REPUBLIC OF ZIMBABWE

MINISTRY OF FINANCE AND ECONOMIC DEVELOPMENT

AGRICULTURAL CONFLICT RESOLUTION AND SUSTAINABLE LIVELIHOODS PROJECT(ACRES)

PEST MANAGEMENT PLAN (PMP) August 2025

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EXECUTIVE SUMMARY

Introduction

This report presents the Pest Management Plan (PMP) for the Agricultural Conflict Resolution and Sustainable Livelihoods Project (ACRES), which is being proposed by the Government of Zimbabwe for implementation in the two provinces of Matebeleland South and Masvingo, specifically in Gwanda, Bulilima, Matobo, Mangwe and Gutu, respectively.

The Agricultural Conflict Resolution and Sustainable Livelihoods Project (ACRES), encompasses a comprehensive Pest Management Plan (PMP) designed to address the complex challenges of pest control within the livestock and leather sectors. As the project aims to enhance crop and livestock production, the PMP is crucial for managing the risks associated with pesticide use and ensuring environmentally and socially sustainable practices. This executive summary provides an overview of the PMP's objectives, strategies, and implementation framework, focusing on how it aligns with national development goals and addresses both the ecological and human health impacts of pest management. By integrating Integrated Pest Management (IPM) principles, the PMP seeks to mitigate negative effects and promote sustainable agricultural practices across the project's operational areas.

The Zimbabwean government has undertaken several initiatives to boost crop and livestock production, notably through a five-year African Development Bank-funded Support to the ACRES Project. This project aimed to address conflicts due livestock migration to Botswana and mitigate the effects of climate change. Following the success of this pilot, Agricultural Conflict Resolution and Sustainable Livelihoods Project (ACRES), was initiated to expand these efforts across additional provinces. ACRES focuses on capacity building, enhancing livestock productivity, providing potable water, and promoting private sector development, all aimed at fostering macroeconomic stability, job creation, and poverty reduction.

Pest can significantly derail project activities by reducing crop yields and livestock productivity, leading to financial losses and food insecurity. The pesticide can also cause environmental damage by harming soil and water including health risks to workers from pesticide exposure. Pest and pesticides management within this project can have several potential impacts on its activities. Effective pest control is essential to protect fodder, crops and cattle from damage, ensuring healthy growth and maximizing yields. However, improper management of pests and pesticides (Including acaricides) can lead to adverse effects that may compromise the project's goals and sustainability.

As part of its comprehensive approach, ACRES will adhere to environmental and social safeguards, including the development of a Pest Management Plan (PMP) in compliance with the Environmental Management Act of Zimbabwe and other AfDB Operating Safeguards standards. The PMP is crucial for minimizing the negative impacts of pesticide use and promoting sustainable pest management practices. Effective pest management is essential for protecting crops and livestock, but improper pesticide use can lead to environmental contamination, health risks for farmers, and reduced agricultural productivity. The ACRES project is structured to integrate pest management practices within its broader objectives, ensuring that environmental and social impacts are carefully managed to support the overall success and sustainability of the initiative.

Description of the Project and results

Project components of the, Agricultural Conflict Resolution and Sustainable Livelihoods Project (ACRES) are designed to boost the crop and livestock production over a five-year period, with a strong emphasis on sustainable development and minimal environmental impact.

The proposed Project aims to enhance the adaptive capacity of drought-affected communities by addressing the interconnected challenges of climate change, water, food and nutrition insecurity, and poverty. The Project will focus on improving water-related infrastructure in order to ensure a reliable water supply for agricultural and domestic uses, thus stabilizing crop and livestock production. Most of the proposed activities will complement the ongoing ZRBF II, in order to build synergies with other development partners, namely EU and Government of Ireland. The Project will ensure social inclusion by addressing the specific needs of women, youth, and marginalised groups through targeted gender equality and protection related interventions. To ensure sustainability, the Project will strengthen local institutions and community structures, including VBUs, and also focus on technical capacity building for sustainable management of resources. Additionally, the Project has incorporated Water, Sanitation, and Hygiene (WASH) and nutrition activities including early warning systems. This integrated approach aligns with Zimbabwe's national climate adaptation strategies and Sustainable Development Goals (SDGs), ensuring long-term sustainability and recovery. The Project aims to complement the Government's efforts to protect livelihoods in the current crisis caused by the El Niño induced drought. The Project is also in line with two of the Bank's "High 5" priorities of *"Feed Africa"* and *"Improving the Quality of Life of Africans"*.

Components and Subcomponents

The Project consists of 3 components, as summarised below, and associated activities.

Components and Sub-components
Component 1 Support to Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities
Sub-component 1.1: Response to mitigate the negative impact of 2024 El Niño induced drought, Provincial Resilience Platform, and Early Warning Systems
Sub-component 1.2 Climate-Resilient Agricultural (Crop and Livestock) Production, Productivity and Marketing
Sub-component 1.3: Sustainable and Diversified Livelihood Options for Rural Inclusive Economic Growth of at-risk Communities
Component 2 Strengthen the agricultural input supply chain by catalysing private sector investment, reinforcing agro-dealer networks through capacity-building and governance reforms (*AFFM)*
Sub-component 2.1: Improving Input Supply Chain Financing and Reporting
Sub-component 2.2: Farmer Outreach, Education, and Resilience Building
Sub-component 2.3: Improve Policy and Regulatory Environment (Fertilizer Policy)
Component 3: Project Management

Components and Sub-components
Sub-component 3.1: Knowledge Management, Monitoring & Evaluation, and Communication
Sub-component 3.2: Project Coordination

The Project Components and Activities

The Project consists of three components, namely (i) Component 1 - Support to Reduce Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities, (ii) Strengthen the Agricultural Input Supply Chain, and (iii) Project Management. This Project has focused on participatory approach in order to select demand-driven activities which will address the specific drivers of fragility and build resilience of rural population, with due consideration to sustainability. The Project activities also aim to complement the Government's efforts to protect livelihoods in the current crisis caused by the El Niño induced drought and future climatic shocks. Gender, Environmental, Fragility and Resilience, Climate Change and Green Growth issues have been incorporated in the Project design. The public and private sectors shall work together to harness economic opportunities from the livestock value chain, which has the potential to create jobs and attract export markets.

Component 1 - Support to Reduce Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities (To be implemented by MLAFWRD - UA 10.08 million, 55.3%).
This Component has three sub-components, namely:
Response to Mitigate the Impact of Future Extreme Events Similar to the 2024 El Niño Induced Drought,
Climate-Resilient Agricultural (Crop and Livestock) Production, Productivity and Marketing.
Social Inclusion, Sustainable and Diversified Livelihood Options for Rural Inclusive Economic Empowerment of at-risk Communities.
This component includes immediate response in terms of (i) food assistance for drought affected rural communities, and (ii) feed assistance for Livestock. It will also facilitate medium term interventions including (i) water supply and nutrition interventions to support drought affected rural population, (ii) Support establishment of Village Business Units (VBUs – Presidential Initiative) within the Project area, in order to promote rural industrialization and economic empowerment, (iii) development of commercial type-high-yielding, community-level demand-driven, multipurpose boreholes fitted with solar-powered pumps, including overhead tanks, and reticulation system which will be used for livestock and crop production and also domestic purpose, (iv) development of water-sand abstraction system (infiltration gallery) to collect water from intermittent sandy riverbeds, even during the dry season, thus utilising the sand as a natural filter, which will provide potable water to target rural communities, and (v) creation of green-zones on the Zimbabwe side for both livestock and crop value chains development. The green-zones will be established using extended VBU-concept, for bridging the gap, which will include construction of livestock service centers, at strategic locations, closer to the Zimbabwe-Botswana border in order to minimise Zimbabwe livestock, especially cattle, straying across the border into Botswana, in search of water and feed. The center will consist of community-level demand driven livestock watering points, low-cost shelters for patrol officers/security officers, feed and fodder processing units (hay baling sets, chuff cutters, feed mixers), feed banks with storage sheds near borehole clusters, pasture production unit (20ha) under irrigation to enhance carrying capacity and fodder availability (forage value chain) with support from Bank's flagship programme Technologies for African Agricultural Transformation (TAAT) International Livestock Research Institute-ILRI), and also community-level demand driven existing livestock dip tanks with start-up package acaricides, initial stock of medication and supplies to improve livestock health and disease

control. Targeted investments in climate resilient infrastructure, improved water management, community-based adaptation, institutional capacity building are urgently needed to reduce vulnerability and enhance resilience, early warning systems, training of lead farmers and extension worker in sustainable land and water management. This Component will provide opportunity to address the underlying causes of climate change vulnerability in the selected districts, thereby building resilience including enabling access to climate proof investment to support productive livestock and crops value chain. The Project has also included the sustainable nutrition activities which shall facilitate awareness and provision of nutritious food to the rural population to achieve enhanced diet quality, whilst preserving the natural resources.

Component 2 - Strengthen the Agricultural Input Supply Chain – (To be implemented by AFFM - UA 4.52 million, 24.9%). This component has two sub-components, namely:
Improving Input Supply Chain Financing (*include Development of Fertiliser Policy*),
Farmer Capacity and Resilience Building.

In Zimbabwe's drought-prone agricultural landscape, where smallholder farmers face chronic input shortages and limited access to finance, the Partial Trade Credit Guarantee (PCG) model offers a transformative solution. The PCG, as part of the suite of blended finance instruments, enhances the public-private partnerships (PPPs) by leveraging concessional capital to attract commercial investment, thereby easing the fiscal burden on government resources. The PCG design will be adapted and enhanced to provide the necessary support in the selected project regions in order to incentivize stimulate private sector investment in sustainable agricultural inputs (fertilizer, seeds and pesticides) distribution. Incorporating risk-sharing mechanisms, such as covering a portion of potential losses, the PCG will catalyse private sector participation in agricultural value chains, unlocking scalable and sustainable financing for inputs, infrastructure, and market access. This approach supports smallholder farmers in transitioning from aid dependency to commercially viable, resilient agricultural production systems, while reinforcing the shift toward inclusive, market-driven rural economies. By covering up to 50% of potential credit losses, the PCG reduces lending risk for local financial institutions, and input suppliers who are willing to sell inputs on credit enabling them to extend credit to medium scale farmers and farmer groups and VBUs. This mechanism not only improves fertilizer availability but also strengthens input supplier distribution networks and enhances the resilience of input supply chains, critical in a country where erratic rainfall and soil degradation threaten food security. The PCG's inclusive and flexible design allows it to serve a wide range of stakeholders, from large scale commercial farmers with satellite small holder farmers to remote small holder farmer groups, ensuring equitable access to inputs across Zimbabwe's diverse agro-ecological zones. Managed by AFFM, the guarantee fund would be governed with strong oversight, ensuring transparency and alignment with Zimbabwe's agricultural development strategies. In a context where financial institutions are often risk-averse and rural credit penetration remains low, the PCG can catalyze much-needed private capital, crowd in additional investment, leverage private sector extension expertise to improve fertilizer utilization, and support climate, resilient farming practices, ultimately contributing to sustainable, inclusive growth, and institutional accountability in fragile rural economies. AFFM-PCG will support the project in leveraging private sector resources and attracting them to these high-risk regions. AFFM PCGs will extend the guarantee coverage to financial institutions and fertilizer suppliers, enabling them to deliver fertilizer and soil conditioners to smallholder farmers involved in food crops, particularly those cultivating drought-resistant varieties. Furthermore, AFFM will explore options to extend the guarantees to livestock farmers, covering the fodder production.

Component 3 – Project Management (UA 3.61 million, 19.8%). This component has 2 sub-components, namely 3.1 Knowledge Management, Monitoring & Evaluation, and Communication *(To be implemented by MLAFWRD)*, and 3.2 Project Coordination *(To be implemented by PMU and ACBF)*.

The sub-component 3.1 will support knowledge management and establishment of robust monitoring and evaluation (M&E) systems for collecting, processing and disseminating/communicating the Project-related information/data and best practices to stakeholders, in order to improve performance and decision-making. M&E activities will include Project Technical Launch, production of the Project Implementation Manual, monitoring/supervisory field visits, review meetings, Mid Term Review, Beneficiary Impact Assessment, Project Completion Review which shall provide opportunities for stakeholders to discuss progress, share best practices, and produce Project progress reports. This sub-component will also support (i) environmental and social safeguards compliance, technical assurance, Grievance Redress Mechanism, strategic communications and visibility, for streamlined execution and efficiency, (ii) implementation of Environmental and Social Management Plan (ESMP) activities, and protection systems, and (iii) nutrition education and promotion package. In terms of communication, the sub-component 3.1 has included activities which will use Bank's communication strategies to promote and achieve sustainable development, namely, data and information generation, information dissemination, promoting dialogue and shared understanding of the established project infrastructure to drive positive change towards a sustainable future. The Project will promote visibility (mass media, brochures, posters, branding, signages on site, banners, videos and multimedia coverage of community), and also support Information Education and Communication (IEC) activities (workshop and awareness meetings, short project documentaries, including photos, radio, television, print media campaigns/content placement). The sub-component 3.2 will support the Third Party (ACBF) in order to ensure efficient Project implementation in line with the objectives and also the Bank's rules and procedures. This sub-component will also facilitate financial management, and procurement related activities.

Effects of Acaricides and Agrochemicals on the Environment

The project activities are going to include use of agro-chemicals that include acaricides, crop protection chemicals and fertilisers. These agrochemicals have the following negative impacts:

- **Biodiversity Loss**: Acaricides can harm non-target species, including beneficial insects like pollinators and predatory mites, leading to reduced biodiversity.
- **Soil Health**: Agrochemicals can disrupt soil microorganisms, affecting soil fertility and structure. This can lead to decreased agricultural productivity over time.
- **Water Contamination**: Runoff from treated fields can contaminate nearby water bodies, impacting aquatic life and drinking water sources.
- **Air Pollution**: Volatilization of agrochemicals can lead to air pollution, impacting human health and the environment.
- **Resistance Development**: Overuse of acaricides can lead to the development of resistance in pest populations, making pest control more challenging and leading to increased chemical use.
- **Ecosystem Imbalance**: Disruption of predator-prey relationships can lead to pest outbreaks, requiring even more chemical applications.

Pollution of Open Water Sources

The primary potential sources of surface water pollution are pesticides and fertilizers used in nutritional gardens, fodder fields, as well as mishandled dip effluent containing acaricides and pesticides. Additionally, general solid waste from construction activities, feed processing hubs, and agro-processing facilities, if not properly disposed of, can also end up in rivers, contributing to water pollution. Pesticides and their containers pose a significant risk to surface waters. The contents of these pesticides can migrate into open watercourses, such as rivers, as well as groundwater sources.

Objectives of Integrated Pest Management (IPM)

Integrated Pest Management (IPM) aims to minimize the impact of pests while reducing reliance on chemical pesticides. Its key objectives include:

- **To** Promote long-term pest control solutions that are environmentally sound and sustainable.
- **To e**nsure that pest management practices are cost-effective for farmers while maintaining crop yields.
- **To** minimize risks to human health from pesticide exposure.
- **To p**rotect beneficial organisms and maintain ecosystem balance.
- **To** Reduce the development of resistance in pest populations through diverse control strategies.
- To increase understanding of pest biology and ecology among farmers and stakeholders to aid in effective pest management strategies.

Current Approaches to Pest Management in Zimbabwe's Agricultural Sector

Pest management strategies in Zimbabwe focus on both chemical and non-chemical methods to address pest issues in fodder crops and livestock. The targeted fodder crops and livestock and their common pests are as follows: -

Targeted Fodder Crops

ACRES targets legumes like velvet bean and lucerne, and grasses such as Katambora and star grass for fodder production. Velvet bean (Mucuna pruriens) and lucerne (Medicago sativa) are valued for their high nutritional content and soil fertility benefits but face pests like the velvet bean caterpillar and lucerne flea. Grasses like Katambora (Cynodon dactylon) and star grass (Cynodon nlemfuensis) are prone to pests such as armyworms and grasshoppers. Effective pest management is crucial for maintaining the productivity and sustainability of these crops.

Horticultural Crops and associated Pest

Horticultural crops are susceptible to a variety of pests that can affect their growth and yield. These include the following

Aphids: Small sap-sucking insects that can transmit viruses and weaken plants.

Whiteflies: Another sap-sucking pest that can cause damage and spread diseases.

Spider Mites: Microscopic arachnids that damage leaves by feeding on plant sap, leading to discoloration.

Thrips: Tiny insects that scrape plant surfaces, causing stippling and potential virus transmission.

Caterpillars: Larval stages of moths and butterflies that can defoliate plants.

Root-Knot Nematodes: Microscopic roundworms that cause galls on plant roots, leading to stunted growth and reduced yield.

Current Approaches to Pest Management

Chemical Pest Control: Pesticides and acaricides are commonly used for managing ticks and maintaining feed quality. Methods include dipping tanks, pour-on formulations, and sprays, but these require careful management to prevent environmental contamination.

Integrated Pest Management (IPM): IPM combines biological, cultural, and mechanical control methods. Biological controls involve natural predators, while cultural practices include crop rotation and resistant varieties. IPM is promoted but not universally applied.

Rangeland Management: Climate-smart practices focus on soil and water conservation to enhance ecosystem health and natural pest control. These practices are being implemented on a limited scale.

Training and Capacity Building: Training programs for safe chemical use and pest management are widespread, supported by veterinary technicians and Agritex extension officers.

Disease Surveillance and Monitoring: The Department of Veterinary Services conducts regular monitoring and surveillance for pest-related diseases, using technology for reporting and tracking. Effectiveness is hampered by limited urgency and knowledge in rural areas.

Regulation and Policy: Government policies regulate pesticide use and pest management practices to ensure environmental and health standards.

Practical Experience with IPM in Zimbabwe and the Agriculture sector]

Successful IPM pilot projects have shown promising results by blending biological control methods with traditional pest management techniques, demonstrating their effectiveness in managing pest populations. These initiatives highlight the importance of partnerships and collaborations among government agencies, NGOs, and research institutions, which are crucial for advancing and implementing IPM strategies. Research plays a vital role, focusing on developing IPM techniques tailored to local conditions and exploring innovations such as resistant breeds and advanced monitoring tools. Community-based programs and farmer-led initiatives are pivotal in promoting the adoption of IPM practices, supported by extension services that facilitate their implementation. Furthermore, IPM is increasingly integrated into broader climate-smart and sustainable agricultural practices, addressing pest issues alongside challenges related to soil and water management. In summary, although traditional pest management methods are still prevalent, there is a noticeable shift towards integrated pest management practices within Zimbabwe's agriculture sector, reflecting a move towards more sustainable and effective solutions.

Usage of Synthetic Pesticides in Zimbabwe.

In Zimbabwe, synthetic chemical pesticides are widely used across agriculture, including in the livestock and crop production. These chemicals, encompassing insecticides, herbicides, and fungicides, are crucial for managing pests in crops and livestock. Dip acaricides, specifically, are extensively used to control tick infestations in cattle, with estimates indicating an annual usage of approximately 1,200,000 litres. Despite the significant reliance on these pesticides, precise data on their volumes

remains challenging to obtain due to inconsistent reporting and varying agricultural practices. This heavy dependence reflects the ongoing need for effective pest management solutions to safeguard agricultural productivity and livestock health.

The Pesticide Regulatory framework.

The regulatory framework for pesticide use in Zimbabwe involves the Pesticide Control Authority (PCA), which oversees the approval, distribution, and application of these chemicals. The PCA ensures that pesticides meet safety and efficacy standards before being approved for use. However, challenges in enforcement and monitoring can lead to issues such as the misuse of unregistered products. Additionally, the effectiveness of pesticide management is impacted by the limited capacity of agricultural extension services, which face constraints in personnel, training, and resources. These limitations contribute to inconsistent pesticide application practices and increased risks of health and environmental issues.

Current issues in pesticide management in the country

Current issues in pesticide use and management highlight several environmental and health concerns. Over-reliance on synthetic pesticides has led to resistance development among pests, reducing the effectiveness of chemical controls and necessitating higher doses or more toxic alternatives. Environmental contamination from pesticide runoff affects soil and water quality, impacting non-target species and ecosystems. Moreover, inadequate protective measures for those handling pesticides expose them to health risks, including acute poisoning and chronic conditions such as cancer and neurological disorders. These challenges emphasise the need for improved regulatory measures, better training, and enhanced safety protocols. The importation, production and use persistent organic pesticides was banned in Zimbabwe and the currently is implementing the National Action Plan on Persistent Organic Pesticides.

