Sri Lanka Agriculture Sector Modernisation Project (ASMP)

ENVIRONMENTAL SCREENING REPORT
FOR
CDP № 3 - ANURADHAPURA (IPALOGAMA) GUAVA

Prepared for: Democratic Socialist Republic of Sri Lanka, Ministry of Agriculture (MOA)

Revised: 29 May 2022

FCG

NEW ZEALAND
G2G KNOW-HOW

InfotechsIDEAS

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TABLE OF ABBREVIATIONS

ADA	Assistant Director of Agriculture
ADO	Agricultural Development Officer
AI	Agriculture Instructor
AQI	Air Quality Index
ARPA	Agriculture Research and Production Assistant
ASMP	Agriculture Sector Modernisation Project
ATDP	Agriculture Technology Demonstration Parks
BS	British Standards
CDP	Cluster Development Plan
CEA	Central Environmental Authority
DOA	Department of Agriculture
DS	Divisional Secretary
EMP	Environmental Management Plan
EMS	Environmental Method Statement
EPL	Environmental Protection Licence
FPO	Farmer Producer Organisation
GAP	Good Agricultural Practices
GN	Grama Niladari
IPM	Integrated pest management
IPNS	Integrated Plant Nutrition System
ISP	International Service Provider
IUCN	International Union for Conservation of Nature
LA	Local authority
LKR	Sri Lanka Rupee
MoD	Ministry of Défense
MOP	Muriate of Potash
O&M	Operation and maintenance
OFC	Other field crops
PCR	Physical cultural resources
PMC	Project Management Committee
PMP	Pest management plan
PMU	Project Management Unit
RDA	Road Development Authority
RPM	Residential Project Manager
SMP	Social Management Plan
WQI	Water Quality Index

Environmental Screening Report

for CDP № 3 - Anuradhapura (Ipalogama) Guava

1. PROJECT IDENTIFICATION

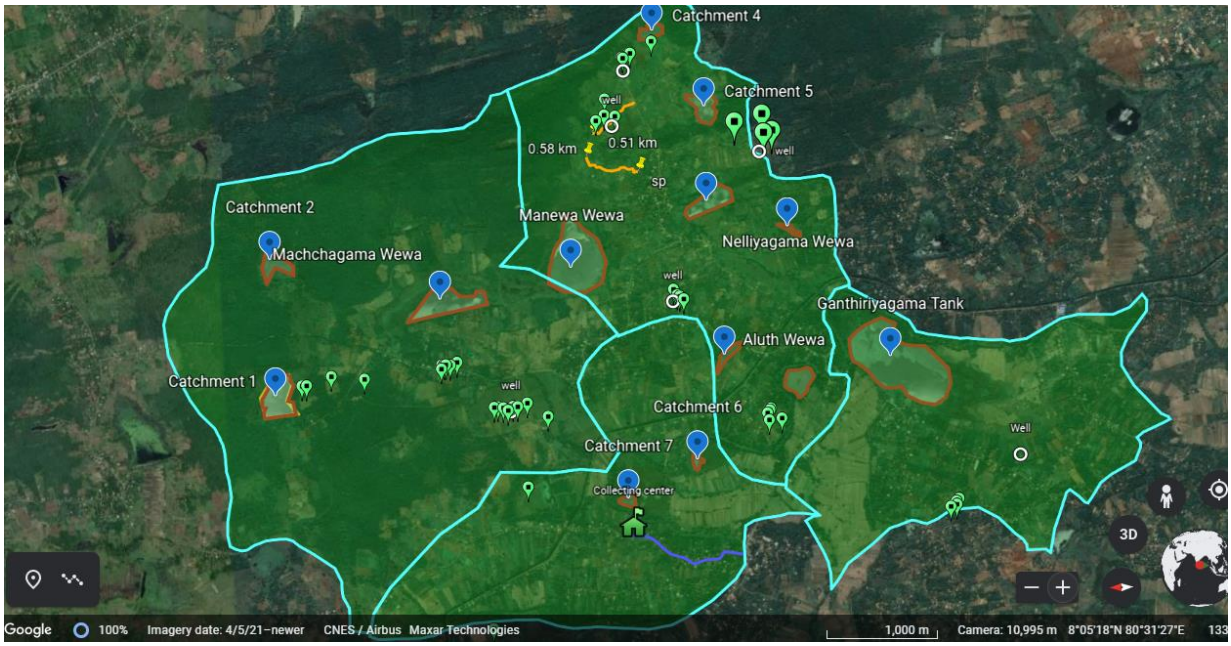
Project title	Introduction of improved technologies to enhance the quality and productivity of Guava in Anuradhapura District (Farmer Cluster Project for Technology Demonstration Parks)
Project proponent	Project Management unit, ASMP, Ministry of Agriculture

2. PROJECT LOCATION

Location **(Relative to the nearest town, highway)**	The ASMP and DOA have identified the farmers from five Grama Niladari (GN) divisions in Ipalogama DS Division (Named 501-Ipalogama, 502-Manewa, 503-Ganthiriyagama, 510-Kadiyangalle, 515-Hiripitiyagama). Farmlands are scattered across the selected GN Divisions as shown in Figure 1. Ipalogama division is accessible via B213 – Thalawa-Kekirawa Road and about 7km to Kekirawa and 27km to Thalawa. Mahailuppallama Agriculture Research Centre is located about 10km away from the division. Further, Manewa GN Divisions extends until the A9 road at Thirappane. Ipalogama is bounded to five DS divisions namely Galnewa, Palagala, Kekirawa, Thirappane and Talawa. Ipalogama DS Division has 32 GN Divisions, and population about 43,905. The total area is 147 km^2 (Divisional Secretariat, Ipologama, 2019).

Figure 1: Area of proposed CDP № 3 - Anuradhapura (Ipalogama) Guava

Figure 2: Tanks/water catchments across the project area



Definition of project area **(Area of the project and those that are affected during construction)**	The beneficiaries have been identified (refer Annexure 2) for the cluster project from Ipalogama DS Division of Anuradhapura district. About 498 farmers were selected from the five GN Divisions, each having a minimum of 0.2 ha of land. However, about 212 ha are included in this cluster. Selected farm slots are scattered across the DS division and no new farm slots will be established. Already cultivated farm slots will be used for the project. No new locations will be used for this cluster.

Table 1: Information on selected guava cluster in the Ipalogama area

No.	Name of the village	Estimated area growing guava	№ of farmers
1	Kadiyangalla	35 ha	82
2	Wedinigama	28 ha	66
3	Gonapathirawa	14 ha	32
4	Manewa	15 ha	36
5	Sangattewa	28 ha	62
6	Ipalogama	14 ha	32
7	Ganthiriyagama	22 ha	48
8	Gonapathirawa	32 ha	70
9	Gamini Halmillawewa	9 ha	25
10	Senapura	15 ha	35
	Total	**212 ha**	**498**

In addition, two rural farmland access roads about 1100m (Refer Figure 1) length will also be improved which will have an impact on people other than the selected farmers. Along these roads, there are two number of culverts idenfied to be replaced. Both access roads belong to 501 GN division and only rehabilitation activities to be taken place. Immediate impact area will be the either side of the roads selected and the users of these roads.

The collection centre, composting unit is already constructed but will need upgrading to handle guava export operations until the district level PHPPC is developed. No new

	lands will be cleared and only rehabilitation activities will be taken place. Lands with Home garden and cultivated lands are surrounded by the selected collection centre. Construction and rehabilitation of agricultural wells will be taken place at few selected farmlands and that is based on the water availability and the accessibility. Few proposed locations are shown in figure 1. Further, existing electric fences belong to the proposed project area will also be rehabilitated. The rainwater and water supplied by the Kala Wewa Reservoir supply water for cultivations throughout the year. Out of farmers in Ipalogama area guava is mainly grown in 4 GN Divisions. The major irrigation scheme of Kala Wewa Reservoir made it possible to cultivate guava successfully. Considering the situation related water supply, 13 new agro wells will be constructed, and two old agro wells will be renovated.
Adjacent land and features	Farmers in Ipalogama can be classified as small to medium farmers having less than 2 ha of land. Guava cultivation could be considered as the main agricultural activity in Ipologama DS division. In this area more than 500 farmers engaged in guava cultivation more than 10 years. The average farm size varies from 0.4 - 0.8 ha per farmer. However, some farmers grow up to 2 - 4 ha. In addition, farmers in Ipologama utilise their home gardens even for guava cultivation. Guava cultivated lands in this area are undulating terrain with poor drainage. Though there is a satisfactory drainage is available in upper parts of the catena, drainage is poor in lower parts of the catena. Selected farm lands are scattered across the GN divisions and most of the adjacent lands are cultivated lands or cultivable lands. However, impacted socially, ecologically sensitive areas were not found. Few farmlands of 501 and 502 GN divisions are bordered to Manewa forest. Construction/rehabilitation of agro wells will be taken place at few above selected farm lands and most of surrounded lands are cultivated or cultivable. Further, tanks/water catchments are distributed across the selected area and few of them are shown in Figure 2. Though there are more than 500 farmers in this area, at the initial stage, new and improved technology packages to enhance productivity and quality will only be featured in newly planted plots, strategically located for maximum exposure to large numbers of farmers. These plots will serve as learn-by-doing sites where, at the beginning when technology is first introduced, training of trainers will take place to prepare “change agents” to work in the dissemination and expansion of the new technology packages to large numbers of farmers. The closest marketplace for guava farmers in the areas is the “Thambuththegama” wholesale market. The identified are consists of large and medium scale commercial cultivation lands observed. It included coconut, green chilli, vegetable, fruit, etc. Further, good dairy/livestock industry observed.

3. PROJECT JUSTIFICATION

Need for the project **(What problem is the project going to solve)**	The guava (*Botanical Name- Psidium guajava)* is a perennial fruit crop commonly cultivated on uplands by the farmers who are living in selected areas in Ipalogama. This crop was introduced by Department of Agriculture (DOA) in the selected areas and it was a good alternative crops for farmers to get maximum output from their uplands. Intension of this cluster development is for productivity enhancement, diversification and demonstrations to support smallholder farmers to produce

	competitive and marketable commodities, improve their ability to respond to market requirements and move towards an increase in commercialisation[1]. Farmers in Ipalogama can be classified as small to medium farmers having less than 2 ha of land. Guava cultivation could be considered as the main agricultural activity in Ipologama DS division. In this area more than 500 farmers engaged in guava cultivation more than 10 years. The average farm size varies from 0.4 - 0.8 ha per farmer. However, some farmers grow up to 2 - 4 ha. In addition, farmers in Ipologama utilise their home gardens even for guava cultivation. Further, paddy cultivation is common for all farmers in Ipologama DS division. By engaging small and medium scale farmers in the area would be benefitted socially. The major problem identified in limiting further expansion of guava cultivation is the root disease spreading in the area that was first recorded in 2017. ISP involvement will mainly seek solutions to stop/avoid/mitigate the **spreading of die-back disease among crops**. There are many improved commercial varieties such as Bangkok Giant, Horana Red, Horana white, Pubudu and Kanthi (a dwarf variety) available. The most popular variety is Thai Royal Janet (Apple Guava). The proposed project is designed as a model for primary value addition, collecting centre and productivity enhancement by using new technology with mini-sprinkler irrigation and construction of collecting centre. Following issues will be sort out by the proposed interventions: 1. Spreding of die-back disease among Guava cultivation 2. Scarecity of water in the area for cultivation 3. High usage of chemicals and fertilisers 4. Poor land preparation practices 5. Clearing of jungles or deforestration 6. Unsustainable post-harvest practices 7. Post-harvest losses Agriculture Technology Demonstration Parks (ATDPs) will support farmers to: (a) develop professional producer associations; (b) achieve economies of scale in production and exports; (c) improve marketing and value addition; and (d) achieve greater efficiency in the provision of technical and other support services. Farmers are expected to directly benefit through improved production capacity and input supply/management, better and more efficient technologies for production and post-harvest, improved market linkages as well as opportunities for value addition. Furthermore, farmers would benefit from capacity building through farmer business and marketing training. The business opportunity identified with farmers and agribusiness is the modernisation of existing and renewed plantation of guava, for export to the Middle East.
Purpose of the project **(What is going to be achieved by carrying out the project)**	New and improved technology packages to enhance productivity and quality will only be featured in newly planted plots, strategically located for maximum exposure to large numbers of farmers. These plots will serve as learn-by-doing sites where, at the beginning when technology is first introduced, training of trainers will take place to prepare “change agents” to work in the dissemination and expansion of the new technology packages to large numbers of farmers. The technology package and other management practices will be introduced to the selected group. This group will provide the foundation to initiate quick marketing of high-quality guava for export market. The main objective of the subproject is to develop Agriculture-related livelihood by achieving below objectives:

[1] ASMP Project Appraisal Document.

