the capacity is expected to be especially low. Therefore, it was agreed with BRD that SACCOs, as an initial condition of eligibility, will be required to have a simplified ESMS that will focus on an adequate process to screen investments against the List of Excluded Activities and then gradually strengthen their ESMS via training and technical support to be provided by BRD.

109. Additionally, the project involves support to the NAIS that would integrate E&S considerations in its agricultural insurance work. This can be initially achieved by including climate and biodiversity metrics into the agricultural insurance design. Subsequently, if insurance companies benefit from the financial support under the project, they would be able to benefit from the initial work by incorporating such considerations into the insurance products, including factoring them into the insurance premiums. This approach is becoming a globally accepted practice and there are initiatives within and outside the World Bank Group that can be built upon.

110. BRD will provide wholesale credits to PFIs. In terms of BRD's institutional capacity as a wholesale FI, BRD is already providing retail agricultural loans to private enterprises. BRD currently has an existing ESMS and two highly qualified full-time staff responsible for E&S Risk Management.

111. The ESMS for BRD was assessed and BRD has aligned it with the ESF requirements of the World Bank, in particular with ESS1, ESS2, ESS3, ESS4, ESS9 and ESS10. Importantly, BRD's ESMS that initially covered only BRD's direct lending has been strengthened by including a robust assessment and monitoring processes for lending via commercial Fis, whereby PFIs' systems and capacity for E&S can be systematically assessed by BRD.

112. BRD has also supplemented the ESMS with an industry guide specific to agricultural lending which is necessary to carry out activities under CDAT as the sector's risks are complex and require deeper understanding that cannot be provided by general cross-sectoral E&S risk management provisions. Additionally, BRD's ESMS has been strengthened in terms of its Stakeholder Engagement Plan (SEP) provisions as required by ESS10.

113. The updated ESMS has been approved by BRD's senior management and Board. BRD will subsequently disclose the updated ESMS on its website. This is expected before project effectiveness as detailed in the ESCP. In addition, to successfully implement its ESMS, BRD will need to meet the following requirements:

a) BRD will be required to also increase its institutional capacity – as feasible – to be able to effectively implement its ESMS, through internal training and continuous improvement of the supporting E&S procedures
b) A grievance redress mechanism for complaints including for labor grievances (including gender-based violence) will also be part of the BRD ESMS.

c) BRD will ensure that PFIs have ESMSs in place, which are acceptable to the World Bank as a condition of eligibility of the PFIs for financing under the credit line and ensure that E&S provisions are included in master financing agreements. PFIs will monitor the entire World Bank-financed portfolio and report to BRD, in a manner which is acceptable to the World Bank. BRD will be required to monitor and supervise the environmental and social performance of the PFIs and their portfolio exposures associated with the credit line. PFIs' ESMS will include, but not be limited to, environmental policies, goals, procedures for the identification, assessment, and management of the environmental and social risks and impacts, monitoring and review procedures, and other elements of ESMS, satisfactory to the World Bank.
d) Substantial capacity building measures will be required to help PFIs establish and/or improve their knowledge of E&S risk management in the agricultural sector, and BRD will be required to prepare and implement an E&S Capacity Building Plan that is included as a required instrument in the ESCP.
e) In terms of the insurance subcomponent, product design will consider Environmental, Social, and Guidance (ESG) factors (importantly, climate change considerations), to which extent RAB will include these in the market analysis, and any other relevant outcomes regarding the NAIS; this may necessitate capacity building of private sector insurers as they take on the responsibilities envisioned by the project.
f) BRD will be required to collect annual E&S reporting from PFIs and provide an annual E&S report to the World Bank (via RAB SPIU), and report any material incidents or accidents related to the World Bank's financing within 3 days of becoming knowledgeable about them, which will require cascading of these obligations to the Fis via legal agreements.
g) Activities financed via PFIs will abide by the List of Excluded Activities (see Annex 7) that is to be adapted into BRD's ESMS as well as PFIs' systems regarding the World Bank financing, provided that this financing can be effectively ring-fenced at the time of loan applications by the beneficiaries. If not, the exclusion list will apply to the entire class of the financial products supported with the World Bank financing (e.g., all working capital loans to agricultural and/or agribusiness MSMEs).
h) BRD is also required to apply relevant ESS2 provisions to its own workforce. To that extent, BRD has reviewed its existing Labor Management Procedures to ensure consistency with ESS2.

114. For the project activities to be managed by RAB, the GoR has prepared, or will be preparing as part of the ESCP, environmental and social instruments that will guide the management of risks and impacts associated with the project. Since most of the subproject sites will not be known until project implementation, it is envisaged that the project will be guided by the following instruments: Resettlement Policy Framework (RPF), Environment and Social Management Framework (ESMF), ESIAs for designed Irrigation schemes, Labor Management Procedures (LMP), and SEP.

115. The environment and social instruments are disclosed in country and on the World Bank's external website. The instruments prepared incorporate relevant guidance from the World Bank's Environmental, Health and Safety Guidelines (EHSG) i.e., general and sector specific guidelines. During project implementation, ESIAs, EMPs and RAPs will be prepared as required.

116. The project could potentially involve significant land acquisition and resettlement due to the nature of the activities, especially those under component 1 of the project. These include among others, irrigation schemes, on-farm infrastructure, such as greenhouses, warehousing, cold chain, and pack houses. Some of

the supported on-farm infrastructure will be privately owned and constructed through Fis. Others, especially those determined to be public goods, will be directly fully or partially financed by the project. The pressure to avail more land for large scale commercialization may give rise to a limited degree of social conflict which should be properly addressed during activity design and through the implementation of the SEP. Any expropriation or costs related to involuntary resettlement will be paid for by the Government through counterpart funding.

117. In terms of Environmental and Social overall coordination and reporting, RAB SPIU will undertake overall environment and social risk coordination and will be responsible for overall reporting on E&S issues. RAB SPIU will recruit additional field-based Environment and Social specialists and the required number of staff will be detailed in the ESCP.

118. MINAGRI, RAB and BRD have implemented several World Bank-funded projects in a satisfactory manner. These include the LHWP and the third RSSP (both closed), the ongoing SAIP and PforR-2, the Renewable Energy Fund Project, the Housing Finance Project, and the Socio-economic Inclusion of Refugees and Host Communities in Rwanda Project. RAB currently has one environmental specialist and one social development specialist for the PIU under SAIP. With this new operation, districts will require staffing and training on the ESF and the related ten ESS in order to manage environment and social risks associated with the project.

119. **MINAGRI & RAB Environmental and Social Risk Management.** Given the additional workload to RAB, eight Environment and social specialists will be recruited, with one environmental and social expert based in each District to support project activities. The overall coordination of the environment and social risk will be done by the two E&S staff based at RAB SPIU. The project will explore the option of recruiting additional E&S specialists to complement the team at RAB SPIU in managing E&S risks of activities under NAIS.

120. All these institutions will need to be oriented on ESFs and specific standards where applicable through the SEP. There is opportunity to inbuild E&S capacity building into Component 4 which already has a capacity building subcomponent. The E&S capacity needs (short and long-term) of the implementing agencies will be costed under Component 4.

121. All participating agencies in the project are responsible for the application and compliance with the ESF and ESSs. To comply with these standards, five ESF instruments have been prepared by the client, namely the: i) ESMF, which is the ESF umbrella instrument; ii) RPF; iii) LMP, which includes OHS procedures; iv) SEP; and v) ESCP. All the ESF instruments were consulted upon, locally disclosed by the client on November 17, 2021, and on the World Bank external website on December 2, 2021, except the SEP which was disclosed by the World Bank on December 8, 2021. Furthermore, these ESF instruments will be included in the PIM. The other instruments will include: i) a COVID-19 plan; and ii) the CERC addendum protocol. Other site-specific instruments including ESIAs, ESMPs, RAP will be prepared during implementation.

122. The project will prepare: (i) a COVID-19 Prevention and Risk Management Plan two months after effectiveness; and (ii) a CERC protocol addendum to be included in the PIM will be ready 45 days after effectiveness. The COVID-19 plan will be owned by the PIU, in collaboration with all agencies, supervisors

and contractors. This will be prepared in coordination with health authorities and local governments. The plan will define the actions and responsibilities of all PIUs, contractors and subcontractors.

123. The project will conduct annual audits to review: (i) the application of all E&S instruments; (ii) specific HR processes and contracting practices for the project; (iii) environmental impact and health and safety management; (iv) provisions and application of the grievance mechanisms; and (v) occupational health and safety practices, to ensure compliance with the requirements of ESS2 and other relevant ESS. Tender documents and contracts will require contractors to comply with the agreed LMP, national regulations, labor and working conditions, occupational health and safety plans and procedures. Contractors will also be requested to prepare Construction-Occupational Health and Safety Plans (COHSP) based on the measures described in the LMP, ESMF, ESIA/ESMP and the requirements of ESS2. The project and its contractors and subcontractors will ensure application of the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines), Good International Industry Practices (GIIP, such as Occupational Safety and Health Administration, OSHA) to minimize or reduce adverse impacts on human health and the environment.

124. In accordance with OP/BP 7.50 (Projects on International Waterways), the riparian notification process for the Project was completed before appraisal. As of December 3, 2021, which was the deadline set out in the notification letter sent to the riparian countries to respond on the Project, no responses were received.

125. **Gender and Gender-Based Violence (GBV).** Prominent GBV risks associated with the target areas include public harassment, which may involve verbal insults and physical abuse of project workers by contractors. Women seeking employment could likely exacerbate these risks as contractors tend to take advantage of those women seeking opportunities. A project specific GBV risk assessment was carried out using the Sexual Exploitation and Abuse/Sexual Harassment risk screening tool. The assessment rated the project as Moderate. During the first quarter of implementation, the project will prepare a GBV Action Plan which will then form part of contractor's ESMP.

126. **Labor and Working Conditions**. The project will include direct workers, contracted workers, primary supply workers, and government workers, which will therefore need to meet requirements for terms and conditions of employment, non-discrimination and equal opportunity, worker's organizations, child labor, forced labor, a grievance mechanism and occupational health and safety plans. Stakeholders and beneficiaries working in connection with the project full-time or part-time will remain subject to the terms and conditions of their existing public sector employment or agreement unless there has been an effective legal transfer of their employment or engagement in the project. The project will also include Occupational Health and Safety procedures or plans and a grievance mechanism for labor disputes as required by ESS2. In line with ESS9, BRD's own labor management policies shall be reviewed for compliance with ESS2 and in case gaps are identified, adjusted.

127. **Stakeholder Engagement**. The project will ensure early, continuous, and inclusive (including vulnerable/disadvantaged groups) stakeholder engagement in accordance with the SEP. The SEP addresses specific risks identified by stakeholders, including the risks to vulnerable persons, etc.) and will be updated as and when necessary. The objective is to establish a systematic approach for stakeholder engagement, maintain a constructive relationship with them, consider stakeholders' views, promote, and provide means

for effective and inclusive engagement with project-affected parties throughout the project life cycle, and ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner. The project will set up a project-specific grievance redress and feedback mechanism for people to report concerns or complaints if they feel unfairly treated or are affected by any of the sub-projects.

128. The project will also conduct annual surveys to assess beneficiary satisfaction with the interventions and modes of communications implemented in this project. The surveys will promote increased citizen engagement throughout the project implementation.

129. **Grievance Redress Mechanism (GRM)**. A locally based project GRM, proportionate to the potential risks and impacts of the project, will be established prior to the commencement of project activities drawing from the lessons learnt from LWH and RSSP implementation. In addition, a GRM specifically for direct and contracted workers will be provided. The project operational manual will detail the specific timelines for addressing the received grievances from the community.

V. GRIEVANCE REDRESS SERVICES

130. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, because of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI. KEY RISKS

131. The main sources of risk are the following:

(i) **Macroeconomic (Substantial):** Rwanda's macroeconomic framework has been stable in the past decade. However, the ongoing global COVID-19 pandemic is posing a threat to Rwanda's economic model with Rwanda now rated as being at moderate risk of debt distress. The impact of COVID-19 continues to affect two main strategic sectors, eco-tourism and air transportation, that have absorbed much public investment in recent years. As such, the country's macroeconomic risks are intensifying with possible long-term negative effects on the economy and a narrowing of the country's fiscal space. For this reason, the macroeconomic risk is rated as Substantial. Strong government actions on national level, some of which in conjunction with World Bank support, will help mitigate these risks. The World Bank Group will continue to engage in macro and fiscal dialogue with the authorities to support an optimal balance between public investments in long-term strategic sectors and preserving the fiscal space for investing in human capital and agriculture. Bank support (including under development policy

operations) allows pro-active engagement in the overall macro-fiscal policy dialogue with the authorities and provides opportunities to flag issues as they emerge.

(ii) **Technical design of the project (Substantial):** A key risk component, deemed as Substantial, is associated with the innovative nature of the project design. The project is multi-sectoral in nature and will rely on the combined technical expertise from at least two government agencies, MINAGRI and MINECOFIN, respectively; other important institutional stakeholders, such as MINICOM, will have to be closely consulted and possibly involved in specific activities pertaining to downstream value chain activities. Another risk factor associated with the project design stems from the novelty of several of the project approaches, at least in the country context. The government's transition from doer to enabler and the focus on public-private facilitation in agriculture are new in Rwanda and will inherently be subject to a learning curve and adjustments along the way. The project design has built-in flexibility to adapt to challenges that may arise during implementation.

(iii) **Fiduciary (Substantial):** The main risks are associated with the complexity of some of the activities, which increases chances that some funds may not be used for their intended purpose; with staffing gaps in FM and internal audit to absorb the additional workload generated by the project; and with inadequate and delayed implementation of external and internal audit recommendations. The project will ensure that capacity building – including FM guidelines, additional staff, and enrolment of project into relevant FM information systems – is available for the project's fiduciary teams.

(iv) **Environmental and Social (Substantial)**: The environmental and social risk is rated as 'Substantial'. This is due to the multi-sectoral nature of the project coupled with the broad agricultural activities to be financed countrywide. Environmental, Social Health and Safety (ESHS) risks and impacts are expected under Components 1, 2, and 4 including potentially significant land acquisition and resettlement due to the nature of the associated activities. The likely E&S risks will be mitigated through avoidance of some of the impacts by proper design of subprojects. Framework instruments were prepared to guide the preparation of site-specific plans aimed at addressing environmental and social risks as sub-projects identified. Any residual risks and impacts will be compensated for during implementation phase and the obligations for managing E&S risks and impacts will be incorporated into tender and contracts documents. Capacity related risks will be mitigated by recruitment of Environmental and Social Specialists at the PIU. Once the recommended mitigation measures are implemented, the residual risks are expected to be moderate during the implementation phase of the project.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY: Rwanda
Commercialization and De-Risking for Agricultural Transformation Project

Project Development Objectives(s)

The Project Development Objectives are to increase the use of irrigation and commercialization among producers and agribusiness firms in supported value chains, and to increase access to agricultural finance.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
To increase the use of irrigation and commercialization in supported value chains							
Increase in cultivated area being irrigated in new and rehabilitated schemes (Percentage)		14.00	14.00	45.00	55.00	65.00	75.00
Of which increase in cultivated area in new schemes (Percentage)		0.00	0.00	40.00	50.00	60.00	70.00
Of which increase in cultivated area in rehabilitated schemes (Percentage)		32.00	32.00	50.00	60.00	70.00	80.00
Increase in share of agricultural produce sold by		0.00	5.00	10.00	15.00	20.00	25.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
participating producers (Percentage)							
Increase in in value of agricultural production quantities procured by participating aggregators (Percentage)		0.00	0.00	15.00	30.00	50.00	70.00
To increase access to agricultural finance							
Increase in number of borrowers obtaining agricultural loans from participating financial institutions (Percentage)		0.00	20.00	40.00	60.00	80.00	100.00
Of which 30% are female borrowers (Percentage)		0.00	30.00	30.00	30.00	30.00	30.00
Total number of benefitting households reached by the project (Number)		0.00					235,977.00

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Component 1: Value chain and infrastructure development							
Number of sub-projects benefitting from matching		0.00	65.00	145.00	290.00	435.00	524.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
grants provided by the project (Number)							
Commercial farmers (Number)		0.00	50.00	100.00	200.00	300.00	350.00
of which female commercial farmers (Number)		0.00	20.00	40.00	80.00	120.00	120.00
Cooperatives (Number)		0.00	10.00	25.00	40.00	60.00	75.00
SMEs (Number)		0.00	5.00	20.00	50.00	75.00	100.00
Increase in net value of produce aggregated to reach the market (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Maize (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Rice (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Beans (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Irish potatoes (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Vegetables (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Cassava (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Fruits (Percentage)		0.00	4.00	8.00	15.00	20.00	25.00
Area provided with new/improved irrigation services (Hectare(Ha))		0.00	0.00	690.00	8,860.00	12,578.00	12,890.00
Area provided with new/improved land husbandry practices with climate resilient features (Hectare(Ha))		0.00	0.00	1,050.00	5,080.00	7,580.00	7,580.00
Number of new innovative ideas, products & services		0.00	10.00	20.00	30.00	40.00	50.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
supported through the Innovation Challenge Fund (Number)							
Of which 40% are female-led (Number)		0.00	4.00	8.00	12.00	16.00	20.00
Food loss index (as measured by change in post-harvest losses) (Percentage)		0.00					0.00
Rice (Percentage)		20.00			17.50		15.00
Maize (Percentage)		22.00			17.00		12.00
Beans (Percentage)		14.00			10.00		6.00
Irish potatoes (Percentage)		30.00			25.00		20.00
Cassava (Percentage)		20.00			15.00		10.00
Vegetables (Percentage)		20.00			15.00		10.00
Fruits (Percentage)		30.00			25.00		20.00
Increasing women representation on decision making positions in participating WUAs. (Percentage)		30.00	30.00	40.00	45.00	50.00	50.00
Component 2: Agricultural finance and insurance							
Number of loans provided by FIs through the line of credit (Number)		0.00	100.00	150.00	150.00	150.00	150.00
of which for female farmers and female-led organizations (Number)		0.00	30.00	45.00	45.00	45.00	45.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Non-Performing Loan (NPL) ratio of the Credit Line portfolio of FIs (Percentage)		0.00	5.00	5.00	5.00	5.00	5.00
Hectares of crop insured (Hectare(Ha))		0.00	25,000.00	60,000.00	105,000.00	160,000.00	217,500.00
Number of insured dairy cows (Number)		0.00	21,000.00	45,500.00	90,500.00	135,500.00	187,500.00
Value of financial protection (Total sum insured) provided to crop and livestock producers (Amount(USD))		0.00	40,202,000.00	93,204,000.00	156,706,000.00	237,000,000.00	337,710,000.00
Total number of insurance policies issued to farmers (Number)		0.00	70,500.00	164,250.00	289,250.00	439,250.00	614,250.00
Component 3: Project management							
Number of knowledge products (reports, briefs, studies, etc.) shared internally and among key stakeholders, partners and clients (Number)		0.00	5.00	10.00	15.00	20.00	25.00
Percentage of beneficiaries who expressed satisfaction with the project interventions, including on delivery and communication modalities (Percentage)		0.00			85.00		100.00
of which female (Percentage)		0.00			85.00		100.00
Percentage of grievances addressed within the time		0.00	100.00	100.00	100.00	100.00	100.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
specified in the project implementation manual (Percentage) (Percentage)							

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Increase in cultivated area being irrigated in new and rehabilitated schemes	This indicator monitors the actual use of the irrigation infrastructure in terms of area being irrigated as a proportion of the total developed area in the relevant areas. The indicator measures use per rehabilitated scheme and from year two of newly constructed schemes. The use of new schemes completed in the last PY will not be measured.	Annual	WUA reports	Percent used for irrigated crops (vs. remaining area that is used for rainfed crops). Only measured in irrigation schemes where construction works have been completed.	RAB / SPIU
Of which increase in cultivated area in new schemes	The indicator measures use from year two of newly constructed schemes. The				

	use of new schemes completed in the last PY will not be measured				
Of which increase in cultivated area in rehabilitated schemes	The indicator measures use per rehabilitated scheme				
Increase in share of agricultural produce sold by participating producers	PDO1: Increase in share of agricultural produce sold by participating producers Annual increment in the proportion of total harvested produce (annual weighted average of all seasons) that is traded/offered for sale in formal and informal markets	Annual	Survey; Coop & aggregator reports	*A simple household commercialization index (HCI) gives the degree of commercialization as the percentage of crop production marketed - HCI = (gross value of all crop sales / gross value of all crop production) * 100.*	RAB-SPIU
Increase in in value of agricultural production quantities procured by participating aggregators	Annual increment in the monetary equivalent (volume x price) of produce (annual weighted average of all seasons) that is bought by aggregators.	Annual	Survey; Coop & aggregator reports		RAB-SPIU
Increase in number of borrowers obtaining agricultural loans from participating financial institutions	Annual growth of the agriculture loan portfolio.	Annual	Reports from banks, MFIs, SACCOs		BRD
Of which 30% are female borrowers					
Total number of benefitting households reached by the project	Number of households benefitting from productive	Annual	Cooperative reports		RAB-SPIU

	investments under the project. The indicator does not include beneficiaries only receiving subsidies for agricultural insurance premiums, without other support under the project.		and FI reports		

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Number of sub-projects benefitting from matching grants provided by the project	Farmers & agri-preneurs (by gender) and their organizations in the project sites that formally and directly receive project grant support	Bi-annual	BDF Progress Report; RAB-SPIU administrative data		RAB-SPIU
Commercial farmers					
of which female commercial farmers					
Cooperatives					
SMEs					
Increase in net value of produce aggregated to reach the market	Incremental amount (annual weighted average of all seasons) of selected value chains' produce sold through formal and informal	Annual	RAB-SPIU		RAB-SPIU

	market channels (kg/MT)				
Maize					
Rice					
Beans					
Irish potatoes					
Vegetables					
Cassava					
Fruits					
Area provided with new/improved irrigation services	Area developed for irrigation (provided with Irrigation and drainage services for the better delivery of water to, and drainage of water from, arable land, including better timing, quantity, quality, and cost-effectiveness for the water users) in project areas (ha)	Annual	RAB-SPIU reports		RAB-SPIU
Area provided with new/improved land husbandry practices with climate resilient features	Area where land management practices in use due to the project intervention protect the land from erosion and make it suitable for agriculture production, including	Annual	RAB-SPIU reports		RAB-SPIU

	resilience to climate change effects.				
Number of new innovative ideas, products & services supported through the Innovation Challenge Fund	Bi-annual count of grants awarded (by gender)	Annual	BDF reports		RAB-SPIU
Of which 40% are female-led					
Food loss index (as measured by change in post-harvest losses)	Measurable quantitative food loss (volume of lost and wasted produce) in in the value chain from the time of harvest through crop processing, marketing and food preparation, to the final decision by the consumer to eat or discard the food.	Mid-term and end-line	Survey	Disaggregated by value chain	RAB-SPIU
Rice					
Maize					
Beans					
Irish potatoes					
Cassava					
Vegetables					
Fruits					
Increasing women representation on decision making positions in participating WUAs.	The indicator measures women participation in executive committees and	Annual	WUA reports.		RAB-SPIU