The economic implications of pesticide use are also significant. High costs associated with synthetic pesticides, coupled with the need for frequent applications due to resistance issues, place a financial burden on farmers. This economic strain is further exacerbated by market access challenges, as international markets increasingly demand low-pesticide residues in agricultural products. Zimbabwean producers, particularly in the beef sector, face potential restrictions on exports due to pesticide residue concerns, affecting their competitiveness and profitability.

There is need to strengthening regulatory frameworks and enforcement to ensure safe and effective pesticide use. Increasing the capacity of agricultural extension services and promoting integrated pest management (IPM) practices can reduce reliance on synthetic chemicals and enhance sustainability. Additionally, improving education and training for farmers on safe pesticide handling, and enhancing waste management systems for obsolete pesticides, are critical steps toward mitigating the adverse effects of pesticide use.

The Legal framework governing pesticide management

Zimbabwe's pesticide management framework is underpinned by a set of environmental regulations and institutions aimed at ensuring sustainable agricultural practices. The primary legislation includes the Environmental Management Act (Chap 20:27), which mandates the sustainable management of natural resources and the prevention of environmental degradation. This Act empowers the

Environmental Management Agency (EMA) to oversee environmental impact assessments and enforce compliance through environmental management certificates. The Environmental Management (Control of Hazardous Substances) General Regulations Statutory Instrument SI 268 of 2018 further details the control measures for hazardous substances, including pesticides.

The Pesticide Regulations, Statutory Instrument 144 of 2012, are specifically tailored to manage pesticide use in Zimbabwe. This legislation mandates that all pesticides must be approved by the Ministry of Lands, Agriculture, Fisheries, Water and Rural Development before use. The Plant Protection Division of the Department of Research and Specialist Services (DRSS) oversees the registration and assessment of these pesticides to ensure they meet safety and efficacy standards. This rigorous approval process is designed to prevent the distribution and use of harmful or ineffective pesticides, thereby protecting public health and the environment.

The African Development Bank (AfDB) also sets standards for pesticide management through its Integrated Social Safeguards:

- ***Operational Safeguard 1: Assessment and Management Environmental and Social Risk and Impact*** – This overarching safeguard governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements. OS1 is triggered by the project activities considering environment and social assessment has to be undertaken prior to implementation of any component requiring civil works and water conservation interventions.
- ***Operational Safeguard 2: Labour and Working Conditions*** – This safeguard establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation. It also ensures greater harmonisation with other multilateral development banks. Workers will be engaged on the project; therefore, this OS will be triggered. Key aspects will be to follow national and international labour organization recommendation when engaging workers on the project.
- ***Operational Safeguard 3: Resources Efficiency and Pollution Prevention and Management***– This safeguard covers the range of key impacts of resource usage, pollution, waste, and hazardous materials for which there are agreed international conventions, as well as comprehensive industry-specific and regional standards, including greenhouse gas accounting, that other multilateral development banks follow. The project will use pesticides, fertilizers and acaricides for its operations and national standards for discharge of effluent will be referenced throughout project lifecycle. It promotes Integrated Pest Management (IPM) as a preferred approach, recommending non-chemical methods and minimal use of harmful pesticides.

- **Operational Safeguard 4: Community Health, Safety and Security**]- This OS recognizes the increase in community exposure to risks and impacts due to projects, activities, equipment and infrastructure therefore it addresses the health, safety and security risks on project affected communities.

- **Operational Safeguard 6: Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources**- Ensuring protection and conservation of biodiversity across all forms of habitats through the promotion of sustainable management of living natural resources.

- **Operational Safeguard 7: Vulnerable Groups-** Ensure that vulnerable groups and individuals are identified as early as possible in Bank Group operations and that engagement is meaningful, taking into account individuals' and communities' specificities, and delivered in an appropriate form, manner and language including affirming, respecting, and protecting the rights and interests of vulnerable individuals and groups throughout the lifecycle of the project or investment.
- **Operational Safeguard 10: Stakeholder Engagement and Information disclosure]-** This OS acknowledges the importance of right to effective participation in decision making process during the project cycle. It requires openness and transparency during stakeholder engagement between the Borrower and project stakeholders to improve E&S sustainability of the projects, enhance project acceptance and make significant contribution to successful project design and implementation.

Institutional arrangements

Institutionally, Zimbabwe's pest management efforts are supported by both public and private entities. Government bodies like the Ministry of Finance, Economic Development and Investment Promotion (MoFEDIP) and the Ministry of Lands, Agriculture, Fisheries, Water and Rural Development (MLAFWRD) play central roles in managing and overseeing the project. Within MLAFWRD, departments such as the Department of Veterinary Services (DVS) and the Department of Research and Specialist Services (DRSS) are crucial for technical support and pesticide regulation. Additionally, private sector institutions like the Agricultural Chemical Industry Association (ACIA) regulate the distribution of agrochemicals, ensuring compliance with safety standards. Strengthening these frameworks and improving local capacities are essential for advancing Integrated Pest Management (IPM) practices and promoting sustainable agricultural development in Zimbabwe.

ACRES Integrated Pest Management Measures (IPMM)

Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods Project (ACRES) emphasizes the importance of integrated pest management (IPM) in ensuring the health and productivity of crops, beef cattle and the quality of leather products. Central to this approach is the management of internal parasites and tick-borne diseases, which significantly impact cattle health in Zimbabwe. Internal parasites, particularly during the rainy season, can cause serious health issues such as diarrhoea and emaciation. Regular deworming with broad-spectrum dewormers at key intervals helps manage these infestations. In contrast, tick-borne diseases like Babesiosis, Anaplasmosis, Heartwater, and Theileriosis pose critical threats, with various chemical control methods, including plunge dipping, spray races, and pour-ons, being used to combat ticks and associated diseases.

Pesticide use in pest management poses several environmental risks, including pollution of water sources, soil degradation, and air contamination. Pesticides can harm non-target species, contribute to bioaccumulation in the food chain, and adversely affect both terrestrial and aquatic ecosystems. To mitigate these effects, the ACRES PMP advocates for a cautious approach, emphasizing the need for Integrated Pest Management (IPM) practices. IPM offers a holistic strategy that combines biological, chemical, cultural, and mechanical methods to manage pests, with chemical pesticides being used as a last resort. The IPM approach promotes environmental health, reduces pesticide resistance, and relies on a thorough understanding of pest life cycles and interactions with the environment.

Effective IPM in fodder production involves several key activities. Crop rotation and diversification help disrupt pest life cycles, while using pest-resistant fodder varieties reduces reliance on chemical

controls. Biological control agents, such as natural predators and entomopathogenic fungi, offer eco-friendly pest management solutions. Additionally, cultural practices like removing crop residues and timely planting can prevent pest outbreaks. These strategies contribute to a more sustainable approach to pest management, ensuring healthier crops and improved yields.

In the context of cattle dipping, IPM strategies include scheduled dipping to manage tick populations and integrating chemical with non-chemical control methods. Biological control, such as using entomopathogenic fungi and natural tick predators, complements these efforts. Proper management of dip effluent, including containment and treatment, is essential to prevent environmental contamination. For hide production, maintaining high sanitation standards, using natural repellents, and controlling environmental conditions in storage areas help prevent pest infestations. Training, capacity building, and regular monitoring and evaluation are crucial for the successful implementation of IPM, ensuring that pest management practices are effective and adaptable to changing conditions.

Table 1. Potential Impacts of ACRES Activities that will Use Chemicals

Project Activity	Pesticide Related Impacts
Support to Reduce Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities	
Rehabilitate dip tanks and supply chemicals (Implying that aprox 1600-2250 litres of acaricide per year will be used)	• Groundwater pollution from dipping solution flowing out of drip-dry pens at the exit from plunge dip • Groundwater pollution from leakages of dipping solution from base of plunge dip if walls and base are not properly sealed • Leakage of dip concentrate solution if not properly stored. • Risk of surface water pollution from flows of dipping solution from drip dry areas out at the exit of the plunge dip. • Risk of ground and surface water pollution and risk to human health from in appropriate disposal of empty pesticide containers. • Approximately 30000 litres of dip effluent are discharged every year per dip- for 25 dip 750000 litre will be discharged
Carry out appropriate conservation practices around rehabilitated dip tanks	• Positive impact on risk of surface water pollution by dip pesticides from the dip and drip-dry areas at the exit from plunge dip. Conservation works stop flow of dip solution into the local streams or dams.
Fodder and Horticultural crops Production	• Some pesticide and rodenticides may need to be used to protect the stored feed and stored grain from pests and rodents. Soil and groundwater pollution may arise from improper storage and handling of these chemicals. • Risk of human and bird poisoning arising from improper storage and handling of pesticides and rodenticides.
Support development of Community Level Feedlots	• No pesticide pollution risk associated with the construction of the feedlots • Risk of soil and groundwater pesticide pollution associated leakage from areas of storage of cattle dosing and dipping/spraying/pour-on chemicals at the feedlot • Risk of soil and groundwater pollution during spraying of cattle in feedlot. • Risk to human health from mishandling of chemicals at the feedlot and in storage areas.

ACRES IPMM Approach

The IPMM approach for ACRES emphasizes a shift from reliance on chemical pesticides toward more sustainable practices, including Biological Control Practices (BCP) and Natural-Based Solutions (NBS). The IPMM aims to reduce environmental and health risks while promoting long-term ecological balance. BCP involves using natural enemies such as predators and pathogens to control pest populations, while NBS leverages plant extracts and cultural practices to manage pests in an environmentally friendly manner. Chemical pesticides are used sparingly and only when absolutely necessary, ensuring that their application is both targeted and responsible. The following additional criteria will apply to the selection and use of such pesticides: (i) they have negligible adverse human health effects; (ii) they are shown to be effective against the target species; and (iii) they have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies.

The IPMM strategy presents significant benefits, including enhanced ecological balance and reduced risk of pest resistance. Sole reliance on BCP and NBS promotes biodiversity and soil health, but these methods may be slower and require more extensive knowledge and training. A balanced approach that integrates BCP and NBS with proportionate chemical use can optimize pest control effectiveness while minimizing negative impacts. However, this combined strategy demands careful management to avoid potential drawbacks such as interaction issues between methods and increased complexity for farmers.

IPM opportunities for ACRES interventions

Fodder production could benefit from IPMM practices by incorporating biological and natural-based controls to reduce chemical use. Cattle dipping requires Integrated Vector Management (IVM) to control ticks, combining acaricides with biological measures. Hide processing involves managing pests without compromising hide quality or worker safety. Effective implementation of these activities hinges on comprehensive training for farmers, extension workers, and other stakeholders to ensure successful adoption and application of IPMM practices.

Monitoring and evaluation are critical for assessing the success of IPMM in ACRES. The project will employ various methods, including baseline data collection, regular field inspections, and the use of technology to track pest incidences and control measures. Evaluation involves mid-term and end-term assessments to measure the impact of IPMM on pest populations, crop and livestock health, and environmental outcomes. Reporting through regular progress updates, annual reports, and community meetings ensures transparency and accountability, facilitating continuous improvement and stakeholder engagement.

Institutional roles in the ACRES IPMM include coordination between government agencies, research institutions, and local actors. The Ministry of Lands, Agriculture, Fisheries, Water, and Rural Development, along with the Project Management Unit (PMU), oversees the implementation of IPMM. The Department of Plant Protection, Zimbabwe Agricultural Research Trust (ZART), and Zimbabwe National Vector Control Programme provide technical support and research. Local agricultural extension officers, dip attendants, and farmer groups play crucial roles in executing and monitoring pest management practices. The integration of these roles, coupled with a robust grievance redress mechanism, ensures that IPMM is effectively managed and responsive to stakeholder concerns.

A budget provision of $187 000,00 is proposed with other aspects such as salaries and some training already covered by the Government of Zimbabwe. Stakeholder engagements as well as Grievance Redress mechanisms are budgeted for in other specific plans for the ESMP.

In conclusion, the Pest Management Plan (PMP) for ACRES focus on integrating Biological Control Practices (BCP), Natural-Based Solutions (NBS), and, minimizing use of chemical pesticides. PMP aims to protect the environment and human health while enhancing productivity. The plan emphasizes comprehensive training, monitoring, and stakeholder engagement to ensure that pest management practices are both effective and adaptive. Through a structured grievance redress mechanism and robust institutional collaboration, ACRES is poised to achieve its goal of fostering a resilient and environmentally balanced agricultural system.

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ABBREVIATIONS

ACIA	-Agricultural Chemical Industry Association
AfDB	– African Development Bank
BPC	-Biological Pest Control
BVC	-Biological Vector Control
DRSS	- Department of Research and Specialist Services
DVS	- Department of Veterinary and Technical Services
ZEMA	– Zimbabwe Environmental Management Agency
ESIA	- Environmental and Social Impact Assessment
ESMP	- Environmental and Social Management Plan
FAO	-Food and Agricultural Organization
GDP	– Gross Domestic Product
GIFAP	-Group of National Associations of Agrochemical Manufacturers (GIFAP)
GoZ	– Government of Zimbabwe
MLAFWRD	– Ministry of Lands, Agriculture, Fisheries, Water and Rural Development
MoFED	Ministry of Finance and, Economic Development and Investment Promotion
NBS	-Nature Based Solution
PMP	- Pest Management Plan
PRB	-Pesticide Registration Board
PRCA	-Pesticide Registration and Control Authority
SADC –	- Southern Africa Development Community
SBLVCP	- Support to the Agriculture Value Chain Project
SME	– Small to Medium Enterprises
TA	- Technical Assistance
WHO	- World Health Organisation of the United Nations
ZART	-Zimbabwe Agricultural Research Trust
BG-ACREBLP	- Bridging Gap-Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods Project

1. INTRODUCTION

The Zimbabwean economy has experienced wildly varied economic fortunes over the past quarter century, with GDP growth rates varying widely from year to year. In 1999, the country registered a negative economic growth rate of -0.8%, which dipped to -17% in 2003 before rising to -3.7% in 2007, and falling again to -17.7% in 2008, its lowest in over fifty years. Thereafter it rose to a high positive growth rate of 21.5% in 2010 before falling again to a low of -7.8% in 2020. In the midst of these varying economic fortunes, agriculture remains a critical sector of the economy, contributing between 12 and 16% of the GDP, and providing about 60% of the raw materials for the manufacturing sector. Agriculture contributes about 40% of the export earnings of Zimbabwe. Above all, agriculture provides employment and livelihoods to 60-70% of the total population, most of them being rural residents practicing smallholder mixed farming. In rural areas the proportion of the population engaged in agriculture exceeds 85%.

Within the Zimbabwe Agricultural sector, crop and livestock production is an important and integral part with livestock products contributing about 30% of the agricultural Gross Domestic Product (GDP), whose cash flow mainly comes from small-scale communal farmers. The agricultural sector is an important source of livelihoods and contributes significantly to inclusive growth of the economy. According to the Zimbabwe Livestock Growth Plan (2021-2025), the livestock sub-sector contributes significantly to household and national food and nutrition security, foreign currency earnings, and is a source of livelihood for about 67% of rural households. Thus, the Government of Zimbabwe continuously invests in this sector to ensure its growth and as a way of propping other sectors of the economy that depend on it. The main challenges facing agricultural sector are:

- low productivity;
- poor animal genetics;
- limited supply of water for existing dip tanks; and
- climate change which has brought about an increase in animal disease outbreaks, poverty deaths, frequent droughts, and floods.

Addressing the plant and animal health situation is a prerequisite for increased livestock and crop productivity and safe trade in animals and animal products. Leather is one of the main products of the livestock sector and it feeds into an important industrial subsector of leather tanning as well as the manufacture of footwear and leather goods manufacturing. In its efforts to revive the leather sub-sector, the Government prepared the Zimbabwe Leather Sector Strategy (2021-2030) with the aim of increasing the competitiveness of the leather value chain. However, since a significant proportion of the cattle production is by small scale farmers, it followed that, to boost production in the livestock sub-sector will require substantive investments to support small scale farmers.

1.2 Project Background

As background, the Zimbabwean government is seeking a grant of UA 18.21.000 million (USD 24.10 million) from the African Development Bank Fund to support the mitigation the negative impacts of El NINO through the Agricultural Conflict Resolution and Sustainable Livelihoods (ACRES). Additionally, the government will contribute 10% of the amount, with beneficiaries contributing a small 1.5%. Government of Zimbabwe submitted a request for funding from the Bank's Transition States Facility (TSF) Pillar 1. Consequently, this Project will focus on participatory approach in order to select demand-driven activities which will aim to address context-specific drivers of fragility and build resilience, with due consideration to sustainability. Some of this Project's activities will complement

the planned activities under the Zimbabwe Resilience Building Fund II (ZRBF-II), which is currently being executed by the United Nations Development Programme (UNDP).

Agriculture is crucial to Zimbabwe's economy, contributing around 16% to the overall output, but it remains underdeveloped in terms of value addition. The sector, which includes crops, livestock, and fisheries & aquaculture, is vital for employment, income generation, livelihoods, and poverty reduction. Agriculture accounts for 12-18% of GDP, provides jobs and income to 60-70% of the population, supplies 60% of raw materials for industry, and generates nearly 40% of export earnings. With 67% of Zimbabwe's population living in rural areas and primarily engaged in smallholder farming, improving agricultural productivity is essential for reducing poverty, hunger, and malnutrition. The Agriculture Transformation Strategy (2019) aims to create a robust sector to help Zimbabwe achieve Vision 2030, addressing issues like population growth, low productivity, and climate change. The National Agriculture Policy Framework (2018-2030) outlines a plan for sustainable investments to enhance agricultural productivity and competitiveness.

The ACRES will emphasize capacity building, providing potable water, enhancing livestock and crop productivity, value addition, and private sector development. It aligns with Zimbabwe's National Development Strategy 1 (NDS1: 2021-2025), Vision 2030, and the Zimbabwe Leather Sector Strategy (2021-2030).

The ACRES has been designed to operate through some well-coordinated and basic critical interventions which include:

- capacity building,
- provision of potable water,
- enhancing livestock productivity,
- value addition, and
- promoting private sector development hence contributing to macroeconomic stability,
- job creation, and poverty reduction.

The districts of Gwanda, Bulilima, Matobo, Mangwe in Matebeleland South province and Gutu in Masvingo province were selected for the project mainly because they are major producers of cattle in semi-arid ecological zones where they face many production challenges. Some of the activities to be considered under the proposed Project will cover capacity building of crop and livestock farmers including procurement of start-up tools for making agriculture products, disease control, exhibition of products at trade fairs, training of farmers in animal husbandry to produce good hides and skins, training of hides collectors and tanners, and logistical support of coordinating stakeholders in the platform.

The ACRES is aligned to the Zimbabwe National Development Strategy 1 (NDS1: 2021-2025), Zimbabwe Vision 2030, and Zimbabwe Leather Sector Strategy (2021-2030).

1.3 Environmental Management Plan and Pest Management Plan for ACRES

The implementation of any development project in Zimbabwe is supposed to be accompanied by the conduction of an environmental and social impact assessment or in this case an environmental and social management plan (ESMP) to ensure that all potential biophysical and social impacts of the project are identified and that measures are incorporated into the project design and implementation protocols to eliminate or mitigate the impacts of these identified impacts. The Environmental Management Act (Chap 20:27) of 2002 prescribes that any project of significant size that is carried out in Zimbabwe must be subjected to an environmental impact assessment (EIA) to identify all the

potential positive and negative environmental impacts associated with it and to devise design features and management protocols for enhancing all positive impacts as well as to minimize, eliminate or mitigate any potential negative impacts. A detailed Environmental Management Plan (ESMP) must be produced out of the EIA report to guide the project implementor in their environmental management. The ESMP will be submitted to the Zimbabwe Environmental Management Authority (EMA) for their assessment after it is approved by the AfDB. An environmental management certificate or letter of approval will be issued by EMA on approval of the ESMP, where, by law, project implementation cannot start before EMA's approval.

An environmental and social impact assessment for the ACRES is in process. However, one of the key elements of the ACRES is with respect to pest control for the livestock and in all areas of tanning and leather processing. The development of a Pest Management Plan (PMP) for the ACRES is justified under OS4 guidelines, which mandate that projects involving pesticide use must include an assessment of the need for, and if necessary, the planning and implementation of an Integrated Pest Management (IPM) and/or Integrated Vector Management (IVM) program. This approach ensures that pest management activities are effectively managed throughout the entire lifecycle of the project, addressing potential risks and promoting sustainable practices. The overall objective of the PMP for the ACRES is to develop a pest management plan to prevent or mitigate the negative impacts of pesticide use on the natural and human environment; and to promote the use of Integrated Pest Management methods and approaches under the program. Specifically, the overall objective can be subdivided into the following:

- to identify potential risks of fodder and crops pests, beef cattle pests and disease control products on the human and natural resources in relation to the interventions envisaged under the project;
- to propose an action plan for Integrated Pest Management, where appropriate, in order to minimize the use of synthetic chemicals; and
- to define institutional arrangements for the implementation and monitoring of the pest management plan before, during and after the implementation of the project and the implementation of activities to eliminate, or mitigate the negative environmental and social impacts.