	• To introduce new technologies to increase yield • Land preparation • Water conservation/Management • Disease control • Use of weedicides, pesticides • Enhancement of productivity and Quality of guava • To minimise post-harvest losses • To increases sustainable farm income • Create new employment opportunities • Identify international market opportunities • Post-harvest processing facilities The famers who are engaging with farming activities in the project's intervention area will follow the Good Agricultural Practices (GAP) introduced by the DOA. ASMP will facilitate to implement GAP by introducing new technologies and enhancing farmers' capacities.
Justification and Alternatives considered **(Different ways to meet the project need and achieve the project purpose)**	Provincial Department of Agriculture (North Central Province) supported the introduction of guava to selected farmers in the area about 20 years ago. This crop provided a significant improvement to their income. Consequently, guava cultivation became very popular among many villagers in Ipalogama because: • Ability to cultivate guava with **limited quantities of water** compared to paddy crop. • Regular and year-round income that has **attracted young farmers** to guava cultivation. • Almost all the farmers converted their uplands into guava farms where water sources are available. • Even though the price fluctuates, the guava price has remained satisfactory. Ipalogama has a well-established farmer organisation already and production of guava available immediately. Most of the farmers have large scale, low flat farmer-based lands with **availability of water** with **less drainage concerns**. Since, ipalogama is already established for guava cultivation, **destruction of vegetation and distubances to natural ecosystem is very minimal**. New On-farm technology package with **control/prevention of die back disease and Fusarium Wilt** to be introduced. Further, crop management by fruit age control using coloured fruit bags, oriented to export will be used. New and improved quality enhancing technologies and Productivity Enhancing Technologies such as drone technology, **water conserving** and low pressure drip and mini sprinkler irrigation systems, **basic flood prevention and drainage field techniques**, new planting patterns with high population densities, **precision fertilisation techniques**, Pest and disease control based on **Integrated pest management (IPM) practices** and modern spray techniques and **precision agriculture** practices to be introduced to meet the expected project out comes. The "no-action" alternative would mean that no guava cluster development undertaken by the ASMP and hence no financial, technical and market support for the existing guava Cultivators in Ipalogama selected GN Divisions. Therefore, conventional farm practices, low productivity, low quality and low income will continue to dominate the economy of the farmers and agriculture sector will not develop in Anuradhapura. Further, **large volume of water usage, high use of chemical fertilisers and mainly spreading of die-back disease** in the entire area which will lead to destruction of guava cultivation.

Legal framework and WB Safeguards Policies

According to the nature of project activities, following local legal framework and WB safeguards policies will be applicable:

#	Permit/Clearance	YES	NO	TBD	Remarks
1	The National Environmental Act. No. 47 of 1980 & its amendments		√		None of the proposed activities are coming under prescribed activities
2	Agrarian Development Act of No 46 of 2000 and 2011 (Section 32)	√			Even though ASMP not supporting to convert paddy lands, the cluster lands selected area paddy converted to Guava with approval of relavent authorities.
3	The Mines and Mineral Act No.33 of 1992	√			Improvements of rural roads and other proposed infrastructure activities may require extraction of soil and rocks. Soil and rocks should be purchased from GSMB permitted borrow pits and quarries.
4	Local Authorities Acts	√			Improvements of rural roads, waste disposal should be approved by the Ipalogama Pradeshiya Sabha.
5	Water Resources Board Act No. 29 of 1964	√			Extraction of ground water should be concented by the WRB
6	The Irrigation Ordinance (Chapter 453)	√			Use of water from Jayaganga and Yodha Ela of Kalawewa should be with the approval of Irrigation Department
7	Soil Conservation (Amendment)Act No. 24 of 1996	√			Any activity which increases the erosion of soil or potentials for activate erosion potential need to take maximum mitigation measures to control soil erosion and apply soil conservation measures wherever applicable
8	The Fauna & Flora Protection Ordinance Act No. 49 of 1993 & its amendments	√			Any cluster activity or infrastructure development closer to a protected area or outside which hinders wildlife movements restrictions should be adhered to FFPO measures
9	Forest Ordinance including Amendments	√			Any activity within forest reserve or buffer zone or

					removal of trees required to be carried out should follow regulation stipulated under this legal framework.

World Bank safeguards policies triggered by the project

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	[**x**]	[]
Natural Habitats (OP/BP 4.04)	[]	[**x**]
Pest Management (OP 4.09)	[x]	[]
Physical Cultural Resources(OP 4.11)	[]	[**x**]
Involuntary Resettlement (OP/BP 4.12)	[]	[**x**]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[]	[x]
Forests(OP/BP 4.36)	[]	[x]
Safety of Dams (OP/BP4.37)	[]	[x]
Projects on International Waterways (OP/BP/GP 7.50)	[]	[x]

4. PROJECT DESCRIPTION

Proposed start date	July 2021
Proposed completion date	December 2023
Estimated total cost	LKR 226,415,912
Present land ownership	Private farmlands, lands with "Swarnabhoomi", deed and permits given by Divisional Secretariat of Ipalogama
Description of the project **(With supporting material such as maps, drawings, etc. attached as required)**	The proposed sub project is mainly focused to introduce the new technology for cultivation activities. The civil works of sub project includes: ***Table 2: Activities and timeline for the introduction of the new/improved technologies***

Activity	Subactivity
Introduction of basic flood prevention and drainage field techniques	Macro level study of the drainage pattern of the guava area to identify poorly drained farms affected by Fusarium Wilt and to determine the slope patterns to quickly evacuate water using on-farm micro drainage technology
	Site levelling using drones
	Quick water evacuation ditches
	Surface drainage techniques (removal of wet spots)
Drone Technology	Levelling for land preparation and drainage
	Disease surveys using infra-red photography
	Application of pesticides
	Precision agriculture
Introduction of water conserving and low pressure drip and mini-sprinkler irrigation systems	Computer controlled heads for water application scheduling supported by fertility sensors, soil moisture sensors and irrigation friendly double row planting
	Precision fertigation with liquid organic compounds
	Precision application of liquid pesticides

	Anti-clogging flushing components
Introduction of new planting patterns with high population densities	Hexagon and equilateral triangle patterns
	Double row planting pattern suitable for multiple cropping
Introduction of new varieties and planting Material	White varieties to renovate the existing field genetic material
	Red variety for fresh and processing to expand market access for farmers
Introduction of new vegetative propagation techniques for guava	Rooting of terminal branches
	Air layering
Introduction of precision fertilisation techniques	Formulation of fertiliser regimes based on complete soil tests and foliar analysis
Pest and disease control based on IPM practices and modern spray techniques	Pest population and pest damage surveys to assess pest threshold status for application of pesticides
	Mitigation of guava dieback disease using disease specific fungicide mixes
	Control of anthracnosis and other pre- and post-harvest diseases
Introduction of precision agriculture practices	Introduction of blocking and tree tagging systems to develop tree identification nomenclature to allow agricultural precision practices

Table 3: Summary of farm access road repair

№	Location	Unit	Length
1	Hapitiyagama First lane.	m	580
2	Hapitiyagama Second lane.	m	510
3	Box culvert in Hapitiyagama first lane.	No	01
4	Spun pipe 600mm dia. culvert in Hapitiyagama first lane.	№	01

Note: **No change in the alignment and width of the roads selected**

Table 4: Summary of Project Interventions in the Cluster

#	Project component	Key Activities	Approx. extent / quantity	Implementation responsibility
1	Cultivation of Guava (Refer table 1)	Land Preparation Irrigation pipelaying Installation of mini-sprinklers	212ha	ISP PPMU
2	Improvements of Rural Roads (Rehabilitation) (Refer table 3)	Trimming, levelling and compaction of sub grade Supplying and pilling approved gravel Spreading and compaction garvel Culvert construction	2 road sections Total length 1.1km 2 Culverts	Contractor LAs Civil Engineer – ISP PPMU Engineer - PMU
3	Construction/improving agro wells (Common Solar panel and submersible pump -	Yield testing Excavation Construction wall	13 new agro wells to be constructed and 2 old agro	Contractor LAs Civil Engineer – ISP

		Common solar panel and submersible pump for 4-5 farmers will be installed)	Installation of Pumps	wells to be rehabilitated	PPMU Engineer - PMU
	4	Renovation of storage and production collection facilities	Laying interlock tiles Widening the existing entrance gate Provision of equipments	1 Collection Centre providing 1500x600x450 mm stainless steel sink including heavy quality taps, wastes and plumbing and Providing 2400x1200 mm stainless steel sorting table including heavy quality GI frame	Contractor FO Civil Engineer – ISP PPMU Engineer - PMU
	5	Construction of Compost Production Unit (Construction of Storage building including office space, toilet and solid waste management facilities)	Fencing Constrution of builing Disposal yards Mixing yards Leachat management	1 Shelter - Approximately 5m x 10m Building - Approximately 7.50m x 15m	Contractor FO Civil Engineer – ISP PPMU Engineer - PMU
	6	Rehabilitation of electric fence – existing electric fences of the selected project area will be rehabilitated	Construction/ Rehabilitation of fence Electrification Maintanance		Contractor FO Civil Engineer – ISP PPMU Engineer - PMU

At the same time as the shipping container task is being implemented, a set of initial and fundamental activities will be undertaken to prepare the farmers and their fields to receive the new and improved technology from the ISP.

Project management team

A Project Management Unit (PMU) has been established under the Ministry of Agriculture to implement proposed project activities.

Contact Persons

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	Environmental and Social Safeguards Specialist ASMP, Ministry of Agriculture No. 123/2 Pannipitiya Road, Battaramulla Tel: +94 112 877 550 Fax: +94 112 877 546 Email: sanjayadms@hotmail.com Web: https://www.asmp.lk/ **Nature of Consultations and Inputs Received** Consultations with Environmental and Social Safeguard Specialist/ PMU However, institutional mechanism for the guava cluster development has been proposed. Project Management Committee chaired by Resident Project Manager, consisting of all the line agencies (Agriculture, Irrigation, Agrarian Development and Land), and all the chairmen of farmer organisations have extended cooperation for guava cultivation in paddy lands under irrigation considering following • Great potential to increase Farmer income with less labour and inputs. • Ability to save water in the reservoir for next seasonal cultivation and minimise water crisis during Yala season. • Effective mechanism to attract young farmers for commercial agriculture. • Almost all the guava farmers have kept smaller part of their land for paddy crop for domestic consumption. • All the guava farmers are members of farmer organisations or successors.

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 PHYSICAL FEATURES	
Topography and terrain	Generally, the project site is an undulating terrain with a gentle slope (slope <30%) and the relief is <20m. The elevation of the area is around 40m-70m AMSL[2].
Climate	The total area of Ipalogama falls under the Agro-ecological region of Low Country Dry Zone (DL1b) which has a bi-modal rainfall pattern as in other areas of the district. Further there are few land spots where water can be taken due to elevation differences.
Geology	Geologically, the project area belongs to the Wanni Complex of Sri Lanka.
Soil (type and quality)	Ipologama falls under the Agro-ecological region of Low Country Dry Zone (DL1b) which has a bi-modal rainfall pattern as in other areas of the district. Climatic conditions of the area are mild, and the average temperature is about 27.0^{0}C throughout the year. Farmers in Ipologama grow mainly guava in upper slopes where main soil group is Reddish Brown Earths (Chromic Luvisols – LVx) and in lesser extent in Low Humic Gley soils (Eutric Gleysols - GLe) and Alluvial soils – Eutric Fluvisols (FLe) present in valley bottoms (Soil Survey Staff, 1992). The Reddish Brown Earths occupy the crest and the upper and mid-slopes of the landscape. The Low Humic Gley soils occupy the lower parts of the slope and valley bottom.

