

ENVIRONMENTAL IMPACT ASSESMENT REPORT

THE PROPOSED COMPOSTING FACILITY LOCATED PLOT L.R NO. DAGORRETTI/MUTUINI/47 DAGORETTI DISTRICT, NAIROBI COUNTY



Submitted to:

The National Environment Management Authority, Popo Road, South C,
P.O.BOX 67839-00200,
Nairobi.

Project Proponent	PREPARED BY
Takataka Solutions Limited P. O Box 29273 – 00625 Nairobi.	 EMERALD ENVIRONMENTAL CONSULTANCY FIRM NEMA REG NO: 1831

Certification

This EIA project report was prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental Impact Assessment and Audit regulations 2003 for submission to the National Environment Management Authority (NEMA).

EIA Experts

<p><i>Emerald Environmental Consultancy Firm</i> <i>NEMA registration Number...1831.....</i></p>	<p><i>Lead EIA Consultant:</i></p> <p>Signature </p> <p>Name:</p> <p>Date</p> <p><i>Official stamp/seal</i></p>
-------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

On behalf of the Project Proponent

<p>TAKATAKA SOLUTIONS LIMITED</p> <p>P. O Box</p> <p>PIN No.....</p>	<p>Signature</p> <p>Name:</p> <p>Designation:</p> <p>Date</p> <p><i>Official stamp/seal</i></p>
-----------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------

EXECUTIVE SUMMARY

Introduction

This study is an Environmental Impact study for an organic waste/Kitchen waste composting plant to be located in Mutuini, in the Western part of Dagoretti District, Nairobi County. The project will be on Plot No L.R Dagorretti/Mutuini/47, Nairobi. The geographic coordinates for the proposed composting site are as follows: *Latitude: 1°18'06.57"S, longitude 36°42'28.11' E*. The client, Taka Taka solutions limited intends to establish a composting facility with a capacity of composting 50 tonnes of kitchen waste per month. The study was undertaken in the month of January 2014.

Study Methodology

The study employed various methodologies that included:

Desktop Study/ Literature Review: This involved review of the project documents, composting documents, best practice reports from other regions, NEMA EIA/EA guidelines, legal and institutional frameworks

Site Visits: Several site visits were organized to the project site. During the visits, the team of consultants surveyed the site and its general surroundings, focusing on existing land use patterns, socio-economic activities, and the general environmental conditions.

Public Participation Process: This was taken using a three tier approach

- *Visit to Case study site:* Selected members from the area adjacent to the proposed project site were taken to the pilot facility project site in Kangemi on the 31st of January 2014
- *Public Baraza:* A public Baraza bringing together all the residents around the project site was held on 8th of February 2014.
- *Key Informant Interviews:* Several series of Interviews were held with various administrative authorities in the region such as the chief, assistant chief, and village elders

The Project Location

The project will be located in Mutuini location, Waithaka Division of Dagoretti District, in Nairobi County. The site has a total surface area of 4.5 acres owned by James Ngugi and leased to Takataka Solutions Ltd.

Project Components

The project consists of the following Components

- I. Waste collection component
- II. Waste segregation at transfer points
- III. Waste composting facility.
- IV. Waste recovery/recycling

This EIA covers the waste composting component only.

The Composting Technology

The technology employs the use of a membrane technology that creates the right environment for decomposition of biodegradable waste. The membrane is weather resistant, allows in oxygen, but traps in odour, humidity and heat

The system is an aerated system that creates ideal composting conditions under the membrane, increasing throughput of organic waste input per square meter by 3-4 times in comparison to manual composting. The membrane also ensures that emissions are reduced by around 99% in Comparison to open-windrow composting

Project Cost

Table 0:1 Summary of Project Cost

Component	Cost
Tractor	4,000,000
Composting sheets (Gore system)	15,000,000

Concrete floor (1500 m ²)	3,000,000
Shredder	2,000,000
Sieve	500,000
Reception area	400,000
Storage products and equipment	200,000
Total Cost	25,100,000

Impact Identification and Analysis

Both positive and negative impacts by the projects were identified and analysed. Impacts were looked at during the design, construction operation and decommissioning phase of the project

Positive Impact

Design and Construction Phase

- Employment to the workers and mansions to be involved in preparation of the site

Operation Phase

- Case study site for sustainable waste management practices in urban areas
- Creation of at least 100 new jobs in the project area
- Multiplier effect I terms off improved health arising from improved solid waste management
- Reduced burden of waste disposed in Dandora dumpsite
- Reduced emissions from poor waste management, especially methane gas which is a potent Green House gas
- Demonstration farms for good agriculture practices for the residents of the area
- Field days for training of locals in the area on compost making
- Provision of an environmentally friendly soil conditioner

Decommissioning Phase

- Employment creation for people to be involved
- Opportunity for recycling of recyclable wastes such as plastics

Negative Impacts

Table 0:2

Component	Impact
Design and Construction Phase	
Clearing of some vegetation to create space for the facility	Plan in place to plant the site with indigenous trees
Construction of a concrete platform may destroy the soil structure	Minimal area to be paved Landscaping measures will be put in place
Noise and Vibration	Noise and vibration standards to be maintained during construction phase No construction works beyond official working hours (5pm)
Dust	Sprinkling of water to reduce dust emission
Health and safety Concerns	Use of PPEs by all workers at the site Restricted access to authorized personnel only Use of roper signage
Operation Phase	
Impact	Proposed Mitigation
Possibility of odours if not managed properly	Proper mixing of organic waste with dry matter in correct ratio Mechanical aeration to ensure aerobic decomposition Use of membrane technology will ensure no odour escapes
Possibility of pollution by leachate if not properly managed	Windrows will be placed on a concrete platform Technology has a leachate collection system for

	leachate recycling
Pest and vermin, if facility is not well managed	High standards of Housekeeping shall be maintained
Generation of extra traffic to site may be a nuisance to residents	Traffic management plan to be developed to ensure regular timings for waste delivery No waste transportation at night Traffic rules to be observed
Noise and vibration from machinery, if heavy machineries are used	No heavy machineries are proposed for use at the facility Natural buffer zones exist in the form of a Forest, proponent to plant more trees around the facility
Decommissioning Phase	
Noise and vibration	Reduce use of heavy machinery Adherence to set noise and vibration regulations
Disturbance of soil structure	Remove all unnecessary fixtures on land Proper landscaping to return land to near original form

Conclusion

The project is a major initiative that will have a multiplier impact on the environment around Nairobi, as well as on the social economic conditions within the neighbourhood.

If recommendations outlined in this report are put in place, the project has positive impacts that can be replicated in other major urban areas.

Acronyms

CBD	Convention on Biological Diversity
CO ₂	Carbon Dioxide
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EPR	Environmental Project Report
GoK	Government of Kenya
Kg	Kilograms
Km	Kilometers
Ksh	Kenya Shillings
Ltrs	liters
Ltd	Limited
M	Meters
NEC	National Environmental Council
NEMA	National Environment Management Authority
NET	National Environmental Tribunal
PCC	Public Complaints Committee
UN	United Nations
UNEP	United Nation Environment Programme
WHO	World Health Organization

Contents

Certification	2
EXECUTIVE SUMMARY	3
Introduction.....	3
Study Methodology.....	3
The project Location	4
Project Components	4
The Composting Technology.....	4
Project Cost.....	4
Impact Identification and Analysis	5
Acronyms.....	8
Contents	9
1. INTRODUCTION	12
1.1 Background	12
1.2 The Study	13
1.2.1 Scope of The study.....	13
1.3 Study Objectives	14
1.4 Study Methodology	14
1.4.1 Environmental Screening.....	14
1.4.2 Environmental Scoping.....	15
1.4.3 Desktop Study/ Literature Review	15
1.4.4 Site Visits	15
1.4.5 Public Participation Process.....	15
i. Visit to Case study site	16
ii. Public Baraza and Focus Group Discussions	16
iii. Key Informant Interviews.....	16
1.4.6 Reporting.....	16
CHAPTER TWO: PROJECT DESCRIPTION	19
2.1 Project Objectives	19
2.2 The project Location	19
2.2.1 General Site setting	20
2.3 Project Details	21
2.3.1 The Composting Component Operations.....	22
2.3.2 The Composting Process	22
2.4 Process Flow	24
2.4.1 Material Intake System	24
2.4.2 Pre-processing System	24
2.4.3 <i>Windrows</i>	24
2.4.4 Windrow Management System.....	25
2.4.5 Stabilization Shed	26
2.4.6 Coarse Segregation System.....	26
2.4.7 Packing and Storage System	26
2.5 Environmental safeguards	26
2.6 The Composting Technology	27
2.7 Quantities/ Material flow	28
2.8 Project Cost	29
BASELINE INFORMATION	30

3.1	Project Area.....	30
3.1.1	Location	30
3.1.2	<i>Physical Environment</i>	30
3.1.3	Water resource	30
3.1.4	<i>Biological Environment</i>	30
3.1.5	Demography.....	30
3.1.6	Religion and archaeological set up	31
3.1.7	<i>Socio- Economic Environment</i>	31
3.1.8	Land use	31
3.1.9	Infrastructure.....	31
	ANALYSIS OF PROJECT ALTERNATIVES.....	32
4.1	No Project Alternative.....	32
4.2	Alternative site	32
4.3	Alternative Technologies	34
4.3.1	Bin Composting	34
4.3.2	Passive Windrow	34
4.3.3	Aerated Static Pile Compositin.....	35
4.3.4	The Preferred Choice: Active Windrow Compositing.....	36
	LEGISLATIVE FRAMEWORK.....	37
5.1	Environmental Management and Coordination Act (Kenya Gazette, 1999).....	37
5.2	Waste Management Regulations (2006)	40
5.3	Public Health Act	42
5.4	The Water Act	43
5.5	The Agriculture Act	43
5.6	The Forest Act.....	43
5.7	The Land Planning Act	44
5.8	Physical Planning Act	44
	CHAPTER SIX.....	46
6.1	IMPACT IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES	46
6.2	Impact Evaluation Methodology.....	46
6.2.1	Impact Criteria and Ranking.....	46
6.2.2	Impact Significance	52
6.3	Impact Assessment & Mitigation Measures.....	53
6.3.1	Visual Impacts & Aesthetics.....	54
6.3.2	Impact on Air Quality	56
6.3.3	Noise and Vibrations.....	59
6.3.4	Impact on Road & Traffic.....	60
6.3.5	Impact on Land Use	61
6.3.6	Impact on Soil Quality	61
6.3.7	Impact on Local Drainage.....	62
6.3.8	Impact of Surface Water Quality	63
6.3.9	Impact on Ground Water Quality	64
6.3.10	Impact on Biological Environment.....	65
6.3.11	Impact on Socio-economic Environment.....	66
6.4	Impact on Occupational Health & Safety	68
6.5	Impact on Community Health & Safety.....	70
6.6	Positive impacts.....	72

6.6.1	Employment opportunities:.....	72
	ENVIRONMENT MANAGEMENT PLAN (EMP).....	74
7.1	Overview	74
7.2	Environment Management Plan	74
7.2.1	Pollution Prevention and Abatement Plan (PPAP).....	75
	Conclusion and recommendation.....	85

1. INTRODUCTION

1.1 *Background*

Solid waste management has been one of the Key challenges facing urban centers in Kenya. Solid waste management in most of our urban centers is characterized by low levels of waste collection, and lack of adequate and environmentally sound disposal methods. The problem is most compounded in Nairobi City. According to the Nairobi Environmental Outlook 2007, the increase in solid waste generation has not been accompanied by an equivalent increase in the capacity of the relevant urban authorities to deal with the problem. The current generation rate of garbage in Nairobi is over 2000 tons per day. The waste is normally collected and dumped at Dandora dumpsite in an environmentally unsustainable manner. The site is due for decommissioning due to the environmental and health hazard it poses to the city.

Municipal solid waste management (MSWM) encompasses the functions of collection, transfer; re-source recovery, recycling, and treatment. However, in Nairobi, both components are greatly underdeveloped. The Collection and transfer component is dominated by licensed private waste management companies, who have been largely inefficient. The resource recovery component is almost nonexistent, and mainly dominated by street children/street families who scavenge in dumpsites for any recyclables that can be sold, to enable them earn a living. The treatment component is basically nonexistent, as most of the waste in Nairobi is openly dumped in Dandora.

Various studies on Waste collection in Nairobi have placed the collection efficiency at between 20 to 40%, meaning the larger part of waste remains uncollected. Waste collection efficiency is lowest in unplanned settlement, as well as in high density, low income residential areas. Such areas are characterized by heaps of uncollected garbage and unsanitary environments. The poor waste collection infrastructure can be cited as one of the greatest threat to the attainment of a clean and healthy environment, which is a constitutional provision guaranteed for under the bill of rights.

1.2 The Study

This study is an Environmental Impact study for an organic waste/Kitchen waste composting plant to be located in Mutuini, in the Western part of Dagoretti District, Nairobi County. The project will be on Plot No L.R Dagorretti/Mutuini/47, Nairobi. The geographic coordinates for the proposed composting site are as follows: *Latitude: 1°18'06.57"S, longitude 36°42'28.11' E.*

The client, TakaTaka Solutions limited intends to establish a composting facility with a capacity of composting 25 tonnes of organic waste per day. The process shall entail the biological decomposition and stabilization of organic material to produce organic fertilizer (compost) for sale. The technology to be used is designed to achieve a final product that is stable, free of pathogens and viable plant seeds, and can be beneficially applied to soils. .

The EIA is an attempt to pre-empt some of the impacts (positive and negative) that may arise from the composting project. The report further recommends possible mitigation measures that can be incorporated in the project design to reduce the negative impacts, while maximizing on the positive impacts that can be derived from the project.

The study is an important planning tool for the project proponent as it will inform them on significant project effects and clearly defined mitigation measures to avoid or curb adverse impacts. Additionally, the proponent is committed to ensuring a clean and healthy environment

1.2.1 Scope of the study

This Environmental Impact Assessment report only covers the composting facility component to be established, as part of the solid waste management project. The plant will be situated on plot No L.R Dagorretti/Mutuini/47, Nairobi. The said project site measures approximately 4¹/₂ acres owned by James Ngugi.

Spatially, the study covers the 4.5 acre piece of land, and its immediate neighborhood

In terms of project scope, the study covers the composting facility, from the design phase, construction phase, operation phase, and decommissioning phase.

NOTE: It is important to note that the proposed composting facility shall only handle biodegradable waste collected from residential areas and markets, and convert them into high grade compost for agriculture. The recyclables will be sold off at the various sorting/collection points while the residual waste will be disposed off at registered dumpsites.

1.3 Study Objectives

The general objectives of this study were;

- i. To identify and analyze the impacts of the development on natural environment (biological and physical)
- ii. Evaluate impacts of the project on the socio-cultural environment
- iii. Assess impacts on infrastructure and social amenities (sewerage, water supply, road network, electricity, etc)
- iv. Assess and predict any effects on sensitive ecosystems
- v. To identify and analyze the projects compliance with existing legal and regulatory Framework
- vi. Formulate an Environmental Management Plan (EMP)

1.4 Study Methodology

In undertaking the study, the following methodologies and steps were followed:

1.4.1 Environmental Screening

Environmental screening was carried out to determine whether an EIA study is necessary for this project and at what level of evaluation. This took into consideration the requirements of the Environmental Management and Coordination Act (EMCA), 1999, and specifically the second schedule of the same

act. From the screening process, it was understood that this project falls under the listed projects requiring an environmental impact assessment.

1.4.2 Environmental Scoping

This was undertaken to determine the scope of the EIA study. An initial site visit was undertaken to the proposed site to analyze the general situation, and pre-empt possible impacts that the project may have. Based on this, the ToRs were generated. The scoping identified possible environmental impacts of great concerns that needed to be looked at during the study. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts.

1.4.3 Desktop Study/ Literature Review

This involved review of the project documents, compositing documents, best practice reports from other regions, NEMA EIA/EA guidelines, legal and institutional frameworks. Other literature reviewed included past works in the area where field studies had been carried out and documented both electronically and through hard copy report surveys. Data retrieved was to a large extent on the natural setting i.e. vegetation, climate, soils, geology and socio-economic setup.

1.4.4 Site Visits

Several site visits were organized to the project site. During the visits, the team of consultants surveyed the site and its general surroundings, focusing on existing land use patterns, socio-economic activities, and the general environmental conditions. This objective was to analyze the potential receptors of impact, any sensitive environment to the project such as potential water sources.

Several photos of the project site were taken for inclusion in this report.

1.4.5 Public Participation Process

The study also sought public opinion/views through Consultation and Public Participation (CPP) exercise. Several methodologies for public participation were employed. Key among them included:

i. Visit to Case study site

Selected members from the area adjacent to the proposed project site were taken to the pilot facility project site in Kangemi on the 31st of January 2014. At this facility, the client has run a trial on waste separation, and the composting process with no mechanization. The site visit was aimed at exposing the residents of Mutuini to the project, its components, and how it works. The objective was to enable the community members to have a glimpse of how the proposed project will look like, and how it will operate, so as to know what to expect if the project is initiated.

ii. Public Baraza and Focus Group Discussions

A public Baraza bringing together all the residents around the project site was held on 8th of February 2014. The objective was raise awareness on the proposed projects, sensitize the members on the project, as well as get their insight, ideas and opinions on the feasibility of the project, as well as garner their support for the project.

iii. Key Informant Interviews

Several series of Interviews were held with various administrative authorities in the region such as the chief, assistant chief, and village elders. The objective was to educate them on the projects, and to get their inputs on aspects that can help in making the project beneficial to the local residents of the area.

1.4.6 Reporting

In the entire exercise, the proponent and EIA experts contacted each other on the progress of the study and signing of various documents. The proponent will have to submit five copies of this report alongside a CD to the National Environment Management Authority for review and issuance of an EIA license.



Plate 1 Proposed Project site



Plate 3 Community leaders from Mutuini during a sensitization tour at the Trial site in Kangemi to learn more about the project



Plate 4. Waste Separation to be encouraged at household level: Bins will be provided for that purpose



Plate 5 Personal Protective Gears used at current site; workers will be provided with similar PPEs



Plate 6 The Public Consultative meeting held at the project site to gather views of the residents about the project

CHAPTER TWO: PROJECT DESCRIPTION

This chapter describes the project, its components, project activities and costs.

2.1 *Project Objectives*

- I. Demonstrate sustainable waste management practices that can be used to reduce the solid waste management project in Kenya
- II. Create employment in the waste management sector
- III. Earn carbon credits for green gas emissions reduction through reduction of methane emissions from solid waste management

2.2 *The project Location*

The project will be located in Mutuini location, Waithaka Division of Dagoretti District, in Nairobi County. The site has a total surface area of 4.5 acres owned by James Ngugi and leased to Takataka Solutions Ltd. The site approximately 150m from the new by-pass connecting Nairobi town to it's out skirts in Rironi, Limuru and about 2.3 km from the junction of Ngong road and the by-pass. The geographic coordinates for the proposed composting site site are as follows: *Latitude: 1°18'06.57"S, longitude 36°42'28.11' E*. The location s outlined in the figures below.



Figure 1 Google earth Image showing proposed site



Figure 2 Google Image showing location in reference to the major Roads

2.2.1 General Site setting

As mentioned above the site is approximately 150m from the by-pass and the geographical setting of the site is as below:

East - On the eastern side of the proposed site is Dagoretti forest, the immediate neighbor.

West- households belonging to the local residents

South – Farms consisting mainly of small scale maize farming.

North –The plot ends close to way leave of the railway (300m distance).

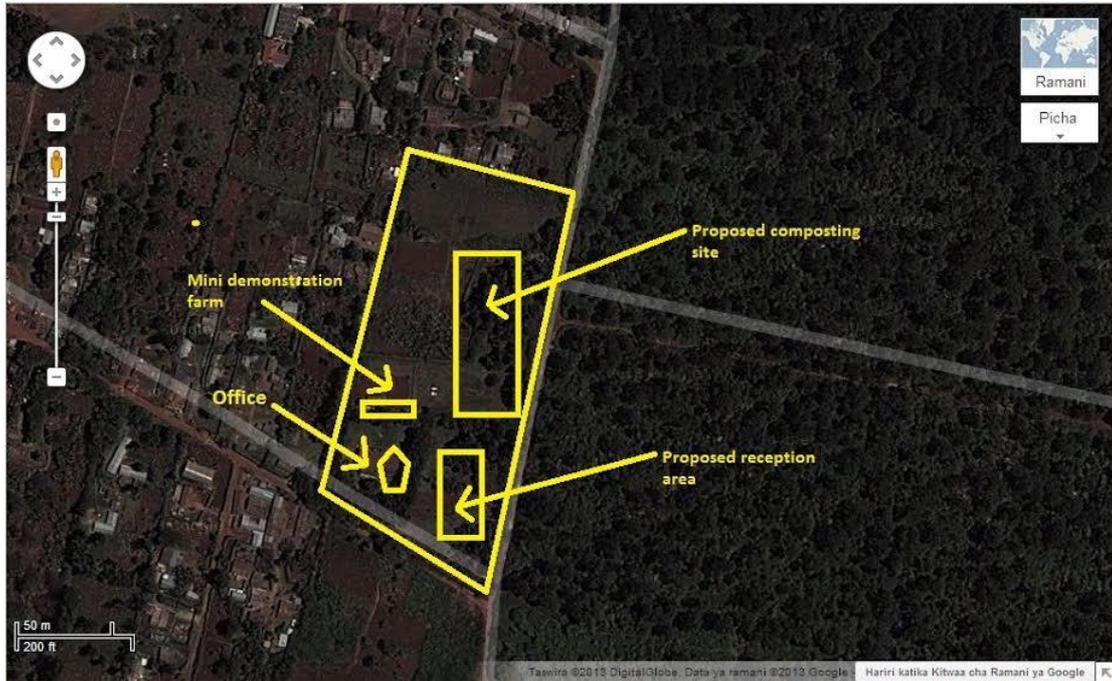


Figure 3 Layout at the proposed site

2.3 Project Details

The project is part of pilot solid waste management project in Nairobi Kenya. Based on the concept of the three R's (Reduce, recycle and re-use), the pilot project will show case the possibilities of sustainable solid waste management for income generation, employment creation and environmental protection. The concept to be employed is simple and environmentally friendly. The project's waste collection component will be piloted in Kangemi and Kawangware estates, which are low income, high density residential areas in Nairobi. The estates are underserved when it comes to solid waste management. Success will see the project expanded to cover Kilimani area and Karen.

The project consists of the following Components

- V. Waste collection component (including source separation by households)
- VI. Waste segregation at transfer points
- VII. Waste composting facility.
- VIII. Waste recovery/recycling (by external third parties)

This EIA covers the waste composting component only.

2.3.1 The Composting Component Operations

The project aims at composting organic waste collected from the residential areas of Kangemi and Kawangware as well as waste from markets, with the potential for scaling out to other residential areas. The project will mainly target waste from households. Each household will be provided with 2 bins per household, and offer basic training on waste separation at source. Waste will then be collected twice per week by use of hand carts and trucks, and taken to a transfer station for further sorting. To achieve waste separation at site, the project has incorporated an awareness creation/training programme on waste separation.

At the transfer station, the waste will be further sorted by TakaTaka Solutions' staff. From this process, three types of waste outputs are expected:

1. Residual. This is waste that cannot be utilized and will be transported to registered dumpsite (Dandora) for disposal.
2. Recyclables: This will consist of plastics, metals among others. The recyclables will be stored and sold off to licensed recycling companies in the city.
3. Organic waste: This will be transported to the composting facility at Mutuini.

2.3.2 The Composting Process

At the composting facility, the waste will be composted using state of the art technology that is both environmentally safe and efficient, and has undergone rigorous tests in the European and American markets.

Compositing at the facility will be undertaken under controlled conditions. This will be accomplished in two main stages: an active stage and a curing stage. In the active composting stage, microorganisms will consume oxygen (O_2) while feeding on organic matter in compost and produce heat, carbon dioxide (CO_2) and water vapour. The process begins at ambient temperature by the activity of mesophilic bacteria which oxidize carbon to CO_2 , thus liberating large amount of heat. Usually, the temperature of the waste piles reaches $50^{\circ}C$ within two days, and this represents the limit of temperature tolerance of the mesophilic organisms. At this

point the process is taken over by thermophilic bacteria and the temperature continues to rise. Most of the thermophilic phase, which lasts about two weeks, takes place in the temperature range 55⁰C – 65⁰C. Temperature above 65⁰C, temporarily slows down the decomposition activities.

To address this issue, the composting facility is designed with inbuilt mechanism for maintaining proper temperature, oxygen and moisture for the organisms. Testing temperature, moisture content, and oxygen levels will be an automated process, and will be used to guide the composting activities, such as turning, aerating, or adding moisture.

In the curing phase, microbial activity slows down and as the process nears completion, the material approaches ambient air temperature. Finished compost takes on many of the characteristics of humus, the organic fraction of soil. The material will have been reduced in volume by 20 to 60%, the moisture content by 40% and the weight by up to 80%.

On average, organic waste will stay in the composting plant for a period of 8 to 12 weeks to ensure complete breakdown. The compost waste will be sieved through a 10mm sieve, weighed and stored in 50 kg bags ready for sale or use in farms. The compost will be subjected to various laboratory tests prior to sell.

Residual compost that did not pass through the sieve in the first round will further be treated and sieved for a second time. The sieved portion will be weighed and stored with the first compost. The remaining part is again added to fresh organic matter at the beginning of the composting process, in a cyclic process designed at attaining zero waste.

The stored compost will be sold into Kenyan agriculture as a soil improver. It will offer the following benefits:

- Increasing the water holding capacity of the soil.
- Increasing the biological activity of the soil.
- Helping to prevent soil born diseases.
- Helping to improve soil structure.
- Providing plant nutrients.

The compost is sold on a first in first out basis from the store.

2.4 Process Flow

The compost plant has been designed for a capacity of 25 tonnes/day. The compost plant is based on the concepts for in-vessel windrow aerobic composting of organic (biodegradable) component of solid waste. The complete process of compost plant can be divided into number of components, which are explained as below:

2.4.1 Material Intake System

All incoming vehicles containing vegetable waste will be visually inspected and weighed at the receiving zone. The organic material will then be emptied into tipping area.

2.4.2 Pre-processing System

The organic waste will have been largely pre-separated by households, during collection and at the waste transfer points. Any organic waste arriving at the composting plant will, therefore, only have small levels of contamination.

The material accepted for composting will be spread on the tipping area, where the unwanted materials that had not been removed and all the other large sized recyclables shall be sorted out manually. The sorted waste containing only organic waste will be taken to the compost pad.

As a general rule food waste and green vegetable waste will have C:N ratio of below 20:1 and a high moisture content of over 60%. Dried vegetable waste, crop residues and woody material will have a C:N ratio of over 60:1 and a moisture content of under 35%.

The process shall begin by missing of food and vegetable waste with wooden materials. A tractor will be used to mix the organic households or market waste with structural (wooden) materials in a 9:1 ratio. This is important as the wooden material will allow for better air circulation during the composting process and ensures a starting C:N ratio of about 30:1.

2.4.3 Windrows

Each windrow shall be approximately 20m to 40m long rows of organic waste with a height of three meters and a width of six to eight meters. The windrows shall be built on a non-permeable concrete platform to prevent leachate seepage. The platform

shall have leachate collection drainage systems. The windrows will be constructed by the use of a tractor. These rows shall be important for ensuring adequate ventilation of the system.

2.4.4 Windrow Management System

In the yard, waste material mixed with the woody materials shall be stacked in rows in the form of Trapezoidal Heaps called Windrows. The windrows will be sprayed with water to accelerate the digestion process. The windrows will then be covered with the membrane material from GORE Ltd so as to start the composting process. To ensure the process is aerobic and eliminate any odour, air will be blown into the covered material using an air compressor to provide oxygen instead of the manual turning to provide aeration and temperature control. The cross sections of the windrows will be adjusted to ensure optimum surface area to volume ratio. Turning of the composting material will be done mechanically using a tractor. During windrowing, moisture will be added to the windrows to maintain requisite moisture levels.



Plate 7 Photo of a covered windrow using the GORE membrane. Source Gore Technologies In.

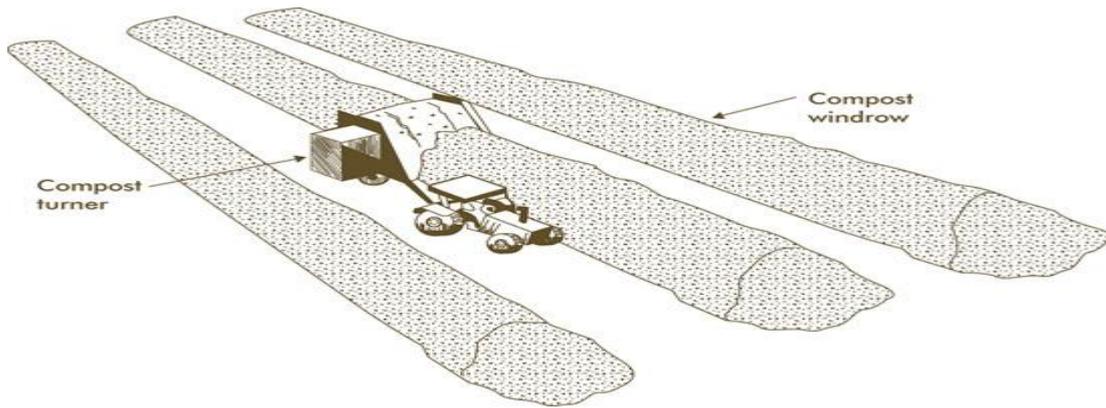


Plate 8: Illustration of windrow turning process using a pull-type turner

2.4.5 Stabilization Shed

Material after digestion needs further stabilization and loss of moisture so that it can be segregated into different fractions. Decomposed material coming from the Compost Pad will be kept here for about 15 – 20 days. The shed will be open from all sides for easy vehicle movement and for ventilation, but covered on the top to protect material from rain.

2.4.6 Coarse Segregation System

Material from the stabilization shed will be fed to the Coarse Segregation Section using a screen for intermediate screening. This will either be automated or manually operated section with feeding point from the windrows. The material will be passed through Screens (screen 1 = 35 mm perforations; screen 2 = 16 mm perforations). The rejected materials mainly consisting of undigested organic matter and inert material will be returned to the initial windrow for further composting.

2.4.7 Packing and Storage System

From the refinement section, high quality compost will be weighed and packed into 50 kg bags for sale.

2.5 Environmental safeguards

To avoid soil contamination due to compost leachate, the Gore system has in-built leachate-collection channels and storage tanks. The collected leachate is then used for watering the compost. Future plans entail harvesting and packaging the leachate for sale as soil conditioner, pending ongoing laboratory trials on its effectiveness.

Any residual waste sorted in the initial sorting process or during sieving is recycled back into the system, or taken to the residual storage area within TakaTaka Solutions' waste processing facility.

The compost will be tested on a monthly basis. A representative sample of compost will be taken. Three key tests will be done:

1. Analysis of the compost giving the following information: pH, Moisture content, carbon percentage, nitrogen percentage, phosphorous, potassium, magnesium, calcium, zinc and copper.
2. Heavy metals will be tested for: Cadmium, nickel, lead, chrome and mercury.
3. Microbiology: E coli, coliforms and salmonella will be tested for.

2.6 The Composting Technology

The technology employs the use of a membrane technology that creates the right environment for decomposition of biodegradable waste. The membrane is weather resistant, allows in oxygen, but traps in odour, humidity and heat.

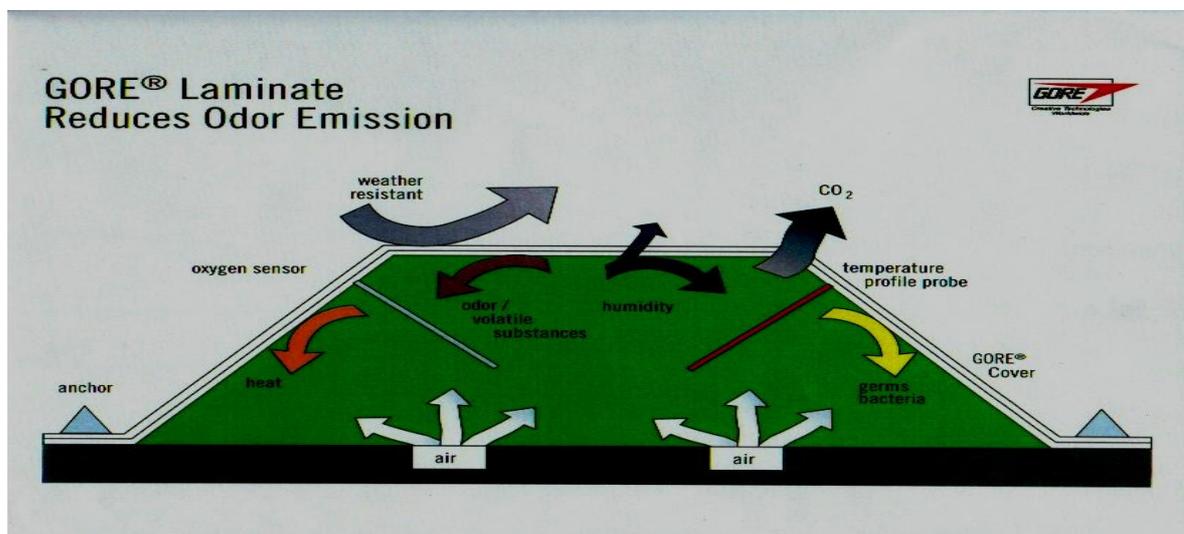


Plate 9 Illustration of working of the membrane

The membranes have been made by an American company known as Gore. The system is an aerated system that creates ideal composting conditions under the membrane, increasing throughput of organic waste input per square meter by 3-4 times in comparison to manual composting. The membrane also ensures that emissions are reduced by around 99% in comparison to open-windrow composting.

The membrane system has inbuilt mechanism for measuring conditions within the system such as oxygen quantities, moisture content, and temperature. The system has an aerator that blows oxygen through the system to ensure adequate aeration so as to reduce odours and create a favourable environment for composting.

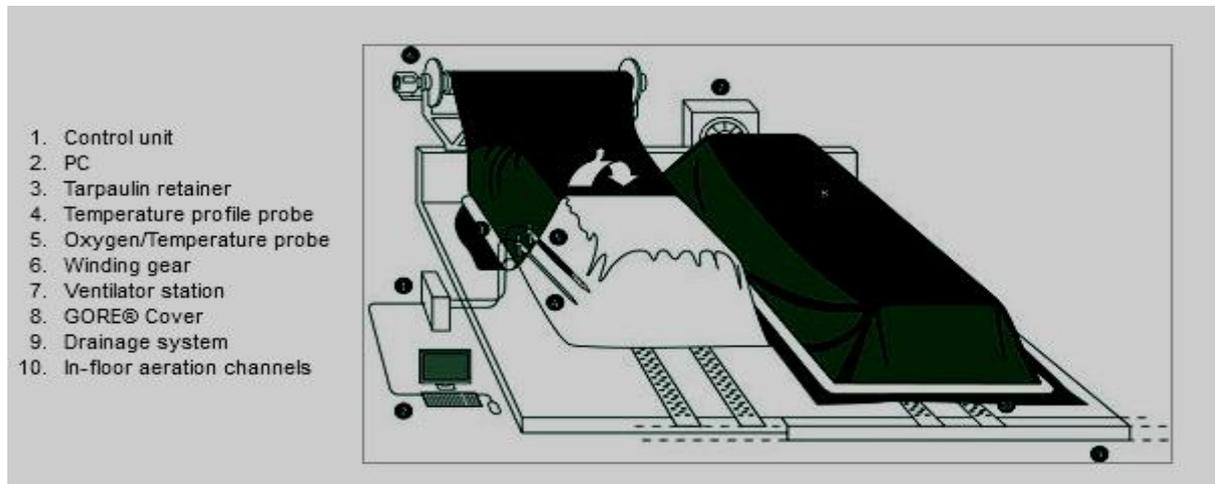


Plate 10 Illustration of the functionalities of the system and its components

The Gore system is compliant with all leading global environmental standards. This will be the first such facility in Africa. Under this system, the compost is aerated once a day for 1-2 hours. After two months the membrane is removed and the compost is turned by the tractor. After another one month of decomposition without the membrane the compost is finished. Thereafter, the compost is sieved and filled into bags.

2.7 Quantities/ Material flow

A total of 25tonnes of organic waste shall be handled per day.

2.8 Project Cost

Table 0:1 summary of project cost

Component	Cost
Tractor	4,000,000
Composting sheets (Gore system)	15,000,000
Concrete floor (1500 m ²)	3,000,000
Shredder	2,000,000
Sieve	500,000
Reception area	400,000
Storage products and equipment	200,000
Total Cost	25,100,000

BASELINE INFORMATION

3.1 *Project Area*

This section describes the area where the proposed project is to be established. It will describe the biological, physical and socio- economic environment of the project area.

3.1.1 Location

Table 0:1 Summary of administrative details

County:	Nairobi
District:	Dagoretti
Division:	Waithaka,
Location:	Mutuini
Sub-Location:	Mutuini
Constituency:	Dagoretti North

3.1.2 *Physical Environment*

The project site is on an agricultural piece of land, located in Mutuini. The land is of a relatively flat terrain. Soils in the area are mainly nittisols, ideal for farming activities.

3.1.3 Water resource

No major rivers and springs in the region. However, the water table is high in the area as evidenced presence of water in excavations below 20 feet.

3.1.4 *Biological Environment*

The proposed piece of land has vegetation that mainly includes banana trees, maize crops and planted trees, mainly eucalyptus spp, and croton spp. The plot neighbors part of the Ngong Forest that extends to Lenana School

3.1.5 Demography

Mutuini has a total population of 5,765 according to the 2009 population census report. Of this, 2,918 are male. There are a total of 1760 households.

3.1.6 Religion and archaeological set up

The area is predominantly dominated by Christian, and a few Muslims. There are No archeological sites in the area

3.1.7 Socio- Economic Environment

3.1.8 Land use

Predominant land use is subsistence agriculture entailing farming of maize, beans and vegetables, as well as keeping of animals such as cattle, pigs, chicken and goats.

3.1.9 Infrastructure

The area is well served with all weather roads that criss cross the village. These include both rural access roads and collector roads. Main roads in the area include: Southern By pass on the southern part, on the Easter side is Ngong Road, on the western side is kikuyu road.

The area has piped water supply, and is connected to the main grid, for electricity supply.

On site sanitation technology is the predominant waste mode of sanitation, as the area is not connected to a trunk sewer facility.

ANALYSIS OF PROJECT ALTERNATIVES

This section outlines the main alternatives provided by the applicant, an evaluation of the impacts of each alternative with clear information on the criteria used to assign significance and an indication of the main reasons for choosing the development proposed taking into account the environmental impacts.

4.1 *No Project Alternative*

The no development option entails abandoning the whole concept. The implication of this would be maintenance of status quo. This will be self defeating in that the environmental, economic and social benefits anticipated through this project will be foregone. In addition to this, the project has the potential for a greater multiplier effect. By contributing to sustainable waste management at household level, the project will contribute to better health, will contribute to attainment of clean and healthy environment as guaranteed by the constitution, will contribute to employment creation, will reduce by several thousand tones the amount of waste transported to Dandora dumpsite. The organic fertilizer produced will contribute to better health, increased agricultural production, as well as savings on cost of fertilizer importation.

The no project option will therefore mean forgoing of all this benefits.

The no project option s therefore not feasible, and will in turn lead to maintenance of the status quo

4.2 *Alternative site*

In selecting an ideal site for composting, the following aspects were considered

Space Requirements

- Availability of sufficient area for the volume of organic waste to be composted, with consideration for future expansion.
- Availability of Space for operation of the equipment at the site.
- Possible impact on the farm residence and any neighboring residences.

Availability of Potential Buffers

Appropriate separation or buffer distances between the composting operation and nearby water resources and neighboring homes were a key consideration. The proposed site is 4 acres bordering a forest on the eastern side, making it ideal for the project.

Site Characteristics

- The selected site is generally flat with a slope of less than 2 to 4% hence ideal for composting.
- The site has well drained soil surface.
- The site has easy access to hauling and storage.

The proposed site is on an undeveloped agricultural piece of land. The predominant land use in the area is agriculture. The land is also accessible through the northern by pass, and is in close proximity to the target waste collection points.

The land use favors the project in that the overall objective is to produce organic fertilizer for agricultural use. The proponent also intends to run a small demonstration farm for sustainable agriculture. This therefore makes the site most ideal. In addition, the land borders a forested area, further making the site ideal, as it would have minimal disturbance to the human settlements.

The proximity to the waste collection point as well as to a major high way further reduces the transport challenges associated with waste transportation, as well as the transport costs which is a major constraint to waste management

Alternative sites will therefore mean that the client foregoes the benefits at the proposed site which gives him competitive advantage in terms of the waste management cycle. This would greatly compromise the financial viability of the project, and therefore may prevent successful implementation.

Based on the predominant land uses within Nairobi, it would be a major challenge in finding suitable alternative land that is well accessible, has enough space, is predominantly agricultural, and has no human settlement challenges.

Table 0:1 summary of factors favouring the site

Location criteria		Evaluation of proposed site
Feature		
1	Lakes or ponds	No lakes or ponds are located within the are
2	River or stream	No navigable river are located within the site; however small seasonal surface water channels are present in the nearby area
5	Notified habitation	There is no notified habitation within the proposed site
6	Public parks	No public parks are present within the site
7	Critical habitat areas	No critical habitats are present near project site
8	Wetlands	No wetlands are present near project site
9	Groundwater table	As per existing boreholes the water table is between 30-50m
10	Airports	There is a no airport near the project site.
11	Water supply well	There exists a bore hole within the compound,
12	Coastal Regulation Zone:	The site does not fall within coastal regulation zone

4.3 Alternative Technologies

It is important that the project aims at making compost from organic waste. This section analyzes some alternative composting technologies

4.3.1 Bin Composting

Bin composting involves the usage of bins at a household level for composting. The bins have holes to allow for oxygen inflow and will often have some mechanism to allow for internal rotation. This technology is not suitable for this project, as bin composting can only be done on a very small scale at the household level.