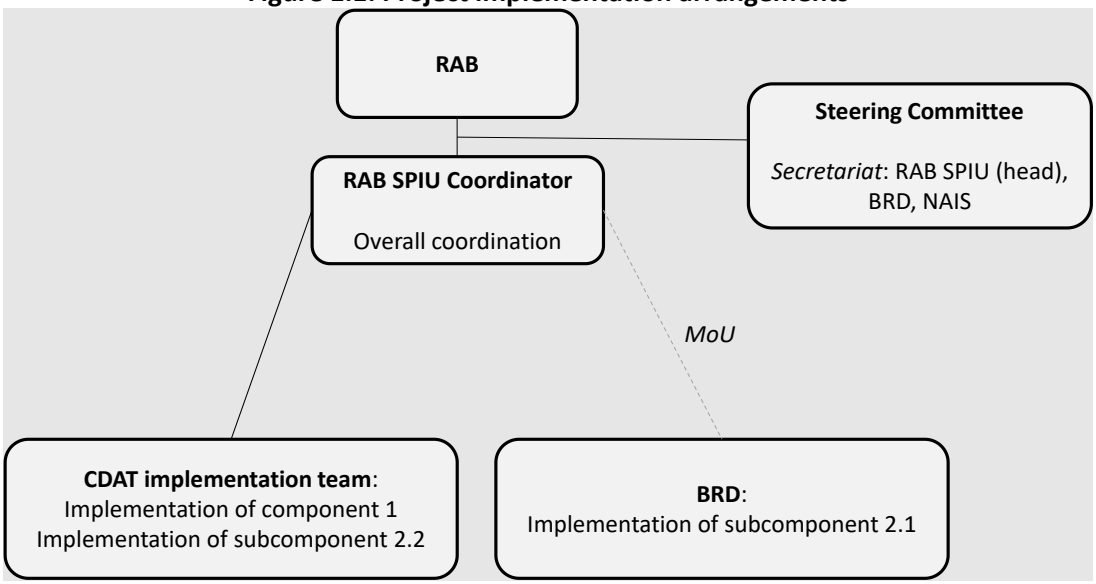
	other elected committees in WUAs. This indicator is in response to the identified constraint to women's access to irrigation services.				
Number of loans provided by FIs through the line of credit	Bi-annual count of agriculture & agribusiness loan approvals under the credit line	Bi-annual	Reports from financial institutions to BRD		BRD and RAB-SPIU
of which for female farmers and female-led organizations					
Non-Performing Loan (NPL) ratio of the Credit Line portfolio of FIs	Bi-annual count of non-performing agriculture and agribusiness loans under the credit line.	Bi-annual	Reports from financial institutions to BRD		BRD and RAB-SPIU
Hectares of crop insured		Bi-annually	Reports from Insurance companies, NAIS		RAB-SPIU
Number of insured dairy cows		Bi-annually	Reports from Insurance companies, NAIS		RAB-SPIU
Value of financial protection (Total sum insured) provided to crop and livestock producers	Total sum of polices issued	Bi-annual	Reports from Insurance companies, NAIS		MINAGRI-SPIU

Total number of insurance policies issued to farmers		Annual	Reports from RAB-SPIU		RAB-SPIU
Number of knowledge products (reports, briefs, studies, etc.) shared internally and among key stakeholders, partners and clients	Bi-annual count of individual products	Bi-annual	RAB-SPIU, BRD		RAB-SPIU
Percentage of beneficiaries who expressed satisfaction with the project interventions, including on delivery and communication modalities	Rating of project performance by participants in the project activities	At MTR and end of project.	Beneficiary survey and activity evaluations	Surveys	RAB-SPIU
of which female					
Percentage of grievances addressed within the time specified in the project implementation manual (Percentage)	Bi-annual count of complaints lodged, pending and dispensed	Monthly	Monthly reports		RAB-SPIU

ANNEX 1: Implementation arrangements and support plan

1. **RAB will ensure the overall coordination of the project, through its current SPIU**. It will also be responsible for the implementation of Component 1 and subcomponent 2.2 activities. In this role, the RAB SPIU will absorb the current staff of NAIS, under a CDAT implementation team. BRD will be responsible for the implementation of subcomponent 2.1. BRD will sign a memorandum of understanding or an implementation agreement with RAB to undertake this work (see Figure 2.1).

Figure 1.1: Project implementation arrangements



2. **Given the multi-sectoral interfaces of this project and the long-standing practice in Rwanda, a Steering Committee (SC) will be established to provide strategic guidance during project implementation**. The Committee, chaired by MINAGRI and co-chaired by MINECOFIN, will meet regularly, and will include representatives of relevant government agencies (such as Ministry of Trade and Industry, RAB, NAEB, BRD, etc.), private sector, and other stakeholders. While a Secretariat will support the works of the SC, it will not be permanent and will not require dedicated staff. Instead, it will draw from the existing staff of the RAB SPIU and BRD. The RAB SPIU will head the Secretariat.

3. **The Steering Committee will have the following key responsibilities**:

- Review and approval of action plans.
- Review and approval of financial plans.
- Review and approval of project implementation reports.
- Advocacy and guidance on policy adjustments required from the agriculture sector and financial sector stakeholders.
- Regular reports and briefing to the Ministers of Agriculture as well as of Finance and Economic Planning.

4. **The Secretariat will primarily be responsible for**:

a) Assisting the Steering committee in its roles.

b) Monitoring the implementation of the steering committee recommendations.

Financial Management arrangements

5. Based on an assessment conducted for CDAT, **the FM risk is substantial**. The objective of the assessment was to determine whether the implementing entities have acceptable financial management arrangements, which will ensure: (a) that funds are used for the intended purposes in an effective, efficient, and economical way; (b) financial reports will be prepared in a reliable, accurate and timely manner; and (c) project assets will be appropriately safeguarded. The assessment covered the RAB SPIU and BRD. The assessment complies with World Bank policy and directives on investment financing.

6. **The key risks identified are**: (a) the nature of some of the activities which are complex and therefore increasing chances that some funds may not be used for their intended purpose; (b) staffing gaps in FM and internal audit to absorb the additional workload generated by the project; and (c) inadequate and delayed implementation of external and internal audit recommendations.

7. **The proposed mitigating measures are as follows**: (a) develop detailed FM guidelines for the project as part of the PIM, (b) recruit a dedicated FM Specialist and Internal Audit Specialist for this project at RAB-SPIU and a Project accountant at BRD with Terms of Reference to be agreed with the World Bank, and (c) enroll the project into the IFMIS at RAB SPIU and the World Bank FM System at BRD.

8. **The arrangements for project oversight and accountability are acceptable**. These arrangements comprise management oversight (i.e., Steering Committee, RAB SPIU and BRD), internal oversight bodies (i.e., internal audit, audit committee), external oversight bodies (i.e., OAG, in relation to RAB SPIU and a Private Audit Firm recognized by the Institute of Public Certified Accountants of Rwanda in relation to BRD) and Parliament, which reviews the OAG's audit reports and approves the government's budget, including that of the project. Monthly consolidated financial reports are to be prepared by RAB SPIU and submitted to MINECOFIN for internal monitoring. RAB SPIU is experienced in World Bank-financed projects (Sustainable Agricultural Intensification and Food Security Project). The existing FM arrangements of BRD provide reasonable assurance that the financing proceeds will be used for intended purpose in a transparent, effective, and efficient manner. The BRD PIU is experienced in World Bank-financed projects (Renewable Energy Fund, Rwanda Housing Finance Project and Social-Economic Inclusion of Refugees and Host Communities in Rwanda Project).

FM Conditions and covenants

9. **Based on the assessment, the following conditions and covenants are proposed**:

(a) Develop detailed FM guidelines for the project as part of the PIM prior to Project effectiveness.
(b) Recruit a dedicated Financial Management Specialist and Internal Audit Specialist for this project at RAB-SPIU and a Project accountant at BRD, no later than three months after effectiveness.

Country System and Use of Country System

10. Rwanda's public financial management (PFM) system is anchored in:

a) The 2003 Rwanda Constitution, revised on December 24, 2015, Articles 162 to 166.

b) The Organic Law N° 12/2013 of 12/09/2013 on State Finances and Property that establishes principles and modalities for sound management of State finances and property. The organic law applies to all budget entities at the central and decentralized levels and sets up fundamental public finance management principles as comprehensiveness, transparency, accountability, uniformity, consolidation, and gender balance in public State finance management.

c) The Ministerial Order N°001/16/10/TC dated 26/01/2016 on financial regulations that regulates the structure and functioning of public FM, the preparation and implementation of the State budget, the accounting and reporting of all financial transactions, and financial control. The Order applies to the management of public finances of all public entities including of the Central Government, decentralized entities, public institutions, and subsidiary entities.

d) Government Accounting Policies Manual.

e) Articles 165-166 of the Rwanda revised Constitution and the Law N° 79/2013 of 11/9/2013 determines the mission, organization and functioning of the Office of the Auditor General of State finances.

11. **The PFM system had gone through series of reforms since 2008**, guided by the PFM strategy plan 2008-2012, the Public Financial Management Sector Strategic Plan (PFM SSP) 2013-2018 and the 2018-2023 PFM strategy. At the national level, progress has been made in budget planning, expenditure efficiency, enhancement of the internal audit function, external audit coverage, and financial reporting. The Public Expenditure and Financial Accountability (PEFA) 2016 confirmed these strengths. Nevertheless, areas for improvement include the weak consultative approach to budget preparation, access to fiscal information, lack of critical mass of qualified PFM staff and low alignment of budget with policies. The project's arrangements will rely on the existing PFM system at central and decentralized levels, with some amendments to consider the project's and the World Bank's FM requirements.

Table 1.1: Financial Management Risks and Mitigating Measures

Risk	Risk Mitigating Measures Incorporated into Project Design	Residual Risk Rating
Inherent risk		**Moderate**
Country level The country's political environment is deemed stable with ongoing judicial and legislative reforms. Governance challenges including retention of adequate accounting and internal audit capacity across government, weak linkage between budgeted and actual performance. Likely macroeconomic challenges due to the impact of COVID-19.	Establishment of MTEF as a basis for government budgeting, adoption of International Public Sector Accounting Standards (IPSAS), implementation of Smart IFMIS. Regular oversight through the OAG, which is deemed independent and effective. Ongoing World Bank support to PFM and accountability.	Moderate
Entity level RAB SPIU and BRD have previous experience in implementation of World Bank projects. At the entity level, RAB has an implementation plan that is moving it towards having an unqualified/clean audit report.	Project implementation through a dedicated SPIU at RAB and at BRD with necessary capacity deployed to respond to the increased workload. RAB to continue implementing its plan towards getting an unqualified/clean audit	Substantial

Risk	Risk Mitigating Measures Incorporated into Project Design	Residual Risk Rating
	opinion.	
Project level There may be challenges executing, monitoring, and coordinating the various project activities.	A detailed PIM to be prepared with all necessary MOUs and Agreements with stakeholders being put in place will further clarify roles and responsibilities. Dedicated SPIU teams at RAB and BRD in charge of day-to-day coordination, while high-level National Steering Committee provides overall oversight.	Substantial
Control Risk		**Substantial**
Budgeting Unreliable budget forecast	Strictly follow national budget procedures and timeline. Engage all project stakeholders effectively early during planning and budgeting process (National Steering Committee, MINAGRI, RAB-SPIU, BRD, World Bank). Ensure that annual work plan and budget is in line with procurement plan to prevent any delays.	Substantial
Accounting Existing accounting capacity at RAB SPIU and BRD SPIU may be overstretched due to additional project workload.	Recruit dedicated FMS at RAB SPIU for this project and an additional accountant at BRD SPIU. Enroll the project in IFMIS at RAB and in the BRD FM System.	Substantial
Internal Controls and Internal audit Due to complexity of some of the project activities there are risks of some funds not being used for intended purpose. Ineffective audit function due to inadequate coverage of project activities. Risk of ineffective measures in place to ensure that stakeholders adhere to signed MoUs and Agreements	A detailed PIM to be prepared with all necessary MOUs and Agreements with stakeholders being put in place will further clarify roles and responsibilities. Recruit a dedicated Internal Audit Specialist for RAB SPIU with Terms of Reference agreed with the World Bank. Internal Audit of RAB SPIU and BRD to include project activities in their annual approved audit plans and to present audit reports to project management at least twice a year.	Substantial
Funds Flow Potential funds flow delays may affect delivery of critical project activities.	Open Designated Accounts (Das) BNR for RAB SPIU and BRD. Funds disbursed by the World Bank on six-month cash flow need.	Moderate
Financial Reporting and Monitoring Unreliable IFRs and delay in submitting the IFRs.	Enroll the project into IFMIS at RAB SPIU and in Bank FM System at BRD.	Moderate
External Auditing	The OAG has mandate to audit all public	Low

Risk	Risk Mitigating Measures Incorporated into Project Design	Residual Risk Rating
Delay in submitting the audit report	funds and will audit the project fund Managed by RAB SPIU. RAB SPIU shall inform the OAG earlier to include the assignment in the audit plan. Private external auditors to be engaged by BRD in time.	
Fraud & Corruption Risk of fraud & corruption.	Monitor the Grievance Redress Mechanism. Few cases of fraud detected under program financed by Government own funds and correctives measures have previously been taken.	Moderate
Overall Risk		**Substantial**

12. The overall residual risk rating is **Substantial**.

Planning and budgeting. RAB SPIU will follow GoR's planning and budgeting procedures. BRD will follow their approved internal procedures which shall be consistent with the activities and procurement plans. The project budgets shall be presented for approval by their respective Board of Director's as part of the annual budget approval process. The first project budget approval may have a separate Board Approval as it might not coincide with the annual planned budget approval timelines. The approved budgets will be monitored on a monthly and quarterly basis by the preparation and analysis of budget execution report including: (a) budget for the period and for the year; (b) actual expenditure for the period and to date; (c) future expenditure commitments; and (d) balance of period budget remaining (actual expenditure and commitments together compared to period budget). The annual workplan and budget shall be submitted to the World Bank for no-objection.

13. **Internal control.** A PIM will be developed and will reflect the FM arrangements under CDAT, for each of the implementing agencies. The PIM will reflect detailed internal control arrangements for the project including extent of segregation of functions in payment processing and internal check mechanisms, in addition to payment approval and authorization arrangements. To enhance internal control arrangements for the proposed project, the internal audit unit of RAB shall conduct biannual reviews, while the one at BRD shall conduct at least annual reviews of project activities and submit reports to the project management team and to the World Bank during ISMs. A dedicated Financial Management Specialist and Internal Audit Specialist for this project will be recruited in RAB SPIU and a Project accountant will be hired at BRD to ensure effective financial management oversight including timely financial reporting.

14. **Accounting and financial reporting.** The project financial records at RAB SPIU shall be maintained using the government IFMIS, while the financial records at BRD shall be maintained using their Banking Core System and FM system; both systems shall be modified to accommodate any special financial reporting requirements prescribed by the World Bank. The project implementing agencies will prepare and submit quarterly interim financial reports (IFRs) to the World Bank within 45 days after the end of the quarter. The IFRs will be used to monitor project financial progress including the rate of budget execution and level of disbursements. In the same way, the respective agencies will prepare annual project financial statements, which will be submitted for external audit within three months after the financial year-end. Financial Reports shall include:

- Consolidated Sources and Uses of Funds (revenues and expenditures statement)
- Consolidated Financial Position statement
- Consolidated Cash flow statement
- Consolidated Budget execution report
- DA activity statement
- Notes on accounting policies
- Appendices

Table 1.2: Financial Management Reporting and Capacity Building

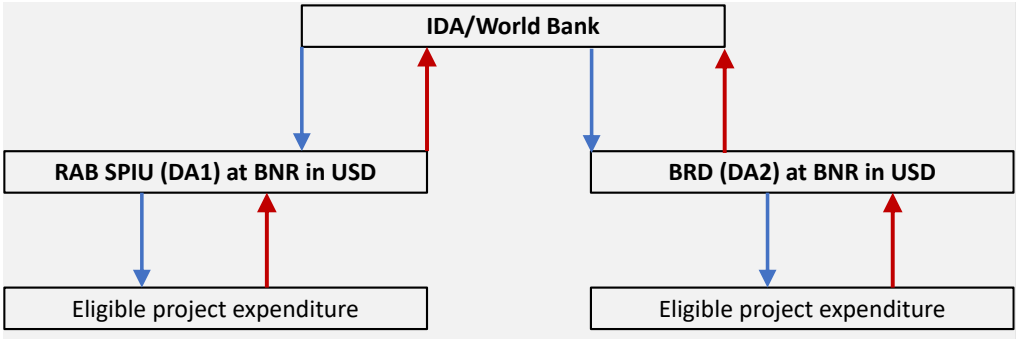
Financial management activity	Frequency	Outputs
Desk reviews		
IFRs review	Quarterly	Interim Financial statements review report
Audit report review	Annually	Audit review report
Internal audit of project activities	At least twice a year for RAB and once a year for BRD.	Internal Audit review report
Review of other relevant information such as internal control systems reports	Continuous as they become available	FM review report
Onsite visits		
Review of overall operation of the financial management system including internal controls.	Twice every 6 months	FM review report
Monitoring of actions taken on issues highlighted in audit reports, auditors' management letters, internal audit, and other reports	As needed	FM review report
Transaction reviews (if needed)	Annually or as needed	FM review report
Capacity building support		
Financial management training sessions	By effectiveness and thereafter as needed	Training sessions held

15. **External audit.** OAG will be responsible for the annual audit of the consolidated project financial statements in relation to the funds that shall be managed by RAB SPIU. OAG is the Supreme Audit Institution in Rwanda and is considered independent and effective. The activities to be managed by BRD shall be subject to external audit by a Private Audit Firm that is regulated by the Institute of Certified Public Accountants of Rwanda. The audit reports and management letters will be submitted to the World Bank within six months after the financial year-end of the respective implementing agency. The audit reports will be publicly disclosed in accordance with the World Bank Access to Information Policy. Upon receipt of the audit reports, each of the implementing/reporting agencies will be expected to prepare an action plan to address the audit findings. Follow up on the implementation of audit recommendations will be conducted as part of regular World Bank FM supervision missions and quarterly review of IFRs.

16. **Funds flow arrangements.** The project will maintain two segregated Designated Accounts (Das). One under RAB-SPIU and another under BRD to facilitate disbursements and fiduciary oversight. DA1 under RAB shall maintain funds relating to Component 1 (Value chain and infrastructure development), Component 2.2 (Scaling up agriculture insurance) and Component 4 (Project Management); while DA2 shall maintain funds relating to Component 2.1 (Scaling up agricultural finance) and Component 4

(Project Management). Disbursements will follow the Interim Financial Reporting (IFR) method. However, the project may also use direct payments, advances to the DA, reimbursement and special commitments depending on the case. Contracts denominated in US$ will be settled from the DA or via direct payment from the World Bank. Upon effectiveness, the project will submit to the World Bank, a request for withdrawal of funds accompanied by six months' cash forecast. Based on the request, the World Bank will transfer the proceeds of the loan/grant to the various Das. Subsequent replenishment of the Das will be based on the submission of application for withdrawal accompanied by an approved IFR showing the funds required as part of the DA reconciliation statement.

Figure 1.2: Funds Flow Arrangements



Procurement arrangements

17. Procurement for the proposed project will be carried out in accordance with the 'World Bank Procurement Regulations for Borrowers under Investment Project Financing', dated Nov. 2020, hereafter referred to as 'Procurement Regulations'. The project will be subject to the World Bank's Anticorruption Guidelines, dated July 1, 2016 and beneficiary disclosure requirements.

18. A PPSD has been developed to understand the project implementation context, market situations and associated potential risks to achieve value for Money and the project development objectives. The PPSD has set out the selection methods to be followed in the procurement of Goods, Works, and Non-Consulting and Consulting Services financed under the project. The PPSD describes the overall project operational context, market situations, implementing agencies capacity and identifies possible procurement risks and mitigation measures. Following the market analysis, based on information obtained from the industry, and the implementing agencies' prior experience, the PPSD advised whether there is risk of supply market or not and concluded that there is adequate market in the country. The underlying Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Box 1. Summary of the PPSD

The Rwanda Agriculture and Animal Resources Development Board/SPIU has prepared a Project Procurement Strategy for Development (PPSD) for Commercialization and De-risking for Agricultural Transformation Project. Procurement for the proposed project will be carried out in accordance with the 'World Bank Procurement Regulations for Borrowers under Investment Project Financing', dated Nov. 2020, hereafter referred to as 'Procurement Regulations'. The project will be subject to the World Bank's Anticorruption Guidelines, dated July 1, 2016 and beneficiary disclosure requirements.

The Project cost is US$300 million equivalent; this PPSD is addressing only the non-financial intermediary part which will be implemented following World Bank procurement regulation. The PPSD covers the following components of the project; Component 1: Value Chain and Infrastructure Development (US$210 million) comprising of sub-components, 1.1 Irrigation rehabilitation and development (US$154 million), 1.2 Land husbandry (US$19 million) and 1.3 Innovation and services for agri-food value chain development (US$37 million), Component 2: Agricultural Finance and Insurance (US$35 million) comprising of sub-components 2.1 Scaling up agricultural finance (US$15 million), 2.2 Strengthening agricultural insurance (US$20 million), Component 3: Project Management (US$15 million), Component 4: Contingent Emergency Response Component (CERC) (US$0 Million) and an unallocated amount of US$40 Million.