The information for this PMP was collected through discussions with dip attendants and farmers in Mangwe, Matobo, Bulilima, Gwanda and Gutu, key interviews with personnel from the Department of Veterinary Services and a review of literature, including reports and publications on pesticide use and management in Zimbabwe.

1.4 Environmental and Social Consequences of Pest Management Practices

Pest management practices in rural communities can have significant environmental and social consequences, both positive and negative. Environmentally, the use of chemical pesticides can lead to contamination of soil and water resources. Pesticides can leach into groundwater or run off into nearby streams and rivers, affecting aquatic ecosystems and potentially entering the food chain. Non-target species, including beneficial insects, birds, and other wildlife, may also be adversely affected by pesticide exposure, leading to a loss of biodiversity and disruption of local ecosystems. Over-reliance on chemical control can result in pest resistance, requiring even higher doses or more toxic chemicals to achieve the same level of control, further exacerbating environmental impacts.

On the social front, pest management practices can influence the health and well-being of rural communities. Pesticide exposure poses significant health risks to farmers and their families, particularly when safety measures and protective equipment are not adequately used. Acute exposure can lead to poisoning, while long-term exposure may result in chronic illnesses, including respiratory

issues, cancers, and neurological disorders. The costs associated with medical treatments and loss of productivity can place a considerable financial burden on affected households, exacerbating poverty and reducing overall community well-being.

Moreover, pest management practices can impact agricultural productivity and food security in rural communities. Effective pest control is essential for protecting crops from damage and ensuring good yields. However, improper use of pesticides can damage crops, reduce soil fertility, and lead to pest outbreaks due to the elimination of natural predators. This can result in reduced harvests and food shortages, which in turn affect the nutritional status and economic stability of rural populations. Balancing pest control with sustainable agricultural practices is crucial for maintaining food security and supporting the livelihoods of rural farmers.

Community dynamics and social structures may also be influenced by pest management practices. The introduction of integrated pest management (IPM) techniques, which combine biological, cultural, and mechanical control methods with minimal chemical use, can foster community cooperation and knowledge sharing. IPM can empower farmers by building their capacity to manage pests sustainably, leading to greater resilience against pest outbreaks and climate variability. However, the success of such initiatives often depends on access to resources, education, and extension services, which may be limited in some rural areas. Collaborative efforts between government agencies, NGOs, and local communities are essential to overcome these challenges and promote environmentally and socially sustainable pest management practices.

1.5 Potential Impacts of Pest and Pesticide Management on Project Activities.

The Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods Project (ACRES) aims to enhance livestock and crop agricultural productivity and profitability in Zimbabwe by focusing on key value chains. Pest and pesticide management within this project can have several potential impacts on its activities. Effective pest control is essential to protect fodder crops and cattle from damage, ensuring healthy growth and maximizing yields. However, improper management of pests and pesticides (Including acaricides) can lead to adverse effects that may compromise the project's goals and sustainability.

One of the primary concerns with pest and pesticide management in ACRES is the potential for environmental degradation. The use of chemical pesticides, if not carefully managed, can contaminate soil and water resources, affecting not only the immediate project areas but also downstream ecosystems. This contamination can reduce soil fertility, harm non-target species, and disrupt local biodiversity. Such environmental impacts can hinder the long-term viability of agricultural activities promote in the area, as soil health and ecosystem services are critical for sustainable farming practices.

Additionally, the health and safety of farmers and workers involved in ACRES are at risk due to pesticide exposure. Without proper training and protective measures, individuals handling pesticides may suffer from acute or chronic health issues, ranging from skin irritations to severe respiratory problems and even cancer. Acaricides can be fatal if accidentally ingested. These health risks can lead to decreased productivity, increased medical costs, and fatalities with potential suffering. Ensuring that farmers and workers are educated on safe pesticide use and provided with necessary protective equipment is crucial to mitigating these risks.

Moreover, pest resistance can develop if chemical pesticides are overused or misused, leading to more persistent and harder-to-control pest populations. This can result in increased costs and labour for farmers as they try to manage resistant pests, potentially reducing the profitability of agricultural activities supported by ACRES. To address this, the project should promote integrated pest

management (IPM) practices, which combine biological, cultural, and mechanical control methods with judicious use of chemicals.

1.5 Structure of the Report

a. This report is structured as follows:
b. Introduction
c. Description of the Project
d. Legislative and Regulatory Framework
e. Current approaches to pest management in the project sector
f. Current issues in the use and management of synthetic chemical pesticides in the Zimbabwe and the agriculture
g. Policy, Legal and Institutional Framework for Integrated Pest Management (IPM)
h. ACRES Integrated Pest Management Measures (IPMM)
i. Project Integrated Pest Management Measures (IPMM)
a. Conclusion and Budget for the PMP

2. DESCRIPTION OF THE ACRES - COMPONENTS AND ASSOCIATED ACTIVITIES

2.1 ACRES Objectives, Components, Activities and Expected Results.

The overall objective of the ACRES is to improve cattle and leather value chain for the benefit of farmers and the national economy in a sustainable manner where the negative impacts on the biophysical, human and social environment are minimized, mitigated or eliminated. The accent lies with the pursuit of sustainable development.

ACRES has been designed as a 5-year project consisting of 3 components as:

The proposed Project aims to enhance the adaptive capacity of drought-affected communities by addressing the interconnected challenges of climate change, water, food and nutrition insecurity, and poverty. The Project will focus on improving water-related infrastructure in order to ensure a reliable water supply for agricultural and domestic uses, thus stabilizing crop and livestock production. Most of the proposed activities will complement the ongoing ZRBF II, in order to build synergies with other development partners, namely EU and Government of Ireland. The Project will ensure social inclusion by addressing the specific needs of women, youth, and marginalised groups through targeted gender equality and protection related interventions. To ensure sustainability, the Project will strengthen local institutions and community structures, including VBUs, and also focus on technical capacity building for sustainable management of resources. Additionally, the Project has incorporated Water, Sanitation, and Hygiene (WASH) and nutrition activities including early warning systems. This integrated approach aligns with Zimbabwe's national climate adaptation strategies and Sustainable Development Goals (SDGs), ensuring long-term sustainability and recovery. The Project aims to complement the Government's efforts to protect livelihoods in the current crisis caused by the El Niño induced drought. The Project is also in line with two of the Bank's "High 5" priorities of *"Feed Africa"* and *"Improving the Quality of Life of Africans"*.

Components and Subcomponents

The Project consists of 3 components, as summarised below, and associated activities.

Components and Sub-components
Component 1 Support to Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities
Sub-component 1.1: Response to mitigate the negative impact of 2024 El Niño induced drought, Provincial Resilience Platform, and Early Warning Systems
Sub-component 1.2 Climate-Resilient Agricultural (Crop and Livestock) Production, Productivity and Marketing
Sub-component 1.3: Sustainable and Diversified Livelihood Options for Rural Inclusive Economic Growth of at-risk Communities

Components and Sub-components
Component 2 Strengthen the agricultural input supply chain by catalysing private sector investment, reinforcing agro-dealer networks through capacity-building and governance reforms (*AFFM)*
Sub-component 2.1: Improving Input Supply Chain Financing and Reporting
Sub-component 2.2: Farmer Outreach, Education, and Resilience Building
Sub-component 2.3: Improve Policy and Regulatory Environment (Fertilizer Policy)
Component 3: Project Management
Sub-component 3.1: Knowledge Management, Monitoring & Evaluation, and Communication
Sub-component 3.2: Project Coordination

The specific activities that will be conducted under ACRES are itemized in the Table 3 below.

Table 1. ACRES project components, Activities and Results

The Project consists of 3 components, as summarised below, and associated activities.

Component Name	Sub-Component and Associated Activities
Component 1 Support to Reduce Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities	**Sub-component 1.1: Response to Mitigate the Impact of Future Extreme Events Similar to the 2024 El Niño Induced Drought** *(UA 2.042 million. 11.2%)* • Immediate response - Identification and registration of drought-affected households, prioritizing women-headed households, children, elderly, and persons with disabilities. • Immediate response - Procurement of essential food items (maize, pulses, cooking oil) for immediate distribution. Targeted food-insecure people receive adequate food transfers to meet their basic food and nutrition needs (total of 60,000 households receiving unconditional food assistance). • Monitoring and reporting on the distribution process, ensuring transparency and accountability. • Support 100,000 drought-affected livestock farmers (project direct beneficiaries) through procurement and distribution of livestock feed packs (including hay, silage, and supplementary feed/mineral premixes) for on farm feed formulation, to support drought affected livestock farmers. • Support 8,000 drought-affected livestock farmers through procurement and distribution of fodder production inputs. • Support 100,000 drought affected farmers with soil borne disease vaccines and dewormers. • Facilitate immediate access of water for (i) livestock watering points and (ii) for domestic use using hired (existing) water mobile/portable water bowsers/tanks, for smallholder livestock farmers.

Component Name	Sub-Component and Associated Activities
	• Enhance dialogue and dispute resolution mechanism (Zimbabwe and Botswana border-livestock communities). • Reduce risks associated with trans-boundary livestock diseases through expertise in disease surveillance, capacitating cross-border collaboration and policy development, and working with partners to strengthen disease risk mapping. • Support operationalization of the Zimbabwe-Botswana Memorandum of Understanding (MoU), including (i) procurement of Foot and Mouth Disease (FMD) Vaccine (400 000 doses, initial vaccine and booster), and (ii) Joint (Zimbabwe–Botswana) Awareness Campaigns. • Train Government staff on trans-boundary disease risk mapping. • Capacitate 4 veterinary laboratories with reagents for trans-boundary disease surveillance. • Capacitate 20 field personnel with sampling material for zero surveillance of trans-boundary diseases. • Develop robust livestock identification and traceability system for livestock (150,000) animals along the shared border. • Train the 20 lead livestock farmers and Government staff on disease surveillance and sample collection. • Support community-based screening for wasting and quality treatment for children with wasting. • Scale up the Care Group network in the targeted districts to enhance access to quality diets and multi-sectoral services for the prevention of malnutrition. • Promote consumption of nutritious and healthy diverse diets
	Sub-component 1.2: Climate-Resilient Agricultural (Crop and Livestock) Production, Productivity and Marketing for improved nutrition security *(UA 6.591 million. 36.2%)* *Crop Value Chain Development (Dakar II) and Nutrition gardens integrated into Village Business Units* • Drill 5 commercial type-high-yielding, community-level demand-driven, multipurpose boreholes fitted with solar-powered pumps, including overhead tanks, and reticulation system (payment will be based on wet-boreholes only). • Procure and distribute 200,000 start-up packages of drought-tolerant and pest-tolerant agricultural inputs (cereal and legume seed only)

Component Name	Sub-Component and Associated Activities
	• Train 30 water point committee members on risk-informed planning and operation and maintenance and for established water systems. Train and equip village pump minders and plumbers. • Train irrigation scheme farmers on (800 Farmers, 4 Training sessions) agronomy, irrigation scheme management, business development, project management, market linkages and value addition, promotion of cash crops non-palatable for wildlife (chili and others) for multiple solutions). • Train 120 local authorities on Village Business Units (VBUs, 4 training sessions) to manage the Project's community level infrastructure. • Conduct nutrition days to support nutrition and resilience building (2 per district). • Construct and equip community-based seed banks (4no) to enhance availability and accessibility of high-quality seeds for farmers and empowering existing and emerging seed houses through training and mentorship programs. • Training of 20 extension staff and 1,200 farmers on Good Agronomic Practices (GAP), climate smart agriculture and sustainable soil and water technologies • Upscale the use of water harvesting (in-situ and ex-situ) technologies to ensure moisture availability during in-season dry periods and to reduce the severity of droughts (20 schools). • Establish a 5 (1-hectare each) nutrition gardens under the village business unit model. • Establishment of 16 nursery sheds (0.3 hectare each) for the promotion of agroforestry as a nature-based solution to climate change resilience in terms of landscape restoration, increased crop and livestock production in Zimbabwe, promoting food crop-based agroforestry (Maize and other crops preferred by local communities) and promoting fuel-wood based mixed with indigenous fruit trees agroforestry (Community fuel-wood agroforestry system). • Rehabilitate/establish 14 Village Business Units (min 2 hectares each) within the Project area (participating districts) to promote rural industrialization and economic empowerment, including establishment of markets and also linkages. • Nutrition education for social behaviour change communication interventions towards dietary diversity *Livestock Production and Marketing* • Construct 100 community-level demand driven livestock water troughs at existing boreholes for reliable water access.

Component Name	Sub-Component and Associated Activities
	• Rehabilitate 10 community-level demand driven existing seasonal livestock dip tanks (5 per district) to make them fully functional (drilling and installation solar powered borehole, start-up package acaricides, initial stock of medication and supplies, water troughs etc) to improve livestock health and disease control. • Establish pastures (100ha), under irrigation to enhance carrying capacity and fodder availability (Forage value chain), with support from Bank's flagship programme Technologies for African Agricultural Transformation-TAAT (International Livestock Research Institute-ILRI). • Construct fire guards/breaks, in the participating districts, to avoid veld fires from spreading into pastures. • Set up 4 feed and fodder processing centres and feed banks with storage sheds near borehole clusters, equipped with processing equipment (Hay baling sets, Chuff cutters, feed mixers) – TAAT ILRI. • Construct 10 low-cost shelters for patrol officers/security officers, at strategic locations, at least one kilometre, away from the Zimbabwe-Botswana border to minimise Zimbabwe livestock straying across the border into Botswana, in search of water. • Procure 10 spray-race units and neck-clamps for VBUs, including construction of handling facilities, and water -troughs. • Procure and establish agroforestry trees in the rangelands along the Zimbabwe-Botswana border area, including leguminous tress such as Leucaena and other indigenous tree species such as monkey bread. • Determine livestock carrying capacity of the rangelands to avoid overstocking which results in over grazing and land degradation. • Map land suitability for conservation and development of vlei areas. • Develop vleis by introducing water loving weeds such as nuts-edges, reeds among others and flooding the range-lands in order to recharge the water table by the use of water harvesting techniques. • Train 400 extension personnel on feeding strategies/feed formulation, animal health management, O&M of livestock infrastructure. • Train 7 000 livestock farmers and on feeding strategies/feed formulation, animal health management, O&M of livestock infrastructure. • Entrepreneurship Training. Develop specialized training modules on livestock-based agribusiness and value chain development for women and young entrepreneurs. Train and equip 2,000 young farmers on pen fattening and maximizing profit through rural auctions. • Produce annual marketing calendar indicating where and when auctions are being done.

Component Name	Sub-Component and Associated Activities
	• Support the review of the carcass and livestock grading act. • Climate-Smart Land Use and Governance Participatory land use planning, including the co-development of land use maps and action plans with traditional leaders and local communities, integrating indigenous knowledge and climate risk assessments. • Establishment and capacity-building of community-based land governance structures, such as grazing committees, water point user groups, and nutrition garden committees, to ensure inclusive, transparent, and accountable land and resource management.
	Sub-component 1.3: Social Inclusion, Sustainable and Diversified Livelihood Options for Rural Inclusive Economic Empowerment of at-risk Communities *(UA 1.447 million. 7.9%)* • Support 70 women and 30 youth groups, (each group, 10 birds and 1 hen), for dual-purpose poultry rearing, using ILRI's improved, well-researched breeds. *Facilitating High nutrient value/Biofortified seed inputs supply chain financing and nutrition education* • Nutrient rich/biofortified seeds production supply chain finance. • Innovative nutrition education activities. *WASH - Provision of water supply, systems* and sanitation infrastructure for *communities at acute risk for water scarcity* • Strengthen water quality monitoring by procuring and distributing consumables, water quality testing kits and hygiene kits for vulnerable households.
Component 2: Strengthen the agricultural input supply chain (*To be implemented by AFFM*)	**Sub-component 2.1: Strengthening Input Supply Chain Financing** *(UA 3.857 million. 21.2%)* • Provide risk-sharing financing mechanisms (Partial Trade Credit Guarantee) to the input supply chain players, leveraging private sector resources to enhance input distribution. (at least 2 private sector input suppliers seed and fertilizer). • Leverage the guarantee at least two times during the winter irrigated season and summer rain fed campaign leverage factor >2. • Demand creation to on board farmer groups transitioning from VBUs (>40). • Demand creation to onboard smallholder farmers into selected smallholder irrigation schemes, starting by those located in drought-prone areas (Metric tons of fertilizer distributed (No of small holders reached 180,000, metric distributed over the project period). • Demand creation to on-board large-scale farmer supporting satellite farmer groups or medium scale farmers >30.

Component Name	Sub-Component and Associated Activities
	• Enhance institutional capacity and accountability by training financial institutions and cooperatives in the administration and monitoring of partial trade credit guarantees (4 training sessions). • Support the enhancement of existing registries to track and monitor the finance provided to targeted beneficiaries. in partnership with MLWARD AFC, CBZ and Input suppliers (2 registries). • Strengthen institutional capacity and accountability by digitizing and integrating national and local beneficiary registries with real-time data dashboards and credit reference bureaus (3). • Support framework of the input consortia for oversight of the input distribution mechanisms, and finance leveraging private sector resources. Development of standardized reporting templates (4) (1 Framework). • Facilitate the creation of risk mitigation mechanisms, such as crop insurance, and support the development of a framework to enhance this risk mitigation mechanism. Partnering crop insurance service providers regional and national (2). • Leverage on the existing commodity trading platform to embed a central digital registry connecting input suppliers, buyers and financier supporting transparent financial transactions (1). • Provide linkages with input suppliers & ARDA to micro lending financial institutions to enhance extension of credit on a portfolio basis to Village Based Units (VBUs), (35). • Support AFFM Component Management Fees.
	Sub-component 2.2: Farmer Capacity and Resilience Building *(UA 0.663 million. 3.7%)* • Develop in collaboration with ARDA- the Farmer Business School — empowering farmers with essential business and entrepreneurial skills to boost efficiency and profitability on their farms (3). • Foster strategic partnerships between fertilizer suppliers and farmers to institutionalize soil testing and fertilizer calibration as integral components of the input supply chain. (5 Partners). • Support ARDA and input providers in co-developing tailored agricultural extension tools that reflect localized soil profiles and targeted production outcomes for transitioning farmers. (7 partners, one agriculture extension tool). • Integrate the distribution of extension materials with input delivery (e.g., seeds and fertilizers) to ensure timely access to embedded advisory services. (at least 30,000 smallholder farmers , 30 farmer groups 60 Mediums Size Farmers).

Component Name	Sub-Component and Associated Activities
	• Facilitate regular on-farm demonstrations and technical visits to reinforce the adoption of GAPs and climate-resilient practices, including: (100 demos plots). • Expand the reach of extension services by enabling public and private actors to utilize existing digital platforms (e.g., MLAWFRD, AFC, FSG) for delivering mobile-based, farmer-friendly advisory content. (minimum 20 campaigns). • Promote inclusive access to GAP knowledge by ensuring materials and digital tools are adapted for women, youth, and marginalized farming communities. (at least 20% of target smallholder farmers are women and 10% are young). • Support the domestication of the African Fertilizer and Soil Health (AFSH) Ten-Year Agenda by assisting the MLAWFRD in reviewing the national input market structure. • Collaborate with stakeholders to develop a ten-year roadmap for input systems reform, focused on improving soil health, nutrient management, and long-term agricultural resilience. • Development of the issues paper (highlighting the problems and the need for policy interventions) • Conduct stakeholder consultations for evidence generation for the development of fertilizer policy • Development and validation of zero draft fertilizer policy
Component 3: Project Management	**Sub-component 3.1: Knowledge Management, Monitoring & Evaluation, and Communication** *(UA 1.007 million. 5.5%)* • Conduct 2 stakeholders consultative workshop on developing the implementation and procurement strategy • Procure 4 off-road-vehicles (4x4 double/twin cabs), one for BDMT and for Livestock head office monitoring and evaluation teams , one for Agriculture and Rural Development Advisory Services. • Procure 5 off-road-vehicles (4x4 single cabs), one for each participating District for project monitoring and reporting. • Procure 5 off-road motorcycles/motorbikes, (border district) for monitoring the border area, rangeland re-enforcement and irrigation schemes. • Procure 40 bicycles/pushbikes for management of VBU activities. • Support vehicle operation and maintenance. • Procure 13 laptops for (5 x district teams, 2 x BDMT, 2 x Livestock (vet & LPD focal persons) 1 x Mechanisation, 1 x Land use planning, 1 x Crops). • Organise a total of 4 community mobilisation workshops/awareness meetings in Project Districts.