4.3.2 Open Windrow

The current technology being used at the trial site in Kangemi is open windrow. Open windrow composting is the production of compost in piles or windrows manual turning and watering. Attention to details such as the porosity of the initial mix, uniform product mixing and particle size greatly improve the speed of the

process and product quality. Generally, material to be composted is collected and promptly piled into windrows, which are then regularly turned.

To prevent odours, the windrows have to be turned periodically. This is because the center of a windrow becomes anaerobic and need to be turned so that it can receive a new supply of oxygen. Open windrow composting is not very conducive to oxygen presence. Since rapid composting can take place only in the presence of oxygen, the compost normally will require longer periods to stabilize.

4.3.3 Aerated Static Pile Compositing

Aerated static pile composting is the production of compost in piles or windrows with mechanical aeration and an air source such as perforated plastic pipes, aeration cones or a perforated floor. Aeration is accomplished either by forcing or drawing air through the compost pile. Aeration systems can be relatively simple using electrical motors, fans and ducting, or they can be more sophisticated incorporating various sensors and alarms.

This system of aeration requires electricity at the site and appropriate ventilation fans, ducts and monitoring equipment. The monitoring equipment determines the timing, duration and direction of airflow. The pile should be placed after the floors are first covered with a layer of a bulking agent, such as wood chips or finished compost. The material to be composted is then added and a topping layer of finished compost applied to provide insulation.

A major difficulty with the static pile system is the efficient diffusion of air throughout the entire pile, especially with wastes characterized by a large particle size distribution, high moisture content or a tendency to clump, such as dairy manure. Other problems include the formation of channels in the pile, which allow forced air to short-circuit. This causes excessive drying due to evaporation of moisture near the channels.

4.3.4 The Preferred Choice: In-vessel windrow Compositing

The technology chosen for this project is in-vessel windrow composting. This entails the production of compost in covered windrows using on-floor aeration. In-vessel composting represents a medium technology and medium labour approach and produces a uniform product. In-vessel composting can produce excellent compost using a variety of diverse materials. Wastes such as bio-sludge and paunch manure (offal), if in a secure compost area to eliminate scavengers, can be composted with bulking agents such as sawdust, straw and recycled paper products. In-vessel composting efficiency and product quality are dependent primarily upon two major factors:

1. The initial compost mix.
2. Management practices.

A pursuant of this alternative will entail going on with construction of the composting site but taking into account the potential impacts on the environment by incorporating mitigation measures. This alternative is more desirable as it will offer a new life-line to management and disposal of solid and liquid organic waste from the town. By adhering to the recommendation of this study, it will also offer the opportunity for application of the three R's (recycling, reuse and reduction of waste) the general level of awareness on waste management among the town residents will increase as the council educates people on waste management. The potential impacts to the environment will also be ameliorated by coming up with an Environmental Management Plan (EMP) that will incorporate the formulated mitigation measures

LEGISLATIVE FRAMEWORK

The National Environment Management Authority (NEMA) is the national body charged with coordinating matters and implementing policies relating to the environment. This body was established under the Environmental Management and Coordination Act (EMCA), 1999. The National Environmental Council, the National Environmental Tribunal and the Public Complaints Commission were also set up under the same Act.

The Government has long been concerned with environmental conservation and protection of human health. Before the enactment of EMCA, explicit legislation and regulations governing industries and other facilities from polluting were contained in sectoral acts. These Acts are executed by different arms of the government including the Local Government, Ministries of Water, Agriculture, Health etc. These did not comprehensively address environmental issues necessitating the enactment of EMCA.

The following is a summary of some of the laws and regulations that protect the environment from environmental pollution by industries and other facilities. The sectoral acts are still applicable, however, for the purpose of this report; special attention should be given to the provisions in EMCA.

5.1 *Environmental Management and Coordination Act (Kenya Gazette, 1999)*

Section 58 (1)

Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee.

Section 58 (2)

The proponent of a project shall undertake or cause to be undertaken at his own expense an environmental impact assessment study and prepare a report thereof where the Authority, being satisfied, after studying the project report submitted under subsection (1), that the intended project may or is likely to have or will have a significant impact on the environment, so directs.

Offences

Section 138

Any person who-

- a. Fails to submit a project report contrary to the requirements of section 58 of this Act;
- b. Fails to prepare an environmental impact assessment report in accordance with the requirements of this Act or regulations made there under;
- c. Fraudulently makes false statements in an environmental impact assessment report submitted under this Act or regulations made there under;

Commits an offence and is liable for conviction and imprisonment for a term not exceeding twenty four months or to a fine of not more than two million shillings or to both such imprisonment and fine.

Section 139

Any person who: -

- a) fails to keep records required to be kept under this Act;
- b) fraudulently alters any records required to be kept under this Act;
- c) Fraudulently makes false statements in any records required to be kept under this Act; commits an offence and is liable upon conviction to a fine of not more than five hundred thousand shillings or to imprisonment for a term of not more than eighteen months or to both such fine and imprisonment.

Section 72 (1)

Any person, who upon the coming into force of this Act (14/1/2000), discharges or applies any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permits any person to dump or discharge such matter into the aquatic environment in contravention of water pollution control standards

established under this Part shall be guilty of an offence and liable to imprisonment for a term not exceeding two years or to a fine not exceeding one million shillings or to both such imprisonment and fine.

Section 72 (2)

A person found guilty under subsection (1) shall, in addition to any sentence or fine imposed on him:

- (a) pay the cost of the removal of any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants, including the cost of restoration of the damaged environment, which may be incurred by a Government agency or organ in that respect;
- (b) Pay third parties reparation, cost of restoration, restitution or compensation as may be determined by a court of law on application by such third parties.

Other relevant sections include:

- Section 59, - Publication of Environmental Impact Assessment
- Section 60, - Comments of EIA report by Lead Agencies
- Section 61, - Technical Advisory Committee on EIA
- Section 62, - Further EIA
- Section 63, - Environmental Impact License
- Section 64, - Submission of fresh EIA report after EIA License issued
- Section 65, - Transfer of EIA License
- Section 66, - Protection in respect of an EIA License
- Section 67, - Revocation, suspension or cancellation of EIA License
- Section 68, - Environmental Audit
- Section 69, - Environmental Monitoring
- Section 78-85, - Air quality standards and emission licensing
- Section 86 - Standards for waste
- Section 87 - Prohibition against dangerous handling and Disposal of wastes
- Section 90 - Court order to cease operation
- Section 91-93 - hazardous wastes

Kenya is also a signatory to a number of different international conventions on the environment some of which include the above mentioned.

5.2 Waste Management Regulations (2006)

Part 11 section 10(1-5), 11 and 12 of Waste Management Regulations states that:

- 10(1) any person granted a license under the Act and any other license required by relevant local authority to operate a waste disposal site or plant, shall comply with all conditions imposed by the authority to ensure that such waste disposal site or plant operates in an environmentally sound manner.
- 10(2) An application for a license to operate a waste disposal site or plant shall be in Form V as set out in the first schedule of the regulation and shall be accompanied by the prescribed fees set out in the second schedule
- 10(3) A license under the Act for the operation of waste disposal site or plant shall be in Form V as set out in the First schedule of these Regulations
- 10(4) A license to operate a waste disposal site or plant shall be valid for a period of one year from the date of issue and may be renewed for a further period of one year on such terms and conditions as the authority may deem necessary or impose for purposes of ensuing public health and sound environmental management.
- 10(5) In issuing a waste disposal license, the Authority shall clearly indicate the disposal operation permitted and identified for the particular waste.
- 11 Any operator of a disposal site or plant shall apply the relevant provisions on waste treatment under the local government Act and Regulations to ensure that such waste does not present any imminent and substantial danger to the public health, the environment and natural resources.
- 12 Every licensed owner or operator shall carry out an annual environmental audit pursuant to the provision of the act Licensing Conditions

General Conditions

The owner/operator shall:

- Convert to a sanitary composting site within two (2) years.
- Only receive waste as specified in the license

- License covers activities on the site plan submitted for Land Registration Number with boundaries marked on the site plan
- Without prejudice to the other conditions of this license shall implement and maintain a management system, organizational structure and allocate resources that are sufficient to achieve compliance with the requirements and conditions of the license.
- This license shall not be taken as statutory defense against charges of pollution in respect of any manner of pollution not specified herein.
- The Authority reserves the right to withdraw this license in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Coordination Act,1999 and the Regulations there under.
- Submit an Annual Environmental Audit together with the application for renewal of license.
- Keep records such as Environmental Impact Assessment report,
- Environmental Audit report, occupational Health and Safety, monitoring reports, environmental policy, Agreement with Composting site operator, and shall make them available to the Environmental inspector on demand
- Give access to Environmental inspectors from the Authority without prior notice upon identification and provide information, reports, records and data for inspection.
- Ensure the site is properly fenced off, with only one entrance manned at all times by security guards.
- Make a deposit bond as stipulated by the Authority

Other laws that govern protection of the environment and executed by different arms of the government include;

1. The Agriculture Act, and the Agriculture (Basic Land Usage) Rules, 1986
2. The Government Lands Act
3. The Local Government Act – as revised 1986
4. The Physical Planning Act, 1996

5. The Public Health Act – as revised 1986, and the Public Health (Drainage and Latrine) Rules

5.3 Public Health Act

This Act provides the impetus for a healthy environment and gives regulations to waste management, pollution and human health.

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health.

Such nuisance or condition are defined under section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into a public street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

On the responsibility of local authorities, Part XI, section 129, of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes....”

On the responsibility of local authorities, Part XI, section 129, of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of

any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes....”

Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in a manner provided by this Act

5.4 The Water Act

The Water Act, Cap 372 of the Laws of Kenya seeks to make better provision for the conservation, control, apportionment and use of the water resources in Kenya, and for purposes incidental thereto and connected therewith. The Act vests ownership and control of water in the Government subject to any rights of user. Under this provision, therefore, Water Department has the responsibility to regulate access, use, and control pollution of water resources.

5.5 The Agriculture Act

The Agriculture Act Cap 318 of the Laws of Kenya seeks to promote and maintain a stable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry. This Act primarily guides and regulates farming practices. It is, indeed, a crucial piece of legislation insofar as it relates to both small scale and large-scale farms. The Agriculture Act is the principal land use statute covering, *inter- alia*, soil conservation, and agricultural land use in general.

5.6 The Forest Act

The Forests Act, Cap 385 revised 1992 of the Laws of Kenya provides for the basic legal guidelines for reservation, management and exploitation of forests and their resources. This act gives the government absolute control of forests through gazettelement. Several aspects of the act are noteworthy. Government has exclusive control over gazetted forest areas, where no activities may be undertaken except

under license. The new forest policy attempts to tackle this issue; until now, however, it has meant that other land issues cannot be integrated into the gazetted forest estate. By contrast, except in un-alienated Government, the forest Department (FD) has no management and conservation powers outside the gazetted forest reserves. However, the appropriate management of gazetted forests must include the management of surrounding areas. Also, considerable areas of forests and woodlands are on private land and on trust land managed by the county councils. The Forest department must rely on the Ministry of Agriculture, the Provincial Administration and the county councils (through the Local Government Act) to prevent destruction of vegetation in these areas.

5.7 The Land Planning Act

The Land Planning Act Cap 303 of 1968 of the Laws of Kenya makes provision for planning the use and development of land. Sec 6 (1) of the subsidiary legislation provides that *"a local authority may, after consultation with, and with the agreement of the Minister, prepare and submit to the Minister for his approval a town plan or area plan, as the case may be, for that part of the area under its jurisdiction to which these regulations apply."*

5.8 Physical Planning Act

This Act provides for the preparation and implementation of physical development plans for connected purposes. It establishes the responsibility for the physical planning at various levels of Government in order to remove uncertainty regarding the responsibility for regional planning.

It provides for a hierarchy of plans in which guidelines are laid down for the future physical development of areas referred to in specific plan. The ostensible intention is that the three-tier order plans, the national development plan, regional development plan, and the local physical development plan should concentrate on broad policy issues.

The Act also promotes public participation in the preparation of plans and requires that in preparation of plans proper consideration be given to the potential for economic development, socio-economic development needs of the population, the existing planning and future transport needs, the physical factors which may influence orderly development in general and urbanization in particular, and the possible influence of future development upon natural environment.

The innovation in the Act is the requirement for Environmental Impact Assessment (EIA).

Any change of use of the actual development without authority constitutes an offence. Similarly, anyone who deposits refuse, scrap or waste materials in a designated area without the consent of the planning authority or the relevant local authority shall be guilty of an offence under the regulations. The general sentence under the regulations is a fine of not exceeding five thousand shillings or Imprisonment not exceeding six months, or to both, such fine and imprisonment.

CHAPTER SIX

6.1 IMPACT IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES

The impact assessment section of the EIA study systematically identifies, characterizes and evaluates the potential impacts arising out of the project and prioritizes them through a semi-quantitative system so that Environment Management Plan can effectively address them. The proposed project involves the treatment of organic waste generated from households and markets. Potential environmental impacts may arise from various sequential activities, which forms an integral part of the proposed project. Impacts are examined under two categories i.e. negative environmental impacts and positive environmental impacts. The various impacts in these two categories are then examined in order of their level of importance and significance. They are also examined in categories of their time of occurrence (construction or operational phase)

An environmental impact identification matrix has been developed to formally present an overview of possible interactions between project aspects and components of the environment, which may get affected. The matrix structure takes into account physical, biological and socioeconomic components of the environment on one axis (X axis) and the activities / aspects of the proposed project on the other side (Y axis). The inputs used for identifying all project aspects include review of project documentation and consultations with the project proponent, Provincial administration and the community at large. Environmental and socioeconomic components were identified based on review of legislation and baseline environment, site reconnaissance visits, and discussions with stakeholders and Emerald Consultant's professional judgment.

6.2 Impact Evaluation Methodology

6.2.1 Impact Criteria and Ranking

Once all project environmental activities/aspects were comprehensively identified for the design, construction and operations stage, the level of impact that may result

from each of the activity-component interactions has been assessed based on subjective criteria. For doing this, three key elements have been taken into consideration based on standard environmental assessment methodologies:

- **Severity of Impact:** the degree of damage that may be caused to the environmental components concerned;
- **Extent of Impact:** the geographical spread of the impact around project location and corridors of activities; and
- **Duration of Impact:** the time for which the impact lasts taking into account the project lifecycle.

The impacts were identified for the following Project Components:

- Site selection and design considerations of the facility
- Construction activities associated with composting facility
- Waste receipt, unloading, processing and storage at the facility
- Operation, maintenance and leachate collection at the facility
- Post closure/decommissioning of composting facility

Table 0:1 Impact Identification Matrix

	Physical Environment									Biological Environment				Social Environment									
	Aesthetics & Visuals	Ambient Air Quality & Odor	Ambient Noise Level	Road & Traffic	Land Use	Soil Quality	Topography & Local Drainage	Surface Water Quality	Ground Water Resources	Ground water quality	Terrestrial Habitat and Flora & Fauna	Bird Species	Threatened & Endangered species	Migratory Species & rout	Aquatic Habitat & flora, fauna	Discomfort during construction activity	Common Property Resources	Discomfort during Operation activity	Conflict on with local people	Job & Economic Opportunity	Occupational Health & Safety	Community Health & Safety	Cultural & Heritage Site
Project Planning & Construction Phase																							
Local procurement																							
Land Procurement																							
Top soil stripping & storage																							
Material sourcing & transportation																							
Excavated material & debris stockpiles																							
Operation of construction machineries/equipment's																							
Storage & handling of raw materials,																							

These elements have been ranked into three levels, 1 (low), 2 (moderate) and 3 (high) based on the following criteria provided in the table below

Table 0:2 Impact Prediction Criteria

Impact Elements	Criteria	Ranking
Severity	<ul style="list-style-type: none"> Regional impact resulting in long term and/ or damage to the natural environment. Major impact on regional resources such as soil and ground water contamination from leachate generation. Major impact on occupational and community health (e.g. injury,), exposure to pathogen and vectors, traffic accidents etc 	3
	<ul style="list-style-type: none"> Local scale impact resulting in short term change and / or damage to the natural environment. Local scale impact on cultural and community resources Moderate impact on human health and well-being (e.g. noise, light, odour, dust, waste littering etc) etc. Complaints from public 	2
	<ul style="list-style-type: none"> Limited local scale impact resulting from temporary dust & noise emissions from construction activities, and influx of workforce etc Limited impact on human health and well-being (e.g. occasional dust, odour, light, and traffic noise). Public Perception/Concern 	2
Extent	<ul style="list-style-type: none"> Regional scale impact and including impacts to physical, biological and socio-economic environment of the composting site 	2
	<ul style="list-style-type: none"> Largely local level impact limited to immediate vicinity of composting facility 	2
	<ul style="list-style-type: none"> Impact not discernable on a local scale 	2
Duration	<ul style="list-style-type: none"> The impact is likely to occur during the entire project life cycle at all times. 	3
	<ul style="list-style-type: none"> The impact is likely to occur in some phases of project life under 	

	normal operating conditions.	
	<ul style="list-style-type: none"> The impact is very unlikely to occur at all during project life cycle but may occur in exceptional circumstances. 	

A positive or beneficial impact that may result from this project has not been ranked and has been depicted with the indication ++.

6.2.2 Impact Significance

The significance of the impact has been adjudged based on a multiplicative factor of the three element rankings. The below assigns impact significance in the scale of LOW-MEDIUM-HIGH and will be used for delineation of preventive actions, if any, and management plans for mitigation of the impacts. The impact significance has been determined taking into account the measures, which have been factored at the design, and planning phase of the project. Legal issues have been taken into account in the criteria sets, wherever appropriate, to aid in Takataka Solutions Ltd effort to comply with all relevant legislations and project HSE requirements.

Table 0:3: Criteria for Significance of Impact

Severity of Impact (A)	Extent of Impact (B)	Duration of Impact (C)	Impact Significance (A x B x C)	
Scoring based on 1 to 3 scale			1 to 5	LOW
Scoring based on 1 to 3 scale			6 -12	MEDIUM
Scoring based on 1 to 3 scale			Above 12	HIGH
Impact is Beneficial				++POSITIVE

To assist in determining and presenting the significance of an impact, an impact evaluation matrix has been developed based on the one developed for the impact identification exercise. In addition to ranked weights, the significance of the impacts has been depicted using colour codes for easy understanding. In the case that an environmental component might be impacted by more than one project activity the higher impact significance ranking has been taken as the significance ranking for the subject receptor. Impacts that have been determined to be having high significance

ranking of “>12” are considered to be significant and hence require examination in terms of preventive actions and/or required additional mitigation to reduce the level of the potential impact. Recommended additional mitigation measures and management plans are presented later in the report. The identified impacts are further discussed in detail in the following section focusing on those impacts, which have been determined to be of higher significance. This is followed by a point wise outline of the mitigation measures recommended.

6.3 Impact Assessment & Mitigation Measures

This section discusses the impacts of the project activities on the environmental receptors that stand to get affected adversely by the project. It discusses probable impacts during various phases of the project lifecycle on the environmental and socioeconomic components. The rankings for each activity – component interaction is based on the criteria set earlier and the resulting environmental significance with necessary justification has been recorded below for each set of impacts and the same has been represented in the evaluation matrices. The potential project related impacts have also been assessed and ranked considering the mitigation measures that are likely to be implemented by the proponent during the pilot assessment phase. The proponent bases on significance ranking of potential impacts identified and assessed for the proposed municipal solid waste management project without any prior adoption of mitigation measures. In broader context, it is however important to remember that operation of the composting facility will also be leading to positive socioeconomic impacts in terms of job creation, efficient management of waste amongst other outcomes. During the design phase of the project, the suitability of the site conducted and summarized below.

Table 0:4 Impact and Mitigation Measure during Design Phase

Sl.No	Impact Sources/ Activities	Impact Assessment	Proposed Mitigation Measures
<i>*Potential impacts are envisaged depending upon siting and design considerations with respect to</i>			

<i>proximity and/or presence of :</i>			
1	Lakes/ ponds	No lakes or ponds are located within 50m of site	During the formulation and designing of the proposed composting and processing facility, the site selection criteria has been duly reviewed and considered. Consultants has duly assessed the site, against each and every criteria of the site selection framework, and adopted necessary measures at the design stage only, wherever required. The land has agricultural potential but has been left bare, the location, size and accessibility fits the siting conditions for a composting facility.
2	River	No river are located within the site; however small seasonal surface water channels are present in the nearby area	
3	National Highway	The highway is approximately 150m	
4	Public parks	No public parks are present within and around the site	
5	Critical habitat areas	No critical habitats are present near project site	
6	Wetlands	No wetlands are present near project site	
7	Groundwater Table	As per existing boreholes the water table is between 30-50m	
8	Water supply well	There exists a bore hole within the compound,.	
9	Coastal Regulation Zone	The site does not fall within coastal regulation zone	

The discussion of key impacts along with their significance ranking with respect to the proposed project during construction and operational phase has been described below.

6.3.1 Visual Impacts & Aesthetics

i. Construction Phase

Possible visual impacts during construction phase activities are likely to arise from:

- Fugitive dust generated from site preparation,
- On-site storage of construction material and storage of construction debris,

- Physical presence and operation of labourers

Such impact is likely to be experienced by the villagers inhabiting near the proposed composting site. There is no industrial activity or large-scale construction activity in the project area. Thus taking into account the temporary nature of construction activities and possible mitigation measures likely to be adopted by the project proponent no major visual impact is envisaged. The possible mitigation measures to address any impacts on visual quality and aesthetics will include:

- On completion of works all temporary structures, surplus materials and wastes will be completely removed.
- The area demarcated for proposed composting facility will be fenced and all the construction activities will be restricted within the demarcated site.
- Condition of the site approach road will be improved and same will be kept free of dust and mud through implementation of dust suppression measures.
- Labourers to come from the homes surrounding the project site

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

ii. Operational Phase

Visual impacts from operational phase are likely to arise from:

- Physical presence composting site,
- Fugitive dust generated during transportation and handling of raw materials
- Odor generated from compost plant & composting site

Such impact is likely to be experienced by the villagers inhabiting near the proposed composting site in Mutuini. The proposed composting site is located in the rural setup, and the people do not have such experience, as most of the waste generated from the household is disposed in the nearby open area in scattered manner. However, greenbelt development and odors management and scientific composting site will minimize such impacts. Considering the appropriate mitigation measures, potential visual impact

resulting from the same is not considered to be of significance. The possible mitigation measures to address the aforesaid impacts include:

- Peripheral green belt will be developed around the composting site in accordance with a green belt plan proposed by Takataka Solutions Ltd
- Dust suppression measures at haul road and waste handling site
- Implementation of proper odor management plan.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	3
Impact Significance = 6 i.e. Medium					

6.3.2 Impact on Air Quality

I. Construction Phase

Raw material transport, storage and handling

During construction phase it is estimated that about borrow material and aggregates will be required for composting site preparation. Fugitive emission is therefore anticipated from transportation, storage and handling of construction material by contractor personnel. However, there site preparation as construction is not large-scale since only concrete beds will be constructed. The temporary nature of construction phase activities and limited movement of project vehicles further reinforce this. Also with the proponent will adopt specific mitigation measures, i.e. regular dust suppression. Considering the above scenario the impact is considered to be of low significance.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

II. Operation of Construction Equipments

During construction phase, gaseous exhaust consisting of PM, NOx, SOx and CO emitted from heavy construction equipment, like Excavator, will impact air quality. Engines on heavy earthmoving equipment’s and other construction equipment’s are diesel driven.

The earthmovers if any will be limited since size of land is small and again the facility only requires construction of concrete beds rather than massive infrastructure.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

III. Operational Phase

Fugitive emissions during loading/unloading and transportation of raw materials

Emissions of fugitive dust, bio-aerosols are quite common from operational activities during waste transportation, receipt, unloading, processing and storage. However given that the metrological conditions and also taking into account that the proponent will be implementing appropriate mitigation measures especially on selection of vehicles for transportation of raw materials the impact is not considered to be of significance.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	3
Impact Significance = 6 i.e. Low					

Mitigation Measures

- Select waste transportation vehicles that meet NEMA requirements.
- Control fugitive emission along internal roads through periodic water sprinkling.
- Ensure waste transportation through covered vehicles as specified waste management regulations of 2006
- Use odor neutralizing sprays where necessary.
- Develop and implement a green belt plan, pollution prevention & abatement plan

Emission from Waste Hauling, & Emergency Generator Sets

The gaseous exhaust consisting of PM, NOx, SOx and CO emitted from waste hauling equipment, generator sets used for backup power supply will impact air quality.

Severity of Impact	2	Extent of Impact	2	Duration of Impact	3
Impact Significance = 12 i.e. Medium					

Mitigation Measures

- Proper servicing of machineries using Internal combustion engines
- Avoid usage of non-roadworthy vehicles for haulage
- Switch off engines for stationary vehicles/ reducing idling.
- Use of mask etc. for operational workers

Generation of composting gas from composting operations

Composting gas primarily comprising of methane (~60%) and carbon dioxide ~30%) is likely to be produced from the anaerobic decomposition of the biodegradable organic waste components. These gases are identified as green house gases (GHGs) and its uncontrolled release can contribute to global climate change if not properly managed. Further the subsurface migration of leachate from the composting site also has the potential to lead to uncontrolled venting of such gases at adjoining private properties. Emission from the proposed project will involve composting of biodegradable waste material in order to stabilize organic waste matter to compost/organic manure.

However with windrow composting being adopted which is characterized as aerobic biological treatments process any potential gaseous emissions resulting from anaerobic conditions are likely to be non-existing. Further taking into account that appropriate mitigation measures such provision of peripheral green belt, technological consideration where mechanical aeration will be adopted covered with cover from (Gortex Technology) to enhance composting efficiency will be adopted by the Takataka Solutions Ltd to this regard the impact is not considered to be of significance

Severity of Impact	2	Extent of Impact	2	Duration of Impact	3
Impact Significance = 12 i.e. Medium					

The possible mitigation measures to address the aforesaid impacts include:

- Mechanical aeration eliminates the chances of anaerobic conditions that a recipe for methane and odour production.
- Perform passive venting that involves collection and removal of composting gas from within the composting pile and in particular from the perimeter of the composting;
- Undertake periodic monitoring of ambient air quality at the composting site and near vicinity.
- Utilize windrow-turning equipment specially designed to minimize air emissions by ensuring aerobic conditions.
- Adequate care need to be taken to maintain C:N ratio, temperature and moisture content in waste piles to maintain aerobic conditions.

Further details have been outlined in the composting gas management plan & environmental monitoring plan as discussed in a later chapter.

Odors

The constituent odors generating gas from leachate are hydrogen sulfide and carbon disulfide. However the major portion of the organic component of raw materials will be used for composting. Therefore, any possible generation of large volumes of leachate is unlikely. Installing the active composting gas management system will mitigate further odors. Considering the receptor location and mitigation measures, the impact is not considered as significant.

6.3.3 Noise and Vibrations

Potential impact on noise quality is anticipated from operation of construction machineries and equipment and vehicular movement during construction of composting site and operation machineries and vehicles during operation of composting site.

I. Construction Phase

Operation of heavy machineries/equipments and vehicular movement during construction of composting site and access road construction may result in the generation of increased noise levels.

The noise related disturbance is likely to be experienced by communities residing in close proximity of the construction site and along material transportation routes like Mutuini villages. However given the short term and localized nature of impacts, limited movement of vehicles and attenuation of noise with distance the impact is not considered to be of major significance. Also considering that adequate management measures will be adopted and implemented by contractor such as the selection of low noise generating equipment, use of acoustic enclosures, preventive maintenance of equipments etc impacts are likely to be mitigated further.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

The possible mitigation measures to address the aforesaid impacts include:

- Install sufficient engineering control on equipments and machineries (like mufflers & noise enclosures for DG sets) to reduce noise and vibration emission levels at source, carry out proper maintenance and subject them to rigid noise and vibration control procedures.
- Locate noise-generating sources based on the proximity of village settlements/habitations.
- Undertake preventive maintenance of vehicles and machineries to reduce noise levels.

6.3.4 Impact on Road & Traffic

Construction material will be hauled to the site by trucks during the entire construction period. During construction the existing road will be used that runs through the villages to the proposed composting site (approximately 1km) will be adequate to accommodate the traffic generated by construction work at site as well as operational traffic. The frequency of construction traffic and operational traffic will be inadequate to disturb the nearby residence along site approach road.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

6.3.5 Impact on Land Use

The project occupies close to 5 acres. The proposed land has mature trees that will be cut. There is agricultural activity in the proposed composting site; however most of the land is unutilized. The dependency of the nearby villagers on this land is very minimum, same type of land is available around the proposed composting site. It is also noted that the implementation of the proposed project will alter only small portion of such category of land in the study area. Apart from the change in land use pattern within the project site no adverse impact on surrounding land use is envisaged due to this project.

Severity of Impact	1	Extent of Impact	1	Duration of Impact	3
Impact Significance = 3 i.e. Low					

6.3.6 Impact on Soil Quality

Potential impact on soil quality is envisaged in the form of increase in soil erosion and loss of soil fertility resulting top soil stripping for construction of composting site, and accidental spillage resulting from storage and handling fuel and chemicals. The soil quality impacts so identified have been assessed and evaluated in the section below.

Site clearance and stripping of top soil

The proposed composting facility will have built concrete sheds to which composting will be done. The sheds will be laid on a level ground, thus top soil stripping may be disturbed. However, it is proposed to stripping of top soil, proper storage and use it for greenbelt development would minimize the impact. Considering this impact on soil quality is considered as medium significance.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 5 i.e. Medium					

Storage and handling of fuel and chemicals

Contamination of soil can result from the project activities if certain operations like storage of chemicals and fuels, spent oil and lubricants are not managed efficiently. Storage of chemicals and fuels, spent lubricants on unpaved surfaces also have potential for contamination of soil. Accidentally, if chemicals, oil and lubricants are spilled, either during transportation or during handling, on open soil may contribute to soil contamination. Improper storage can result in contamination of the soil. However, the scale of operations don't envisage mass use fuel or chemicals the impact is not considered to be of significance but spill prevention and control measures have been put in place by the proponent.

Severity of Impact	2	Extent of Impact	2	Duration of Impact	1
Impact Significance = 4 i.e. Low					

The possible mitigation measures to address the aforesaid impacts include:

- Stripping of top soil before site construction
- Proper storage of top soil and use for greenbelt development
- Ensure proper storage of fuel and lubricants to prevent any potential contamination from spillage.
- Install properly designed drainage system on site and adopt effective soil amendment strategies

6.3.7 Impact on Local Drainage

The drainage of the proposed composting area is regulated by a natural drainage channel, which flows down the new bypass, the northern transport corridor. Impact on the site drainage may arise due to flow disruption of natural drainage channel as a result of improper site clearance and grading activities. However it is understood that the composting site will be developed based on the existing contours to the extent possible and will involve optimal land cutting and filling operations to maintain the natural drainage slope.

The existing site lay out plan shows that, natural drainage channel will be kept as it; however, the development of the composting site may intercept this drainage channel

thereby blocking the water flow. Thus taking into account the possible disruption of natural drainage pattern of the site ,during composting site development and operation, the impact is considered to be of medium significance.

Severity of Impact	2	Extent of Impact	1	Duration of Impact	2
Impact Significance = 4 i.e. Low					

The possible mitigation measures to address the aforesaid impacts include:

- Leveling and grading operations will be undertaken with minimal disturbance to the existing contour thereby maintaining the general slope of site;
- Disruption/alteration of drainage pattern will be minimized to the extent possible.
- Loss of drainage, if any to be compensated through provision of alternate drainage.

6.3.8 Impact of Surface Water Quality

Construction Phase

The impact on surface water quality during construction phase is anticipated mainly from discharge of uncontrolled surface run-off .

Discharge of surface run-off

As discussed in “Impact on Soil Quality” top soil stripping during site preparation will be leading to increase in soil erosion. Hence during rainy season, the surface run-off generated from the site area will be characterized by high sediment load, which will subsequently get discharged in the natural drainage channel located within the site. It may also be noted that the discharge will be a temporary activity and will be experienced only during rainy season hence the impact is not considered to be of significance.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

The possible mitigation measures to address the aforesaid impacts include:

- Soil erosion to be checked, especially from unpaved surfaces
- Provision of adequate drainage and sediment control systems onsite;

- Fuel and lubricant storage areas will be properly maintained;
- Construction activities to be restricted during dry season to the extent possible;
- Protection of ground and surface water quality of the project area

Operational Phase

Potential surface water quality impacts are not envisaged during operational phase. Surface water quality impact is however anticipated from discharge of surface run-off generated from composting site especially during the rainy season. Again all such run-off will be channeled through storm water drains to a settling unit for removal of suspended solids prior to its discharge to natural drainage channel. Thus considering the intermittent generation of surface run-off and its necessary treatment prior to its discharge, the impact is not considered to be of significance.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

The possible mitigation measures to address the aforesaid impacts include:

- Provision of leachate collection and treatment system in accordance with the Leachate Management Plan
- Provision of lined storm water drainage network onsite equipped with sediments traps/interceptors.
- Discharge of surface run-off to nearby drainage channels need to comply with water discharge standards.
- Ensure complete recirculation of treated leachate to accelerate the process of compost stabilization thereby minimizing potential discharge situation.

6.3.9 Impact on Ground Water Quality

Operational Phase

Leachate generated from Composting site

Ground water contamination is unlikely from the project operational phase. But leachate is formed as infiltrating water migrates through the waste material extracting water-soluble compounds and particulate matter. With respect to the proposed project considering the inert nature of the waste and engineering control measures such us use

of concrete basement on the windrows any significant adverse ground water impacts is not envisaged.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	3
Impact Significance = 6 i.e. Medium					

The possible mitigation measures to address the aforesaid impacts include:

- The leachate will be managed in accordance with the *Leachate Management (collection and treatment) Plan* discussed later
- Periodic monitoring of the ground water well in the region will be conducted

6.3.10 Impact on Biological Environment

The potential impacts on biological environment in the study area are discussed below:

Impact on Flora, Fauna & Wildlife Habitat

All the construction activities of composting site will be take place in the non-forest area. Therefore, there is no scope of destruction of natural habitat and habitat fragmentation. Again the proposed site has no mature indigenous trees only few shrubs and grass. The site preparation would require removal of exotic trees such as eucalyptus to give way for the construction and access roads. The review of the ecological conditions and habitats established the Dagoretti forest neighboring the site. The forest will however not be touched by the project operation and constructions. There is no sensitive ecological habitat in the entire study area. Considering the nature of project activity, it may be stated that the existing habitats, will not undergo any further degradation during the site preparation and operational stages of the project.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	2
Impact Significance = 4 i.e. Low					

Habitat Fragmentation & Migratory Paths

The ecological survey conducted revealed that there is no established migratory route/corridor for the mammals in the entire study area hence no potential impact on migratory route/corridor is envisaged.

Impact on Endangered/Threatened Flora and Fauna

No endangered or threatened floral species have been recorded in the proposed Composting site in the entire study area. Given the nature and scale of the proposed activities, there is not likely to be of any significant impact on any endangered/endemic fauna and the impact is considered to be of low significance.

Severity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Low					

Aquatic Ecology

It has been established in the baseline studies, that the existing water quality of the surface water bodies is quite favorable to support diverse range of aquatic fauna and flora. Though, they are quite far from the project site. Surface runoff during rainy season from the composting site has the potential to contaminate receiving surface water bodies thereby impacting their aquatic ecology. This is however not envisaged to be of any threat since the site will have roof cover and a trampoline will cover windrows and the leachate will be managed insitu.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	1
Impact Significance = 2 i.e. Low					

6.3.11 Impact on Socio-economic Environment

Based on the nature and type of impacts, the assessment has been divided into broad categories namely (i) Adverse impacts and (ii) Positive impacts.

Adverse Impact

Discomfort due to Construction Activity

The construction works will include construction of the Composting site, waste treatment facility and site access road. The composting facility borders local homesteads on one side and forest on the other. Potential impacts due to construction activity include:

- Noise and increased air emission caused by operation of heavy equipment;
- Increased movement of heavy vehicles, and
- Runoff of contaminated waste from construction area.

These impacts are temporary in duration, with no long-term residual effects. These impacts can be minimized by the implementation of mitigation measures. These measures will comprise an integral part of contractor specification and include, among others, specifications for the noise performance of heavy equipment, restriction of noise generating activity during the day and implementation of runoff management.

Severity of Impact	2	Extent of Impact	2	Duration of Impact	1
Impact Significance = 4 i.e. Low					

Discomfort due to Operational Activity

The operational phase will include transport of waste to composting site, composting. The composting facility is not far away from the residents and operation at the site itself will have impacts. Potential impacts due to operational activity include:

- Noise and increased air emission caused by transport and handling of waste;
- Generation of odor from waste treatment facility and Composting site;
- Contamination of surface water and ground water due to leachate generated from Composting site

These impacts can be minimized by the implementation of mitigation measures. These measures will comprise of greenbelt development plan, leachate treatment plan, odor control & mitigation measures and dust & noise control measures.

Severity of Impact	2	Extent of Impact	1	Duration of Impact	3
Impact Significance = 6 i.e. Low					

Conflict with Local People

Influx of population is anticipated during all stages of the project cycle. During construction phase it is anticipated that approx.10-20 nos. contractor workers and site personnel will be deployed for the proposed project. Influx of workforce therefore may result in the conflict with local communities due to sharing of common resources. However taking into account that workforce is likely to be sourced from nearby villages

and adequate sanitation and drinking water facilities shall be provided by the proponent onsite the probability of such conflict are negligible.

Severity of Impact	1	Extent of Impact	2	Duration of Impact	1
Impact Significance = 2 i.e. Low					

6.4 Impact on Occupational Health & Safety

Construction Phase

Occupational health and safety impacts during construction phase are anticipated primarily from operation of construction machineries/equipments during construction.

Operation of construction machineries/equipments during site preparation

During construction phase impact on occupational health and safety of contractor workers is anticipated from exposure to high noise generated from operation of heavy machineries /equipments and fugitive dust generated from material stockpiles, cut and fill operations and vehicular movement along unpaved roads. Noise generated from the operation of heavy machineries/equipment deployed for construction works, has the potential to adversely affect the occupational health of onsite workers. However, considering the temporary nature of construction phase activities and appropriate mitigation measures such as provisions of acoustic enclosures, use of PPEs, etc to be implemented by the contractors the impact is not considered to be of major significance.

Severity of Impact	2	Extent of Impact	2	Duration of Impact	2
Impact Significance = 8 i.e. Medium					

The possible mitigation measures to address the aforesaid impacts include:

- Provision of proper PPEs for the contractor workers onsite;
- Exposure of workers operating in near high noise generating sources will be reduced to the extent possible;
- Health surveillance of contractor workforce will be conducted
- Occupational health and safety of workforce will be assured through the formulation of an “Occupational Health & Safety Management Plan”

Operational Phase

Occupational health and safety impacts during operational phase are anticipated primarily from operation of Waste collection and segregation, Waste unloading, pre-processing, composting and storage, composting operations.

Waste collection and segregation

Workers involved in waste disposal and handling face occupational health and safety hazards, which are as diverse as the materials, they are handling. Workers' primary complaints relate to odour and upper respiratory tract irritation usually related to dust. However, actual occupational health and safety concerns vary with the work process and the waste stream characteristics. Skin damage or diseases are common complaints in waste handling operations. Wastes contain a variety of materials that can cause lacerations or punctures. These are of particular concern in labour intensive operations such as waste segregation. This also includes direct skin damage from waste contaminants, combined with high exposures to pathogenic organisms and typically, poor availability of washing facilities resulting in increased incidence of skin problems during such operations.

Severity of Impact	2	Extent of Impact	1	Duration of Impact	3
Impact Significance = 6 i.e. Medium					

Waste unloading, pre-processing, composting and storage

Occupational hazards in composting operations include vehicle and mechanical hazards resulting from tractors and trucks involved in turning wind-ows of waste to maintain aeration and moisture content. Nausea, headache and diarrhoea have been identified a major health concerns among compost workers with odour problems also likely to occur as a result of poor control of moisture and air required for the composting to progress. If anaerobic conditions are allowed to occur, hydrogen sulphide, amines and other odorous materials are generated.

In line with the above discussion the proponent plans to develop and implement an Occupational Health & Safety Management to address the identified risks associated with the proposed facility operations.

Severity of Impact	2	Extent of Impact	1	Duration of Impact	3
Impact Significance = 6 i.e. Medium					

The possible mitigation measures to address the aforesaid impacts include:

- Integrate informal sector work into the formal work process
- Provide adequate sanitation and safe drinking water provisions onsite.
- Ensure proper segregation of waste streams to facilitate characterization of wastes and identification of appropriate control measures and work practices
- Minimize mixed vehicular and pedestrian traffic in work areas
- Minimize respirable dust exposures in high dust operations
- Ensure use of appropriate PPEs such as safety glasses, safety shoes and gloves
- Integrate occupational safety and health concerns with respect to complex and potentially more hazardous enclosed operations such as composting, mechanical or manual separation for recycling etc.
- Develop and implement an Occupational Health & Safety Management *Plan* prepared in accordance with the provisions of OSHA act of 2007. Under this plan the provision of periodical health check up of the workers shall be included

6.5 Impact on Community Health & Safety

Construction Phase

Operation of heavy vehicles and construction machineries

Community disturbances/discomfort associated with air emission and elevated noise levels is likely to be short term, localized in nature and can be mitigated through implementation of appropriate mitigation measures. Further with necessary considerations to be made by the proponent regarding siting of noise generating equipments away from nearby settlements no significant impact is anticipated. However frequent movement of vehicles involved in the transportation of raw material may pose safety risks for communities. In this regard the proponent will be implementing a Road

Safety & Traffic Management Plan to address any potential community safety risks/impacts.