The SPIU-RAB and BRD are implementing agencies of the project. RAB and BRD have been responsible for implementing several World Bank-funded projects in a satisfactory manner and they are familiar with World Bank procurement regulation. RAB will ensure the overall coordination of the project through its current Single Project Implementation Unit (SPIU). It will also be responsible for the implementation of Component 1 and subcomponent 2.2 activities. In this role, RAB/SPIU will absorb the current staff of National Agricultural Insurance Scheme (NAIS) into a CDAT implementation team. BRD will be responsible for the implementation of subcomponent 2.1; and will have its own procurement plan.

A PPSD is developed to understand the project implementation context, market situations and associated potential risks to achieve value for Money and the project development objectives. The overall project context shows that the political, security, economic situation and polices of the government and related agencies are favourable for implementation of the project. The project will use technologies which allows bidders to do business transparently and efficiently. Procurement approaches will be instrumental in ensuring that social and environmental measures are taken into account, for example workers health and safety measures.

Market analysis determines the nature of the supply market, how it works and the impacts upon the market approach and acquisition strategy. The PPSD showed that Rwanda promotes economic growth and development as it stimulates domestic, regional and international trade. Competitive bidding, transparent and fair public procurement systems give satisfaction to suppliers and contractors and encourage them to participate in procurement opportunities. PPSD identified internal risks such as: (i) limited consultancy firms may lead to deliver low quality of consultancy services and inefficiency in procurement processes arising out of additional workload; Mitigation measure are: approaching international market for all high value consultancy services, RAB-SPIU and BRD in coordination with World Bank will organize tailored training on selection of consultant and recruitment of additional procurement staff; (ii) gaps in domestic production of construction materials relative to the demand generated by Rwanda's construction sector can delay the completion of works and award contracts at high cost. Mitigation measure: Starting early procurement process to enable contractors' ample time to know where to get the required construction materials and this will allow them sufficient time for preparing bids. Using international competitive procurement and encouraging contractors to employ local labor with necessary job skills will ultimately reduce reliance on expensive foreign experts. It is also important to note that, in Rwanda, some irrigation equipment are exempted from Value Added Tax, (ii) Financial risk: bankrupt and currency exposure: mitigation: Deep analysis of bidders and risk transfer (insuring against risk) and environmental risks associated with external forces; is also expected and those risks can be prevented and/or mitigated by adequately anticipating their incidence before and during the project implementation Again obligations for managing environmental and social risks and impacts will be incorporated into the tender and contracts documents.

The PPSD identified the approach and methods that will be most appropriate for the project. An open competitive approach to market is preferred approach as it provides all eligible prospective Bidders/Proposers an equal opportunity to bid. After analysis of various options for the procurement approach and contracting strategy, international market approach using Quality and Cost-Based Selection

(QCBS), and International Competitive Bidding (ICB) would be the most appropriate selection arrangement for procurement of the identified consultancy services, Goods and works because the participation of foreign firms will increase competition and may assure the achievement of best Value for Money (VfM). National Market approach using National Competitive Bidding (NCB) and Request for Quotation (RFQ) will be used depending on value and risk of the specific procurement activities. The analysis revealed that there is no high risk of market, both in terms of competitiveness of the market and quality of the services. Mainly international market approach for consultancy services and national market approach for Works, Goods and non-consultancy services are recommended, whereas other methods will be used as may be found appropriate in rate cases.

The project will use Systematic Tracking of Exchanges in Procurement (STEP), a planning and tracking system, which will provide data on procurement activities, establish benchmarks, monitor delays, and measure procurement performance, the RAB/SPIU will use the Rwanda e-Procurement system (Umucyo) for all "post" review procurements in parallel with Bank STEP and the agencies will also use the e-Procurement for "prior" review procurement once the World Bank and Rwanda Public Procurement Authority (RPPA) agree on.

The Procurement Plan for the first 18 months is prepared with activities of works, goods, non-consulting services and consulting services packages and provided in annex of the PPSD, which includes a description of the procurement contracts, the contract values, source of funds, the approach (es) to market and the Selection Methods and the Bank's review requirements. The PPSD and the procurement plan of the project shall be regularly updated as appropriate during the project implementation.

Duly considering the procurement profile and contract management arrangements, based on the perceived risks and proposed mitigation measures, the project's overall residual mitigated procurement risk rating is determined as **'Moderate'**. The risk rating on procurement may be reviewed and updated periodically by the World Bank.

19. **E-Procurement system**. The e-Procurement system assessment was carried out against the multilateral development Banks' requirements and has been found acceptable for use for procurements under World Bank-funded projects. Accordingly, the implementing agency (RAB) of the project will be using the Rwanda e-Procurement system (Umucyo) for all "post" review procurements in parallel with World Bank STEP. The agency will also use the e-Procurement for "prior" review procurement once the system enhancement is completed and the World Bank and RPPA agree on it. The e-Procurement system assessment was carried out against the multilateral development Banks' requirements and has been found acceptable for use for procurements under World Bank-funded projects. Accordingly, the implementing agency (RAB) of the project will be using the Rwanda e-Procurement system (Umucyo) for all "post" review procurements in parallel with World Bank STEP. The agency will also use the e-Procurement for "prior" review procurement once the system enhancement is completed and the Bank and RPPA agrees on it.

20. **Beneficial Ownership Pilot.** The preliminary assessment revealed that there will be no procurement activity under the project that would fall within Operational Procurement Regional Committee (OPRC) thresholds that requires applying 'beneficial ownership pilot'. However, it will apply if contracts happen to fall within the OPRC threshold.

21. **Procurement risk assessment.** Assessment of procurement capacity and risks of the Ias is underway by the World Bank for the implementing agencies to review the organizational structure and functions, experience, staff skills and capacity, procurement cycle management, quality, and adequacy of supporting and control systems and record keeping.

22. The following are potential project **procurement risks identified by the PPSD**: (a) lengthy consultant selection processes and poor-quality deliverables from consultants due to limited experience of RAB-SPIU and BRD in managing high value consultancy contracts, and (b) inefficiency in procurement processes arising out of additional workload with recent increase of number of projects implemented by BRD and under staffing of RAB. **Recommended Risk Mitigation Measures are**: (a) RAB in coordination with the World Bank to organize tailored training on selection of consultants, (b) Hiring two procurement specialist/office each for both RAB and BRD, in addition to their existing procurement staff, Rwanda has established performance management system where the performance contracts are signed every beginning of the financial year between the staffs and their supervisors. The performance contracts clearly show the targets to achieve in a certain period and their clear Key Performance Indicators as a measurement tool and they are reported monthly or quarterly depending on the activity.

23. The RAB-SPIU is audited by the Rwanda Public Procurement Authority (RPPA) and the OAG; whereas BRD audited only by the OAG, to make sure the institution is implementing fundamental principles governing public procurement as per article 6 Law N°62/2018 of 25/08/2018 Law governing public procurement and procurement policy of BRD. The audits are conducted on annual basis. Rwanda procurement law has included an established appeal/complaint handling mechanism. The Ias have a practice where tender is opened and evaluated, all the information is disclosed to the bidders and the public. When the respondent bidders'/service providers/contractors or consultants have complaint on the results of the tender process, they have 7 days to appeal to the Procuring Entity through the e-procurement system. During this period, all other process of awarding the tender are stopped until the issue is resolved with the complainant using relevant facts. The E-Procurement system has included a feature for submitting and addressing complaints electronically in the system and hence all complaints and responses are available in the system for public disclosure and auditing for those procurements done in the E-procurement. BRD has its own complaint management system as per its procurement policy. In case the complainant is not satisfied by explanations given by the procuring Entity, she/he has the right to appeal to the Independent Review Panel (IRP) which is established by the procurement law, to receive and handle procurement complaints/appeals from all categories of people responded to the tender.

24. There are activities that will follow international market approach, where use of World Bank standard procurement documents is mandatory. There are also activities falling within the NCB threshold and hence will use borrower's standard procurement documents. Where national standards are used, the bid documents shall be subject to World Bank review and clearance to ensure, the bid documents are consistent with World Bank regulation and includes provision for World Bank anti-corruption guideline and Bank's right to audit, consistent with Rwanda public procurement law and the ESF instruments prepared for the project ESFM, RPF, SEP, ESCP, LMP.

25. **Project Procurement Risk:** Based on procurement assessment of the implementing agencies, market practice and nature of procurement activities of the project, the project procurement risk is rated **Moderate.**

26. The project procurement profile comprises all procurement categories including: **Goods**: agricultural inputs, Digital solutions for strengthening agricultural insurance, Project vehicles, motorcycles and operating costs and Premium co-financing; **Works**: irrigation infrastructure and access roads and postharvest infrastructures; and procurement of **consultancy services**: feasibility studies, design studies, construction supervision, base line survey, mid-term review, impact evaluation and end

line survey and technical assistances. In addition, US$15 million is put aside for project management component.

27. From July 1, 2017, all procurement entities in the country started using the Rwanda E-Procurement system for government-financed and most development partners-financed projects. The E-Procurement system has also been used for World Bank-financed projects from January 1, 2019 for "post" review contracts and will be applied to prior review procurement in near future, following the ongoing E-Procurement system enhancement exercise. To avoid duplicate in parallel use of the E-GP and STEP, Bank is working on interfacing of the two system. Until the interfacing will be completed the two systems will be used in parallel.

28. The assessment revealed that adequate number of suppliers/contractors/consultants from international and national markets are available.

29. In general, the assessment confirmed that transparency and accountability of procurement process by the Ias are ensured in the procurement process. However, there are few identified weaknesses in the past including lack of timely uploading of procurement documents in STEP and lack of having realistic procurement plan.

30. Preliminary procurement plan with list of Procurable items, descriptions, cost estimates, review types, selection methods and market approach will be presented in the PPSD. World Bank's standard procurement documents should be used for all procurements when approaching the international market.

31. **Use of national procurement procedures.** The Ias shall follow World Bank procurement regulation as required by the financing agreement. For other procurements including projects financed by government or from other development partners, if any, the national procurement procedure issued by RPPA is used as appropriate. When in use, RPPA SPD will be reviewed by the World Bank to make sure provision for application of World Bank Anti-Corruption guideline and Bank's right to audit and all ESF requirements are included.

32. **Procurement of works:** For procurement of works contract, the national procurement procedures and national SBDs as agreed with and deemed satisfactory to the World Bank will be used, when approaching the national market. Procurements while approaching the international market will be using the World Bank's Standard Procurement Documents. Small value works will be undertaken through request for quotation procedures. The request for quotation will indicate the specifications of works as well as the delivery/completion time and the contract award will be based on comparing price quotations from several qualified contractors, with a minimum of three, to ensure competition. When the value of the contract of such works exceeds the request for quotation threshold and when procured through NCB procedures, the national SBDs issued by the RPPA and acceptable to the World Bank will be used. Direct contracting shall be used where the PPSD informs so and it is to the benefit of the project and in accordance with the procurement regulation.

33. **Procurement of Goods and Non-Consultancy Services.** Procurement of goods and non-consultancy service other than through ICB would use the national procedures and SBDs as agreed with and deemed satisfactory to the World Bank. Small value Goods will be undertaken through request for quotation procedures. The request for quotation will indicate the specifications of works as well as the delivery/completion time and the contract award will be based on comparing price quotations from

several qualified contractors, with a minimum of three, to ensure competition. Direct contracting will be used where the PPSD informs so to the benefit of the project. Procurements while approaching the international market will be done using the World Bank's Standard Procurement Documents.

34. **Procurement of consultancy services.** Procurement methods to be used are specified in the PPSD. The default method for firm selection is QCBS. Selection of individual consultants shall be undertaken either through CV comparison or by advertising request for expression of interest (REOI). Project staffs required for the implementation will be hired following World Bank regulation for positions identified as consultant (IC), and for positions not identified as consultants (IC) Project implementation Support Personnel, paragraph 7.32 of Procurement Regulations shall be used. Paragraph 7.32 allows use of government own hiring procedure.

35. **Operating costs.** The items to be identified as operating cost in the PPSD will be procured using the borrower's procurement and administrative procedures subject to review and acceptable to the World Bank including selection of project implementation support personnel not identified as consultant (IC).

36. **Record keeping.** All records pertaining to award of tenders, including bid notification, register pertaining to sale and receipt of bids, bid opening minutes, bid evaluation reports and all correspondence pertaining to bid evaluation, communication sent to/with the World Bank in the process, bid securities, and approval of invitation/evaluation of bids will be retained by respective agencies and in electronic system of the borrower or in hard copy and uploaded in STEP.

37. **Disclosure of procurement information.** The following documents shall be disclosed on the agencies' websites: (a) a Procurement Plan and updates, (b) an invitation for bids for goods and works for all contracts, (c) Request for Expression of Interest for selection/hiring of consulting services, (d) contract awards of goods, works, and non-consulting and consulting services, (g) a monthly financial and physical progress report of all contracts, and (h) an action taken report on the complaints received on a quarterly basis.

38. The following details shall also be published in the United Nations Development Business and the World Bank's external website: (a) an invitation for bids for procurement of Goods and Works following open international market approaches, (b) Request for Expression of Interest for selection of consulting services following open international market approaches, and (c) contract award details of all procurement of goods and works and selection of consultants using open international market approaches.

39. **Fiduciary oversight by the World Bank.** The World Bank shall prior review contracts according to prior review thresholds set in the PPSD/Procurement Plan. All contracts not covered under prior review by the World Bank shall be subject to post review during implementation support missions and/or special post review missions, including missions by consultants hired by the World Bank or third-party independent auditor delegated by the World Bank. To avoid doubts, the World Bank may conduct, at any time, independent procurement reviews of all the contracts financed under the loan. All procurement post reviews are carried out online in STEP. For this reason, uploading of procurement documents of post review contracts should in a timely manner and keeping up to date at all time should be ensured.

40. **Contract Management.** Currently, high-risk, and high-value procurements have not been identified for increased contract management support. However, as RAB will be implementing Works

contract of medium size there is a need to enhance its capacity by hiring procurement, contract management and technical specialists. If high-risk and high-value procurements are identified in the due course of implementation, the agency will develop key performance indicators (KPIs) for such identified contracts and the KPIs will be monitored during actual execution of contracts. The World Bank team will conduct additional due diligence and independent review of the contract performance of such identified procurements. A fully staffed PIU will be responsible for overall project/contract management.

Environment and Social risk management arrangements

41. RAB has put in place the ESMF, the RPF, as well as the LMP, the SEP and the Environmental and the ESCP. Additionally, a Pest Management Plan (PMP), Master Emergency Response Plan (ERP) for a wide range of emergency situations, and Master EPP (Emergency Preparedness Plan) related specifically to dam safety requirements, a Cumulative Impacts Assessment (CIA), and a Biodiversity Impacts Assessment (BIA) will also be required as stipulated in the ESCP.

42. RAB currently has a social development specialist for the PIU under SAIP and is in the process of recruiting an environmental specialist. In addition, RAB's capacity to manage environment and social risks at district level will require staffing for District based staff and training on the ESF and the related ten ESS and special focus on the project specific instruments – ESMF, LMP, RPF, GRM, monitoring and reporting. ESCP includes a requirement for RAB to engage eight (four environmental and four social) specialists and assign them to defined project sites before the commencement of the works at each site. It is understood that the same officers may be responsible for several subproject sites during the project implementation. ESCP also includes a requirement for one Climate Change Specialist at head office to manage de-risking aspects.

43. In line with ESS9, BRD is required to have in place an institutional ESMS. BRD has two dedicated staff with institutional responsibility for environmental and social risk management, which is considered sufficient for CDAT to start implementation but may recruit additional environmental and social Specialist(s) if need arises. BRD is encouraged to gradually increase its internal capacity via recruiting additional staff (as possible), internal training of investment and operational risk staff, as well as continuous improvement of the underlying E&S procedures.

44. BRD will prepare a structured Environmental and Social Capacity Building Plan that will include both BRD and PFI capacity and needs assessment as well as activities throughout the project implementation. This will help ensure that both BRD and PFIs are able to meet the requirements outlined above. This plan will include adequate budget and resources for implementation. BRD has already commenced similar work under the AFIRR project and is expected to have gained experience that can be applied to CDAT.

Monitoring and evaluation arrangements, reporting, and knowledge management

45. The project team will conduct a baseline survey to determine the baseline values that could not be established from existing data. A Mid-Term Review (MTR) will be conducted in year three and an end-of-project (EOP) evaluation at the end of the operation. Project monitoring shall be coordinated by RAB SPIU, to maintain interagency coordination within national and project components for M&E. In carrying out the project M&E function, BRD will provide all the needed inputs to RAB SPIU in a timely fashion, as it will be laid out in the MoU. Responsibilities for M&E activities will be assigned to appropriate units/staff teams within RAB SPIU and BRD, and the project will ensure that the skills exist to monitor and evaluate

projects according to the adopted arrangements. Reporting will be optimized to meet the different needs of different implementing and supervising agencies and organizations without unnecessary additional effort. The project, through RAB SPIU, will maintain a knowledge management ecosystem, comprising different information sharing platforms that increase connectivity and interaction internally and among key stakeholders, partners, and clients, and improve the dissemination of information and advice. Overall, the project's knowledge management plan will support a goal of providing project stakeholders and beneficiaries useful knowledge, when they need it, to support their implementation work and maximize impact.

ANNEX 2: Irrigation and land husbandry activities

Irrigation rehabilitation and development

1. crops and related irrigation schemes will be selected based on their commercial potential and will benefit from market linkages supported through the other two subcomponents.

2. **This project will rehabilitate and improve existing gravity-fed and pressurized irrigation sites and develop new ones.** The crops and related irrigation schemes will be selected based on their commercial potential and will benefit from market linkages supported through the other two subcomponents. A total of 37 sites have tentatively[30] been identified with a combined command area of 17,673 ha (see further down for a summary of the breakdown of these sites by categories related to their stages of designs; from those with detailed designs to those needing full design studies starting with prefeasibility). Sites with full designs will require a review before confirmation, while new sites requiring prefeasibility studies will be ranked to guide the selection of sites, which can be implemented within the allowable budget. The project will promote technology and best practice for increased availability and efficient use of water for irrigation to increase crop productivity and increase farmers resilience to climate volatility. As such, the project will finance pre-feasibility and feasibility studies, preparation of detailed design, construction supervision and quality assurances, construction of irrigation water abstraction, delivery, distribution, and drainage structures, among others. The project will also finance complementary infrastructure as needed (e.g., development of access roads within the schemes). Infrastructure support will target the selected value chains, such as rice, maize, beans, horticulture.

3. From a technical perspective, the project will employ some innovative ideas for marshland schemes. Wherever possible, the project will irrigate crops other than rice that use less water and can allow expansion of command area as compared to rice. This could be done for new sites, or for any existing rice schemes where water supply is limited, or command area can be expanded. Improved irrigation methods should be used for these non-rice crops such as furrows on level land or contour furrows on sloping land, with furrows fed by ditches or portable gated pipe. For sites where marshland area is limited or where cultivation doesn't exhaust available water resources, and additional water is available, solar pumps will be considered to lift water for irrigation of adjacent hillsides.

4. Water conveyance efficiency improvements will be made by lining canals with unreinforced concrete; secondary canals may be eliminated, where possible, to maximize irrigated land. Lateral canals can be fed directly from piped outlets in the main canal, not from secondary canals running parallel to the main canal. Schemes will be provided with flow measurement weirs and staff gauges at head of main canals to improve water management. The sub-projects will use water control gates with improved qualities so that there will be increased life span and reduced maintenance and leaking. Stainless steel or aluminum gates can be introduced.

5. A hillside site, Bakokwe, is on an already designed list that incorporates all the innovative ideas developed during LWH project: (i) lined main canals with flow measurement at the head and ending at regulating reservoirs which eliminate spills and conserves water, (ii) secondary pipes delivering pressurized flow to areas below the canals for flexible options for irrigation including sprinkler, drip, hose, and basin and furrow, and (iii) area that is gravity-fed from the regulating reservoir has no canals but is a fully piped pressurized network, which eliminates spills.

[30] The list will be updated following the pre-feasibility and feasibility studies.