Component Name	Sub-Component and Associated Activities
	• *Communication* – Support information generation, dissemination, promotion of dialogue and shared understanding of the established project infrastructure to drive positive change towards a sustainable future. • *Communication* - Promote Project visibility (mass media, brochures, posters, Project branding, signages on site, banners, 5 videos, 4 radio jingles, and multimedia coverage of community etc.). • *Communication* - Support Information Education and Communication (IEC) activities [workshop and awareness meetings, 5 short project documentaries, including photos, Radio, television, print media campaigns (content placement), Media project visit - twice in the project cycle]. • Produce (i) 4 Annual Work Plans and Budgets, and (ii) 4 Procurement Plans. • Facilitate 1 Project Technical Launch (PY1). • Conduct Baseline Survey/Study – Individual Consultancy (PY1). • Produce 1 Project Implementation Manual (PIM) – Inhouse activity (PY1). • Conduct 2 monitoring/supervisory field visits per year, for HQ, Regional and District Official (max 10 people, per 5 day-trip). • Conduct 48 District monitoring/supervisory field visits. • Conduct 16 quarterly review meetings & produce associated Bank's Quarterly Progress Reports (QPR). • Facilitate 4 Annual Project Steering Committee (PSC) Meetings. • Conduct 1 Mid Term Review (MTR, PY3) - recruit consultant (fees & field trip DSA). • Conduct 1 Beneficiary Impact Assessment (BIA, PY5) - recruit consultant (fees & field trip DSA). • Conduct 1 Project Implementation Progress/Completion Review (PCR, PY5) - recruit consultant (fees & field trip DSA). • Support environmental and social safeguards compliance, technical assurance, Grievance Redress Mechanism (GRM), strategic communications and visibility, for streamlined execution and efficiency. • Support implementation of ESMP activities, and protection systems to facilitate strengthened implementation. • Support the development of nutrition education for dietary diversity promotion materials to sustainably support the consumption of nutritious and healthy diets.
	Sub-component 3.2: Project Coordination *(UA 2.603 million. 14.3%)* • Support Third Party (UNOPS) Fees to manage the Project (max 5%). • Support United Nations Resident Coordinator's Office (RCO, max 1%).

Component Name	Sub-Component and Associated Activities
	• Support UNOPS Staff Costs (Project - Coordinator, Procurement Specialist, Accountant, M&E Specialist, Gender Specialist, E&S Officer, Conflict Resolution Specialist, and Civil/Irrigation Engineer). • Conduct 5 Annual Financial and Procurement Audits (including field verification visits). • Support various Bank Implementation Support Missions, including fiduciary clinics.

2.2 ACRES Activities Subject to Pest and Vector Control

The ACRES (Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods Project) includes several activities that require diligent pest and vector control measures to ensure the project's success and sustainability. These activities are critical in enhancing agricultural productivity and the implementation of Integrated Pest Management (IPM) practices within these activities not only protects crops and livestock from pests and diseases but also promotes environmental sustainability and public health.

i). Cattle Dipping

One of the primary activities in the ACRES involves the rehabilitation of plunge pool dip tanks and the installation of 9 solar-powered boreholes with overhead tanks and reticulation systems. Cattle dipping is essential for controlling ectoparasites such as ticks, which are vectors for various bovine diseases, including East Coast fever, caused by the tick parasite *Theileria parva* and anaplasmosis, caused by the tick bacterium *Anaplasma marginale*. Effective pest control in these dipping facilities ensures healthier livestock and reduces the economic burden of pest-related diseases on farmers. According to the Department of Veterinary Services, regular and effective dipping can significantly lower tick infestations and associated disease outbreaks (Department of Veterinary Services, 2023).

ii) Fodder Production Farming of Legumes and Fodder Grasses

The project promotes the development of pasture across through the cultivation of legumes and grasses. The cultivation of legumes and fodder grasses not only supports livestock nutrition but also plays a role in soil fertility and erosion control. However, farming of the grasses and legumes for fodder also poses challenges related to pest management. Insects such as locusts and armyworms, including aphids, beetles, and fungal pathogens can devastate fodder crops, reducing the quality and availability of feed for livestock.

iii) Stock Feed Processing

Stock feed processing hubs are established to enhance feed quality and availability for livestock. However, these facilities can attract pests such as rodents and insects, which can contaminate feed and spread diseases.

Viii) Horticultural Crops Production

The project is going to facilitate establishment of VBUs (nutrion Gardens) in which farmers will grow horticultural crops to boost the nutrition of the communities and for household food security

Agro-processing activities, require pest control measures to prevent infestations and maintain product quality.

3. CURRENT APPROACHES TO HORTICULTURAL CROP, LIVESTOCK AND FODDER PEST MANAGEMENT IN ZIMBABWE AGRICULTURAL SECTOR.

Current approaches to pest management focus on both chemical and non-chemical methods, addressing various pest issues affecting Horticulture, fodder crops and livestock. The Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods Project (ACRES) aims to bolster the country's Agricultural sector by implementing a comprehensive Pest Management Plan (PMP). This initiative addresses critical challenges such as pest control in fodder production, cattle dipping to manage tick-borne diseases like East Coast fever and anaplasmosis, and hide processing to improve leather quality. This section describes the approaches used in the country to enhance crop and livestock health, boost productivity, and ensure the economic viability of the agriculture sectors.

3.1 Overview of Targeted Horticultural and Fodder Crops, and Associated Pest Problems.

For fodder production, ACRES is targeting the use of legumes, specifically velvet bean and lucerne, as well as grasses like Katambora and star grass. These fodder crops have been selected for their beneficial characteristics, such as high nutritional content, ability to improve soil fertility, and resilience to various environmental conditions.

Legumes play a crucial role in improving soil fertility and providing high-nutrient fodder for livestock within the ACRES framework. Velvet bean (*Mucuna pruriens*) is particularly valued for its high nutritional content and its ability to fix nitrogen in the soil, enhancing fertility. However, it faces threats from pests such as the velvet bean caterpillar (*Anticarsia gemmatalis*) and various aphid species, which can damage the plants and reduce their effectiveness as fodder. Similarly, lucerne (*Medicago sativa*), a high-protein legume that supports livestock productivity, is commonly affected by the lucerne flea (*Sminthurus viridis*) and various leafhoppers. Managing these pests involves using insecticides and promoting natural predators to maintain pest populations at bay.

In the category of grasses, Katambora grass (*Cynodon dactylon*) is a widely used pasture grass but is susceptible to pests like the armyworm (Spodoptera species) and the stem borer (*Busseola fusca*), which can significantly damage grass stands. Star grass (*Cynodon nlemfuensis),* known for its high drought tolerance and quality forage, faces challenges from grasshoppers (*Caelifera species*) and various beetles that can reduce its forage quality and yield. Effective pest management strategies are essential to preserve the productivity and sustainability of these vital fodder crops.

For distribution of breeding bulls, ACRES is targeting use of the Tuli and Nkuni breeds. These are Zimbabwe's indigenous cattle breeds, that stand out for their adaptability to local conditions and their significant contributions to the agricultural economy. These breeds, valued for their unique traits, face specific pest-related challenges that affect their health and productivity.

The **Tuli Cattle** originate from the Tuli River area, in Matabeleland, and are renowned for their resilience in harsh environments. Medium-sized with a smooth coat ranging from yellowish to reddish-brown, they are known for high fertility, good mothering abilities, and adaptability to local climates. Tuli cattle produce tender and flavourful meat, making them highly prized for beef quality. However, they are susceptible to pests such as ticks, flies, and internal parasites. Ticks are particularly

problematic as they transmit diseases like East Coast fever, anaplasmosis, and babesiosis. Internal parasites like gastrointestinal worms can lead to weight loss, anaemia, and reduced productivity.

Nkuni cattle, also referred to as Nkone or Nguni, are smaller than Tuli cattle and exhibit a variety of coat colours and patterns. They are hardy, adaptable, and resistant to harsh climatic conditions, known for their excellent meat quality and reproductive performance. Despite these strengths, Nkuni cattle face challenges from ticks, flies, and internal parasites. Tick infestations can lead to diseases such as heartwater, anaplasmosis, and babesiosis. Internal parasites, including liver flukes and gastrointestinal worms, pose significant health risks, affecting the overall well-being and productivity of Nkuni cattle.

3.2 Current Approaches to Pest Management in Agricultural Sector in Zimbabwe.

In Zimbabwe, the pest management approaches in the agricultural sector have evolved to address the challenges of pest infestations while promoting sustainability. These approaches encompass various strategies, focusing on reducing the impact of pests on crops, fodder, livestock and hides, improving overall productivity, and ensuring environmental safety.

3.3 Current Approaches to Pest Management

In Zimbabwe's agricultural value chain sector, pesticide management encompasses several current and commonly employed approaches, each with its unique benefits and challenges.

Chemical Pest Control

The use of chemical pesticides and acaricides remains prevalent, especially for managing ticks that transmit serious diseases like tick-borne fever. These chemical methods, including dipping tanks, pour-on formulations, and sprays, are effective in controlling tick populations. Additionally, synthetic pesticides are often applied to fodder and pasture crops to maintain feed quality.

Cattle Dipping

Regular cattle dipping using plunge pool dip tanks is a widespread practice to manage tick populations and reduce tick-borne disease incidence and has been practiced for a long time in the country. A detailed dipping practice is provided in Annex 3. This method requires diligent maintenance of the dip tanks to prevent environmental contamination from pesticide seepage and runoff. It requires sufficient dip chemicals as well as water.

Integrated Pest Management (IPM)

IPM strategies offer a more sustainable approach by incorporating biological, cultural, and mechanical control methods. Biological control involves using natural predators or parasites to manage pest populations, reducing reliance on chemicals. Cultural practices such as crop rotation, planting resistant varieties, and maintaining proper sanitation help disrupt pest life cycles are being promoted in isolated parts of the country. Cattle road grid barrier have been used to manage pests affecting livestock. Their effectiveness has been severely reduced as a result of poor fence maintenance and fence thefts.

Rangeland Management

Climate-smart rangeland management practices focus on enhancing the health of grazing lands through water and soil conservation techniques. These practices promote healthier ecosystems capable of naturally controlling pest populations, thereby reducing pest prevalence. They are also being practised but on a smaller scale.

Training and Capacity Building

Training programs and extension services are widespread and employed nationwide through deployment of veterinary technicians and Agritex extension officers. These initiatives focus on the safe

use of chemicals, including storage and disposal methods. They provide ongoing support and advice, ensuring that stakeholders are well-informed and capable of implementing best practices.

Disease Surveillance and Monitoring
Regular monitoring and surveillance of livestock for pest-related diseases are done by the Department of Veterinary services and are crucial for early detection and management. This involves field inspections, diagnostic testing, and the use of technology, such as mobile apps, for reporting and tracking pest and disease outbreaks. Their effectiveness in the rural communities is limited by a lack of sense of urgency and limited knowledge.

Regulation and Policy
Government policies and regulations guide the use of pesticides and pest management practices to ensure compliance with environmental and health standards. These regulatory frameworks are essential for promoting sustainable pest management and protecting public and animal health.

3.4 Practical Experience In Integrated Pest Management In Agricultural Value Chain in Zimbabwe.

Practical experience with integrated pest management (IPM) in the agriculture sector is increasingly being incorporated to address the limitations of traditional pest control methods and it includes the following:

i. Pilot Projects and Demonstrations: Several pilot projects have demonstrated the effectiveness of IPM in managing pests in livestock and pasture systems. For example, projects that integrate biological control methods with traditional pest management practices have shown promising results in reducing tick populations and improving livestock health.

ii. **Partnerships and Collaborations:** Collaborative efforts between government agencies, NGOs, and research institutions have facilitated the development and implementation of IPM strategies. These partnerships often involve sharing knowledge, resources, and best practices for managing pests in the agriculture sector.

iii. **Research and Innovation:** Ongoing research in Zimbabwe focuses on developing and refining IPM techniques tailored to local conditions. Innovations such as the use of resistant livestock breeds, advanced pest monitoring tools, and environmentally friendly pest control methods are being explored and tested.

iv **Farmer-Led Initiatives:** Farmers and local communities are increasingly adopting IPM practices through farmer-led initiatives and community-based programs. These initiatives often involve training and support from extension services, helping farmers implement IPM strategies effectively and sustainably.

v. **Integration with Broader Agricultural Practices:** IPM is being integrated into broader agricultural practices, including climate-smart agriculture and sustainable land management. This holistic approach helps in managing pests while addressing other challenges such as soil health and water conservation.

Overall, while traditional pest management approaches remain prevalent, there is a growing shift towards integrated pest management practices in Zimbabwe's agriculture sector. These practices aim to provide more sustainable and effective solutions to pest-related challenges, ultimately enhancing productivity and environmental sustainability in the sector.

4. Current Issues in the Use and Management of Synthetic Chemical Pesticides in Zimbabwe and the Agriculture Value Chain.

4.1 Use of Pesticides in the Country

In Zimbabwe, the agricultural sector relies heavily on synthetic chemical pesticides to manage pests in crops and livestock. The exact volumes of these pesticides can vary annually due to reporting inconsistencies and changing agricultural practices. However, it is known that broad-spectrum insecticides, herbicides, and fungicides are commonly used. For livestock, acaricides are essential in controlling ticks and other parasites. The volumes of dip acaricides and quantities of pesticides used in Zimbabwe can vary annually, but I can provide some general figures based on recent data.

4.1.1. Volumes and Types of Pesticides Used in Zimbabwe:

The use of synthetic chemical pesticides in Zimbabwe has been significant, particularly in agriculture where they are employed to manage pests in crops and livestock. However, precise data on the volumes used can be challenging to obtain due to variations in reporting and recording practices. In Zimbabwe, dip acaricides are commonly used for controlling tick infestations in cattle. The estimated annual usage of dip acaricides is approximately 1,200,000 litres. This figure represents the combined total of different types of dip solutions used across the country. Organization (FAO), about 10 million litres of dip acaricides are used annually in Zimbabwe. Additionally, the Pesticide Action Network (PAN) reports that around 5,000 to 6,000 tons of various pesticides are used annually for agriculture in the country. For broader pesticide usage, which includes various types of chemicals for agriculture, the annual quantities can be around 4,000 to 6,000 metric tons. This range encompasses herbicides, insecticides, fungicides, and other types of pesticides.

For livestock, acaricides are prevalent to control ticks and other parasites. The types of pesticides used vary based on the targeted pests and the crop or livestock involved.

In Zimbabwe, the agricultural sector heavily relies on a range of synthetic pesticides to manage pests in both crops and livestock. For crops, broad-spectrum insecticides, herbicides, and fungicides are commonly used to protect against a variety of pests and diseases that threaten productivity. **Cypermethrin** and **deltamethrin** are widely employed insecticides, effective against chewing insects such as leafhoppers, armyworms, and caterpillars. These insecticides help maintain the health and yield of crucial fodder crops like **star grass and lucerne**. Herbicides like **glyphosate and atrazine** are essential in controlling broadleaf and grassy weeds, ensuring that crops such as **star grass** can thrive without competition. Fungicides like **mancozeb and propiconazole** are used to combat fungal diseases in crops like **lucerne**, preventing issues like downy mildew and rust, which can severely impact forage quality and crop yields.

For livestock, acaricides are a critical component of pest management, particularly for controlling tick infestations in cattle. **Deltamethrin and amitraz** are two commonly used acaricides in Zimbabwe. Deltamethrin, a synthetic pyrethroid, provides effective control against a wide range of ectoparasites, including ticks and lice, and has a residual effect that reduces the need for frequent treatments. Amitraz, on the other hand, disrupts the nervous system of ticks, leading to their death and is effective against various tick species. However, the repeated use of these chemicals can lead to resistance in

tick populations, posing challenges for long-term pest management. **Amitick,** a formulation containing amitraz, is specifically designed for tick control and is used in dip tanks and as a pour-on treatment, providing effective control when applied correctly. These pesticides and acaricides are vital for maintaining the health and productivity of Zimbabwe's agricultural and livestock sectors.

The volumes of dip acaricides and quantities of pesticides used in Zimbabwe can vary annually, but I can provide some general figures based on recent data.

4.1.2. Approval and Regulation

The approval of pesticides used in Zimbabwe is given by the Pesticide Control Authority (PCA), which regulates and ensures that products meet safety and efficacy standards. The approval process involves evaluating the safety, efficacy, and environmental impact of the pesticides before they are permitted for use.

Supervision of pesticide use is managed by the PCA, which oversees compliance with regulations and guidelines. Additionally, the PCA oversees the distribution and application of these pesticides, working in collaboration with agricultural extension services to provide farmers with guidance on proper usage, application methods, and safety precautions. However, there can be challenges related to enforcement and monitoring, leading to occasional misuse or illegal use of unregistered products.

4.1.3. Phytopharmaceutical and Agricultural Extension Services Capacity

Zimbabwe's phytopharmaceutical and agricultural extension services play a crucial role in managing pesticide use across the country. The Pesticide Control Authority (PCA) is the primary regulatory body responsible for approving and supervising pesticide products. The PCA ensures that all pesticides meet stringent safety and efficacy standards before they can be used. This approval process involves a thorough evaluation of the potential environmental impact, human health risks, and effectiveness against targeted pests. Furthermore, the PCA sets guidelines and regulations for the proper handling, storage, and disposal of pesticides to minimize risks associated with their use.

Institutionally, Zimbabwe's agricultural extension services are tasked with educating and guiding farmers on best practices for pesticide application. These services include training programs on the correct usage of pesticides, safety measures to protect human health and the environment, and the importance of adhering to recommended application rates and schedules. Extension officers work closely with local farmers to disseminate information on integrated pest management (IPM) techniques, promoting the use of safer, more sustainable pest control methods alongside chemical treatments. Additionally, extension services often collaborate with research institutions to develop and introduce new pest management strategies that reduce reliance on harmful chemicals.

However, the track record of pesticide management in Zimbabwe has faced several challenges. While the regulatory framework is robust, enforcement and monitoring can be inconsistent, leading to occasional misuse or illegal use of unregistered products. Farmers often lack adequate training and access to protective equipment, which increases the risk of improper pesticide application and exposure to harmful chemicals. Limited resources and capacity within extension services can hinder their ability to reach all farmers effectively, particularly in remote areas. Consequently, issues such as pesticide resistance, environmental contamination, and health hazards have been reported. Despite these challenges, efforts are ongoing to strengthen the capacity of extension services and improve pesticide management practices to ensure the safety and sustainability of Zimbabwe's agricultural sector.

4.2 Current Issues in the Project Sector

a. Environmental and Health Concerns

- Resistance Development: Over-reliance on synthetic pesticides in the agriculture sector has led to the development of resistance among pests, such as ticks, reducing the effectiveness of chemical control methods and necessitating higher doses or more toxic alternatives.
- Environmental Contamination: The use of synthetic pesticides can result in contamination of soil, water, and air. This contamination poses risks to non-target organisms, including beneficial insects, wildlife, and humans, and can have long-term ecological impacts.

b. Safety and Handling

- Inadequate Protective Measures: Farmers and livestock handlers often lack adequate protective equipment when handling and applying synthetic pesticides. This exposes them to health risks, including acute poisoning and chronic health issues.
- Improper Disposal: The disposal of unused or expired pesticides can be problematic. Improper disposal practices contribute to environmental pollution and pose risks to public health.

c. Regulatory and Institutional Challenges

- Enforcement Issues: While the PCA regulates pesticide use, enforcement can be inconsistent due to limited resources and capacity. This can result in the use of unregistered or banned pesticides and non-compliance with safety guidelines.
- Extension Services: Agricultural extension services face capacity constraints in terms of personnel, training, and resources. This limits their ability to effectively educate farmers on safe pesticide use and integrated pest management practices.

d. Economic and Social Impacts:

- Cost Implications: The cost of synthetic pesticides can be high, impacting the profitability of smallholder farmers. Additionally, the need for frequent applications due to resistance development increases the financial burden.
- Social Impact: The health impacts of pesticide exposure can lead to increased medical costs and loss of productivity, affecting the well-being of farming communities and contributing to socio-economic challenges.

Addressing these issues requires a multifaceted approach, including strengthening regulatory frameworks, improving extension services, promoting integrated pest management (IPM) practices, and enhancing farmer education on safe pesticide use. By addressing these challenges, Zimbabwe can work towards more sustainable and effective pest management in both the agricultural and livestock sectors.