[2] Above mean sea level https://en-in.topographic-map.com/maps/gmcr/Sri-Lanka/

	A narrow strip of alluvial soils occurs along the natural drainage stream (Panabokke, 1996). The soils are high in exchangeable bases, neutral or moderately acid in reaction fairly rich in potassium and low in phosphorus and nitrogen and low organic matter due to the high temperature and low rainfall (Panabbokke, 1996). In Reddish Brown Earths normal soil profile consists of sandy loam to a sandy clay loam surface horizon underlain by a sandy clay loam to sandy clay subsoil. The surface soil structure is weak to moderate, coarse, subangular blocky. The base saturation in the sub soil is almost 60-80%; and soil reaction slightly acid to neutral. Low Humic Gley Soils are characterised by wetness or gleying throughout the profile or gleying immediately below the surface horizon. The dominant factor that governs the expression of these soils is the periodically high ground water level. The colour of the surface soil is dark greyish brown to dark brown. Calcium carbonate concretions are found in the lower depths of the profile in the drier environments (Panabokke, 2003). Guava growing lands in Ipologama could be categorised as flat lands with poor drainage.
Surface water **(Sources, distance from the site, local uses and quality)**	Several tanks and streams are scattered within the identified area. The major irrigation scheme of Kalawewa reservoir made it possible to cultivate guava successful. All selected guava cultivation lands are fed by Kalawewa reservoir. Comparatively Kalawewa irrigation system is considered as a water abundant scheme and main source of water is the Kalaoya river and in addition drainage water from Mahaveli System H contributes significantly to maintain the reservoir capacity. All the canals, tanks, rivers, and sub canals which use for the guava cultivation are feed by Kalawewa reservoir. The closest farm land is around 6.5 km away from the Kalawewa reservoir. Figure 2 depicts the surface waterbodies falling within the selected area. Kalawewa reservoir is feed by Kala Oya basing and the Water Quality Index (WQI) of surface water ranged from 35 to 158. The WQI values of shallow water ranged from 6 to 187. Therefore, drinking water of Kalaoya basin should purify before using. (Muhandiram, Bandara, Perera, Vithanage, Edirisinghe, Athapaththu, 2019).
Ground water **(Sources, distance from the site, local uses and quality)**	Data on groundwater availability in the project area is very sketchy. Agro wells are wells, 7-8 metres deep, with an average diameter of 5 m. They are a popular way to obtain water in upland areas to irrigate small areas of high value crops or to provide a supplementary and secure source of water for the paddy crop. An estimated 5,000 agro wells have been installed in the North Central Province in the past three years. All together there are 132 agro wells found within the selected cluster. Considering Kalaoya basin large number of areas, fluoride levels of groundwater are higher than recommended level. The WQI values of groundwater ranged from 1.1 to 385 and it is not possible to conclude that ground water quality of this area is good[3].

[3] Water quality index for Kalaoya basin (2019)- Muhandiram G.M.H.M.1, Bandara W.D.C.1, Perera W.L.G.D.1, Vithanage M.2, Edirisinghe V.3, Athapaththu B.C.L.1*

Air quality **(Any pollution issues)**	Any major air pollution sources in the vicinity of the project site are not recorded. Small scale industries and traffic may cause air pollution within the area. However, https://www.breezometer.com/air-quality-map/air-quality/sri-lanka/palugaswewa shows that the Air Quality Index (AQI) of Ipalogama is 26/500 and $PM_{2.5}$ is the dominant pollutant while O_3, PM_{10} and CO are having good concentration than $PM_{2.5}$[4].
5.2 ECOLOGICAL FEATURES – ECOSYSTEM COMPONENTS	
Vegetation **(Trees, ground cover, aquatic vegetation)**	It was observed that there are home gardens, cultivated lands and fragmented secondary forest patches scattered along the roadsides. A dense groundcover could be observed in many areas. Home gardens are a common agroforestry type in this area. Based on the instructions from DoA, people have moved towards the formation of eco-friendly home gardens within their private lands. Home gardens are located on a small piece of land close to their residences. Normally the average size of home gardens in dry zone varies between 0.5ha and 1 ha. Crop types depend on the availability of moisture content of the soil. In the Ipalogama DS Division, Agrosilvopastoral practices can be seen very commonly. Different types of species including vegetables, fruits, medicinal plants, ornamental plants, and plantation crops with animal husbandry practices can be seen in the Ipologama area. The main purpose of home gardens is daily family consumption and the additional crop harvest for income generation. Coconut, jack, papaya, orange, guava, mango and vegetables including chillies, ladies fingers, bitter guards, pumpkins, and cucumber are the most common food crops found within home gardens. Timber species of halmilla, sandalwood, teak, tamarind, and margosa are also can be orbserved at the home gardens and kumbuk (*Terminalia arjuna*), weera (*Drypetes sepiaria*) and palu (*Manilkara hexandra*) like species can be observed at the embankments of our ancient tank system. Aloe vera and neem are the most common medicinal plants in home gardens. Some medicinal species have been cultivated for oil extraction (mee, batu, aba, gingelly). These extracted oil types are used as an extra income source since they can sell through community-based organisations. Lotus, Ruffled Sword Plant (“kekakiya”) like plants are mostly associated with aquatic vegetation. According to literature, some endemic species such as *Micromelum minutum* var. *ceylanicum, Glenniea unijuga* and some other wood species such as *Diospyros ebenum* (Kaluwara), *Drypetes sepiaria* (Weera), *Pterygota thwaitesii* (Gal nawa / Etaritiva) have been recorded in 501 and 502 GN divisions near to Manewa forest. Any of these forest features are not affected because no new agricultural lands have been proposed except the technological improvements to existing cultivation practices. The tall plants grow up to 18m -20m and built the canopy cover. Climax forest plant species *Dialium L.* has also been recorded in the hill forests in Manewakanda. Other species are *Fabaceae, Malvaceae, Acanthaceae, Rutaceae* and *Rubaceae* which are the most abundant plant families in the area. The presence of late seral plant species *Grewia helicterifolia* and *P. suberifolium* in the forest canopy can be identified.

[4] https://www.breezometer.com/air-quality-map/air-quality/sri-lanka/palugaswewa

Following dominant species could be identified in proposed cultivation lands:

Table 5 : Commonly identified varieties

Common Sinhala Name	Scientific Name	Conservation status according to the National red list 2020
Karanda	*Pongamia pinnata*	LC
Palu	*Manilkara hexandra*	*NT*
Weera	*Drypetes sepiaria*	*LC*
Amba	*Mangifera indica*	-
Kohomba	*Azadirachta indica*	-
Thekka	*Tectona grandis*	-
Ali Pera	*Persea americana*	-
Jam	Muntingia calabura L.	-
Kon	*Schleichera oleosa*	*LC*
Kotta	*Ceiba pentandra*	-
Pare Maara	*Albizia saman f.muell.*	-
Halmilla	*Berrya cordifolia*	*LC*
Maila	*Bauhinia racemosa*	*LC*
Murunga	*Moringa oleifera*	-
Kathuru Murunga	*Sesbania grandiflora*	-
Pol	*Cocos nucifera*	-
Thal	*Borassus flabellifer*	-
Ahu	*Morinda citrifolia l.*	*LC*
Ipil	*Leucaena leucocephala (lam.) de wit*	-
Puwak	*Areca catechu l.*	-
Anoda	*Abutilon indicum*	*LC*
Anguna	*Wattakaka volubilis*	-
Kowakka	*Coccinia grandis (L.) J. Voigt*	*LC*
Katupila	*Flueggea leucopyrus willd.*	*LC*
Hinguru	*Acacia pennata*	*LC*
Girithilla	*Argyreia populiolia*	*LC*
Wel Keliya	*Grewia orientalis*	*LC*
Heen-eraminiya	*Ziziphus oenoplia (L.)*	*LC*
Heen-karamba	*Carissa spinarum l.*	*LC*
Una	*Bambusa multiplex*	-

(LC- Least Concern, NT- Near Threaten)

Ipologama is considered one of the most recognised areas for paddy cultivation and other cash and catches crops such as chilli, onion, ground nut, soya bean, green gram, cow pea, sweet corn and many dry zone crops and vegetables. A large number of crops can be cultivated particularly in lands where both irrigated water and subsurface water is available. Most crops are cultivated in the home gardens and the areas where the tank water supply is available. However, paddy is the major crop depending on the tank system. Other crops such as chilli, onion, and bitter gourd like species are also cultivated in the tank catchment area.

	Almost all the tanks in the Kalawewa sub-catchments have lotus and sedges. The density of lotus increases as the depth of the tank decreases due to siltation. According to the literature and field observations, no ecologically sensitive areas were identified within the proposed project area and no species were identified within the threatened category of the IUCN redlist. Since the proposed project continues in the existing agricultural lands, no disturbance will occur to the existing wetlands or forested ecosystems.
Presence of wetlands	Tank associated ecosystem is the most common wetland ecosystem type in the dry zone. As the main livelihood in the area is based on agriculture, tanks have been used for irrigational purposes since ancient times. Therefore, Ipalogama also consists of a large number of seasonal and perennial tanks. Perennial tanks hold water throughout the year however the seasonal tanks hold water during the rainy seasons. The main wetland types of the Ipologama area are the Tank system and its associated paddy fields. According to the field observations, Some dry zone specific common dragonfly species and damselfly species could be observed around these wetlands ecosystems. Invasive species of *Eichhornia crassipes* ("Japan Jabara") could be observed within the tank ecosystem. "Kumbuk" (*Terminalia arjuna*), "Mee" (*Madhuca longifolia*), "Weera" (*Drypetes sepiaria*) and "Palu" (*Manilkara hexandra*) species could be observed around these wetland ecosystems. In the Kalawewa sub-catchment, there are a significant number of families' livelihoods depend on the village tank. They have engaged in fisheries, flower gathering and lotus roots and leaves collecting activities, animal husbandry activities, etc[5]. According to the field observations and available literature, the wetlands ecosystem will not be impacted by this proposed project.
Fish and fish habitats	Tank associated ecosystems are rich in biodiversity and provide numerous environmental and economic benefits. These tanks are rich in many other resources such as fish, sedges, flowers and edible plants. Thilapiya, Banded etroplus, Flying barb, Clinbing perch, Spiny eel, Eel and Freshwater catfish are the common fish species found in the tank systems. Kalawewa reservoir and associated waterways can be identified as fish habitats. The reservoir provides important habitats for a wide range of species including migratory birds and waterfowl, amphibians and fish. The surface area of the Kalawewa reservoir is around 2583 ha and the mean depth is around 4.8 m. Hence, it is contributing sustainable fish yield to the market[6]. Freshwater fishing also provides nutrition to children and income for the low-income people in the district. The field studies clearly showed that there are few full-time fishermen and many part-timers who do fishing mainly for their

[5] Preram S, Vidanage, S and Kallesoe, M (2005). Multiple Benefits of Small Irrigation Tanks and their Economic Value - A case study in the Kala Oya Basin, Sri Lanka. IUCN – Ecosystems and Livelihoods Groups, Sri Lanka and Asia Region. https://portals.iucn.org/library/efiles/documents/2005-016.pdf