Table 2.1: Tentative list[31] of irrigation and land husbandry sites with targeted value chains

S.N.	Name and Type of Scheme	Location (District/ Sector)	Command Area (ha)	Land Husbandry Area (ha)	Scheme Description	Targeted Value Chain
1. Schemes with detailed designs						
1	Bakokwe – Hillside (New)	Muhanga	390	550	River diversion, and surface irrigation through lined canal and pipes and furrow	Maize, beans, horticulture, and cassava
2	Karambi – Marshland (Rehabilitation)	Kayonza	300	500	Storage dam (7.5M high and 500,000 m3 storage capacity) with Gravity fed / surface irrigation	Rice
3	Bugarama - Marshland (Upgrading and rehabilitation)	Rusizi District: Muganza & Bugarama& Nyakabuye & Gikundamvura	2000	2550	Basin/ Surface irrigation	Rice
4	Rubuyenge /Burakari - Marshland	Nyanza-Ruhango	320	550	Basin/ Surface irrigation	Rice
5	Cyohoha (Marshland and hillside irrigation) -	Bugesera	3000	480	Pressurized system from Cyohoha N. Lake fed from Akayaru River	Horticulture + maize
6	Gashora Hillside Irrigation	Bugesera	2850	450	Pressurized system abstracting water from Lakes Rumira, Kidogo, Gashanga, Mirayi, Kilimbi and River Akagera.	Maize, Bean and Horticulture
	S/total		**8,860**	**5,080**		
No.	**Name and Type of Scheme**	**Location (District/Sector)**	**Command Area (ha)**	**Land Husbandry Area (ha)**	**Scheme Description**	**Targeted Value Chain**
2. New scheme with prefeasibility study only						
1	Kageyo	Kayonza	2000	100	Earth dam for gravity feed system	Rice
Sub/Total 2			**2,000**	**100**		

[31] The list is not definitive, sites will only be confirmed after feasibility and detailed designs, and review for those with complete studies

No.	Name and Type of Scheme	Location (District/Sector)	Command Area (ha)	Land Husbandry Area (ha)	Scheme Description	Targeted Value Chain
3. Existing marshland schemes for rehabilitation without studies						
1	Gashora and Rwangingo	Bugesera (Gashora) and Gatsibo-Nyagatare	800	400	Surface/basin	Rice
2	Gatuna	Gicumbi (Kaniga, Rubaya, Cyumba)	200	391	Surface/ furrow	Maize, Beans + Horticulture
3	Muvumba-8	Nyagatare	750	-	Rehabilitation of drainage canals and irrigation structures, feeder roads and levelling.	Rice, maize and vegetables.
4	Kibati	Nyamasheke	30	60	Diversion structure	Rice
5	Kamiranzovu	Nyamasheke	115	100	Diversion structure	Rice
6	Kagitumba	Nyagatare	810	-	Center pivots	Maize, beans and vegetables
7	Nasho	Kirehe	600	300	Sprinklers	Maize, beans and vegetables
8	Agasasa	Nyanza	200	400	Lined canals	Rice
9	Nyarubogo	Nyanza	150	300	Lined canals	Rice
10	Rurambi	Bugesera	750	-	Pumping system, levelling	Rice
11	Cyabayaga	Nyagatare	400	359	Dyke rehabilitation, diversion structures	Rice
12	Kajevuba	Gasabo	90	180	Rehabilitation	Rice, maize, vegetables
13	Kiryango	Ruhango	108	216	Surface/basin	Rice
14	Nyirakiyange	Ruhango	98.5	197	Diversion structure, levelling	Rice
15	Base	Ruhango/Nyanza	134	268	Surface, basin	Rice
16	Kigaga	Gisagara	40	100	Surface/basin	Rice
17	Nyakanyeri	Gisagara	70	100	Surface/basin	Rice, Horticulture
18	Nyagahembe	Nyamasheke	40	80	Diversion structure, rehabilitation	Rice
19	Runukangoma	Huye	96	192	Surface/basin	Rice
20	Makera	Muhanga	100	150	Lined canals, rehabilitation	Maize and vegetables
21	Mugonero	Nyamasheke	50	100	Rehabilitation	Rice
22	Ruvugangoma	Gisagara	43	86	Diversion structure, canals rehabilitation and	Maize, beans and vegetables

					levelling	
23	Nyabuyogera	Gisagara	109	218	Diversion structure, canals rehabilitation and levelling	Maize, beans and vegetables
S/total 3			**5,783**	**4,197**		
4. New marshland schemes without any study						
No.	**Name and Type of Scheme**	**Location (District/Sector)**	**Command Area (ha)**	**Land Husbandry Area (ha)**	**Scheme Description**	**Targeted Value Chain**
1	Mwogo	Nyanza (Nyagisozi, Cyabakamyi,)	405	810	Surface/furrow	Maize, Beans, Rice
2	Kanyegenyege	Ruhango (Kinazi & Ntongwe); Nyanza (Busoro)	128	268	Surface/furrow	Rice
3	Gipfuna	Nyaruguru (Ngoma)	95	213	Surface with furrow	M2 Food + Horticulture
4	Agatorove	Nyaruguru	99	318	Surface/furrow	Maize Beans + Horticulture
S/total 4			**727**	**1,609**		
Total 3 & 4			**1,727**	**2,400**		
1	MATIMBA Scheme	Nyagatare	90		Pipe network/sprinkler	Maize and vegetables
2	Multiple RAB Seed Multiplication Sites and some sites located in Kigali area ((Runyoza, Ndera, Rusororo), and Kicukiro)	Nyagatare, Huye, Kicukiro, Bugesera, and Nyanza	213		Pipe network/sprinkler	Basic seeds (Maize, Soya Beans, Common beans, +Horticulture+ Fodder Crops
	S/total 5		**303**			
	Pre-feasibility study for 5,000 ha		5000			
	Feasibility study for 2,000 ha		2000			
	S/total 6		**7,000**			
	OVERALL TOTAL		**17,673**	**10,986**		

6. The two Irrigation schemes with complete feasibility studies and detailed designs and which will require a quick review before a final decision on development are Bakokwe (new) and Karambi

(rehabilitation). The Bakokwe Project Site 27 Bakokwe is a hill side scheme situated along the Bakokwe Stream, covering cells Kabuye, Sholi, Buramba, Ngarama and Remera, sectors Muhanga and Kabakuzi, Muhanga District, South Province of Rwanda. Site 27 Bakokwe located on the hills along the Bakokwe Stream is planned by MINAGRI to increase the present net irrigated areas in Rwanda by 260ha. The source of water for the planed irrigation system in Bakokwe is a river diversion proposed to be built upstream of command area. It is planned to be a surface irrigation scheme delivering irrigation water through lined canal and pipes and furrows. The water catchment upstream the diversion has an area of 52.8 km^2. The total gross area of the project covers 9153 ha out of which 57.7 percent (5,278.6 ha) is the area of water catchment, 37.4 percent (3,420.7ha) is command area catchment and 5 percent (454.3 ha) is the command area. Whereas Karambi is a Marshland rehabilitation scheme with a small storage dam (7.5m high and 500,000 m^3 storage capacity) with gravity fed/surface irrigation. It is deemed appropriate to build a small dam due to water from stream and bigger size of the catchment which leads to floods during rainy season. The dam will play the role of water storage but also erosion control. As one of the driest districts of the country, this scheme is anticipated to contribute to feeding other parts of the district.

7. **In addition, the project will contribute to improving water governance through dedicated activities**, such as capacity building of WUAs and technical assistance on irrigation policy, regulatory and governance aspects. The technical assistance will undertake an in-depth assessment of Rwanda's Irrigation Schemes Management, Governance and Cost recovery; ownership, operations and maintenance of irrigation dams (at all levels of government) arrangements, collate relevant best practices experience from other countries on these issues; and provide recommendations and policy briefs for improving sustainability of irrigation schemes in Rwanda. The proposed project will prioritize bringing in new and innovative approaches to support the WUAs in sustainably managing the project-funded irrigation schemes. As such, it will provide support to the project beneficiaries by establishing, organizing, and strengthening the irrigation WUAs for the sustainable management of irrigation schemes. To increase ownership, the proposed activities will focus on: (i) the establishment and strengthening of the irrigation institutions from scheme to national level, and (ii) the implementation of national policies, strategies and regulations related to sustainable management of irrigation schemes in Rwanda. To harmonize interventions while avoiding overlap, the project will liaise with existing capacity building projects including WAMCAB under JICA or other capacity building programs undertaken by other organizations.

Land husbandry activities

8. **The land husbandry activities will ensure protection of the watershed areas which drain to the sites to be developed for irrigation, while also increasing the productivity of these areas and preventing soil erosion.** Complementary land husbandry measures are necessary to protect and ensure sustainability of the irrigation infrastructure developed through subcomponent 1.1. Land husbandry studies will be carried out for each site during the feasibility and detail design study stages. Activities will include soil conservation measures and infrastructure appropriate to differing slope categories (e.g., bunding, green manuring, progressive and radical terracing, see Table 1.2 for Land Husbandry Measures proposed by slope category). Given the acidity of Rwandan soils, additional activities such as liming may be necessary. The land husbandry work will cover 31 sites with a total area of 10,986 ha. The subcomponent will also finance complementary capacity building activities on the land husbandry technologies. Agricultural productivity will be enhanced in non-irrigated areas due to improvements in soil quality through delivering land husbandry techniques, improvements in soil fertility (through complementary technology such as use of improved seeds and composting), as well as increases in farmers' capacity and knowledge. Beneficiaries will participate in the selection of appropriate practices

and technologies. Linking farmers in these terraces to markets or to any other relevant value chain actors plus other good production technologies will be addressed under subcomponent 1.3.

Table 2.2: Land Husbandry Measures by Slope Category

	Slope Category	Land-husbandry Measures
1	Nearly level to strongly undulating (slope 0-6 %)	1. Grass strip/trash lines (~1km /ha)
		2. agroforestry interventions
		3. intercropping with plant cover and green manuring
		1. Applying manure/compost at the rate of 10 tons/ha & mulching
2	Gently rolling too strongly rolling (slope 6- 16%)	2. Construction of soil bunds (1 km/ha) (level or graded as per agroclimatic zone
		3. Planting treed/shrubs along the lower side supporting the bunds
		3. intercropping and green manuring
		4. Applying manure /compost at 10 tons/ha and mulching
3	Hilly to steep (slope 16 – 40 %)	1. Constructing Bench (radical) terraces (~ 1km/ha)
		4. Planting tree/shrubs along the lower side supporting the radical terraces
		3. intercropping and green manuring
		4. liming with agricultural lime at 2.5 tons/ha
		5. Applying manure /compost at 10 tons/ha and mulching
4	Very steep (slope 40 – 60 %)	1. Constructing progressive terraces (~5 km/ha)
		2. Intercropping and green manuring
5	Extremely steep (slope 60 – 120%)	1. Constructing micro-basins with tree planting pits at 1000/ha
		2. Planting tree seedlings (reforestation) at 1000/ha

ANNEX 3: Key constraints in the prioritized value chains

1. **A market-oriented seed systems, processing and post-harvest infrastructure and marketing models are examples of technological developments that are essential to facilitate commercialisation, increase competitiveness, and address market failures.** Rwanda has experienced low demand for agricultural technology stemming from limited technological awareness and lack of accessible, feasible and implementable options particularly for smallholder farmers, which has resulted in limited mechanisation among other innovative practices. On the supply side, the costs and risks of investing in developing appropriate products or services such as greenhouses, cold storage, processing units are currently unaffordable to many producers. Even if the product is developed, low expressed demand, or high distribution costs to reach smallholders may limit commercial and financial viability. Selected interventions can offset these unfavourable demand and supply conditions; further encourage and incentivise private sector actors to invest in these sectors.

Rice

2. **Rice in Rwanda is produced mostly for commercial purposes**. While only 5.4 percent of crop-producing households cultivate rice, 90 percent of the rice producers sell more than half of their harvest. The total revenue for the rice farmers has been more than US$1,160 per hectare since 2017, due to high sales and better prices relative to other crops. The farmers have been earning a net profit of more than US$209/ha in the farming season since 2017, which indicates that rice cultivation is a significant source of income for the farmers.

3. **Domestic consumption exceeds local supply**. Rice production and area under rice cultivation has been increasing in the last decade. In 2010, the annual rice production was 67,253 tons and the total area under rice cultivation was 12,975 hectares. In 2020, the annual rice production was 116,504 tons and the total area under rice cultivation was 29,584 hectares. Despite expansion in production and area under cultivation of rice, Rwanda imports about 70,000 tons of rice (or nearly two thirds of the amount produced domestically) primarily from Pakistan, India, and Tanzania. The local production is thus clearly unable to meet the domestic demand (especially that of long-grain rice), which is stemming mainly from the urban areas. Tapping this demand represents a key opportunity for the domestic producers. Therefore, investments in the promotion of mechanization and value addition of domestically produced rice (especially long-grain rice) can lead to decrease in Rwanda's rice imports. (Rwanda tests locally developed long-grain rice varieties, 2020) (Crops, 2021).

4. **Rwandan rice has potential to compete and grow in the domestic markets**. The local rice is around 16–17 percent cheaper than Asian rice, and 26–28 percent cheaper than Tanzanian rice on average. The average cost of locally produced rice is RWF 14,000 per bag (25 kgs) whereas rice from Pakistan (on which 40 percent tariff is imposed) is sold around RWF 19,000 per bag (25 kgs). Lower prices provide an opportunity to expand in the domestic markets. However, the low competitiveness of local rice is reflecting the need to invest more in market-oriented seed systems and efficient and innovative production systems to reduce the cost of production.

Challenges

5. The rice value chain faces multiple challenges that hinder its **value addition** (processing). There is a scope of increasing the efficiency of these mills through routine checks for standards of operations and outputs. Additionally, mills in Rwanda are operating far below their full capacity (at least by 40 to 50 percent).

There are about 25 milling units and most of them are functioning well below their 2.5 tons per hour capacity, due to:

- **Low contract enforcement**: Industrial mills sign contracts with the cooperatives for procuring rice, but cooperatives often violate these contracts. Cooperative members pressure their management to sell the rice to the highest bidder, which may result in side-selling.

- **Unfair competition between millers and traders**: Cooperatives put their paddy out to tender but participating traders and processors do not always compete fairly. Traders run mainly cash-based businesses, which creates opportunities for them to evade their tax obligations. As a result, they can offer better prices to farmers than processors. In turn, industrial mills have significant investments to amortize, face low utilization rates resulting in high costs, and must fulfil their tax obligations. (The road to a competitive rice industry in Rwanda, 2012)

6. The rice value chain also faces challenges regarding **marketing**. Rwandan rice has a poor market reputation and recognition in comparison to imported milled rice. Moreover, poor grading of varieties by the millers impacts the overall market competitiveness of the Rwandan rice. Rwandan rice millers also blend different varieties of rice together prior to selling it.

7. In addition, several **supply-side** challenges limit the availability of good quality rice produce for **value addition and marketing**:

(a) **Poor quality of and low access to seeds**: Many rice farmers face difficulties accessing quality rice seeds. This is mainly due to the absence of a private sector seed production and distribution system[32], and lack of efficient public seed production and distribution networks[33]. Limited accessibility of quality rice seeds coupled with limited awareness regarding suitability of high-quality seed varieties to the farmers' fields leads to farmers using low quality seeds that they save. Around 40 percent of farmers use low quality seeds (including farm saved seeds). Additionally, changing microenvironment and varying geo-climatic conditions restrict the application of a single seed variety across the different rice producing areas in Rwanda.

(b) **Lack of adequate knowhow regarding rice production**: Farmers have limited knowledge about Integrated Pest Management (IPM), Integrated Nutrient Management (INM) practices, or maintenance and operation of farm machinery. Additionally, Rwanda's public extension services do not have the required technical capacity to timely and effectively disseminate information on improved soil, water, and crop management practices. These deficiencies limit processing and market (including export) opportunities for the domestic rice.

Interventions in response to these challenges

8. The project will finance the following interventions to enhance **value addition** for rice: (i) a matching grant[34] will be available to SMEs to upgrade their processing infrastructure to produce high-quality rice. Grantees for matching grant will be competitively selected based on their business plans, potential impact of their investments and other selection criteria. Beneficiaries will receive a grant of up to 50 percent of the

[32] This is caused by the domination of public sector in the seed production system
[33] This is caused by the limited capacity of RAB in terms of both field level manpower and their knowledge
[34] The purpose of provision of matching grant will be to demonstrate the benefits of processing technology upgradation. This will, consecutively increase the demand for credit line for financing of processing infrastructure (provided under component 2).

costs. The project will leverage RSB services to facilitate the implementation of agreements between millers and cooperatives to ensure availability of good quality produce for processing. TRAB will facilitate the setting up of agreements, which will specify the quality of rice required by the miller and ensure that both parties are enforcing the signed agreement by resolving the differences between millers and cooperative.

9. To enhance the **market reach** for rice, the project will provide support in: (i) assisting relevant government authorities to design and enforce regulations/standards on rice quality and safety, (ii) building the recognition of Rwanda's rice in domestic and regional markets, and (iii) organizing nationwide campaigns to increase consumer and processor sensitization towards domestically produced rice.

10. Additional interventions will focus on the **supply side** to enhance the availability of produce for **value addition and marketing**. To develop the seed sector for the rice value chain, RAB will train and build capacity of commercial farmers and cooperatives for producing high quality certified seeds; project will be supporting RAB to facilitate agri-research on suitable marketable rice varieties for different microenvironments; and conducting frequent field exercises, workshops and demonstrative programs with cooperatives to facilitate increased adoption of the certified seeds by farmers.

11. To facilitate **adoption of Good Agriculture Practices** (GAP), the project will: (i) provide a matching grant to private players (especially women groups) to facilitate provision of extension services such as INM, IPM, other agronomic services, and suitable post-harvest management services, (ii) pilot this private-sector driven extension service provision model and scale it up if justified, and (iii) set up Custom Hiring Centers under a PPP model to increase mechanization at farm level.

Maize

Overview

12. **Rwandan maize has high potential for commercialization**. Rwandan maize flour exports have grown by 64.84 percent between 2015 and 2018, earning US$9.55 million in 2018, alone. The presence of big processing units such as Minimex, Amirwa, and Africa Improved Foods (AIF) has allowed the country to export 46,963 tons of maize flour in 2018. Maize cultivation has been providing a revenue of more than US$2,612.34/ha to farmers with a gross margin of more than US$493.08/ha, indicating high income generation for farmers. Further, big processing units like Minimex and Amirwa have been earning a healthy profit of more than US$0.071 per kg and US$0.030 per kg since 2013. This indicates a high potential for commercialization for both producers and processors of maize. However, high aflatoxin content in maize has limited the sector from reaching its full potential because of high rejection rates from big processors. Therefore, appropriate investments must be made to overcome the aflatoxin issue in the maize sector (Rwanda National Institute of Statistics, 2019), (Knoema, 2020), (The News Times, 2018).

13. **Rwanda raw maize production has the potential to meet its domestic demand**. In 2020, the domestic demand of maize was 540,000 tons. However, the domestic production of maize in 2020 was 448,633 tons (the average yield was around 1.5 MT/ha and the total area under maize cultivation was around 294,439 ha). Thus, Rwanda imported about 91,367 tons of maize at a higher cost to fulfil its domestic demand. The imported maize was costly due to high cost of transportation during imports. This is because the country is fully dependent on imported fuel for transport which results in the transport costs of imports to be as high as US$3,245 for one standard container of goods. These are US$1,000 to US$2,000 more expensive than the regional averages. Therefore, appropriate investments need to be made to increase the maize production which would substitute the imports and cater to demands of maize sector, (Rwanda Corn

Domestic Consumption by Year, 2021).

Challenges

14. The maize value chain faces multiple challenges which hinder its **value addition** (processing). Small millers lack working capital and storage infrastructure for bulk procurement of raw maize and its storage. Additionally, these millers have limited skills regarding diversification of maize products and utilization of every part of maize kernels.

15. The maize value chain also faces challenges regarding **marketing**. Farmers are unable to get good prices for their produce. This is because market-related information is available only to a few organizations and is not accessible to individual farmers (UNIDO, 2013), (Ministry of Agriculture and Animal Resources , 2013).

16. Apart from the challenges stated above, another constraint is the a**bsence of proper postharvest infrastructure** which leads to significant post-harvest losses due to various reasons including aflatoxins. This reduces the milling and marketing (including export) opportunities for this commodity.

Interventions in response to these challenges

17. To enhance the **value addition** for maize, the project will organize sessions to: (i) train farmers on using tech-based platforms such as Ikofi (launched by Bank of Kigali) and other financial products promoted by the project to facilitate availability of credit for farmers, and (ii) provide technical assistance to millers to support them in diversifying of their products.

18. To facilitate adoption of enhanced production and post-production practices and availability of facilities for drying and storage, the project will: (i) provide a Matching Grant[35] to value chain actors, to build new drying and storage facilities and modernize existing ones, (ii) the project will provide training to producers on good agriculture practices and on aflatoxin control solutions such as [36]OBJ.

Cassava

Overview

19. **Rwanda's cassava industry has a significant potential for commercialization, mainly thanks to opportunities for product diversification**. Diversification into products such as cassava starch and refined bakery flour can lead to growth in both the domestic and export market segments. Rwanda's domestic demand for cassava is high due to cassava being one of the most important staples in the country. In 2020, Rwanda's overall consumption of cassava and cassava flour was 143,500 tons 189,100 tons, respectively, showing a high domestic demand. In 2018, Rwanda exported cassava worth US$67.2 thousand, which has increased significantly since then. The main destinations of cassava exports from Rwanda are Rwandan diaspora in Belgium-Luxembourg (US$36.5 thousand), United Kingdom (US$25.1 thousand), and Burundi (US$5.55 thousand). Therefore, appropriate investments need to be made in cassava processing to commercialize the sector for meeting the high domestic and global demand (Rwanda's agricultural exports

[35] The purpose of provision of matching grant will be to demonstrate the benefits of drying and storage facilities. This will, consecutively increase the demand for credit line for agriculture finance (provided under component 2).
[36] Aflasafe is a safe natural solution which cuts down Aflatoxin levels in maize and groundnuts by 80 to 100 percent.

grow by 44% to over Rwf447b, 2018).

20. **Rwanda has competitive advantage in cassava.** Rwanda enjoys a competitive advantage in cassava production compared to its neighbors. Rwanda has suitable weather and soil for growing cassava and its cassava yields are the highest in the region. In 2020, Rwanda produced 1,320,742 tons of cassava across an area of 87,669 ha, achieving a yield of 15 tons/ha. Meanwhile, the average cassava yield (in 2019) for the Democratic Republic of Congo, Kenya and Tanzania was only 8.14 tons/ha, 13.91 tons/ha, and 8.25 tons/ha, respectively. Therefore, the natural comparative advantages of Rwandan cassava make it highly competitive against other regional producers (Crops, 2021).

Challenges

21. The cassava value chain faces multiple challenges that limit **value addition** (processing). Limited know-how and processing technology hinder processors from diversifying their range of cassava products (such as into cassava starch, etc.). The technology used by processors in Rwanda is obsolete in comparison to other countries. Processors lack the technical capacity to process high quality cassava products (flour, starch, and chips), which are in demand in the global markets. Additionally, processors are unable to operate at their full capacity. For instance, the Kinazi Cassava Plant has a capacity of processing 144 tons of fresh cassava into 48 tons of flour per day.

22. The cassava value chain also faces challenges regarding **marketing**. Cross border formal trade represents only a small portion of Rwanda's cassava exports, as nearly 94 percent of dried cassava and cassava flour exports is made through informal channels. Additionally, Rwanda's cassava flour is unable to meet the tastes and preferences of export markets such as the Democratic Republic of the Congo. Cassava, as a food ingredient, is also less popular than other grains such as rice and wheat.

23. In addition, the following challenges on the **supply side** limit the availability of produce for **value addition and marketing**:

- **Low availability and appropriateness of seeds and limited commercial farming practices**. Cassava faces lower seed multiplication ratios than other crops such as maize and wheat; moreover, development of new cassava varieties is a time consuming and expensive process. Most of seeds utilized are non-certified and prone to diseases such as Cassava Brown Streak Disease (CBSD) and Cassava Mosaic Virus (CMV). Opportunities regarding increased production through commercial farming of cassava have yet not been explored. Producers cultivate cassava mostly for non-commercial purposes, making limited use of inputs (such as fertilizers) for cultivation.

- **Phytosanitary challenges and poor farming practices**. Cassava is subjected to frequent pest and disease attacks; for instance, the 'Cassava Mosaic Disease' regularly affects cassava production in Rwanda. Cassava also faces Post Physiological Deterioration which leads to losses of 11.9 percent of the total annual production. Additionally, producers have limited knowledge regarding GAP (such as usage of herbicides) for cassava cultivation (Participatory appraisal of preferred traits, production constraints and postharvest challenges for cassava farmers in Rwanda, 2016).

Interventions in response to these challenges

24. To enhance the **marketing** of cassava products, the project will support the National Agricultural Export Development Board (NAEB) on training exporters about targeting the regional African market.