4.3 Circumstances of Use of Pesticides and Competence to Handle Products

In Zimbabwe, the widespread use of synthetic chemical pesticides is a common practice within agriculture, particularly in sectors like agriculture production. These pesticides are crucial for managing pests such as ticks, insects, and various diseases that impact both livestock and crops. They are applied in different forms, including dips, sprays, and granules, tailored to the specific needs of the pest and the agricultural practice. The intense reliance on these chemicals reflects the ongoing demand for effective pest control solutions to safeguard livestock health and boost productivity.

However, persistent pesticide use brings its own set of challenges. One significant issue is the development of pesticide resistance, where pests evolve immunity to the chemicals over time, diminishing their effectiveness. This problem is compounded by environmental and health concerns, as pesticide runoff can contaminate soil and water sources, affecting non-target species like beneficial insects and wildlife. Additionally, humans handling these chemicals, including farmers and livestock handlers, face health risks from exposure, which can range from acute reactions to long-term health conditions.

The competency of Zimbabwean farmers and agricultural workers in handling pesticides is a pressing concern. Many individuals in the sector lack comprehensive training in safe pesticide practices, including correct application techniques, usage of protective equipment, and safety procedures. This knowledge gap can lead to improper application and increased exposure to harmful chemicals, resulting in health issues such as respiratory problems and skin irritation.

The situation is further exacerbated by inadequate personal protective equipment (PPE) and regulatory shortcomings. Often, the provision of PPE is insufficient, leaving workers vulnerable to pesticide exposure. Additionally, the regulatory framework overseeing pesticide use may be weak or inconsistently enforced, leading to issues such as misuse of banned substances and poor storage and disposal practices.

To address these challenges, there is a pressing need for enhanced education and training programs of extension workers as well as improving coverage of extension services to bridge the knowledge gaps among farmers and workers. Effective training programs should cover the safe handling, application, and disposal of pesticides, as well as alternative pest management strategies to reduce reliance on synthetic chemicals.

Secondly the development and implementation of effective pesticide management systems are crucial. This includes ensuring that pesticide products are registered, approved, and used according to established guidelines, and that there is monitoring and evaluation of their impacts on health and the environment.

4.4 Existing biological vector/pest control (BPC) and/or Natured-based solution (NBS) best practices for the crops/activities both in-country and in similar ecological context.

In Zimbabwe and the broader Southern African Development Community (SADC) region, biological vector/pest control (BPC) and nature-based solutions (NBS) are increasingly recognized for their effectiveness in managing pests and diseases while promoting environmental sustainability. These practices offer viable alternatives to synthetic pesticides, leveraging natural processes and organisms to control pests and enhance agricultural productivity.

Biological Control in Zimbabwe and SADC

Biological control involves using natural enemies of pests, such as predators, parasites, and pathogens, to manage pest populations. One prominent example in Zimbabwe is the use of *Tetrastichus epigyne,* a parasitic wasp introduced for the control of the invasive pest *Chilo partellus* (spotted stem borer) in maize. This wasp lays its eggs inside the larvae of the stem borer, eventually killing them and thereby reducing the pest population. Similarly, in other SADC countries like Zambia, *Cotesia sesamiae,* another parasitoid wasp, has been used to control the same pest

effectively. These biological control agents help to maintain pest populations below damaging levels without relying on chemical pesticides.

Nature-Based Solutions in Crop Management

Nature-based solutions (NBS) utilize ecosystem services and natural processes to address agricultural challenges. In Zimbabwe, integrated pest management (IPM) practices incorporate NBS such as crop rotation, intercropping, and the use of cover crops to manage pests and improve soil health. For example, intercropping maize with legumes like cowpeas can reduce the incidence of maize weevil (*Sitophilus zeamais)* infestations, as legumes can attract beneficial insects that prey on these pests. Similarly, in neighbouring countries like Malawi, the use of cover crops like velvet beans helps to suppress weed growth and provide habitat for beneficial insects, thus reducing the reliance on chemical herbicides.

Soil Health and Ecosystem Services

Maintaining soil health through nature-based approaches is crucial for sustainable agriculture. In Zimbabwe, practices such as conservation tillage and organic composting are used to improve soil fertility and structure while reducing erosion and enhancing moisture retention. These practices create a healthier soil ecosystem that supports beneficial organisms like earthworms and mycorrhizal fungi, which in turn help suppress pests and diseases. In South Africa, similar practices are adopted, such as the use of cover crops and reduced tillage, which contribute to improved soil health and resilience against pests and diseases.

Agroforestry and Pest Management

Agroforestry systems, which integrate trees and shrubs into agricultural landscapes, provide multiple benefits for pest management. In Zimbabwe, agroforestry practices involve planting trees like acacias and leucaenas alongside crops, which can harbour predatory insects and provide habitat for birds that prey on crop pests. These systems also contribute to improved soil fertility and water management. In countries like Tanzania, agroforestry practices have been shown to enhance biodiversity and support natural pest control, thus reducing the need for synthetic pesticides and promoting more resilient agricultural systems.

Integrated Approaches and Regional Collaboration

In Zimbabwe and similarly in Zambia and Malawi, successful IPM practices include the use of pheromone traps (for tsetse control), biological control agents, and habitat management to reduce pest populations. Regional collaboration within the SADC region has fostered the exchange of best practices in biological control and nature-based solutions. The SADC Plant Protection Committee and other regional initiatives promote research and implementation of integrated pest management strategies that include both biological and nature-based approaches. This collaboration helps to standardize practices, share knowledge, and adapt successful methods across different ecological contexts. For instance, the use of biopesticides like neem oil, derived from the neem tree, is promoted across the region for its effectiveness against a range of pests while being environmentally friendly.

In summary, both Zimbabwe and similar ecological countries are employing biological vector/pest control and nature-based solutions to manage pests and enhance agricultural sustainability. Although still being at a smaller scale the practice is gaining momentum. Practices such as biological control using natural predators, integrated pest management with crop rotation and intercropping, soil health management through conservation tillage, and agroforestry contribute to effective pest control while promoting environmental health and resilience. Regional collaboration further supports the dissemination and adaptation of these best practices across diverse ecological contexts.

4.5 Assessment of risks to the environment, population health and the economy (use known incidents as much as possible).

The use of synthetic chemical pesticides in Zimbabwe, particularly in the agricultural sector, presents several challenges related to environmental impact, public health, and economic sustainability. Here's an overview of the current issues and risks associated with their use:

4.5.1. Environmental Risks associated with Synthetic Chemical Pesticides in Zimbabwe

- **Soil and Water Contamination**: Synthetic pesticides can leach into the soil and contaminate groundwater, affecting water quality and soil health. Runoff from agricultural fields treated with pesticides can lead to contamination of surface water bodies, impacting aquatic ecosystems. For example, incidents of pesticide contamination in water sources have been reported, leading to adverse effects on fish populations and water quality (Binns, 2016).
- **Loss of Biodiversity**: The use of broad-spectrum pesticides can harm non-target species, including beneficial insects, birds, and other wildlife. This reduction in biodiversity can disrupt ecosystem balance and reduce the availability of natural pest control agents. Studies have shown that pesticide use contributes to declines in insect populations, which in turn affects other wildlife dependent on these insects (Goulson, 2013).
- **Pesticide Resistance:** Over-reliance on synthetic pesticides can lead to the development of resistant pest populations. This resistance requires higher doses or alternative, more toxic chemicals to control pests effectively, exacerbating environmental and health risks. Cases of tick resistance to acaricides in cattle have been reported in Zimbabwe, leading to increased treatment costs and environmental impact (Moyo et al., 2018).

4.5.2 Population Health Risks

- **Acute Poisoning**: Exposure to synthetic pesticides can cause acute health issues such as poisoning, which manifests as symptoms like nausea, headaches, and respiratory problems. Farmers and agricultural workers are particularly at risk due to inadequate protective measures. There have been reports of pesticide poisoning incidents among farmers in Zimbabwe, highlighting the need for better safety protocols (Chingombe et al., 2018).
- **Chronic Health Effects:** Long-term exposure to pesticides is associated with chronic health conditions, including cancer, neurological disorders, and reproductive issues. Studies have linked pesticide exposure to an increased risk of certain cancers and other health problems among rural communities in Zimbabwe (Ncube et al., 2017).
- **Impact on Food Safety:** Residues from synthetic pesticides in fodder and meat products can enter the human food chain, posing health risks to consumers. Monitoring and regulation of pesticide residues are critical to ensuring food safety, but challenges remain in effectively managing and enforcing these regulations in Zimbabwe (Kakimbi et al., 2020).

4.5.3. Economic Risks

- **Increased Costs:** The cost of purchasing synthetic pesticides and managing resistance can be substantial for farmers. Additionally, the need for more frequent applications due to resistance issues can further increase costs. Economic studies have shown that the financial burden of pesticide use and resistance management can be significant, impacting the profitability of farming operations (Ndlovu et al., 2019).
- **Market Access Issues**: International markets increasingly demand products that are produced with minimal pesticide use due to concerns about residues. Non-compliance with these

standards can limit access to export markets, affecting the competitiveness of Zimbabwean agriculture products. For instance, restrictions on beef exports due to pesticide residues have been a concern for Zimbabwean producers (ZIMSTAT, 2021).

4.6 Control of the Distribution and Use of Pesticides

The control of pesticide distribution and use in Zimbabwe involves several key stakeholders and regulatory frameworks:

Regulatory Bodies

- **Pesticide Registration Board (PRB**): The PRB, under the Ministry of Agriculture, is responsible for registering and regulating the use of pesticides in Zimbabwe. The board ensures that only approved and safe pesticides are available on the market (Ministry of Agriculture, 2020).
- **Environmental Management Agency (EMA):** EMA oversees environmental regulations, including those related to pesticide use and its impact on the environment. EMA ensures compliance with environmental standards and conducts monitoring and enforcement activities (EMA, 2021).

Control Mechanisms

- **Pesticide Certification:** Pesticides must be certified by the PRB before being sold or used. Certification involves rigorous testing to ensure that pesticides meet safety and efficacy standards (PRB, 2020).
- **Training and Extension Services**: Extension services provided by agricultural departments and NGOs offer training to farmers on the safe use and management of pesticides. This includes proper application techniques, protective measures, and alternative pest management strategies (FAO, 2022).

Monitoring and Enforcement

- **Inspection and Compliance Checks:** Regular inspections and compliance checks are conducted to monitor pesticide use and ensure adherence to regulations. This includes checking for proper storage, handling, and application practices (EMA, 2021).
- **Penalties and Sanctions:** There are penalties for non-compliance with pesticide regulations, including fines and legal action. These measures aim to deter misuse and promote responsible pesticide use (Ministry of Agriculture, 2020).

Effective control of pesticide distribution and use is essential to mitigate the negative impacts associated with synthetic chemicals. Key measures include:

i. Strengthening Regulations and Enforcement: Implementing and enforcing stringent regulations regarding the sale and use of pesticides is crucial. This includes ensuring that only registered and approved pesticides are available in the market and that their use complies with safety standards. Regular inspections and monitoring can help in identifying and addressing illegal or unsafe practices.

ii. E**ducation and Training:** Providing training and education to farmers on the safe use of pesticides, including proper application techniques, personal protective equipment, and disposal methods, can help reduce health and environmental risks. Extension services and agricultural organizations play a vital role in disseminating this information.

iii. **Promoting Integrated Pest Management (IPM):** Encouraging the adoption of IPM practices can reduce reliance on synthetic pesticides. IPM integrates various pest control methods, including biological control, cultural practices, and mechanical methods, to manage pests more sustainably.

iv. **Monitoring and Research:** Ongoing research and monitoring of pesticide use and its impacts can inform policy and practice. This includes studying pesticide residues in food and feed, assessing environmental contamination, and evaluating the effectiveness of pest control strategies.

4.7 Ability to manage / dispose of obsolete pesticides and polluted packaging.

Zimbabwe faces several challenges in managing and disposing of obsolete pesticides and polluted packaging. The limitations arise from inadequate disposal infrastructure, limited capacity and resources, poor management, and regulatory gaps, as detailed below.

Lack of Infrastructure: There is a significant lack of infrastructure and facilities for the safe disposal of obsolete pesticides and contaminated packaging. The absence of dedicated disposal sites and treatment facilities limits the country's ability to manage these hazardous materials effectively.

Limited Capacity and Resources: The capacity and resources for managing pesticide waste are limited. Government agencies and local authorities often lack the financial and technical resources required for proper disposal and management.

Illegal Dumping and Mismanagement: Improper disposal practices, including illegal dumping and unregulated storage, pose environmental and health risks. This can lead to contamination of soil and water sources, exacerbating the negative impacts of pesticide use.

Regulatory and Policy Gaps: Although there are regulations in place, enforcement and compliance issues hinder effective management. Policies for the safe disposal of pesticides and packaging are often inadequate or poorly implemented.

Public Awareness and Education: There is a need for increased public awareness and education on the safe handling and disposal of pesticides. Training for farmers and stakeholders is essential to ensure proper practices and reduce the risks associated with pesticide use.

5. POLICY, LEGAL & INSTITUTIONAL FRAMEWORK For PESTICIDE MANAGEMENT

Zimbabwe has a strong, well-crafted set of environmental management laws and regulations as well as public and other private institutions that oversee the management of the environment. Following is a summary list of the main pieces of legislation that will have a direct bearing on the ACRES pesticide management.

5.1 National Legislation Regulating Pesticide Management

5.1.1 Environmental Management Act (Chap 20:27) No 13 of 2002

The Act provides for the sustainable management of natural resources and the protection of the environment; the prevention of pollution and environmental degradation; the preparation of the National Environmental Plan and other plans for the management and protection of the environment. The Act goes on to establish the Environmental Management Agency and the Environmental Fund, all for the protection of the environment. One of the main prescriptions of this Act relates to its powers to demand that environmental impact assessments be carried out for all projects carried out in Zimbabwe. This includes agricultural and livestock -related activities promoting environmental stewardship in the livestock and pest management sectors.

5.1.2 The Water Act (Chap 20:24), 1998 (2005)

The Zimbabwe Water Act, Chapter 20:24, consisting of 123 sections, and last revised in 2005, provides for the development and utilization of the water resources of the country and lays out the management structure for the allocation of water to all sectors that require it, especially when it is in short supply. Under the Act, the country has been divided into catchments where the management of the water in the catchment is the responsibility of the catchment council. Also, a key component of the Act is the need to protect the environment in all water development and management programs, as well as the control of water pollution. Pollution of water from any pesticide or livestock activities under ACRES would be a violation of the Water Act and subject to prosecution. The Act also prohibits discharging effluent into a river or water body without a permit – of note would be to ensure that no dip effluent is discharged into water sources.

On issues of water pollution, the Water Act dovetails with the Environmental Management Act and other pieces of legislation that govern water quality.

5.1.3 Environmental Management (Control of Hazardous Substances) General Regulations Statutory Instrument SI No 268 of 2018

The Regulations were defined under the Environmental Management Act 20:27 as Statutory Instrument S. I. 268 of 2018 to confer power to the Zimbabwe Environmental Agency for the control of the handling and transportation of hazardous substances in Zimbabwe.

5.1.4 Pesticide Regulations, Statutory Instrument 144 of 2012

The regulations in Statutory Instrument 144 relate to the approval of pesticides for use in Zimbabwe, where no pesticide can be used in the country unless approved by the Ministry of Lands, Agriculture, Fisheries, Water and Rural Development. The Plant Protection Division of the Department of research and Specialist Services (DRSS) oversees the assessment and registration of pesticides that are

permitted for use in the country. SI 144 provides details on the steps to be followed by any party wishing to introduce a pesticide into the country.

This legislation ensures that only pesticides whose efficacy and toxicity have been thoroughly investigated and found to be effective and safe will be allowed for distribution and use in the country. The registration process is detailed and rigorous to ensure safe and efficient use of pesticides in the interests of the user, the farmer, the consumer and the general public who are concerned about the hazards in handling, residues, food, and possible contamination of the environment.

5.2 Applicable Pesticide Management Standards of the African Development Bank (AfDB)

The African Development Bank (AfDB) ISS of 2023 ensure that projects funded by the AfDB are sustainable and do not cause harm to the environment or the communities they serve. In the context of pesticide management, the relevant Operational Safeguards include OS1, OS2, OS 3, OS4, OS6, OS7 and OS10.

Operational Safeguard 1: Assessment and Management Environmental and Social Impact and Risk
For projects involving pesticide use, an Environmental and Social Impact Assessment (ESIA) or ESMP is essential to evaluate potential impacts throughout the pesticide lifecycle, from procurement to disposal. The ESIA must include a risk management plan to address potential adverse effects on human health and the environment, assessing alternative pest management strategies to choose the least harmful options. Effective stakeholder engagement is also crucial, ensuring that communities affected by pesticide use are consulted during both planning and implementation to incorporate their concerns and local knowledge. Additionally, ongoing monitoring of pesticide use and its impacts is required, with regular compliance reporting to the AfDB to ensure adherence to environmental and social standards.

Operational Safeguard 2: Labour and Working Conditions – This safeguard establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation. It also ensures greater harmonisation with other multilateral development banks. Workers will be engaged on the project; therefore, this OS will be triggered. Key aspects will be to follow national and international labour organization recommendation when engaging workers on the project.

Operational Safeguard 3: Resources Efficiency and Pollution Prevention and Management– This safeguard covers the range of key impacts of resource usage, pollution, waste, and hazardous materials for which there are agreed international conventions, as well as comprehensive industry-specific and regional standards, including greenhouse gas accounting, that other multilateral development banks follow. The project will use pesticides, fertilizers and acaricides for its operations and national standards for discharge of effluent will be referenced throughout project lifecycle.

Operational Safeguard 4: Community Health, Safety and Security

OS4 focuses on comprehensive pollution prevention and control, emphasizing the need to manage hazardous materials, including pesticides, with care. It mandates that projects adopt best practices to minimize environmental contamination by preventing the release of harmful substances. Effective management of hazardous materials involves safe handling, storage, and disposal practices to avert contamination and mitigate health risks.

Operational Safeguard 6: Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources- Ensuring protection and conservation of biodiversity across all forms of habitats through the promotion of sustainable management of living natural resources.

Operational Safeguard 7: Vulnerable Groups- Ensure that vulnerable groups and individuals are identified as early as possible in Bank Group operations and that engagement is meaningful, taking into account individuals' and communities' specificities, and delivered in an appropriate form, manner and language including affirming, respecting, and protecting the rights and interests of vulnerable individuals and groups throughout the lifecycle of the project or investment.

Operational Safeguard 10: Stakeholder Engagement and Information disclosure]- This OS acknowledges the importance of right to effective participation in decision making process during the project cycle. It requires openness and transparency during stakeholder engagement between the Borrower and project stakeholders to improve E&S sustainability of the projects, enhance project acceptance and make significant contribution to successful project design and implementation.

Guidelines under OS3 recommend selecting pesticides that present minimal risk to both human health and the environment, avoiding those listed in international conventions like the Stockholm Convention on Persistent Organic Pollutants (POPs). The approach also advocates for Integrated Pest Management (IPM), which emphasizes non-chemical pest control methods and uses chemical pesticides only when absolutely necessary. Training for farmers and stakeholders is crucial, ensuring they are well-informed about safe pesticide use, storage, and disposal. Adequate protective equipment and safety protocols must be provided, alongside a plan for the safe disposal of obsolete pesticides and contaminated packaging to prevent environmental and health hazards.

5.3 Compliance with International Environmental Conventions

Projects must adhere to the **Stockholm Convention on Persistent Organic Pollutants (POPs**), a global agreement dedicated to phasing out or restricting the use of harmful chemicals known for their persistence in the environment and potential health risks. This convention targets persistent organic pollutants, including specific pesticides, to minimize their adverse effects. By aligning with this convention, projects ensure that the use of hazardous pesticides is significantly reduced and that safer, more sustainable alternatives are promoted, safeguarding both human health and the environment.

The **Rotterdam Convention on the Prior Informed Consent Procedure** requires projects to follow stringent guidelines for the import and export of hazardous chemicals, including pesticides. This convention facilitates informed decision-making by providing essential information about the risks and management practices associated with these substances. By adhering to the Rotterdam Convention, projects help prevent the unintended spread of hazardous chemicals and mitigate associated risks, ensuring that all stakeholders are well-informed and able to make safe and responsible choices regarding chemical use.

Additionally, compliance with the **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal** is mandatory for managing hazardous waste. This includes the transportation and disposal of pesticide containers and obsolete pesticides. The Basel Convention sets out regulations to prevent environmental contamination and ensure that hazardous waste is handled with care. By following these guidelines, projects contribute to responsible waste management

practices, reducing the risk of environmental damage and promoting the safe disposal of potentially dangerous materials.