[6] FAO. Fisheries Reservoir Fisheries. At URL: http://www.fao.org/3/T0028E/T0028E05.htm

	consumption[7]. There are no proposed community-based activities that will have a significant impact on the fish habitats. Since the proposed project activities continue in the existing agricultural lands, no significant impact will happen on the fish species and their habitats.
Birds (waterfowl, migratory birds, others)	The tanks and their associated vegetation, natural scrublands and abandoned paddy fields can be identified as potential bird habitats for migratory birds. Many large birds such as owls, eagles and hawks do hunt rodents. Also, wetland associated bird species such as cranes, storks, and herons feed on insects that pose a threat to rice production. Further, it was highlighted that there has been a huge increase in peacock populations over the past years in the area and peacocks feed on the tendril roots, seeds and flowers of the crops, not just severely destroying the main crops, but will severely affect the future cultivations. However, since the proposed project activities continue in the existing agricultural lands, no significant impact will happen on the bird species and their habitats.
Presence of special habitat areas (special designations and identified sensitive zones)	The area has not been identified as a special habitat area as per the sensitive areas map (annexure 4) of the Central Environmental Authority. However, tanks provide habitats for a wide range of species including migratory birds, waterfowl, amphibians and fishes. Many of these species depend on the food sources associated with the aquatic habitats. Moreover, tanks will enhance the aesthetic beauty and will contribute to healing the peoples' stressful minds. Kalawewa reservoir is 6.5 km away from its closest agricultural land. Few selected agricultural lands of 501 & 502 GN divisions are closer to the Manewa forest. However, all these are existing agricultural lands and no new agricultural lands will be cleared for the proposed activities. Therefore, according to the rapid field observations and available literature, the proposed project activities in the Ipalogama DS Division will not be impacted the existing vegetation, wetlands, birds, fish and fish habitats or any other sensitive ecosystems.
5.3 OTHER FEATURES	
Residential/sensitive areas **(E.g. hospitals, schools)**	According to the information provided by Grama Niladhari, all together there are five schools scattered within the area as one school in 501, one school in 502, two schools in 503 and one school in 515 GN division. All the schools are Sinhala medium schools and it was found that the Kadiyangalle (510) GN division does not have a school in the Grama Niladhari Division. Three Ayurvedic hospital found in Ipalogama DS Division. Divisional health department located in Ipalogama. Government hospitals are located in surrounding DS divisions too. Facilitated teaching hospital located in Anuradhapura Municipality.
Traditional, economic and cultural activities	Out of total workforce in Anuradhapura district, 54.0% is employed in agriculture sector activities, 14.7% is employed in government sector and 11.4% is engaged with private sector occupations. With compared to other districts, the considerable percentage of workforce is engaged in labour works

[7] Preram S, Vidanage, S and Kallesoe, M (2005). Multiple Benefits of Small Irrigation Tanks and their Economic Value - A case study in the Kala Oya Basin, Sri Lanka. IUCN – Ecosystems and Livelihoods Groups, Sri Lanka and Asia Region. At URL: https://portals.iucn.org/library/efiles/documents/2005-016.pdf

	and it is 16.5%. Other sectors are minor and low contribution to the economy[8]. The average monthly household's income is LKR 58,326 and the average monthly household's expenditure is LKR 48, 299[9]. The community who lives below the poverty line is around 3.8% in the district. The primary income source of the majority households is agriculture. More than 90% of households have both upland and paddy lands. Farmers cultivates their paddy-land in both Yala and Maha seasons under irrigation system. The farmers have constructed their residential houses on upland and timber trees and fruit bearing trees are planted in balance part of the land. During the Maha season (September to March), intercropping is done on upland. Ipalogama DS Division is located in Anuradhapura district. It is bounded to five DS divisions of Anuradhapura district such as Galnewa, Palagala, Kekirawa, Thirappane and Talawa. Ipalogama DS Division has 32 GN Divisions, and population about 43,905. The total area is 147 km^2 (Divisional Secretariat, Ipologama, 2019). It is estimated that 569 out of 2448 families are getting "Samurdhi" benefits from department of Samurdhi development and it is around 23.2% from the total families of the selected GN Divisions. According to the information provided by Grama Niladhari, all together there are five schools are scattered within the selected area as one school in 501, one school in 502, two schools in 503 and one school in 515 GN division. All five schools are Sinhala medium schools and it was found that the Kadiyangalle (510) GN division does not have a school fallen within their boundary. As per the selected area's information[10], there are around 2,017 farmers and nearly 1,267 daily paid employees while 749 were unemployed. Furthermore, more than 530 government and around 431 private employees are living within the selected area. The project creates many opportunities for unemployed people to have daily basis employment opportunities and some of them will get opportunity to work as skilled farm labourers. Further, there will be employment opportunities at the Post harvesting processing centres. The area of guava farmlands) were predicted as being 228 ha within Ipologama DS division during Yala season- 2019. Total land area of the five selected GN Divisions is 2,832 ha that has 302 highland parcels ranging size from 0.4 to 0.8 ha and another 63 highland parcels that are larger than 2 ha. Furthermore, there are 954 paddy-land parcels with 424 of the smaller paddy-land parcels ranging in size from 0.2 to 0.4 ha and another 62 paddy-land parcels that are greater than 2 ha. Around 1,708 farmers were found within the villages of this cluster. The main economic activities are agro based activities. As well, the cluster area has 295 female headed families. However, the project is looking for a minimum of 40% female representation. ASMP will need to see how to assist this situation to improve female representation and leadership within this guava cluster. It could be a good opportunity to improve economic benefits for these female-headed families.
Archaeological resources	Archaeological resources in the proposed project site are not recorded. However, Ipologama is located in Anuradhapura district and it has proud

[8] www.anuradhapura.dis.gov.lk/images/PDF/Statistical

[9] Household income expenditure survey

[10] Resource profile, Ipologama Divisional Secretariat-2019

(Recorded or potential to exist)	history. Anuradhapura district is having thousands of known and unknown historical places and archaeological resources. Atamasthana or eight sacred places are bound religious history and also Anuradhapura is the first kingdom in Sri Lankan history. Hence, chance find scenarios can be expected and required guidance are provided in the EMP. Ipalogama is the closet selected village to the well-known Kalawewa and it is around 3 Km away from the village while Vijithapura is around 4 Km away.

6. DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES

6.1 CULTIVATION

Existing Condition of the Crop	Guava cultivation could be considered as the main agricultural activity in Ipologama DS division. In the area, almost 535 farmers engaged in guava cultivation for more than 10 years. In addition, farmers in Ipologama utilise their home gardens that includes guava trees. Guava is grown on undulating terrain with poor drainage in this area. Though there is a satisfactory drainage is in the upper parts of the catena, drainage is poor in lower parts of the catena. Consequently, with the continuous cultivation without adopting proper drainage systems at present crop is in danger. However, in upland production areas drainage is satisfactory due to the presence of tanks and thereby evacuation of excess water. Jaya Ganga and Yoda Ela are main water sources available for guava farmers in Ipologama area. The most common insect pests are white fly and fruit fly. They spray insecticide using knapsack sprayers. Large scale farmers use power sprayers with long hoses. Fungicides and borax are sprayed before bagging. In addition, applications of different types of foliar fertilisers are also a common practice. The major phyto-sanitary problem and major threat to the industry is the guava die back disease. At the initial stage young leaves start yellowing and wilting and with the time whole plant affected. It happens both in the rainy and dry seasons, but it spreads more in the rainy season. Both young and old trees are attacked by this disease. Almost two decades ago guava cultivation practised intensively in Kalpitiya peninsula. However, guava cultivation in Kalpitiya completely destroyed due to an unknown die back disease. The phenology of the tree is as follows: from flower induction pruning, it takes 4 months to flowering, 2 months to bagging and 1 to 1.5 months to harvest. Therefore, the farmers can do approximately two harvests per year. After flower induction pruning, 2 branches form and the leave 1 fruit per branch. From seedlings transplant to harvest, it takes about 1 year. In layering it takes 6 months. The best yield is obtained in the second or third year. After 3 years, the trees begin to die from the die back disease. The best quality such as smooth appearance and colour of fruit is obtained in 6 to 7 years. Fruits are bagged made by used newspapers at a relatively small size. Though flood irrigation is popular among guava farmers it has created many problems due to poor drainage of soils found in the area. At present die back is the most destructive disease for guava plants in Ipologama. This is a major threat to guava cultivation in this area. Excess water use due to flood irrigation and poor hygienic conditions could be considered as the main reason for this problem. Farmers grow white guava variety, namely apple guava. At present, almost all production is sold in local market. However, there is a growing high demand for type of guava in even in international market.

	Screening revealed that existing watering system is high-cost method and it increases water losses and wastes more time. The selected farmers will be encouraged to obtain high yield with more quality from their cultivations with improved irrigation system and it will be indirectly benefitted for customers too since they have opportunity buy high quality fruit products at local market. At the same time, guava farmers use to send their products to market as bulk and it is directly affected on the market price. Just after the harvest, farmers pack the guava in the bags and send to market. The average weight of a bag is around 55-65 kg per pack. Due to overweight, handling of bags is difficult, and it make high post-harvest losses. Post-harvest losses are a national crisis and it directly decrease the quality and the quantity of harvest and ultimate result is the decreasing of farmers' income. This sub project encourages the perennial crop production in dry zone of Sri Lanka. It will be positive benefit to environment as seasonal crops make many environmental issues. When cultivating perennial crops, the soil is covered by vegetation throughout the year and it reduces the soil erosion during rainy season. By increasing crop cover on uplands, it helps to decrease the atmospheric temperature. Introduction of sprinkler irrigation system will save the water and it will be benefitted to conserve the ground water table of the area

Figure 3: Existing Conditions of the crop using "local" bagging of fruits

6.2 POLLUTING PROCESSES (POINT SOURCE)	
In cultivation some key polluting steps, although limited, takes place; mainly in the cultivating and post harvesting phases.	
Land preparation for cultivation	At the beginning, removal of all shrubs and bushes takes place. Manual weed control is the best method at preliminary land preparation stage. Then, any branches of big trees near the field that might shade the new plants are removed. Also, this removes an alternative host for pests and diseases. Soil preparation follows, doing first ploughing with disc or mould board ploughs and doing second deep ploughing with disc or mould board ploughs perpendicular to the first ploughing. Then the disking or harrowing is taking place by each pass being perpendicular to the previous one. These activities provide benefits such as improvement of soil aeration, destroy pest cycles in different stages, destroy harmful bacteria and microorganisms due to aeration is improved and destroy harmful pathogens due to exposing silos to sun light. Adding compost and mixing with soil will increase beneficial macro and microorganism in the soil and decrease pathogenic microorganism. Water by means of irrigation is applied immediately after transplanting. The majority farmers extract seeds from fruits collected from their own fields and raised plants in nurseries prepared with soil /compost mixture. Planting spacing is 2.5m between rows and 2 m tree to tree within a row. This rectangular planting pattern yields a population density of 2,225 trees per ha. This high-density planting is used because of the threat of the dieback disease affecting the groves. However, there are some farmers' use different spacing such as 2 x 2 m or even 2.5 x 3.6 m. Traditionally, the volume of the planting hole is usually 30cm x 30cm x 30cm. Compost and chemical fertilisers are applied in the hole. Water through irrigation is applied immediately after transplanting. Mostly flood irrigation is used. Farmers are not very happy with sprinklers because the height of the sprinklers causes the fruit bags to get wet and damage. Farmers prefer drip irrigation rather than sprinklers. They irrigate every 6-7 days during the dry period. After transplanting, fertiliser is applied 15 days later in a small trench on both sides of the plant that is covered with soil after it is applied. Generally, weeds are controlled with a bush cutter. Some farmers use weedicides such as glyphosate[11]. After transplanting, the tree is trained and one month after pruning begins when the top of the young tree is removed (topping). Afterwards, the tree is pruned four to five times to induce flowering. The budded plants are commonly used for guava cultivation. The different types of budding method used for guava include the propagation patch budding (commonly used), modified forkette budding, shield budding, and air layering planting. To address these critical concerns (e.g. waterlogged plants), the ISP will introduce a new and/or improved technology package that will cover practices from land preparation for a new plantation, use of drones for to guide land preparation and levelling, new planting patterns (e.g. to reduce water logging) and population densities, basic flood prevention and drainage techniques.
Water requirement	The main source of irrigation for the Ipologama Guava Cluster is Kala Wewa Reservoir. Farmers use both flood irrigation and in field earth channel irrigation

[11] Sri Lanka was the first country to issue a nationwide ban on glyphosate in 2014. However, the government decided to lift the ban due to crop losses and overgrowing weeds in 2018.