Training the exporters would enable them inunderstanding and meeting the standards and certification requirements of the export markets and diversify the products portfolio and packaging for targeting different market segments.

25. Additional interventions will focus on the **supply side** to enhance the availability of produce for **value addition and marketing**. The project will support: (i) RAB to expedite research on disease resistant seeds and accelerate adoption of on-shelf varieties, and (ii) providing training to cooperatives on Good Agricultural Practices (GAP)through farmer field schools.

Horticulture

Overview

26. **The horticulture value chain has witnessed increasing gains from commercialization.** The overall income from horticulture has grown from US$0.3 million in 1994 to US$30 million in 2020, according to MINAGRI. In the past decade, horticulture exports have also witnessed a five-fold increase from US$5 million in 2005 to US$25 million in 2018. According to National Agricultural Export Development Board (NAEB), Rwanda exported 31,788 tons of horticulture commodities (vegetables, fruits, and flowers) which generated a significant revenue of US$28.7 million (about RWF 27 billion) in 2019-2020. Export destinations for horticulture not only cover neighboring markets (such as Burundi, the Democratic Republic of Congo, and South Sudan) but also global destinations (such as the European Union and the United States). Further, processed horticulture exports (like pineapple juice, dried pineapple, pastes like tomato, etc.) have also been increasing over the years. However, the limited cold chain infrastructure and weak post-harvest handling practices have resulted in significant post-harvest losses (at least 50 percent of horticulture produce gets lost at post-harvest stages) in the sector. Therefore, appropriate investments need to be made to reduce the post-harvest losses to commercialize the sector to meet the high domestic and global demand..

27. **The Rwandan horticulture can grow to be highly competitive.** Rwanda has a mild, tropical-highland-climate and fertile soil which is extremely well-suited for horticulture production. Despite being a new industry, horticulture production has grown very quickly in Rwanda. Between 2016 and 2019, vegetable production has grown by 10 percent and the fruit production has grown by 8 percent. In 2016, the horticulture output reached 318,869 tons for vegetables and 71,732 tons for fruits. In 2019, the horticulture output was 350,505 tons for vegetables and 77,793 tons for fruits. Rwanda's horticulture sector also comprises of an abundant, hardworking labor force which indicates Rwanda's potential to develop a vibrant horticulture industry. The labor costs in Rwanda are competitive in comparison to its neighboring countries. In Rwanda, casual labor generally costs US$1.50–2.00 /day while specialist staff can be hired for US$300–450 /month in comparison to Kenya, where the average daily wage is US$2.50–5.00. Thus, Rwanda possesses comparative advantage in the horticulture sector, owing to the availability of cheap labor and conducive agro-climatic conditions for horticulture production (National Institute of Statistics of Rwanda, 2019) (Ministry of Agriculture and Animal Resources, Rwanda, 2014).

Challenges

28. The horticulture value chain faces challenges regarding **marketing**. Rwandan exporters possess limited information regarding standards and certification requirements on high-value markets such as the European Union. They are also not sufficiently aware of the tastes and preferences of the different global markets.

29. In addition, several challenges on the **supply side** limit the availability of produce for **value addition and marketing**:

a) **Limited availability of appropriate seeds**. Few seed varieties are available and the market for hybrid seed varieties is small. This is because private sector engagement within the horticulture seed value chain (especially within sectors like passion fruit and tomato) is narrow. The adoption of certified seeds and plantlets by farmers is also low.

b) **Limited access to finance and high post-harvest losses**. Lack of demand-driven training on extension services (such as production techniques) restricts the increase in the volume of produce. The absence of tailored financial products to address the financial requirements of the sector impacts the acquisition of necessary equipment (such as greenhouses and supplementary irrigation facilities). Although short term credit for horticulture is available, long-term credit for horticulture products (like avocado[37]) is not. Furthermore, the sector is confronted with high post-harvest losses (e.g., 50-60 percent in the tomato value chain), mainly due to limited availability of packhouses and storage facilities (Nshizirungu and Kitinoja, 2019). Centralized packhouses such as the NAEB (National Agricultural Export Development Board) are few and have limited capacity. Moreover, unavailability of transport infrastructure between cold chain facilities and markets restricts the overall usage of cold chain facilities.

Interventions in response to these challenges

30. To enhance the **market reach** for horticulture, the project will: (i) assist exporters in understanding and meeting the standards and certification requirements of the export markets, (ii) provide technical assistance to exporters on product diversification and packaging for targeting different market segments (for example cut/sliced pineapples), and (iii) provide market-related information to farmers by organizing food fairs and visits.

31. To increase domestic supply, the project will: (i) support a matching grant[38], targeting cooperatives and agri-SMEsto modernize their current storage and cooling facilities, and (ii) provide demand-driven modern training to district agri-extension officers and private sector players on horticulture production; build the overall capacity of private players in managing, maintaining and operating cold chain (cold storages, and transportation infrastructure such as cold trucks, etc.); and mainstream energy-efficient cold storage along the horticulture value chain.

Irish Potato

Overview

32. **Commercialization of Irish potato can lead to high income gains for Rwandan farmers.** Irish potato is a prominent value chain for Rwanda, owing to its huge potential for value addition and to sound market demand. Regional market demand for diversified value-added products (such as processed chips and crisps) is rising, and new players such as Winnaz are entering the market to cater to this demand. Rwanda also has a huge domestic market demand for Irish potatoes with per capita consumption of potatoes at 125 kgs per year. Additionally, farmers consider potatoes a significant source of income and average gross income per

[37] Avocadoes have a relatively long gestation period of approximately 3 years.
[38] The purpose of provision of matching grant will be to demonstrate the benefits of greenhouse and cold storages. This will, consecutively increase the demand for credit line for financing of processing infrastructure (provided under component 2).

year per household has been more than US$731 since 2018, which constitutes 57 percent of farmers' income. Therefore, appropriate investments need to be made in the marketing and value-addition of the horticulture sector to meet the high domestic demand (RAB has released 6 new potato varieties, 2020).

33. **Irish potato sector is extremely competitive in Rwanda relative to neighbouring countries.** Rwanda is the second largest producer of potatoes in the East African Community (EAC) after Kenya and the third largest in sub-Saharan Africa. The Seasonal Agricultural Survey (SAS) 2020 quoted the average yield of Irish potatoes at 8.2 tons/ha and the total cultivated area to be around 104,494 ha. Rwanda's potato yields at 12 tons/ha are higher than regional competitors, with potential to increase these yields to 40 tons/ha. Rwanda has a comparative advantage in the production of Irish potatoes due to its low domestic resource cost (between 0.21 and 0.69), rich volcanic soils and favorably high altitude. Since 2012, the total production has increased by about four-fold, and the average yield of Irish potato has doubled. Currently, Rwanda produces approximately 858,521 tons of Irish potatoes in a year. Therefore, the production of Irish potatoes in Rwanda has continued to be efficient, competitive, and profitable (Rwanda, 2020).

Challenges

34. The Irish potato value chain faces multiple challenges that inhibit its **value addition**. Most of the Rwandan processors lack the required infrastructural capacity and technical expertise to produce high quality products such as chips, crisps, and frozen chips. Currently, there are only two processing factories in Rwanda that produce potato crisps. Even these factories do not operate at their full capacity due to limited procurement of potatoes and limited cold chain infrastructure (facilities such as cold storages, trucks).

35. Irish potatoes also face major **marketing** challenges. The market reach of new domestically produced potato products, such as chips and crisps, is limited compared to imported chips and crisps as the quality of the domestic products is low. Additionally, the competitiveness of the value chain is challenged by weak coordination between farmers groups and potential buyers.

36. In addition, **Insufficient access to know-how, credit and low storage capacity** are among the other constrains on the supply side which limit the availability of produce for value addition and marketing. Farmers do not have the required knowledge regarding the quality of potatoes required for processing. They also lack the required finance for purchasing crucial inputs and storing their produce. This is because banks and other financial institutions continue to perceive farming activities as high-risk[39]. Additionally, other institutions, such as MFIs, are at a nascent stage to provide any significant financial support. Storage facilities (including cold storages), in general, are also very few and face crucial issues such as power shortages. In absence of adequate storage, farmers are forced to sell their harvests quickly. As a result, market gluts are quite common during the harvest season.

Interventions in response to these challenges

37. To enhance **value addition** for Irish potato, the project will finance: (i) technical support and pilot exercises to promote new processing techniques developed by the International Potato Center with RAB and evaluating their impact, (ii) technology upgrades that enable potato processing, (iii) a matching grant[40] targeting SMEs to support the establishment of energy efficient cold storages, and (iv) train private players in managing and operating cold chain functions (cold storages, cold trucks etc.), and (v) facilitate the creation

[39] Caused by crop risks, weather changes, diseases, commodity price fluctuations, quality issues, etc.
[40] The purpose of provision of matching grant will be to demonstrate the benefits of cold storages. This will, consecutively increase the demand for credit line for financing of processing infrastructure (provided under component 2).

of a contractual agreement between producers and processors.

38. To enhance the **market reach** for Irish potato, the project will (i) provide assistance in the marketing of processed potato products, (ii) conduct diagnostic mapping exercises such as identification of buyers (hotels, restaurants, etc.) willing to purchase potatoes regularly, and (iii) organize producer buyer meetings to increase overall integration of the value chain.

39. In addition, the project will finance **supply side** interventions to enhance the availability of produce for **value addition and marketing.**

40. **To enhance the seed sector** for the Irish potato value chain, the project will: (i) invest in seed multiplication by providing lab equipment, technologies, and infrastructure (such as tissue culture labs), (ii) support RAB who will be responsible for (a) training farmers in seed multiplication practices, (b) promoting adoption of certified seeds through demonstration plots, and (c) seed replication and incentivizing private seed companies to invest in the seed sector.

Beans

Overview

41. **The beans value chain in Rwanda has a strong potential for commercialization.** Rwanda is one of the world's largest consumers of beans with an average per capita consumption of beans reaching 40 to 60 kgs per year. In comparison, neighboring countries such as Tanzania consume only 13 to 15 kgs per year. Further, investments from big organizations such as Farm Fresh in precooked and canned beans, is a testimony for the growing processed bean market in Rwanda. Evidently, there exists a wide scope for expansion in the raw and processed beans in the domestic and global markets. Additionally, high income for farmers also remains one of the reasons behind the commercial orientation of the beans sector. In 2019, producer prices for beans (dry) were reported to be US$532.2/ton, which indicates profitable source of income for farmers. Therefore, appropriate investments need to be made in better production techniques and processing of Rwandan beans to commercialize the sector to meet the high domestic and global demand (Monitor group, 2012).

42. **Competitiveness of Rwandan beans is growing in the world market.** The beans value chain has witnessed a fast growth as compared to the rest of the agriculture sector. Beans' output has recorded a 12.6 percent CAGR in real value between 2008 and 2019, whereas the overall crop output remained relatively stagnant. Rwanda is currently producing 484,251 tons of beans with an average yield of 0.8 tons/ha. Also, Rwanda is a net exporter of beans to the African Region. Exports are generally around 6 to 7 percent of the total production i.e., around 35,000 tons on average every year. Most Rwandan bean exports have been to Uganda (almost 54 percent), followed by Tanzania and the Democratic Republic of Congo. In 2019, Rwanda exported 23,818 tons of beans (dry), which is a jump from only 8,661 tons in 2018. The value of exported Rwandan beans (dry) was reported to be US$9.86 million. Therefore, the competitiveness of the beans sub-sector is rising in Rwanda and holds significant potential for growth against other international competitors (Edouard Musabanganji, 2019), (FAOSTAT, 2021).

Challenges

43. The beans value chain faces multiple challenges, which inhibit its **value addition**. At present, the bean processing capacity in the country is limited. There are very few ventures (like Farm Fresh) that are

involved in processing precooked beans, while most processors only perform cleaning and sorting activities. They lack the required technology to process high-quality products such as fortified and blended bean flour, and pre-cooked beans. Additionally, packaging technology (such canning) is not available to most of the processors.

44. The beans value chain also faces challenges regarding **marketing**. The exports of Rwandan beans occur mostly through Ugandan traders who procure the beans informally. There is a network of assemblers, traders, and retail outlets, but there are very few large commercial buyers. Rwandan exporters lack the required knowledge for sorting beans properly and therefore mix multiple varieties together. Due to this, they are unable to capture the niche markets for certain beans (such as yellow eyed beans) which have a high demand in the EU.

45. In addition, several **supply side** challenges limit the availability of good quality beans produce for **value addition and marketing**:

(a) **Low availability and awareness regarding inputs**. There is limited supply of high-quality seeds (such as certified seeds). Due to this, certified seeds contribute only 1 percent to 5 percent of the total planted seeds.

(b) **Limited agronomic know-how.** Farmers have limited knowledge regarding bean variety best suited for different microenvironment[41]; for instance, farmers cultivate bush beans (that mature faster) over huge tracts in Rwanda, but which are far more susceptible to disease (such as Root rot) than climber beans. Additionally, farmers fail to engage in GAP (such as row plantation, etc.).

Interventions in response to these challenges

46. To enhance **value addition** for beans, the project will support matching grant for SMEs to upgrade their processing infrastructure for diversifying into new bean products and to upgrade packaging technology for producing canned beans.

47. To enhance the **market reach** for beans, the project will finance interventions to: (i) develop new business marketing models that target specific market niches for yellow beans, and (ii) train exporters on targeting different market segments within the beans sector This will facilitate the creation of contractual agreements for cultivating specific types of beans for niche markets.

48. In addition, the project will finance **supply side** interventions to enhance the availability of produce for **value addition and marketing**.

49. The project will (i) support RAB to: (a) pilot and promote good quality certified beans seeds, (b) demonstrate and promote the use of seeds with disease-resistant properties (against diseases such as Foliar and Root rot), and (c) provide technical support to RAB in the promotion of bean varieties suitable for various microenvironment in Rwanda.

[41] In Rwanda, different microenvironments (such as marshlands, highlands) exist. Farmers do not have the required knowledge regarding suitability of different bean variety according to the microenvironment.

ANNEX 4: Agricultural finance and Insurance

A. Agricultural finance

1. Rwanda's financial sector consists of a broad array of financial institutions. The banking sector dominates the financial sector assets with a 67 percent share. The sector consists of 16 institutions, including 11 commercial banks, 3 microfinance banks, 1 cooperative bank, and 1 development bank. The national bank of Rwanda regulates and supervises microfinance institutions including Savings and Credit Cooperatives (SACCOs), which account for 5.7 percent of the financial sector assets. There are 19 MFIs and 416 Umurenge SACCOs, and 22 other SACCOs. The establishment of the Umurenge SACCOs was initiated by the government in 2008 to increase access to formal financial services in the rural areas. Other non-bank financial institutions include insurance companies, pension funds, payment system operators, payment service providers, remittance service providers, and others. The Rwanda Stock Exchange trades equity and bonds with a market capitalization of US$3.3 billion, 32 percent of GDP at the end of 2019.

2. SACCOs, mobile money accounts, and saving groups strongly drive financial inclusion among farming households. The 2020 FinScope survey found that more than half of adults who generate income from farming activities have access to financial services through non-bank formal sources such as SACCOs and mobile money accounts[42]. Their reliance on such non-bank formal services is the highest compared to that of other occupational segments. On the other hand, their access to commercial banks is the lowest, less than one out of four adults in farming using formal banking services. The level of financial exclusion among the adults in farming is 7 percent, equivalent to that of informal sector workers (9 percent). While savings data is not segmented in the 2020 survey, about 50 percent of Rwandan adults rely on informal means and this ratio is probably higher among farmers. Borrowing for agriculture purposes seems to be extremely limited. While 40 percent of the surveyed adults are from farming and close to 80 percent of the adults borrow, only 3 percent of the borrowings are for agriculture purposes. Similarly, the agriculture household survey in 2017 indicated that only 4.7 percent of agricultural households applied for agriculture loans. The sources of the loans are mostly savings groups (39 percent) and SACCOs (35 percent), followed by MFIs (8 percent) and commercial banks (5 percent)[43]. The heavy dependence on SACCOs, mobile money accounts, and savings groups mainly stems from transaction costs. They are easier and cheaper to access for farmers than commercial banks and MFIs.

3. Financial institutions largely have sufficient liquidity, but the finance intermediation remains inadequate, especially in the agriculture sector. Commercial banks are well capitalized, possess ample liquidity, are profitable and their NPLs slightly declined despite the COVID-19 pandemic in 2020. The solvency and liquidity position of banks remained above prudential requirements. MFIs are also sound although their NPLs increased in the second half of 2020. Despite the overall soundness of the financial institutions, Rwanda's private sector credit relative to GDP has been stagnant for the last five years, hovering around 20 percent. This is equivalent to or higher than the regional peers but much lower than the average of Sub-Saharan Africa (45 percent). Agriculture is one of the under-financed segments of the economy. Credit to agriculture production represented only 4.1 percent of the agricultural GDP in 2019. The share goes up if the loans for agricultural trading and processing are added, but only to around 7 percent.

[42] Finscope Financial inclusion Rwanda 2020 (*https://www.statistics.gov.rw/publication/finscope-rwanda-2020*)
[43] Agricultural Household Survey 2017 (*https://www.statistics.gov.rw/publication/agricultural-household-survey-2017*)

4. The agriculture credit has increased continuously, but the growth is slower than that of total private sector credit. The overall agriculture credit amounted to RWF149 billion in 2019. It consists of three subcategories by usage: agriculture production (RWF89.9 billion), trading (RWF18.6 billion), and processing (RWF40.6 billion). The trading and processing may be understated as the credit from MFIs and Umurenge SACCOs are not included due to the data limitation. The agriculture credit more than doubled since 2014 with CGAR of 15.3 percent but the growth was slower than that of the total private sector credit (CGAR of 16 percent). The agriculture production loans recorded the highest annual average growth among the three subcategories (CGAR of 17.9 percent) and most of which was attributable to a significant jump in MFI loans in 2019 from RWF11 billion to RWF48.7 billion.

5. Commercial banks, the largest lenders active across the three subsegments, mainly lend to agribusiness companies and large farms. The banks recently increased their exposure to agriculture processing, from RWF22.5 billion in 2014 to RWF40.6 billion in 2019. On the other hand, agriculture production loans remained rather flat around RWF25 to 30 billion for the last 5 years. Agriculture production is one of the main economic activities in the economy, but the sector represented only 1.3 percent of the commercial bank loan portfolio in 2019. The share increases with agriculture processing and trading loans, but it was still just 4.4 percent. These shares declined from 3 percent and 6.6 percent in 2014, respectively. This decline is partially caused by high NPLs due to drought in 2016-17. In addition, the agriculture borrowers are susceptible to price changes, deficiencies in the market, and climatic events. Banks traditionally focus on well-structured value chains including coffee, tea, maize, rice, and potato, often securing loan repayments through off-takers or input providers. Other banks try to reduce transaction costs by introducing mobile-based lending products. Commercial bank loans tend to be relatively larger than those from MFIs and SACCOs. Long-term loans are mainly available for well-established and larger borrowers. In 2019-20, medium and long-term loans accounted for about 41 percent and 10 percent of the loans disbursed for agriculture production. Limited access to long-term liquidity is raised as one of the key impediments for long-term loans. As of 2019, deposits which accounted for 77 percent of the total liability of the banks, were mostly demand deposits that can be withdrawn at any time.

6. The Development Bank of Rwanda (BRD), as a sole development financial institution, focuses on several priority sectors in the economy including agriculture and agribusiness. Since its reorganization in 2016, BRD's lending portfolio has increased but its agriculture/agribusiness loan portfolio decreased from RWF29.3 billion in 2016 to RWF24.2 billion in 2019. It is still one of the largest lenders in the sector. As a development bank with a limited presence in the rural areas, its direct lending tends to focus on large-scale projects especially in processing and trading and value chain financing through agribusiness companies. Indirect lending mainly goes through MFIs and banks. Backed by the government as a shareholder and borrowings from the Rwanda Social Security Board (a public pension fund) and development partners, more than 80 percent of BRD's agriculture/agribusiness lending is medium to long-term, up to 8 years.

7. MFIs and SACCOs lend actively for agriculture production, but the loans are mostly short-term, and their capacity and products seem to be limited. MFIs' agriculture loan portfolio[44] was smaller than that of Umurenge SACCOs from 2014 to 2018, but it increased by 4.5 times in 2019 to RWF48.7 billion partially due to agriculture insurance pilot (See Annex 5 for more information on agriculture insurance). As a result, MFIs' share in total agriculture production loans jumped significantly from about 17 percent in 2012 to 54 percent in 2019. Agriculture production accounted for 37 percent of their loan portfolio in 2019. Some MFIs offer tailored lending products for their target agriculture commodities. Umurenge SACCOs is the smallest among the formal lender categories with

[44] Includes MFIs and non-Umurenge SACCOs.

RWF15.5 billion, accounting for about 17 percent of the total agriculture credit. However, their presence seems to be much larger in terms of the number of loans based on the access to finance data. Their advantage is proximity to farmers, but their agriculture lending products and capacity are largely inadequate, characterized by small loan amount and frequent repayments. Some also suffer from weak management and limited operational capacity.

8. Other lenders include traders, processors, investment funds, and specialized lenders for agriculture SMEs. The members of the Council on Smallholder Agricultural Finance (CSAF) disbursed loans totaling about US$18.6 million in 2020[45] for cooperatives and traders in well-organized export-oriented value chains such as coffee (the total agriculture/agribusiness loan disbursement from banks in Rwanda was about US$88 million in 2019). Value chain actors such as traders and processors also provide some credit to cooperatives and farmers, but aggregate financing data from these sources are not available. There are several investment funds that target agriculture and agribusiness. For example, AgDevCo has invested about US$3.5 million into three agribusiness companies since 2016[46]. The warehouse receipt financing system introduced by the EAX remains limited. There are several initiatives to provide digital-based services for agricultural SMEs and farmers such as market information, extension support, and payments, but lending seems to be still in a nascent stage.

9. The NPL ratio of the agriculture loan portfolio has been generally higher than that of private sector credit. The agriculture production loans of commercial banks suffered from especially high level of NPLs in 2016 – 2017 due to drought, but the ratio subsequently declined to 5.2 percent, the lowest for the last 5 years and comparable to that of the total commercial bank loan portfolio (4.9 percent). While the risk exposure of the agriculture processing loans remained steady and low around NPL ratio of 2-3 percent except for 2016-17, the quality of the agriculture trading loans was volatile and deteriorated significantly in recent years (the NPL ratio increased to 23 percent in 2019). The NPLs of MFIs' and SACCOs' agriculture loans are not available. To manage credit risks, some lenders use credit guarantees in addition to other risk management means such as collateral and value chain financing.