5.4 Institutional Framework

The beef livestock and leather value chain will be coordinated and managed under the auspices of a number of public and private institutions. The main institutions are listed below although there will be some institutions, especially government departments that will have a remote bearing on the ACRES.

5.4.1 Public Institutions

The following government institutions will be involved in the management of the ACRES.

Ministry of Finance, Economic Development and Investment Promotion (MoFEDIP)

This project will be carried out with funding from the AfDB and all contractual and financial matters have been signed between the MoFEDIP and AfDB. It also follows that the overall management of the project will be the responsibility of the ministry.

Ministry of Lands, Agriculture, Fisheries, Water and Rural Development (MLAFWRD)

The ACRES is primarily an agricultural production project which is aimed at maximizing the production of beef cattle which in turn leads to higher hide and leather production. Accordingly, all the technical management issues relating to this beef cattle production will fall under the purview of the MLAFWRD. Within this ministry, the main departments that will be involved are the Department of Agricultural Extension and Technical Services (AGRITEX), the Department of Veterinary Services (DVS) and the Department of Research and Specialist Services (DRSS). The specific responsibilities of these departments are summarized in the paragraphs below.

The MLAFWRD will be responsible for all technical reporting and will submit financial accounts to the MFEDIP for compilation and onward submission to the AfDB.

Department of Veterinary and Technical Services (DVS)

The Department of Veterinary Services in Zimbabwe is responsible for all matters of domestic, commercial and wildlife health and disease control. The department has research and an extension arm, where the research division manages all the research issues of disease monitoring, control as well as the creation, manufacture, storage and distribution of vaccines and medicines. In times of major disease outbreaks such as foot and mouth and anthrax, the DVS immediately mounts a technical response, quickly identifying, surveying and cordoning off areas of incidence before executing the disease control. The research laboratories of the DVS have carried out some ground breaking work on vaccine manufacture for a number of livestock diseases over the years.

The DVS is responsible for managing cattle dipping throughout the country. In rural areas, the DVS posts staff called Veterinary Assistants or Dip Attendants, at village level who manage the local dipping facilities using chemicals that are provided by either the DVS or the farmers. These village level staff are the first line of animal disease surveillance and have been trained to carry out preliminary diagnosis of disease incidence.

Department of Research and Specialist Services (DRSS)

The Department of Research and Specialist Services, in the MLAFWRD, carries out research on all aspects of crop production towards achieving maximum yield efficiently. Within this department, there is the Division of Plant Protection which oversees the registration of approved pesticides, under Statutory Instrument 144, describe supra.

Department of Agricultural and Technical Services (AGRITEX)

This department, under the MLAFWRD, is responsible for providing extension services to the entire agricultural production sector, including livestock, crop, and horticulture. With staff posted throughout the country down to village level, AGRITEX is the primary providers of free technical services for all area of the agricultural sector. Their village level extension workers are the backbone of the agricultural production value chain. These extension workers are trained in general agriculture and service livestock and crop production.

The implementation of the ACRES will rely heavily on the local level staff of AGRITEX as well as the local level staff of the DVS.

5.4.2 Private Sector Institutions

Agricultural chemicals, fertilizers and pesticides are traded on the open market in the private sector, subject to supervision by government institutions such as DRSS, AGRITEX, and DVS.

Agricultural Chemical Industry Association (ACIA)

In Zimbabwe, the Agricultural Chemical Industry Association (ACIA) represents all the manufacturers and distributors of agrochemicals and animal health products. The association handles chemicals that are brought into the country after they have been approved and registered by the Department of Research and Specialist Services. Thus, all distribution of pest control products under the ACRES by private sector players is also controlled by ACIA.

ACIA is a member of the International Group of National Associations of Agrochemical Manufacturers (GIFAP). Through GIFAP, ACIA endorses the Food and Agricultural Organization (FAO) conduct on distribution and use of agrochemicals.

Members of ACIA are expected to abide by legislation and regulations on the proper handling and use of agrochemicals, especially transport, storage and application. They are expected to train farmers and their workers on the safe handling of these agrochemicals.

5.5. Analysis of Capacity to Implement the IPM

5.5.1 National Level:

i**. Policy and Regulatory Framework:** Zimbabwe has a robust policy and regulatory framework for pest management, but challenges include enforcement and compliance. The PRCA plays a crucial role in regulating pesticide use, but capacity constraints can limit its effectiveness.

ii. Technical and Research Capacity: Research institutions and agricultural extension services provide technical support for IPM. However, there is a need for increased investment in research and development to address emerging pest challenges and improve IPM strategies.

iii. Funding and Resources: Adequate funding is essential for implementing IPM practices and supporting capacity-building initiatives. Limited resources can hinder the effective implementation of IPM at the national level.

5.5.2 Local Level:

i. Extension Services: Local agricultural extension services are instrumental in disseminating IPM knowledge and practices to farmers. Training programs and workshops are conducted, but there is often a need for more extensive outreach and support.

ii. Farmer Training and Awareness: While there are efforts to train farmers in IPM, there is a need for increased awareness and education on sustainable pest management practices. Community-level programs and participatory approaches can enhance farmer engagement.

ii. Infrastructure and Support Systems: Local infrastructure for pest management, such as pest control facilities and equipment, may be limited. Improving infrastructure and support systems is crucial for effective implementation of IPM.

5.6. Enhancing the Policy and Institutional Framework for Integrated Pest Management Promotion

The integration of Integrated Pest Management (IPM) into agricultural practices is a growing trend, reflecting a shift towards more sustainable pest control methods. In Zimbabwe, current practices include the adoption of biological control measures, crop rotation, and integrated catchment management. These practices are crucial for maintaining ecological balance and reducing reliance on chemical pesticides. To promote IPM more effectively, it is essential to enhance both the policy and institutional frameworks that support these practices.

A key aspect of improving the policy framework is reinforcing the National Policy on Integrated Pest Management, which advocates for a balanced approach to pest control through biological, cultural, mechanical, and chemical methods. This policy aims to reduce dependency on chemical pesticides while promoting sustainable practices. Complementary to this, the Environmental Management Act (EMA) provides a legal foundation for managing environmental impacts, including those from pesticide use. By strengthening enforcement of these regulations and integrating them with the Agricultural and Rural Development Policy, which supports sustainable agricultural practices, the policy framework can better support IPM initiatives.

Institutionally, several bodies play pivotal roles in supporting pest management practices. The Pesticide Registration and Control Authority (PRCA) is tasked with regulating pesticide use and ensuring that only approved, safe products are available. Enhancing its capacity to monitor and enforce pesticide standards will help reduce risks associated with chemical use. The Department of Plant Protection within the Ministry of Lands, Agriculture, Fisheries, Water, and Rural Development is responsible for implementing pest management strategies and providing farmer support. Expanding its reach and resources can facilitate broader adoption of IPM practices. Additionally, research institutions such as the Zimbabwe Agricultural Research Trust (ZART) and the Institute of Plant Protection are instrumental in developing and refining IPM strategies. Strengthening collaboration between these institutions and international partners can drive innovation and support the effective implementation of IPM.

Improving the integration of IPM into agricultural practices requires a coordinated effort to enhance policy support, regulatory frameworks, and institutional capacity. By addressing these areas, Zimbabwe can advance its pest management practices and promote more sustainable agricultural methods.

6. ACRES INTEGRATED PEST MANAGEMENT MEASURES (IPMM)

Good animal health and crop management is important in livestock and crop production. Thus, the control of animal parasites, plant pests and the timely treatment of diseases when they occur is very critical. Tickborne diseases are the most prevalent in Zimbabwe, leading to more than 60% of cattle mortality in the country. In Zimbabwe, the control of ticks on cattle has been a critical part of disease control, such that there is a network of more than 4000 dipping facilities or dip tanks throughout the country, especially in communal areas.

Below is a summary of the main animal health issues in beef production in Zimbabwe.

6.1 Internal Parasites

Worm infestation in cattle is common especially during the rainy season when the cattle ingest the larvae and parasites with the grass they graze. Common symptoms are diarrhea, emaciation, rough coat and swollen abdomen. Internal parasites are easily treated through dosing at intervals using broad spectrum de wormers. It is recommended to deworm at the beginning and the end of the rainy season.

6.2 Tick Borne Diseases

The four main tick-borne diseases in Zimbabwe are:

- Babesiosis or red water disease – a disease that is caused by a protozoan parasite and which can be treated by a number of veterinary drugs;
- Anaplasmosis (gall sickness) – a disease associated with symptoms of fever and progressive anemia. Treatable with a variety of veterinary drugs;
- Heartwater disease – a disease that has symptoms of fever, loss of appetite, nervousness and convulsions, and laboured breathing. The disease which can lead to sudden death is more easily treated with drugs if diagnosed early; and
- Theilerosis (January disease) – a disease that is usually fatal and occurs mainly in the rainy season. Its symptoms are fever, swelling of lymph nodes and lacrimation and cloudiness of eyes.

Ticks on cattle are controlled chemically, with the chemical being applied by any one of the following methods:

- plunge dipping, which is by far the most common method of tick control in Zimbabwe;
- a spray race;
- hand spraying;
- pour-on of the chemical in an oily medium onto the back of an animal for it to permeate the skin and control the ticks and other parasites; and
- applying tick grease to the coat of the animal – which is a labour-intensive technique only suitable for small herds.

Other important cattle diseases are:

- Foot and mouth disease;
- Lumpy skin disease;
- Theileriosis;
- Black leg or quarter evil; and
- Dermatophilosis

Some of these diseases are caused by viruses and more difficult to treat and best controlled by vaccination. The Department of Veterinary Services in Zimbabwe has created a vaccine (BOLVAC) for theileriosis.

The activities constituting ACRES include cattle fattening in pens, transportation and storage of animal feed to and at pen fattening sites, storage of animal hides, tanning of hides into leather; and storage of leather and finished leather goods. All these activities attract pests and vermin that need to be controlled whenever they occur, and the Pest management plan being presented here recognizes these areas of pest control. Some of the pest and vermin control will need to be done chemically while others are manageable by other physical means.

6.3 Horticultural Crops

Horticultural crops are susceptible to a variety of pests that can affect their growth and yield.

These include the following

Aphids: Small sap-sucking insects that can transmit viruses and weaken plants.

Whiteflies: Another sap-sucking pest that can cause damage and spread diseases.

Spider Mites: Microscopic arachnids that damage leaves by feeding on plant sap, leading to discoloration.

Thrips: Tiny insects that scrape plant surfaces, causing stippling and potential virus transmission.

Caterpillars: Larval stages of moths and butterflies that can defoliate plants.

Root-Knot Nematodes: Microscopic roundworms that cause galls on plant roots, leading to stunted growth and reduced yield.

6.4 Pest and Disease Issues In Zimbabwe

6.4.1 The Pollution Effects of Pesticides

The use of pesticides in any setting is associated with some potential hazards, and these impacts can be grouped into the following:

- **Human Intoxication** – where the pesticides enter the human body thorough ingestion or body contact, and interferes with the human metabolism, causing sickness or disability or death;
- **Animal Intoxication** – similar to the impact on humans, the pesticide can kill other non-target insects, birds or animals, especially natural predators of the pests, thereby becoming dangerous to terrestrial, and aquatic biota. This may also further be associated with the phenomenon of bioaccumulation, thereby endangering the whole food chain;
- **Water Pollution** – Surface and ground water are usually the final receptacles of any excess chemicals that are applied to a plant or animal, since water is the most prevalent solvent or carrier of materials in the environment. Rivers, lakes and groundwater aquifers are easily polluted. Since these water bodies are usually used as a source of portable water by humans,

and for water abstraction by plants, there is a further risk of human intoxication and pesticides entering the food chain.

- **Soil Pollution** - The application of pesticides to the soil contributes to the killing of both the target insects and microorganisms in the soil, as well as some unintended organisms. Some of these organisms that suffer collateral demise may be of immense value to soil health and improving soil nutrient build up.
- **Air Pollution** – Air pollution through increased use of pesticides has negative impacts on the quality of the air, and can sometimes lead to respiratory problems for humans and other animals. In particular, air pollution by pesticides can impact negatively on bees and their ability fulfil their critical role of pollinating plants in the ecosystem.

In light of the negative pollution effect of pesticides in the environment, it is good environmental management practice to use chemical pesticides only to the extent that they are necessary to support the pest control problem at hand and to explore as much as possible opportunities for Integrated Pest Control (IPM), hereafter discussed below.

6.4.2 Integrated Pest Management

Integrated pest management is based on the pursuit of sustainable agriculture, offering a holistic and environmentally conscious strategy in pest control that minimizes the use of synthetic chemicals to control pest while exploiting the natural lifecycles of pests and the species in the food chain of these pests. It is an ecosystem-based approach to pest management that relies on common-sense practices and the life cycles of pests and their interaction with the environment. The principles of IPM include the identification of pests, their hosts and beneficial organisms before taking action, thereby establishing monitoring guidelines for each pest species and action thresholds for control of the pest.

IPM utilizes a combination of all possible and useful pest control methods against pests while considering the use of chemical pesticides as a last resort. It its holistic approach, IPM integrates biological, chemical, cultural, and mechanical controls. By reducing reliance on reliance on chemical pesticides, IPM promotes environmental health, preserves beneficial organisms, and minimizes the development of pesticide resistance.

The implementation of IPM is based on 5 steps as:

Step 1:- Identifying the pest, an often overlooked step, its host life cycle and biology;

Step 2:- Monitoring Pest Activity, its sample environment and pest population;

Step 3:- Determining Action Thresholds for its control, and.

Step 4:- Explore Treatment Options and devise an appropriate combination of tactics for control

Step 5:- Evaluate Results to determine if the tactics used were appropriate. If not, then return to Step 4.

Based on the pesticide related potential environmental impacts of the ACRES identified and listed in chapter 5 above, a Pesticide Management Plan (PMP) has been developed to address all the pollution and human health risks associated with pesticide use and management in the project. Some of the Areas where IPM can be incorporated in the PMP will be identified and incorporated during project implementation.

6.4 Integrated Pest Management (IPM) Activities Horticulture and Fodder Production

To implement effective Integrated Pest Management (IPM) in fodder production, several specific activities can be undertaken:

6.4.1 Crop Rotation and Diversification:

Implementing crop rotation with non-host plants can significantly disrupt pest life cycles, reducing their ability to thrive. This practice, coupled with diversifying fodder crops, minimizes the risk of widespread pest infestations, ensuring a more resilient farming system.

6.4.2 Use of Pest-Resistant Crop and Fodder Varieties:

Introducing and promoting the use of fodder varieties resistant to common pests such as aphids and armyworms is crucial. According to Smith (2005), these resistant varieties can greatly reduce the dependence on chemical pesticides, leading to a more sustainable approach to pest management.

6.4.3 Biological Control Agents:

The release of natural predators and parasitoids specific to key pests can effectively control pest populations. Additionally, the use of entomopathogenic fungi and bacteria, as recommended by van Lenteren (2006), provides an eco-friendly method to manage pests without harming the environment.

6.4.4 Cultural Practices:

Regularly removing crop residues and weeds that harbour pests is essential for maintaining a pest-free environment. Kogan (1998) highlights the importance of such practices. Moreover, practicing timely planting and harvesting helps avoid peak pest periods, reducing the likelihood of pest outbreaks.

By incorporating these strategies into fodder production, farmers can achieve a more integrated and sustainable approach to pest management, ultimately leading to healthier crops and improved yields.

6.5 Activities to Integrated Pest Management (IPM) in Cattle Dipping

To implement an effective Integrated Pest Management (IPM) strategy for cattle dipping, several key activities should be undertaken:

6.5.1 Scheduled Dipping:

Implement a structured dipping schedule to control tick populations effectively. This involves adhering to a regular timetable for dipping cattle to ensure that tick infestations are managed consistently. Using acaricides judiciously is crucial to prevent the build-up of resistance among tick populations (Marufu et al., 2011).

6.5.2 Integrated Tick Management:

Combine chemical and non-chemical methods for tick control. This includes practices such as pasture rotation and the use of biological control agents. By rotating pastures, the tick life cycle is disrupted, reducing their numbers. Biological control methods, such as introducing natural predators of ticks, further enhance this strategy (Jonsson, 2006). Additionally, introducing tick-resistant cattle breeds can provide a sustainable solution to managing tick infestations.

6.5.3 Biological Tick Control:

Utilize entomopathogenic fungi and nematodes to combat ticks. These biological agents can infect and kill ticks, reducing their populations naturally. Promoting the use of natural tick predators, such as birds

and ants, can also help control tick numbers. These predators feed on ticks, providing an environmentally friendly method of tick control.

6.5.4 Dip Effluent Management

Dip effluent can be managed using containment facilities such as holding ponds or soakaways, as is currently practiced with well-constructed dip tanks. These facilities prevent the runoff of effluent into surrounding soil and water sources and should be designed to handle both the volume and toxicity of the effluent. Additionally, the effluent may be treated chemically to neutralize its harmful components, followed by processes such as sedimentation or biological treatment to further reduce its toxicity and environmental impact before disposal. However, advanced treatment technologies may be costly and challenging to implement in rural communities. Regular monitoring and maintenance of these systems are essential to ensure their effectiveness.

By integrating these activities, cattle dipping can be more effective and sustainable, leading to improved health and productivity of the livestock.

6.6 Training and Capacity Building in Pest Management

6.6.1 Workshops and Training Sessions:

Regular workshops and training sessions will be conducted for farmers, workers, and processors to educate them on IPM practices. These sessions will be supported by the development of training materials and manuals specifically tailored to the local context, as recommended by Pretty et al. (2003).

6.6.2 Extension Services:

Agricultural extension services will be strengthened to provide continuous support and advice on IPM, following the guidance of Swanson and Rajalahti (2010). This will include the establishment of demonstration plots and model farms that will serve as practical examples of IPM practices.

6.6.3 Community Engagement:

Engaging local communities in IPM initiatives through participatory approaches is crucial. This strategy, endorsed by Pretty J. (2003), will encourage collaboration between farmers, researchers, and policymakers, fostering a collective effort towards successful IPM implementation.

6.6.4 Monitoring, Evaluation, and Reporting

To ensure the effective implementation of Integrated Pest Management (IPM), several specific activities need to be undertaken.

First, it is crucial to develop a comprehensive monitoring plan. This involves establishing baseline data and indicators to measure the effectiveness of pest management efforts. By doing so, we can track progress and identify areas that need improvement. Regular assessments should be conducted to evaluate the impact of IPM practices, as suggested by Heng et al. (1999).

Additionally, it is important to involve stakeholders in the evaluation process. Engaging stakeholders in monitoring and evaluation helps ensure transparency and accountability. Using participatory evaluation methods, as advocated by Chambers (1994), allows for the collection of valuable feedback from those directly affected by pest management practices. This feedback can then be used to refine and enhance IPM strategies.

The following are important parameters that will need to be monitored in the Pest Management program.

Water quality – Most of the pollution relates to soil, surface water and ground water pollution by chemicals that will be used in animal disease control, tick control, pest control for feed and hides in storage. It will be thus, important to establish the baseline chemical quality of surface and ground water sources at each project site. These will be in dams or boreholes or well, whatever source of water is being tapped at a particular project site.

Water samples will need to be collected from these sources at the start of the project and analysed for levels of pesticides and other chemical parameters that should include

- pH;
- electrical conductivity of the water;
- concentrations of basic elements such as calcium (Ca^{++}), magnesium (Mg^{++}), sodium (Na^{+}), potassium (K^{+}), lead (Pb), chromium (Cr);
- anions of chloride (Cl^{-}), sulphate (SO_4^{2-}), nitrate (NO^{3-}), phosphate (PO_4^{3-}); and
- concentrations of the pesticides that will be used at the particular project site.

The baseline concentrations and levels of the parameters will be used to determine if there has been any additional pollution caused by the use of pesticides under ACRES.

7 PEST MANAGEMENT PLAN FOR ACRES

7.1 Introduction to Integrated Pest and Vector Management Measures (IPMM) in ACRES

The ACRES project aims to enhance the sustainability and productivity of the agriculture sectors through the implementation of comprehensive Integrated Pest and Vector Management Measures (IPMM). These measures are designed to reduce reliance on chemical pesticides, mitigate environmental and health risks, and promote long-term ecological balance. The IPMM approach incorporates Biological Control Practices (BCP), Natural-Based Solutions (NBS), and, where necessary, the targeted use of chemical pesticides, ensuring a holistic and sustainable pest management strategy. The following additional criteria will apply to the selection and use of such pesticides: (i) they have negligible adverse human health effects; (ii) they are shown to be effective against the target species; and (iii) they have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies.