	methods in guava cultivation, but flood irrigation is most common. Farmers are not keen on traditional sprinkler irrigation because the sprinkler height causes the fruit bags to become wet and damaged. Consequently, farmers prefer drip rather than sprinkler irrigation. Usually, farmers irrigate every 6 to 7 days during the dry period. Though flood irrigation is popular among guava farmers, it is associated with many issues due to the poor drainage of the local soils. At present die back is the most destructive disease for guava in Ipologama and linked to the use of the excessive water use due often caused by flood irrigation. From the farmers' experience, daily net water requirements for guava are about 12 m^3 per ha. The proposed use of micro sprinkler system will improve the water use efficiency (normally 75%) as compared to the current commonly use surface systems with lower water use efficiency (up to 50%). It is proposed to use raised beds, so helping preventing waterlogging of the guava plants. They will help overcome the poor drainage of the high clay in soils and the associated disease and other problems cause by excess water for guava cultivation in Ipologama area. Normally, guava is a rainfed crop with supplementary irrigation whenever required, so the demand for irrigation water is periodic (in the drier seasons) rather than constant as for paddy. However, project will construct 13 new agro wells and improve 2 existing agro wells to ensure the water accessibility to the farmers. Introduction of water conserving and low pressure drip and mini sprinkler irrigation systems powered by solar panels is one aim of the project to support guava farming.
Use of fertiliser and pesticides and weedicides	Fertiliser is applied 15 days after transplanting in a small trench on both sides of the plant that is covered with soil after the fertiliser is applied. Generally, weeds are controlled with a bush cutter. Some farmers use weedicides such as Round up. After transplanting, the tree is trained and 1 month after pruning begins when the top of the young tree is removed (topping). Afterwards, the tree is pruned 4 to 5 times to induce flowering. The most common insect pests are white fly and fruit fly. They spray insecticide using knapsack sprayers. Large scale farmers use power sprayers with long hoses. Fungicides and borax are sprayed before bagging. In addition, applications of different types of foliar fertilisers are also a common practice. Urea is used as the nitrogen source, Rock Phosphate and Triple Super Phosphate are used as the phosphate source and Muriate of Potash is the Potassium source. To control pest and diseases, there are several crop management methods apart from pesticide application. They are: Covering the guava fruit at early stage • Use improved varieties of guava resistance to pest and diseases • Select healthy budded plants from DOA certified nursery • Keep the hygienic condition of the land • Weed controlling • Use of organic manure before planting • High amount of nitrogen fertiliser (urea) may increase the susceptibility to pests. Therefore, excessive use of nitrogen fertiliser must be avoided • Use of sprinkler irrigation methods Major insect pests of guava that can cause considerable economic damage include the bark-eating caterpillar (*Indarbela spp*.), fruit flies (*Bactrocera spp*.), mealybug (*Ferrisia virgata*), scale insect (Chloropulvinaria psidii), fruit borer

	(Deudorix isocrates), whitefly (*Aleurodicus dispersus*), mosquito bug (*Helopeltis antonii*) and stem borer (*Aristobia testudo*)[12] IPM is encouraged to control the pest and diseases in the crop management as per the pest management plan (PMP) prepared for ASMP and for both pest and diseases the recommended pesticides and the fungicides are applied by the framers. Proposed IPM technologies in table 6 should be implemented during the project. These agrochemicals are recommended by the Pesticides Register of DOA and PMP as well.
Harvesting	The phenology of the tree is as follows: from flower induction pruning, it takes 4 months to flowering, 2 months to bagging and 1 to 1.5 months to harvest. Therefore, the farmers can do approximately two harvests per year. After flower induction pruning, 2 branches form and the leave 1 fruit per branch. From seedlings transplant to harvest, it takes about 1 year. In layering it takes 6 months. The best yield is obtained in the second or third year. After 3 years, the trees begin to die from the die back disease. The best quality such as smooth appearance and colour of fruit is obtained in 6 to 7 years. Fruits are bagged made by used newspapers at a relatively small size. Harvesting for the local market is done only when the bag expands. At the harvesting stage, the fruit is hard green. Usually, harvesting is done using crates or sacks. Prices in Dambulla range between Rs. 50.00 – 70.00 per kg. However, in Colombo, the price range is Rs. 90.00 - 100.00 per kg
Post-harvest storage and transportation	This guava is mainly used as the fresh fruit and maintain of freshness is important. Therefore, the harvest should be transported to the market within 6 hours after harvesting. Grading and packing of the fruit is an essential part during the post-harvest period as it helps to cut down the losses and increase the fruit high quality and value. Therefore grading, packing, and transporting should be undertaken with improved technology. These technology facilities will be available for farmers

Figure 4: Existing Selecting and storing practices

6.3 OTHER FACTORS

Solid waste	The solid organic waste is generated as crop residuals and at post-harvest period and all are biodegradable. However, compost production unit (See annexure 5: Compost plant proposal) will be implemented to produce compost using solid waste generated from Post harvesting processing centre and these organic

[12] Baradevanal, Gundappa and Rajkumar, M. and Singh, Shivshankar and Rajan, Shailendra. (2018). Pests of Guava. 10.1007/978-981-10-8687-8_15.

	fertilisers will be used at land preparation stage. Major solid waste generation from Guava is bags. For which proper collection, segregation, reuse and safe disposal mechanism should be placed. Screening report and relevant EMP and SMP reports of Post harvesting processing centre will be developed separately
Wastewater	Surface run off will carry the fertilisers and applicable chemicals (pesticides, weedicides etc.) and impact is higher due to flood irrigation system. This will minimise by introducing water conservation techniques. Further, due to application of IPM mechanism, soil and ground/surface water pollution will be minimalised. ASMP will conduct the awareness creation and training programmes for both farmers as well as the officers regarding the IPM as per the PMP. Refer table 6 for application of IPM during cluster development

Table 6: IPM Technologies use for guava cultivations in Ipalogama

Stages	IPM practices	Impacts of implementation	Benefit for farmers
Land clearing	• Removal of all shrubs and bushes. Shading branches of big trees near the field are removed	• Destroying of all alternative host plants of pest and diseases	• Future risk of pest damage is minimised
	• Assessment of drainage patterns • Macro level study of the drainage pattern of the guava area to identify poorly drained farms affected by Fusarium Wilt and to determine the slope patterns to quickly evacuate water using on-farm micro drainage technology	• Fusarium wilt is decimating guava trees in Ipalogama • This disease flourish in poorly drained areas	• Fusarium free fields are assured
Land preparation	• Doing first ploughing with disc or mould board ploughs	• Soil aeration improved • Different stages of pest cycles are destroyed • Harmful bacteria and microorganisms are destroyed and minimise due to aeration is improved • Harmful pathogens are destroyed also due to exposing soils to sunlight • Minimum risk of Fusarium disease	• Future pest and disease incidences and damages are minimised • Cost of pest control reduced • Environmental pollution will be minimised
	• Doing second deep ploughing with disc or mould board ploughs perpendicular to the first ploughing		
	• Disking or harrowing; each pass being perpendicular to the previous one		
	• Adding Compost and mixing with soil	• Increase beneficial macro and microorganism in the soil and decrease pathogenic microorganism • Improvement of soil structure	
Nursery and planting	• Variety to be selected. Existing Apple Variety will be continued until introduction of a new imported variety with white pericarps.	• New variety/varieties will be introduced as the existing genetic materials are now deteriorated.	• Possibility of yield and quality improvement of the produce to suit the export market.
	• Planting materials will be purchased from well recognised nurseryman.	• Only Pest and diseases free high yielding planting materials are assured • Quality high yield is assured.	• High income is assured.
	• Seedlings of same height and growth are planted in separate rows	• Easy to manage agronomic practices. Uniform plantation is assured	• A healthy plantation is assured
Sapling	• Daily attention to all saplings is assured	• Early identification of pest and diseases incidents	• A healthy plantation is assured. Cost reduced
	• weakened plants are replaced by new saplings	• Even plantation is assured	
	• No water stress is allowed	• Vigorous growth and Even plantation is assured	

Stages	IPM practices	Impacts of implementation	Benefit for farmers
	• Only correct dose of nutritionally balanced fertilisers will be applied	• No unwanted canopy development and vigorous growth is assured	
Juvenile, flowering and maturity	• Daily attention on very seedlings is assured. This procedure is followed in every growth stage of the crop cycle	• Unnecessary chemical spraying is not needed	• A healthy plantation is assured. Cost reduced
	• Field sanitation is assured by managing garbage and debris in the field		
	• Suspicious plants are marked and will be monitored for pest and diseases progressiveness. Chemical treatment will be followed if identified only as economically harmful pest or a disease.		
	• Heavily infected plants are uprooted and immediately destroyed if necessary		
	• Intercropping	• Specific attention for weed control is not necessary. Rest of growing alternative host for pest and diseases will be prevented	• Cost Reduction. Additional income
	• Automated low pressure Micro irrigation System	• Volume of water need for the effective root zone is assured • Percolation of irrigated water towards the ground water is minimised • No Excess water retention around the root zone • Helped for a vigorous plant growth	• Easy to handle, cost reduced. Less harm to the environment
	• Fertigation with fertilisers • Formulation of fertiliser regimes based on complete soil tests and foliar analyses • It will be continued flowering and maturity stages too	• Correct dose of nutrient to the plant is assured • It minimised adding of excess fertilises to the environment • Vigorous plant growth is assured • Less risk of pest and disease infestation	• A healthy plantation is assured. Maximum yield will be assured Easy to handle
	• Pest population and pest damage assessment surveys to evaluate pest and disease intensity/quantity factors for damage prevention and to determine pest population threshold status for rational application of pesticides	• IPM practices are combined with mod*ern spray techniques when necessary i.e. ultra-low volume spray using drones if needed • Pesticide application through irrigation system if needed	• Healthy crop is assured

Stages	IPM practices	Impacts of implementation	Benefit for farmers
	• Fruit covering will be taken place. Every week a different coloured bag is applied to fruit that has already set and has developed a small size as a whole fruit	• Prevent from fruit fly attack, so that the fruit remains unblemished has a good appearance • Age of fruit can be easily identified	• Assurance of quality of the product
• Harvesting	• Guava fruits for harvesting are chosen based on age (bag colour) and by visual signs of maturity mostly colour change from green to yellow.	• Bagging increases the efficiency of the harvesting task by reducing the labour required • Guava pickers go directly to fruit bagged with the colour to be harvested on a given day. Fruit wastage will be minimised.	• Increase labour use efficiency.
• Transport	• The harvested fruit is placed carefully into 20-kg plastic trays lined with foam. The colour bags that were on the fruit are also placed in the crate to allow for inventory management at the packing centre	• Protects the guava fruit from damage during transport to packing centre • Least risk of pest and disease infestation	• Expected quantity of produce is assured. Reasonable price is assured.

7. PUBLIC CONSULTATION

Consultation was held with the private sector involved in input supplies, marketing and transportation of agricultural products. Most importantly, attention has been paid on the existing threat of the dieback disease affecting the groves and their role and functions in irrigation management and decision making. Community consultations were conducted by ISP-ASMP. Following concerns were arisen during the discussions held with farmers in the selected area. (See annexure 6: Outcomes of community mapping).

- Die back disease

Farmers claim that the existing crops have an unknown disease and it was confirmed during the onsite visit conducted at the farmlands. At the initial stage young leaves start yellowing and wilting and with the time whole plant affected. It happens both in the rainy and dry seasons, but it spreads more in the rainy season. Both young and old trees are attacked by this disease. The major phyto-sanitary problem and major threat to the industry is the guava die back disease. At present die back is the most destructive disease for guava plants in Ipologama. This is a major threat to guava cultivation in this area. Excess water use due to flood irrigation could be considered as the main reason for this problem and technological solutions will be provided during the project implementation.

- How to obtain continues technical knowhow throughout the cultivation cycle to take products up to suitable quality for export market.

Concerns were raised by farmers that the yield of existing crop is low, size and the shape of the product is low. Hence, whether is it acceptable for the future forecast of the project? However, it was found that this is mainly due to the poor agronomic practices adopted by farmers. Low adoptability of new technologies, low productivity of lands, labour and other inputs, Poor crop management practices and poor sanitation, Fertiliser application is not practice by based on soil and foliar analyses were identified as common reason for above concern and the technology package and other management practices will be introduced to the selected group to overcome the concerns.

- Hygienic conditions that should be maintained during harvesting as well as post harvesting periods.

Caring for harvesting crates, best harvest time, harvest maturity index by age and calliper, discarding poor quality fruit and other waste organic materials in the field to leave as organic fertiliser, avoiding mechanical scarring and bruising quality defects, selecting the best product for packing, cleaning the selected product, properly storing the harvested product before delivery to the packing facility were highlighted during discussions and practical training awareness on basic harvest and post-harvest practices are highly needed.