10. Agriculture is one of the focus sectors of the BDF guarantee scheme. The BDF, a public sector entity, provides partial credit guarantees mainly to SME and agriculture loans. The guarantee portfolio for the agriculture sector stood at RWF8.9 billion for a total loan value of RWF24.5 billion in 2019, 27.3 percent of the total agriculture production loans. The annual guarantee issuance has declined from about RWF3.0 billion for 297 loans in 2015 to RWF0.36 million for 158 loans in 2019. As the annual expiration outvalued the new issuance, the guarantee portfolio has been declining in recent years. Based on the cumulative data for the last five years, BRD was the largest user in terms of the guaranteed loan value, accounting for about 80 percent. However, SACCOs are the largest in terms of the number of guaranteed loans, representing 85 percent of the total. BDF also provides matching grants and technical assistance support to agriculture SMEs.

11. The financial sector largely remains resilient despite the COVID-19 pandemic. Banks have been able to absorb losses caused by the pandemic through their capital and liquidity buffers. As of June 2020, their liquidity was adequate due to consistent inflow and low levels of outflows. Their profits increased due to higher interest income, and relief measures by NBR including loan restructuring, treatment of provisioning, and loan classification. The NPL ratio was contained by significant loan restructuring, amounting to 39 percent (RWF 978 billion) of their loan portfolio. However, this may bear huge costs to banks' asset quality and profitability in the

[45] CSAF State of the Sector report 2020 (*https://csaf.org/wp-content/uploads/2020/07/CSAF_State_of_Sector_2020_FINAL.pdf*
[46] AgDevCo website (*https://www.agdevco.com/our-investments/by-country/Rwanda*)

future[47]. Indeed, according to the recent survey of the pandemic impact, 90 percent of the surveyed banks expected negative impact on their lending portfolios and over 80 percent expected lower revenue in the next 3-6 months[48]. MFIs also remained solvent and liquid but suffered from higher NPLs increased from 6.7 percent in June 2019 to 12.8 percent in June 2020. The restructured loans are a key risk for MFIs in the near-term. MFIs loan restructuring amounted to FRW 29.5 billion, 23 percent of their loan portfolio[49]. According to the survey of MFIs and SACCOs, 65 percent responded that the pandemic had a significant negative impact on their loan portfolios and 80 percent expect reduced income in the next 2-3 months[50].

12. Digital transactions flourished due to the COVID restrictions. During FY2019-20, the number of mobile payment services transactions increased by 51 percent from 333 million to 504 million. The value increased by 87 percent from RWF2.06 trillion to RWF3.84 trillion[51]. According to the AFR surveys, while almost all the banks offer digital/mobile banking services, less than 10 percent of MFIs and SACCOs offer them, limiting their adaptability to the movement restrictions.

Development Bank of Rwanda

13. **BRD will be the main implementing agency for the agriculture finance subcomponent of the project.** BRD is currently the implementing agency of several World Bank funded projects, including the Renewable Energy Fund Project, the Rwanda Housing Finance Project, and the Access to Finance for Recovery and Resilience Project.

14. **BRD's changed its legal status into a public company and received a BNR banking license in August 2011.** BRD was initially incorporated in August 1967 with the objective of providing support for priority areas identified in Government programs and Rwanda's development strategies. Since 2015, the key aspects of its business strategy are to increase resource mobilization, build strong partnerships and support well focused investments and growth to maximize the development impact. BRD has a diversified ownership structure with Class A and Class B shares, where Class B shareholders are majority private owned. The bank's shareholding is currently as follows: Agaciro Development Fund (65.9 percent), Rwanda Social Security Board (32.2 percent), Belgium Government (1.2 percent), SONARWA (0.46 percent), and Bank of Kigali (0.14 percent). It also established a wholly owned subsidiary—the BDF—which focuses on providing guarantees to stimulate SME access to finance. The BRD Board currently has eight members.[52] Four of the Board members are independent members with relevant experience in the banking and financial sector.

15. **BRD is regulated and supervised by BNR.** In addition to complying with prudential regulations for commercial banks, BRD is also expected to comply with the Directive on activities and special liquidity norms for Development Banks. The bank acts both as wholesaler and retailer -providing short, medium, and long-term funding to priority sectors-particularly agriculture, exports, energy, housing and education. In addition to direct

[47] NBR annual report 2019-2020 (*https://www.bnr.rw/fileadmin/user_upload/BNR_Annual_Report_Web_English.pdf*)
[48] AFR Covid-19 impact survey Rwanda commercial banking sector April – May 2020 (*https://afr.rw/survey-the-impact-of-covid-19-on-the-rwanda-banking-sector/*)
[49] NBR annual report 2019-2020
[50] AFR Covid-19 response survey results from MFIs and SACCOs in Rwanda - April 2020 (*https://afr.rw/focus-note-the-impact-of-covid-19-to-the-microfinance-sector-in-rwanda/*)
[51] NBR annual report 2019-2020.
[52] BRD charter allows up to 11 members.

lending, BRD participates in co-financing arrangements jointly with other financial institutions, local or foreign, in economically strategic projects.

16. **BRD offers a variety of financial products.** The main business includes (a) credit lines facilities to finance working capital needs (13.7 percent of portfolio); short, medium, and long-term investment loans to projects in priority sectors (76 percent of total portfolio), and (b) equity participation in any company provided it does not exceed 25 percent of the company's portfolio[53] (9.7 percent of the portfolio). In addition, other services provided by BRD include guarantee funds to cover the risks of prospective projects that impact sustainable development; trade finance and payment system facilities to facilitate trade; and advisory services and capacity building to clients. The agriculture sector is one of BRD's priorities but its exposure to the sector declined from 17.6 percent of the total loan portfolio in 2015 to 5.5 percent in 2020[54]. The wholesale lending currently amounts to about 30 percent of BRD's lending activity and BRD aims to increase it to 60 percent.

Financial Performance

17. **BRD is compliant with most BNR prudential requirement.** BRD's financial condition ended with positive income as at second quarter of 2021. The bank complies with capital adequacy requirements[55] for banks. As of June 2021, the total CAR for the bank was 28.7 percent against required total capital of 15 percent, and core capital was 23.3 percent against minimum of 10 percent. The NPL ratio stood at 6.5 percent for the same period, compared to 7.5 percent in 2019. BRD's liquidity ratios are above minimum ratios required by BNR. The LCR stands at 306 percent above the 100 percent required by BNR.

Table 4.1 Financial Soundness Indicators (%)

	2017	2018	2019	2020	June 2021
CAR	12.8	17.93	19.0	23.9	28.7
LCR	145.9	189	705	128	306
Tier 1 Capital Ratio	8.1	13.0	14.0	19.0	23.3
NPLs	16.3	19.3	7.5	6.4	6.5
ROE	−51.6	0.03	1.8	5.5	5.0
ROA	−90.0	0.01	0.5	1.7	1.6

18. BRD main sources of funding comprise (a) equity from shareholders (24 percent); (b) reserves, lines of credit (70 percent); and (c) corporate bonds and other instruments (6 percent). BRD borrows and lends in both local and foreign currencies.

[53] With the exception when the company is 100 percent owned by BRD as a subsidiary.
[54] Some loans for agriculture such as coffee and tea are categorized as export, but the volume is not available.
[55] The Regulation No. 06/2017 of 19/05/2017 on Capital Requirements requires banks to be adequately capitalized by having a total capital of not less than 12.5 percent of total risk-weighted assets of which 10 percent is core capital. In addition to the minimum capital adequacy ratios stated in Article 20 of the Regulation, a bank shall have and hold a capital conservation buffer of 2.5 percent of the total risk-weighted assets over and above these minimum ratios.

Pricing Policy and Interest Rates

19. BRD current lending limits are as follows: small loans are in the amount of RWF 50 million to RWF 1 billion (US$50,000 to US$1 million); medium loans are between RWF 1 billion to RWF 3 billion (US$1 million to US$3 million); and large loans range between RWF 3 billion and up to 25 percent of bank core capital.

20. BRD uses a loan pricing model where interest rates charged follow the following guidelines: (a) funding cost incurred, (b) operating costs of servicing the loan, (c) risk premium to compensate the bank for default risk, and (d) a profit margin/sustainability factor on each loan that provides the bank with adequate return on capital. BRD may allow for pricing exceptions from the established standard interest rates. Some of the exceptional cases may include Libor-based loans; loans based on other benchmarks such as T/Bills; co-financing deals not based on bank pricing models; syndicated facilities where the bank is invited to participate; and special projects.

Scaling up agricultural finance

9. **The project will finance** a credit line for production and post-harvest finance and institutional capacity development for Participating Financial Institutions (PFIs). Both activities will be managed by the BRD based on its expertise in agricultural/agribusiness lending and its relations with PFIs developed through its wholesale lending operations. See Annex 4 for the details of the BRD.

10. **The proposed interventions intend to build the nascent agriculture finance market and over time transition to a market mechanism that can sustain and grow this further.** Most PFIs have insufficient knowledge to lend to the agriculture sector especially agriculture production. Therefore, their risk management strategy is heavily skewed to collateral, limiting the lending activities to relatively better-off businesses. Secondly, limited long-term finance hinders production and post-harvest investments and thus commercialization of the agriculture sector.

11. *Credit line for production and post-harvest finance*: This component will set up and operationalize a local currency line of credit facility in the BRD that will set the foundation for facilitating lending activities for farmers and farmer organizations for agriculture production and post-harvest activities. Given that the growth of the lending activities will be dependent on the broad enabling environment, the project intends to encourage financial institutions to start testing the lending opportunities by offering various support (credit line, TA, and the demand-side value chain support). The project will capitalize on BRD's experience and established structure including the ESMS in managing the World Bank-funded credit lines. In addition, the project will build on and strengthen BRD's ongoing effort to expand its wholesale lending portfolio. The design and execution of the credit line is described below. The details will be further defined in the PIM and the Credit Line Manual.

12. Expected demand for the credit line: The industry agriculture loan portfolio has been increasing by a compound annual growth rate (CAGR) of 18 percent for the last five years and it is one of the least affected sectors by COVID-19. Despite the growth, financing for farmers and farmer organizations is not yet an established offering of commercial banks and MFIs mainly due to the low-risk appetite of the lenders and high costs for client acquisition and loan appraisal. These are compounded by limited risk management tools (reliance on physical assets for collateral), limited usage of the existing guarantee scheme, and inadequate supply of long-term liquidity. During stakeholder consultations, PFIs expressed interest to strengthen lending for small agriculture borrowers if

supported with long-term liquidity, partial credit guarantees, and agriculture insurance. In this context, the credit line intends to support lending for smaller borrowers (farmers and farmer organizations) in agriculture production and post-harvest by: (a) providing long-term liquidity and technical assistance for institutional capacity development, (b) linking the credit line with the BDF guarantees and agriculture insurance (subcomponent 2.2), and (c) stimulating viable demand through value chain development support (Component 1).

13. *Selection of PFIs:* Under the credit line, PFIs will be selected based on eligibility criteria including compliance with national prudential requirements, adequate appraisal standards, and capacity and willingness to implement and meet project implementation requirements.

14. *Institutional capacity development:* The capacity building support will upgrade agriculture finance skills and operations of the PFIs. The contents of the training will be commensurate to the level of knowledge and expertise and will include cross-cutting topics such as gender and climate-smart agriculture. It will also promote linkages with value chain development activities (subcomponent 1.3) and the usage of risk management instruments such as crop insurance (subcomponent 2.2) as well as the PCG scheme and the Bridge lending window supported by AFIRR project.

15. *Blended finance and Pricing:*

- BRD will provide lines of credit to local PFIs (commercial banks, MFIs, and SACCOs) for on-lending to farmers and farmer organizations. The wholesale lending rate for PFIs will reflect BRD's costs (financing from GoR and operating expenses), risk, and profit margin. BRD will cover the credit risk of PFIs.
- On-lending by PFIs will be done using a blended finance mechanism where PFIs will be required to blend the BRD credit line funds with their own funds, aiming to offer affordable terms.
- For their portion of the credit, PFIs will be allowed to charge interest rates to end-borrowers, taking into account the cost of funding, operational costs, an appropriate credit risk premium based on the assessment of the borrower, and a profit margin to ensure their active participation. PFIs will assume full credit risk for all loans extended to end-borrowers.
- The BRD funds share will be gradually reduced towards market rates via a learning and review process on the product design. A review process and the revision of the blending ratio would be conducted semi-annually to ensure the pathway towards market pricing, while also factoring concerns on affordability.
- The blended finance mechanism aims to create and sustain the agriculture finance market by reducing excessive risk premium in the lending rate relative to the cash flow and the risk of the businesses and by crowding in private capital to support investment needs of the sector.
- Since the product is novel , the initial disbursement from the component will require the satisfactory completion of the Credit Line Manual as well as development of an initial annual workplan and budget - work towards these can be initiated immediately and before the project effectiveness. Subject to a market assessment and the evidence of the successful implementation and completion of the previous workplan and budget, the component could possibly be scaled up using the unallocated proceeds. The details of this mechanism to identify the transition and scale up will be defined in the Credit Line Manual.

16. *Other conditions:* The maturity of the wholesale loans for PFIs will reflect the actual maturity of the end-

loan portfolio. The PFIs are encouraged to provide loans with long-term maturity and grace periods suitable for the projects of the end-borrowers. PFIs' credit policies and procedures will be applied including collateral requirements. The credit line manual will set maximum loan amounts for PFIs and end-borrowers, respectively.

17. *End-borrowers:* The primary targets of the credit line are farmers and farmer organizations with production and post-harvest projects for the commercialization of their agriculture/agribusiness operation. These will include players from the *prioritized value chains* as well as other subsegments of the agriculture sector. Priority will be given to female farmers/female-led organizations and climate-smart projects. To this end, the technical assistance will strengthen PFIs' capacity to appreciate and analyze female farmers and climate mitigation/adaptation.

18. *Disbursement:* The wholesale loans to PFIs will be disbursed on a first-come, first-served basis against the term-sheet or proof of a realistic pipeline. PFIs will be free to select eligible borrowers following the criteria in the Credit Line Manual and disburse the loans as per the loan agreements with end-borrowers.

19. *Monitoring and reporting:* PFIs are required to collect and report the data and information related to the credit line operation according to the Credit Line Manual and the agreement with BRD. BRD will monitor the progress of the lending activities of the PFIs towards the result indicators and achievement of the PDO.

20. The credit line will complement the Working Capital and Investment Credit Line of the AFIRR project, especially the ringfenced allocation for agro-processing companies, as well as the improvement and capitalization of the BDF partial credit guarantee scheme. The agriculture finance activities of the CDAT and AFIRR projects contribute to the GoR initiative to establish an Agriculture Finance Facility for the sustainable growth of the agriculture finance market in Rwanda.

B. Agricultural Insurance

21. Agricultural Insurance is a very new class of insurance business in Rwanda, starting in 2011/12 with a series of weather index insurance and traditional livestock insurance initiatives. Crop insurance was initially underwritten primarily by three insurance companies that included Soras, Sonarwa, and UAP Old Mutual. These companies have offered weather index insurance (WII) and area yield index insurance (AYII), but with limited success: the WII programs for maize and sorghum experienced severe basis risk and their usage has been scaled down since 2015. UAP Old Mutual insurance company launched an individual farmer Multi-Peril Crop Insurance (MPCI) program in 2015, and in 2019 at the launch of the NAIS it was the only major player in crop insurance in Rwanda offering both MPCI to individual farmers and AYII to cooperatives linked to seasonal loans provided by KCB Bank. Two companies Sonarwa and UAP Old Mutual have also underwritten livestock insurance in the past: Sonarwa was the first to launch individual livestock indemnity-based insurance in 2011, and UAP Old Mutual added livestock to its insurance product range in 2013. Between 2011/12 and 2018/19 there was no government support to agricultural insurance in Rwanda and demand and uptake of crop and livestock insurance was very low among farmers.

National Agricultural Insurance Scheme (NAIS)

22. GoR launched a subsidized National Agricultural Insurance Scheme (NAIS) in April 2019 to increase

farmers' access to financial services and credit and protect their investments in agricultural productivity from weather and pest related risks. The government through the Ministry of Finance and Economic Planning, MINECOFIN, has agreed to subsidize up to 40 percent of the cost of the premiums for the three-year period 2019-21 (pilot year followed by two years of full implementation). The program is being implemented under a Public-Private arrangement with MINAGRI playing a leading role in scheme design and implementation: there is a 6-person technical support team housed in a MINAGRI SPIU which is responsible for NAIS operations and which is currently being financially supported by MINAGRI56, (NB: this team will be absorbed by RAB SPIU). In 2019, three insurance companies were selected by competitive tendering to underwrite the NAIS pilot crop and livestock insurance programs, namely, Prime, Radiant and Sonarwa. The number of insurance companies underwriting NAIS increased to five by 2020 when BK Insurance and UAP/Old Mutual joined the scheme. Reinsurance is being facilitated by the MINAGRI SPIU jointly with the insurance companies, and AfricaRe and MamdaRe are the main reinsurers of the NAIS.

23. The livestock insurance product is a standard individual animal indemnity-based policy that covers accidental death and diseases of livestock. To date the program has insured mainly dairy cows, as well as cows that were transferred to households through the Girinka program. Between March 2019 and August 2020, a total of 9,762 animals were insured by NAIS with total sum insured, TSI, of US$5.48 million57, premium of US$0.21 million and with paid and outstanding claims of US$0.17 million (loss ratio 78 percent). The average sum insured per animal is US$561 and with an average premium rate of 3.88 percent. The average premium is US$21.8 per animal of which the producer has to pay 60 percent of the premium or US$13.1 per animal, while government pays the remaining 40 percent or US$8.7 per animal. NAIS is insuring cows provided to poor households free of charge under the government's Girinka program (15 percent of total number of insured animals) and separately to clients of the insurers (85 percent of total insured animals).58 In September 2020, NAIS started offering cover for poultry and pigs with average premium rates respectively of 6.0 percent and 5.5 percent. At end December 2020 the total number of insured animals stood at: 29,754 cattle, 37,970 poultry and 2,246 pigs59.

24. In 2019 NAIS launched an Area Yield Index Insurance, AYII, program for maize and rice farmers starting in the cropping season A. The program is actively being marketed on a group basis to farmers' cooperatives with linkage to crop production credit and input supply. The sum insured is equal to the cost of production-including seeds, fertilizers, pesticides, energy, and labor-and not the potential value of output (yield x expected price), to lower the cost of the premium. The AYII Policy offers "all risk" loss of crop yield protection in a defined geographical area (termed the Unit Area of Insurance, UAI) and which is generally the total cultivated crop area of a cooperative. It is designed to pay out when average crop yield in the UAI fall below 80 percent to 85 percent of the five- year yield average, in which case all insured farmers in that UAI receive the same amount of yield shortfall payout per hectare. By August 2020, NAIS insurers had insured a total of nearly 9,666 Ha of maize and rice over two crop seasons (seasons A and B 2020), generating TSI of US$4.1 million, and premium of US$0.29 million and with paid and outstanding claims estimated at US$0.42 million (loss ratio 144 percent). The B Season rice crop incurred major flood damage and this crop accounted for the bulk of outstanding claims. The average

[56] For the past five years, Access to Finance Rwanda, AFR, funded the operating costs of the MINAGRI SPIU implementing NAIS, but this program terminated at end December 2020. MINAGRI has committed to continue funding the project management unit for the time-being to ensure continuity of NAIS implementation.
[57] For the purposes of this analysis an exchange rate of Rwandan Francs 1,000 = US$1.00
[58] Livestock Insurance results data provided by MINAGRI: NAIS update from March 2019 to August 2020 Both Livestock and Crop
[59] Data provided by MINAGRI SPIU March 2021

sum insured for maize is about US$363/Ha with average premium rate of 8.25 percent and implied premium cost of US$30 per hectare of which the farmer pays 60 percent or an average of US$18 per hectare for maize. The average sum insured of rice is slightly higher at US$ 430 per hectare with slightly lower average premium rate of 7.08 percent and average premium cost of US$30 per hectare and the farmers' 60 percent share of premium amounts to US$18 per hectare60. In 2020, the AYII program has been expanded to include new crops including chili peppers, French beans, and Irish potatoes all of which carry an 8 percent premium rate.

25. NAIS with the support from the Government of Morocco is also developing a hybrid weather index insurance, WII and AYII insurance product for rainfed maize. The hybrid cover has been designed by the Moroccan Mutual Agricultural Reinsurance Company, MamdaRe, in collaboration with Partner Reinsurance Company. The product is designed as a five vegetative-stage rainfall deficit insurance cover, but late season if there is evidence that the weather index is not accurately estimating actual on-farm losses in maize, the AYII option will be used at the time of harvest to determine final payouts to insured farmers. The hybrid product has higher average premium rate of 10 percent than the straight AYII cover. The GoM, hybrid WII/AYII program for maize had not incepted by end August 2020.61

Key Issues and Challenges facing NAIS

26. Non-Life Insurers62 in Rwanda mostly lack technical knowledge and expertise in the design and implementation of agricultural insurance and currently they rely very heavily on support from the MINAGRI SPIU to implement the NAIS. There is very limited capacity in terms of technical knowledge amongst the local insurance companies to underwrite agricultural crop and livestock risks. There are very few insurance professionals with expertise in designing, rating, underwriting, and implementing both indemnity and index-based agriculture insurance products. Of the three insurance companies that were appointed (by tender) to underwrite NAIS back in 2019, only Sonarwa has prior experience of underwriting crop and livestock insurance and Radiant and Prime have no previous experience at all. Therefore, at the time of inception of NAIS the insurers were highly dependent on international consultants appointed by AFR and international reinsurers to assist them with the design and rating of the crop and livestock insurance products and during implementation they have relied on major support from the MINAGRI SPIU. Under the NAIS, Sonarwa is insuring both crops and livestock, Radiant is also insuring both crop and livestock and has invested in staffing and equipping an agricultural insurance department and Prime Insurance has contracted out its crop insurance field operations to Acre Africa.