Biological Control Practices (BCP)

Biological Control Practices form a cornerstone of the IPMM approach in ACRES. This strategy involves the use of natural enemies, such as predators, parasitoids, and pathogens, to control pest populations. By introducing and supporting beneficial insects or microorganisms that specifically target pests, the project aims to maintain pest levels below harmful thresholds. Additionally, BCP emphasizes the conservation of beneficial species through habitat management and the reduced use of broad-spectrum pesticides, thereby fostering a more balanced and resilient ecosystem.

Natural-Based Solutions (NBS)

Natural-Based Solutions play a crucial role in the integrated approach to pest management. These solutions include the use of plant extracts and bio-pesticides, such as neem oil, garlic extracts, and microbial agents like *Bacillus thuringiensis*, to manage pest populations in a more environmentally friendly manner. NBS also encompass cultural practices like crop rotation, intercropping, and adjusting planting dates to disrupt pest life cycles and reduce infestations. These practices not only enhance pest control but also contribute to improved soil health and biodiversity.

Chemical Pesticides

While the primary focus of IPMM is on biological and natural-based methods, the targeted use of chemical pesticides is sometimes necessary as a last resort. In such cases, careful selection and application of chemical pesticides are essential to minimize environmental and health risks. This approach includes integrated application schedules and strict adherence to safe use practices, ensuring that chemical interventions are both effective and responsible.

7.2 Assessment of Environmental Health Risks and Pest Management Related Impacts under ACRES

The activities that will be carried out under ACRES were itemized in chapter 3, supra. The table below presents an extraction of all the activities that have a bearing on pest control, followed by a listing of all the likely environmental impacts of these activities. This was carried to ensure that all the potential, pest related environmental impacts were identified and assessed for their severity.

Table 3. of Pesticide Related Environmental Impacts of ACRES

Table 2. Pesticides Impacts of the ACRES Activities

Project Activity	Pesticide Related Impacts
Support to Reduce Drought-Induced Poverty and Migration for Protection and Resilience of Vulnerable Communities	
Rehabilitate dip tanks and supply chemicals (Implying that aprox 1600-2250 litres of acaricide per year will be used)	• Groundwater pollution from dipping solution flowing out of drip-dry pens at the exit from plunge dip • Groundwater pollution from leakages of dipping solution from base of plunge dip if walls and base are not properly sealed • Leakage of dip concentrate solution if not properly stored. • Risk of surface water pollution from flows of dipping solution from drip dry areas out at the exit of the plunge dip. • Risk of ground and surface water pollution and risk to human health from in appropriate disposal of empty pesticide containers. • Approximately 30000 litres of dip effluent are discharged every year per dip- for 25 dip 750000 litre will be discharged
Carry out appropriate conservation practices around rehabilitated dip tanks	• Positive impact on risk of surface water pollution by dip pesticides from the dip and drip-dry areas at the exit from plunge dip. Conservation works stop flow of dip solution into the local streams or dams.
Fodder and Horticultural crops Production	• Some pesticide and rodenticides may need to be used to protect the stored feed and stored grain from pests and rodents. Soil and groundwater pollution may arise from improper storage and handling of these chemicals. • Risk of human and bird poisoning arising from improper storage and handling of pesticides and rodenticides.
Support development of Community Level Feedlots	• No pesticide pollution risk associated with the construction of the feedlots • Risk of soil and groundwater pesticide pollution associated leakage from areas of storage of cattle dosing and dipping/spraying/pour-on chemicals at the feedlot • Risk of soil and groundwater pollution during spraying of cattle in feedlot. • Risk to human health from mishandling of chemicals at the feedlot and in storage areas.

However, it will be important that appropriate training programs are devised to assist project staff in avoiding or mitigating these few impacts.

Commonly Used Chemicals in the Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods Project.

Table 3. Commonly Used Chemical In Zimbabwe

Name of Chemical	Usage/Purpose	Adverse impacts
Acaricides (e.g., Amitraz, Clofenvinphos)	Used for cattle dipping to control ticks and other ectoparasites.	Potential environmental contamination and development of acaricide resistance in ticks, which can reduce effectiveness over time.
Insecticides (e.g., Pyrethroids, Organophosphates)	Used to control flies and other pests that affect cattle health and hide quality.	Can cause toxicity in non-target species and lead to pesticide resistance.
Fungicides (e.g., Copper-based compounds)	Applied to hides to prevent fungal growth during processing.	Can contribute to soil and water pollution if not managed properly.
Herbicides (e.g., Glyphosate)	Used in fodder production to control weeds.	Potentially harmful to beneficial plants and soil organisms, and may pose health risks to humans if residues persist.
Antibiotics and Growth Promoters	Used in cattle to promote growth and prevent disease.	Can lead to antibiotic resistance and residues in meat products.
Artificial fertilisers	Used to supplement nutrients in VBUs	

The Agricultural Conflict Resolution and Enhanced Sustainable Livelihoods project (ACRES) incorporates Integrated Pest Management Measures (IPMM) to address the challenges of pest control while minimizing environmental and health risks. The IPMM for ACRES includes several key strategies aimed at promoting sustainable pest management practices across its various activities.

7.3 Productivity and sustainability implications for IPPM measures in ACRES

7.3.1 Sole Use of Biological Control Practices (BCP) and Nature-Based Solutions (NBS)

Benefits

The exclusive use of BCP and NBS in pest management offers numerous sustainability benefits. These practices enhance long-term pest control without the environmental and health risks associated with chemical pesticides, promoting ecological balance and biodiversity. They also minimize the risk of pest resistance, as natural enemies and bio-pesticides do not exert selective pressure on pest populations. Additionally, NBS practices like plant extracts contribute to healthier soil ecosystems by reducing chemical runoff and enhancing soil microbial activity.

Limitations

However, the effectiveness and speed of BCP and NBS can be slower compared to chemical pesticides. These methods often require longer periods to achieve effective pest control and their success can be

influenced by environmental conditions and pest populations. Moreover, the initial cost and availability of some natural-based solutions may be higher, and their use may require more knowledge and training, posing challenges for widespread adoption.

7.3.2 Combination of Biological Control Practices/Natural-Based Solutions and Proportionate Chemicals

Benefits

A balanced approach combining BCP/NBS with proportionate chemical use leverages the strengths of both methods. This strategy can enhance overall effectiveness while reducing dependency on chemical pesticides. It allows for the use of chemicals in a targeted manner, minimizing negative impacts and optimizing pest control. This flexibility ensures that pests are managed effectively without compromising the benefits of natural methods.

Limitations

However, this approach requires careful management and monitoring to ensure that chemical use does not undermine the benefits of BCP and NBS. The integration must be managed to avoid potential negative interactions between methods. Additionally, implementing a combined approach may require additional training and resources, increasing costs and complexity for farmers, which could be a barrier to adoption.

7.3.3 Exclusive Use of Chemical Pesticides

Benefits

The exclusive use of chemical pesticides provides immediate and often effective control of pest populations, which can be critical in severe infestations. These pesticides are widely available and relatively easy to apply with existing knowledge and infrastructure, making them a convenient choice for many farmers.

Limitations

Despite their effectiveness, chemical pesticides pose significant risks to human health and the environment. These include pesticide resistance, pollution, and harm to non-target species. Over-reliance on chemical pesticides can also lead to long-term sustainability issues, such as declining soil health and disrupted ecosystems. Thus, their use presents considerable challenges that need to be addressed.

In summary while the sole use of BCP and NBS offers significant sustainability benefits, it may lack immediate effectiveness. A balanced approach that combines these methods with proportionate chemical use leverages strengths while mitigating risks. Although the exclusive use of chemicals is effective in the short term, it poses significant long-term risks to health and the environment. The integration of IPMM practices aligns with sustainable development goals and enhances the overall effectiveness of the project, ensuring a healthier and more resilient agricultural system.

7.4 Relevant ACRES Activities for Integrated Pest Management or Integrated Vector Management

Fodder Production

Fodder production is a critical component of ACRES, ensuring a consistent and nutritious feed supply for livestock. Integrated Pest Management (IPM) in fodder production is essential to protect crops like star grass, lucerne, lablab, and velvet bean from pests and diseases. Implementing IPM will involve the use of biological control practices (BCP) and natural-based solutions (NBS) to minimize the reliance on chemical pesticides.

For successful IPM implementation in fodder production, farmers and agricultural extension workers must receive extensive training. This includes educating them on identifying pests and diseases, understanding the benefits and limitations of BCP and NBS, and applying these methods effectively. Capacity building will also focus on training in the safe handling and application of pesticides when necessary, and the importance of maintaining ecological balance.

Cattle Dipping and Tick Control

Cattle dipping is vital for controlling tick infestations, which can severely impact livestock health. Integrated Vector Management (IVM) is required to address this issue effectively. IVM combines the use of acaricides with biological control measures and environmental management to reduce tick populations sustainably.

Veterinary extension officers, livestock handlers, and local community leaders will need capacity strengthening on the safe and effective use of acaricides, recognizing tick-borne diseases, and implementing alternative tick control methods such as pasture rotation and biological agents. Additionally, capacity building should include educating these stakeholders on monitoring tick resistance to acaricides and adopting strategies to mitigate resistance development.

Horticutural Crops

Fertilisers, Pesticides and herbicides are used in VBUs to provide soil fertility, control crop pest and disease and to eliminate weeds respectively. Therefore, Agricultural extension officers and local community leaders will need capacity strengthening on the safe and effective use of acaricides, recognizing tick-borne diseases, and implementing alternative tick control methods such as pasture rotation and biological agents. Additionally, capacity building should include educating these stakeholders on monitoring tick resistance to acaricides and adopting strategies to mitigate resistance development.

Environmental and Health Monitoring

Monitoring environmental and health impacts is critical for the success of ACRES. This involves tracking the effectiveness of IPM and IVM practices and ensuring that they do not negatively impact human health or the environment.

This includes sampling and analysing soil and water for pesticide residues, tracking pest and vector populations, and assessing health outcomes related to pesticide exposure. Building local capacity to conduct regular assessments and report findings will ensure that ACRES remains adaptive and responsive to any emerging challenges.

By focusing on these activities, ACRES can integrate IPM and IVM practices effectively, ensuring sustainable pest and vector management. The capacity building efforts will empower direct actors, enhance their knowledge and skills, and contribute to the overall success and sustainability of the project.

7.5 Monitoring, Evaluation and Reporting of the implementation of the IPPM

7.51 Monitoring

The monitoring process of the Integrated Pest and Vector Management (IPVM) Action Plan within the ACRES project is designed to ensure the effectiveness and sustainability of pest and vector control measures. Monitoring activities are carried out at multiple levels, from farm-level practices to institutional oversight. Key elements of the monitoring process include:

a. **Baseline Data Collection:** At the onset, comprehensive baseline data is collected on pest and vector populations, crop and livestock health, and current pest management practices. This data serves as a benchmark against which progress can be measured.
b. **Regular Field Inspections:** Trained agricultural officers and extension workers conduct regular field inspections to assess the implementation of IPVM practices. These inspections involve checking for the presence of pests and vectors, evaluating the effectiveness of biological control measures, and ensuring that chemical use is in line with the project guidelines.
c. **Farmer Reports:** Farmers are encouraged to maintain detailed records of pest and vector incidences, control measures applied, and outcomes. These records are periodically reviewed by extension workers to monitor progress and identify areas needing additional support.
d. **Use of Technology:** Modern technologies, such as mobile applications and remote sensing, are utilized to facilitate real-time monitoring. Farmers and extension workers use these tools to report pest incidences and track the effectiveness of control measures, enabling timely interventions.

7.5.2 Evaluation

The evaluation process involves systematic assessment of the IPVM Action Plan's outcomes to determine its effectiveness and areas for improvement. The evaluation framework includes the following components:

a. **Mid-Term and End-Term Evaluations:** Comprehensive evaluations are conducted at the mid-point and end of the project. These evaluations involve comparing the baseline data with current data to assess changes in pest and vector populations, crop and livestock health, and the sustainability of pest management practices.
b. **Impact Assessment:** An impact assessment is carried out to measure the broader effects of the IPVM Action Plan on the environment and community health. This includes evaluating soil health, biodiversity, and the incidence of pesticide-related health issues among farmers and livestock handlers.
c. **Stakeholder Feedback:** Feedback from various stakeholders, including farmers, community leaders, and institutional partners, is gathered through surveys, focus group discussions, and interviews. This feedback helps to gauge the perceived effectiveness of the IPVM measures and identify any challenges faced during implementation.
d. **Performance Indicators:** Specific performance indicators are developed to measure progress towards the goals of the IPVM Action Plan. These indicators include reductions in chemical pesticide use, increases in biological control measures, and improvements in crop and livestock productivity.

7.5.3 Reporting

Effective reporting is crucial for transparency, accountability, and continuous improvement of the IPVM Action Plan. The reporting process includes:

a. **Regular Progress Reports**: Quarterly progress reports are prepared by agricultural officers and extension workers. These reports detail the activities carried out, challenges encountered, and outcomes achieved. They are shared with project management and relevant stakeholders to keep them informed of the project's status.
b. **Annual Reports:** Annual reports provide a comprehensive overview of the IPVM Action Plan's implementation over the year. They include detailed analysis of monitoring and evaluation

data, impact assessments, and lessons learned. These reports are shared with donors, government agencies, and other key stakeholders.

c. **Community Reporting:** Regular community meetings are held to share progress and results with the local community. These meetings provide an opportunity for community members to ask questions, provide feedback, and engage in discussions about the project's progress and future plans.
d. **Use of Digital Platforms:** Digital platforms, such as project websites and social media, are used to disseminate information about the IPVM Action Plan. These platforms provide easy access to reports, success stories, and updates, ensuring transparency and broader engagement.

By implementing a robust monitoring, evaluation, and reporting framework, the ACRES project ensures that the IPVM Action Plan is effectively managed, continuously improved, and transparently communicated.

7.6 Institutional Arrangements Roles in ACRES IPMM

The ACRES project involves a well-coordinated effort among various institutions and stakeholders to implement Integrated Pest and Vector Management Measures (IPMM). Each entity has distinct roles and responsibilities to ensure effective pest and vector control, sustainability, and community engagement.

A. Project Implementation Entity

Ministry of Lands, Agriculture, Fisheries, Water, and Rural Development: This ministry serves as the primary project implementation entity for ACRES. It ensures that pest management practices are integrated into project activities and that they align with environmental and social safeguard policies. It oversees the execution of IPMM measures through its various departments and units. Two key departments involved are the **Department of Plant Protection and the Department of Veterinary services**. The former is responsible for implementing phytosanitary measures and pest management strategies. This department provides technical support and guidance on pest control practices, including the use of Integrated Pest Management (IPM) principles. The DVS is responsible for cattle health and disease control, managing the procurement, distribution and monitoring of acaricides used in the country.

Project Management Unit (PMU): Situated within the Ministry of Finance and Economic Development (MoFEDIP), the PMU coordinates the overall implementation of ACRES including IPMM. The PMU plays a crucial role in managing resources, monitoring progress, and ensuring compliance with international conventions related to pest management.

B. Phytosanitary Services

Department of Plant Protection: This department is pivotal in implementing phytosanitary measures and pest management strategies. It collaborates with other stakeholders to develop and promote IPM practices suitable for local conditions. The department's responsibilities include providing technical guidance, conducting research, and ensuring that pest management practices are sustainable and effective.

Zimbabwe Agricultural Research Trust (ZART): ZART supports research and development related to pest management. It works closely with the Department of Plant Protection and other stakeholders to develop and promote IPM practices. ZART's research focuses on creating sustainable pest control solutions that are tailored to the local agricultural context.

C. Vector Control

Zimbabwe National Vector Control Programme: This program focuses on controlling vector-borne diseases affecting both livestock and humans. It collaborates with the ACRES to implement vector control measures, particularly for tick management in the beef sector. The program's efforts include monitoring vector populations, assessing the efficacy of control measures, and training stakeholders on best practices.

Department of Veterinary Services: This department plays a critical role in acaricide distribution, training, and monitoring (full description given in Annex 3). It ensures that farmers have access to effective acaricides, provides training on their safe use, and monitors the efficacy of acaricide treatments. The department also maintains records of acaricide use and its impact on pest populations, ensuring that treatments are effective and sustainable.

D Local Level Actors and Partners

Agricultural Extension Officers: These local officers are essential in implementing IPMM at the community level. They provide hands-on training and support to farmers on pest management practices, including IPM strategies. Extension officers act as the link between research institutions, government agencies, and farmers, ensuring that best practices are disseminated and adopted at the grassroots level.

Dip Attendants: Dip Attendants play a crucial role in the effective management and implementation of pest control measures, particularly in the agriculture sectors. Their primary responsibilities include overseeing the safe and efficient operation of cattle dipping facilities to control tick infestations, ensuring that cattle are properly dipped in acaricides according to prescribed schedules and protocols. Dip Attendants are also tasked with maintaining accurate records of dipping activities, monitoring the health of the cattle for any adverse reactions to treatments, and providing guidance to farmers on best practices for pest management. Additionally, they play an educational role, training farmers on the importance of regular dipping and the safe handling and application of acaricides, thus contributing to the overall sustainability and success of the project's integrated pest management initiatives.

Farmer Groups (including Rangeland, Agro -processing and Di Tank Committees) and Cooperatives: Local farmer groups and cooperatives are key partners in the implementation of IPMM. They facilitate the dissemination of knowledge and practices among farmers, helping to promote sustainable pest management techniques. These groups also play a vital role in organizing training sessions and collective action against pest infestations and will require to be sensitised and.

Local NGOs and Community-Based Organizations (CBOs): These organizations support IPM activities by raising awareness, providing training, and assisting with the implementation of pest management measures at the grassroots level. They often work closely with agricultural extension officers and farmer groups to ensure that pest management practices are culturally appropriate and widely adopted.

Integrating Institutional Roles

To ensure the success of the IPMM, it is essential to integrate the roles of various institutions with the responsibilities of the Department of Veterinary Services. This integration involves collaborative efforts in providing training on the safe use of chemicals, monitoring the efficacy of pest control measures, and maintaining detailed records.

The Department of Veterinary Services can work with agricultural extension officers to deliver comprehensive training programs that cover safe handling, application, and disposal of pesticides. These programs should also include IPM strategies to reduce reliance on chemical treatments.

Extension officers can support this effort by regularly visiting farms, offering hands-on guidance, and reinforcing best practices.

Monitoring efficacy and record-keeping are crucial for evaluating the success of pest control measures. The Department of Veterinary Services should collaborate with farmer groups and cooperatives to establish a robust monitoring system. This system would involve regular field inspections, data collection on pest populations, and assessments of control measures' effectiveness. By maintaining accurate records, the department can ensure that pest management practices are both effective and sustainable.

In conclusion, the ACRES project's institutional arrangements and the roles of the Department of Veterinary Services, along with other stakeholders, are critical for the successful implementation of IPMM. By working together, these entities can promote sustainable pest management practices, ensure the safety of chemical use, and enhance the overall productivity and sustainability of the agriculture sectors.

7.7 Project Grievance Redress Mechanism

The ACRES ESMP includes a comprehensive Grievance Mechanism to address any concerns or complaints related to the project's activities, including those related to pest management practices. The GM aims to provide a transparent and accessible process for stakeholders to raise issues and seek resolution.

Channels for Grievances: The mechanism offers multiple channels for submitting grievances, including a dedicated hotline, email, and physical submission points at local offices. This ensures that stakeholders can easily report concerns regarding pest management and other aspects of the project.

Resolution Process: The grievance resolution process involves an initial review of the complaint, investigation by relevant project staff, and resolution through dialogue with the affected parties. The process is designed to be timely, fair, and transparent, with a focus on addressing the root causes of grievances.

Monitoring and Reporting: The project maintains a grievance tracking system to monitor the status and resolution of complaints. Regular reports on grievance management are provided to ensure accountability and transparency.