- Implementation of field fruit caring practices to protect the guava from damage.

Bagging of guava fruit is not a new practice and attention was given to discuss training and pruning, de-budding, destroying ripe fruits fallen on ground and propping activities. Unavailability of packing materials was highlighted while some farmers use bags prepared from recycle polythene.

- Issues bound with flood irrigation system

Excessive flood irrigation creates many problems such as waterlogged conditions, poor crop performances, high disease incidence and waste of water, high soil erosion due to prolonged flood irrigation were identified under water conservation and management discussions. Bringing water to inaccessible lands was a prioritised question raised from farmers and introduction of water conserving and low pressure drip and mini sprinkler system was highlighted during the discussion. However, technical knowledge on implementation and continuity of mini sprinkler system needed to be given.

Figure 5: Existing flood irrigation system

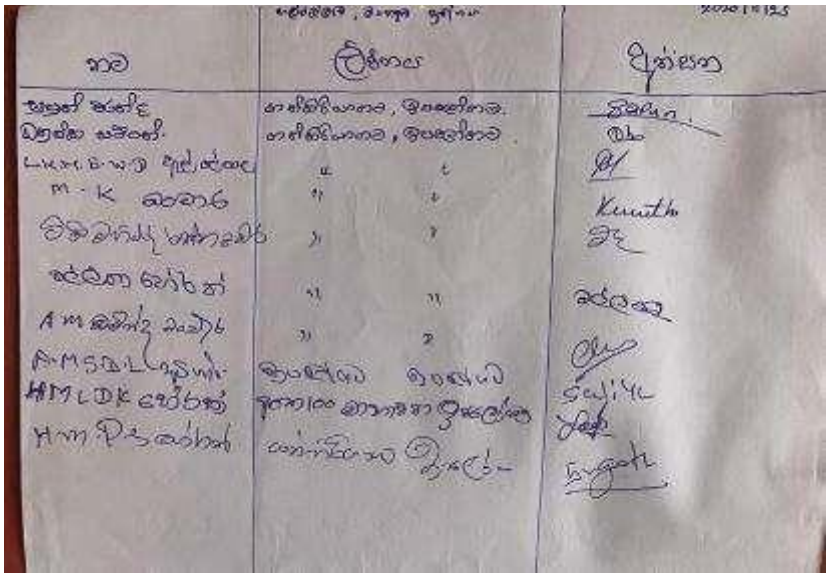
- Failure on export market

One of the main objectives of the project is export market-based production and doubt was highlighted that what will happen if export market is failed? Are there any options available in the local market for the excessive production?

- Infrastructure development

Some of farmers looking to bring water to lands which are not flooded by existing irrigation system. Hence, water and drainage work required to bring water to farms and to avoid flooding and water logging. Further, Improvement of access roads and especially post-harvest processing and packing centre are highlighted during the discussions.

Figure 6: Attendance sheets of public consultation



Further, there were points highlighted during the discussions such as use of weedicide, poor and inefficient land utilisation pattern, attention for micronutrient fertilisers and knowledge of farmers for IPM mechanism for better crop production.

The majority of the community is willing to support the project activities as they will benefit from the proposed sub project directly. Extensive social screening has been covered under the Social Safeguard component.

Figure 7: Community mapping activities

- Existing environmental issues

Some farmers were raised their existing issues related to the agricultural activities during the public consultation such as crop losses due to wild animals and onsite waste management issues. It was highlighted that most of the damages are caused by monkeys and wild elephants. Use of chemicals including fertilisers is highly applicable during the guava cultivations and leftovers are dumped on the same land and it causes environmental contamination.

Water contamination of leftovers (empty chemical bottles, polyethene, pipes) considered as the main issue and some of onsite observations are shown in figure 8. Further, existing crops have an unknown disease and it was confirmed during the onsite visit conducted at the farmlands. This was highlighted as discouraging point of the existing farmers.

Figure 8: Existing environmental issues

8. ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

Table 7: Screening for Potential Environmental Impacts

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
1	Will construction and operation of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.?)	√		Low-moderate	• Existing land preparation and flood irrigation system will be changed. Land preparation techniques will focus on reducing the effects of flood irrigation. No significant disturbances for any existing land use, or water bodies and no negative impact causes are anticipated
2	Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	√		Moderate	• Pesticides, weedicides, fertilisers and some additional chemicals will be used and there is a possibility to have chronic impacts due to the long-term usage. However, proposed techniques will reduce the amount of chemicals and fertilisers use and modern techniques/methods will be introduced to increase the productivity by other means • In terms of public infrastructure development, handling, storage, transportation and use of substances which will be harmful for human health such as cement
3	Will the Project produce solid wastes during construction or operation?	√		Moderate - High	• During its operation, solid organic waste will be produced as crop residue that can be used for the compost production unit. Fruit covering bags will be a main sources of solid waste for which EMP measures should be applied. • However, development of infrastructure will create solid waste during clearing and grubbing, construction, etc which need to handle with care, but quantum would be small • During the agro well construction, considerable volume of excavated material will be generated. The excavated materials can be reused for mixing with compost during land preparation and embankment construction of rural roads. However, precautions are given in EMP.
4	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	√		Moderate	• Implementation of proposed IPM practices will reduce the use of chemical fertilisers for cultivation of Guava • Pesticides, weedicides will be used and released to the air. Possibility to have significant impacts to other flora and fauna • Further, infrastructure development activities will also create emission of dust during clearing and grubbing, construction, etc which need to be mitigated by good engineering practices. However, since small scale

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
					infrastructure development, no significant pollution is expected during construction
5	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	√		Low	• Land preparation, transportation and Construction of collecting centre may create noise and vibration impacts and it can be mitigated through proper implementation of EMP • Similar noise and vibration will create during proposed infrastructure development which will also be mitigated by adhering to EMP
6	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater or coastal wasters?	√		Moderate	• All chemicals used to include pesticides and weedicides during cultivation may contaminate land or water. In addition, pollutants during infrastructure development will have an impact on surface and ground water in surrounding areas if not properly managed
7	Will the project cause localised flooding and poor drainage during construction? Is the project area located in a flooding location?		√		• Flooding locations were not identified during the visit and the project will not cause localised flooding
8	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?	√		Low	• No medium and large-scale infrastructure development envisaged and hence, no severe health and safety hazard identified. Better hazard identification and prevention and corrective measures during construction will eliminate the risk associate
9	Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?	√		Low	• Guava transportation from cultivated lands to collection centre and transportation from collection centre to shipments/or any other location will be taken place. No creation of significant environmental problems • However, improvements to existing road network will create some form of traffic during construction which can be reduced or prevented by adhering to proper traffic management plan during construction
10	Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?		√		• No recreational or other facilities will be disturbed

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
11	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?		√		• There are no areas or features with high landscape or scenic value on or around the location
12	Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests which could be affected by the project?		√		• Important or sensitive areas were not found except surrounded home gardens.
13	Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, migration, which could be affected by the project?		√		• No protected areas or sensitive areas identified within the cluster area
14	Is the project located in a previously undeveloped area where there will be loss of green field land		√		• No new lands will be used for cultivation and only existing guava farmers will be engaged. Infrastructure development will not be undertaken newly and only improvements to the existing structures will be undertaken
15	Will the project cause the removal of trees in the locality?		√		• Removal of trees is not required
16	Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?		√		• No features of historic importance have been identified within the study area
17	Are there existing land uses on or around the location e.g. home gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry,	√		Low	• Farmlands and the construction/rehabilitation activities are scattered selected GN divisions. However, there are home gardens, private properties, and agriculture areas which will have an impact due to proposed project activities.

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
	tourism, mining or quarrying which could be affected by the project?				
18	Are there any areas on or around the location which are densely populated or built up, which could be affected by the project?		√		• Densely populated or built up areas will not be affected by the project
19	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project	√		Low	• Sensitive land uses in or around the project site will not be negatively affected by the project. There will be improvements on Road network and canals which positively affected to the livelihood of selected areas
20	Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?		√		• Existing agricultural practices will be improved by the sub project activities and no negative impacts are anticipated
21	Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?		√		• There are no areas around the location where legal environmental standards have been exceeded or has been environmentally polluted

Table 8: Contractor's responsibility for mitigating adverse environmental issues raised during agricultural activities

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
1	Public complaints and lack of community support for the project implementation	Information Disclosure among Stakeholders Community Outreach activities including training Institutional development based on farmer organisations	• Strengthen institutional development component and proper awareness and community leadership • Discussions should be conducted with the beneficiary farmers including women, and youth • The beneficiary farmers selection based on the criteria which were developed at stakeholders meeting and identifying of beneficiary farmers were undertaken transparently • Residents in the area will be briefed of the project, purpose and design and outcomes with comprehensive discussion • Communication and training activities focusing women, youth and farmers who are poor in communication • The farmers should take note of all impacts, especially temporary issues and safety hazards that will be of concern to the cropping pattern of the farmers. All possible impacts will be mitigated as stipulated in the EMP to mitigate them • The ISP/ASMP will maintain a log of any grievances/complains and actions taken to resolve them • A copy of the EMP should be available at all times at the project supervision office on site
2	Lack of knowledge on basic harvest and post-harvest practices lead to low quality of product and high amount of waste	Introduction of bagging Use of harvesting crates Mechanical scarring and bruising quality defects Cleaning the selected product Storing the harvested product before delivery to the packing facility Selecting the best product for packing Discarding poor quality fruit and other waste organic materials in the field	• Maintain good hygiene and good housekeeping • Practical training for the selected farmers on basic harvest and post-harvest practices to protect the quality of the product and to assure the packing facility receives only clean and viable product • Harvest maturity index by age and calliper • Use of Discarded poor quality fruit and other waste organic materials in the field to leave as organic fertiliser or use for compost production • Avoiding mechanical scarring and bruising quality defects • Provide packaging materials and storage facilities • Establishment of temporary packing facilities

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
3	Activities related to installation of mini sprinkler irrigation systems	Installation of mini sprinklers systems Fixing water pumps and electricity supply Plumbing works	• Carry out installation works during off cultivation seasons • Solid waste generation during installation should be minimised and disposed generated waste with care • Potential damages to pipe system should be minimised by burying or covering the pipe distribution
4	Exposing and damaging of physical cultural resources (PCR)	Site preparatory work	• Upon discovery of physical cultural material during project implementation work, the following should be carried out: ✓ Immediately stop construction activities ✓ With the approval of the resident engineer delineate the discovered site area ✓ Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over ✓ Through the Resident engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours ✓ Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented ✓ Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out ✓ An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days ✓ Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed
5	Spreading of Invasive Alien Species	Vegetation clearing Cultivation of Guava	• Provide DOA certified guava variety only to farmers • Good housekeeping • Manual and integrated weed control

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• Prevent weed spreading via organic manure (Compost) by periodic inspection and manual removal after application
6	Contamination of water, land and air during usage of chemicals (pesticides, weedicides.)	Land preparation Vegetation clearing Use of fertilisers Use of chemicals for specific requirements	• Adherence to IPM standards of the WB, IPM action plan of ASMP and standards • Introduce technological methods to reduce dosage amounts • Awareness on usage time, handling and storage • Guidance on suitable time for the usage of chemicals • Promote organic fertilisers • Formulation of fertiliser regimes based on complete soil tests and foliar analysis
7	Impaired water quality	Cultivation of Guava	• Excess water extraction is to be cut down to preserve ground water table • Proper introduction of mini-sprinkler irrigation practices instead of flood irrigation to preserve water and use of modern techniques as discussed in the CDP for reduce water consumption
8	Solid Waste Disposal	Discarding poor quality fruits organic materials in the field (Bunch clearing, d, de-handing, de-leafing, debudding, bagging, propping and guying) Waste from weed control activities Covering bags	• Burnt to maintain the farmlands' hygienic condition • Use postharvest waste for compost production • Implement waste minimisation as proposed in pilot activity of minimisation of waste generation, income generation and empowerment • Make a safe disposal system for polythene bags in consultation with Pradeshiya Sabha. Reuse and recycling should be encouraged as much as possible. Until safe disposal, proper segregation and collection should be done by the farmers
9	Spread of crop related diseases among other flora species	Throughout the cultivation period	• Use of drone technology to conduct disease surveys using infra-red photography • Provide technical guidance on application of chemicals including dosage, suitable time and frequency • Use of chemicals using drone technology • Pest and disease control based on IPM practices and modern spray techniques • Pest population and pest damage surveys to assess pest threshold status for application of pesticides
10	Health hazard	Use of agrochemicals (fertilisers, pesticides, weedicides etc.) Snake Bites	• Carry out proper hazardous identification and risk assessment of all proposed activities including snake bites related hazards • Training and awareness on safe chemical handling • Use drone technology to spray chemicals