Severity of Impact	2	Extent of Impact	2	Duration of Impact	1
Impact Significance = 4 i.e. Low					

The possible mitigation measures to address the aforesaid impacts include:

- Provision of employment opportunities for locals and adequate sanitation and drinking water facilities onsite for contractor workforce.
- Develop and implement Pollution Prevention & Abatement Plan and Road Safety & Traffic Management Plan

Operational Phase

Occupational health and safety impacts during operational phase are anticipated primarily from Transportation of segregated biodegradable waste to the proposed facility, Processing and composting of biodegradable waste and Operation of Composting’s. Community health impacts are manifested through generation of litter, noise, dust & odors generated from proposed project operations

Litter: Uncollected garbage and litter spread beyond the waste management facility boundaries by wind, vermin, and vehicles can directly spread disease; attract rats, flies, and other vectors; and expose the community to hazardous substances. Scavenging birds, such as crows etc commonly congregate on Composting sites accepting household waste. They disturb newly tipped and partially covered waste whilst searching for food, and lead to complaints from adjoining residents and landowners about food scraps, excreta and other waste dropped away from the Composting. Transportation of waste to the facility without proper cover may also lead to littering along haulage routes causing community discomfort. However given that Composting site will be access controlled and involve application of daily soil cover and proper compaction any potential impacts are likely to be limited onsite.

Noise: Noise is typically generated by waste processing and treatment equipment as well as vehicular traffic on the site and bringing waste and materials to and from the facility. However given the limited movement and also taking into account that the

proponent will be adhering to relevant management measures as outlined in the Pollution Prevention & Management Plan the impact is considered to be of minimal significance.

Dust & Odors: Dust and odor generated from composting operations has the potential to lead to community discomfort depending upon the topography and the prevalent micro-meteorological conditions. Potential sources of Composting odors include sulfides, ammonia etc, if present at concentrations higher than normal. Although Composting odors may not associated with long-term adverse health effects or illness it may be considered offensive and unpleasant by the nearby communities. Potential community risk is also anticipated from possible accidental events that may arise from daily movement of waste transportation vehicles along defined haulage routes. With respect to the proposed project the waste will be brought into the Composting through the bypass to a connecting road that branches from the bypass about 50m.

Severity of Impact	3	Extent of Impact	3	Duration of Impact	1
Impact Significance = 9 i.e. Medium					

The possible mitigation measures to address the aforesaid impacts include: Community health and safety risks identified with respect to the proposed project will be dealt in accordance with Road Safety & Traffic Management Plan, Pollution Prevention & Abatement Plan and Community Health & Safety Management Plan.

6.6 Positive impacts

6.6.1 Employment opportunities:

The project will benefit the people living in the neighboring villages by giving preference to them in relation to direct & indirect employment associated with the various project activities. Site preparation & construction phase will involve a certain number of laborers and there is a possibility that local people can be engaged for this purpose. The operational phase will involve a number of skilled and unskilled workers. There is a possibility that local people will be engaged for this purpose to the extent possible and hence improve the existing employment scenario of the region. It is proposed that first

preference will be given to nearby villagers. The next preference will be given to the poorer people and subsequently the other villagers.

Impact Significance = ++ i.e. POSITIVE

Construction of composting facility

The project is likely to benefit the people living within the greater Nairobi environs through improvement in overall waste as compared to open dumping which is practiced leading to serious health and ground water pollution problems. Again no facility is currently available for the sound environmental management of solid waste generated in Nairobi County. Some waste from these in the county is informally disposed at open area around the villages. There are indirect costs to health associated with haphazard and open disposal of waste. Creation of such composting facility will provide for permanent cost effective waste management.

Impact Significance = ++ i.e. POSITIVE

Mitigation Measures

The details of the mitigation measures to be taken to minimize adverse socioeconomic impacts and at the same time accentuate positive impacts to the communities in the surrounding villages are discussed in detail in the Socioeconomic Impact Management section of the EMP.

ENVIRONMENT MANAGEMENT PLAN (EMP)

7.1 Overview

This Environmental Management Plan and Framework is a site specific document for the proposed composting facility in Mutuini, Dagoretti, which has been developed to ensure that Takataka Solutions Ltd can implement the project in an environmentally sustainable manner and where all contractors, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage such risk. This EMP will be considered to be an overview document that will guide environment management of all aspects of Takataka Solutions Ltd activities within the project site. This EMP may also be considered as flexible and will be backed up by more specific Environmental Action Plans, Procedures and Bridging Documents.

7.2 Environment Management Plan

The Environment Management Plan details out the mitigation measures to be implemented by both Takataka Solutions Ltd and the Contractors during project design, construction and operation phase. The following environmental management plans have been formulated in line with the proposed project activities such as Waste receiving at the site, processing, storage and disposal including Composting closure.

- Pollution Prevention and Abatement Plan
- Composting Gas Management Plan
- Leachate Management Plan
- Road Safety and Traffic Management Plan
- Occupational Health & Safety Management Plan
- Community Health & Safety Management Plan
- Green Belt Development Plan
- Post Closure & Maintenance Plan

Takataka Solutions Ltd will ensure communication and implementation of the aforesaid management plans prior and during operations on ground. In addition, the mitigation measures for social issues and concerns are also separately presented in this report. In

cases, where there are possible overlaps, the plans have been cross-referenced to avoid repetition. The additional mitigation measures to ensure effective management of identified environmental aspects during various phases of the proposed project have been discussed under the aforesaid plans in the subsequent sections.

7.2.1 Pollution Prevention and Abatement Plan (PPAP)

Scope:The Pollution Prevention and Abatement Plan (PPAP) is applicable for and encompasses both construction and operational phase activities for the proposed project which has the potential to adversely impact the ambient air and noise quality, surface and ground water quality and soil quality.

Purpose: The PPAP establishes specific measures and guidelines aimed at effectively addressing and mitigating the air, noise, water and soil quality impacts that may arise as result of site preparation, waste transportation, handling and disposal.

Mitigation Measures & Strategies: The following mitigation measures need to be adopted and implemented by Takataka Solutions Ltd and its contractors during various phases of the proposed project to prevent and control air emissions (both point and fugitive), high noise generation, soil contamination and fertility loss, contamination and depletion of ground water resources and storm water discharge.

Control of fugitive and point source emissions

Project Phase	Mitigation measures
Construction	<ul style="list-style-type: none">• Vehicles delivering raw materials like soil and fine aggregates shall be covered to prevent fugitive emissions.• Storage and handling of raw material and debris to be carefully managed to prevent generation of fugitive dust.• Sprinkling of water on earthworks, material haulage and transportation routes on a regular basis during dry season.• All vehicles, equipment and machinery used for construction will be subjected to preventive maintenance as per manufacturer norms.

	<ul style="list-style-type: none"> • All Vehicular exhaust will be complying with the NEMA specified emission norms for heavy diesel vehicles.
<p>Operation Phase</p>	<p>Mitigation measures to address the air quality impacts resulting from vehicular movement, operation of heavy construction machineries and material handling are similar as discussed above with additional mitigation measures being tabulated below:</p> <ul style="list-style-type: none"> • Ensure covered transportation of segregated waste • Regular water sprinkling will be done along haulage roads utilized for transportation of cover material. Dust suppression will be carried out along project traffic routes lying close to residential areas and other sensitive locations such as schools, colleges etc; • Routine and scheduled maintenance of engine of vehicles and equipments (compressors, generators etc) will be ensured so that exhaust emissions do not breach statutory limits set for that vehicle/equipment type and mode of operation. • All vehicles and equipment will be maintained in accordance with manufacturers" guidance; • Green belt will be developed along internal roads and boundary of site to prevent any offsite dispersion of air pollutants. The green belt will also be serving as wind abatement system to prevent any generation of wind blow dust onsite

	<ul style="list-style-type: none"> • Establishing frequent waste collections schedules and optimize waste collection routes to minimize distance traveled and overall fuel use and emissions. • Use of windrow turning equipment that is specially designed to minimize air emissions • Enclose leachate drains to reduce the emission of odors
--	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Control of Noise and Vibration

Project Phase	Mitigation measures
Construction	<ul style="list-style-type: none"> • All vehicles utilized in transportation of raw material and personnel will have valid NEMA license • Periodic preventive maintenance of DG sets and vehicles will be carried out as per manufacturer’s schedule to ensure compliance with noise limits. • All high noise generating equipments will be identified and subjected to periodic preventive maintenance. • No nighttime operation of vehicles and construction activities will be undertaken. • Engines of vehicles and construction equipment to be turned off when not in use for long periods.
Operations	<p>Mitigation measures to address the noise quality impacts resulting from vehicular movement, operation of heavy construction machineries and material handling are similar to as discussed above with additional mitigation measures being tabulated below:</p> <ul style="list-style-type: none"> • Provision of peripheral green belt in accordance with green belt plan to serve as an acoustic barrier; • Select equipment with low noise emission levels and restrict all noise generating operations during daytime; • Periodic monitoring of noise levels on site and at nearby

	receptors to ensure compliance with Noise Pollution (Regulation & Control) Rules 2009.
--	----------------------------------------------------------------------------------------

Prevention and Control of Soil Quality Impacts

Project Phase	Mitigation measures
Construction	<ul style="list-style-type: none"> • Site preparation and access road widening activities to be restricted within defined boundaries. • Debris and excavated material generated during construction activities to be stockpiled in designated areas onsite. • No material to be disposed in adjacent land surrounding the site boundary. • For cleared areas, retain topsoil in stockpile where possible on perimeter of site for subsequent re-spreading onsite during green belt development and/or Composting embankment. • Install and maintain effective run-off controls, including silt traps, straw barriers etc so as to minimize erosion.

<p>Site Closure</p>	<ul style="list-style-type: none"> • Potential soil quality impacts arising from Composting closure will be managed in accordance with “Post Closure & Maintenance Plan” which will also include periodic inspection of final cover as specified below: The final cover is inspected 2 to 4 times a year <ul style="list-style-type: none"> a) To check that vegetation growth is occurring satisfactorily and that plants are not showing stunted growth, b) To detect if any erosion gullies have been formed, c) To earmark depressions that may have developed with time d) To identify ponding of water on the Composting cover. • At least one inspection should be carried out during or immediately after the peak of the rainy season.
---------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Prevention and Control of Surface Water Quality Impacts

Project Phase	Mitigation measures
<p>Construction</p>	<ul style="list-style-type: none"> • Leveling and grading operations will be undertaken with minimal disturbance to the existing contour thereby maintaining the general slope of site. • Disruption/alteration of micro-watershed drainage pattern at the project will be minimized to the extent possible through provision of alternate drainage thereby preventing localized water logging. • During site preparation and construction, surface water run-off will be managed through implementation of proper drainage system onsite. • Run-off discharges to natural drainage channels/water bodies will conform to NEMA Water Discharge Standards.

Operations	<ul style="list-style-type: none"> • Onsite personnel will do regular supervision of Composting embankment. • Cutoff drains to re-channel/ divert water from the composting area • Composting site will have a constructed shed to protect t from weather factors • Rain water harvesting from the catchment created by the protective shed to supplement water source. • System shall have an inbuilt leachate collection system that will be re-used in reconditioning the windrows
Composting Closure	<ul style="list-style-type: none"> • Potential surface water quality impacts arising from Composting closure will be managed in accordance with “Post Closure & Maintenance Plan” which will also include periodic inspection of surface drainage.

Prevention and Control of Ground Water Quality Impacts

Project Phase	Mitigation measures
Construction	<ul style="list-style-type: none"> • With no major construction activities apart from the concrete floor and shed, Cutting and filling operations will be minimal.
Operation	<ul style="list-style-type: none"> • Potential for ground water pollution minimisd by presence of a concrete flow beneath the windrow, and an active system of leachate collection.
Composting Closure	<ul style="list-style-type: none"> • Potential ground water quality impacts arising from Composting closure will be managed in accordance with “Post Closure & Maintenance Plan” which will also include periodic inspection of gas and leachate management system as specified below: • Periodic inspection leachate collection systems will be undertaken

Composting gas management

Composting gas is generated as a product of waste biodegradation. Considerable heat is generated by these reactions with methane, carbon dioxide, nitrogen, oxygen, hydrogen sulphite, and other gases as the by-products. Methane and carbon dioxide are the principle gases produced with almost 50 – 50 per cent share. When methane is present in the air in concentrations between 5 to 15 per cent, it is explosive.

Mitigation Measures

- It is important to note that the composting process will be purely aerobic, reducing the possibility of methane gas formation. The byproduct expected is carbon dioxide
- The client intends to apply for Certified Emission reductions through the Carbon Credit system, for preventing the emission of methane gas, which is a potent green house gas.

Leachate management plan

The plant will have a Leachate Collection System. The system is designed to collect and convey leachate out of the Composting unit and to control the depth of the leachate above the liner. The main components of leachate collection system are drainage layer and conveyance system. Leachate conveyance system shall consist of a network of pipes by which the leachate is collected through perforated pipes and collected in a sump..

- The purpose of leachate collection sump is to collect the leachate from entire Composting on daily basis.
- The leachate will be recycled in the composting process to condition the windrows and catalyze the composting process.
- Future plans entail bottling the leachate for sale as soil conditioner

Green belt development plan

During the operational phase of the proposed facility, the proponent intends to plant indigenous plants around the site.

This shall achieve the following objectives

- Beautification of the area
- Buffer zone with residential areas
- Soil erosion control

Road Safety & Traffic Management Plan

The Road Safety & Traffic Management Plan is applicable to both construction and operational phase activities particularly with respect to vehicular transportation of raw materials, project and contractor personnel and segregated waste. The plan outlines specific measures to be adopted and implemented by Takataka Solutions Ltdto mitigate any potential impact on community health and safety that may arise from movement of vehicles during raw material and waste transportation during both phases.

Mitigation Measures

- Project vehicular movement involved in sourcing and transportation will be restricted to defined access routes to be identified in consultation with locals and concerned authorities.
- Proper signage will be displayed at important traffic junctions along the predefined access routes to be used by construction and operational phase traffic.
- The signage will serve to prevent any diversion from designated routes and ensure proper speed limits are maintained near village residential areas.
- Provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property accesses along defined project routes.
- Traffic flows will be scheduled wherever practicable during period of increased commuter movement.
- Movement of vehicles during night-time will be minimized.
- Vehicles will maintain speed limits

- A Journey Management Plan will be formulated and implemented by the proponent to control construction and operational phase traffic.

Occupational Health & Safety Management Plan

The Occupation Health & Safety Management Plan (OHSMP) is applicable for all project operations, which have the potential to adversely affect the health and safety of construction workers, composting facility operators and garbage collectors. The plan have been formulated to address the occupational health and safety related impacts that may arise from proposed project activities particularly during waste handling and segregation, waste unloading, processing and disposal.

Mitigation Measures – Construction Phase

- All machines to be used in the construction will be kept in good working order, will be regularly inspected and properly maintained to the satisfaction of the project manager.
- Contractor workers involved in the handling of construction materials will be provided with proper PPEs such as safety boots, nose masks etc.
- No employee may be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day.
- Provision of earplugs, earmuffs etc and rotation of workers operating near high noise generating areas.
- Health problems of the workers should be taken care of by providing basic health care facilities through health centers.
- Adequate sanitation and drinking facilities will be provided onsite for the operational workforce both during construction and operational phase of the project.
- Training programs will be organized for the operational workforce regarding proper usage of PPEs, handling and storage of fuels and chemicals etc.

Mitigation Measures – Operations

- Provide workers with appropriate protective clothing, gloves, respiratory facemasks and slip-resistant shoes for waste transport workers and hard-soled safety shoes for all workers to avoid puncture wounds to the feet.
- Use automated systems to turn the windrows in order to minimize contact with the waste;
- The workplace must be equipped with fire-fighting equipment. The equipment shall be periodically inspected and maintained in good working condition.
- Provision of adequate ventilation of composting beds to avoid accumulation of odors and dangerous gases.
- Control and characterize incoming waste
- Maintain good housekeeping in waste processing and storage areas.
- Maintain aerobic conditions and proper temperatures in the windrows.
- Maintain adequate temperature and retention time in biological treatment systems to achieve pathogen destruction.
- Use integrated pest control approaches to control vermin levels, treating infested areas, such as exposed faces and flanks with insecticide, if necessary.
- Provide and require use of dust masks or respirators under dry and dusty conditions (e.g., when compost is being turned).
- Provide daily cover of wastes to minimize the attraction to birds, which can become infected with avian influenza and other bird diseases that can then be carried off-site.

Conclusion and recommendation

This EIA study report has been prepared for this project based on baseline environmental quality data collected for the study area. Identification and prediction of significant environmental impacts due to the proposed project with an Environmental Impact Statement followed by delineation of appropriate impact mitigation measures in an Environmental Management Plan (EMP) are included in the EIA report.

The proposed project intends to ensure that the developmental activities related to the project are environmentally sound and does not have any adverse effects on the natural environment in the surroundings of the site. The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the proposed project and related activities taking place concurrently.

References

1. GOK 2000, The Environmental Management and Coordination Act, Government Printer, Nairobi, Kenya
2. GoK. Water Act, Cap 372. Government Printer
3. Kenya gazette supplement Acts Land Planning Act (Cap. 303). Government Printer, Nairobi
4. Kenya gazette supplement Acts Local Authority Act (Cap. 265). Government Printer, Nairobi
5. Kenya gazette supplement Acts Penal Code Act (Cap. 63). Government Printer, Nairobi.
6. Kenya gazette supplement Acts Physical Planning Act 1999. Government Printer, Nairobi'
7. Kenya gazette supplement Acts Public Health Act (CAP. 242). Government Printer, Nairobi
8. Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. Government Printer, Nairobi
9. Kenya gazette supplement number 69. Environmental Management and Coordination (Waste Management) Regulations 2006. Government Printer, Nairobi
10. Kenya gazette supplement number 68. Environmental Management and Co ordination (Water Quality) Regulations 2006. Government Printer, Nairobi
11. http://www.gore.com/en_xx/products/fabrics/swt/index.html



USAID
FROM THE AMERICAN PEOPLE



**Closing the urban-rural nutrient cycle: From waste to
increased agricultural productivity'
(AID-OAA-F-13-00043)**

Implementation Plan: May 2014 – June 2016



September 2014

This document was produced for review by the United States Agency for International Development. It was prepared by TakaTaka Solutions.

Table of Contents

1. Introduction	3
2. Project summary	3
3. Project Implementation Plan.....	5
4. Explanation of Project Implementation Plan	6
5. Project Photos.....	12

1. Introduction

This document entails the Project Implementation Plan (PIP) for the USAID project 'Closing the urban-rural nutrient cycle: From waste to increased agricultural productivity' (AID-OAA-F-13-00043).

The document is structured as follows. After the introduction (1), a summary of the project will be given (2). This will help put the Project Implementation Plan into context. Thereafter, the Project Implementation Plan is presented as a Gantt chart graphic (3). Subsequently, each of the main project areas will be elaborated, thereby giving further information in relation to the Gantt chart (4). For each project area, the planned project activities as well as the already commenced project activities shall be elaborated. Lastly, some photos of current project activities will be provided (5).

2. Project summary

The overall project goals of the project are:

- to create a market for organic fertilizer (compost) produced by TakaTaka Solutions on the one hand
- and to develop adequate access to quality input products for small-scale farmers through the Farm Shop franchise system and other agro-dealers

In detail the successful outcome of the grant period is:

- to sale organic fertilizer (compost) to 9,000 small-scale farmers in rural areas
 - this is to be realized through the build-up of 54 Farm Shops (or other agro-dealers) in four project areas
 - about one third of total customers of each agro-dealer shop (total = 500 per shop) will buy organic fertilizer
- to create awareness on organic fertilizer (compost) for small-scale farmers in the project areas.

The project has three angles/approaches from which the market for compost is build:

- Agricultural Effectiveness
 - Analyzing farmers' agricultural baseline
 - Demonstrating and analyzing compost benefits through trials
 - Developing application guidelines and manuals

- Marketing and Communication effectiveness
 - Analyzing what information channels farmers use and valued (radio, sms, agro-dealers, demonstration plots, ...)
 - Understanding what type of marketing and branding is valued by farmers
 - Developing and testing different communication, information and marketing approaches
- Impact effectiveness
 - Analyzing baseline economic, capability and relationship well-being of small scale farmers
 - Tracking project progress alongside changes of the above mentioned impact indicators
 - Established impact tracking system for usage beyond project duration

The project has three implementation phases:

- Phase 1: Research (9 months)
 - Market research on smallholder farmers (surveys, competitive product analysis)
 - Product research and demonstration (field trials)
 - Developing and piloting (development of marketing materials, training of agro-dealers, agro-dealer network expansion to 30 shops)
 - Processing and quality control (for compost)
 - Impact Assessment
- Phase 2: Testing (9 months)
 - Product Research and demonstration (field trials)
 - Developing and piloting (Pilot sales of compost in Farm Shop to test different marketing strategies, expansion of agro-dealer network to 54 shops)
 - Processing and quality control (for compost)
 - Impact Assessment
- Phase 3: Commercial Launch
 - Product Research and demonstration (field trials)
 - Developing and piloting (selling of compost in 54 agro-dealers, promotional activities)
 - Processing and quality control (for compost)
 - Impact Assessment

4. Explanation of Project Implementation Plan

The three implementation phases (Research Phase, Testing Phase and Commercial Launch Phase) can be seen on the horizontal axis towards the top. The different activity categories (Market Research on smallholder farmers, Product Research and Demonstration for Compost, Developing and Piloting, Processing and Quality Control as well as Impact Assessment) can be seen on the vertical axis on the left.

Below will provide further information on the activities planned and/or already started by activity category.

4.1 Market Research on smallholder farmers

Analyzing farmers' agricultural baseline: This will take place in a two-fold manner. First, based on data available from Farm Shop as well as a literature review, Nairobi University will undertake a market segmentation of smallholder farmers in the project area. This study will focus on soil types, cultivated crop species and crop production practices. Second, more extensive data on farmers' agricultural baseline will be undertaken as part of the impact baseline study to be conducted in early 2015.

The literature review study is currently being undertaken and is expected to be completed by September 2014. Data collection on farmers' agricultural baseline will take place alongside the baseline survey in early 2015.

Analyzing farmers' use of information/marketing channels: This will also take place alongside the baseline impact study. Its result will inform the marketing approach to be tested. The survey will take place alongside the impact baseline survey in early 2015

Competitive Analysis: The competitive analysis will give an overview of products competing with compost. It is currently being undertaken and is scheduled for September 2014

Distribution Analysis: The distribution analysis will inform the project on the avenues of distributing compost to both agro-dealers and from agro-dealers to farmers. It will be done prior to the Testing Phase.

4.2 Product Research and Demonstration for Compost

3 mother field trials: One mother field trial was already started in April 2013, thereby providing early data points on the performance of TakaTaka Solutions' compost. This trial site is located in Kiambu district (high fertility area) in the vicinity of Banana Town on 3 acres. The next trial site has already been identified in Machakos County near Thika (medium fertility area), and planting will start in October 2014. The third trial site will be located in Kajiado County near Ngong (low fertility area). As Ngong is a low fertility area, planting will start with the long rains in April 2015.

The mother field trial plots will showcase the value of compost in a scientific manner. They will also serve as a marketing tool to farmers. The mother field trials are managed by TakaTaka Solutions and Nairobi University.

The set-up of the trial sites is as follows:

- 6 crops (maize, potatoes, French beans, spinach, cabbage, onions)
- 4 inputs (compost, chemical fertilizer, manure, rock phosphate)
- Each input in a high and low application rate, reflecting different income levels of farmers
- Inputs in 19 combinations (control, low compost & high fertilizer, high compost alone, et cetera)
- 4 replications of each crop-input combination (e.g. maize on high compost & high manure) for statistical relevance
- →Total of 456 trial plots

9 baby field trials: Each mother field trial will have three baby field trials in its surrounding. A baby field trial is a smaller version of the mother field trial, which is located on farmers' plots. They mainly function as a marketing tool to demonstrate the value of compost to farmers. The baby trials will only have two crops (maize and potatoes) and three inputs (compost, chemical fertilizer and manure).

The first three baby field trials will be started in Kiambu in October 2014. The remaining six baby field trials will be started in Machakos and Kajiado in April 2015. The late start is due to the long rains.

Compost laboratory analysis: In conjunction with Nairobi University, both the compost and the soils in the field trials will be analyzed. This will start after the current planting season, i.e. from October 2014, and will be ongoing throughout the project.

Analysis of field trial results: In conjunction with Nairobi University the field trial results will be continually analyzed. This will both showcase the benefits of compost as well as providing relevant data for marketing. Analysis of field trial results will start in October 2014.

Assessment of compost economics: This will entail the profitability analysis of producing and distributing TakaTaka Solutions' compost at every step. It will be undertaken at the beginning of the Testing Phase.

4.3 Developing and Piloting

Selection and development of marketing tools: Different marketing tools will be tested in the Testing Phase. This will help in identifying an ideal marketing mix, which will be used in the Commercial Launch project phase to market compost.

The following four marketing channels have been identified that will be tested:

- 1: In-shop marketing (marketing materials, training of agro-dealer staff, surveys)
- 2: Radio (including the development of a four-feature radio show on compost)
- 3: SMS marketing campaign
- 4: Marketing around trial plots

Testing & development of marketing tools through pilot sale: In the Testing Phase six agro dealers will be selected. Two of them will only conduct (1), two of them will conduct (1) & (2) & (3) and two of them will conduct (1) & (2) & (3) & (4). After two months of marketing through the respective channels, an extensive survey will be conducted with farmers in the area. This will establish both if they were reached by the respective marketing channels and how effective the marketing channel had been. Furthermore, survey will also be conducted at the agro-dealers to analyze the effectiveness of the various marketing channels.

Testing of supply chain logistics through pilot sales: Different supply chain options will be tested in the Testing Phase.

Expansion of TakaTaka Solutions' waste collection services: TakaTaka Solutions' waste collection services will be continually expanded throughout the project. The expansion of waste collection services is important both in terms of supplying the input for the compost production as well as for job creation. Currently, TakaTaka Solutions is collecting from around 5,000 households (25,000 people) in the low-income areas of Kangemi and Kawangware in Nairobi. This has created jobs for 42 people as of August 2014.

Expansion of agro-dealers to 54: Compost is to be sold to 9,000 through 54 agro-dealers. The agro-dealers will consist both of Farm Shop agro-dealers as well as other agro-dealer networks. Currently, the project has access to 15 agro-dealers through the Farm Shop network. Additional non Farm Shop agro-dealers will be recruited from October 2014.

Roll-out of sales to 9,000 farmers through 54 agro-dealers: This is the ultimate goal of the project. It will be realized in the last phase of the project, the Commercial Launch Phase.

4.4 Processing and Quality Control

Scale TakaTaka Solutions' compost production to 240 tons/month: Scaled production of compost production will provide the relevant compost quantities that are to be sold to farmers. The scaling will happen through increased waste collection customers (see. 4.3) and through increased production capacity. The latter entails the building of a modern composting plant using Gore-tex composting equipment. Currently TakaTaka Solutions is producing 40 tons of compost per month, however, this will significantly increase in the coming months with the pipeline of new waste collection customers. The Gore-tex composting system is currently being imported and should be functional by end year 2014.

Certification: To sell compost certification is required. The process of certification by Kenyan standards is currently ongoing and expected to be completed by October 2014. Thereafter, regular quality control will take place to ensure adherence to the certification standards.

4.5 Impact Assessment

Initial visit: The initial scoping visit took place as scheduled in August 2014. A report will follow shortly.

Evaluation strategy including indicators: Subsequent to the visit, the University of Michigan staff will write the evaluation strategy, which also includes the list of indicators. This document is due in September 2014.

Baseline survey written: After agreeing on the evaluation strategy with USAID, the baseline survey will be written. It will also include the components on 'agricultural baseline' and on 'communication/marketing tools used by farmers'.

Survey pilot & training of enumerators: Once the baseline survey has been written, enumerators will be trained. To make sure that the baseline survey will be properly conducted, a pilot survey will be run.

Baseline survey undertaken: After the pilot survey, the actual baseline survey will be conducted. Most likely the baseline survey will be conducted with the support of mobile phone survey tools (e.g. Dimagi - CommTrack) to ensure that data is properly collected.

Endline survey written: After the baseline survey has been conducted, the endline survey will be written.

Endline survey undertaken: After its writing, the endline survey will be conducted. Most likely the endline survey will be conducted with the support of mobile phone survey tools (e.g. Dimagi - CommTrack) to ensure that data is properly collected.

Final report: After analyzing both baseline and endline survey, the final impact assessment report will be written by the University of Michigan.

5. Project photos



Trial farm in Banana Hills, Kiambu. Photo from bottom of farm.



Trial farm in Banana Hills, Kiambu, Photo from top of farm.



Trial farm in Banana Hills, Kiambu. Seedling propagation before planting.



Trial farm in Banana Hills. View from bottom of farm.



Waste collection at client of TakaTaka Solutions.



Storing of sorted waste at waste transfer point, Kawangware.



Sacks for sorting waste at waste transfer point, Kawangware.



Training of school children on waste separation



Signs for waste separation at waste collection clients



Bins with waste separation sign at client's plot



Waste collection truck



Construction at new processing/composting facility of TakaTaka Solutions



Manual composting at new facility (awaiting for arrival of Gore technology)



Glass bottles awaiting recycling at TakaTaka Solutions' new facility



Recycled glass made by TakaTaka Solutions



Closing the rural-urban nutrient cycle: From waste to increased agricultural productivity

Strategic Analysis (Qualitative) Phase - Addendum

Deliverable 2: Interviews and conversations conducted for the Strategic Analysis Phase

Grant Number: AID-OAA-F-13-00043

Submitted by The William Davidson Institute at the University of Michigan (WDI)

Date: August 29, 2014; Addendum: October 28, 2014

This report was prepared by Heather Esper and Yaquta Fatehi, members of the Assessment team at WDI, based on our assignment to complete a study with TakaTaka Solutions (Kenya) to identify the impacts on farmers from the use of high-quality compost, under a grant AID-OAA-F-13-00043, funded by the United States Agency for International Development (USAID). The field visit was conducted in Nairobi, Kenya from August 19th -26th, 2014. This field report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of The William Davidson Institute at the University of Michigan and do not necessarily reflect the views of USAID or the United States Government.



Farmer Interview Guide

WDI OFFICE USE ONLY	
Interviewer Name:	
Interviewee Number:	
Date:	
Time:	
County, Town:	
Months for Long rain and harvest date	March/April to May/June
Months for Long rain	October to November/December
How to describe location:	

Legend: Bold-> in the survey given to TL for feedback; Underline-> absolutely must ask this question; red text-> ask a few farmers

Hello! My name is _____ and I work at the William Davidson Institute at the University of Michigan in Michigan, USA. I am here today to learn about you and your farming practices as part of a study to understand how soil practices can impact farmers and their households. Your information will be kept anonymous and confidential and we will not share it with any external party. Thank you very much for your cooperation! If you have any questions for me anytime during the interview, feel free to ask me.

Note to selves: Focus of qualitative interviews is how farmers get to answer/# not exact answer/#

Section 1: FARMER DEMOGRAPHICS

First, I would like to know more about you and the persons who live in your household.

1. Please tell me your name:
2. Please tell me how old you are:

3. Please tell me your civil status: married, separated, divorced, widowed
4. How many years have you been farming for?
5. **How many people live with you in your house?** Please share some information about these persons; starting with the youngest, please tell me their name and age. *IWR PROBE: probe education*

<u>Name</u>	<u>Age</u>	<u>Education</u>

6. *If you are not available, and someone wants to learn more about your farm, who in your household knows about this farm as well as you?*

Section 2: FARM CHARACTERISTICS AND PRACTICES

7. **Please tell me about your farm. I know sometimes farmers have multiple plots of land. I am interested in knowing about the different types of areas that you farm on.** *IWR NOTE: For each plot learn location from home, tenure status (own, rent), estimate of size and what they grow on that plot in the long rains.*

<u>Plot 1 (size, location, tenure status, what crops do you grow on it in long rains,</u> rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?	<u>Plot 2 (size, location, tenure status, what you grow on it in long rains,</u> how is plot 2 different from plot 1 outside of crops e.g. use only some inputs, soil quality etc.) , rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?	<u>Plot 3 (size, location, tenure status, what you grow on it in long rains,</u> how is plot 3 different from plot 1 & 2 outside of crops e.g. use only some inputs, soil quality etc.) , rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?	<u>Plot 4 (size, location, tenure status, what you grow on it in long rains,</u> how is plot 4 different from plot 1, 2 & 3 outside of crops e.g. use only some inputs, soil quality etc.) , rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?

--	--	--	--

IWR NOTE: For each plot learn what they grow on that plot in the short rains.

<p>Plot 1 (what crops do you grow on it in the short rains; rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?</p>	<p>Plot 2 (what you grow on it in short rains, how is plot 2 different from plot 1 outside of crops e.g. use only some inputs, soil quality etc.) , rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?</p>	<p>Plot 3 (what you grow on it in short rains, how is plot 3 different from plot 1 & 2 outside of crops e.g. use only some inputs, soil quality etc.) , rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?</p>	<p>Plot 4 (what you grow on it in short rains, how is plot 4 different from plot 1, 2 & 3 outside of crops e.g. use only some inputs, soil quality etc.) , rate the soil on this plot (1-5 where 5 is very good). What crops are the largest percentages by amount? By value received?</p>

8. Now take me through your growing process for the focus crops from preparing the soil, planting the seeds all the way to selling crops in the market; tell me about any variation by crop, how the rain matters in this process; please also tell me in each step who works on the farm; Also, tell me in each step what input you add and how much of it; IWR PROBE: You want to know all inputs they use; as such if they don't list something ask specifically " Please tell me all the inputs that you use when farming e.g. fertiliser, manure, fungicide,

pesticide, hybrid seeds, local seeds, irrigation pump” NOTE TO SELF: May need to ask this process for each specific crop. May want to prioritize asking only about 2 crops in quantitative survey rather than all crops using compost

Activity for long rains	When in the year is this done?	What inputs are used here?	How much of this input do you apply here? Do you apply evenly in all the plots you mentioned?	<u>Why do you apply this input?</u>	Who helps you do this?	Do you pay cash to this person for helping you on the farm in this activity? [Y/N]	Do you incur any other expenses in this stage? If yes – what is it?
Preparing soil – pruning							
Preparing soil – mulching							
Planting seeds							
Applying fertiliser							
Removing weeds							
Removing pests							
Planting other trees							
Managing water for farm							
Harvesting							
Storing							
Selling to market							

Now please tell me the same for the crops in the short rains

Activity for short rains	When in the year is this done?	What inputs are used here?	How much of this input do you apply here? Do you apply evenly in all the plots you mentioned?	<u>Why do you apply this input?</u>	Who helps you do this?	Do you pay cash to this person for helping you on the farm in this activity? [Y/N]	Do you incur any other expenses in this stage? If yes – what is it?
Preparing soil – pruning							
Preparing soil – mulching							
Planting seeds							
Applying fertiliser							
Removing weeds							
Removing pests							
Planting other trees							
Managing water for farm							
Harvesting							
Storing							
Selling to market							

9. Coming back to the inputs that you use on your farm, please take me through the inputs that you use: IWR PROBE: Why didn't you use other inputs (this will help get at the value proposition and risk as we ask above why they applied certain inputs)

FOR FOCUS CROP 1:

Year	Input used	How much do you apply?	Do you apply this evenly in all areas?	How did you get this input? If bought how much do you spend on this input?
2014 long rain	DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2			
2013 long rain	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2

FOR FOCUS CROP 2:

Year	Input used	How much do you apply?	Do you apply this evenly in all areas?	How did you get this input? If bought how much do you spend on this input?
2014 long rain	DAP CAN Urea Manure Hybrid seeds	DAP CAN Urea Manure Hybrid seeds	DAP CAN Urea Manure Hybrid seeds	DAP CAN Urea Manure Hybrid seeds

	Local seeds Fungicide Other 1 Other 2			
2013 long rain	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2

FOR FOCUS CROP 3:

Year	Input used	How much do you apply? (weight)	Do you apply this evenly in all areas?	How did you get this input? If bought how much do you spend on this input?
2014 long rain	DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2			
2013 long rain	Was it the same? DAP CAN Urea Manure			

Hybrid seeds	Hybrid seeds	Hybrid seeds	Hybrid seeds
Local seeds	Local seeds	Local seeds	Local seeds
Fungicide	Fungicide	Fungicide	Fungicide
Other 1	Other 1	Other 1	Other 1
Other 2	Other 2	Other 2	Other 2

10. How does the risk you face change when you purchase these inputs?

- a. Why do you feel that it changes in this way? Please help me understand this better.
- b. How can we measure this change in risk that a farmer is feeling
- c. Who is the main decision maker to purchase these inputs?
- d. In general, do you think these inputs are worth the money for farmers (not asking specifically you, I am asking in general)?

11. Coming back to the inputs that you use on your farm, what are the different ways that farmers in your community use to purchase inputs- what have you heard? IWR PROBE: How does this purchase affect your other assets? IWR PROBE: Did you have to take a loan to purchase all these inputs? IWR NOTE: manure could be made at home

- a. **How much money on average do you have to pay for transport to the agro-shop or to transport the materials back to your farm?**

12. If you had any questions about agriculture – such as how to use a particular input – how would you seek the information?

Section 3: FARM PRODUCTIVITY

13. For each of your focus crops you grow in the long season tell me: how do you measure your yield (the area over which you grow this (an estimate is fine)), how do you track how much your household eats, how much you give your friends/other farmers, how much you lose (IWR PROBE: field loss or storage loss), how much you sell in the market and what do you earn for it? How would you suggest we collect this information through farmers? IWR NOTE: if the farmer uses a bag as a unit, ask the farmer if s/he knows how much that bag weighs when full.

IWR NOTE: Reflect back on each crop listed in question 5 when the farmer discussed his plots and ask about each one individually. Be aware that the farmer can add any new crops that he/she didn't mention in question 5.

IWR NOTE: Focus crop is based on crop that is percent wise grown the most for selling as well as any crop that gets the most value of money by percent. IWR PROBE: Does someone else in your house have a better sense of this answer?

FOR FOCUS CROP 1:

<u>Year</u>	<u>Yield per crop (harvested output)</u>	<u>Month harvested</u>	<u>Total area over which you grow this</u>	<u>How much your HH eats of it? Does someone else in your house have a better sense of this answer?</u>	<u>How much you give to friends/farmers Does someone else in your house have a better sense of this answer?</u>	<u>How much you keep in the storage</u>	<u>How much is lost (field as well as storage losses)</u>	<u>How much do you sell – and to who? Is there variation risk of selling such as who sell to and time of year? Is there variation in price based on the amount you sell?</u>	<u>How much you earn for this amount that you sold – per buyer?</u>	<u>Which month stock gets COMPLETELY over</u>	<u>Amount of rain</u>
2014 long rain											
2013 long rain											
2012 long rain											

FOR FOCUS CROP 2:

<u>Year</u>	<u>Yield per crop (harvested output)</u>	<u>Month harvested</u>	<u>Total area over which you grow this</u>	<u>How much your HH eats of it? Does someone else in your house have a better sense of this answer?</u>	<u>How much you give to friends/farmers Does someone else in your house have a better sense of this answer?</u>	<u>How much you keep in the storage</u>	<u>How much is lost (field as well as storage losses)</u>	<u>How much do you sell – and to who? Is there variation risk of selling such as who sell to and time of year? Is there variation in price based on the amount you sell?</u>	<u>How much you earn for this amount that you sold – per buyer?</u>	<u>Which month stock gets COMPLETELY over</u>	<u>Amount of rain</u>
2014 long rain											
2013 long rain											
2012 long rain											

FOCUS CROP 3

<u>Year</u>	<u>Yield per crop (harvested output)</u>	<u>Month harvested</u>	<u>Total area over which you grow this</u>	<u>How much your HH eats of it? Does someone else in your house have a better sense of this answer?</u>	<u>How much you give to friends/farmers Does someone else in your house have a better sense of this answer?</u>	<u>How much you keep in the storage</u>	<u>How much is lost (field as well as storage losses)</u>	<u>How much do you sell – and to who? Is there variation risk of selling such as who sell to and time of year? Is there variation in price based on the amount you sell?</u>	<u>How much you earn for this amount that you sold – per buyer?</u>	<u>Which month stock gets COMPLETELY over</u>	<u>Amount of rain</u>
2014 long rain											
2013 long rain											
2012 long rain											

After they tell you earnings per crop per buyer – sum it up and ask “so roughly, do you earn X KSH for all sales in 2014? Y KSH for all sales in 2013)

14. What kind of trainings do farmers receive every year? Who provides them and how do farmers access them?

- a. Which of these have you attended in this past year?
 - b. How has these helped you?
 - c. Are you part of any groups? If yes, what kind of information do you receive there?
15. What kind of risk do farmers face with each kind of buyer?
16. How does the amount of economic risk a farmer faces change with increasing yield?
17. What are the differences in prices by buyer – what factors do the buyers consider when they dish out a price to the farmer? *IWR PROBE: Differences in price based on when sell product?*
- a. If you get an increase in yield, do you change your buyer? *IWR PROBE: Which buyer would you go to?*
18. Do you know of other ways that farmers can earn income outside their farm?
- a. **What are all the other ways that you earn income besides from your farm? You can include your household members' income as well as any remittances or gifts you receive. *IWR NOTE: Reflect back to the demographic question about which household members works where to ensure that these match. IWR PROBE: Probe into whether anyone in the household works on other farms, sells non-farm products like livestock products, works in an external shop or company like M-PESA. Any earnings from a farmer co-operative?***
 - b. Do you know if any of your household members work as unpaid workers where they do not get money for their work?
 - c. Do you use any money platforms to sell your produce?
19. How do you engage with a government ag extension worker?
20. What external shocks can occur that threaten your harvest?
- a. If any of these occur will you be able to manage?

Section 4: COMPOST USE

21. **Do you use compost? *IWR PROBE: The farmer may be using manure- ask if they use manure if he/she says no to compost? IWR PROBE: Do you use the compost/manure with chemical fertilisers or in addition to any other soil fertility management practice e.g. trees on your farm, shrubs on your farm, or improved fallows?***
- a. How many hectares do you use compost on?
 - b. Do you know how many farmers in the community use compost? *IWR PROBE: What is the influence of where people buy compost (quality, cost, etc.) on outcomes?*

If the farmer does not use either compost or manure, SKIP to SECTION 6

22. For how long have you applied compost?
23. Where do you buy this compost from?
- a. If it is homemade, ask if they sell the homemade compost to anyone else?