Integrated Pest Management Measures (IPMM) can leverage the project's Grievance Redress Mechanism (GRM) to enhance its effectiveness and ensure stakeholder concerns are addressed promptly. The several ways this can be done is by: -

a. **Feedback Collection and Issue Identification**: The GRM provides a structured way to collect feedback from stakeholders, including farmers, community members, and project staff. For IPMM, this means capturing concerns related to pest management practices, such as the efficacy of pest control measures, adverse effects of pesticides, or issues with training and resources. By systematically recording and analysing these grievances, the project can identify recurring problems or gaps in the IPMM implementation.
b. **Addressing Safety and Environmental Concerns:** Farmers and communities may raise concerns about the safety of pesticide use or potential environmental impacts. The GRM can facilitate the reporting of such issues, enabling the project to take corrective actions or adjust IPMM strategies accordingly. This could involve reviewing and improving safety protocols, modifying pesticide use practices, or enhancing training on environmental protection.

c. **Enhancing Transparency and Trust**: Utilizing the GRM effectively ensures transparency in how issues are addressed and resolved. This builds trust among stakeholders, encouraging more open communication and collaboration. For IPMM, this means that farmers and other stakeholders will feel more confident in the pest management strategies being implemented, knowing that their concerns are taken seriously and acted upon.
d. **Improving Training and Capacity Building:** The feedback and grievances received through the GRM can highlight specific areas where additional training or resources are needed. For example, if multiple grievances relate to the improper use of pesticides, the project can enhance training programs to address these issues. This continuous feedback loop helps in tailoring capacity-building efforts to meet the actual needs of the stakeholders.
e. **Monitoring and Evaluation:** The GRM can serve as a tool for monitoring and evaluating the effectiveness of IPMM. By analysing grievance data, the project can assess whether the implemented pest management measures are achieving the desired outcomes or if there are unintended consequences. This ongoing evaluation helps in refining and improving the IPMM approach.

Incorporating the GRM into IPMM practices ensures that the pest management strategies are responsive to stakeholder needs, addresses concerns promptly, and fosters a collaborative approach to achieving sustainable pest control outcomes.

7.8 Consultation of Stakeholders and Public

This IPMM was developed with input from various stakeholders. Local communities shared insights on current dipping and pest control practices that are commonly used. More detailed technical procedures and processes related to dipping and chemical use were provided by key informants from the Department of Veterinary Services, Annex, and Plant Protection.

The ACRES project emphasizes stakeholder engagement and public consultation to ensure that IPMM measures are effective and inclusive. Evidence of consultation includes:

ACRES will conduct regular meetings and workshops with stakeholders, including farmers, local communities, and industry representatives. These meetings provide a platform for discussing pest management issues, sharing information, and gathering feedback on IPM practices. Where deemed necessary training in IPMM will be implemented to address identified gaps.

Public Awareness Campaigns: Public awareness campaigns will be conducted to inform communities about IPM practices and the benefits of sustainable pest management. These campaigns use various media, including radio, print, and social media, to reach a broad audience.

In addition, diseases breakout alerts or infestations will be communicated timely, clearly and with instructions on how farmers should respond. These alerts will be shred through social media, radio and channelled to communities through the extension officers. R Community and farmer responses will be monitored as well as the impacts on the livestock or fodder of the responses.

Feedback Mechanisms: The project incorporates feedback mechanisms to gather input from stakeholders on IPM measures. Surveys, focus groups, and community forums are used to collect and address stakeholder concerns and suggestions.

Documentation and Reporting: Documentation of stakeholder consultations and public engagement activities is maintained to ensure transparency and accountability. Reports on stakeholder engagement are included in project updates and progress reports.

7.9 Budget for the PMP

Based on the activities that will need to be carried out for the Pest Management Plan, the budget in the table below was compiled to fund the proposed activities over a period of 4 years. The costs included in this budget are specific to the PMP, with other costs such as staff salaries, office support, and transport covered under the main PIU budget. The Department of Veterinary Services (DVS) currently provides annual training on acaricide handling for dip attendants, dipping sub-committees, and district veterinary extension officers across all districts. The Agritex Extension Officers also conduct annual training of pesticides management for farmers. The ACRES project will enhance this by increasing the frequency of training to twice a year and offering additional support where needed. Training materials will be updated to ensure that Integrated Pest Management Measures (IPMM) are thoroughly incorporated.

Table 4. The Budget for implementing the PMP for ACRES

Activity	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total cost**
1.Training and Capacity building	5 344	5 344	5 344	5 344	5 344	26 720
2. Monitoring and evaluation						
2.a Data collection	1 280	1 280	1 280	1 280	1 280	6 400
2.b Laboratory test kits for Pesticide residue	2 032	2 032	2 032	2 032	2 032	10 160
3 Field monitoring						
3a. Travel and expenses	1 524	1 524	1 524	1 524	1 524	7 620
3b. Evaluation Reports and dissemination	1 016	1 016	1 016	1 016	1016	5 080
4. Biological control agent	3 048	3 048	3 048	3 048	3 048	15 240
5. Pesticide applications equipment	2 032	2 032	2 032	2 032	2 032	10 160
7. Pest Registers for Extension	260	260	260	260	260	1 300
8. Communication and Outreach						
7a. Awareness campaign	2 4 64	2 464	2 464	2 464	2 464	12 320
7b Community engagements						
Total						**$95,000.00**

8 Conclusion

The ACRES Pest Management Plan (PMP) represents a comprehensive and strategic approach to managing pests in the context of the Agriculture sector in Zimbabwe. By integrating biological, cultural, and chemical control methods, the PMP aims to achieve sustainable pest management while minimizing environmental and health risks. The plan aligns with both national regulations and international standards, ensuring that pest control practices are effective, safe, and environmentally sound.

The focus on Integrated Pest Management (IPM) emphasizes the importance of preventative measures, regular monitoring, and the judicious use of pesticides. This holistic approach not only addresses immediate pest issues but also promotes long-term resilience and sustainability in the agricultural sector. The PMP incorporates robust training and capacity-building initiatives, ensuring that farmers and stakeholders are well-equipped to implement IPM practices effectively.

Furthermore, the ACRES PMP is designed to be adaptive, allowing for continuous improvement based on monitoring results and feedback from stakeholders. This adaptability is crucial for responding to evolving pest challenges and changing environmental conditions. By fostering collaboration among government agencies, local communities, and international partners, the PMP enhances the collective capacity to manage pests sustainably.

In conclusion, the ACRES Pest Management Plan is a critical component of the broader effort to enhance the agriculture value chain in Zimbabwe. Its implementation will not only improve pest control outcomes but also contribute to the overall health, productivity, and sustainability of the agricultural sector. Through commitment to IPM principles and ongoing stakeholder engagement, the ACRES PMP sets a strong foundation for sustainable pest management and agricultural development in Zimbabwe.

ANNEX 1 BANNED CHEMICALS AND PESTCIDES

hIn Zimbabwe, several chemicals are banned due to their hazardous effects on human health and the environment. Some of the key banned chemicals include:

Mercury: Mercury has been banned in Zimbabwe, especially for industrial use, under the Minamata Convention on Mercury, which the country ratified. Its use in artisanal and small-scale gold mining persists illegally, posing severe health risks such as neurological damage and environmental pollution, particularly contaminating water bodies.

Highly Hazardous Pesticides (HHPs): Zimbabwe is actively phasing out HHPs, which constitute about 10% of the registered pesticides in the country. These include older pesticide molecules known to cause acute or chronic health hazards and environmental damage. The Food and Agriculture Organization (FAO) and the Government of Zimbabwe are working together to mitigate the impacts of these chemicals and promote safer alternatives.

Persistent Organic Pollutants (POPs): Under the Stockholm Convention, Zimbabwe has banned several POPs known for their long-lasting presence in the environment and potential to bioaccumulate in living organisms. These include certain pesticides like aldrin, dieldrin, endrin, and heptachlor, which have been widely used in agriculture but pose significant health and environmental risks.

The impacts of these banned chemicals are profound. For instance, mercury exposure can lead to severe neurological and developmental damage in humans, and its environmental contamination affects aquatic ecosystems and food chains. HHPs and POPs can cause long-term health issues such as cancer, endocrine disruption, and reproductive problems. Their persistence in the environment can lead to bioaccumulation, affecting wildlife and human populations through the food chain.

Efforts to manage and phase out these hazardous chemicals are ongoing, with international cooperation and national initiatives aimed at promoting safer pest management practices and protecting public health and the environment.

Chemicals in the agricultural sector

Several chemicals that were previously used in agriculture and livestock production in the country have been banned due to their detrimental effects on human health, livestock, and the environment. These include DDT, Endosulfan, Aldicab (Temik) Adrin, Dieldrin, Paraquat, and Chlordane banned due to their harmful effects on human health and the environment.

These chemicals were banned under various regulations and legislative measures to protect human health, safeguard biodiversity, and promote sustainable agricultural practices in Zimbabwe.

i) DDT (Dichlorodiphenyltrichloroethane):

DDT (Dichlorodiphenyltrichloroethane) is a widely known insecticide used for pest control in agriculture, DDT was banned in Zimbabwe due to its persistence in the environment, bioaccumulation in the food chain, and harmful effects on wildlife and human health.

DDT has been banned in Zimbabwe since 1990.

Reason for Ban: DDT is a persistent organic pollutant (POP) that accumulates in the environment and poses significant risks to wildlife and human health. Its use is restricted under the Stockholm Convention on Persistent Organic Pollutants, which Zimbabwe is a party to.

ii) Endosulfan:

Endosulfan: Another organochlorine insecticide used to control a wide range of pests, including aphids, whiteflies, and certain beetles. It was banned in Zimbabwe due to concerns over its high toxicity to humans and wildlife, as well as its persistence in the environment.

Endosulfan was banned in Zimbabwe in 2011.

Reason for Ban: Endosulfan is an organochlorine insecticide and acaricide known for its toxicity to humans and wildlife. It was listed under the Stockholm Convention due to its persistence, bioaccumulative nature, and potential for long-range environmental transport.

Iii) Adrin and Dieldrin:

Aldrin and Dieldrin: Both chemicals belong to the organochlorine group and were used as insecticides in agriculture. They were banned in Zimbabwe due to their long-term persistence in the environment, bioaccumulation in organisms, and toxic effects on non-target species. These chemicals were banned in Zimbabwe in 1989

Reason for Ban: Adrin and Dieldrin are organochlorine insecticides that are highly toxic to humans and wildlife. They persist in the environment for long periods, accumulating in soil, water, and organisms.

International Regulation: The use of Adrin and Dieldrin is regulated under the Stockholm Convention on Persistent Organic Pollutants (POPs), which aims to eliminate or restrict the production and use of persistent organic pollutants worldwide. Zimbabwe is a party to this convention.

iv) Paraquat:

Paraquat is a non-selective herbicide used for weed control in various crops. It was banned in Zimbabwe due to its high acute toxicity to humans and animals, as well as its potential health risks from chronic exposure (Ministry of Agruicuture, SI 50 2007).

Reason for Ban: Paraquat is a highly toxic herbicide that poses significant health risks, including acute poisoning and long-term health effects. It is also hazardous to the environment.

Zimbabwe banned Paraquat in 2007.

International Regulation: Paraquat is included in the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. This convention aims to promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals.

v) Aldicarb (Temik):

Aldicarb was used in agriculture in Zimbabwe primarily as a highly effective insecticide and nematicide, especially for controlling pests such as aphids, thrips, nematodes, and mites in crops like cotton, maize, and vegetables. Its use was favored due to its broad-spectrum action and ability to provide quick knockdown of pests.

Aldicarb was banned in Zimbabwe in 2008.

Reason for Ban: Aldicarb is a carbamate insecticide and nematicide that is highly toxic to humans and animals and potential contamination of underground water. Its use was restricted due to acute toxicity concerns and environmental persistence.

Aldicarb is listed under the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

v) Chlordane:

Chlordane is an organochlorine insecticide and termiticide used extensively in agriculture and structural pest control. It was banned in Zimbabwe due to concerns over its persistence, bioaccumulation, and toxicity to wildlife and humans.

Reason for Ban: Chlordane is an organochlorine pesticide that persists in the environment and can accumulate in living organisms, posing significant risks to human health and wildlife.

Chlordane was banned in Zimbabwe in 1989.

Chlordane is also regulated under the Stockholm Convention on POPs due to its persistence, bioaccumulative potential, and toxicity.

These bans align with Zimbabwe's commitment to international conventions and agreements aimed at reducing the use of hazardous chemicals and protecting human health and the environment. The Stockholm Convention on Persistent Organic Pollutants (POPs) is particularly relevant in regulating chemicals like DDT and endosulfan, aiming to eliminate or restrict their production, use, and release into the environment.

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ANNEX 3 – KEY INFORMANT MEETING NOTES

Meeting with Ms Sidhabehlezi Moyo. (National Veterinary Supervisor)

17th July 2025– DVO offices

Dipping Practice

Frequency of Dipping:

- During the rainy season: Once every week.
- During the dry season: Once every two weeks.
- Most dips follow a fortnightly schedule.

Acaricide Choice and Management:

- The choice of acaricide depends on the supplier, with different suppliers for different provinces.
- The size and design of dip tanks are uniform, although some have not been renovated for a long time and lack roofs to reduce evaporation, as well as drying pens.
- About 38% of dips use AMTIK. Each dip tank holds 15,000 litres of water and is emptied twice a year. They are topped up with water as needed.
- All dip tanks are made of concrete to prevent water seepage into the soil.
- For 50% AMTIK, 2 kg is used. If it's 25%, the amount is doubled.
- Dosing occurs every dipping session, with acaricides having a 27-day residual period. When tick activity is high, owners are encouraged to use pour-ons or ensure weekly dipping.
- Plunge pools are best for large herds exceeding 500 cattle.
- Acaricides are stored at animal health centres in locked storerooms and issued to dip attendants when needed. Most dip tanks also have storerooms for acaricides.

Dipping Structure:

- District: District Veterinary Officer (DVO)
- Animal Health Centre: Veterinary Extension Supervisor (VES)
- Veterinary Extension Officers (VEO)
- Dipping Attendants (DA) at the dips
- Local Community Dipping Committees (LDC) assist DAs and encourage community participation in dipping.
- Annual training on handling and disposing of chemicals is conducted for all staff. Chemical containers are stored for a week before being burnt. New empty containers are not destroyed.

Monitoring:

- Every 2-3 years, dip wash samples are collected and tested in the national lab for resistance and effectiveness.
- Dips should have soakaway pits constructed with concrete and covered with polyethylene to avoid seepage into the surrounding soils. Effluent is discharged into the holding soakaway.
- A dip should have a forcing pen, drying pen, dipping pen, storeroom for acaricides, and a fence around the premises. Some dips have an on-site borehole for water supply.
- Drying pens have inlet valves opened during dipping sessions to allow dripped effluent back into the dip tank. During the rainy season, outlet valves are opened to let rainwater out.

Stock Registry Monitoring:

- Farmers have stock cards with their names, number of animals, including calves, and dates of birth and dipping.
- At the dip tank, a sub-collector registry records the livestock owner's name, number of cattle, those sold, died, or away, and the farmer's ID number. These records are taken during each dipping session and submitted to the Animal Health Centre.

- Records at the Animal Health Centre are updated after every dipping session.
- Quarterly summaries with livestock numbers are compiled from the Animal Health Centre.
- The amount of acaricide used for each session and the remaining amount is reported weekly and monthly.

Stock Registry for Cattle in Zimbabwe

Data Collection and Compilation:

1. Farmers' Stock Cards:

- Information Recorded: Each farmer maintains a stock card that includes their name, the number of animals (including calves), dates of birth, and dates of dipping.
- Purpose: This card helps track individual cattle and manage the health and productivity of the herd.

2. Dip Tank Sub-Collector Registry:

- Information Recorded: During each dipping session, a sub-collector records details such as the livestock owner's name, the number of cattle dipped, those sold, those that died, and those that are away. The farmer's ID number is also recorded.
- Responsible Persons: Dip attendants, supervised by Veterinary Extension Officers (VEOs), are responsible for maintaining this registry.
- Purpose: This registry ensures accurate tracking of cattle health interventions and herd management at the community level.

3. Submission to Animal Health Centre:

- Process: After each dipping session, the recorded data is submitted to the Animal Health Centre.
- Responsible Persons: Veterinary Extension Supervisors (VES) and Veterinary Extension Officers (VEOs) at the Animal Health Centre compile and update records based on the submitted data.
- Purpose: Centralized data collection helps monitor cattle health and manage acaricide usage.

4. Animal Health Centre Records:

- Information Recorded: The Animal Health Centre updates its records after every dipping session with the information received from the dip tanks.
- Responsible Persons: Veterinary Extension Officers (VEOs) and Veterinary Extension Supervisors (VES) maintain and update these records.
- Purpose: These records provide an overview of the cattle population and health status within the district.

5. Quarterly Summaries:

- Information Compiled: Quarterly summaries of livestock numbers, dipping activities, and acaricide usage are compiled from the data at the Animal Health Centre.
- Responsible Persons: District Veterinary Officers (DVOs) oversee the compilation of these summaries.
- Purpose: These summaries inform higher-level decision-making and resource allocation for cattle health management.

Nature of the Data:

- Quantitative Data: Number of animals, dates of birth, dates of dipping, number of cattle dipped, number of cattle sold, died, or away.
- Qualitative Data: Health status and treatment history of cattle, reasons for cattle absence (sold, died, etc.).

Responsible Persons:

- Farmers: Maintain individual stock cards.
- Dip Attendants (DA): Record data during dipping sessions.
- Veterinary Extension Officers (VEOs): Supervise dip attendants and maintain sub-collector registries.
- Veterinary Extension Supervisors (VES): Oversee VEOs and manage data submission to Animal Health Centres.
- District Veterinary Officers (DVOs): Compile and analyze quarterly summaries and oversee overall data management.

Purpose and Importance:

- Cattle Health Management: Ensures timely and accurate tracking of cattle health interventions.
- Resource Allocation: Informs decision-making and resource distribution for acaricides and other veterinary services.
- Disease Control: Helps monitor and control tick-borne diseases through effective dipping schedules and acaricide management.
- Regulatory Compliance: Ensures compliance with national veterinary health regulations and standards.

Management of Acaricides and Effluent Disposal at Dipping Tanks for Cattle in Zimbabwe

Acaricide Management:

1. Storage:
   - Location: Acaricides are stored at animal health centres and dipping tanks.
   - Security: They are kept in locked storerooms to prevent unauthorized access.
   - Distribution: Only issued to dip attendants when dipping is scheduled.
2. Usage:
   - Dosing: Acaricides are used during each dipping session. The dosage is based on the concentration of the product:
   - For 50% AMTIK, 2 kg is used. (*Approx 64KG are used per diptank, 90 kgs if there is weekly dipping during the rainy season)*
   - For 25% AMTIK, the amount is doubled.
   - Application: Acaricides are added to the dipping tank water, and cattle are fully immersed during dipping to ensure thorough treatment.

3. Frequency:
   - Rainy Season: Dipping occurs once every week.
   - Dry Season: Dipping occurs once every two weeks.
   - High Tick Activity: During periods of high tick activity, owners are encouraged to dip weekly or use additional treatments like pour-ons.

4. Residual Period:
   - Effectiveness: Acaricides typically have a residual period of 27 days, providing extended protection against ticks.

5. Training:
   - Handling and Disposal: Staff, including dip attendants and veterinary officers, receive annual training on the proper handling and disposal of acaricides.

Effluent Disposal:

1. Soakaway Pits:
    - Construction: Soakaway pits are constructed with concrete and covered with polyethylene to prevent seepage into the surrounding soil.
    - Function: These pits collect and contain effluent from the dipping tanks.

2. Effluent Management:
- Discharge: Effluent is discharged into the soakaway pits to avoid environmental contamination.
- Recirculation: Drying pens have inlet valves that are opened during dipping sessions to allow dripped effluent to flow back into the dip tank, maintaining the concentration of acaricides.
- Rainy Season: During the rainy season, outlet valves are opened to let excess rainwater out, preventing overflow and dilution of the dip mixture.

3. Infrastructure:
- Design: Dips are designed to include essential components such as forcing pens, drying pens, dipping pens, and storerooms for acaricides.
- Fence: The premises are fenced to secure the area and prevent unauthorized access.
- Water Supply: Some dips have on-site boreholes to ensure a reliable water supply for dipping.

4. Environmental Protection:
    - Monitoring: Regular checks are conducted to ensure that soakaway pits and other effluent management systems are functioning properly.
    - Compliance: Effluent management practices comply with national environmental protection regulations to minimize the impact on the surrounding ecosystem.

Tracking and Reporting:

1. Usage Records:
    - Documentation: The amount of acaricide used during each dipping session and the remaining quantity are documented.
    - Frequency: Records are maintained on a weekly and monthly basis.
    - Submission: These records are submitted to the Animal Health Centre for review and further action if needed.
2. Effectiveness Testing:
    - Dip Wash Samples: Every 2-3 years, dip wash samples are collected and tested in national laboratories to assess resistance and effectiveness of the acaricides used.
    - Adjustments: Based on the results, adjustments may be made to the dipping schedule or acaricide choice to ensure continued effectiveness in tick control.