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• Implement proper health and safety protocols by elimination, substitution, engineering controls, administrative control and provide personal protection equipment (PPEs). Provided necessary PPEs (basic should include gloves, goggles, masks and protective clothing) • Availability of first-aid facilities • A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored • Pest and disease control according to the international standard including IPM frame work of the world bank and pest management action plan prepared by ASMP • Formulation of fertiliser regimes based on complete soil tests and foliar analysis • Pest population and pest damage surveys to assess pest threshold status for application of pesticides

Table 9: Environmental management plan for Agro well construction/improvement activities

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
1	Public complaints and lack of community support for the project implementation	Information Disclosure among Stakeholders	• Discussions should be conducted with the users of the tank. • Residents in the area have to be briefed of the project, purpose and design and outcomes via a documented community consultation session ***-This should be done immediately once the contractor is mobilised.*** • The contractor should take note of all impacts, especially access issues and safety hazards that will be of concern to the residents and take necessary measures as stipulated in the EMP to mitigate them. • The contractor will maintain a log of any grievances/complains and actions taken to resolve them. • A copy of the EMP should be available at all times at the project supervision office on site
2	Exposing and damaging of physical cultural resources	▪ Site preparatory work	Upon discovery of physical cultural material during project implementation work, the following should be carried out: • Immediately stop construction activities

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• With the approval of the resident engineer delineate the discovered site area • Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over • Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours • Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented • Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out • An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days. • Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.
3	Air Pollution including dust generation that can affect nearby vegetation and households	▪ Setting up of material storage yards, and removal of vegetation ▪ Transport of construction material and storage on site ▪ Desilting	• In the construction method statement, the contractor should clearly designate areas for maintaining excavated material stockpiles, Rubbles stockpiles, and Sand. These dust emitting sources should be located away from human activity and natural drainage paths as much as possible. • All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. • Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. • Vehicles transporting soil, sand and other construction materials shall be covered. Limitations to speeds of such vehicles necessary. Transport through densely populated area should be avoided. • Regular and proper maintenance of construction vehicles and machinery to avoid air emissions. • There should be no burning of wastes on site. • Until removal to arranged disposal sites, waste from demolition shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic, local residents.
4	High Noise and Vibration levels that can affect nearby structures and wildlife	▪ Operation of equipment and machinery ▪ Material storage and transport	• Working time for noise/vibration generation activities such as excavation should be restricted and carried out only from 6.00 am to 6.00 pm. • All equipment and machinery should be operated of noise not to exceed 75 dB (during construction) as practical as possible. Regularly maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12). If the construction activities happen during the night time, it is necessary to maintain the noise level at below 50 db. • Construction equipment and machinery should be maintained in good condition. Contractor shall submit the list of high noise/vibration generating machinery and equipment to the project for approval
5	Blocking of surface drainage paths leading to localised flooding and ponding of water	▪ Site Preparation including provision of access roads, material/waste piles ▪ Desilting	• Until transported out to arranged disposal sites, debris and waste from site preparation work and desilting shall be stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic and local residents. The contractor shall identify areas for stockpiling material and waste such as excavated materials. • The stockpiles should be suitably covered to minimise wash-offs to nearby waterways. • If impacts to surface drainage cannot be avoided leading to ponding of rain water and inconvenience to people, the contractor

	Potential Environmental Impacts and Risk Level	**Key project activities causing the impact**	**Mitigation Measures proposed and action to be implemented by the Contractor**
			must provide an adequate surface drainage system to safely remove water from the site to canal to avoid on site ponding or flooding. • Proper planning to avoid construction during rainy season. • Preventing total blockage of streams/ providing alternative drainage path during construction
6	Damage to Flora and wildlife Specially impacts to elephants roaming in the area	▪ Vegetation clearing ▪ Excavation of Agro wells	Department of Wildlife and Forest Department consents and recommendations should be obtained and incorporated construction before start work. • Speed limits and operating times for the construction vehicles should be imposed. • Due consideration should be given to carefully clearing of vegetation avoiding destruction of habitats of fauna. • The desilted matter shall immediately be disposed of to pre-decided disposal sites. • The contractor will take reasonable precaution to prevent workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. • If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. • The Engineer will report to the nearby Forest Department /Department of Wild Life Conservation (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials. • It is recommended to do the project work day time only. • The contractor should ensure elephant access to water is not blocked during activities. • Excavated wells should be properly fenced and protected
7	Solid Waste Disposal	▪ Site clearing ▪ Excavation of Wells	• The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type. • Excavated materials should be properly stockpiled at site

	Potential Environmental Impacts and Risk Level	**Key project activities causing the impact**	**Mitigation Measures proposed and action to be implemented by the Contractor**
			• Excavated materials should be reused as much as possible for mixing with compost and embankment construction of rural roads • Disposal of unsuitable excavated materials should be done with consultation of LAs • Any hazardous type of waste shall be dealt with special care and instructions from the LA. • The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations. • The contractor shall remove waste from the site each day and dispose of the waste in the LA approved site/s
8	Public/occupational safety hazard	▪ Site clearing, storage of equipment, material etc ▪ Noise and vibration of construction machinery	**Training** • The contractor must ensure that all workers, including managers are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** • All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets). • Gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary should be maintained in stock at the site office. • A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored. **Site Delineation and Warning Signs** • The entire construction site should be delineated using devices such as cones, lights, tubular markers, orange and white strips and barricades to inform oncoming vehicular traffic and pedestrians in the area about work zones. • Dangerous warning signs should be raised to inform public of particular dangers and to keep the public away from such hazards. • Overloading of vehicles with materials should be controlled • Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety.

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned, if they are easily identifiable and whether they are reflective. **Equipment safety** • Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems. **Emergency Procedures** • An emergency aid service must be in place in the work site. • During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site. **Construction camps** • Construction camps should have adequate sanitation facilities for construction workers to control transmission of infectious diseases. • Avoid housing workers in camps and provide socio-economic benefits locally by employing local people. If there is no alternative to employing workers from elsewhere, locate accommodation camps away from communities on land acquired from willing sellers. Provide labour camps with adequate sanitation, waste disposal and health facilities according to labour laws. Clear work camp sites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS. **Information management** • Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities.

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• Provide advance notice to local communities by way of information boards or leaflet, during village committees about the schedule of construction activities, interruption to services and access etc.
	Post construction phase		
9	Clearing/Closure of Construction Site		• Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. This includes burrow sites and storage yards as well • On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer
10	Environmental Enhancement/ Landscaping		• Landscape plantation, including turfing shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents • The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP

Table 10: Environmental management plan for Improvements of Rural Roads and Canal

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
1	Public complaints and lack of community support for the project implementation	Information Disclosure among Stakeholders	1. Discussions should be conducted with the project affected persons. 2. Residents in the area have to be briefed of the project, purpose and design and outcomes via a documented community consultation session -*This should be done immediately once the contractor is mobilised.* 3. The contractor should take note of all impacts, especially access issues and safety hazards that will be of concern to the residents and take necessary measures as stipulated in the EMP to mitigate them. 4. The contractor will maintain a log of any grievances/complains and actions taken to resolve them. 5. A copy of the EMP should be available at all times at the project supervision office on site.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
2	Exposing and damaging of physical cultural resources	Site preparatory work	Upon discovery of physical cultural material during project implementation work, the following should be carried out; 1. Immediately stop construction activities. 2. With the approval of the resident engineer delineate the discovered site area. 3. Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over. 4. Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours. 5. Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented. 6. Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. 7. An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days. 8. Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.
3	Spreading COVID 19 virus	▪ All activities	• take all necessary precautions to maintain the health and safety of all Staffs including labourers • The contractor must ensure that all workers, including managers, are well trained on COVID 19 safety precautions published by the health ministry. • appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents • ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics • Follow all necessary guidance stipulated under Interim Guidance on COVID-19 Version 1- April 2020 (see Annex 6)

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
4	Over extraction of natural resources	Material Sourcing	1. The contractor is required to ensure that sand, aggregates and other quarry material is sourced from licensed sources. The contractor is required to maintain the necessary licenses and environmental clearances for all burrow and quarry material they are sourcing –including soil, fine aggregate and coarse aggregate. 2. Sourcing of any material from protected areas and/or designated natural areas, including tank beds, are strictly prohibited. 3. If the contractor uses a non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed. 4. The contractor should submit in writing all the relevant numbers and relevant details of all pre-requisite licenses etc. and report of their status accordingly.
5	Impact on habitats of fauna and flora	Vehicle and machinery movements Site preparation including tree removal (if any)	1. The contractor shall make every effort to avoid removal and/or destruction of trees, including those of religious, cultural and aesthetic significance. 2. If such action is unavoidable, the Engineer shall be informed in advance to verify and report on the technical justification for the trees that will be required to be removed. • The following steps are to be followed if trees are identified for removal during the renovation. • Identify and document the number of trees that will be affected with girth size and species type. • Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department (LA). • Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area. • The contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority (CEA), if any with regard to felling of trees and removal of vegetation. • Removed trees of economic value must be handed over to the State Timber Corporation.
6	Air Pollution including dust generation that can affect nearby vegetation	Site Preparation activities, setting up of material storage yards, and removal of vegetation Transport of construction material and storage on site	1. In the construction method statement, the contractor should clearly designate areas for maintaining material stock piles, waste stock piles, labour camps and vehicle maintenance yards. These dust emitting sources should be located away from human activity and natural drainage paths as much as possible. 2. Stock piles should be suitably covered to minimise washing off. 3. The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			4. Transporting out debris to be carried out with minimal use of heavy transport vehicles and taking due care to avoid unwanted damages to existing structures. 5. Until removal to arranged disposal sites, waste shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to local traffic, local residents. 6. There should be no burning of wastes on site.
7	Noise Pollution & Vibration that can affect nearby structures	Operation of construction equipment and machinery. Material storage and transport.	1. Working time for noise/vibration generation activities should be restricted and carried out only from 6.00 am to 6.00 pm. 2. All equipment and machinery should be operated of noise not to exceed 75 dB (during construction) as practical as possible. Regularly maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12). 3. If the construction activities happen during the night time, it is necessary to maintain the noise level at below 50 dB. 4. Use of mechanically driven saw blades for tree felling will make the noise levels restrict to only a short period of time. 5. Construction equipment and machinery should be maintained in good condition. Contractor shall submit the list of high noise/vibration generating machinery & equipment to the PMU for approval. Material procurement should be carried out only from places where environmental clearance or environmental protection license is obtained.
8	Traffic Congestion and public inconvenience	Increased construction vehicle traffic causing congestion on Access Roads and impact on the transport.	1. Speed limits and operating times for the construction vehicles should be imposed. 2. Travel route for construction vehicles should be designed to avoid areas of congestion. 3. All roads and access sites must be restored to their original state as soon as possible 4. If project works occur after dark, a lighting system should be maintained such that vehicles and pedestrians can clearly see the construction area. 5. Public should informed properly on the inconvenience made during construction. 6. During construction, proper safety measures and barricade systems should be introduced for traffic management.
9	Siltation of adjoining canals	▪ Site Preparation including provision of	1. Until transported out to arranged disposal sites, debris and waste from site preparation work shall be stockpiled in a place with minimal interference with