- i. If it is homemade, ask how much time does it take to prepare it?
 - 1. Would they rather buy it commercially to save the labour required?

24. Tell me how you apply this compost? *IWR PROBE: do you apply this in the same way to all your crops? On all your plots?*

- a. When is the best time to apply compost?
- a. **Where did you learn to apply it in this manner?**
- b. Do all farmers apply it in a similar manner?
- c. How can we capture variation in compost use?
 - i. How can we measure how one farmer applies it versus another farmer?

Section 5: IMPACTS FROM VARIATION IN OUTPUT

25. How does variation in output affect your well-being?

- a. ***IWR PROBE ECONOMIC WELL-BEING: In general how does change in output affect _____ for you or for someone in your household over the short planting season? Over the long planting season? (Fill the blank with each item here: income, income stability, savings, expenses (casual labour to help during planting/harvesting/etc., bags, transport to and/or loading/unloading at market paid out of own pocket, storage including security paid out of own pocket, other inputs haven't mentioned yet)-if increased expenditure what are they diverting money away from , assets like cows, assets like loans, changes in risk, ability to withstand an external shock, change in price earned for the harvest, change in focus crop)***
- b. ***IWR PROBE CAPABILITY WELL-BEING: In general how does change in output affect _____ for you or for someone in your household over the short planting season? Over the long planting season? (Fill the blank with each item here: food security, caloric and protein intake, and month that last tuber harvested? Last stocks run out? physical health, psychological health, stress, mood, confidence, self-esteem, traditional beliefs/values about the environment as well as gender, skills and knowledge about agricultural practices, skills and knowledge about market dynamics, farming confidence, pride when using organic material)***
- c. ***IWR PROBE RELATIONSHIP WELL-BEING: In general how does change in output affect _____ for you or for someone in your household over the short planting season? Over the long planting season? (Fill the blank with each item here: activities at home, free time- any activities the farmer has to reduce, give up or start to use compost, your status at home, decision-making at home, relationship with your partner your status in your co-operative if applicable, your status in the community, the***

environment example: your soil, changes to the amount input you apply and the general ecosystem in and around your farm, changes to the way you use your land or external water sources, perception about the environment) What are the effects on the broader household i.e. children, spouse, etc.?

Section 6: IMPACTS OF COMPOST USE

26. What has changed since you started using compost? IWR PROBE: quality of soil, quality of crop, quantity of crop harvested, amount of water you add to the soil, amount of chemical fertiliser you add. IWR PROBE IF TIME ALLOWS: Show me a place where you apply compost and a place where you do not apply compost?

27.

- a. **IWR PROBE for ECONOMIC WELL-BEING: Tell me more of how, if at all, _____ has changed for you or for someone in your household since using compost over the short planting season? Over the long planting season? (Fill the blank with each item here: income, income stability, savings, expenses (casual labour to help during planting/harvesting/etc., bags, transport to and/or loading/unloading at market paid out of own pocket, storage including security paid out of own pocket, other inputs haven't mentioned yet)-if increased expenditure what are they diverting money away from, assets like cows, assets like loans, changes in risk, ability to withstand an external shock, change in price earned for the harvest, change in focus crop)**
- b. **IWR PROBE CAPABILITY WELL-BEING: Tell me more of how, if at all, _____ has changed for you or for someone in your household since using compost over the short planting season? Over the long planting season? (Fill the blank with each item here: food security, caloric and protein intake, and month that last tuber harvested? Last stocks run out? physical health, psychological health, stress, mood, confidence, self-esteem, traditional beliefs/values about the environment as well as gender, skills and knowledge about agricultural practices, skills and knowledge about market dynamics, farming confidence, pride when using organic material)**
- c. **IWR PROBE RELATIONSHIP WELL-BEING: Tell me more of how, if at all, _____ has changed for you or for someone in your household since using compost over the short planting season? Over the long planting season? (Fill the blank with each item here: activities at home - any activities the farmer has to reduce, give up or start to use compost, free time, your status at home, your relationship with your partner, decision-making at home, your status in your co-operative if applicable, your status in the community, the environment example: your soil, changes to the amount input you apply and the general ecosystem in and around your farm, gender equality, changes to the way you use your land or external water sources, perception about the environment) What are the effects on the broader household i.e. children, spouse, etc.?**

- d. How does using compost change work others in household do?
- e. What is the influence of loans, cooperatives, mobile money on impact of compost?
- f. If you needed any advice on compost, who do you turn to?
 - ii. Where does this person live?
 - iii. What is your relationship with this person?

28. What impacts can you expect to envision after one harvest season? Subsequent seasons?

29. What significant changes do you see occurring for farmers in your community in the near future

- a. What significant changes do you see for your farm in the horizon good or bad?

30. How would you describe how the soil changes after one season of using compost? After two seasons? After many more seasons? IWR PROBE: Changes in moisture content, soil erosion (runoff, soil structure)? IWR PROBE: Changes in plants such as changes in disease (wilting, spots, etc.)? Yield?

31. How do variations in training affect impact of compost?

Section 7: COMPARISONS AND RELATIONSHIPS W OTHER FARMERS IN THE COMMUNITY

32. How do farmers judge each other in the community? What differentiates one farmer from another IWR PROBE: on what basis do you compare yourself with another farmer?

33. Who do farmers tend to be friends with in this community – other farmers of equal standing (social-economic class) or with farmers of lower socio-economic standing?

34. Are farmers willing to share information in this community – if not, why do you think this is the case?

- a. Who would you be willing to share information with?
- b. Are you worried that if you share information with another farmer, they will do better than you?

35. Who do you aspire to be like?

- a. Who do you compare yourself with?

If the farmer uses compost:

36. Why don't other farmers use compost like you?

37. Compared to others in the community who are not using compost, what changes do you see in your farm/lives versus their farm/lives? IWR NOTE: After the farm, ask about, "compared to those that are not using compost, what changes do you see in your life versus their life as a result of you using compost"

- a. ***IWR PROBE: What problems these farmers who do not compost have because they are not using the compost? IWR NOTE: Follow this by “what benefits do you see these farmers as having from not using compost in their farms?”***

If the farmer does not use compost/manure:

38. Over the last year, did you use any techniques that to conserve your soil or water (protect)? IWR NOTE: animal manure; compost; crop residue; leave your land uncultivated for some time (natural fallow), plant some woody or herbaceous plants for some time (improved fallow), intercrop, plant an organic source at different time from your crop (relay systems), grow intercrops or rotation with cereals (dual purpose legumes), biomass transfer;
- Over how much area of your land do you conduct each of these practices?
 - How did you learn to use this technique?
39. Why do you not use compost or manure? *IWR PROBE: is it too expensive, not available, do know about this input, too risky or would have low yield in bad reason and hence money wasted, in general – it is not worth it, some other reason?*
40. **Compared to others in the community who are using compost, what differences do you see between your farm/lives and their farm/lives? IWR NOTE: After the farm, ask about, “compared to those that are using compost, what differences do you see in your life and their life?**
- IWR PROBE: What problems do these farmers that use compost as have when compared to you? IWR NOTE: Follow this by”what benefits do you see these farmers as having from using compost?”***
41. **Any final thoughts or comments that I didn’t ask or didn’t get a chance to hear from you?**

Many thanks for taking the time today to speak with me. I would like to give you this gift as a token of my appreciation for the time you spent with me. Do you have any questions for us?



Agro-dealer Interview Guide

WDI OFFICE USE ONLY	
Interviewer Name:	
Interviewee Number:	
Date:	
Time:	
County, Town:	
How to describe location:	

Legend: Underline-> absolutely must ask this question

Hello! My name is _____ and I work at the William Davidson Institute at the University of Michigan in Michigan, USA. I am here today to learn about you, the products you sell in your shop and the interactions you have with farmers. Your information will be kept anonymous and confidential and we will not share it with any external party. Thank you very much for your cooperation! If you have any questions for me anytime during the interview, feel free to ask me.

Section 1: BASIC DEMOGRAPHICS

1. Please tell me your name:
2. How long have you been working in this Ag shop?
3. Do you own this shop?

Section 2: CONTEXT

4. How would you differentiate between the farmers in the area you serve? IWR PROBE: by income, by size of farms, by the inputs used, by good versus not so good practices, by number of years they do farming?
 - a. On what items do farmers judge/compare themselves to other farmers in the community?
 - b. What percentage of farmers do you cover in your area?

Section 3: SHOP PRODUCTS

5. What are all the different products you sell in this shop?

Year	Input sold	How much do you charge?
2014 long rain	DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	DAP CAN Urea Manure Fungicide Other 1 that impacts compost Other 2 that impacts compost
2013 long rain	Was it the same as 2014? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2	Was it the same as 2014? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 that impacts compost Other 2 that impacts compost

Section 4: FARMERS' USE OF INPUTS

6. What are the most common inputs that farmers in your area use? *IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and try to ask them to guesstimate percentages*
7. If the farmer had questions on inputs, who would they turn to?
8. What kind of variation do you find in the way different farmers use/apply the same input? *IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and local seeds*
 - a. How do you learn how farmers apply the inputs you sell?

Section 5: FARMERS' USE OF COMPOSTS AND IMPACT

9. What is the optimal and minimum amount of compost that should be applied?
10. How do you convince farmers to use compost? What would you say? [REWORD: What will the impacts of compost be?] *IWR PROBE: Probe economic, capability and relationship well-being: yield, income, expenses, savings, risk, income stability, health, knowledge, schooling for children, self-confidence, pride, free time, social network, ecosystem, environment?*

- a. IWR PROBE: What is the influence of where people buy compost (quality, cost, etc.) on outcomes?
- 11. What will the impacts of compost – both good and challenging – be for farmers?
- 12. How are farmer’s lives different when they use compost as compared to those that don’t over long planting season, over short term planting season, over multiple seasons? When do you envision these impacts as occurring – after many growing seasons? What impacts will farmers be able to enjoy immediately?
 - a. IWR PROBE
 - i. *How do activities at home change?*
 - ii. *How do financial resources change such as expenditure, income, income stability? If increased expenditure, what are they diverting money from? Risk?*
 - iii. *Ag productivity data points: Hectares planted, harvest yield, value of sales, quantity of yield sold, costs from purchases of inputs*
 - iv. *Physical health? Food security, caloric and protein intake? Stress, mood, confidence? Feelings about self?*
 - v. *Time? Status? Traditional beliefs/values about the environment as well as gender?*
 - vi. *What are the effects on the broader household i.e. children, spouse, etc.? Quality of the broader ecosystem (water quality and quantity)?*
 - b. IWR PROBE: *What long-term impacts do you expect to occur?*
 - c. IWR PROBE: *What is the influence of loans, cooperatives, mobile money on impact of compost?*
 - d. IWR PROBE: *IWR PROBE: How do variations in training affect impact of compost*
- 13. How will variation in crop output affect well-being of farmers?
- 14. Who do farmers sell their end farm products to? Is there variation in who they sell to or in time they sell?
- 15. What are the biggest changes seen in people using compost versus those who don’t?
- 16. Any examples or recommendations on how to measure agriculture productivity?
 - b. How can we have farmer’s self-report changes in soil erosion, (runoff, soil structure) as well as reduced disease (wilting, spots, etc.)? Yield?

Section 6: CHALLENGES

- 17. What challenges do you envision for farmers to use compost? [REWORD: What are the biggest constraints that farmers face when accessing compost?] *IWR PROBE: additional labour required, additional time spent on the field, poor training, poor application methods, poor response due to soil nature, crops grown?, not enough chemical fertilizer being applied to see full effective response from compost, costs, access, risk, transport, very high expectations from compost which are not met*

18. What are the biggest challenges that farmers face in purchasing inputs to increase yields? *IWR PROBE: affordability of inputs, access to inputs, dependence on rainfall, amount of risk that they can withstand, knowledge and skills to improve yields/use new inputs, counterfeit inputs, agro-dealers do not carry enough stocks,*
19. What are your biggest challenges in selling compost?

Section 7: MEASUREMENT

20. What is the best way to get rain estimates for the three areas we are working in?
21. Best way to get market prices throughout the year?

Many thanks for taking the time today to speak with me. I would like to give you this gift as a token of my appreciation for the time you spent with me. Do you have any questions for me?



Government Agriculture Extension Officer Interview Guide

WDI OFFICE USE ONLY	
Interviewer Name:	
Interviewee Number:	
Date:	
Time:	
County, Town:	
How to describe location:	

Legend: Underline-> absolutely must ask this question

Hello! My name is _____ and I work at the William Davidson Institute at the University of Michigan in Michigan, USA. I am here today to learn about the agricultural practices in the district that you cover. Your information will be kept anonymous and confidential and we will not share it with any external party. Thank you very much for your cooperation! If you have any questions for me anytime during the interview, feel free to ask me.

Section 1: DEMOGRAPHICS

1. Please tell me your name:
2. How long have you been an ag extension worker?

Section 2: FARM CHARACTERISTICS AND PRACTICES

3. How would you describe the soil in the area that you cover?
4. How would you describe the rainfall in the area that you cover?
5. What are the most common focus crops for farmers in your area for the long growing season as well as the short growing season? /WR
PROBE: Probe these three categories: that farmers grow to sell to a buyer; that earn them the most income; that they grow the majority of)

6. Who are the different crop buyers in your area and what are the differences between them? *IWR PROBE: Is there variation in who they sell to or in time they sell? price they pay, way they interact with farmers, who they in-turn work for*
7. How would you differentiate between the farmers in your area? *IWR PROBE: by income, by size of farms, by the inputs used, by good versus not so good practices, by number of years they do farming?*
 - a. On what items do farmers judge/compare themselves to other farmers in the community?

Section 3: ROLE AND RESPONSIBILITIES

8. Please take me through your day. *IWR PROBE: who do you meet, what do you do, how much do you travel between farmers*
 - a. What services do you provide to farmers?
 - b. What kind of information (or services) do you provide to farmers? *IWR PROBE: what kind of information do you give on DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds]*
9. What kind of work do you do with agro dealers? [REWORD: what kind of interactions do you have with agro dealers in your area?]

Section 4: FARMERS' USE OF INPUTS

10. What are the most common inputs that farmers in your area use? *IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and try to ask them to guesstimate percentages*
11. What kind of variation do you find in the way different farmers use the same input? *IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and local seeds*
12. What kind of work do you do with these inputs? *IWR PROBE: if they do not mention training, then ask them. [MAP TO Q 10 and 11]*
13. How do farmers purchase these inputs? *IWR PROBE: loans, cash, savings, sell assets, mobile money?*
 - a. How does this affect their ability to take on risk?
 - b. Does the farmer have access to insurance?

Section 5: FARMERS' USE OF COMPOSTS AND IMPACTS

14. What is the optimal and minimum amount of compost that should be applied?
15. How to convince farmers to use compost? What would you say? [REWORD: What will the impacts of compost be?] *IWR PROBE: Probe economic, capability and relationship well-being: yield, income, expenses, savings, risk, income stability, health, knowledge, schooling for children, self-confidence, pride, free time, social network, ecosystem, environment?*
 - a. *IWR PROBE: What is the influence of where people buy compost (quality, cost, etc.) on outcomes?*
16. What will the impacts of compost – both good and challenging – be for farmers?

17. How are farmer's lives different when they use compost as compared to those that don't over long planting season, over short term planting season, over multiple seasons? When do you envision these impacts as occurring – after many growing seasons? What impacts will farmers be able to enjoy immediately?
- a. *IWR PROBES: How do activities at home change?*
 - i. *How do financial resources change such as expenditure, income, income stability? If increased expenditure, what are they diverting money from? Risk?*
 - ii. *Ag productivity data points: Hectares planted, harvest yield, value of sales, quantity of yield sold, costs from purchases of inputs*
 - iii. *Physical health? Food security, caloric and protein intake? Stress, mood, confidence? Feelings about self?*
 - iv. *Time? Status? Traditional beliefs/values about the environment as well as gender?*
 - v. *What are the effects on the broader household i.e. children, spouse, etc.? Quality of the broader ecosystem (water quality and quantity)?*
 - b. *IWR PROBE: What long-term impacts do you expect to occur?*
 - c. *IWR PROBE: What is the influence of loans, cooperatives, mobile money on impact of compost?*
 - d. *IWR PROBE: IWR PROBE: How do variations in training affect impact of compost*
18. How will variation in crop output affect well-being of farmers?
19. Do you think there is effective demand for commercial compost?
20. What are the biggest changes seeing in people using compost versus those who don't?
21. What do you think are the best methods to encourage farmers to continue to use compost every season when the impacts are not seen immediately? How do you get them hooked on to the product?
22. Can markets absorb the extra yield that farmers produce?
- b. How will pricing be affected? IWR PROBE: pricing improved quantity and quality?
 - c. How will the amount of money that comes in the hands of the farmer be affected?
 - i. Will labour allocation be affected when the farmer has more money in his hands?

Section 6: FARMER SOCIAL RELATIONSHIPS

23. Are farmers willing to share information on ag practices and products with one another?
- a. If no, why is this so?
24. Who do farmers make friendships with – other farmers of the same socio-economic class or farmers who are from a lower socio-economic class?
25. On what items/assets do farmers compare themselves on?

Section 7: CHALLENGES

26. What are the biggest challenges that farmers face? *IWR PROBE: affordability of inputs, access to inputs, dependence on rainfall, amount of risk that they can withstand, knowledge and skills to improve yields/use new inputs, counterfeit inputs, agro-dealers do not carry enough stocks,*
27. What challenges do you envision for farmers to use compost? [REWORD: What are the biggest constraints that farmers face when accessing compost?] *IWR PROBE: additional labour required, additional time spent on the field, poor training, poor application methods, poor response due to soil nature, crops grown?, not enough chemical fertilizer being applied to see full effective response from compost, costs, access, risk, transport, very high expectations from compost which are not met*
28. To use compost, what does the farmer have to give up if anything at all?

Section 8: MEASUREMENT?

1. What are best practices to keep in mind when talking to farmers about how they apply compost and their crop yields including capturing issues that affect yield like disease and soil erosion?
 - a. How do you think we can measure the impact of changes from _____ on farmers? (For example: how measure changes in soil quality in the short and long term? etc.).
 - b. How can we have farmer's self-report changes in soil erosion, (runoff, soil structure) as well as reduced disease (wilting, spots, etc.)
 - c. Any reports you can share with us with methods and data collection tools for collection such metrics?
 - d. Any examples or recommendations on how to measure agriculture productivity?
 - e. Any reports can share with us on how to collect information on how farmers apply compost and any variation in application?
2. What is the best way to get rain estimates for the three areas we are working in?
3. Best way to get market prices throughout the year?

Many thanks for taking the time today to speak with me. I would like to give you this gift as a token of my appreciation for the time you spent with me. Do you have any questions for me?



Expert Interview Guide

WDI OFFICE USE ONLY	
Interviewer Name:	
Interviewee Number:	
Date:	
Time:	
County, Town:	
Area of expertise	

Legend: Underline-> absolutely must ask this question

Hello! My name is _____ and I work at the William Davidson Institute at the University of Michigan in Michigan, USA. I am here today to learn about you, the products you sell in your shop and the interactions you have with farmers. Your information will be kept anonymous and confidential and we will not share it with any external party. Thank you very much for your cooperation! If you have any questions for me anytime during the interview, feel free to ask me.

Section 1: GENERAL INFORMATION AND INTERVIEW BEST PRACTICES

1. Please share more regarding what you do – a brief high-level overview will be very helpful.
2. What best practices should we keep in mind when we interview farmers? Example: During your interviews, how would you rate the accuracy with which farmers are able to remember their yield, price and other harvest information?
 - a. How can we triangulate this information?
 - b. What methods are available to collect data on farmers outside of asking the farmers themselves?

Section 2: IF SOIL EXPERTS

3. What are the benefits of compost to the soil?
4. What are the benefits of compost to the larger ecosystem?

5. How can compost impact the quality of the crop? [as compost increases the water content as well as releases nitrogen at the correct time, how does this affect the quality of the soil; we ask about quality both in terms of gaining higher prices in the market as well as higher nutritional content of the food]
6. What is the optimal and minimum amount of compost that should be applied?
7. How many applications does a farmer have to conduct to get the full effectiveness of compost?
 - a. What kind of training should be provided to farmers when they purchase compost in order to gain its full efficiency? [REWORD: What increases the effectiveness of compost: training/timing/other simultaneous inputs that need to be applied?]
8. What kind of questions should we ask farmers to understand the environmental impacts on the soil and water in the local areas (soil nutrient and structure, soil's ability to hold water, soil pH, soil erosion)
9. When do you envision these impacts as occurring – after many growing seasons? What impacts will farmers be able to enjoy immediately?
10. How to convince farmers to use compost? What would you say? [REWORD: What will the impacts of compost be?] IWR PROBE: Probe economic, capability and relationship well-being: yield, income, expenses, savings, risk, income stability, health, knowledge, schooling for children, self-confidence, pride, free time, social network, ecosystem, environment?
11. While overuse of chemical fertilizer is bad for the environment, what impacts can we say from reduced use of chemical fertilizer and reduced pesticides over time when it comes to impact on the environment (can we simply say reduced likelihood of degradation of downstream water quality, reduced likelihood of eutrophication or reduced likelihood of production of greenhouse gas - nitrous oxide?).

Section 3: IF FARMER EXPERTS

12. How will variation in crop output affect well-being of farmers?
13. How would you differentiate between the farmers in the area you serve? IWR PROBE: by income, by size of farms, by the inputs used, by good versus not so good practices, by number of years they do farming?
 - a. On what items do farmers judge/compare themselves to other farmers in the community?

Section 4: FARMERS' USE OF INPUTS

14. What are the most common inputs that farmers in your field of study use? IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and try to ask them to guesstimate percentages
15. What kind of variation do you find in the way different farmers use the same input? IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and local seeds

Section 5: CHALLENGES

16. What if any negative changes do you know occur from _____ on farmers? Any activities the farmer has to reduce, give up or start to use compost?

17. What challenges do you envision for farmers to use compost? [REWORD: What are the biggest constraints that farmers face when accessing compost?] *IWR PROBE: additional labour required, additional time spent on the field, poor training, poor application methods, poor response due to soil nature, crops grown?, not enough chemical fertilizer being applied to see full effective response from compost, costs, access, risk, transport, very high expectations from compost which are not met*
18. Could you tell me in what scenarios do you think compost will not be effective?
19. If the farmer is already using some ISFM method - how will his uptake of compost impact him?

Section 6: IMPACT

20. How are farmer's lives different when they use compost as compared to those that don't over long planting season, over short term planting season, over multiple seasons? When do you envision these impacts as occurring – after many growing seasons? What impacts will farmers be able to enjoy immediately?
 - e. *IWR PROBES: How are farmer's lives different when they use compost as compared to those that don't over long planting season, over short term planting season, over multiple seasons?*
 - i. *How do activities at home change?*
 - ii. *How do financial resources change such as expenditure, income, income stability? If increased expenditure, what are they diverting money from? Risk?*
 - iii. *Ag productivity data points: Hectares planted, harvest yield, value of sales, quantity of yield sold, costs from purchases of inputs*
 - iv. *Physical health? Food security, caloric and protein intake? Stress, mood, confidence? Feelings about self?*
 - v. *Time? Status? Traditional beliefs/values about the environment as well as gender?*
 - vi. *What are the effects on the broader household i.e. children, spouse, etc.? Quality of the broader ecosystem (water quality and quantity)?*
 - f. *IWR PROBE: What long-term impacts do you expect to occur?*
 - g. *IWR PROBE: What is the influence of loans, cooperatives, mobile money on impact of compost?*
 - h. *IWR PROBE: IWR PROBE: How do variations in training affect impact of compost*
21. What long-term impacts do you expect to occur?
22. What is the influence of loans, cooperatives, mobile money on impact of compost?
23. What is the influence of where people buy compost (quality, cost, etc.) on outcomes?
24. How do variations in training affect impact of compost

Section 7: MEASUREMENT

25. How do you think we can measure the impact of changes from _____ on farmers? (for example: how measure changes in soil quality in the short and long term?, etc.).
26. Any reports you can share with us with methods and data collection tools for collection such metrics?
 - a. Any examples or recommendations on how to measure agriculture productivity? Yield?
 - b. How can we have farmer's self-report changes in soil erosion, (runoff, soil structure) as well as reduced disease (wilting, spots, etc.)
27. Any reports can share with us on how to collect information on how farmers apply compost and any variation in application?
28. Anyone else we should speak with that can share more with us regarding potential negative impacts from compost use, how to survey farmers on self-reporting (such as yield, disease, soil erosion, application of compost, water quality).
29. What is the best way to get rain estimates for the three areas we are working in?
30. Best way to get market prices throughout the year?

Many thanks for taking the time today to speak with me. I would like to give you this gift as a token of my appreciation for the time you spent with me. Do you have any questions for me?



Questions for FarmShop Management

Section 1: FARMSHOP CONTEXT

1. What is the expansion plan timeline relevant to Farmshop franchisees selling TakaTaka compost ?
2. What M&E indicators is FarmShop tracking?

Section 2: LOCAL FARMERS CONTEXT

31. How would you differentiate between the farmers in the area you serve? IWR PROBE: by income, by size of farms, by the inputs used, by good versus not so good practices, by number of years they do farming?
 - c. On what items do farmers judge/compare themselves to other farmers in the community?
2. How will variation in crop output affect well-being of farmers?

Section 3: SHOP PRODUCTS

1. What are all the different products that your franchisees sell?

Year	Input sold
2014	DAP
long	CAN
rain	Urea
	Manure
	Hybrid seeds
	Local seeds
	Fungicide
	Other 1
	Other 2

2013 long rain	Was it the same as 2014? DAP CAN Urea Manure Hybrid seeds Local seeds Fungicide Other 1 Other 2
----------------------	----------------------------------------------------------------------------------------------------------------------------

2. Will it be difficult for FS franchisees to carry compost?
 - a. Will it be difficult to convince them to carry compost?
 - b. How much stock do FS franchisees plan to carry of TT compost?
 - c. Do you believe there is effective demand for commercial compost?
 - d. How many farmers make their own homemade compost?
 - e. How will homemade manure that farmers apply affect their willingness to pay for commercial compost?/ will still make them want to buy compost?
 - f. Do you know of adulterated compost/organic material in the market?
 - i. How do counterfeit products affect farmers views on inputs?
3. What sales indicators do FarmShop franchisees tracking on the products sold/farmer?

Section 4: FARMERS' USE OF INPUTS

4. What are the most common inputs that farmers use? *IWR PROBE: list DAP, CAN, Urea, manure, compost ,irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and try to ask them to guesstimate percentages*
5. What kind of variation do you find in the way different farmers use/apply the same input? *IWR PROBE: list DAP, CAN, Urea, manure, compost, irrigation, improved fallows or other kind of soil fertility management methods, hybrid seeds and local seeds*
 - i. Where is this variation coming from?
 - j. How do you learn how farmers apply the inputs you sell? [How can we measure how farmers apply their inputs?]

Section 5: FARMERS' USE OF COMPOSTS AND IMPACT

6. How do you convince farmers to use compost? What would you say? [REWORD: What will the impacts of compost be?] *IWR PROBE: Probe economic, capability and relationship well-being: yield, income, expenses, savings, risk, income stability, health, knowledge, schooling for children, self-confidence, pride, free time, social network, ecosystem, environment?*
 - k. IWR PROBE: What is the influence of where people buy compost (quality, cost, etc.) on outcomes?

Section 6: CHALLENGES

1. What challenges do you envision for farmers to use compost? [REWORD: What are the biggest constraints that farmers face when accessing compost?] *IWR PROBE: additional labour required, additional time spent on the field, poor training, poor application methods, poor response due to soil nature, crops grown?, not enough chemical fertilizer being applied to see full effective response from compost, costs, access, risk, transport, very high expectations from compost which are not met*

Section 7: MEASUREMENT

1. How do you think we can measure the impact of changes from _____ on farmers? (for example: how measure changes in soil quality in the short and long term?, etc.).

Many thanks for taking the time today to speak with me. I would like to give you this gift as a token of my appreciation for the time you spent with me. Do you have any questions for me?

Closing the rural-urban nutrient cycle: From waste to increased agricultural productivity

Milestone 4: Evaluation strategy and key indicators

Grant Number: AID-OAA-F-13-00043

Submitted by The William Davidson Institute at the University of Michigan (WDI)

Date: November 26, 2014

This field report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of The William Davidson Institute at the University of Michigan and do not necessarily reflect the views of USAID or the United States Government.



USAID
FROM THE AMERICAN PEOPLE



William Davidson Institute
AT THE UNIVERSITY OF MICHIGAN

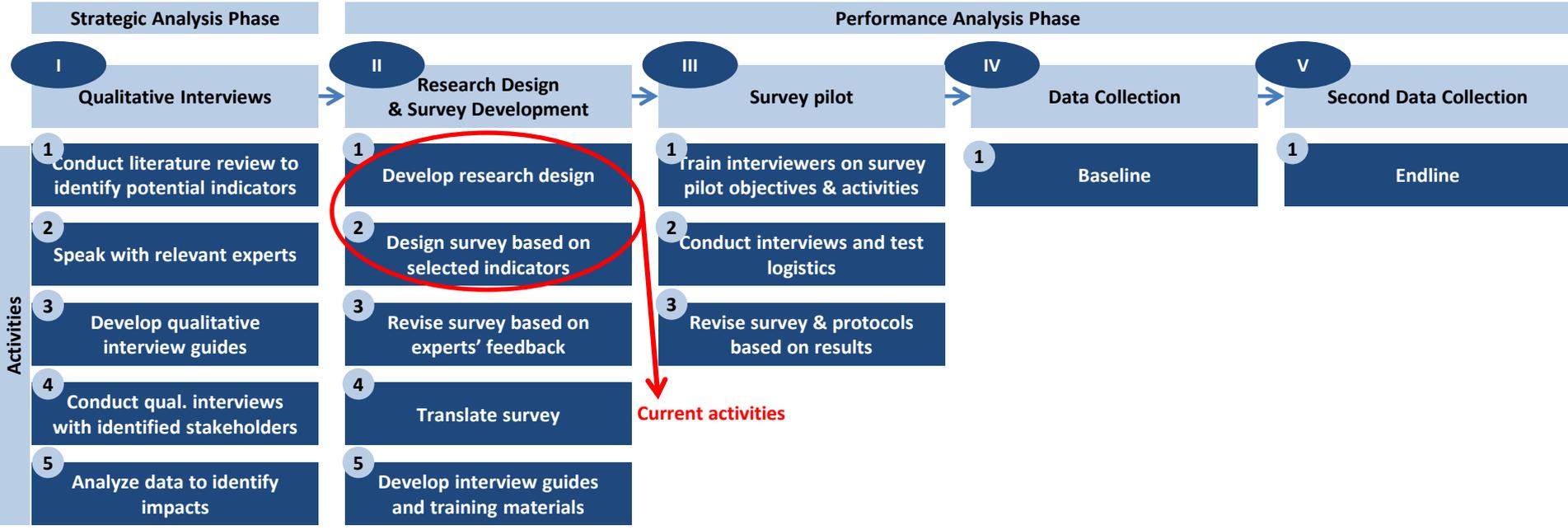


TAKA TAKA
SOLUTIONS

Overview of the study activities

The WDI study with TakaTaka Solutions aims to identify the impacts on farmers from the use of high-quality compost. It consists of 2 phases:

1. The Strategic Analysis (qualitative) phase and
2. The Performance Analysis (quantitative) phase



This report provides the evaluation strategy for the study with TakaTaka Solutions. It also provides the list of key impact variables to measure changes across multiple dimensions of well-being that occur in farmers' lives from the use of Soil Plus- the high-quality, commercial-grade compost manufactured by TakaTaka Solutions

This report -for Milestone 4- includes:

- Information on the research design including selection of the treatment and comparison groups, estimated sample size at baseline and endline, and the associated timeline for data collection
- Key impact indicators to be collected. These were selected based on information gathered of likely changes to farmer well-being from using compost/manure
- Responses to USAID's questions on selection bias, endogeneity and selection-on-observables regression analysis (addressed on page 8)

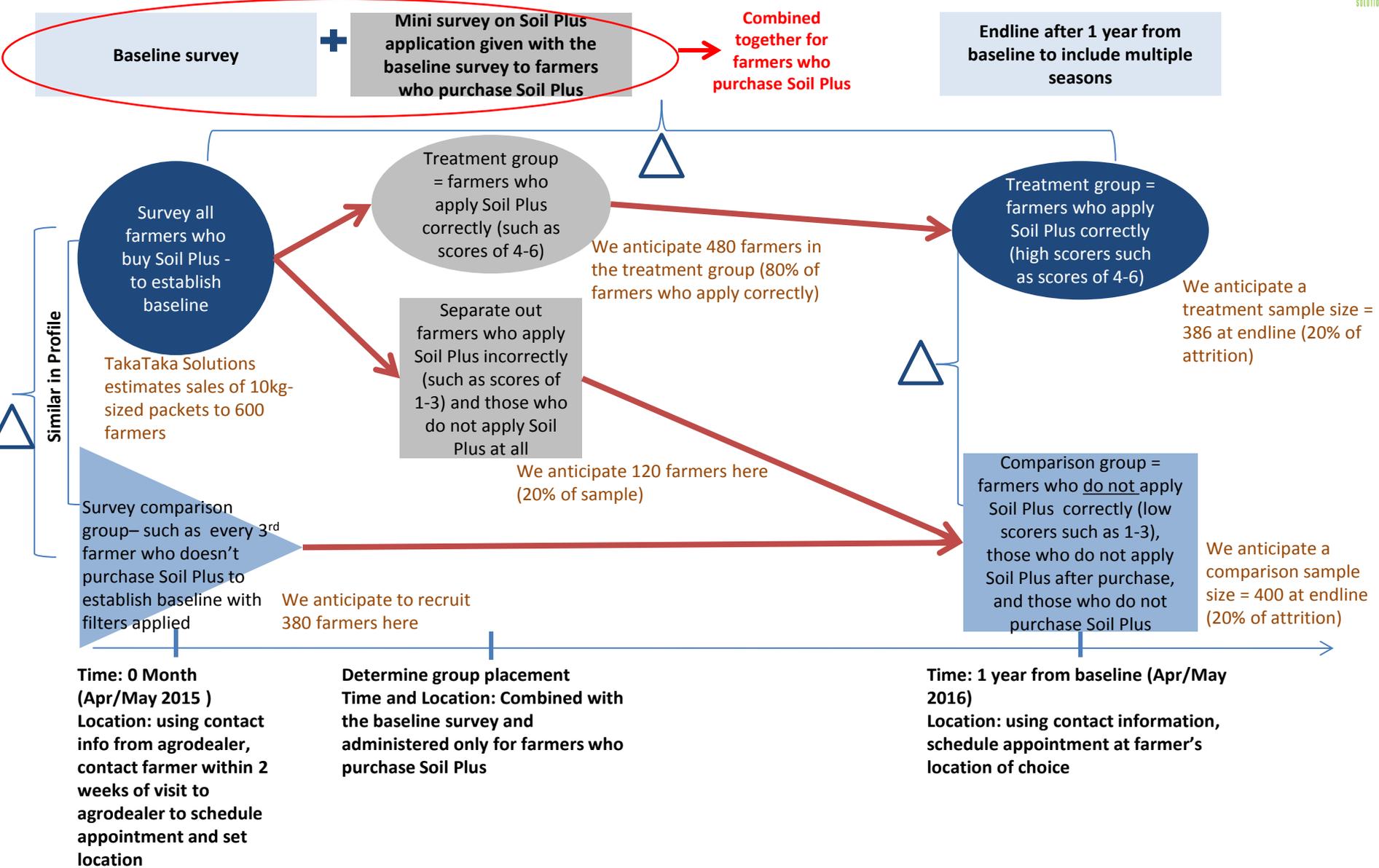
From our discussions with Daniel Paffenholz- Founder and General Manager of TakaTaka Solutions and during our field visit with the farmers in August 2014, we learned that there is more value in measuring the impacts from use of Soil Plus after the second growing season versus the first growing season. As such we have changed the timeline of our study such that end line data can be collected after two more seasons as requested and discussed with USAID on November 13th, 2014. We understand that this request can only be approved by the Agreement Officer, responsible for execution of the contract modification. Please note these changes in our study revised timeline assuming that the request is approved (presented on page 15)

Also, please note that each step builds on the previous step and is dependent on the acceptance of the previous step. As such, it is critical to get final signoff on all deliverables as soon as possible to ensure we collect the baseline information on 2016's long rain period

The baseline survey will be shared in Milestone 5

The evaluation strategy and intervention design

TakaTaka Solutions will hold marketing and training constant once study starts to reduce number of controls required



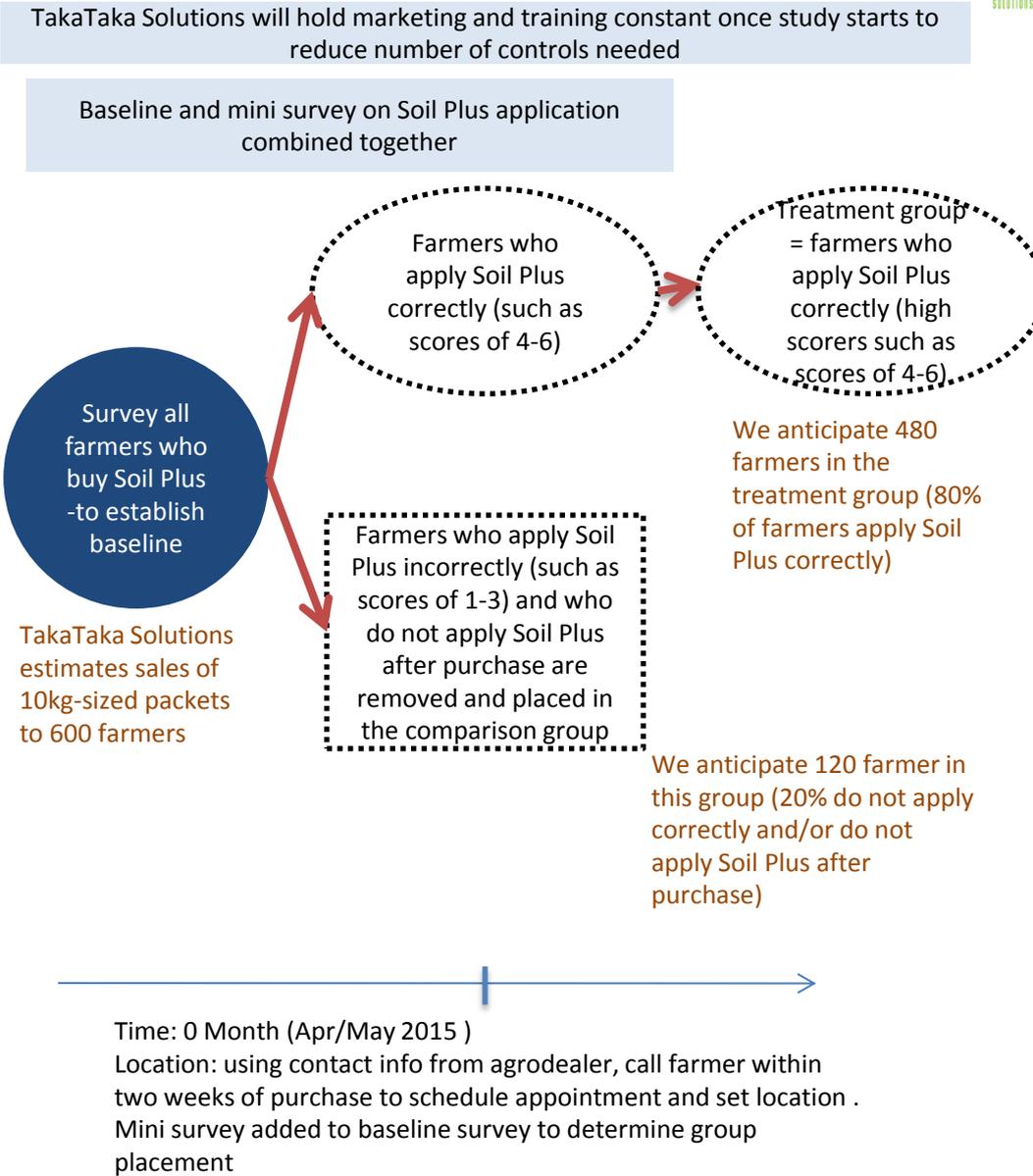
TakaTaka Solutions will conduct their sales pilot in 8 FarmShop franchisee shops in Kiambu and 2 agrodealer shops in Machakos. They estimate sales of 10kg-sized packets of Soil Plus to 600 farmers. Based on our literature review and conversations with experts, with farmers in these areas in August 2014, and most importantly, with TakaTaka Solutions, please find the assumptions we base our evaluation strategy on below:

1. Soil Plus is of high quality and consistent
2. We assume the majority of farmers grow the following crops in the two regions where the study will be conducted:
 - In Kiambu: spinach, cabbage, zucchini, maize, potatoes and beans
 - In Machakos: tomatoes, chilies, french beans, spinach, maize and beans
3. Majority of farmers apply Soil Plus on crops they sell in the market
4. There is variation in how farmers apply Soil Plus. Of farmers who purchase Soil Plus, 80% will use the product correctly and 20% will use the product incorrectly and/or will not apply the product after purchase. This assumption is based on discussions with TakaTaka Solutions as they will include usage and recommendation practices on Soil Plus packaging as well as provide training to participating agrodealers (on what to share with the farmer at the point of sale) and farmers
5. Farmers purchase small bags of Soil Plus and apply it on a small piece of their farm at least in the first season
6. TakaTaka Solutions will hold the sales pilot steady so that we do not have to add too many statistical controls in our study
7. All farmers who purchase Soil Plus will allow us to include them in our study and agree to taking the baseline survey
8. There will be a 20% attrition rate for the treatment and comparison group from baseline to endline. The attrition for the comparison group also includes those members that have left the group because they purchased and applied Soil Plus or another similar high-quality commercial-grade compost product over the course of our study
9. The sample size numbers provided in this report seem feasible based on discussions with TakaTaka Solutions and other experts

Deconstructing the design- Details on treatment group at baseline (1/2)

The treatment group consists of farmers who purchase Soil Plus and use it correctly