27. Insurers face major data constraints which are needed to design and rate agricultural insurance. It is not possible to offer good quality crop and livestock insurance products and programs without access to time-series data that is granular and of consistently high quality. The agro-meteorological weather and crop area, production

[60] Crop Insurance results data provided by MINAGRI SPIU: NAIS update from March 2019 to August 2020 Both Livestock and Crop
[61] For an in-depth review of the NAIS Crop and livestock insurance policies see World Bank 2019. Rwanda, National Agricultural Insurance Scheme: Situation Analysis and Options for Strengthening

[62] The 10 non-life, or general insurers include: Sonarwa General Insurance Ltd, Soras Assurances Generales Ltd, Saham Assurance Rwanda Ltd, Prime Insurance Ltd, Radiant Insurance Company, BK General Insurance Ltd UAP Old Mutual Insurance Rwanda Ltd, Phoenix Assurance Rwanda, Britam Insurance Company Rwanda Ltd, and Mayfair Insurance Company Rwanda Ltd.

and yield data and statistics at a local level require strengthening. Rwanda due to its variably topography has a very large number of micro-climates and the weather station density is inadequate to cover the many different micro-climate and rainfall and temperature zones – this is a major challenge and can cause basis risk issues for weather index insurance programs that rely on ground-weather stations. There are major data-related issues and challenges in Rwanda for introducing AYII including the lack of quality time-series historical area yield data on which basis to construct the area yield index, as well the relatively weak field service organizations in the public and private sectors that have trained staff to conduct area yield assessment using Crop Cutting Experiments (CCEs). Currently NISR collects and publishes crop production and yield statistics at the agro-ecological zone level, which is too large a geographical area for the effective operation of an AYII program.

28. The demand for agricultural insurance is constrained by farmers lack of awareness and understanding of agricultural insurance. Financial and insurance literacy levels are very low in Rwanda and insurance penetration is equally low. Total market gross premium (life and non-life) is still below 2 percent of GDP which places Rwanda among countries with the lowest insurance penetration in Africa. Microinsurance penetration including agricultural insurance remains very low and only a small proportion of agricultural households have any knowledge or understanding of the role of traditional and new agricultural index insurance in protecting their investments in their farming enterprises. Financial literacy that will stimulate demand and usage of financial products like insurance are urgently required to transform the predominantly subsistence farming sector to a vibrant commercial agri-business sector based on adoption of new higher yielding technology (improved seeds and fertilizers, improved animal breeds, etc.).

29. Agricultural insurers in Rwanda currently lack rural branch offices and networks with which to promote and distribute and administer agricultural insurance cost-effectively with large numbers of smallholder crop and livestock producers. The insurance companies have very few retail sales outlets at sector and village level, making it difficult for remote rural households to access and utilize insurance products. Furthermore, very few of the insurance companies have dedicated networks of field agents to promote insurance and to inspect crop losses and adjust claims. There is an urgent need to identify cost-effective distributional channels for agricultural insurance products and services and here CDAT value chain actors that could become risk aggregators to enhance insurance product distribution. The risk aggregators include farmer organizations, input dealers, packer-processors/traders and financial lending institutions. Going forward digital technology and platforms are likely to play an important part in delivering agricultural finance and insurance to small farmers in Rwanda.

30. Start-up farmers will require financial support to access agriculture insurance as they shift from a low investment/low yield continuum to high-investment high yield production levels. In response, the GoR is providing limited premium subsidy support, equal to 40 percent of the cost of the commercial premium, to make insurance more accessible to small farmers. There is a broad body of literature that shows the demand for agricultural insurance by smallholder farmers is highly price-elastic and that where governments have provided targeted premium subsidies this can lead to major increases in the usage of agricultural insurance63. GoR has committed to providing 40 percent premium subsidies over the three-year period 2019-2021; however, international experience shows that for programs to achieve scale and sustainability this financial commitment may need to be provided in the medium to long term. International experience also shows that once agricultural insurance premium subsidies have become popular among the farming community, it is extremely difficult for governments

[63] Kenya and Zambia are two examples of countries where government has recently introduced crop insurance premium subsidies and where the demand for crop insurance by small-scale farmers has subsequently taken off

to withdraw these subsidies64.

31. The support to NAIS should go beyond insurance premium subsidy provision. The support should be considered for investments that make the agriculture insurance market more efficient, for example, creation of suitable legal and regulatory environment to promote agricultural insurance; the strengthening of weather and agricultural data and statistics; farmer insurance literacy, awareness creation and training; and building infrastructure for insurance delivery, over and above providing premium subsidies. The budget for supporting agriculture insurance, therefore, need to consider all financial aspects of implementation and appropriate resources be allocated.

32. High-quality weather and agricultural data and statistics add significant value beyond agricultural insurance to multiple policy makers and planners in the agricultural sector. While the initial intended use of this data would be for the NAIS, the data have significant value beyond crop and livestock insurance. More accurate yield data could support MINAGRI in planning and budgeting processes. Increased weather station density and data could be used to develop bulletins to support farmer planning, as well as for early warning. Farmer databases could be used by financial institutions and payment providers to better target other financial products, such as savings, e-payments, and credit.

33. A key recommendation arising out of the World Bank's 2019 NAIS Situation Analysis and Option for Strengthening study was for the NAIS insurers to form a coinsurance pool to underwrite the scheme going forward. Technical support and assistance will therefore be provided under subcomponent 2.2. for strengthening NAIS agricultural insurance to explore new and innovative ways of enhancing agriculture insurance uptake through cost-effective product distribution models.

Strengthening agricultural insurance

34. **The project will strengthen the quality and effectiveness of agriculture insurance offered through NAIS and to contribute to de-risking the agricultural sector using market-based financial and insurance mechanisms.** The focus will be to address key challenges to NAIS identified through the World Bank review (2019) by: (i) strengthening the private sector's capacity to take over private-sector roles and responsibilities to implement the NAIS, (ii) supporting the public sector to become an enabler of agriculture insurance provision to enhance its sustainability and effectiveness, and (iii) application of fintech solutions to enhance access to financial services, including insurance.

35. **The project will support the strengthening of NAIS through four major areas of investment as described below**:

A. Support institutional strengthening and delivery of appropriate agriculture insurance products

36. **Under this subcomponent, the project will strengthen capacity of private sector to develop and offer high-quality crop and livestock insurance products**. In coordination with the RAB SPIU, the ASSAR will help insurance companies identify institutional and technical challenges to develop insurance products acceptable by

[64] See Mahul and Stutley 2010.

financial institutions, cooperative and agribusinesses. The project will procure the assistance of an international consultancy firm to address the identified private sector capacity gaps. The international consultant will work closely with ASSAR and RAB SPIU to ensure the appropriate transfer of skills to the private sector by the end project period. Under the institutional capacity strengthening, the private sector will be supported to improve on their coinsurance arrangements, in close collaboration with regional reinsurance actors. The project will support insurers and ASSAR to examine a cost-sharing formula under which the NAIS coinsurers will share in the staffing and operating costs, if the private sector chooses the coinsurance route.

37. On the public sector side, the project supports the strengthening of the agriculture data collection. This will include strengthening the crop cutting experiments (CCEs) used to collect data for adjusting Area Yield Index Insurance products and support dairy animal registration for insurance purposes.

B. Premium co-financing

38. The project will provide premium co-financing for agriculture insurance under NAIS to incentivize investment in good farming practices like climate smart agriculture through de-risking agriculture, changing farmer behavior, and boosting yields. The project will finance partial premium subsidies in line with existing NAIS practices for agriculture insurance products developed during the project implementation to make agricultural insurance more accessible and affordable to smallholder crop and livestock producers. There is strong evidence that carefully designed or smart premium subsidy programs can be effective in increasing demand and uptake of agricultural insurance (see Box 1 for further details of the role of smart premium subsides in the context of Rwanda). The project will promote bundling of agriculture insurance products with other services to ensure farmers have the right package of services necessary to improve their production. The project will support a strong linkage between farming activities supported in component 1 and credit facilitation in subcomponent 2.1.

C. Awareness creation and outreach to both public and private agriculture insurance actors.

39. **The project will fund activities aimed at increasing financial knowledge with emphasis to female farmers.** The project will support training of agriculture insurance underwriters, training of extension officers, developing and pilot-testing agriculture insurance training content for cooperatives, off-takers, and farmers. Awareness creation and training of farmers, farmer groups, farmer cooperatives will be undertaken using MINAGRI extension service structures. MINAGRI staff will receive gender training to ensure that they can effectively reach out and train women farmers

40. **Creating insurance awareness and financial literacy among smallholder farmers and herders is fundamental to the scalability and sustainability of NAIS in Rwanda.** Crop farmers and livestock producers will be provided with education and training on financial and insurance products to ensure they are fully informed and become active participants in the financial sector. With increased awareness and understanding of insurance, demand for crop and livestock insurance (as well as credit) will be enhanced. Because financial products are ultimately about trust, the financial education and training programs for farmers will be convened through actors and channels that farmers trust and deal with regularly[65]. The budget includes provision in the start-up year to develop suitable crop and livestock insurance farmer sensitization and educational training communication and extension methods and materials (such as radio, digital text messaging, videos, and printed materials) including

[65] For example, local radio and other trusted media

specific training material to meet the needs of women farmers. RAB SPIU through the crop and livestock extension departments will take a lead role in the implementation of agricultural insurance awareness and education and training programs for farmers and livestock producers. Training of trainer courses will be provided to the extension staff to mainstream financial education in the extension package and to ensure equal access to these courses by female farmers.

41. **The long-term success of NAIS is dependent on agricultural insurance capacity building and training for the three main stakeholders** including: (i) the private insurance companies, (ii) MINAGRI and other government line ministries and (iii) the value chain actors involved in promoting and distributing NAIS products and services. The project will provide specialized capacity building to these key stakeholder categories. **Private sector insurers** will receive specialized training delivered through consultancy services to design and rate new indemnity-based and index-based crop and livestock insurance products and programs, and the roll-out of these new products. **MINAGRI and other public stakeholders** will receive training in the NAIS crop and livestock insurance products and programs to enable them to support agricultural insurance implementation including farmer training, the conduct of field inspections and loss assessment. The **value-chain actors** will be trained to assume a central role by bundling of insurance with products and services they provide to farmers. The training will cover the role of agricultural insurance and the design features of each product, the insured perils and the cost of the product and the basis of indemnity and claims payouts.

D. Fintech solutions to enhance financial access.

42. **The project will support the roll-out of digital technologies and provide platform for sub-component 1.3 and 2.1 to achieve intended objectives.** The cost of delivering agricultural finance and insurance solutions to remote farmers is still high, contributing to low uptake of financial services. Fintech solutions have the potential of reducing delivery cost significantly. The project will build on increased mobile money penetration among over 9 million adults with mobile transaction accounts and around 4 million active users. The project will support the government in establishing a digital platform that will link producers and financial services data. The digital platform will be available to private sector players to lower the cost of financial service delivery further and strengthen the efficiency of value chains. For example, through fintech solutions, farmers could receive extension support, pay insurance premiums, and accept payments digitally. Financial institutions will have access to the data collected, moving them to information-based lending, thus reducing physical collateral demand. The fintech solutions will allow smart contracts to increase transparency and openness in business transactions, thus speeding up agriculture transformation.

Box 2. Agricultural Insurance Premium Subsidies as a Public Good in Rwanda

In Rwanda, agricultural insurance promises substantial benefits to farmers, financial institutions, and government. Farmers can use insurance to smooth their consumption and incomes; to protect their investments in new higher yielding production technology; to leverage their access to credit and to ensure that they remain credit worthy in times of major production loss. FIs in Rwanda have traditionally been very risk averse to lending to small farmers who lack collateral to secure their loans but bundling of crop credit and crop insurance offers the FIs protection against climatic shocks resulting in crop failure and farmers' inability to repay their loans. For the GoR, agricultural insurance offers the potential to transfer part of the fiscal risk from its budget / balance-sheet by replacing traditional disaster relief and compensation schemes to affected rural

communities and farmers, with ex-ante private sector agricultural insurance instruments that are demanded and purchased by farmers.

Yet, due to affordability challenges as well as market inefficiencies, to date agricultural insurance has been slow to take off in Rwanda and uptake by farmers is very low. Many Rwandan farmers are poor, and they lack the necessary savings or access to lines of credit to fund expensive crop and livestock insurance premiums. The limited demand and uptake of agricultural insurance has, in turn, severely restricted the supply of agricultural insurance and few private commercial insurers have been willing to risk their capital in this risky class of business. Without widespread uptake of their products, insurers lack diversification and economies of scale, driving up the cost of capital and operations. Higher premiums, in turn, further constrain the ability of small-scale Rwandan farmers to purchase the policies on offer.

Starting in 2020, the GoR has made a commitment to derisk lending to the agricultural sector by entering into a public private partnership with local commercial insurers to promote agricultural insurance under the NAIS. Under NAIS, the GoR is providing major technical and capacity building and implementation support to insurers and is also providing incentives to farmers to take out agricultural insurance in the form of partial premium subsidies: the 40 percent premium subsidy support provided by MINECOFIN is one of the lowest and most prudent premium subsidy levels provided by governments anywhere in the World. NAIS was launched in 2020 and is showing encouraging results to date.

Premium financing in the form of agricultural insurance premium subsidies is one of the main instruments to improve the affordability of insurance solutions for small-scale farmers and livestock producers. There is a strong body of literature to show that affordability is a major constraint to uptake of micro-retail agricultural insurance by smallholder crop and livestock producers and that demand is highly price-elastic meaning that smart premium subsidies can be very effective in increasing demand and uptake of insurance by these smallholders "Smart" subsidies should be designed and implemented in ways that provide maximum social benefits while minimizing distortions in the market and mistargeting of clients. (Hill et al 2016; Hazell et al 2017; InsuResilience 2021a&b).

The GoR has requested CDAT to provide US$20 million over the next 5 years to supporting NAIS scale-up and sustainability and transfer of responsibility for implementation to the private sector. About 50 percent of CDAT's component 2.2 budget is allocated to partial premium subsidy support. Premium subsidies are the most common form of public intervention by governments to develop agricultural insurance markets (Mahul and Stutley 2010). The investment under CDAT in partial premium subsidies is intended to further increase the demand and uptake of agricultural insurance by Rwandan farmers and to support the project's' objectives of increasing access to agricultural credit to finance modernization and investment and commercialisation of the agricultural sector; strengthening farmer resilience and food security; and boosting Rwanda's agricultural GDP.

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InsuResilience 2021b. Smart Premium and Capital Support: Enhancing Climate and Disaster Risk Finance Effectiveness Through Greater Affordability and Sustainability

ANNEX 5: Economic and financial analysis

1. **Overview:** This annex presents an *ex-ante* economic and financial analysis (EFA) of the Commercialization and De-Risking for Agricultural Transformation Project (CDAT) that aims to invest in six selected value chains – maize, rice, horticulture, Irish potato, cassava and beans. The analysis focuses on the benefits associated with investments in irrigation, post-harvest handling, primary processing, agri-business processing and market infrastructure. It benefits from other *ex-ante* project analysis of agriculture projects in Rwanda and follows the World Bank guidelines.

2. The World Bank approach to EFA seeks to address three questions, in all projects. First, what is the project's development impact? This is an underlying question to cost-benefit analysis, which considers expected stream of project benefits and costs, and establishes an explicit causal framework linking project activities to targeted outcomes. Second, is public sector provision or financing the appropriate vehicle? Third, what is the World Bank's value added? It examines the World Bank's contribution to the project outcomes and seeks to determine the benefit from the Bank's involvement, or whether the proposed project maximizes the development impact.

3. **Methodology.** To capture the net incremental benefit of project interventions two scenarios are devised to compare the without-project and with-project scenarios, starting at the lowest unit of measurement (one hectare) per crop and multiplying it by the total area cultivated under each crop and farming household, with similar scenarios devised further down the value chain for micro-processor/enterprises. Some general assumptions include an estimated increase in costs / output by a moderate 5 percent and a reduction in half of post-harvest loses to 10 percent, since the project is primarily concerned with post-harvest production and processing. All crop models are aggregated up to the project level, based on the area cultivated for the past three years - from the Rwandan Statistical Agricultural Survey (SAS 2019).[66] The net incremental benefits are used to calculate the viability of the project using indicators such as the internal rate of return, net present value, benefit-cost ratio and switching values. The timeframe used in the economic and financial analysis is 20 years, with a discount rate of 6 percent, which is based on World Bank guidelines. The economic and financial analysis aggregates the incremental benefits of the selected crops and those related to potential reduction in GHG emissions, using the FAO EX-ACT, while factoring in the project's investment and recurrent costs, using economic values from Costab.

4. **Project development impact.** The project generates economic benefits from investments in increased mechanization of rice production, improved processing and drying of maize, increased processing of cassava and high-value products, reduced post-harvest losses in horticulture through improved handling and cold storage, advanced processing infrastructure for higher-end value products in Irish potatoes and new marketing models for processed canned beans. The analysis models the benefits from improved irrigation and water resources management, while also taking into consideration the area-based crop insurance scheme costs and external financing. Further downstream investments include the cold storage, milling and agricultural mechanization service providers. Benefits begin with improved post-harvest handling at the crop production level, which allows for additional markable surplus, and of its processing for value addition, that then reaches commercial markets.

[66] Individual analysis of returns for the 37 irrigation sites was not conducted due to limitations of data on a site-by-site basis. During implementation, detailed feasibility studies of each individual site are expected prior to investment approval.

Investments in irrigation, drainage and land husbandry are justified by the increasing nature of extreme weather events and declining potential for evapotranspiration in part due to increasing average mean temperatures linked to climate change that requires better regulation of water supply, especially during seasons B and C of Rwanda.

5. After consideration of the models, the analysis returns a net present value (NPV) of US$374.67 million, an economic internal rate of return (EIRR) of 23.7 percent and a benefit-cost ratio (BCR) of 1.99. Anticipated number of farmers that draw benefit from project investments is estimated at 236,000 farming households or 173,000 ha of area under cultivation, which equates to around 11 percent of total farming households in Rwanda (or 12 percent of cultivated land). This is the rate of adoption, by Rwandan farmers estimated for the project.

6. **Financial Analysis.** In total 13 crop models, 3 farm models and 4 enterprise models were developed to capture the agricultural value chain related investments, related benefits and demonstrated impact on household income. Some general assumptions related to the crop budgets include: (i) one hectare of land per crop budget; (ii) farm models are set at an average of 1 ha; (iii) cropping intensity varies from 100-200-300 percent in the with-project and without-project scenarios; (iv) yields increase in line with by national targets provided by RAB; (v) post-harvest losses decline by a quarter to a half of base scenario values; (vi) agricultural mechanization reduces on-farm labour needs per hectare in traditional cash crop type areas and increases in more market and commercially orientated crops such as vegetable and fruit production; (vii) crop insurance premiums at 60 percent of 7.5 percent premium is added as an operating expense on a progressive basis; (viii) grant/loan funding is factored into cash flow analysis as a part of project support.

7. The models illustrate how a modest increase in yields, coupled with improved productivity in post-harvest handing can achieve significant gains in profitability, as reflected in positive NPV, IRRs and BCRs, in the table below.

Table 5.1: Summary table of crop budgets

	Yields (tons/ha)			Gross revenue (USD/ha)			Income without family labor (USD/ha)		
	WOP	*WP*	*Increm.*	*WOP*	*WP*	*Increm.*	*WOP*	*WP*	*Increm.*
Rice	4.20	6.50	55%	1,724	3,262	89%	1,466	2,772	89%
Maize	1.60	3.00	88%	336	830	147%	165	412	149%
C.bean	2.00	2.60	30%	473	713	51%	113	235	109%
Potato	8.90	14.46	63%	1,222	2,818	131%	658	1,920	192%
Cassava	14.20	21.02	48%	773	1,412	83%	649	1,058	63%
Veg	4.25	11.25	165%	3,854	16,428	326%	3,007	14,986	398%
Fruit	7.50	12.50	67%	7,673	16,477	115%	6,920	15,216	120%

	Return on family labor (USD/pers-day)			NPV @ 0.06	FIRR	Benefits/ Costs
	WOP	*WP*	*Increm.*	*WP*	*WP*	*WP*
Rice	4.03	9.43	134%	9,266	-	2.65
Maize	-0.36	0.85	-332%	2,624	565%	1.22
C.bean	-0.64	-0.05	93%	356	19%	0.81
Potato	3.51	11.36	224%	9,330	1576%	2.28
Cassava	2.75	5.40	96%	981	16%	2.07
Veg	7.21	38.18	429%	25,825	-	3.25
Fruit	47.97	11.36	-76%	29,121	-	5.81

8. Farm model 1 represents the opening of marshland areas to improved rice cultivation and an increase in horticultural production; Farm model 2 represents increased horticultural production and other commercially-

orientated open-field crops such as potato and beans, the latter embodying the dual prospect of contributing to a balanced nutritional diet, combined with strong local market potential, and Farm model 3 embodies further expansion in fruit production for export markets in the region and beyond. Farm model results are summarized in the table below.

Table 5.2: Summary table of farm budgets

	Net production value			Total Outflows			Cash Flow Before Labour			Return per hectare		
	WOP	*WP*	*Incr.*	*WOP*	*WP*	*Incr.*	*WOP*	*WP*	*Incr.*	*WOP*	*WP*	*Incr.*
Model 1: Marshland rice and horticulture	1,724	7,864	356%	555	1,285	131%	1466	6990	377%	1,466	6,990	377%
Model 2: Potato, common beans and horticulture	1,695	27,291	1510%	1,371	3,834	180%	770	24453	3075%	770	24,453	3075%
Model 3: Maize, cassava and beans	2,421	11,348	369%	812	1,601	97%	2036	10141	398%	2,036	10,141	398%

	Return on labour day			Cash Flow Before Financing			Benefit/Cost Ratio		NPV @ 6%		IRR @ 6%	
	WOP	*WP*	*Incr.*	*WOP*	*WP*	*Incr.*	*WOP*	*WP*	*Before financing*	*After financing*	*Before financing*	*After financing*
Model 1: Marshland rice and horticulture	4.03	19.94	395%	1,168	6,579	463%	3.10	6.12	23,348	23,516	-	-
Model 2: Potato, common beans and horticulture	2.87	65.76	2189%	324	23,457	7138%	1.24	7.12	96,863	97,323	-	-
Model 3: Maize, cassava and beans	11.50	69.00	500%	1,609	9,747	506%	2.98	7.09	50,533	50,714	-	-

9. Enterprise models pick up on basic agricultural service providers of machinery that include threshers, power tillers and cold storage and maize mills. These activities include indirect benefits associated with their main activities, which the analysis attempts to capture, for instance, by including benefits that may extend to farmers served by the operator and subsequently result in further value addition to farmers.