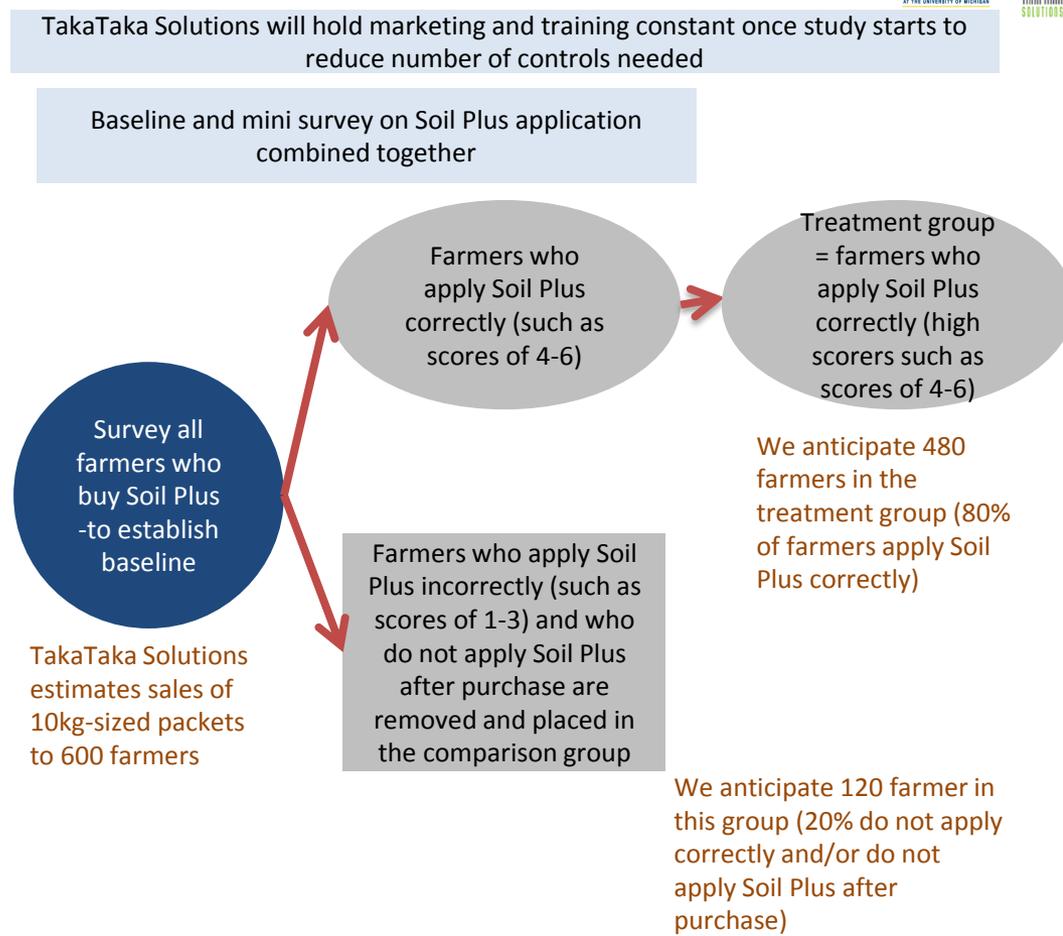
1. TakaTaka Solutions will begin its sales pilot in April-May 2015 at 8 FarmShop franchisees in Kiambu and 2 agrodealers in Machakos. As per TakaTaka Solutions estimates, at minimum, there will be 600 farmers who purchase the 10kg –sized bag of Soil Plus. There will also be a set of farmers who purchase the 25kg-sized bags of Soil Plus that can also be part of our sample. The compost will be sold at a discounted price to help increase sales
2. FarmShop franchisees and participating agrodealers will track name and telephone number of farmers who purchase Soil Plus. The agrodealer will also ask the farmer the following questions: “do you grow any of these crops (preselected list of crops provided on page 5- cater to region) followed by “do you sell any of these crops in the market” and lastly, “do you plan to use Soil Plus on these crops you sell in the market?” and mark their responses. See page 5 (point 2) and page 8 (point 4) for more information on how these crops were selected and why this information is collected respectively. The agrodealers will also note the quantity of Soil Plus that the farmer purchases
3. The local data collection partner (hired and managed by TakaTaka Solutions) will collect this information from the participating agrodealers. They will call the farmers tracked on the list within two weeks of purchase. On this call, they will ask the farmer if he/she has applied Soil Plus and if yes, on which crops. If the farmer has applied Soil Plus, the data collection partner will schedule the baseline interview and set the location. Based on this information, the data collection partner will send their enumerator to the farmer and conduct the baseline survey and mini survey on how the farmer has applied Soil Plus
4. If sales are not up to expectations, TakaTaka Solutions is open to selling Soil Plus at an even further reduced price in order to reach the sample sizes listed on slide 4. The final backup case would be giving it away for free to get farmers interested in the product and increase the use of Soil Plus and hence our sample size



Deconstructing the design- Details on treatment group at baseline (2/2)

The treatment group consists of farmers who purchase Soil Plus and use it correctly

1. The mini survey is asked to determine how the farmer has applied Soil Plus, the location of the land, on which crops he/she has done so, and the application rate (the amount of Soil Plus over the amount of land). This survey will be conducted with the baseline survey. For example, the respondent's answers to questions on how he/she applied Soil Plus will be combined to provide a composite score of such as 1-6. Low scores such as 1-3 will denote incorrect application and high scores such as 4-6 will denote correct application of Soil Plus. Based on these example scores that respondents receive in this survey, they will be separated into two groups. Farmers with scores that determine effective and correct application will be placed in the treatment group. Farmers with scores that determine they have not applied Soil Plus correctly, will be separated out of this initial group and be placed in the comparison group
2. There will be usage instructions and recommendations on Soil Plus packaging as well as information and training shared by the FarmShop franchisee and other agrodealers at the time of sale. Hence based on these trainings, after discussion with TakaTaka Solutions we assume that 80% of farmers apply Soil Plus correctly. Based on this, 480 farmers of 600 farmers apply Soil Plus correctly and will be placed in the treatment group
3. The remaining 120 farmers who either did not apply Soil Plus correctly or did not use Soil Plus after purchase, will be moved into the comparison group



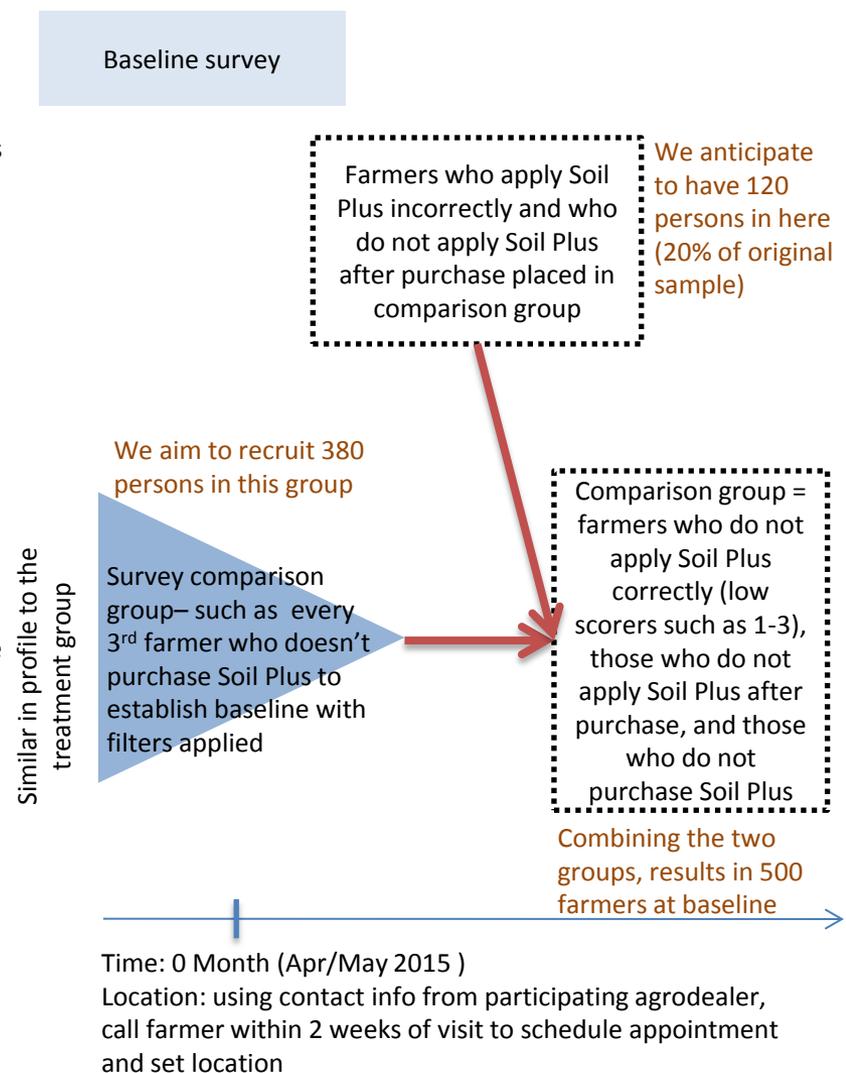
Time: 0 Month (Apr/May 2015)
 Location: using contact info from agrodealer, call farmer within two weeks of purchase to schedule appointment and set location .
 Mini survey added to baseline survey to determine group placement

Deconstructing the design- Details on comparison group at baseline

The comparison group consists of farmers who do not purchase Soil Plus but instead purchase fertilizer when they visit agrodealers who are part of the TakaTaka Solutions sales pilot as well as those that purchase but do not apply Soil Plus correctly and those who do not apply after purchase

1. Participating agrodealers will track name and telephone numbers of farmers who do not purchase Soil Plus but purchase fertilizer. The participating agrodealer will also ask the farmer the following questions: “do you grow any of these crops (preselected list of crops provided on page 5- cater to region)” followed by “do you sell any of these crops in the market” and mark their responses. We will then randomly choose farmers from this list (such as every third farmer) that funnels through based on filters. These questions have been applied based on conversations with TakaTaka Solutions, that it is mainly farmers who sell their crops in the market who are motivated to purchase a new product such as Soil Plus and that the majority of farmers, depending on the region their farm is located in, grow and sell the crops listed on page 5. We aim to recruit 380 farmers in this group
2. The local data collection partner will collect this information from the participating agrodealers. They will call the farmers randomly selected from the list within two weeks of their visit to the participating agrodealer and schedule the baseline interview and set the location
3. Additionally, farmers who have purchased Soil Plus but do not use it or do not use it correctly will also be placed in the comparison group. As such, after combining the farmers in these two categories, we anticipate 500 farmers in the comparison group at baseline
4. Because of this unique composition of the comparison group, issues of selection bias and endogeneity will be addressed via the following: we are including farmers who have purchased Soil Plus and as such their motivations and profile are the same as those in the treatment group. Also, farmers who do not purchase Soil Plus, are still visiting the same agrodealer and purchasing fertilizer. We will also recruit only those farmers who funnel through the filters, which will help ensure they are farmers with similar profiles to the treatment group farmers. We will select farmers (such as every third farmer) that visit the participating agrodealer and fit these filters adding in randomization into recruitment of the comparison sample. Please note, we can never be sure that the two groups can be equal but by adding randomization, we can say it helps control for the differences and gets rid of selection-on-observables regression analysis
5. We are going to seek to explore the presence of instrumental variables to deal with issues of unobserved variables. Instrumental variables are used to control for confounding and measurement error. To do this we may potentially engage in a two stage least squares analysis
6. Since this is a new product we do not know the exact profile of farmers who purchase this new product and may need to apply different filters post-recruitment

TakaTaka Solutions will hold marketing and training constant once study starts to reduce number of controls needed



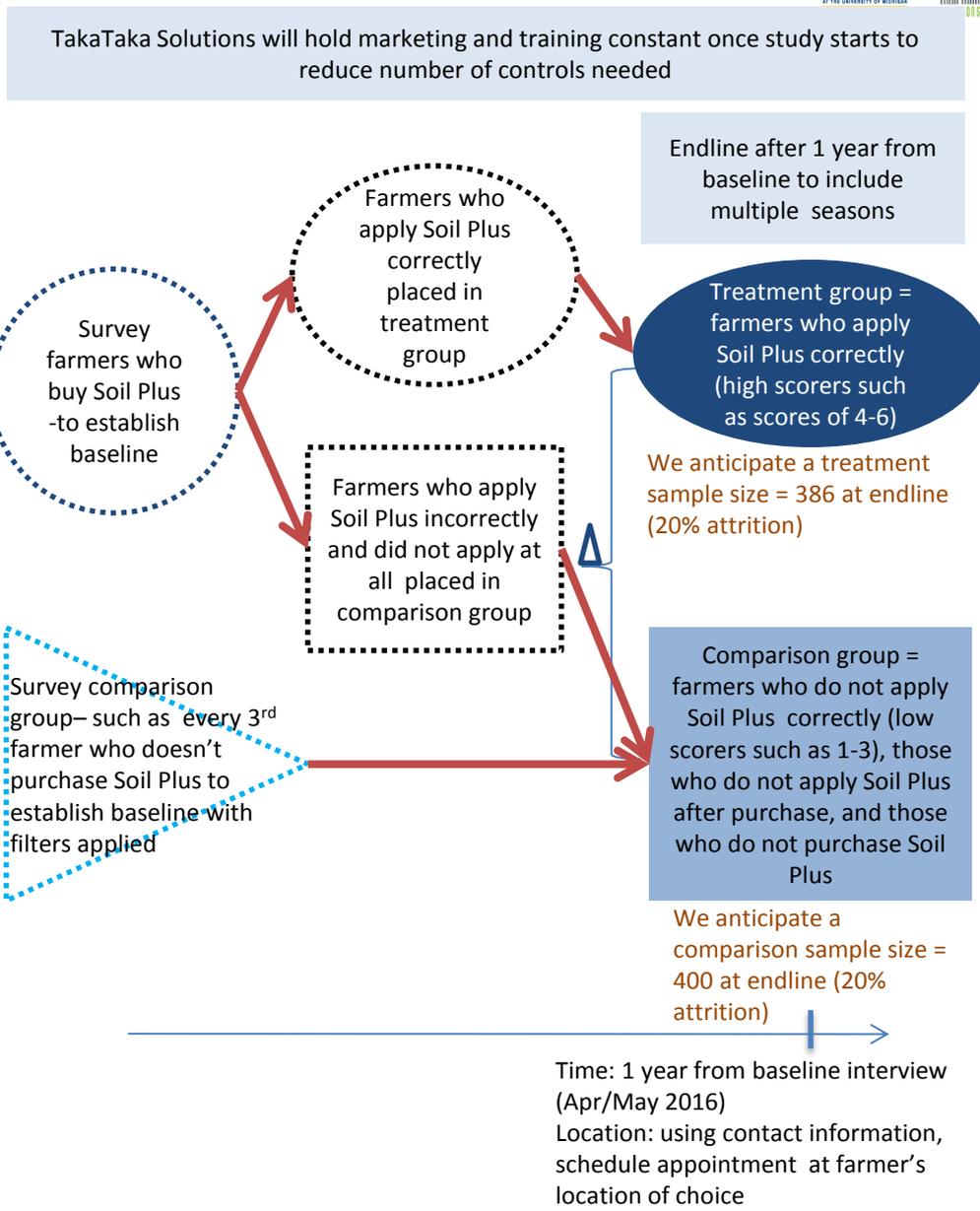
Deconstructing the design- Details on treatment and comparison groups at endline

Treatment group at endline

1. The treatment group consists of farmers who purchase Soil Plus and use it correctly
2. This endline survey will be conducted one year after the baseline interview such as to account for multiple seasons of Soil Plus benefits
3. The data collection partner will implement the endline survey with all farmers who were placed in the treatment group at baseline. They will call the farmer at least three times before marking them with “no-response.” The data collection partner will contact the farmer in the treatment group to schedule an interview and set location
4. Since Soil Plus will have residual effects, even if a farmer in the treatment group does not apply Soil Plus again (or multiple times) before the second or next planting cycle, the treatment group size is not altered. We will include questions on the farmer’s use of Soil Plus on the same area they originally applied Soil Plus at baseline in the endline survey
5. We anticipate approximately 386 persons in this group at endline based on the attrition rates (please note, based on our power calculations, the size of the sample comes to 394)
6. Discussions with stakeholders including TakaTaka Solutions suggest 20% as a reasonable attrition rate for this group

Comparison group at endline

1. The comparison group consists of farmers who do not purchase Soil Plus as well as those that do not use Soil Plus after purchase or do not apply it correctly
2. This endline survey will be conducted one year after the baseline interview
3. The data collection partner will implement the endline survey with all eligible farmers in the comparison group at baseline (the enumerator will ask the respondent if he/she has used Soil Plus or another high-quality commercial-grade compost when scheduling the interview to assess eligibility). They will call the farmer at least three times before marking them with “no-response”. The data collection partner will contact the farmer to schedule an interview
4. We anticipate 400 farmers in this group at endline based on a 20% attrition rate from baseline to endline
5. Discussions with stakeholders including TakaTaka Solutions suggest 20% as a reasonable attrition rate for this group (and includes farmers who leave the comparison group because they have now purchased Soil Plus or a similar high quality compost product)



Sample size based on power analysis and assumptions

Since Soil Plus is a new product we have based assumptions for our power calculation on conversations with TakaTaka Solutions and other experts

We require approximately 394 farmers at endline in our treatment group as well as our comparison group, based on our power analysis

- In our power analysis we used:
 - p-Value = 0.05
 - Effect size = 0.2
 - Power = 80%

However, based on expected purchase rates, correct application, and attrition for the treatment group we anticipate having 386 farmers in the treatment group at endline

- TakaTaka Solution estimates 600 farmers to purchase the 10kg-sized packet of Soil Plus. Of these farmers, we assume that only 80% of the sample applies Soil Plus correctly resulting in 480 persons in the treatment group at baseline
- Based on literature review and discussions with stakeholders including TakaTaka Solutions, we assume an attrition rate of 20% at endline
- Given these assumptions, we anticipate to be left with 386 farmers in the treatment group at the end of our study

At endline, we require 394 farmers in our comparison group, based on our power analysis

- We will select 380 farmers who do not purchase Soil Plus and meet the following required criteria: purchase fertilizer ; grow one, some or all of the preselected crops specified on page 5 and sell these crops in the market
- Of the group of farmers who purchased Soil Plus, we assume 20% of farmers will not apply Soil Plus correctly and/or will not apply it. This results in 120 farmers of the 600-farmer group that purchased Soil Plus
- The comparison group at baseline will consist of those who do not purchase Soil Plus (380 farmers) as well as those that purchased but do not apply the product correctly and/or do not apply it at all (120 farmers), resulting in a total of 500 farmers at baseline
- Based on literature review and discussions with stakeholders including TakaTaka Solutions, we assume an attrition rate of 20% at endline and anticipate to be left with 400 farmers in the comparison group at the end of our study
- The final expected sample for comparison group based on these assumptions will meet the sample size in the above power analysis

Challenges of this design

1. We will test the success of the agrodealers' ability to collect information on farmers and their practices during the survey pilot. If we find this to be burdensome for the agrodealers, we will only request the agrodealer collect the name and telephone numbers of farmers. Additional information on farming practices (crops grown and sold in the market) will be collected by the data collection partner's enumerators on the phone call to schedule the baseline interview with the farmer
2. Farmers may not be willing to share their contact telephone number with the participating agrodealer
3. We do not know the exact profile of the farmer who will purchase Soil Plus and therefore may need to apply filters post-data collection which could decrease our sample size at endline for the treatment and/or comparison group
4. Some individuals in the comparison group will likely have different motivations than the treatment group because he/she did not purchase Soil Plus
5. When conducting the endline after one year versus a shorter period of time, there is a higher rate of attrition (chance of not finding a farmer) in both the treatment or comparison groups
6. We may face a higher rate of attrition with farmers who farm in Machakos than with those who farm in Kiambu. This is because many farmers in Machakos rent land and/or switch plots due to decreasing soil quality
7. Assumptions on sales and percentage of farmers that apply Soil Plus correctly are based on best possible estimates

The following points are important to the success of our study

1. Poor application method results in reduced benefits
 - Effects of incorrect application: According to a soil expert at the University of Nairobi - Professor Karanja, the effects of incorrect application would be large (although she could not quantify them). Ideally, compost should be worked into the soil close to the plant root. If the compost is not worked in and stays on the surface, this has two negative effects: nitrogen may volatilize and secondly, phosphorous will not be released. Hence, fewer nutrients will be supplied to the plant. If the compost is worked in but not close to the plant root, the plant has more difficulties accessing the nutrients. Other effects, like better water and fertilizer retention, will also be less effective. The other risk is applying compost at a too-low application rate
2. TakaTaka Solutions estimates that it will make sales of 10kg-sized bags of Soil Plus to a minimum of 600 farmers. The company also estimates that there will be a set of farmers who purchase the 25kg-sized bags who can be included in our study
3. We are not measuring the efficacy of Soil Plus. Rather, the goal of this study is to provide market research for TakaTaka Solutions regarding which types of farmers are using the product and what impact do they experience from this use. This is hence, not a randomized control trial. TakaTaka Solutions is conducting rigorous experimental trails on testing the efficacy of Soil Plus in their demo farms
4. TakaTaka Solutions is responsible for hiring, managing and paying a third party to administer the surveys and enter the data for the surveys
5. If at endline the final treatment group sample size is much lower than the sample size in the power analysis we will find effect sizes greater than 0.2

Impact indicators to be collected

Economic, capability and relationship well-being indicators

To measure the changes in farmers' lives from the use of Soil Plus, we will develop a survey to assess changes in impact across multiple dimensions of well-being. These changes can be divided into three categories:

- Economic well-being (captures an individual's financial well-being and control over resources),
- Capability well-being (captures the person's agency i.e. an individual's ability to complete daily activities and other activities important to them) and,
- Relationship well-being (this moves beyond the individual and captures resources that individuals can draw upon from their roles, status, and networks, as well as their surrounding environment)

The impact indicators were selected based on the analysis of qualitative interviews conducted in August 2014 in Nairobi and surrounding areas. These interviews were conducted with 18 farmers, 3 agriculture extension officers, 2 agrodealers and numerous experts in order to identify a holistic set of potential changes across multiple dimensions of well-being that are expected to occur on farmers who use compost. The below impact indicators were selected based on Soil Plus's likely effect on farmers and likelihood of their occurrence after multiple seasons. These indicators will be captured at baseline and endline through quantitative surveys with both the treatment and comparison group using an interviewer-administered paper-based survey.

Economic well-being indicators

1. Agriculture productivity
2. Income stability
3. Savings and/or investments into the farm

Capability well-being indicators

1. Food security
2. Quality of life
3. Aspirations and expectations for the future
4. Pride

Relationship well-being indicators

1. Soil environment in the farm based on physical changes noted by farmer
2. Farmer's social network

Other variables to be collected

In our surveys, we will also include questions to capture other variables, which are listed below. While some of these are control variables, others are variables that provide background information on the farmer's growing practices and his/her household information. Some of these variables will also provide market research information to TakaTaka Solutions

1. Integrated soil fertility management practices that the farmer implements such as crop rotation, intercropping, leaving the land fallow for a season, etc.
2. Access to water
3. Inputs used currently and use of homemade compost and manure
4. Rating of soil (rating based on farmer's subjective opinion)
5. Land tenure status
6. Demographic information (sex, age, years of farming, tribe, education, size of land, marital status, number of people in the household, village, district)
7. Contact information
8. Treatment group only:
 - For the area in which Soil Plus is applied at baseline track on: crops that receive Soil Plus including number of plantings and duration, Soil Plus application technique, number of applications, location of application, area over which applied, quantity of Soil Plus applied
 - Decision making in purchase of Soil Plus
9. Comparison group only:
 - Why the farmer chose not to purchase Soil Plus

Method for data collection (includes our best practices)

1. Details on the data collection partner

- TakaTaka Solutions is responsible for electing, engaging, hiring, managing and funding third parties to administer and enter the data for the baseline and endline surveys developed by us, following the research design
- We will cooperate with the data collection partner and will provide guidance to TakaTaka Solutions if need be during the study period
- Throughout baseline and endline surveys, TakaTaka Solutions will provide us with the data collected, on a weekly basis, to the extent possible. We will advise if any actions to revise the collection method are required. All data from the data collection partner is requested in Excel spreadsheet format, and should be translated into English. TakaTaka Solutions will ensure that the data collection partner will also provide us with a separate codebook, listing the variable names and extended definitions of all the variables, and their value labels as listed in the Excel spreadsheet

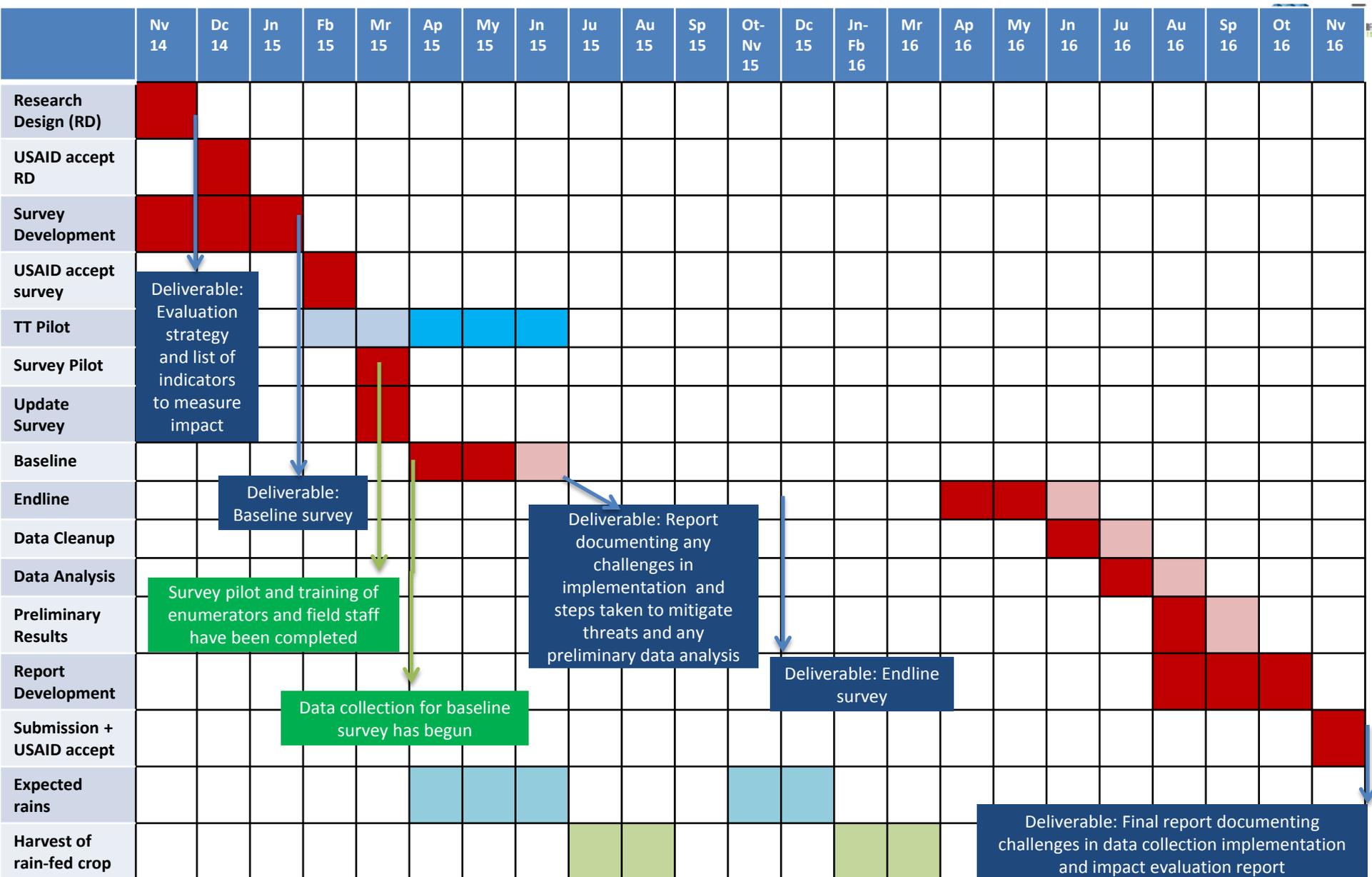
2. Details on data collection method

- The third party data collection partner will work with agrodealers to train them to collect information at the time of purchase for the both treatment and comparison group
- The third party data collection partner will schedule interviews with farmers who have purchased Soil Plus using contact information gathered by the FarmShop franchisees and other agrodealers that are part of the TakaTaka Solutions sales pilot. The agrodealers will track which farmers have purchased the product and in what quantity. They will also track if the farmers grow any of the preselected crops and sell them in the market. The data collection partner will contact the farmer within two weeks of their visit to the agrodealer and schedule the interview and set the location
- The third party data collection partner will schedule interviews with farmers who have not purchased Soil Plus using contact information gathered by the FarmShop franchisees and other agrodealers that are part of the TakaTaka Solutions pilot. The agrodealers will track which farmers have not purchased this product but purchased fertilizer. They will also track if the farmers grow any of the preselected crops and sell them in the market
- At the time of endline, the data collection partner will call the farmers who are part of the study and schedule the endline survey interview at a location of the farmer's choosing. The data collection partner will try to contact the farmer at least three times before marking that farmer as "no-response"
- The baseline and endline surveys will be administered by trained enumerators at a location chosen by the farmer
- Both baseline and endline surveys should require 1.5 hours or less to complete

3. Details on the survey pilot:

- We will test the baseline survey as well as the methods for data collection in the survey pilot. During the survey pilot we will test if farmers in the treatment and comparison groups understand each question and can answer the questions asked in the survey. Our aim is to run the survey pilot for two weeks and revise the survey based on the results. This will ensure that the survey content is adapted to the local context and an efficient process for data collection.
- During the survey pilot, we will also test the ability of agrodealers to collect information from customers at the time of purchase and we will revise the data collection process accordingly
- We will train the enumerators from the data collection organization to explain the purpose of the study as well as each question in the baseline survey. This training will be conducted before the survey pilot to ensure an effective survey pilot

Study timeline with endline conducted after multiple growing seasons (Nov '14- Nov '16)



Assumptions

- (1) "USAID accept" means no more changes to the deliverable can occur without affecting proposed timeline
- (2) Third party can execute proposed timeline from March 2015 – May 2016
- (3) TakaTaka pilot results in large enough sample in timeframe listed here
- (4) WDI receives final data set from third party data collection agency end of May 2016
- (5) No additional funding required

Next steps

- Milestone 5 will contain the baseline survey
- Following the acceptance of the survey by USAID, our data collection partner will translate the survey into Swahili
- We will also begin preparing for the survey pilot

Closing the rural-urban nutrient cycle: From waste to increased agricultural productivity

Milestone 5: Baseline Survey

Grant Number: AID-OAA-F-13-00043

Submitted by The William Davidson Institute at the University of Michigan (WDI)

Date: January 23, 2015

This field report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of The William Davidson Institute at the University of Michigan and do not necessarily reflect the views of USAID or the United States Government.



USAID
FROM THE AMERICAN PEOPLE



William Davidson Institute
AT THE UNIVERSITY OF MICHIGAN

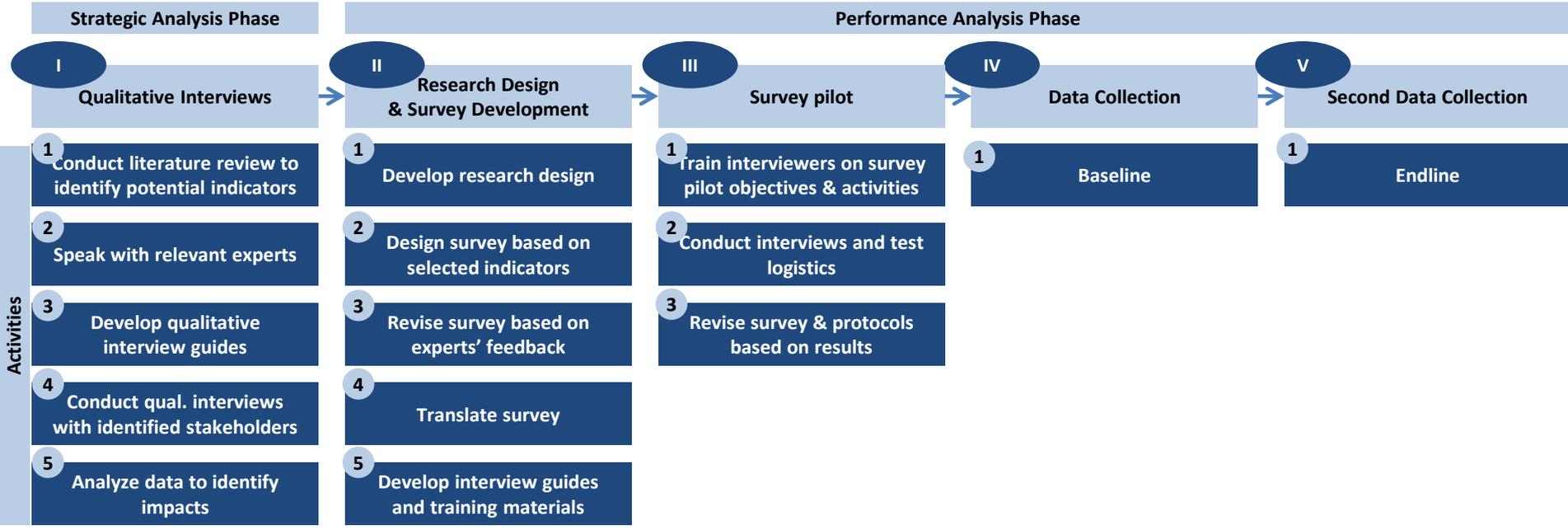


TAKA TAKA
SOLUTIONS

Overview of the study activities

The WDI study with TakaTaka Solutions aims to identify the impacts on farmers from the use of high-quality compost. It consists of 2 phases:

1. The Strategic Analysis (qualitative) phase and
2. The Performance Analysis (quantitative) phase



Report content

This report provides the baseline survey for the study with TakaTaka Solutions. It also provides additional documents that are referenced in the baseline survey.

This report -for Milestone 5- includes:

- Information on the baseline survey
- Information on the survey pilot
- Attachment A: Baseline survey
- Attachment B: Informed consent forms that are referenced in the baseline survey
- Attachment C: Showcards referenced in the baseline survey
- Attachment D: Pre-baseline activities carried out by the agrodealer and the data collection partner (i.e. activities carried out prior to administering a baseline survey)

The baseline survey includes feedback provided by Daniel Paffenholz- Founder and General Manager of TakaTaka Solutions and his team of advisors.

Our next report-based deliverable after the baseline survey, will be later in the year and will document baseline data collection efforts and experiences.

1. The baseline survey (Attachment A) contains questions for all variables listed in Milestone 4: Evaluation Strategy and Key Indicators document submitted in November 2014 except 'tribe' of the respondent
 - i. We removed 'tribe' based on feedback from Daniel Paffenholz and his team of advisors after they reviewed the survey in detail. They believe that asking about tribe will make the survey political and will lead to resistance from interviewees
 - ii. The list of indicators submitted in Milestone 4 can be found in the Annex section of this report
2. Attachment B consists of informed consent forms for respondents in the treatment and comparison group to ensure ethical research practices
3. In developing the survey, wherever possible, we leveraged survey questions that had been used in similar contexts.
4. All questions in the survey will be asked to respondents in the treatment group
5. Except for questions that involve the use of Soil Plus, all other questions will be asked to respondents in the comparison group
6. As many of the questions contain the use of Likert scales, showcards to help the respondents understand the options have been developed. These can be found in Attachment C
7. The sections of the survey are:
 - A. Background
 - B. Farm plot characteristics
 - C. Crops grown
 - D. Household and farm finances
 - E. Household food security
 - F. Quality of life
 - G. Aspirations and expectations for the future
 - H. Pride and respect
 - I. Strength of social network
 - J. Community dynamics
 - K. Feelings about self
 - L. Marketing section
 - M. Qualitative section

Details on the survey pilot

1. During the survey pilot, we will train enumerators from the data collection partner and adapt the survey questions to the local context through cognitive interviews
 - i. We will train enumerators to explain the purpose of the study as well as each question in the baseline survey
 - ii. This training will be conducted before the survey pilot to ensure success
2. During the survey pilot, we will test if farmers in the treatment and comparison groups understand each question and can answer the questions asked in the survey. Our aim is to run the survey pilot for two weeks and revise the survey based on the results. This will ensure that the survey content is adapted to the local context
3. We will also test the data collection processes associated with baseline including collecting data at participating agro-dealers
 - i. During the survey pilot, we will also test the ability of agrodealers to collect information from customers at the time of purchase and we will revise the data collection process accordingly
 - ii. Attachment D consists of the list of activities carried out by the agrodealer and the data collection partner prior to conducting a baseline interview with a farmer
4. Based on the results of our pilot, we expect to change the text of some of the questions. We also expect to shorten the survey by removing some variables that did not resonate with the respondents. All these changes will first be discussed with TakaTaka Solutions to ensure we are meeting the company's needs
5. The revised baseline survey (updated based on the pilot results) will be administered in 45-60 minutes
6. Our pilot will be conducted from Feb 23-March 4. We deeply appreciate if you could please provide us with feedback on the survey by **February 5, 2015** such that we have sufficient time to address this before our travel. As such, the successful pilot will depend on receiving timely feedback from USAID.

Next steps

1. Conduct survey pilot
2. Update baseline survey based on results of the survey pilot
3. Prepare for baseline study



Impact indicators to be collected

Economic, capability and relationship well-being indicators

To measure the changes in farmers' lives from the use of Soil Plus, we will develop a survey to assess changes in impact across multiple dimensions of well-being. These changes can be divided into three categories:

- Economic well-being (captures an individual's financial well-being and control over resources),
- Capability well-being (captures the person's agency i.e. an individual's ability to complete daily activities and other activities important to them) and,
- Relationship well-being (this moves beyond the individual and captures resources that individuals can draw upon from their roles, status, and networks, as well as their surrounding environment)

The impact indicators were selected based on the analysis of qualitative interviews conducted in August 2014 in Nairobi and surrounding areas. These interviews were conducted with 18 farmers, 3 agriculture extension officers, 2 agrodealers and numerous experts in order to identify a holistic set of potential changes across multiple dimensions of well-being that are expected to occur on farmers who use compost. The below impact indicators were selected based on Soil Plus's likely effect on farmers and likelihood of their occurrence after multiple seasons. These indicators will be captured at baseline and endline through quantitative surveys, with both the treatment and comparison groups, using an interviewer-administered paper-based survey.

Economic well-being indicators

1. Agriculture productivity
2. Income stability
3. Savings and/or investments into the farm

Capability well-being indicators

1. Food security
2. Quality of life
3. Aspirations and expectations for the future
4. Pride

Relationship well-being indicators

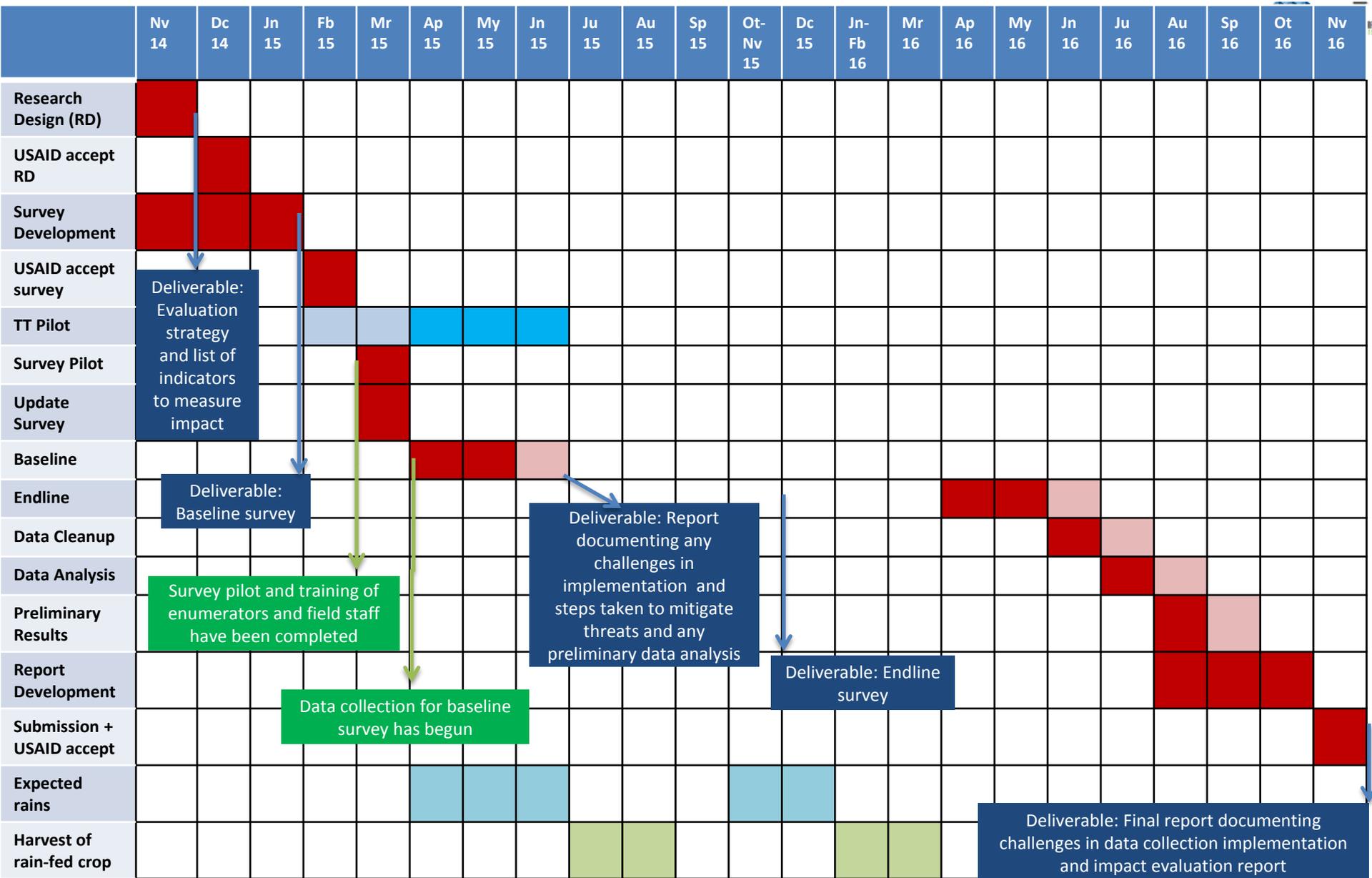
1. Soil environment in the farm based on physical changes noted by farmer
2. Farmer's social network

Other variables to be collected

In our survey, we will also include questions to capture other variables, which are listed below. While some of these are control variables, others are variables that provide background information on the farmer's growing practices and his/her household information. Some of these variables will also provide market research information to TakaTaka Solutions

1. Integrated soil fertility management practices that the farmer implements such as crop rotation, intercropping, leaving the land fallow for a season, etc.
2. Access to water
3. Inputs used currently and use of homemade compost and manure
4. Rating of soil (rating based on farmer's subjective opinion)
5. Land tenure status
6. Demographic information (sex, age, years of farming, *tribe*, education, size of land, marital status, number of people in the household, village, district)
 - i. *We are not asking the question on tribe based on feedback received from TakaTaka Solutions*
7. Contact information
8. Treatment group only:
 - For the area in which Soil Plus is applied at baseline track on: crops that receive Soil Plus including number of plantings and duration, Soil Plus application technique, number of applications, location of application, area over which applied, quantity of Soil Plus applied
 - Decision making in purchase of Soil Plus
9. Comparison group only:
 - Why the farmer chose not to purchase Soil Plus

Study timeline with endline conducted after multiple growing seasons (Nov '14- Nov '16)



Assumptions

- (1) "USAID accept" means no more changes to the deliverable can occur without affecting proposed timeline
- (2) Third party can execute proposed timeline from March 2015 – May 2016
- (3) TakaTaka pilot results in large enough sample in timeframe listed here
- (4) WDI receives final data set from third party data collection agency end of May 2016
- (5) No additional funding required



USAID
FROM THE AMERICAN PEOPLE



**Closing the urban-rural nutrient cycle: From waste to
increased agricultural productivity'
(AID-OAA-F-13-00043)**

Implementation Plan: May 2014 – June 2016



January 2015

This document was produced for review by the United States Agency for International Development. It was prepared by TakaTaka Solutions.

Table of Contents

1. Introduction	3
2. Project summary	3
3. Project Implementation Plan.....	5
4. Explanation of Project Implementation Plan	6
5. Updates – January 2014	11
6. Project Photos.....	13

1. Introduction

This document entails the Project Implementation Plan (PIP) for the USAID project 'Closing the urban-rural nutrient cycle: From waste to increased agricultural productivity' (AID-OAA-F-13-00043).

The document is structured as follows. After the introduction (1), a summary of the project will be given (2). This will help put the Project Implementation Plan into context. Thereafter, the Project Implementation Plan is presented as a Gantt chart graphic (3). Subsequently, each of the main project areas will be elaborated, thereby giving further information in relation to the Gantt chart (4). For each project area, the planned project activities as well as the already commenced project activities shall be elaborated. Lastly, some photos of current project activities will be provided (5).

2. Project summary

The overall project goals of the project are:

- to create a market for organic fertilizer (compost) produced by TakaTaka Solutions on the one hand
- and to develop adequate access to quality input products for small-scale farmers through the Farm Shop franchise system and other agro-dealers

In detail the successful outcome of the grant period is:

- to sale organic fertilizer (compost) to 9,000 small-scale farmers in rural areas
 - this is to be realized through the build-up of 54 Farm Shops (or other agro-dealers) in four project areas
 - about one third of total customers of each agro-dealer shop (total = 500 per shop) will buy organic fertilizer
- to create awareness on organic fertilizer (compost) for small-scale farmers in the project areas.

The project has three angles/approaches from which the market for compost is build:

- Agricultural Effectiveness
 - Analyzing farmers' agricultural baseline
 - Demonstrating and analyzing compost benefits through trials

- Developing application guidelines and manuals
- Marketing and Communication effectiveness
 - Analyzing what information channels farmers use and valued (radio, sms, agro-dealers, demonstration plots, ...)
 - Understanding what type of marketing and branding is valued by farmers
 - Developing and testing different communication, information and marketing approaches
- Impact effectiveness
 - Analyzing baseline economic, capability and relationship well-being of small scale farmers
 - Tracking project progress alongside changes of the above mentioned impact indicators
 - Established impact tracking system for usage beyond project duration

The project has three implementation phases:

- Phase 1: Research (9 months)
 - Market research on smallholder farmers (surveys, competitive product analysis)
 - Product research and demonstration (field trials)
 - Developing and piloting (development of marketing materials, training of agro-dealers, agro-dealer network expansion to 30 shops)
 - Processing and quality control (for compost)
 - Impact Assessment
- Phase 2: Testing (9 months)
 - Product Research and demonstration (field trials)
 - Developing and piloting (Pilot sales of compost in Farm Shop to test different marketing strategies, expansion of agro-dealer network to 54 shops)
 - Processing and quality control (for compost)
 - Impact Assessment
- Phase 3: Commercial Launch
 - Product Research and demonstration (field trials)
 - Developing and piloting (selling of compost in 54 agro-dealers, promotional activities)
 - Processing and quality control (for compost)
 - Impact Assessment

4. Explanation of Project Implementation Plan

The three implementation phases (Research Phase, Testing Phase and Commercial Launch Phase) can be seen on the horizontal axis towards the top. The different activity categories (Market Research on smallholder farmers, Product Research and Demonstration for Compost, Developing and Piloting, Processing and Quality Control as well as Impact Assessment) can be seen on the vertical axis on the left.

Below will provide further information on the activities planned and/or already started by activity category.

4.1 Market Research on smallholder farmers

Analyzing farmers' agricultural baseline: This will take place in a two-fold manner. First, based on data available from Farm Shop as well as a literature review, Nairobi University will undertake a market segmentation of smallholder farmers in the project area. This study will focus on soil types, cultivated crop species and crop production practices. Second, more extensive data on farmers' agricultural baseline will be undertaken as part of the impact baseline study to be conducted in early 2015.

The literature review study is currently being undertaken and is expected to be completed by September 2014. Data collection on farmers' agricultural baseline will take place alongside the baseline survey in early 2015.

Analyzing farmers' use of information/marketing channels: This will also take place alongside the baseline impact study. Its result will inform the marketing approach to be tested. The survey will take place alongside the impact baseline survey in early 2015

Competitive Analysis: The competitive analysis will give an overview of products competing with compost. It is currently being undertaken and is scheduled for September 2014

Distribution Analysis: The distribution analysis will inform the project on the avenues of distributing compost to both agro-dealers and from agro-dealers to farmers. It will be done prior to the Testing Phase.

4.2 Product Research and Demonstration for Compost

3 mother field trials: One mother field trial was already started in April 2013, thereby providing early data points on the performance of TakaTaka Solutions' compost. This trial site is located in Kiambu district (high fertility area) in the vicinity of Banana Town on 3 acres. The next trial site has already been identified in Machakos County near Thika (medium fertility area), and planting will start in October 2014. The third trial site will be located in Kajiado County near Ngong (low fertility area). As Ngong is a low fertility area, planting will start with the long rains in April 2015.

The mother field trial plots will showcase the value of compost in a scientific manner. They will also serve as a marketing tool to farmers. The mother field trials are managed by TakaTaka Solutions and Nairobi University.

The set-up of the trial sites is as follows:

- 6 crops (maize, potatoes, French beans, spinach, cabbage, onions)
- 4 inputs (compost, chemical fertilizer, manure, rock phosphate)
- Each input in a high and low application rate, reflecting different income levels of farmers
- Inputs in 19 combinations (control, low compost & high fertilizer, high compost alone, et cetera)
- 4 replications of each crop-input combination (e.g. maize on high compost & high manure) for statistical relevance
- →Total of 456 trial plots

9 baby field trials: Each mother field trial will have three baby field trials in its surrounding. A baby field trial is a smaller version of the mother field trial, which is located on farmers' plots. They mainly function as a marketing tool to demonstrate the value of compost to farmers. The baby trials will only have two crops (maize and potatoes) and three inputs (compost, chemical fertilizer and manure).

The first three baby field trials will be started in Kiambu in October 2014. The remaining six baby field trials will be started in Machakos and Kajiado in April 2015. The late start is due to the long rains.

Compost laboratory analysis: In conjunction with Nairobi University, both the compost and the soils in the field trials will be analyzed. This will start after the current planting season, i.e. from October 2014, and will be ongoing throughout the project.

Analysis of field trial results: In conjunction with Nairobi University the field trial results will be continually analyzed. This will both showcase the benefits of compost as well as providing relevant data for marketing. Analysis of field trial results will start in October 2014.

Assessment of compost economics: This will entail the profitability analysis of producing and distributing TakaTaka Solutions' compost at every step. It will be undertaken at the beginning of the Testing Phase.

4.3 Developing and Piloting

Selection and development of marketing tools: Different marketing tools will be tested in the Testing Phase. This will help in identifying an ideal marketing mix, which will be used in the Commercial Launch project phase to market compost.

The following four marketing channels have been identified that will be tested:

- 1: In-shop marketing (marketing materials, training of agro-dealer staff, surveys)
- 2: Radio (including the development of a four-feature radio show on compost)
- 3: SMS marketing campaign
- 4: Marketing around trial plots

Testing & development of marketing tools through pilot sale: In the Testing Phase six agro dealers will be selected. Two of them will only conduct (1), two of them will conduct (1) & (2) & (3) and two of them will conduct (1) & (2) & (3) & (4). After two months of marketing through the respective channels, an extensive survey will be conducted with farmers in the area. This will establish both if they were reached by the respective marketing channels and how effective the marketing channel had been. Furthermore, survey will also be conducted at the agro-dealers to analyze the effectiveness of the various marketing channels.

Testing of supply chain logistics through pilot sales: Different supply chain options will be tested in the Testing Phase.

Expansion of TakaTaka Solutions' waste collection services: TakaTaka Solutions' waste collection services will be continually expanded throughout the project. The expansion of waste collection services is important both in terms of supplying the input for the compost production as well as for job creation. Currently, TakaTaka Solutions is collecting from around 5,000 households (25,000 people) in the low-income areas of Kangemi and Kawangware in Nairobi. This has created jobs for 42 people as of August 2014.

Expansion of agro-dealers to 54: Compost is to be sold to 9,000 through 54 agro-dealers. The agro-dealers will consist both of Farm Shop agro-dealers as well as other agro-dealer networks. Currently, the project has access to 15 agro-dealers through the Farm Shop network. Additional non Farm Shop agro-dealers will be recruited from October 2014.

Roll-out of sales to 9,000 farmers through 54 agro-dealers: This is the ultimate goal of the project. It will be realized in the last phase of the project, the Commercial Launch Phase.

4.4 Processing and Quality Control

Scale TakaTaka Solutions' compost production to 240 tons/month: Scaled production of compost production will provide the relevant compost quantities that are to be sold to farmers. The scaling will happen through increased waste collection customers (see. 4.3) and through increased production capacity. The latter entails the building of a modern composting plant using Gore-tex composting equipment. Currently TakaTaka Solutions is producing 40 tons of compost per month, however, this will significantly increase in the coming months with the pipeline of new waste collection customers. The Gore-tex composting system is currently being imported and should be functional by end year 2014.

Certification: To sell compost certification is required. The process of certification by Kenyan standards is currently ongoing and expected to be completed by October 2014. Thereafter, regular quality control will take place to ensure adherence to the certification standards.

4.5 Impact Assessment

Initial visit: The initial scoping visit took place as scheduled in August 2014. A report will follow shortly.

Evaluation strategy including indicators: Subsequent to the visit, the University of Michigan staff will write the evaluation strategy, which also includes the list of indicators. This document is due in September 2014.

Baseline survey written: After agreeing on the evaluation strategy with USAID, the baseline survey will be written. It will also include the components on 'agricultural baseline' and on 'communication/marketing tools used by farmers'.

Survey pilot & training of enumerators: Once the baseline survey has been written, enumerators will be trained. To make sure that the baseline survey will be properly conducted, a pilot survey will be run.

Baseline survey undertaken: After the pilot survey, the actual baseline survey will be conducted. Most likely the baseline survey will be conducted with the support of mobile phone survey tools (e.g. Dimagi - CommTrack) to ensure that data is properly collected.

Endline survey written: After the baseline survey has been conducted, the endline survey will be written.

Endline survey undertaken: After its writing, the endline survey will be conducted. Most likely the endline survey will be conducted with the support of mobile phone survey tools (e.g. Dimagi - CommTrack) to ensure that data is properly collected.

Final report: After analyzing both baseline and endline survey, the final impact assessment report will be written by the University of Michigan.

5. Project Update – January 2015

Below are the updates for the different project areas since the last Project Implementation Report in November 2014.

Market Research on smallholder farmers:

- *Analyzing farmers' agricultural baseline:* The baseline survey, which will provide detailed information on farmers' agricultural performance, has been written and was submitted as part of Milestone 5.
- *Competitive Analysis:* Completed.
- *Distribution Analysis:* The distribution analysis was started in January 2015.

Product Research and Demonstration for Compost:

- *3 mother field trials:* A second mother field trial was started in Machakos County, about 20km east of Thika Town, in late 2014. It covers around 8,000m² and has 342 plots. The crops that are being planted are representative of crops grown in the area and are: maize, beans, chilis, tomatoes, spinach and melons.
- *9 baby field trials:* 3 baby field trials were started in Kiambu Country, near Banana. In the first trial cabbage and spinach are grown on 20 plots, in the second trial maize and potatoes are grown on 20 plots, and in the third trial maize and beans are grown on 20 plots. All these plots are on the land of different smallholder farmers, who also manage the plots. These plots will serve as demonstration tools to farmers.
- *Compost laboratory analysis:* This is ongoing and regular samples are being analysed. The most recent analysis from Jan 2015 was provided as part of Milestone 5. The compost looks good. Nutrient values are high, which is very positive. The pH value is also high, however, considering Kenyan soils are largely acidic this will be a benefit.
- *Analysis of field trial results:* The results for Season 1 & 2 of the trials in Kiambu have been analysed. Season 3 analysis should be ready by February 2015.

Developing and Piloting:

- *Selection and Development of Marketing Tools:* This has been submitted as part of Milestone 4.
- *Expansion of TakaTaka Solutions' waste collection services:* TakaTaka Solutions is currently serving around 8,000 households and employs more than 60 people in its waste collection operations (this does not include the composting operations). This is exceeding project targets.

- *Expansion of agro-dealers to 54:* Farm Shop is currently operating 25 Farm Shop franchisees. Additional (non Farm-Shop) agro-dealers have also been recruited. This is in line with project targets.

Quality Control

- *Scale TakaTaka Solutions' compost production to 240 tons/month:* This is ongoing and in line with project targets.
- *Certification:* TakaTaka Solutions has obtained certification for its composting plant from both NEMA (National Environmental Management Authority) and Nairobi City County. Certification by the Kenya Bureau of Standards should be completed by February 2014.

Impact Assessment

- *Initial visit:* The initial visit took place in August 2014.
- *Evaluation strategy including indicators:* This has been submitted as part of Milestone 4.
- *Baseline survey:* This has been written and submitted as part of Milestone 5.

Challenges encountered

- *Identifying farmers for baby trials:* It has been difficult to identify farmers that could offer part of their land to be used for compost trials. Difficulties ranged from unreliable farmers (promised to provide land but subsequently reneged), lack of water availability & excessive demands for compensation. This was solved by (1) talking to a high number of farmers, (2) trial and error: starting the planting of the trial to see if there was commitment or not, and (3) offering to buy all inputs for the trial plot and promise the farmer that he can keep the harvest after data was measured.
- *Certification:* Obtaining compost certification from the Kenya Bureau of Standards has been a tedious process. This is because of very slow response times as well as lack of knowledge on organic fertilizers on the side of Kenya Bureau of Standards. To solve this, we have done the following: (1) frequent contact and meetings explaining about compost and compost laboratory analysis, (2) showing other results from other laboratories, and (3) showing requirements of various international organic fertilizer standards.

6. Project photos



Trial farm in Banana Hills, Kiambu. Photo from bottom of farm.



Trial farm in Banana Hills, Kiambu, Photo from top of farm.



Trial farm in Banana Hills, Kiambu. Seedling propagation before planting.



Trial farm in Banana Hills. View from bottom of farm.



Waste collection at client of TakaTaka Solutions.



Storing of sorted waste at waste transfer point, Kawangware.



Sacks for sorting waste at waste transfer point, Kawangware.



Training of school children on waste separation



Signs for waste separation at waste collection clients



Bins with waste separation sign at client's plot



Waste collection truck



Construction at new processing/composting facility of TakaTaka Solutions



Manual composting at new facility (awaiting for arrival of Gore technology)



Glass bottles awaiting recycling at TakaTaka Solutions' new facility



Recycled glass made by TakaTaka Solutions



Performance Report

February 2015

Grantor:

TakaTaka Solutions Ltd.
P.O. Box 29273-00625
Nairobi, Kenya

RECIPIENT:

Farm Shop Ltd.
Pekenya House, Tiikaya-Njoro Road, Kiambu County
P.O. Box 2345-0606, Sarit Centre, Nairobi, Kenya

GRANT TYPE: Fixed Obligation Sub-Grant

GRANT #: AID-OAA-F-13-00043

GOVERNMENT CLIENT: U.S. Agency for International Development

Progress:

As of February 18, 2015, Farm Shop has achieved:

Farm shop expansion:

- 25 Farm Shops running
- 360 regular customers per Farm Shop

This achievement is demonstrated via the following:

- 25 Shops opened by December 2014
- Average number of customers served per shop per month – 445
- Average total sales for the shops (November 2014 – January 2015) – 6,263,771 KES
- 90 % of all customers served purchased at least KES 50 worth of products
- A randomly selected list of 100 actual customers who purchased between averages of KES 50 to KES 2,000 per month are analyzed below. (See the table 1 below)

Table 1: List of randomly selected customers who purchased products worth between KES 50 and KES 2,000

#	AGENT	CUSTOMER NAME	DATE OF REGISTRATION	TOTAL SALES
1.	KARURA	Mwaura Kanyungu	14/2/2014	1,380.00
2.		Esther Maina	29/12/2014	240.00
3.		Margret Nyambura	24/12/2014	940.00
4.		Joram Njoroge	2/2/2015	285.00
5.	WANGIGE	Eddah Githiri	19/1/2015	1,500.00
6.		Agnes Njoka	2/2/2015	1,625.00
7.		Jeff Gaithe	16/2/2015	245.00
8.		Mumbi Boro	19/1/2015	680.00
9.		Betty Nganga	30/12/2014	2,000.00
10.	KAHUHO	Muturi Peter	8/1/2015	650.00
11.		Mary Wangui	15/12/2014	590.00
12.		David Mburu	16/12/2014	710.00
13.		Alice Wambui	5/12/2014	1,680.00
14.		Judy Muthoni	2/12/2014	1,085.00
15.	NDENDERU	Hellen Wangui	11/2/2015	1,400.00
16.		Eric Kiago	30/12/2014	280.00
17.		Laban Kamau	30/12/2014	960.00
18.		Judy Gitau	30/12/2014	50.00
19.	KARURI	Maxwel Kayesi	2/12/2014	990.00
20.		Jane Waruingi	3/12/2014	235.00
21.		John Njuguna	2/12/2014	395.00
22.		Richard Muiruri	2/12/2014	80.00
23.	KWAMAIKO	Mr Kiritu	19/1/2015	150.00
24.		Peter Kibiru	19/1/2015	150.00
25.		Viginia Wanjiru	17/1/2015	200.00
26.		Monicah Wambui	16/1/2015	180.00
27.		Stephen Muiruri	8/1/2015	690.00
28.	GIKAMBURA	Mary Wangari	27/1/2015	360.00
29.		Paul Kiragu	20/1/2015	175.00
30.		Jane Wanjiru	4/12/2014	1,025.00
31.		Harmfully Mbugua	3/12/2015	1,100.00
32.		Julias Mungai	3/12/2014	540.00
33.	KIGANJO	Paul Mwangi	22/1/2015	325.00
34.		Peter Thiongo	21/1/20115	50.00
35.		Scola Mwangi	19/1/2015	420.00
36.		Teresiah Wainaina	14/1/2015	300.00
37.	KENYATTA	Karimi Chuka	24/1/2015	880.00

#	AGENT	CUSTOMER NAME	DATE OF REGISTRATION	TOTAL SALES
38.		Kuria Mwangi	6/2/2015	500.00
39.		Salome Wangui	13/2/2015	130.00
40.		Micheal Ngugi	17/1/2015	710.00
41.		Timinah Wangui	13/11/2014	490.00
42.		Irene Nyawira	23/1/2015	400.00
43.	KIAMUMBI	Edwrdr Kamau	29/1/2015	570.00
44.		Agnes Mburu	3/12/2014	180.00
45.		Nancy Karago	4/11/2014	1,360.00
46.		Samuel Mwaniki	3/2 2015	600.00
47.	NYATHUNA	Milka Wanjiru	15/1/2015	1,520.00
48.		John Ndumbo	17/1/2015	750.00
49.		Gearge Mau	27/12/2014	1,260.00
50.		Wambui Muthoni	2/12/2014	100.00
51.	RUIRU	Linet	14/11/2014	240.00
52.		Mr Kingori	3/11/2014	420.00
53.		Peter	1/11/2014	200.00
54.		Roders	31/10/2014	240.00
55.	MUCHATHA	Erustus Kagwe	6/12/2014	750.00
56.		James Muli	17/12/2014	800.00
57.		Mr . Muchiri	10/10/2014	1,830.00
58.		Thomas Kioko	26/8/2014	1,200.00
59.	RUAI	John Njoroge	3/12/2014	1,720.00
60.		Mary Munyiri	3/12/2014	270.00
61.		Monicah Gacheru	26/11/2014	850.00
62.		Kioko52	1/10/2014	600.00
63.	GATHANGA	Jane Wanjiku	19/2/2015	1,475.00
64.		Grace Mumbi	19/2/2015	520.00
65.		Evelyne Wanjiku	3/2/2015	1,475.00
66.		Peter Kamau	6/12/2014	1,225.00
67.	MWIHOKO	Lucy Nyaga	20/1/2015	1,650.00
68.		Esther Wainaina	19/1/2015	840.00
69.		Josphat Ngari	19/1/2015	770.00
70.		Peter Ndiritu	2/1/2015	470.00
71.		John Deire	19/1/2015	505.00
72.		Ann Wabata	17/2/2015	630.00
73.	GATAMAIYO	David Wanjau	10/12/2014	440.00
74.		Joseph Gicheha	17/11/2014	1,950.00
75.		Rahab Nyambura	19/11/2014	1,500.00

#	AGENT	CUSTOMER NAME	DATE OF REGISTRATION	TOTAL SALES
76.		Naomi Wangui	3/2/2015	870.00
77.	GACHIE	Mutembei	11/12/2014	1,380.00
78.		Samuel Mwangi	22/12/2014	930.00
79.		Daniel Karega	30/1/2015	950.00
80.		Joyce Wanjuhi	23/12/2014	1,900.00
81.		Simon Jeremiah	2/12/2015	575.00
82.		Bernard Mumita	1/12/2015	380.00
83.	KIAMWANGI	Kamau	15/10/2014	2,000.00
84.		Peter Kamau	15/10/2014	505.00
85.	KABUKU	Mungai Mwangi	1/12/2014	1,190.00
86.		James Mbai	10/11/2014	390.00
87.		James Maungu	8/11/2014	680.00
88.		Keneth Muriithi	23/10/2014	1,575.00
89.		Kinyanjui Antony	18/10/2014	1,060.00
90.	ZAMBEZI	Wangongu	30/1/2015	350.00
91.		Esther Kinuthia	26/1/2015	600.00
92.		Ndegwa James	26/1/2015	400.00
93.		Rose Nyambura	26/1/2015	1,600.00
94.	KIMENDE	John Njenga	29/12/2014	450.00
95.		Gladysthinguri	29/12/2014	1,233.00
96.	MWIKI	Francis Wageche	18/12/2014	930.00
97.		Beatrice Wambui	15/1/2015	700.00
98.		Evans Mose	17/12/2014	1,080.00
99.		Patrick Mbaya	11/12/2014	1,365.00
100.		Esther Ndugi	9/12/2014	1,450.00

Table 2: Summary of Average sales of the 100 randomly selected customers

	AGENT	CUSTOMERS	AVERAGE TOTAL SALES PER MONTH	AVERAGE TOTAL SALES PER CUSTOMER
	24 SHOPS	100	80,228.00	802.28

The 25th shop is excluded since the franchisee had not recorded sales per customer.

Report prepared by: Paul Gachie

Project Manager: Farm Shop

Signature:



Updated pre-baseline survey activities

Activities to be carried out by agrodealers and TakaTaka Solution event staffers

The FarmShop franchisees and other non-FarmShop agrodealers partnering with TakaTaka Solutions play a critical role in our study. TakaTaka Solutions will distribute and sell Soil Plus through this channel and as such, the agrodealers will have the first point of contact with farmers who purchase Soil Plus.

TakaTaka Solutions will work with the agrodealer to hire someone they trust during the survey period to carry out the follow:

1. Report information on farmers that purchased Soil Plus (to be included at baseline in the treatment group)
2. Report information on farmers that did not purchase Soil Plus but purchased fertilizer (to be included at baseline in the comparison group)

When the farmer has selected all products and approaches the register, the agrodealer and/or his/her staff will review the products that are being purchased. If the farmer has selected Soil Plus, the agrodealer will collect the information listed in [Section A](#). If the farmer has not selected Soil Plus, but has selected any kind of fertilizer, then the agrodealer will collect the information listed in [Section B](#). The agrodealer will request this information by saying that the company that makes a farm input product wants to learn more about the changes in their life over the next year.

Section A: Information collected for farmers that purchase Soil Plus (treatment)

1. Name of purchaser
2. Owner: "Are you the owner of the farm you will use these inputs on?"
 - a. If yes → continue
 - b. If no → "Please give me the telephone number of the owner of the farm so I can ask them if they would like to participate in this study."
3. Telephone number
4. Date of purchase
5. Quantity purchased
6. List of crops: "Please tell me all the crops that you are planning to grow this season?"
7. List of crops sold: "Do you sell any of these crops in the market?"
8. Intent to use Soil Plus: "Do you plan to use Soil Plus on any of these crops? If yes, which ones?"
9. Agree to be contacted

Section B: Information collected for farmers that do not purchase Soil Plus but purchase fertilizer (comparison)

1. Name of purchaser
2. Owner: “Are you the owner of the farm you will use these inputs on?”
 - a. If yes → continue
 - b. If no → “Please give me the telephone number of the owner of the farm so I can ask them if they would like to participate in this study.”
3. Telephone number
4. Date of purchase
5. Item purchased and quantity
6. List of crops: “Please tell me all the crops that you are planning to grow this season?”
7. List of crops sold: “Do you sell any of these crops in the market?”
8. Agree to be contacted

Agrodealers fill in this information after each applicable purchase on a sheet (log) provided by the third party data collection agency (henceforth called data collection partner (DCP)). The DCP will collect this information on a fixed schedule (twice per week). Additionally, the DCP will train agrodealers and agrodealer assistants prior to the start of the baseline using materials prepared with WDI.

The same information as detailed in Section A will be collected by event staffers from farmers who purchase Soil Plus at events organized by TakaTaka Solution staffers (market events or those hosted at farmer organizations). Those that do not purchase Soil Plus from these events will be asked the same questions detailed in Section B (above).

The DCP will receive this log of farmers at these events from TakaTaka Solution staffers.

Activities to be carried out by DCP head office staff before the DCP interviewer calls the farmers to schedule appointments

When the DCP head office staff receives the logs, the DCP administrator will conduct the following activities:

1. Review the log files for missing information
 - a. If information is missing, DCP administrator will contact the particular agrodealer and ask for missing information. The administrator will also re-train the agrodealer over the phone on how to collect the missing information and request him/her to discuss this with the rest of his/her staff. Similarly, if any information is missing from log files created at the events, the DCP administrator will follow up with TakaTaka Solutions staffers
 - b. If no information is missing, continue to the next step
2. The DCP administrator, will separate those farmers who purchased Soil Plus from those that did not purchase Soil Plus and enter them separately into excel sheets
3. The DCP administrator will organize calls to farmers who purchased Soil Plus (see the next section: Activities to be carried out by the interviewer before the baseline interview with the

farmer). The DCP administrator will assign DCP interviewers with farmer information to call and schedule interviews with those farmers who have purchased Soil Plus. Recording the list of crops from farmers who applied Soil Plus correctly in terms of how and when, the DCP interviewer will develop a list of crops that these farmers **applied Soil Plus on**

4. Regarding farmers who did not purchase Soil Plus, the DCP administrator will first identify all farmers that agreed to be contacted from the excel sheet. Then the administrator will match farmers that grow the same crops on which farmers applied Soil Plus correctly. For this step to be carried out, the DCP administrator will require the list of crops discussed in step 3. Hence calls to farmers who purchased Soil Plus must be carried out prior to this matching step. The DCP administrator will match farmers in the comparison group on at least one crop (there will not be sub-groups of farmers based on matched crops; but rather one list where all farmers have matched at least one crop on the list that has been compiled based on what farmers applied Soil Plus on). Thirdly, after selecting this matched group of farmers, the administrator will make a sub-selection by randomly selecting farmers: for example, the administrator will select every third farmer and will create a separate sheet with this sub-selection. The DCP interviewers will contact farmers from this sub-selected sheet. The DCP administrator will assign DCP interviewers with farmer information to call and schedule interviews

Activities to be carried out by the DCP interviewer before the baseline interview with the farmer (questions on the pre-baseline telephone call)

On receiving the excel sheet from the DCP administrator, DCP interviewers will begin scheduling interviews with farmers.

1. The DCP interviewer will call the farmer who has agreed to be contacted within two weeks of purchase date
2. On this call, the DCP interviewer will request to speak with the person who is most aware of the household's farming activities and works on the farm "I would like to speak with the person most knowledgeable about your farm, your soil and your farming activity". On ensuring that the interviewer is speaking with the correct person, he/she will briefly introduce the study
3. For farmers that have purchased Soil Plus: The interviewer will ask whether the farmer has applied Soil Plus
 - a. If yes
 - i. List of crops: "On which crops did you apply Soil Plus?"
 - ii. Timing: "Approximately, when did you apply Soil Plus?" (date of the month)
 - iii. Application technique for each plot that the farmer has applied Soil Plus: "how did you apply Soil Plus" and "at which stages of growing the crop did you apply Soil Plus?" (correct response from farmers should be: worked into the soil and placed near the root; applied into the soil and then the seed/seedling is planted i.e. at planting stage)

1. On analysis of the 'how and when' the farmer applied Soil Plus, interviewers on deeming correct responses, will schedule the baseline interview with the farmer
 - iv. Set data and time of interview: "When are you available for an interview?"
 - v. Set location of the interview: "would you like to meet at your farm or some other location?" (take the address of meeting place with attention to landmarks)
 - b. If no
 - i. Timing: "When do you intend to apply Soil Plus?"
 - ii. DCP interviewer says he will call back after this date of application to arrange an interview time and ends the call.
 - iii. DCP interviewer calls back after intended date of application and asks whether the farmer has applied Soil Plus
 1. If yes, go to 'yes' list of instructions listed above on 4a
 2. If no, repeat instructions in 4b
4. For farmers that have **NOT** purchased Soil Plus: The interviewer will confirm the list of crops to ensure matching again on the call
 - a. List of crops: "Which crops are you growing this season?"
 - b. If the match in crops still holds,
 - i. Set data and time of interview: "when are you available for an interview?"
 - ii. Set location of the interview: "would you like to meet at your farm or some other location?" (take the address of meeting place with attention to landmarks)
 - b. If the match in crop does not hold
 - i. Thank respondent and end call (no baseline interview is scheduled since there is no match in any crop)
 - ii. Call next randomly selected farmer who did not purchase Soil Plus

After the call, the DCP interviewer will fill in section 1 of the treatment and comparison paper survey respectively. He/ she will also enter all the information from the agrodealer log as well as the phone call into the treatment and comparison group databases. The DCP interviewer then administers the survey to the respondent at the agreed upon time and location.

Showcards to be used with the
TakaTaka Solutions Baseline

Showcard A



Terrible



Bad



Medium



Good



Excellent

1

2

3

4

5

Mbaya sana

Mbaya

**Wastani/
katikati**

Mzuri

Mzuri sana

Showcard B

Never

Rarely

Sometimes

Most times

Always

Sijawahi

Mara chache

Saa zingine

Mara Nyingi

Kila mara

1

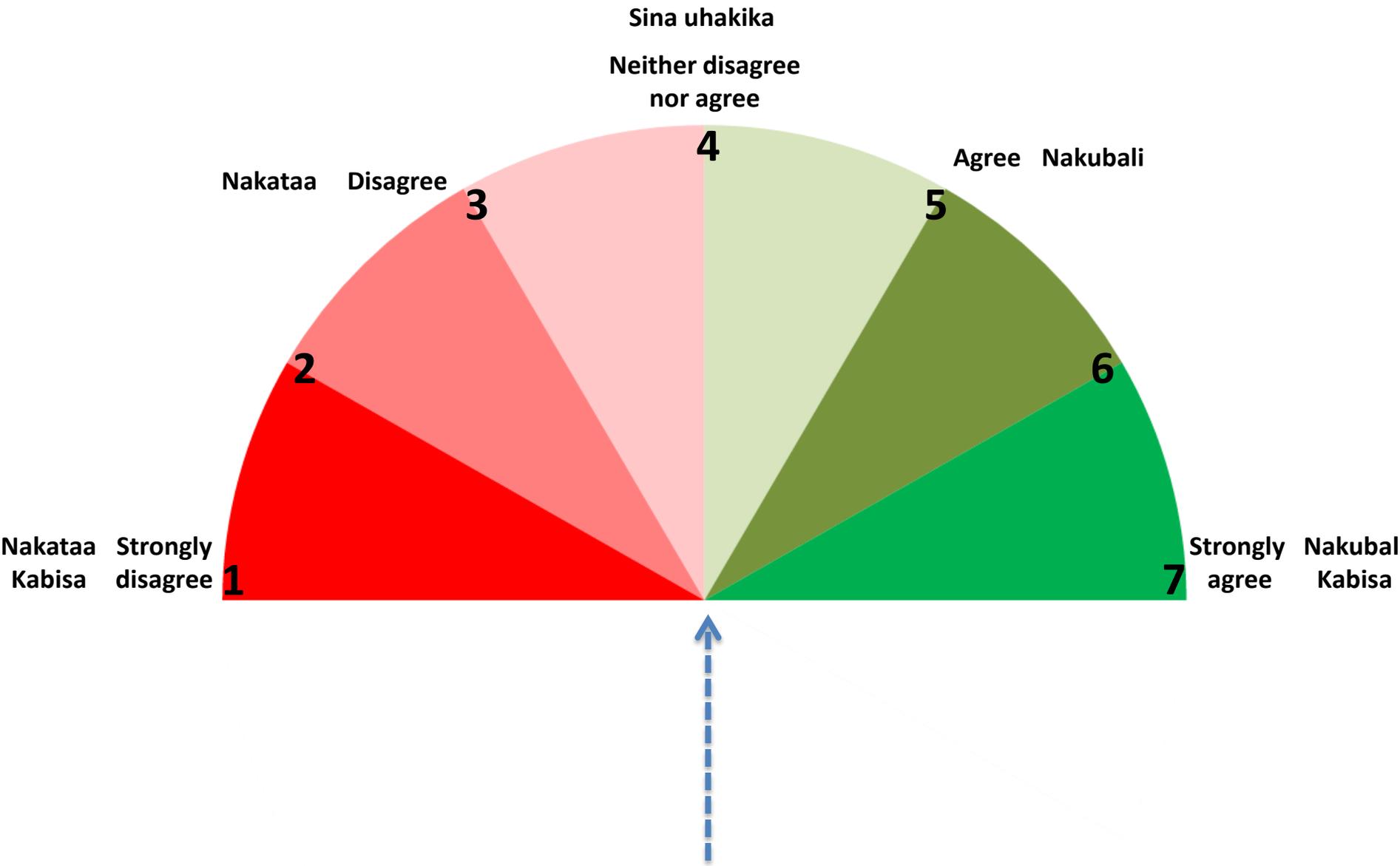
2

3

4

5

Showcard C



List of crops arranged alphabetically									
Amaranthus (Terere)	1	Cotton (Pemba)	25	Khat (miraa)	49	Pears	73	Sugar beets	97
Apple	2	Cowpeas incl leaves (kunde)	26	Kales (sukuma wiki)	50	Pigeon peas	74	Sugarcane (miwa)	100
Arrowroots (Ndmma)	3	Cucumber	27	Lemons (ndimu)	51	Pineapples (mananasi)	75	Sunflower	101
Artemesia	4	Custard apple (tomoko)	28	Lemon grass	52	Plums	76	Sweet melon	102
Avocado	5	Dates	29	Lettuce	53	Pomegranate	77	Sweet potatoes	103
Bananas (Ndizi)	6	Corriander (dhania) incl grains	30	Lugard	54	Poyo	78	Tamarind	104
Bananas (tissue culture)	7	Dolichos (njahi)	31	Macademia nuts incl. grafted	55	Pumpkin (Malenge)	79	Tangerine	105
Barley	8	Eggplant	32	Maize, dry	56	Pumpkin leaves	80	Tea (chai)	106
Beans (Mahawagwe)	9	Flowers (Mana)	33	Maize green (hindi choma)	57	Pyrethrum	81	Tabacco	107
Brinjals (biriganya)	10	Fodder (Nyasi)	34	Mangoes incl. grafted (embe)	58	Rice (mchele)	82	Tomatoes (nyanya)	108
Bulrush millet (wimibi)	11	French beans- Mishiri	35	Millet (wimbi)	59	Runner beans	83	Tree tomato	109
Beetroot	12	Garlic onions- saumu	36	Mkunga	60	Ravaya	84	Trees, commercial	110
Cabbage	13	Ginger (tangawizi)	37	Mulberry (onunga)	61	Saina	85	Turnips	111
Cammomila	14	Gourds (abutho)	38	Njugu mawe/bambara bean	62	Simsim	86	Vanilla	112
Capsicum/ peppers (hoho)	15	Goosberries (nathi)	39	Oats	63	Sisal	87	Watermelon	113
Carrots	16	Grapes (zabibu)	40	Okra	64	Snow peas	88	Wheat (ngano)	114
Cashew nuts (Koroshu)	17	Green grams (Ndegu)	41	Onion (vitunguu)	65	Sorghum (Mtama)	89	White suppoise	115
Cassava (mihogo)	18	Green peas (Miuji)	42	Oranges	66	Soyabean (Saya)	90	Wild berries	116
Castor oil (mbariki)	19	Groundnuts (Njugu)	43	Other leaves (njahi)	67	Spinach	91	Yams	117
Cauliflower	20	Guava (Mapera)	44	Nightshade (Managu)	68	Squash	92	Yellow passion fruit (mero)	118
Chilli peppers (pili kali)	21	Indigenous vegetables	45	Napier grass	69	Stefali	93	Zambaro	118
Coconut (mingzi) incl. copra, green	22	Irish potatoes	46	Passion fruit	70	Stinging nettle	94	Other (please specify)	98
Coffee incl. cherries, churned, mbuni	23	Jackfruit (Renesi)	47	Pawpaws	71	Sycamore (mkuyu)	95	DON'T KNOW	99
Corn flower	24	Karela	48	Peaches	72	Strawberries	96		

COMPARISON GROUP SURVEY

SECTION 1: FILL THIS SECTION FROM PHONE CONVERSATION

T.1 NAME OF THE RESPONDENT: _____

DID YOU PURCHASE SOIL PLUS?

1. YES

2. NO (THIS RESPONDENT IS IN THE COMPARISON GROUP. END SECTION AND MOVE ON TO THE SURVEY SECTION)

T.2

SECTION 2: CARRY OUT THESE THREE STEPS:

1. CHECK TO SEE THAT YOU ARE MATCHING THE PHONE LOG'S RESPONDENT WITH THE CORRECT SURVEY RESPONDENT
2. CHECK THAT THE RESPONDENT IS MOST FAMILIAR WITH THE FARM.
3. ASK RESPONDENT IF **HE OR SHE HAS PURCHASED SOIL PLUS SINCE THE TELEPHONE CALL TO SCHEDULE THE INTERVIEW.**

--> IF YES, SWITCH TO TREATMENT GROUP SURVEY DOCUMENT AND FILL OUT SECTION 1

--> IF NO, THE RESPONDENT HAS NOT PURCHASED SOIL PLUS, CARRY ON WITH THIS SURVEY

UNIQUE IDENTIFIER: _____

DATE: _____

IWR NAME: _____

IWR: DO NOT ENTER UNIQUE IDENTIFIER. WILL BE DONE IN OFFICE

I can do the interview in English or Swahili. Which language would you like me to use? (NAWEZA KUULIZA MASWALI KWA LUGHA YA KIINGEREZA AU KISWAHILI. UNGEPENDA NITUMIE LUGHA GANI?)

IWR: USE LANGUAGE THE FARMER SAYS AS THE PRINCIPAL LANGUAGE

Hello, my name is [INTERVIEWER'S NAME]. I am part of a study team that wants to learn about your farming practices. I work for Beta Consulting, a research consulting firm, on behalf of the William Davidson Institute at the University of Michigan. This is an independent research institution and does not represent the government or any political party. (HABARI YAKO JINA LANGU NI _____.MIMI NI MMOJA YA WASOMI WENYE WANGEPENDA KUJUA VILE WEWE UNAENDELEZA UKULIMA YAKO .NAFANYA KAZI NA BETA CONSULTING WAKISHIRIKIANA NA WILLIAM DAVIDSON INSTITUTE KUTOKA CHUO KIKUU CHA MICHIGAN.HILI NI SHIRIKA LA KIPEKEE LA UTAFITI AMBALO HALINA UHUSIANO NA SERIKALI AU CHAMA CHOCHOTE CHA KISIASA.)