10. **Sensitivity analysis.** The analysis demonstrates that the project can absorb substantial negative impacts – including delays in the start of the project benefits, increases in costs and decreases in benefits and reduced adoption rates. Even a reduction in benefits by more than 30 percent or increase in costs by over 20 percent results in a positive NPV. Under the base scenario, the project is projected to reach payback in year 9 of the discount period. Total cost estimates are based on the investment and recurrent costs of project implementation from project years to one to five, plus an average annual maintenance cost equal to six percent of project costs – on a progressive basis - throughout the discount period. The only scenario to return a negative return is when adoption by the 10 percent of farmers declines by 50 percent, suggesting a robust model for return.

Table 5.3: Sensitivity analysis – summary results

No.	Scenarios				EIRR	NPV (USD)
1	Base scenario @6%	-28,535	-53,324	91,279	23.7%	374,612
2	Base scenario @3%	-28,535	-53,324	91,279	23.7%	584,559
3	Base scenario @9%	-28,535	-53,324	91,279	23.7%	238,451
4	costs +10%	-31,574	-60,971	89,688	20.7%	336,950
5	costs +20%	-34,612	-68,619	88,098	18.2%	299,288
6	costs +30%	-37,651	-76,267	86,507	16.0%	261,626
7	benefits +10%	-28,350	-51,008	101,997	27.0%	449,736
8	benefits +20%	-28,165	-48,693	112,715	30.4%	524,859
9	benefits +30%	-27,980	-46,378	123,434	33.8%	599,982
10	benefits -10%	-28,720	-55,639	80,560	20.4%	299,489
11	benefits -20%	-28,905	-57,954	69,842	17.0%	224,366
12	benefits -30%	-29,090	-60,269	59,123	13.6%	149,243
13	benefits delayed 1 year	-30,385	-74,627	60,488	18.2%	300,561
14	benefits delayed 2 years	-30,385	-76,477	60,918	14.7%	239,759
15	Adoption rate 90%	-28,720	-55,639	80,560	20.4%	299,489
16	Adoption rate 80%	-28,905	-57,954	69,842	17.0%	224,366
17	Adoption rate 70%	-29,090	-60,269	59,123	13.6%	149,243
18	Adoption rate 60%	-29,275	-62,585	48,405	9.9%	74,119
19	Adoption rate 50%	-29,460	-64,900	37,687	5.9%	-1,004
20	Adoption rate 40%	-29,645	-67,215	26,968	1.3%	-76,127

11. **Environmental co-benefits.** The EX-Ante Carbon Balance Tool (EX-ACT) was used to estimate the total gross and net GHG emissions resulting from investments in the six selected value chains of the project. The 2017 World Bank guidance notes on the shadow price of carbon (SPC) was referenced to determine the shadow price of carbon – ranging from US$8 for market values and US$42 to US$64 for low and US$84 to US$128 for high social values. This range results in an NPV of US$373.6 million, US$368.4 million and US$362.4 million and an EIRR at its lowest of 23.1 percent.

12. Total area under consideration is the area cultivated plus areas planted with bush plants under land husbandry for protective purposes and fruit trees. Baseline emissions are equivalent to -3,596,082 tCO_2 and gross emissions by the project are projected to be -3,371,136 tCO_2, making net emissions equivalent to 224,945 tCO_2 over a 20 -year period or 11,247 tCO_2 per year. Preliminary analysis of the EIRR – using market, low and high values for the SPC – decreases from 23.7 percent to 23.1. As a percentage of benefits, the share changes from 0.3 to 3.4 percent.

Table 5.4: Summary table of base case and GHG benefits using market and shadow price of carbon.

	Base	Market	Low	High
NPV w ENV Benefits (USD)	374,612	373,644	368,395	362,206
EIRR w ENV Benefits (%)	**23.7%**	**23.6%**	**23.4%**	**23.1%**
NPVb	751,232	793,450	787,971	781,516
NPVc	376,620	376,620	376,620	376,620
BCR ratio	1.99	2.11	2.09	2.08
Switching values - benefit	-50%	-53%	-52%	-52%
Switching values - cost	99%	111%	109%	108%
ENV Benefits as a percentage of total		-0.3%	-1.7%	-3.4%

13. **Public provisioning of finances.** The project will work to address the market failures related to the selected value chains, by ensuring buy-in of the private sector with innovative approaches, that foster the development of group services and collective organization for improved service delivery and reduced transaction costs for better market-driven, export orientation by agri-businesses and processors. Public-private partnerships will be directed at developing the agri-food system, predominantly for agricultural innovation and agri-infrastructure development, including input supply, production, processing and marketing. While PforR-2 is tackling the broader and most significant regulatory aspects, the Project will provide complementary and targeted investment, as well as capacity building and technical assistance to improve the eco-system and enabling environment for private sector operators to crowd-in.

14. **World Bank value addition**. The Bank is well positioned to provide financing and technical support for such a comprehensive operation. First, the Bank can take advantage of its unique cross-sectoral expertise mix. The project draws from the Agriculture and Food Global Practice, the Finance, Competitiveness and Innovation Global Practice, as well as from the International Finance Corporation (IFC). Second, the Bank has been successfully financing comparable, holistic value chain approaches in the region, such as through the Angola: Commercial Agriculture Development Project (P159052), or the Republic of Congo: Commercial Agriculture project (159979), and others. Third, the Bank has significant experience with leveraging private sector participation and investment in the agri-food sector, both on a larger scale (particularly through its various IFC operations), and on a smaller scale (through its various IDA and IBRD operations), in which de-risking the sector through various approaches is paramount. Fourth, the Bank has a proven track record, of over 15 years, and success in linking agricultural producers to markets and strengthening agri-food value chains, such as through its Productive Alliance model, first mainstreamed in Latin America and the Caribbean, and then successfully applied in other regions as well. Fifth, the World Bank has used to great effect AgResults that uses Pay-for-Results prize competitions to incentivize and pull-in the private sector to overcome agricultural market barriers by investing in innovative research and delivery solutions that improve, often using disruptive technologies, with a sharp focus on bettering the lives of smallholder farmers.

Table 5.5: Summary of Economic Analysis and environmental co-benefit values

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Project year	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	Yr-9	Yr 10-20
Project benefits										
Total Project Benefits	1,850	23,153	40,572	50,417	55,295	63,384	67,841	70,357	70,284	91,956
Project costs										
Investment and Recurrent costs	28,665	70,525	73,152	53,919	38,822					
Other costs										
Maintenance and fees	1,720	5,951	10,341	13,576	15,905	15,905	15,905	15,905	15,905	15,905
Total Project Costs	30,385	76,477	83,492	67,495	54,727	15,905	15,905	15,905	15,905	15,905
TOTAL PROJECT INCREMENTAL NET BENEFITS	-28,535	-53,324	-42,920	-17,078	568	47,479	51,936	54,452	54,379	76,050

NPV (in USD '000) @ 0.06	**374,612**			What-If						
EIRR	**23.7%**			Scenarios	1	2	3			
Social discount rate	6.0%			2	9%	6%	3%			
Project benefit stream	1,850	23,153	40,572	50,417	55,295	63,384	67,841	70,357	70,284	91,956
NPVb (in USD) @ 0.06	751,232									
Project cost stream	30,385	76,477	83,492	67,495	54,727	15,905	15,905	15,905	15,905	15,905
NPVc (in USD) @ 0.06	376,620									
Project net incremental benefits	-28,535	-53,324	-42,920	-17,078	568	47,479	51,936	54,452	54,379	76,050
NPV (in USD) @ 0.06	**374,612**									
Break-Even	**-26,920**	**-74,378**	**-110,415**	**-123,942**	**-123,517**	**-90,046**	**-55,506**	**-21,342**	**10,845**	**53,312**

Switching values	Appraisal value	Switching value	% change
Incremental benefits	751,232	376,620	-50%
Incremental costs	376,620	751,232	99%
BCR	1.99		

	Inc.	
Costs	100%	*cost*
Benefits	100%	*ben*
R&M	6%	

With Environmental co-benefits	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Market price of carbon (USD/tCO2)	8									
Carbon prices - Low* (USD/tCO2)	42	43	44	45	46	47	48	49	50	51
Carbon prices - High* (USD/tCO2)	84	86	87	89	91	94	96	98	100	102
Uptake	0.2	0.4	0.6	0.8	1	1	1	1	1	1
Total tCO2e over 20 years (EX-ACT)		-224,945	tCO2	-11,247						
Total tCO2e per year (EX-ACT) - over 18 years in total		-12,497	tCO2							
Actual total tCO2e per year (adjusted for slow uptake)	- 2,499	- 4,999	- 7,498	- 9,998	- 12,497	- 12,497	- 12,497	- 12,497	- 12,497	- 12,497
Environmental co-benefits @ market price (8 USD/tCO2)	-20	-40	-60	-80	-100	-100	-100	-100	-100	-100
Environmental co-benefits @ low estimate price (avg. 51 USD	-105	-215	-330	-450	-575	-587	-600	-612	-625	-637
Environmental co-benefits @ high estimate price (avg. 102 U	-210	-430	-652	-890	-1,137	-1,175	-1,200	-1,225	-1,250	-1,275
Total Benefit with ENV Market Price	*1,830*	*23,113*	*40,512*	*50,337*	*55,195*	*63,284*	*67,741*	*70,258*	*70,184*	*91,856*
Total Benefit with ENV Low Price	*1,745*	*22,938*	*40,242*	*49,967*	*54,720*	*62,797*	*67,241*	*69,745*	*69,659*	*91,318*
Total Benefit with ENV High Price	*1,640*	*22,723*	*39,920*	*49,528*	*54,158*	*62,209*	*66,641*	*69,133*	*69,035*	*90,681*
Total Net Benefit Without ENV Benefits	**-28,535**	**-53,324**	**-42,920**	**-17,078**	**568**	**47,479**	**51,936**	**54,452**	**54,379**	**76,050**
Total Net Benefit With ENV Benefits @ Market Price (USD)	-28,555	-53,364	-42,980	-17,158	468	47,379	51,836	54,353	54,279	75,951
Total Net Benefit With ENV Benefits @ Low Price (USD)	-28,640	-53,538	-43,250	-17,528	-7	46,892	51,336	53,840	53,754	75,413
Total Net Benefit With ENV Benefits @ High Price (USD)	-28,745	-53,753	-43,572	-17,968	-569	46,304	50,736	53,228	53,129	74,776

ANNEX 6: Greenhouse gas emissions accounting analysis

1. **World Bank Mandate**: In its 2012 Environment Strategy, the World Bank adopted a corporate mandate to conduct greenhouse gas (GHG) emissions accounting for investment lending. The quantification of GHG emission is an important step in managing and ultimately reducing emissions, and is common practice for many international financial institutions. The World Bank had adopted the EX-Ante Carbon-balance Tool (EX-ACT) developed by FAO in 2010, [67] to assess a project's net carbon-balance. This is the net balance of tons of CO_2 equivalent (tCO_2e) GHGs that were emitted, or carbon sequestered as a result of project implementation compared to a "without project" scenario compared to the "initial" scenario. EX-ACT thus estimated the carbon stock changes as well as GHG emissions per unit of land, expressed in tCO_2 per hectare, per year.

2. **Data Inputs in EX-ACT**: Rwanda has tropical mountain moist climate and High Activity Clay soil type. The project duration is five years, the capitalization period is assumed to be 15 years. Dynamics of evolution are assumed to be linear. Default "Tier 1" coefficients are used.

3. The project proposes several activities that can be captured with the GHG accounting tool EX-ACT. Under component 1 the project aims to invest in irrigation, land husbandry and innovation and services for agri-business development. Changes in the current, without-project and with-project scenario are presented with the above investments incorporated, using aggregate figures for land use, as per the economic and financial analysis.

Table 6.1: Data inputs to EX-ACT in the current, without project and with project scenario.

Activities	Current scenario	Without project scenario	With project scenario
Agriculture	Traditional: Cassava 38,124 ha Maize 29,180 ha Irish potato 10,594 ha Beans 55,938 ha Fruit and vegetable 17,331 ha Rice 3,340		Traditional: Cassava 19,062 ha Maize 14,590 ha Irish potato 5,297 ha Beans 27,969 ha Fruit and vegetable 8,666 ha Rice 0 ha Improved: Cassava 19,062 ha Maize 14,590 ha Irish potato 5,297 ha Beans 27,969 ha Fruit and vegetable 8,666 ha Rice 3,340 ha Fruit trees 2,708 ha Bushes and LH 1,639 ha
Inputs			Fertilizer 632,692 tonnes Irrigation 17,673 ha

[67] http://www.fao.org/in-action/epic/ex-act-tool/en/

4. First results show that the project emits a minor net amount of **224,945 tCO_2e** equivalent over 20 years, **11,247 tCO_2e** annually, due to increases in fertilizer usage and increased cropping intensity that are offset by climate smart agricultural practices. Net emissions from annual crops decrease by 190,321 tCO_2e over 20 years (-9,516 tCO_2e/year), while from improved input it increases by 632,851 over 20 years (31,643 tCO_2e/year).

Table 6.2: Preliminary EX-ACT Results - All GHG in tCO_2e

Component	Positive	Negative	Balance
Agriculture			
Annual	-2,909,363	-3,099,684	-190,321
Perennial	-892,642	-879,919	12,723
Rice	135,698	135,698	0
Inputs and investments		632,851	632,851
Total	-3,596,082	-3,371,136	224,945
Per hectare	-20.6	-19.3	-1.3
Per hectare per year	-1.0	-1.0	0.1

ANNEX 7: List of excluded activities (SME finance)

1. Production or trade in any product or activity deemed illegal under Rwanda's laws or regulations or international conventions and agreements.

2. Production or trade in pharmaceuticals, pesticides/herbicides, ozone depleting substances, polychlorinated biphenyls (PCBs) subject to international phase outs or bans.

3. Trade in wildlife or wildlife products regulated under Convention on International Trade in Endangered Species.

4. Production or trade in weapons and ammunitions[1]

5. Production or trade in alcoholic beverages[1]

6. Production or trade in tobacco[1]

7. Gambling, casinos, and equivalent enterprises[1]

8. Production or trade in radioactive materials (this does not apply to the purchase of medical equipment, quality control measurement equipment, and any equipment where the radioactive source is considered to be trivial and/or adequately shielded).

9. Cross-border trade in waste and waste products, unless compliant with the Basel Convention and the underlying regulations.

10. Production or trade in or use of unbounded asbestos fibers.

11. Unsustainable fishing practices, such as drift net fishing in the marine environment using nets in excess of 2.5 km length, electric shocks, or explosive materials.

12. Production or trade in wood or other forestry products other than from sustainably managed forests.[2]

13. Production or activities involving harmful or exploitative forms of forced labor[3] or harmful child labor.[4]

14. Activities involving land acquisition and/or restrictions on land use resulting in involuntary resettlement or economic displacement.[5]

15. Any activities involving significant degradation or conversion of natural[6] and/or critical habitats[7] and/or any activities in legally protected areas.

16. Production, trade, storage, or transport of significant volumes of hazardous chemicals, or commercial scale usage of hazardous chemicals (gasoline, kerosene, other petroleum products, textile dyes, etc.).

17. Production or activities that have adverse impacts, including relocation, on the lands, natural resources,

or critical cultural heritage subject to traditional ownership or under customary use by Indigenous Peoples.[8]

18. Activities involving significant adverse impacts on critical cultural heritage.[9]

Notes:

1. This does not apply to enterprises that are not substantially involved in these activities. 'Not substantially involved' means that the activity concerned is ancillary to an enterprise's primary operations.

2. Sustainable forest management may be demonstrated by the application of industry-specific good practices and available technologies. In some cases, it may be demonstrated by certification/verification or progress towards certification /verification under a credible standards system.

3. Forced labor means all work or service, not voluntarily performed that is extracted from an individual under threat of force or penalty.

4. Harmful child labor means the employment of children that is economically exploitive, or is likely to be hazardous to, or to interfere with, the child's education or to be harmful to the child's health, or physical, mental, spiritual, moral, or social development.

5. Land acquisition and/or restrictions on land use may result in the physical displacement of people (involuntary resettlement), as well as their economic displacement (as loss of assets and/or means of livelihood, regardless of whether the affected people are physically displaced). Land must be bought on willing-buyer, willing-seller basis.

6. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition. This includes HCV forests. HCV areas do not directly correspond with definitions for modified, natural, and critical habitat. The HCV Resource Network, an internationally recognized group, provides information and support on the evolving usage of HCV to ensure a consistent approach. https://www.hcvnetwork.org/.

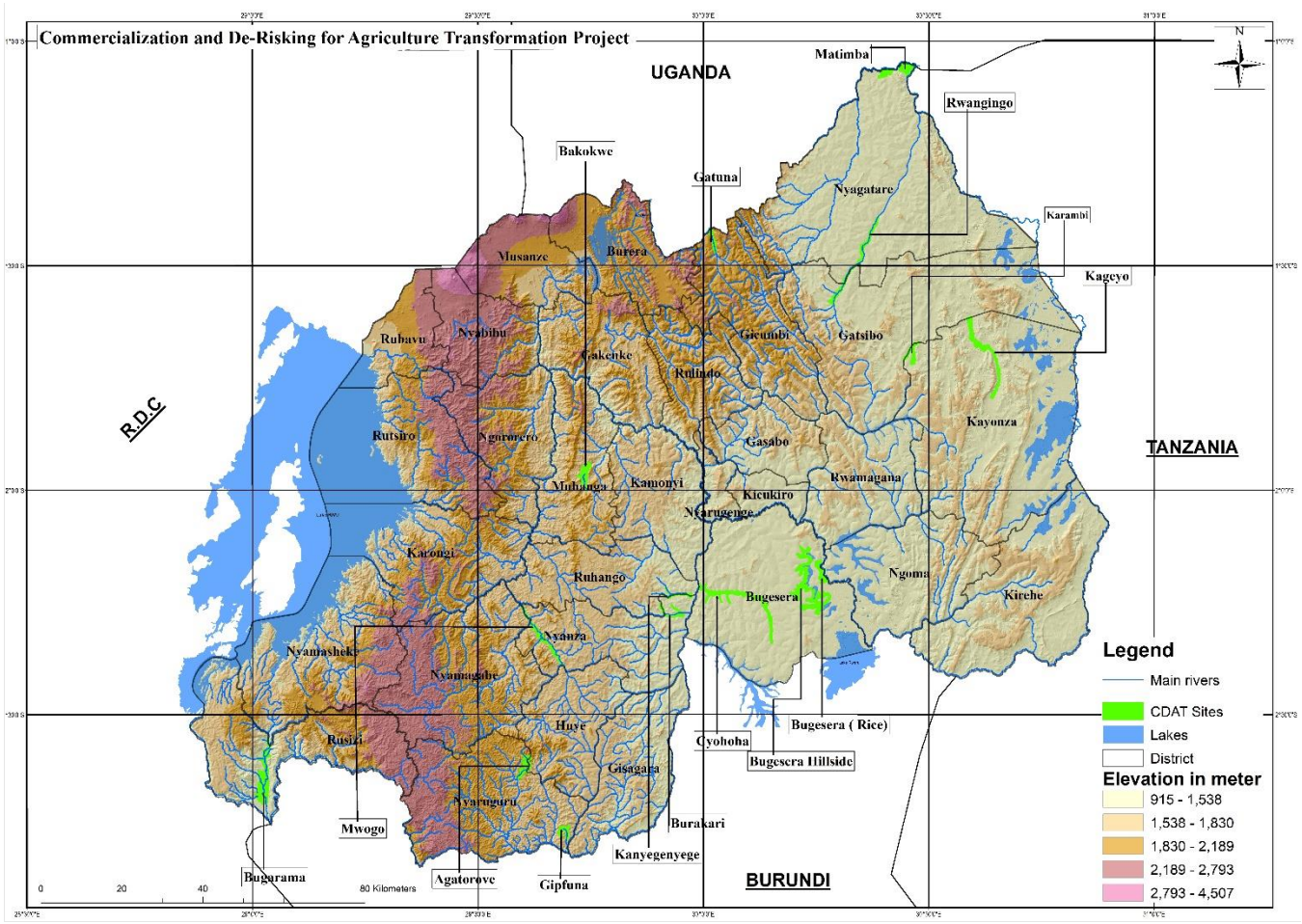
7. Critical habitat is a subset of both natural and modified habitats that deserves particular attention. Critical habitat includes areas with high biodiversity value that meet the criteria of the World Conservation Union (IUCN) classification, including habitats of significant importance for required for critically endangered or endangered species as defined by the IUCN Red List of Threatened Species; habitats of significant importance for endemic or restricted-range species; habitats supporting globally significant concentrations of migratory species and/or congregatory species; and areas with unique assemblages of species or which are associated with key evolutionary processes. Primary forests or forests of High Conservation Value (HCV) shall be considered Critical Habitats.

8. The term 'Indigenous Peoples' is used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:

(a) Self-identification as members of a distinct cultural group and recognition of this identity by others,
(b) Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories,
(c) Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture,
(d) A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

9. Critical cultural heritage consists of (a) the internationally recognized heritage of communities who use, or have used, within living memory the cultural heritage for long-standing cultural purposes, and (b) legally protected cultural heritage areas, including those proposed by host governments for such designation.

ANNEX 8: Maps


Commercialization and De-Risking for Agriculture Transformation Project
UGANDA
TANZANIA
BURUNDI
R.D.C
Matimba
Rwangingo
Bakokwe
Gatuna
Nyagatare
Karambi
Musanze
Burera
Kageyo
Rubavu
Nyabihu
Gicumbi
Gatsibo
Rakenke
Rulindo
Kayonza
Rutsiro
Ngororero
Gasabo
Rwamagana
Muhanga
Kamonyi
Kicukiro
Nyarugenge
Karongi
Ruhango
Ngoma
Bugesera
Kirehe
Nyanza
Nyamasheke
Nyamagabe
Huye
Bugesera (Rice)
Rusizi
Cyohoha
Bugesera Hillside
Gisagara
Nyaruguru
Mwogo
Burakari
Kanyegenyege
Bugarama
Agatorove
Gipfuna
0
20
40
80 Kilometers
Legend
Main rivers
CDAT Sites
Lakes
District
Elevation in meter
915 - 1,538
1,538 - 1,830
1,830 - 2,189
2,189 - 2,793
2,793 - 4,507