IWR: GIVE THE RESPONDENT THE INFORMED CONSENT FORM: BELOW IS THE TEXT TO READ OUT ALOUD.

Our goal in this research is to better understand effects that farming inputs can have on your life. We want to help a company that manufactures a farming input product to improve their on-going work by understanding what changes happen to farmers that purchase and do not purchase their product. The information gathered will help the company to ensure the product meets the needs of farmers. All information you share with me will be kept confidential and will not be given to anyone outside the study. We are using this information for research purposes only. Your name will never be used in any reports. Your participation is voluntary. Your responses will not affect your current or future relationship with any organization. You can stop your participation or decline to respond to any question for any reason. We would like you to know that your participation is greatly appreciated and is extremely valuable to the success of our efforts. Please keep this paper for your records. If you have any questions contact the addresses given on the form. Do you give your consent to participate in this study?

KIINI CHA UTAFITI HUU NI KUELEWA MANUFAA YA VIFAA VYA KILIMO KWA MAISHA YAKO. TUNGEPENDA KUSAIDIA KAMPUNI AMBAYO INATENGENEZA MBOLEA YA KIASILI/ORGANIC KUBOresha MBOLEA HIYO KWA KUELEWA MABADILIKO KWA MAISHA YA MKULIMA KUTOKANA NA KUTUMIA BIDHAA HIYO AU KUTOITUMIA. MAJIBU YA WAKULIMA ITASAIDIA KAMPUNI HIYO KUHAKIKISHA WAKULIMA WENGI WANANUFAIKA KUTOKANA NA BIDHAA HIYO. MAJIBU YAKO YOTE YATAKUWA SIRI BAINA YETU NA HAYATAPATIWA MTU YEYETO ASIYE HUSIKA KWA UTAFITI NA MAON HAYO YATATUMMIKA KWA MINAJILI YA UTAFITI PEKEE. JINA LAKO HALITATUMIWA KATIKA REPOTI YOYOTE. KUHUSIKA KWAKO NI HIARI YAKO, NA HAITADHURU UHUSIANO WAKO WA SASA AU WABAADAYE NA SHIRIKA LOLOTE. UNaweza KATIZA KUHUSIKA KWAKO AU UNaweza KATA KUJIBU SWALI LOLOTE KWA SABABU YOYOTE. TUNGEPENDA UJUE KWAMBA TUNASHUKURU KWA KUHUSIKA KWAKO NA NI KWA MANUFAA SANA KWA KUFAULU KWETU. WEKA KARATASI HII NA UKIWA NA SWALI LOLOTE, TAFADHALI PIGA SIMU KWA;

ASK FOR VERBAL CONSENT. IF THEY AGREE TO PARTICIPATE AND CONTINUE WITH THE SURVEY. IF THEY CHOOSE NOT TO PARTICIPATE THANK THEM FOR THEIR TIME.

This is not a test and your responses will not be judged. I want to know the situation even if it is not the best for you. If you don't have an exact answer for some of the questions, please try to give your best estimate. You can stop me at anytime to repeat something if you don't understand or ask me to explain it in a different manner. Thank you very much for your cooperation (HII SI MTIHANI, CHENYE NITAKUHULIZA HAKITAPINGWA NA MTU YEYOTE.NATAKA KUJUA TU MAMBO VILE ILIVYO HATA KAMA SI MAZURI KIKWAKO.KAMA HAUNA JIBU KAMILI KWA MASWALI YOYOTE TAFADHALI JARIBU KUNIPA JIBU LINALOKARIBIA UKWELI.UNAEZA NISIMAMISHA WAKATI WOWOTE KURUDIA KITU/ JAMBO AMBALO HAUJAELEWA AMA UNATAKA UFANUZI KIVINGINE NITAKUELEZA).

IWR: DO NOT READ "DON'T KNOW" OR OTHER RESPONSE OPTIONS IN ALL CAPITALS (UPPERCASE)-NON-BOLD FONT TO RESPONDENTS.

START TIME: _____

I would like to understand more about your farm and any land that your household uses for farming over the last 12 months. Please remember we will not share this information with any outside parties. (NINGEPENDA KUJUA ZAIDI KUHUSU MASHAMBA YAKO YENYE ULIFANYIA KILIMO KWA MIEZI 12 ILIYOPITA. TAFADHALI JUA YA KWAMBA HABARI HII HAITAPATIWA MTU YEYOTE ULE)

IWR: ASK ABOUT ALL THE PIECES OF LAND FIRST AND THEN COMPLETE QUESTIONS 6-9 FOR EACH PIECE OF LAND. QUESTIONS 2-5 ARE ONLY ASKED TO TREATMENT GROUP RESPONDENTS AND ARE NOT INCLUDED IN THIS SURVEY

1. How many pieces of land did you farm on in the past 12 months. Include any pieces you farm on outside of your home piece and/or in other counties. (TAFADHALI NIAMBIE KUHUSU MASHAMBA YOTE UNAYOLIMA) IWR: ASSIGN NAME WITH FARMER FOR EACH PIECE	6. What is the area of this piece of land? (HILI SHAMBA NI NGAPI) IWR: ASK ONLY ABOUT THE AREA THAT THEY FARM ON, NOT INCLUDING THE HOME. ESTIMATE BY WALKING IF NO AREA GIVEN		7. Do you own or rent this piece of land? (HII SHAMBA UNAIMILIKI KIVIPI) 1. OWN 2. RENT 98. OTHER (please specify___) 99. DON'T KNOW IWR: INHERITED PIECE OF LAND/ OR TITLE CHANGE STILL TO BE DONE SHOULD BE MARKED AS 'OWN'	8. How would you rate the fertility of the soil on this piece of land after you have applied any input such as fertilizer, compost and/or manure? (KWA MAONI YAKO, UBORA WA UDONGO UKO VIPI BAADA YA KUTUMIA MBOLEA AU FERTILIZER) IWR: IF FARMER SAYS NO INPUT APPLIED, SAY RATE FERTILITY OF SOIL AS IS. IWR: USE SHOWCARD A. READ SCALE OPTIONS ALOUD. 1. TERRIBLE-MBAYA SANA 2. BAD-MBAYA 3. MEDIUM- SI MBAYA 4. GOOD-MZURI 5. EXCELLENT-MZURI SANA 99. DON'T KNOW-SIJUI	9. Do you practice mulching on this piece of land? (UNAFUNIKA UDONGO KWA NYASI AU KWA MABAKI YA MIMEA YOYOTE) 1. YES 2. NO 99. DON'T KNOW
	NUMBER	UNIT			
a					
b					
c					
d					

CODE FOR UNIT FOR QUESTION 6--> 1. ACRES; 2. FEET; 3. METRES; 4. FOOT TO FOOT; 5. STRIDES

IWR:QUESTIONS 10-13 ARE ONLY ASKED TO THE TREATMENT GROUP FARMERS AND HENCE ARE NOT LISTED IN THE COMPARISON GROUP SURVEY

Now I would like to ask you some questions on crops you grew and sold last harvest (NINGEPENDA KUJUA KUHUSU MIMEA ULIYOKUZA NA KUUZA KWA MAVUNO ILIYOPITA).

				Seed	Water(MAJI)	Labor (WAFANYI KAZI)		Time of the year (MUDA KATIKA MWAKA)	Harvest(MAVUNO)		
14. Crop name (JINA YA MMEA ULIYOUZA) <small>IWR: FOR CROP CODE: SEE CROP LIST AT END OF SHOWCARDS</small>	15. Which piece of land did you plant this [INSERT CROP] on? (ULIPANDA KWA SHAMBA GANI) MATCH TO QUESTION 1	16. Over how much area, did you plant this [INSERT CROP]? (HUU MMEA ULIPANDA KWA SHAMBA KIASI GANI) <small>IWR: EST. BY WALKING IF NO AREA GIVEN</small> 1. ACRES 2. FEET 3. METRES 4. FOOT TO FOOT 5. STRIDES	17. What fertilizer, compost, manure did you apply on [INSERT CROP]? (ULITUMIA FERTILIZER AU MBOLEA GANI KWENYE HUU MMEA) <small>Please tell me how much quantity of each did you add on [INSERT CROP] with unit. (ULITUMIA KIASI GANI YA FERTILIZER AU MBOLEA KWA HUU MMEA)</small> <small>IWR: ASK FARMER ABOUT TOP DRESSING -- IF FARMER SAYS NITROGEN, ASK IF NPK OR CAN? -- IF FARMER SAYS DONT KNOW NAME, ASK COLOUR OF FERTILIZER</small>	18. Did you use hybrid or local seeds/seedlings for this [INSERT CROP]? (ULITUMIA MBEGU ZA AINA GANI, HYBRID AMA KIENYEJI?) 1. HYBRID 2. LOCAL 3. BOTH HYBRID AND LOCAL 4. UNSURE 99. DON'T KNOW	19. What was your main source of water for this [INSERT CROP] ? (MAJI SANA SANA HUWA UNATOA WAPI) 1. RAIN FED 2. IRRIGATION 3. BOTH 99. DON'T KNOW	20. Besides you, did other persons work to help you grow this [INSERT CROP] ? (KANDO NA WEWE KUNA MTU YEYOTE MWINGINE ALIKUSAIDIA KUKUZA MMEA HUU) 1. YES 2. NO (SKIP TO QUESTION 22) 99. DON'T KNOW	21. What type of persons would you categorize them as? (WALIKUWA AKINA NANI) <small>IWR: LIST ALL; PUT COMMA AFTER EACH</small> 1. HIRED HELP 2. FAMILY 3. COMMUNAL 4. GANG LABOUR 98. OTHER (specify) 99. DON'T KNOW	22. What month of the year did you plant [INSERT CROP] ? (ULIPANDA MWEZI GANI) 1. JANUARY 2. FEBRUARY 3. MARCH 4. APRIL 5. MAY 6. JUNE 7. JULY 8. AUGUST 9. SEPTEMBER 10. OCTOBER 11. NOVEMBER 12. DECEMBER	23. How many months does it take until it is ready to harvest [CROP] you planted in [MONTH FROM Q22] (MMEA HUU ULIPANDA MWEZI WA..... UNACHUKUA MIEZI MINGAPI NDIO UANZE KUVUNA?) 1. DAY 2. WEEK 3. MONTH	24. For how many months do you harvest [INSERT CROP] you planted in [INSERT MONTH] (UNAVUNA MMEA HUU KWA MIEZI MINGAPI) 1. HARVESTED ONCE (SKIP TO Q27) 2. MONTHS	25. How often do you harvest [INSERT CROP] you planted in [INSERT MONTH] ? (TUSEME KAMA KWA MWEZI UNAVUNA MARA NGAPI) 1. HARVESTED ONCE 2. DAY 3. WEEK 4. MONTH
		N U	NAME N U						N U	N U	N U
a. CROP FROM LAST HARVEST WITH TOP SALES CROP: _____											
b. NAME OF CROP FROM LAST HARVEST WITH TOP SALES CROP: _____											

CODE FOR NAME OF QUESTION 24--> 1. CAN; 2. DAP; 3. UREA; 4. NPK; 5. COMPOST; 6. MANURE; 7. FOLIAR FEED; 8. MAVUNO; 9. NONE; 98. OTHER (specify); 99. DON'T KNOW

CODE FOR UNIT FOR QUESTION 24--> 1. KGS; 2. HANDFUL; 3. WHEEL BARROW; 4. CUPS; 5. 50-KG BAG; 6. 90-KG BAG; 7. DEBE; 8. PICK UP; 9. CANTER; 10. TONNES; 11. 70-KG BAG; 12. GORO GORO 98. OTHER (specify); 99. DON'T KNOW

IWR: DRAW A MAP OF THE PIECE OF LAND AND LABEL THE CROPS THAT YOU JUST DISCUSSED WITH THE FARMER AND WHERE THEY WERE GROWN ON THE LAND. DRAW THIS MAP AT THE BACK OF THIS PAGE. CHECK FOR ANY INCONSISTENCIES. IF FARMER USES SOIL PLUS THEN INSTEAD OF DRAWING A NEW MAP ADD THIS CROP INFORMATION TO MAP DREW EARLIER.

NAME OF CROP IWR: COPY CROP CODE FROM ABOVE TABLE	LIST PIECE OF LAND ON WHICH CROP WAS PLANTED IWR: COPY THE NAME OF THE PIECE OF LAND FROM THE ABOVE TABLE	Harvest(MAVUNO)		Sale of crop(MAUZO)		Quality				
		26. IWR: CALCULATE THE TOTAL NUMBER OF HARVESTS. ASK FARMER IF THIS CALCULATED NUMBER SOUNDS CORRECT. IF NOT, RECORD THE NUMBER THAT THE FARMER SAYS.	27. On average, what was the quantity of each harvest you got of the [INSERT CROP] you planted in [INSERT MONTH]? Please include the unit. (MAVUNO YA KILA MMEA ULIKUWA WA KIASI GANI. KIPIMO GANI) IWR: IF RESPONDENT SAYS NONE, END TABLE HERE	28. On average, per harvest of this [INSERT CROP] you planted in [INSERT MONTH], what quantity did you sell? Please include the unit. (ULIUZA KIASI GANI. KIPIMO GANI) IWR: LIST NUMERICAL VALUE. IF RESPONDENT IS UNSURE, OR DOES NOT HAVE AN ANSWER, ASK FOR TOTAL AMOUNT FOR ALL HARVESTS AND WRITE THE WORD TOTAL AFTER	29. How much money did you receive for one harvest from this planting? (ULIPATA PESA NGAPI KWA MAVUNO MOJA YA HII MMEA?) IWR: SKIP TO QUESTION 32, IF CROP WAS HARVESTED JUST ONCE	30. IWR: MULTIPLY RESPONSE OF Q29 BY THE TOTAL NUMBER OF HARVESTS LISTED IN Q26. ASK RESPONDENT IF CALCULATED NUMBER IS ACCURATE. IF ACCURATE CIRCLE AND SKIP TO Q32. IF NOT ACCURATE, ASK Q31.	31. How much money did you receive from selling all harvests from this planting? (KWA MAUZO YOTE YA MMEA HUU, ULIPATA PESA NGAPI) IWR: CIRCLE WHICH VALUE IS MORE ACCURATE (Q30 OR Q31)	32. How would you rate the quantity of this [INSERT CROP] you planted in [INSERT MONTH] compared to your previous years? (KWA MAONI YAKO WINGI WA MAVUNO YA HUU MMEA ULIKUWA VIPI UKILINGANISHA NA MIAKA ILIYOPITA) IWR: USE SHOW CARD A. READ SCALE OPTIONS. 1. TERRIBLE 2. BAD 3. MEDIUM 4. GOOD 5. EXCELLENT 98. NOT APPLICABLE 99. DON'T KNOW	33. How would you rate the quality of this [INSERT CROP] you planted in [INSERT MONTH]'s harvest compared to previous years? (KWA MAONI YAKO, MAVUNO YA HUU MMEA ULIKUWA VIPI UKILINGANISHA NA MIAKA ILIYOPITA) IWR: USE SHOW CARD A. READ SCALE OPTIONS ALOUD. 1. TERRIBLE 2. BAD 3. MEDIUM 4. GOOD 5. EXCELLENT 98. NOT APPLICABLE 99. DON'T KNOW	
		NUMBER	UNIT	NUMBER	UNIT					
a.										
b.										

CODE FOR UNIT FOR QUESTION 27 AND 28--> 1. GRAMS; 2. KGS; 3. 100-KG BAGS; 4. 90-KG BAGS; 5. 50-KG BAGS; 6. METRIC TONNES; 7. QUINTALS; 8. CRATES; 9. 70-KG BAG; 10. DEBE; 11. GORO GORO; 98. OTHER (**specify**); IF FARMER SAYS BUNCHES, ASK HOW MANY BUNCHES FIT IN A BAG

PART C: Household and farm finances(MAPATO YA FAMILIA)

Now I would like to better understand your household finances and investments into your farm to understand how agricultural inputs affect your finances. I will keep all your responses confidential so please provide the most accurate answers as possible. (NINGEPENDA KUJUA ZAIDI JUU YA MAPATO YA BOMA LAKO NA VILE UMEEKEZA KWA UKULIMA, NAKUHAKIKISHIA YA KWAMBA KILE UTANIAMBIA NITAKIWEKA CHA SIRI KWA HIVYO NINGEOMBA UNIAMBIE UKWELI IWEZEKANAVYO)

34 For the next few questions, how often did you experience these situations over the past three months (IWR: SINCE <MONTH>). (TUKIZUNGUMZIA MIEZI TATU ILIYOPITA NINGEPENDA UNIELEZE MARA NGAPI ULIJIPATA KATIKA HALI HII NTAKAYO KUSOMEA)

SHOW RESPONDENT SHOWCARD B. READ SCALE OPTIONS OUT LOUD.

(CIRCLE ONE NUMBER PER LINE)

	Never (Haijawahi)	Rarely (Mara chache)	Sometimes (Saa zingine)	Most times (mara nyingi)	Always (Kila Mara)	DON'T KNOW(SIJUI)	NOT APPLICABLE
a. Since <MONTH>, I was able to save as much money as I need from my farming. (NILIKUWA NA UWEZO WA KUWEKA PESA NILIYOTOA KWA UKULIMA KWA AKIBA)	1	2	3	4	5	99	98
b. Since <MONTH>, I was able to make investments I want to make in my farm. (KUTOKA MWEZI WA.....NILIKUWA NA UWEZO WA KUWEKEZA VILE NATAKA KATIKA KILIMO)	1	2	3	4	5	99	98
c. Since <MONTH>, my household's income stability was good which means it remained steady from harvest to harvest. (KUTOKA MWEZI WAMAPATO YA FAMILIA YANGU ILIKUWA SAWA NA YA KUTOSHA KUTOKA MAVUNO HADI MAVUNO)	1	2	3	4	5	99	98

Now I would like to ask you some questions on the quantity of food your household eats. (NINGEPENDA KUKUULIZA MASWALI MACHACHE KUHUSU KIASI/KIWANGO HYA VYAKULA FAMILIA YAKO INAKULA.)

35 In which months in the past 12 months (IWR: SINCE <MONTH>) did you not have enough food to meet your family's needs? (NI MIEZI GANI KWA MIEZI KUMI NA MBILI IMEPITA HAMKUWA NA CHAKULA CHA KUTOSHA ILI KUTIMIZA MAHITAJI YA FAMILIA YAKO)

IWR: THIS INCLUDES ANY KIND OF FOOD FROM ANY SOURCE, SUCH AS OWN PRODUCTION, PURCHASE OR EXCHANGE, FOOD AID, OR BORROWING.

DO NOT READ THE LIST OF MONTHS ALOUD. USE A SEASONAL CALENDAR IF NEEDED TO HELP RESPONDENT REMEMBER THE DIFFERENT MONTHS. PROBE TO MAKE SURE THE RESPONDENT HAS THOUGHT ABOUT THE ENTIRE PAST 12 MONTHS.

MONTH	1. YES	2. NO	99. DON'T KNOW
a. JANUARY			
b. FEBRUARY			
c. MARCH			
d. APRIL			
e. MAY			
f. JUNE			
g. JULY			
h. AUGUST			
i. SEPTEMBER			
j. OCTOBER			
k. NOVEMBER			
l. DECEMBER			

PART E: Optimism/Pessimism for the future

Not all questions I ask you will require a yes or no response. Some questions require different responses. Let me do one example with you first using this showcard (IWR: USE SHOWCARD C).

Imagine this scale is like a speedometer. In a speedometer your speed can increase and decrease from time to time. Similar to a speedometer your feelings can also increase and decrease over time. Similarly you can change how much you agree or disagree with a statement. IWR: READ ALL THE OPTIONS OF THE SCALE AND POINT AS YOU DO IT.

Say if you had asked me how much I agree or disagree with the following question "Since the last three months, so since <MONTH>, I am happy. I will pick a response from this scale to answer you.

At the beginning of the year I was very happy because I was excited that the new year started (POINT TO 6) but then I got busy with work and spent long hours at my shamba so I got sad (POINT TO DISAGREE). Since I have mixed feelings which are more towards happy, I select agree.

(SI MASWALI YOTE NITAKUULIZA YATATAKA KUJIBIWA NDIO AU LA .MASWAALI MENGINE ITAHITAJI KUJIBIWA VINGINE AMA TOFAUTI. KWA MFANO, WACHA TUFANYE KWAA MFANO KWANZA NIKITUMIA KADI. FIKIRIA KIPIMO KAMA CHA SPEED MITA YA GARI. KASI YA GARI YAWWEZA KUPUNGUA AU KUONGEZEKA. FIKRA NA UNAVYOJIHISI PIA YAWWEZA KUBADILIKA KAMA SPEED MITA NA WAWWEZA KUBADILISHA JINSI UNAVYO KUBALI AU KUKATAA SWALI LIFUATALO. KAMA UNGENIULIZA KAMA NAKUBALI AU KUKATAA SENTENSI IFUATAYO. (IWR: READ ALL THE OPTIONS OF THE SCALE AND POINT AS YOU DO IT) KUTOKA MWEZI WA.....NINAFURAHA, NITACHAGUA JIBU KUTOKA KWA KIPIMO ILI KUKUJIBU. MWAKA ULIPOANZA NILIFURAHU KWA SABABU NILIKUWA NAONA MWAKA UMEANZA VYEMA HALAFU NIKAWA NA SHUGULI NYINGI ZA SHAMBA NA NIKAWA SINA FURAHA. KWA SABABU NINA MICHANANYIKO YA JINSI NINAVYO JIHISI, NACHAGUA KUKUBALI.

Now, I will ask you some questions with this scale. SASA NITAKUULIZA MASWALI KUHUSU RAMANI/SCALE HII

Think about your farming experience over the past three months (IWR: SINCE <MONTH>); (SASA FIKIRIA KUHUSU VILE UMEKUWA NA UJUZI AMA UMAARIFA WA UKULIMA KWA MIEZI TATU ILIYOPITA,UTATUMIA KADI KUJIBU,NAMBARI MOJA INAMAANISHA UMEKATAA KABISA NA NAMBARI SABA INAMAANISHA UMEKUBALI KABISA)

USE SHOWCARD C. READ SCALE OPTIONS ALOUD.

(CIRCLE ONE NUMBER PER LINE)

	Strongly Disagree (NIMEKATAA KABISA)	Disagree (NIMEKATAA)	Neither disagree nor agree (SINA UHAKIKA)	Agree (NAKUBALI)	Strongly Agree (NAKUBALI KABISA)	DON'T KNOW (SIJUI)
a. Since <MONTH>, I felt it would be nice to continue farming. (KUTOKA MWEZI WA.....NILIHISI INGEKUWA VYEMA KUENDELEA NA KILIMO)	1	2	3	4	5	6 7 99
b. Since <MONTH>, I felt farming is satisfying. (KUTOKA MWEZI WAKILIMO YA TOSHELEZA)	1	2	3	4	5	6 7 99
c. Since <MONTH>, I felt young people should be encouraged to farm. (KUTOKA MWEZI WA.....NILIJIHISI VIJANA WANAFAA KUHIMIZWA KUFANYA KILIMO)	1	2	3	4	5	6 7 99

PART F: Quality of life (UBORA WA MAISHA)

In the next set of questions, I will ask you how you felt about your quality of life, health, and other areas of your life over the past three months (IWR: SINCE <MONTH> This is to understand how the use of agricultural inputs can affect your life. Please tell me how much you agree or disagree with these statements. (KWA MASWALI IFUATAYO NINGEPENDA KUJUA VILE ULIJIHISI KIMAISHA,KIAFYA NA MAMBO MENGINE YA KIMAISHA KWA MIEZI TATU ILIYOPITA ILI NIELEWE JINSI MATUMIZI YA BIDHAA ZA KILIMO ZINAWWEZA PELEKANA NA MAISHA YAKO.

37 TAFADHALI NIELEZE JINSI UNAKUBALI AU KUKATAA MAMBO YAFUATAYO YANAYOHUSU KUJITOSHELEZA.)

SHOW RESPONDENT SHOWCARD C. READ SCALE OPTIONS OUT LOUD.

(CIRCLE ONE NUMBER PER LINE)

	Strongly Disagree (NIMEKATAA KABISA)	Disagree (NIMEKATAA)	Neither disagree nor agree (SINA UHAKIKA)	Agree (NAKUBALI)	Strongly Agree (NAKUBALI KABISA)	DON'T KNOW (SIJUI)
a. Since <MONTH>, I am satisfied with my health. (KUTOKA MWEZI WA.....UMEJITOSHELEZA NA AFYA YAKO)	1	2	3	4	5	6 7 99
b. Since <MONTH>, I am satisfied with my energy. (KUTOKA MWEZI WA.....UMETOSHEKA NA NGUVU YAKO)	1	2	3	4	5	6 7 99
c. Since <MONTH>, I am satisfied with my relationships with family and friends. (KUTOKA MWEZI WA.....UMETOSHEKA NA UHUSIANO WAKO NA JAMII NA MARAFIKI)	1	2	3	4	5	6 7 99
d. Since <MONTH>, I am satisfied with my home. (KUTOKA MWEZI WA.....UMETOSHEKA NA KWAKO AU VYENYE KWAKO KUNAKAA)	1	2	3	4	5	6 7 99

Now I would like to ask you questions about the types of people you discuss agriculture and your farm work with. (SASA NINGEPENDA KUKULIZA MASWALI KUHUSU WATU MNAOJADILIANA KUHUSU UKULIMA NA MAMBO YA KILIMO)

	<p>38. In the past three months, since <MONTH>, how often do you normally discuss about agriculture with [INSERT NAME OF CATEGORY OF PERSONS HERE]; KWA MIEZI MITATU ILIYOPITA, KUTOKA MWEZI WA..... ULIJADILIANA MAMBO YA UKULIMA MARA NGAPI NA; (WEKA AINA YA KIKUNDI HAPA)</p> <p>SHOW RESPONDENT SHOWCARD B. READ SCALE OPTIONS OUT LOUD.</p> <p>1. Never (Sijawahi) 2. Rarely (Mara chache) 3. Sometimes (Saa zingine) 4. Most times (mara nyingi) 5. Always (Kila Mara) 99. DON'T KNOW (SIJUI) 98. NOT APPLICABLE</p>
a. Family / Relative (FAMILIA)	
b. Friend (RAFIKI)	
c. Neighbor (JIRANI)	
d. Agrodealer (MUUZAJI WA BIDHAA ZA KILIMO)	
e. Customer (MNUNUZI WA BIDHAA ZA KILIMO)	
f. Government agriculture extension officer (MAAFISA WA KILIMO WA SERIKALI)	
g. Private sector technical officer (WATAALAMUWA UKULIMA WA KIBINAFSI)	

Please tell me top 3-5 groups and organisations that you are actively involved in at present such as Saccos, chama, cooperatives. (TAFADHALI NIELEZE KUHUSU VIKUNDI VITATAU MUHIMU KWAKO KAMA CHAMA, SACCO, AU YA KILIMO UNAVYOJIHUSISHA NAVYO)

IWR PROBE: GROUPS WHERE YOU DISCUSS AGRICULTURE AND FARMING PRACTICES. ASK ALL QUESTIONS ABOUT EACH GROUP BEFORE MOVING ONTO THE NEXT GROUP I.E. THE NEXT ROW

46. Name of the agricultural groups (JINA LA KIKUNDI)	39. What is your position in this group? (UNA CHEO GANI KWA HICHO KIKUNDI) IWR PROBE: ARE YOU A MEMBER OR A SECRETARY OR TREASURER. DO YOU HAVE A LEADERSHIP ROLE?	40. How many members does this group have? (HICHO KIKUNDI KINA WATU WANGAPI)	41. What value does this group provide to you ? (HIKI KIKUNDI KINAKUFAIDI KWA NJIA GANI) IWR PROBE: HOW DOES THIS GROUP HELP YOU? WHY ARE YOU A PART OF THIS GROUP?
a.			
b.			
c.			
d.			
e.			

PART H: Feelings about self. JINSI UNAVYOJIHISI

Now lets turn back to you. For the next few questions, think about how you felt in general, over the past three months (IWR: SINCE <MONTH>). (KWA MASWALI YAFUATAYO, FIKIRIA/KUMBUKA JINSI ULIVYOJIHISI KWA UJUMLA KWA MIEZI TATU ILIYOPITA KUTOKA MWEZI 42 WA.....HADI.....)

SHOW RESPONDENT SHOWCARD C. READ OPTIONS OUT LOUD.

(CIRCLE ONE NUMBER PER LINE)

	Strongly Disagree (NIMEKATAA KABISA)	Disagree (NIMEKATAA)	Neither disagree nor agree (SINA UHAKIKA)	Agree (NAKUBALI)	Strongly Agree (NAKUBALI KABISA)	DON'T KNOW (SIJUI)
a. Since <MONTH>, I was satisfied with myself. (KUTOKA MWEZI WA.....NILIHISI NIMERIDHIKA)	1	2	3	4	5	6 7 99
b. Since <MONTH>, I thought I am a good person. (KUTOKA MWEZI WA.....NILIKUWA NAONA NILIKUWA MTU MZURI).	1	2	3	4	5	6 7 99
c. Since <MONTH>, I was able to do things as well as others. (KUTOKA MWEZI WA.....NILIWEZA KUFANYA MAMBO KAMA WENGINE)	1	2	3	4	5	6 7 99
d. Since <MONTH>, I felt I do have much to be proud of. (KUTOKA MWEZI WA.....NILIHISI NIKO NA MENGI YA KUJIVUNIA)	1	2	3	4	5	6 7 99
e. Since <MONTH>, I took a positive attitude toward myself. (KUTOKA MWEZI WA..... NILIAMUA KUJIAMINI)	1	2	3	4	5	6 7 99

IWR:QUESTIONS 43-44 ARE ONLY ASKED TO THE TREATMENT GROUP FARMERS AND HENCE ARE NOT LISTED IN THE COMPARISON GROUP SURVEY

Now I have a few questions about yourself and your household. (SASA NINA MASWALI MACHACHE KUHUSU WEWE NA JAMII YAKO)

Are you male or female? (WEWE IN MWANAMKE AMA MWANAUME?)

45 IWR: DO NOT ASK THIS QUESTION - JUST TICK THE ANSWER
(TICK ONE BOX ONLY)

1. MALE

2. FEMALE

How old are you? (UKO NA MIAKA NGAPI)

46 IWR: IF RESPONDENT DOES NOT ANSWER OR IS UNSURE, SAY "YOUR CLOSEST ANSWER IS FINE"
(PROVIDE NUMBER IN SPACE PROVIDED)

_____ years old

99. DON'T KNOW

47 What is your highest level of education? (UMESOMA MPAKA KIWANGO GANI)

(TICK ONE BOX ONLY)

1. NO FORMAL SCHOOLING

5. SOME SECONDARY SCHOOL/HIGH SCHOOL

9. UNIVERSITY COMPLETED

2. INFORMAL SCHOOLING ONLY

6. COMPLETED SECONDARY SCHOOL

10. POST-GRADUATE

3. SOME PRIMARY SCHOOLING

7. POST-SECONDARY QUALIFICATIONS, OTHER THAN UNIVERSITY
E.G. A DIPLOMA OR DEGREE FROM A POLYTECHNIC OR COLLEGE

98. OTHER (please specify _____)

4. COMPLETED PRIMARY SCHOOL

8. SOME UNIVERSITY

99. DON'T KNOW

48 What is your marital status? (UME OA AMA UMEOLEWA)

(TICK ONE BOX ONLY)

1. SINGLE

3. DIVORCED

5. SEPERATED

98. OTHER (please specify: _____)

2. MARRIED

4. WIDOWED

6. INFORMAL UNION OR LIVING WITH PARTNER

99. DON'T KNOW

49 Including yourself, how many people live in your household? By household I mean a group of people who do not necessarily live in the same building; who usually eat from the same pot; and who pool their incomes and other resources. (PAMOJA NA WEWE, HAPA KWAKO MNAISHI NA WATU WANGAPI. NIKISEMA JAMII/WAKO NAMAANISHA MNAISHI PAMOJA, MNAPIKA PAMOJA NA MNAFANYA MAAMUZI YA KINYUMBAINI PAMOJA SI LAZIMA MUWE KWENYE NYUMBA MOJA)

(PROVIDE NUMBER IN SPACE PROVIDED)

99. DON'T KNOW

At what age did you start farming? (ULIANZA KILIMO UKIWA NA MIAKA MINGAPI?)

50 IWR: IF RESPONDENT DOES NOT ANSWER OR IS UNSURE, ASK WHAT YEAR DID YOU BEGIN FARMING OR NUMBER OF YEARS OF EXPERIENCE IN FARMING.
(PROVIDE NUMBER IN SPACE PROVIDED)

a. _____ Years old

b. _____ Year

c. _____ Years of experience

99. DON'T KNOW

Now I need some information on how to find you next year for the follow-up interview. I will keep this information confidential and will not share it with anyone else outside this study. Can I please take down this information? (SASA NINGEPENDA KUJUA VILE TUTAKUPATA MWAKA UJAO TUTAKAPO KUWA TUNA FUATILIA UTAFITI HUU,NITA YAWEKA MANENO TUMEONGEA IWE SIRI BAINA YETU NA WATU WANAOHUSIKA NA HUU UTAFITI)

IWR: ONLY IF THE RESPONDENT SAYS YES, THEN PROCEED WITH THIS SECTION. (PROVIDE RESPONSES IN SPACE PROVIDED)

51 Complete Name (First name, Surname). Please spell this for me. (TAFADHALI NIAMBIE MAJINA YAKO YOTE)

52 Other names you often go by. (TAFADHALI NIPATIE MAJINA INGINE YENYE UNAJULIKANA NA WATU KATIKA ENEO HILI)

53 ENTER GPS LOCATION (TAKE PICTURE WITH GPS ON)

54 Your phone numbers such that they are the best way to contact you next year in 12 months? (PIA NINGEPENDA UNIPATIE NABARI ZA SIMU KWA SABABU NDIZO MZURI KWA KUKUPATA MWAKA UJAO)

IWR: FILL BOTH BLANKS: MOBILE NUMBER AND ASK FOR ANY OTHER NUMBER THEY MAY HAVE WHERE THEY CAN BE REACHED

(PROVIDE NUMBER IN SPACE PROVIDED)

a. Mobile Number (NANBARI YA SIMU) : _____

b Other (Specify) (ZINGINEZO): _____): _____

55 Name of another person who will know where you are in 12 months. (JINA YA MTU MWINGINE MWENYE ATAJUA MAHALI UTAKUWA MWAKA MMOJA UJAO)

(PROVIDE RESPONSES IN SPACE PROVIDED)

His/Her name (JINA YAKE)

56 Relationship to you (UHUSIANO WAKO NA YEYE)

57 His/Her Phone Number (NAMBA YA SIMU YAKE)

58 Name of a second person who will know where you are in 12 months who does not live with you. (JINA YA MTU WA PILI MWENYE ATAJUA UTAKAKOKUWA MWAKA MMOJA UJAO)

(PROVIDE RESPONSES IN SPACE PROVIDED)

His/Her name (JINA YAKE)

59 Relationship to you (UHUSIANO WAKO NA YEYE)

60 His/Her Phone Number (NAMBA YA SIMU YAKE)

CHECK ALL LANGUAGES THAT YOU USED DURING THIS INTERVIEW:

1. ENGLISH

2. SWAHILI

3. KIKUYU

4. KAMBA

5. OTHER _____

END TIME: _____

ADDRESS WHERE INTERVIEW IS CONDUCTED IF DIFFERENT FROM RESPONDENT'S HOME ADDRESS(ANWANI YA MAHALI MTAFIGI ALIPATA MKULIMA KAMA NI BA LI NA ANAPOISHI) :

ADD ANY IMPORTANT LANDMARKS AROUND YOU(TAJA MIJENGO AMA MAJABALI MUHIMU YALIYO KARIBU NA KWAKO)

Thank you for your time and answering all my questions. All the information you have given me is very helpful. Do you have any questions or comments for me? (NASHUKURU KWA KUNIPA WAKATI WAKO NA KUNIJIBU MASWALI.MAJIBU YOTE UMENIPA NI MUHIMU SANA.UKO NA SWALI LOLOTE?)

TREATMENT GROUP SURVEY

SECTION 1: FILL THIS SECTION FROM PHONE CONVERSATION

T.1 NAME OF THE RESPONDENT: _____

T.2 DID YOU PURCHASE SOIL PLUS? 1. YES 2. NO (THIS RESPONDENT IS IN THE COMPARISON GROUP. END SECTION AND MOVE ON TO THE SURVEY SECTION)

T.3 DATE OF PURCHASE? _____

T.4 LOCATION OF PURCHASE 1. AGRODEALER 2. FIELD TRIAL MARKETING EVENT 3. FARMER ASSOCIATION EVENT

T.5 HOW MUCH SOIL PLUS DID YOU BUY?

	NUMBER OF PACKETS
a. 10 KG	

T.6 DID YOU APPLY SOIL PLUS? 1. YES (GO TO NEXT QUESTION) 2. NO (END; MOVE TO SURVEY) 3. I NO LONGER PLAN TO USE THIS FOR THIS SEASON (END; MOVE TO SURVEY)

T.7 APPROXIMATELY, WHEN DID YOU APPLY SOIL PLUS? _____ DON'T KNOW(SIJUI)

HOW DID YOU APPLY SOIL PLUS? (ULIWEKA SOIL PLUS KIVIPI --TUKIANGALIA MIZIZI)

T.8 IWR: WITH RESPECT TO THE ROOT OF THE PLANT?

(TICK ALL THAT APPLY)

1. WORKED INTO SOIL NEAR ROOT 3. TOP DRESS AT TIME OF PLANTING 98. OTHER (please specify_____)

2. WORKED INTO SOIL AWAY FROM ROOT 4. TOP DRESS AFTER PLANTING 99. DON'T KNOW

T.9 AT WHICH STAGES DID YOU APPLY SOIL PLUS (ULITUMIA SOIL PLUS WAKATI GANI)

(TICK ALL THAT APPLY)

1. BEFORE PLANTING 4. GERMINATION 7. RIGHT BEFORE HARVEST 99. DON'T KNOW

2. SEED BED 5. ON TOP OF CROP (TOP DRESSING) WITH OTHER FERTILIZER 8. AFTER HARVEST 98. OTHER (please specify__)

3. PLANTING INTO THE FARM 6. AT MANY STAGES- PLANTING AND AGAIN AS TOP DRESSING

SECTION 2: CARRY OUT THESE THREE STEPS:

1. CHECK TO SEE THAT YOU ARE MATCHING THE PHONE LOG'S RESPONDENT WITH THE CORRECT SURVEY RESPONDENT
2. CHECK THAT THE RESPONDENT IS MOST FAMILIAR WITH THE FARM.
3. ASK RESPONDENT IF HE OR SHE HAS APPLIED SOIL PLUS. IF YES, CONTINUE WITH THE SURVEY. IF NO, RESCHEDULE THE INTERVIEW TO AFTER THEY HAVE APPLIED SOIL PLUS

UNIQUE IDENTIFIER: _____

DATE: _____

IWR NAME: _____

IWR: DO NOT ENTER UNIQUE IDENTIFIER. WILL BE DONE IN OFFICE

I can do the interview in English or Swahili. Which language would you like me to use? (NAWEZA KUULIZA MASWALI KWA LUGHA YA KIINGEREZA AU KISWAHILI. UNGEPENDA NITUMIE LUGHA GANI?)

IWR: USE LANGUAGE THE FARMER SAYS AS THE PRINCIPAL LANGUAGE

Hello, my name is [INTERVIEWER'S NAME]. I am a researcher conducting a survey of persons who bought Soil Plus to see how your life is affected by using this new product. I work for Beta Consulting, a research consulting firm, on behalf of the William Davidson Institute at the University of Michigan. This is an independent research institution and does not represent the government or any political party. (HABARI YAKO JINA LANGU NI_MIMI NAFANYA UTAFITI KUHUSU MBOLEA MPYA YA KIASILI INAYOITWA SOIL PLUS ILI KUJUA JINSI ITAFAIDI UKULIMA WAKO.NAFANYA KAZI NA BETA CONSULTING WAKISHIRIKIANA NA WILLIAM DAVIDSON INSTITUTE KUTOKA CHUO KIKUU CHA MICHIGAN.HILI NI SHIRIKA LA KIPEKEE LA UTAFITI AMBALO HALINA UHUSIANO NA SERIKALI AU CHAMA CHOCHOTE CHA KIASIA.)

IWR: GIVE THE RESPONDENT THE INFORMED CONSENT FORM: BELOW IS THE TEXT TO READ OUT ALOUD.

Our goal in this research is to better understand effects that farming inputs can have on your life. We want to help a company that manufactures a farming input product to improve their on-going work by understanding what changes happen to farmers that purchase and do not purchase their product. The information gathered will help the company to ensure the product meets the needs of farmers. All information you share with me will be kept confidential and will not be given to anyone outside the study. We are using this information for research purposes only. Your name will never be used in any reports. Your participation is voluntary. Your responses will not affect your current or future relationship with any organization. You can stop your participation or decline to respond to any question for any reason. We would like you to know that your participation is greatly appreciated and is extremely valuable to the success of our efforts. Please keep this paper for your records. If you have any questions contact the addresses given on the form. Do you give your consent to participate in this study?

KIINI CHA UTAFITI HUU NI KUELEWA MANUFAA YA VIFAA VYA KILIMO KWA MAISHA YAKO. TUNGEPENDA KUSAIDIA KAMPUNI AMBAYO INATENGENEZA MBOLEA YA KIASILI/ORGANIC KUBOresha MBOLEA HIYO KWA KUELEWA MABADILIKO KWA MAISHA YA MKULIMA KUTOKANA NA KUTUMIA BIDHAA HIYO AU KUTOITUMIA. MAJIBU YA WAKULIMA ITASAIIDIA KAMPUNI HIYO KUHAKIKISHA WAKULIMA WENGI WANANUFAIKA KUTOKANA NA BIDHAA HIYO. MAJIBU YAKO YOTE YATAKUWA SIRI BAINA YETU NA HAYATAPATIWA MTU YEYETO ASIYE HUSIKA KWA UTAFITI NA MAON HAYO YATATUMMIKA KWA MINAJILI YA UTAFITI PEKEE. JINA LAKO HALITATUMIWA KATIKA REPOTI YOYOTE. KUHUSIKA KWAKO NI HIARI YAKO, NA HAITADHURU UHUSIANO WAKO WA SASA AU WABAADAYE NA SHIRIKA LOLOTE. UNAWeza KATIZA KUHUSIKA KWAKO AU UNAWeza KATA KUJIBU SWALI LOLOTE KWA SABABU YOYOTE. TUNGEPENDA UJUE KWAMBA TUNASHUKURU KWA KUHUSIKA KWAKO NA NI KWA MANUFAA SANA KWA KUFAULU KWETU. WEKA KARATASI HII NA UKIWA NA SWALI LOLOTE, TAFADHALI PIGA SIMU KWA;

ASK FOR VERBAL CONSENT. IF THEY AGREE TO PARTICIPATE AND CONTINUE WITH THE SURVEY. IF THEY CHOOSE NOT TO PARTICIPATE THANK THEM FOR THEIR TIME.

This is not a test and your responses will not be judged. I want to know the situation even if it is not the best for you. If you don't have an exact answer for some of the questions, please try to give your best estimate. You can stop me at anytime to repeat something if you don't understand or ask me to explain it in a different manner. Thank you very much for your cooperation (HII SI MTHANI, CHENYE NITAKUHULIZA HAKITAPINGWA NA MTU YEYOTE.NATAKA KUJUA TU MAMBO VILE ILIVYO HATA KAMA SI MAZURI KIKWAKO.KAMA HAUNA JIBU KAMILI KWA MASWALI YOYOTE TAFADHALI JARIBU KUNIPA JIBU LINALOKARIBIA UKWELI.UNAEZA NISIMAMISHA WAKATI WOWOTE KURUDIA KITU/ JAMBO AMBALO HAUJAELEWA AMA UNATAKA UFAFANUZI KIVINGINE NITAKUELEZA).

IWR: DO NOT READ "DON'T KNOW" OR OTHER RESPONSE OPTIONS IN ALL CAPITALS (UPPERCASE)-NON-BOLD FONT TO RESPONDENTS.

START TIME: _____

1. I would like to start the survey with understanding how many pieces of land did you farm on in the past 12 months. Include any pieces you farm on outside of your home piece and/or in other counties. This is only to understand where you have and havent applied Soil Plus. Please remember we will not share this information with any outside parties. (TAFADHALI NIELEZE KUHUSU MASHAMBA YOTE UNAYOLIMA MIEZI 12 ILIYOPITA. TUZUNGUMZE KUHUSU MASHAMBA YOTE ULIYOLIMA HATA KAMA YAKO MBALI NA NYUMBANI AU YAKO KWENYE KAUNTI ZINGINE. HII NI YA KUNIWEZESHA KUJUA MAHALI ULITUMIA SOIL PLUS NA MAHALI HAUKUTUMIA. TAFADHALI JUA YA KWAMBA HABARI HII HAITAPATIWA MTU YEYOTE ULE)

IWR: ASSIGN NAME WITH FARMER FOR EACH PIECE

a

b

c

d

Now I would like to know more on where and how you used Soil Plus. Lets call the area where you applied Soil Plus a plot. If you have multiple plots where you applied Soil Plus on the same piece of land, please let me know about each plot separately. (NINGEPENDA KUJUA JINSI ULIVYOTUMIA SOIL PLUS,MAHALI ULITUMIA,KAMA ULITUMIA SOIL PLUS KWA MASHAMBA MENGI,NIELEZE KILA SHAMBA KIVYAKE)

<p>2. On which pieces of land did you add Soil Plus? Lets use the same name that we used in the earlier question when you first told me about your pieces of land on which you farm (KWA ZILE SHAMBA TULISEMA AWALI, NI GANI ULITUMIA SOIL PLUS)</p> <p>IWR: IF APPLIED SOIL PLUS TO MULTIPLE PLACES ON THE SAME PIECE OF LAND, THEN EACH PLOT IS A SEPERATE ROW. TO NAME THESE PLOTS: CALL EACH PLOT AN ALPHABET LETTER SUCH AS 'A' AFTER THE NAME OF THE PIECE OF LAND WRITTEN IN PREVIOUS FARM TABLE. E.G. IF FARMER HAS APPLIED SOIL PLUS ON 2 PLOTS ON HOME FARM THEN NAME THESE PLOTS AS -> HOME:A IN FIRST ROW AND HOME:B IN SECOND ROW (EACH PLOT IS WRITTEN ON A NEW ROW)</p>	<p>3. What is the area of the plot on which you applied the Soil Plus? (SEHEMU ULIWEKA SOIL PLUS ILIKUWA KAMA KIASI GANI)</p> <p>IWR: ESTIMATE BY WALKING IF NO AREA GIVEN</p>	<p>4. How much quantity of Soil Plus did you apply to this plot? (ULITUMIA SOIL PLUS KIASI GANI). Please include the unit. (ULITUMIA KIPIMO GANI)</p> <p>IWR: SEE CODE BELOW TABLE</p>	<p>5. IWR: CALCULATE THE RATE AND CHECK IF IT MEETS MINIMAL STANDARDS FOR CORRECT APPLICATION</p>		
	NUMBER	UNIT	NUMBER	UNIT	
a					
b					
c					
d					

CODE FOR UNIT FOR QUESTION 3--> 1. ACRES; 2. FEET; 3. METRES; 4. FOOT TO FOOT; 5. STRIDES

CODE FOR UNIT FOR QUESTION 4--> 1. KGS; 2. HANDFUL; 3. WHEEL BARROW; 4. CUPS; 5. 50-KG BAG; 6. 90-KG BAG; 7. DEBE; 8. PICK UP; 9. CANTER; 10. TONNES; 11. 70-KG BAG; 12. GORO GORO; 98. OTHER (Please specify); 99. DON'T KNOW

CONTINUE SURVEY ONLY IF RATE OF SOIL PLUS APPLICATION MEETS MINIMAL CORRECT STANDARDS. IF IT DOES NOT MEET THE MINIMAL CORRECT RATE, END SURVEY HERE. THANK RESPONDENT FOR THEIR TIME.

IWR: DRAW A MAP OF THE PLOTS WHERE THE RESPONDENT APPLIED SOIL PLUS IN SPACE BELOW. SHADE THE AREA OR AREAS WHERE THE RESPONDENT APPLIED SOIL PLUS IN THE PIECES OF THE LAND THAT THEY APPLIED SOIL PLUS ON. MARK THE NAME OF THE PIECE OF LAND OR MULTIPLE PIECES OF LAND WITH NAME GIVEN IN QUESTION 1. MARK THE PLOTS WITH THE NAME GIVEN IN QUESTION 2

Now lets turn back to your pieces of land that you farm on. I would like to understand more about this. (WACHA SASA TUANGAZIE MASHAMBA ULİYOLIMA. NINGEPENDA KUJUA ZAIDI KUYAHUSU)

IWR: ASK 6-9 FOR EACH PIECE OF LAND BEFORE GOING TO THE NEXT PIECE

IWR: FILL IN THE NAME FROM EARLIER WHEN YOU FIRST ASKED THE RESPONDENT FOR THEIR PIECES OF LAND THEY FARM ON (FROM QUESTION 1) IWR: DOUBLE CHECK WITH THE RESPONDENT THAT THERE ARE NO OTHER PIECES OF LAND THAT HE/SHE HAS FARMED ON IN THE PAST 12 MONTHS BESIDES THE ONES THAT HE/SHE HAS ALREADY TOLD YOU ABOUT	6. What is the area of this piece of land? (HILI SHAMBA NI NGAPI)		7. Do you own or rent this piece of land? (HII SHAMBA UNAIMILIKI KIVIPI) 1. OWN 2. RENT 98. OTHER (please specify ___) 99. DON'T KNOW IWR: INHERITED PIECE OF LAND/ OR TITLE CHANGE STILL TO BE DONE SHOULD BE MARKED AS 'OWN'	8. How would you rate the fertility of the soil on this piece of land after you have applied any input such as fertilizer, compost and/or manure? (KWA MAONI YAKO, UBORA WA UDONGO UKO VIPI BAADA YA KUTUMIA MBOLEA AU FERTILIZER) IWR: IF FARMER SAYS NO INPUT APPLIED, SAY RATE FERTILITY OF SOIL AS IS. IWR: USE SHOWCARD A. READ SCALE OPTIONS ALOUD. 1. TERRIBLE-MBAYA SANA 2. BAD-MBAYA 3. MEDIUM- SI MBAYA 4. GOOD-MZURI 5. EXCELLENT-MZURI SANA 99. DON'T KNOW-SIJUI	9. Do you practice mulching on this piece of land? (UNAFUNIKA UDONGO KWA NYASI AU KWA MABAKI YA MIMBA YOYOTE) 1. YES 2. NO 99. DON'T KNOW
	NUMBER	UNIT			
a					
b					
c					
d					

CODE FOR UNIT FOR QUESTION 6--> 1. ACRES; 2. FEET; 3. METRES; 4. FOOT TO FOOT; 5. STRIDES

Now I would like to know more on your use of Soil Plus in the plots you mentioned earlier. (SASA NINGEPENDA KUJUA ZAIDI KUHUSU MATUMIZI YA SOIL PLUS KWENYE SHAMBA/MASHAMBA ULİYOTAJA HAPO AWALI)

IWR: FILL IN THE NAME OF THE PLOT FROM EARLIER WHEN YOU ASKED THE RESPONDENT FOR THE PLOTS THEY APPLY SOIL PLUS ON (FROM QUESTION 2)	10. How many times did you apply Soil Plus to this plot from the time you purchased the product till right now? (TANGU UNUNUE SOIL PLUS UMETUMIA MARA NGAPI KWA HII SEHEMU MPAKA SAA HII)	11. For which crops did you apply Soil Plus? (NI MIMBA GANI ULIWEKA SOIL PLUS) IWR: FOR CROP CODE: SEE CROP LIST AT END OF SHOWCARDS. LIST ALL CROPS THAT THE RESPONDENT SAYS. SEPARATE CODES BY COMMAS	12. What fertilizer, compost, manure did you apply on this plot where you applied Soil Plus? (ULITUMIA FERTILIZER AU MBOLEA GANI KWENYE MIMBA ULİYOUZA?- ULIWEKA HIYO SOIL PLUS KWA SEHEMU GANI YA MIMBA) IWR: ASK FARMER ABOUT TOP DRESSING. -- IF FARMER SAYS NITROGEN, ASK IF IT IS NPK OR CAN? -- IF FARMER SAYS DONT KNOW THE NAME, ASK ABOUT COLOUR OF THE FERTILIZER. IWR: SEE CODE BELOW TABLE. LIST ALL PRODUCTS THE RESPONDENT SAYS. SEPERATE CODES BY COMMAS
a			
b			
c			
d			

CODE FOR QUESTION 12 --> 1. CAN; 2. DAP; 3. UREA; 4. NPK; 5. COMPOST; 6. MANURE; 7. FOLIAR FEED; 8. MAVUNO; 9. NONE; 98. OTHER (please specify); 99. DON'T KNOW

13 What do you plan to grow in 8 months in the plot (IWR: SAY PLOTS IF MULTIPLE SPOTS OF APPLICATION) where you applied Soil Plus? (UNAPANGA KUPANDA NINI AU MIMBA GANI MIEZI NANE IJAYO KWA HILI/HAYA MASHAMBA AMBAYO UMEWEKA SOIL PLUS)
(LIST ALL CROPS); FOR CROP CODE: SEE CROP LIST AT END OF SHOWCARDS

--

Now I would like to ask you some questions on crops you grew and sold last harvest (NINGEPENDA KUJUA KUHUSU MIMEA ULIYOKUZA NA KUUZA KWA MAVUNO ILIYOPITA).

14. Crop name (JINA YA MMEA ULIYOUZA)	15. Which piece of land did you plant this [INSERT CROP] on? (ULIPANDA KWA SHAMBA GANI)	16. Over how much area, did you plant this [INSERT CROP]? (HUU MMEA ULIPANDA KWA SHAMBA KIASI GANI)	17. What fertilizer, compost, manure did you apply on [INSERT CROP]? (ULITUMIA FERTILIZER AU MBOLEA GANI KWENYE HUU MMEA)	Seed	Water(MAJI)	Labor (WAFANYI KAZI)	Time of the year	Harvest(MAVUNO)				
				18. Did you use hybrid or local seeds/seedlings for this [INSERT CROP]? (ULITUMIA MBEGU ZA AINA GANI, HYBRID AMA KIENYEJI?)	19. What was your main source of water for this [INSERT CROP] ? (MAJI SANA SANA HUWA UNATOA WAPI)	20. Besides you, did other persons work to help you grow this [INSERT CROP] ? (KANDO NA WEWE KUNA MTU YEYOTE MWINGINE ALIKUSAIDIA KUKUZA MMEA HUU)	21. What type of persons would you categorize them as? (WALIKUWA AKINA NANI)	22. What month of the year did you plant [INSERT CROP] ? (ULIPANDA MWEZI GANI)	23. How many months does it take until it is ready to harvest [CROP] you planted in [MONTH FROM Q22] (MMEA HUU ULIPANDA MWEZI WA..... UNACHUKUA MIEZI MINGAPI NDIO UANZE KUVUNA?)	24. For how many months do you harvest [INSERT CROP] you planted in [INSERT MONTH] (UNAVUNA MMEA HUU KWA MIEZI MINGAPI)	25. How often do you harvest [INSERT CROP] you planted in [INSERT MONTH] ? (TUSEME KAMA KWA MWEZI UNAVUNA MARA NGAPI)	
IWR: FOR CROP CODE: SEE CROP LIST AT END OF SHOWCARDS SP: STANDS FOR SOIL PLUS	MATCH TO QUESTION 2 IF ASKED FOR TOP CROP HARVESTED FROM SOIL PLUS PLOT. IF TOP CROP BY SALE, MATCH TO QUESTION 1.	IWR: EST. BY WALKING IF NO AREA GIVEN 1. ACRES 2. FEET 3. METRES 4. FOOT TO FOOT 5. STRIDES	Please tell me how much quantity of each did you add on [INSERT CROP] with unit. (ULITUMIA KIASI GANI YA FERTILIZER AU MBOLEA KWA HUU MMEA) IWR: ASK FARMER ABOUT TOP DRESSING -- IF FARMER SAYS NITROGEN, ASK IF NPK OR CAN? -- IF FARMER SAYS DONT KNOW NAME, ASK COLOUR OF FERTILIZER	1. HYBRID 2. LOCAL 3. BOTH HYBRID AND LOCAL 4. UNSURE 99. DON'T KNOW	1. RAIN FED 2. IRRIGATION 3. BOTH 99. DON'T KNOW	1. YES 2. NO (SKIP TO QUESTION 22) 99. DON'T KNOW	IWR: LIST ALL; PUT COMMA AFTER EACH 1. HIRED HELP 2. FAMILY 3. COMMUNAL 4. GANG LABOUR 98. OTHER (specify) 99. DON'T KNOW	1. JANUARY 2. FEBRUARY 3. MARCH 4. APRIL 5. MAY 6. JUNE 7. JULY 8. AUGUST 9. SEPTEMBER 10. OCTOBER 11. NOVEMBER 12. DECEMBER	1. DAY 2. WEEK 3. MONTH	N U	N U	N U
a. CROP LAST HARVESTED WHERE SP NOW APPLIED. IF MULTIPLE CROPS GROWN IN AREA WHERE SP APPLIED, CHOOSE TOP CROP BY SALES. CROP: _____												
b. NAME OF CROP FROM LAST HARVEST WITH TOP SALES CROP: _____												
c. IF SOIL PLUS APPLIED ON 2ND SPOT, LIST TOP CROP LAST HARVESTED ON 2ND SPOT WHERE SP NOW APPLIED CROP: _____												
d. IF SOIL PLUS APPLIED ON 3RD SPOT, LIST TOP CROP LAST HARVESTED ON 3RD SPOT WHERE SP NOW APPLIED CROP: _____												

CODE FOR NAME OF QUESTION 24--> 1. CAN; 2. DAP; 3. UREA; 4. NPK; 5. COMPOST; 6. MANURE; 7. FOLIAR FEED; 8. MAVUNO; 9. NONE; 98. OTHER (specify); 99. DON'T KNOW

CODE FOR UNIT FOR QUESTION 24--> 1. KGS; 2. HANDFUL; 3. WHEEL BARROW; 4. CUPS; 5. 50-KG BAG; 6. 90-KG BAG; 7. DEBE; 8. PICK UP; 9. CANTER; 10. TONNES; 11. 70-KG BAG; 12. GORO GORO 98. OTHER (specify); 99. DON'T KNOW

IWR: DRAW A MAP OF THE PIECE OF LAND AND LABEL THE CROPS THAT YOU JUST DISCUSSED WITH THE FARMER AND WHERE THEY WERE GROWN ON THE LAND. DRAW THIS MAP AT THE BACK OF THIS PAGE. CHECK FOR ANY INCONSISTENCIES. IF FARMER USES SOIL PLUS THEN INSTEAD OF DRAWING A NEW MAP ADD THIS CROP INFORMATION TO MAP DREW EARLIER.

NAME OF CROP IWR: COPY CROP CODE FROM ABOVE TABLE	LIST PIECE OF LAND ON WHICH CROP WAS PLANTED IWR: COPY THE NAME OF THE PIECE OF LAND FROM THE ABOVE TABLE	Harvest(MAVUNO)			Sale of crop(MAUZO)			Quality		
		26. IWR: CALCULATE THE TOTAL NUMBER OF HARVESTS. ASK FARMER IF THIS CALCULATED NUMBER SOUNDS CORRECT. IF NOT, RECORD THE NUMBER THAT THE FARMER SAYS.	27. On average, what was the quantity of each harvest you got of the [INSERT CROP] you planted in [INSERT MONTH]? Please include the unit. (MAVUNO YA KILA MMEA ULIKUWA WA KIASI GANI. KIPIMO GANI) IWR: IF RESPONDENT SAYS NONE, END TABLE HERE	28. On average, per harvest of this [INSERT CROP] you planted in [INSERT MONTH], what quantity did you sell? Please include the unit. (ULIUZA KIASI GANI. KIPIMO GANI) IWR: LIST NUMERICAL VALUE. IF RESPONDENT IS UNSURE, OR DOES NOT HAVE AN ANSWER, ASK FOR TOTAL AMOUNT FOR ALL HARVESTS AND WRITE THE WORD TOTAL AFTER	29. How much money did you receive for one harvest from this planting? (ULIPATA PESA NGAPI KWA MAVUNO MOJA YA HII MMEA?) IWR: SKIP TO QUESTION 32, IF CROP WAS HARVESTED JUST ONCE	30. IWR: MULTIPLY RESPONSE OF Q29 BY THE TOTAL NUMBER OF HARVESTS LISTED IN Q26. ASK RESPONDENT IF CALCULATED NUMBER IS ACCURATE. IF ACCURATE CIRCLE AND SKIP TO Q32. IF NOT ACCURATE, ASK Q31.	31. How much money did you receive from selling all harvests from this planting? (KWA MAUZO YOTE YA MMEA HUU, ULIPATA PESA NGAPI) IWR: CIRCLE WHICH VALUE IS MORE ACCURATE (Q30 OR Q31)	32. How would you rate the quantity of this [INSERT CROP] you planted in [INSERT MONTH] compared to your previous years? (KWA MAONI YAKO WINGI WA MAVUNO YA HUO MMEA ULIKUWA VIPI UKILINGANISHA NA MIAKA ILIYOPITA)	33. How would you rate the quality of this [INSERT CROP] you planted in [INSERT MONTH]'s harvest compared to previous years? (KWA MAONI YAKO, MAVUNO YA HUO MMEA ULIKUWA VIPI UKILINGANISHA NA MIAKA ILIYOPITA) IWR: USE SHOW CARD A. READ SCALE OPTIONS ALOUD. 1. TERRIBLE 2. BAD 3. MEDIUM 4. GOOD 5. EXCELLENT 98. NOT APPLICABLE 99. DON'T KNOW	
		NUMBER	UNIT	NUMBER	UNIT					
a.										
b.										
c.										
d.										

CODE FOR UNIT FOR QUESTION 27 AND 28--> 1. GRAMS; 2. KGS; 3. 100-KG BAGS; 4. 90-KG BAGS; 5. 50-KG BAGS; 6. METRIC TONNES; 7. QUINTALS; 8. CRATES; 9. 70-KG BAG; 10. DEBE; 11. GORO GORO; 98. OTHER (specify); IF FARMER SAYS BUNCHES, ASK HOW MANY BUNCHES FIT IN A BAG

PART C: Household and farm finances(MAPATO YA FAMILIA)

Now I would like to better understand your household finances and investments into your farm to understand how agricultural inputs affect your finances. I will keep all your responses confidential so please provide the most accurate answers as possible. (NINGEPENDA KUJUA ZAIDI JUU YA MAPATO YA BOMA LAKO NA VILE UMEKEZA KWA UKULIMA, NAKUHAKIKISHIA YA KWAMBA KILE UTANIAMBIA NITAKIWEKA CHA SIRI KWA HIVYO NINGEOMBA UNIAMBIE UKWELI IWEZEKANAVYO)

34 For the next few questions, how often did you experience these situations over the past three months (IWR: SINCE <MONTH>). (TUKIZUNGUMZIA MIEZI TATU ILIYOPITA NINGEPENDA UNIELEZE MARA NGAPI ULIJIPATA KATIKA HALI HII NTAKAYO KUSOMEA)

SHOW RESPONDENT SHOWCARD B. READ SCALE OPTIONS OUT LOUD.

(CIRCLE ONE NUMBER PER LINE)

	Never (Haijawahi)	Rarely (Mara chache)	Sometimes (Saa zingine)	Most times (mara nyingi)	Always (Kila Mara)	DON'T KNOW(SIJUI)	NOT APPLICABLE
a. Since <MONTH>, I was able to save as much money as I need from my farming. (NILIKUWA NA UWEZO WA KUWEKA PESA NILIYOTOA KWA UKULIMA KWA AKIBA)	1	2	3	4	5	99	98
b. Since <MONTH>, I was able to make investments I want to make in my farm. (KUTOKA MWEZI WA.....NILIKUWA NA UWEZO WA KUWEKEZA VILE NATAKA KATIKA KILIMO)	1	2	3	4	5	99	98
c. Since <MONTH>, my household's income stability was good which means it remained steady from harvest to harvest. (KUTOKA MWEZI WAMAPATO YA FAMILIA YANGU ILIKUWA SAWA NA YA KUTOSHA KUTOKA MAVUNO HADI MAVUNO)	1	2	3	4	5	99	98

Now I would like to ask you some questions on the quantity of food your household eats. (NINGEPENDA KUKUULIZA MASWALI MACHACHE KUHUSU KIASI/KIWANGO HYA VYAKULA FAMILIA YAKO INAKULA.)

35 In which months in the past 12 months (IWR: SINCE <MONTH>) did you not have enough food to meet your family's needs? (NI MIEZI GANI KWA MIEZI KUMI NA MBILI IMEPITA HAMKUWA NA CHAKULA CHA KUTOSHA ILI KUTIMIZA MAHITAJI YA FAMILIA YAKO)

IWR: THIS INCLUDES ANY KIND OF FOOD FROM ANY SOURCE, SUCH AS OWN PRODUCTION, PURCHASE OR EXCHANGE, FOOD AID, OR BORROWING.

DO NOT READ THE LIST OF MONTHS ALOUD. USE A SEASONAL CALENDAR IF NEEDED TO HELP RESPONDENT REMEMBER THE DIFFERENT MONTHS. PROBE TO MAKE SURE THE RESPONDENT HAS THOUGHT ABOUT THE ENTIRE PAST 12 MONTHS.

MONTH	1. YES	2. NO	99. DON'T KNOW
a. JANUARY			
b. FEBRUARY			
c. MARCH			
d. APRIL			
e. MAY			
f. JUNE			
g. JULY			
h. AUGUST			
i. SEPTEMBER			
j. OCTOBER			
k. NOVEMBER			
l. DECEMBER			

PART E: Optimism/Pessimism for the future

Not all questions I ask you will require a yes or no response. Some questions require different responses. Let me do one example with you first using this showcard (IWR: USE SHOWCARD C).

Imagine this scale is like a speedometer. In a speedometer your speed can increase and decrease from time to time. Similar to a speedometer your feelings can also increase and decrease over time. Similarly you can change how much you agree or disagree with a statement. IWR: READ ALL THE OPTIONS OF THE SCALE AND POINT AS YOU DO IT.

Say if you had asked me how much I agree or disagree with the following question "Since the last three months, so since <MONTH>, I am happy. I will pick a response from this scale to answer you.

At the beginning of the year I was very happy because I was excited that the new year started (POINT TO 6) but then I got busy with work and spent long hours at my shamba so I got sad (POINT TO DISAGREE). Since I have mixed feelings which are more towards happy, I select agree.

(SI MASAWALI YOTE NITAKUULIZA YATATAKA KUJIBIWA NDIO AU LA .MASWAALI MENGINE ITAHITAJI KUJIBIWA VINGINE AMA TOFAUTI. KWA MFANO, WACHA TUFANYE KWAA MFANO KWANZA NIKITUMIA KADI. FIKIRIA KIPIMO KAMA CHA SPEED MITA YA GARI. KASI YA GARI YAWWEZA KUPUNGUA AU KUONGEZEKA. FIKRA NA UNAVYOJIHISI PIA YAWWEZA KUBADILIKA KAMA SPEED MITA NA WAWWEZA KUBADILISHA JINSI UNAVYO KUBALI AU KUKATAA SWALI LIFUATALO. KAMA UNGENIULIZA KAMA NAKUBALI AU KUKATAA SENTENSI IFUATAYO. (IWR: READ ALL THE OPTIONS OF THE SCALE AND POINT AS YOU DO IT) KUTOKA MWEZI WA.....NINAFURAHIA, NITACHAGUA JIBU KUTOKA KWA KIPIMO ILI KUKUJIBU. MWAKA ULIPOANZA NILIFURAHI KWA SABABU NILIKUWA NAONA MWAKA UMEANZA VYEMA HALAFU NIKAWA NA SHUGULI NYINGI ZA SHAMBA NA NIKAWA SINA FURAHIA. KWA SABABU NINA MICHANANYIKO YA JINSI NINAVYO JIHISI, NACHAGUA KUKUBALI.

Now, I will ask you some questions with this scale. SASA NITAKUULIZA MASWALI KUHUSU RAMANI/SCALE HII

Think about your farming experience over the past three months (IWR: SINCE <MONTH>); (SASA FIKIRIA KUHUSU VILE UMEKUWA NA UJUZI AMA UMAARIFA WA UKULIMA KWA MIEZI TATU ILIYOPITA,UTATUMIA KADI KUJIBU,NAMBARI MOJA INAMAANISHA UMEKATAA KABISA NA

36 NAMBARI SABA INAMAANISHA UMEKUBALI KABISA)

USE SHOWCARD C. READ SCALE OPTIONS ALOUD.

(CIRCLE ONE NUMBER PER LINE)

	Strongly Disagree (NIMEKATAA KABISA)	Disagree (NIMEKATAA)	Neither disagree nor agree (SINA UHAKIKA)	Agree (NAKUBALI)	Strongly Agree (NAKUBALI KABISA)	DON'T KNOW (SIJUI)		
a. Since <MONTH>, I felt it would be nice to continue farming. (KUTOKA MWEZI WA.....NILIHISI INGEKUWA VYEMA KUENDELEA NA KILIMO)	1	2	3	4	5	6	7	99
b. Since <MONTH>, I felt farming is satisfying. (KUTOKA MWEZI WAKILIMO YA TOSHELEZA)	1	2	3	4	5	6	7	99
c. Since <MONTH>, I felt young people should be encouraged to farm. (KUTOKA MWEZI WA.....NILIJIHISI VIJANA WANAFAA KUHIMIZWA KUFANYA KILIMO)	1	2	3	4	5	6	7	99

PART F: Quality of life (UBORA WA MAISHA)

In the next set of questions, I will ask you how you felt about your quality of life, health, and other areas of your life over the past three months (IWR: SINCE <MONTH> This is to understand how the use of agricultural inputs can affect your life. Please tell me how much you agree or disagree with these statements. (KWA MASWALI IFUATAYO NINGEPENDA KUJUA VILE ULIJIHISI KIMAISHA,KIAFYA NA MAMBO MENGINE YA KIMAISHA KWA MIEZI TATU ILIYOPITA ILI NIELEWE JINSI MATUMIZI YA BIDHAA ZA KILIMO ZINAWWEZA PELEKANA NA MAISHA YAKO.

37 TAFADHALI NIELEZE JINSI UNAKUBALI AU KUKATAA MAMBO YAFUATAYO YANAYOHUSU KUJITOSHELEZA.)

SHOW RESPONDENT SHOWCARD C. READ SCALE OPTIONS OUT LOUD.

(CIRCLE ONE NUMBER PER LINE)

	Strongly Disagree (NIMEKATAA KABISA)	Disagree (NIMEKATAA)	Neither disagree nor agree (SINA UHAKIKA)	Agree (NAKUBALI)	Strongly Agree (NAKUBALI KABISA)	DON'T KNOW (SIJUI)		
a. Since <MONTH>, I am satisfied with my health. (KUTOKA MWEZI WA.....UMEJITOSHELEZA NA AFYA YAKO)	1	2	3	4	5	6	7	99
b. Since <MONTH>, I am satisfied with my energy. (KUTOKA MWEZI WA.....UMETOSHEKA NA NGUVU YAKO)	1	2	3	4	5	6	7	99
c. Since <MONTH>, I am satisfied with my relationships with family and friends. (KUTOKA MWEZI WA.....UMETOSHEKA NA UHUSIANO WAKO NA JAMII NA MARAFIKI)	1	2	3	4	5	6	7	99
d. Since <MONTH>, I am satisfied with my home. (KUTOKA MWEZI WA.....UMETOSHEKA NA KWAKO AU VYENYE KWAKO KUNAKAA)	1	2	3	4	5	6	7	99

Now I would like to ask you questions about the types of people you discuss agriculture and your farm work with. (SASA NINGEPENDA KUKULIZA MASWALI KUHUSU WATU MNAOJADILIANA KUHUSU UKULIMA NA MAMBO YA KILIMO)

	<p>38. In the past three months, since <MONTH>, how often do you normally discuss about agriculture with [INSERT NAME OF CATEGORY OF PERSONS HERE]; KWA MIEZI MITATU ILIYOPITA, KUTOKA MWEZI WA..... ULIJADILIANA MAMBO YA UKULIMA MARA NGAPI NA; (WEKA AINA YA KIKUNDI HAPA)</p> <p>SHOW RESPONDENT SHOWCARD B. READ SCALE OPTIONS OUT LOUD.</p> <p>1. Never (Sijawahi) 2. Rarely (Mara chache) 3. Sometimes (Saa zingine) 4. Most times (mara nyingi) 5. Always (Kila Mara) 99. DON'T KNOW (SIJUI) 98. NOT APPLICABLE</p>
a. Family / Relative (FAMILIA)	
b. Friend (RAFIKI)	
c. Neighbor (JIRANI)	
d. Agrodealer (MUUZAJI WA BIDHAA ZA KILIMO)	
e. Customer (MNUNUZI WA BIDHAA ZA KILIMO)	
f. Government agriculture extension officer (MAAFISA WA KILIMO WA SERIKALI)	
g. Private sector technical officer (WATAALAMUWA UKULIMA WA KIBINAFSI)	

Please tell me top 3-5 groups and organisations that you are actively involved in at present such as Saccos, chama, cooperatives. (TAFADHALI NIELEZE KUHUSU VIKUNDI VITATAU MUHIMU KWAKO KAMA CHAMA, SACCO, AU YA KILIMO UNAVYOJIHUSISHA NAVYO)

IWR PROBE: GROUPS WHERE YOU DISCUSS AGRICULTURE AND FARMING PRACTICES. ASK ALL QUESTIONS ABOUT EACH GROUP BEFORE MOVING ONTO THE NEXT GROUP I.E. THE NEXT ROW

46. Name of the agricultural groups (JINA LA KIKUNDI)	39. What is your position in this group? (UNA CHEO GANI KWA HICHO KIKUNDI)	40. How many members does this group have? (HICHO KIKUNDI KINA WATU WANGAPI)	41. What value does this group provide to you ? (HIKI KIKUNDI KINAKUFAIDI KWA NJIA GANI)
	IWR PROBE: ARE YOU A MEMBER OR A SECRETARY OR TREASURER. DO YOU HAVE A LEADERSHIP ROLE?		IWR PROBE: HOW DOES THIS GROUP HELP YOU? WHY ARE YOU A PART OF THIS GROUP?
a.			
b.			
c.			
d.			
e.			

PART H: Feelings about self. JINSI UNAVYOJIHISI

Now lets turn back to you. For the next few questions, think about how you felt in general, over the past three months (IWR: SINCE <MONTH>). (KWA MASWALI YAFUATAYO, FIKIRIA/KUMBUKA JINSI ULIVYOJIHISI KWA UJUMLA KWA MIEZI TATU ILIYOPITA KUTOKA MWEZI

42 WA.....HADI.....)

SHOW RESPONDENT SHOWCARD C. READ OPTIONS OUT LOUD.

(CIRCLE ONE NUMBER PER LINE)

	Strongly Disagree (NIMEKATAA KABISA)	Disagree (NIMEKATAA)	Neither disagree nor agree (SINA UHAKIKA)	Agree (NAKUBALI)	Strongly Agree (NAKUBALI KABISA)	DON'T KNOW (SIJUI)
a. Since <MONTH>, I was satisfied with myself. (KUTOKA MWEZI WA.....NILIHISI NIMERIDHIKA)	1	2	3	4	5	6 7 99
b. Since <MONTH>, I thought I am a good person. (KUTOKA MWEZI WA.....NILIKUWA NAONA NILIKUWA MTU MZURI).	1	2	3	4	5	6 7 99
c. Since <MONTH>, I was able to do things as well as others. (KUTOKA MWEZI WA.....NILIWEZA KUFANYA MAMBO KAMA WENGINE)	1	2	3	4	5	6 7 99
d. Since <MONTH>, I felt I do have much to be proud of. (KUTOKA MWEZI WA.....NILIHISI NIKO NA MENGI YA KUJIVUNIA)	1	2	3	4	5	6 7 99
e. Since <MONTH>, I took a positive attitude toward myself. (KUTOKA MWEZI WA..... NILIAMUA KUJIAMINI)	1	2	3	4	5	6 7 99

PART I: Marketing information (KUHUSU MAUZO)

43 Now, I would like to bring our conversation back to the new product - Soil Plus that you purchased. Where did you learn about Soil Plus? (NINGEPENDA KUONGEA JUU YA MBOLEA KIASILI MPYA INAYOITWA SOIL PLUS ,ULIJULIA WAPI?)

(TICK ALL BOXES THAT APPLY)

<input type="checkbox"/>	1. AGRODEALER	<input type="checkbox"/>	4. FIELD TRIAL (DEMO PLOT)	<input type="checkbox"/>	7. FARMER ASSOCIATION EVENT
<input type="checkbox"/>	2. SMS	<input type="checkbox"/>	5. RADIO	<input type="checkbox"/>	98. OTHER (please specify _____)
<input type="checkbox"/>	3. PRINT ADVERTISEMENT	<input type="checkbox"/>	6. WORD OF MOUTH (FROM FRIENDS, FAMILY, NEIGHBOUR ETC)	<input type="checkbox"/>	99. DON'T KNOW

Why did you buy Soil Plus? (KWA NINI ULINUNUA SOIL PLUS)

44 IWR: PROBE INTO WHY

PART K: Background (MAISHA YAKO)

Now I have a few questions about yourself and your household. (SASA NINA MASWALI MACHACHE KUHUSU WEWE NA JAMII YAKO)

Are you male or female? (WEWE IN MWANAMKE AMA MWANAUME?)

45 IWR: DO NOT ASK THIS QUESTION - JUST TICK THE ANSWER

(TICK ONE BOX ONLY)

1. MALE

2. FEMALE

How old are you? (UKO NA MIAKA NGAPI)

46 IWR: IF RESPONDENT DOES NOT ANSWER OR IS UNSURE, SAY "YOUR CLOSEST ANSWER IS FINE"

(PROVIDE NUMBER IN SPACE PROVIDED)

_____ years old

99. DON'T KNOW

47 What is your highest level of education? (UMESOMA MPAKA KIWANGO GANI)

(TICK ONE BOX ONLY)

1. NO FORMAL SCHOOLING

5. SOME SECONDARY SCHOOL/HIGH SCHOOL

9. UNIVERSITY COMPLETED

2. INFORMAL SCHOOLING ONLY

6. COMPLETED SECONDARY SCHOOL

10. POST-GRADUATE

3. SOME PRIMARY SCHOOLING

7. POST-SECONDARY QUALIFICATIONS, OTHER THAN UNIVERSITY
E.G. A DIPLOMA OR DEGREE FROM A POLYTECHNIC OR COLLEGE

98. OTHER (please specify _____)

4. COMPLETED PRIMARY SCHOOL

8. SOME UNIVERSITY

99. DON'T KNOW

48 What is your marital status? (UMEOA AMA UMEOLEWA)

(TICK ONE BOX ONLY)

1. SINGLE

3. DIVORCED

5. SEPERATED

98. OTHER (please specify: _____)

2. MARRIED

4. WIDOWED

6. INFORMAL UNION OR LIVING WITH PARTNER

99. DON'T KNOW

Including yourself, how many people live in your household? By household I mean a group of people who do not necessarily live in the same building; who usually eat from the same pot; and who pool their incomes and other resources. (PAMOJA NA WEWE,HAPA KWAKO MNAISHI NA WATU WANGAPI. NIKISEMA JAMII/WAKO NAMAANISHA MNAISHI PAMOJA,MNAPIKA PAMOJA NA MNAFANYA MAAMUZI YA KINYUMBAINI PAMOJA SI LAZIMA MUWE KWENYE NYUMBA MOJA)

49

(PROVIDE NUMBER IN SPACE PROVIDED)

99. DON'T KNOW

At what age did you start farming? (ULIANZA KILIMO UKIWA NA MIAKA MINGAPI?)

50 IWR: IF RESPONDENT DOES NOT ANSWER OR IS UNSURE, ASK WHAT YEAR DID YOU BEGIN FARMING OR NUMBER OF YEARS OF EXPERIENCE IN FARMING.

(PROVIDE NUMBER IN SPACE PROVIDED)

a. _____ Years old

b. _____ Year

c. _____ Years of experience

99. DON'T KNOW

PART L: Contact information (VILE NITAKUPATA)

Now I need some information on how to find you next year for the follow-up interview. I will keep this information confidential and will not share it with anyone else outside this study. Can I please take down this information? (SASA NINGEPENDA KUJUA VILE TUTAKUPATA MWAKA UJAO TUTAKAPO KUWA TUNA FUATILIA UTAFITI HUU,NITA YAWEKA MANENO TUMEONGEA IWE SIRI BAINA YETU NA WATU WANAOHUSIKA NA HUU UTAFITI)

IWR: ONLY IF THE RESPONDENT SAYS YES, THEN PROCEED WITH THIS SECTION. (PROVIDE RESPONSES IN SPACE PROVIDED)

51 Complete Name (First name, Surname). Please spell this for me.
(TAFADHALI NIAMBIE MAJINA YAKO YOTE)

52 Other names you often go by. (TAFADHALI NIPATIE MAJINA INGINE YENYE UNAJULIKANA NA WATU KATIKA ENEO HILI)

53 ENTER GPS LOCATION (TAKE PICTURE WITH GPS ON)

54 Your phone numbers such that they are the best way to contact you next year in 12 months? (PIA NINGEPENDA UNIPATIE NABARI ZA SIMU KWA SABABU NDIZO MZURI KWA KUKUPATA MWAKA UJAO)

IWR: FILL BOTH BLANKS: MOBILE NUMBER AND ASK FOR ANY OTHER NUMBER THEY MAY HAVE WHERE THEY CAN BE REACHED

(PROVIDE NUMBER IN SPACE PROVIDED)

a. Mobile Number (NANBARI YA SIMU) : _____

b Other (Specify) (ZINGINEZO): _____

Name of another person who will know where you are in 12 months. (JINA YA MTU MWINGINE MWENYE ATAJUA MAHALI UTAKUWA MWAKA MMOJA UJAO)

55 (PROVIDE RESPONSES IN SPACE PROVIDED)

His/Her name (JINA YAKE)

Relationship to you (UHUSIANO WAKO NA YEYE)

56

His/Her Phone Number (NAMBA YA SIMU YAKE)

57

Name of a second person who will know where you are in 12 months who does not live with you. (JINA YA MTU WA PILI MWENYE ATAJUA UTAKAKOKUWA MWAKA MMOJA UJAO)

58 (PROVIDE RESPONSES IN SPACE PROVIDED)

His/Her name (JINA YAKE)

Relationship to you (UHUSIANO WAKO NA YEYE)

59

His/Her Phone Number (NAMBA YA SIMU YAKE)

60

CHECK ALL LANGUAGES THAT YOU USED DURING THIS INTERVIEW:

1. ENGLISH

2. SWAHILI

3. KIKUYU

4. KAMBA

5. OTHER _____

END TIME: _____

ADDRESS WHERE INTERVIEW IS CONDUCTED IF DIFFERENT FROM RESPONDENT'S HOME ADDRESS(ANWANI YA MAHALI MTAFIGI ALIPATA MKULIMA KAMA NI BA LI NA ANAPOISHI) :

ADD ANY IMPORTANT LANDMARKS AROUND YOU(TAJA MIJENGO AMA MAJABALI MUHIMU YALIYO KARIBU NA KWAKO)

Thank you for your time and answering all my questions. All the information you have given me is very helpful. Do you have any questions or comments for me? (NASHUKURU KWA KUNIPA WAKATI WAKO NA KUNIJIBU MASWALI.MAJIBU YOTE U MENIPA NI MUHIMU SANA.UKO NA SWALI LOLOTE?)