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
	Blocking of surface drainage paths leading to localised flooding and ponding of water Siltation of adjacent canals/ drains	access roads, material/waste piles ▪ Embankment construction	local drainage paths and obstruction to traffic and local residents. The contractor shall identify areas for stockpiling material and waste. 2. Construct silt-traps where necessary to avoid siltation field canals along the roads 3. The stockpiles should be suitably covered to minimise wash-offs to nearby waterways/ drains. 4. If impacts to surface drainage cannot be avoided leading to ponding of rain water and inconvenience to people, the contractor must provide an adequate surface drainage system to safely remove water from the site to roadside drains to avoid on site ponding or flooding.
10	Solid Waste Disposal	Site clearing Construction debris Unsuitable soil	1. The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type. 2. Any hazardous type of waste shall be dealt with special care and instructions from the LA. 3. The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations. 4. The contractor shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
11	Public/occupational safety hazard	Site clearing, storage of equipment, material etc Increased traffic of heavy vehicles for material transportation Noise and vibration of construction machinery	**Training** 1. The contractor must ensure that all workers, including managers are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets). 3. In addition, the contractor shall maintained in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary. 4. A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored. **Site Delineation and Warning Signs** 5. The entire construction site should be delineated using devices such as cones, lights, tubular markers, orange and white strips and barricades to inform oncoming vehicular traffic and pedestrians in the area about work zones.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			6. Dangerous warning signs should be raised to inform public of particular dangers and to keep the public away from such hazards. 7. Overloading of vehicles with materials should be controlled 8. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety. 9. The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned, if they are easily identifiable and whether they are reflective. **Equipment safety** 10. Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems. **Emergency Procedures** 11. An emergency aid service must be in place in the work site. 12. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site. **Information management** 13. Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities. 14. Provide advance notice to local communities by way of information boards or leaflet about the schedule of construction activities, interruption to services and access etc.
12	Access restrictions and public inconvenience	Site Preparation activities Vehicle and machinery movements	1. Prior consultation and consent should be taken from relevant authorities and should conduct work with a minimum disturbance to public. 2. Provision of access during designated times of day or where possible provides temporary access paths for users/ staff within the premises.
	Post construction phase		
13	Clearing/Closure of Construction Site/Labour Camps		1. Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. This includes burrow sites and storage yards as well. 2. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.
14	Environmental Enhancement/ Landscaping		1. Landscape plantation, including turfing shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. 2. The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP.

Table 11: Environmental management plan for Construction of collection centre and Compost Yard

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
1	Public complaints and lack of community support for the project implementation	• Information Disclosure among Stakeholders • Community Outreach activities including training	• Discussions should be conducted with the beneficiary farmers including women, and youth • The beneficiary farmers selection based on the criteria which were developed at stakeholders meeting and identifying of beneficiary farmers were undertaken transparently • Residents in the area will be briefed on the project, purpose and design, and outcomes with a comprehensive discussion • Communication and training activities focusing on women, youth, and farmers who are poor in communication • The contractor should take note of all impacts, especially temporary issues and safety hazards that will be of concern to the cropping pattern of the farmers. All possible impacts will be mitigated as stipulated in the EMP to mitigate them • The contractor will maintain a log of any grievances/complaints and actions taken to resolve them • A copy of the EMP should be available at all times at the project supervision office on site
2	Spreading COVID 19 virus	• All activities	• take all necessary precautions to maintain the health and safety of all Staffs including labourers • The contractor must ensure that all workers, including managers, are well trained on COVID 19 safety precautions published by the health ministry.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents • ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics • Follow all necessary guidance stipulated under Interim Guidance on COVID-19 Version 1- April 2020 (see Annex 6)
3	Water Quality	• Spill out of fuels and lubricants from machinery	• Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets • Prioritize re-use of excess spoils and materials in the construction works. • Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; • Place storage areas for fuels and lubricants away from any drainage leading to water bodies; • Dispose of any wastes generated by construction activities in designated sites. • Irrigation works must be planned to be carried out during times of lowest flow
4	Spreading of Invasive Alien Species	• Vegetation clearing • Material transportation • Desilting	• Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done. • Vehicles should be covered during transportation of cleared vegetation to and from the construction site. • Borrow material to be brought from properly identified borrow pits and quarry sites, the sites should be inspected in order to ensure that no invasive plant species are being carried with the burrowing material. • Washing the vehicles should be conducted periodically to prevent carrying any invasive species • The construction site should be inspected periodically to ensure that no invasive species are establishing themselves at the site. • Good housekeeping
5	Noise Pollution & Vibration that can affect nearby structures	• Operation of equipment and machinery. • Material storage and transport	• Working time for noise/vibration generation activities should be restricted and carried out only from 6.00 am to 6.00 pm. • All equipment and machinery should be operated of noise not to exceed 75 dB (during construction) as practical as possible. Regularly maintenance of all construction vehicles and machinery to meet noise control regulations stipulated

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
		• Use of hammer type pile driving will generate high noise and vibration.	by the CEA in 1996 (Gazette Extra Ordinary, No 924/12). If the construction activities happen during the night-time, it is necessary to maintain the noise level at below 50 db. • Use of mechanically driven saw blades for tree felling will make the noise levels restricted to only a short period of time. • Construction equipment and machinery should be maintained in good condition. The contractor shall submit the list of high noise/vibration generating machinery & equipment to the PE for approval
6	Air Pollution including dust generation that can affect nearby vegetation and households	• Site Preparation activities setting up of material storage yards, and removal of vegetation • Transport of construction material and storage on site	• In the construction method statement, the contractor should clearly designate areas for maintaining material stockpiles, waste stockpiles, labor camps, and vehicle maintenance yards. These dust-emitting sources should be located away from human activity and natural drainage paths as much as possible. • All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. • Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. • The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. • Vehicles transporting soil, sand, and other construction materials shall be covered. Limitations to the speeds of such vehicles are necessary. Transport through densely populated areas should be avoided. • Regular and proper maintenance of construction vehicles and machinery to avoid air emissions. • There should be no burning of wastes on-site. • Until removal to arranged disposal sites, waste from demolition shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic, local residents.
7	Solid Waste Disposal	• Site clearing • Construction waste • Waste from labour resting areas	• The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type. • Any hazardous type of waste shall be dealt with special care and instructions from the LA. • The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• The contractor shall remove waste from the site each day and dispose of the waste in the LA-approved site/s.
8	Public/occupational safety hazard	• Site clearing, storage of equipment, material etc. • Increased traffic of heavy vehicles for material transportation • Noise and vibration of construction machinery	**Training** 1. The contractor must ensure that all workers, including managers, are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include a safety helmet, protective footwear, and high visibility jackets). 3. In addition, the contractor shall maintain in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness, and any other equipment considered necessary. 4. A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wearing and monitoring. **Site Delineation and Warning Signs** 5. The entire construction site should be delineated using devices such as cones, lights, tubular markers, orange and white stripes, and barricades to inform oncoming vehicular traffic and pedestrians in the area about work zones. 6. All digging and installation work items that are not accomplished should be isolated and warned of by signposts and flash lamps in the night-time. 7. Dangerous warning signs should be raised to inform the public of particular dangers and to keep the public away from such hazards. 8. Trenches should be progressively rehabilitated once work is completed. 9. Overloading of vehicles with materials should be controlled 10. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety. 11. The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned if they are easily identifiable, and whether they are reflective. **Equipment safety** 12. Work zone workers use tools, equipment, and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			be carried out to test the equipment before it is used so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts, and mechanical or electrical problems. **Emergency Procedures** 13. An emergency aid service must be in place on the worksite. 14. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site. **Construction camps** 15. Construction camps should have adequate sanitation facilities for construction workers to control the transmission of infectious diseases. 16. Avoid housing workers in camps and provide socio-economic benefits locally by employing local people. If there is no alternative to employing workers from elsewhere, locate accommodation camps away from communities on land acquired from willing sellers. Provide labour camps with adequate sanitation, waste disposal, and health facilities according to labour laws. Clear work campsites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS. **Information management** 17. Develop and establish the contractor's own procedure for receiving, documenting, and addressing complaints from the affected public and nearby communities. 18. Provide advance notice to local communities by way of information boards or leaflets about the schedule of construction activities, interruption to services and access, etc.
9	Mosquito breeding places and spreading vector borne diseases	• Temporary water ponding due to construction	• Water pocketing should be avoided specially during rainy season • Temporary pond should be filled as soon as possible • Construction equipment and tanks should be emptied immediate after the construction concluded for the day
Post construction phase			

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
10	Solid waste	Operational stage crops related waste, general household waste & machinery parts.	• Any hazardous type of waste shall be dealt with special care and instructions from the LA. • The farmer societies shall document all types and quantities of waste generated and removed from the site and the disposal locations. • The farmer societies shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
11	Environmental Enhancement/ Landscaping		• Landscape plantation, including turfing shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. • The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP
12	Greenhouse gas emission	Use of electricity during processing activities (Electricity usage for machineries)	• The farmer society shall use eco-friendly practices • The farmer society shall get recommendation for the efficient machineries by experts • Conservation practices for electricity should be followed options such as use of Solar power
13	Contamination of Soil and Water Resources due to discharge of wastewater	Discharges of wastewater	• Wastewater generate should not be discharged to outside site • Primary trapping and treatment methods can be followed

9. COST OF MITIGATION

Table 12: Means and cost of mitigation

№	Environmental mitigation measure	Cost (LKR)	Remarks
1	Information Boards, leaflets	250,000	Awareness leaflets for organic cultivation practices and IPM
2	On site first aid facilities	50,000	N / A
3	Safety equipment including COVID-19 precautions	250,000	PPEs should be provided
4	Dust suppression	50,000	Need to be done during road and canal renovation activities
5	Waste removal from site	50,000	Waste from vegetation clearing, site preparation, labour camps
6	Training of Farmers and Village level stakeholders on IPM and new technological applications	250,000	Should be scheduled to a few sessions

10. CONCLUSION AND SCREENING DECISION

Assumes all mitigation measures are implemented as proposed, the following effects can be predicted

Table 13: Summary of environmental effects

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
DURING AGRICULTURAL ACTIVITIES		
• Land preparation • Fencing (if applicable) • Land preparation • Drainage Labour • Raised Beds • Preparation of pits and planting • Planting materials	• No significant negative impacts since new lands are not used for the cultivation activities. Water accessibility will be improved	SP
• Introduction of basic flood prevention and drainage field techniques • Site levelling using drone surveying and laser levelling machinery • Quick water evacuation ditches • Surface drainage techniques (removal of wet spots)	• Less water consumption, less soil erosion	SP
• Use of fertilisers and chemicals • Mechanical Weeding • Insect Control • Sigatoka Fungus Control • Nematode Control • Other Spray	• Land, water an air contamination	NS
• Product transportation and storage	• No significant impacts	NS
• Introduction of drone technology • Geo-positioning • Land surveys for site selection • Levelling for land preparation and drainage • Disease surveys using infra-red photography • Application of pesticides	• Less agro-chemical contamination on Land, water, and air	SP

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
• New and improved quality enhancing technologies • Introduction of coloured plastic ribbons to fix the age of the fruit • Bunch clearing, de-flowering, de-handing, de-leafing, debudding, bagging, propping and guying • Fish line de-handing, de-latexing in the field, disposal of organic waste in the plantation, prolonging the usefulness of the mother plant • Field heat removal • Line packing technology Cold-chain management	• Solid waste generation	SN
• Introduction of water conserving and low-pressure drip and mini sprinkler irrigation systems • Computer controlled heads for water application scheduling supported by fertility sensors, soil moisture sensors and irrigation friendly double row planting • Precision fertigation with liquid organic compounds • Precision application of liquid pesticides • Anti-clogging flushing components	• No such harm, less use of water and Less contamination of agro-chemicals on Land, air and water	SP
CONSTRUCTION OF AGRO WELLS		
• Material transportation and storage	• Emission of dust, generation of noise and disturbance to community including farmers, households	NS
• Vegetation clearing	• Clearing of vegetation will collect significant amount of waste which will lead to several environmental issues such as blockage of drainage, siltation of downstream, damage to habitats, spreading of invasive species etc	NS
• Disposal of desilted material	• Siltation of waterways and low-lying areas, blocking of natural drainage paths, soil contamination	NS
INFRASTRUCTURE ACTIVITIES (RENOVATION OF ROADS AND COLLECTION CENTRE)		

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
• Vegetation clearing	• Clearing of vegetation will collect significant amount of waste which will lead to several environmental issues such as blockage of drainage, siltation of downstream, damage to habitats, spreading of invasive species etc	NS
• Material transportation and storage	• Emission of dust, generation of noise, disturbance to natural drainage, traffic congestion, public inconvenience	NS
• Embankment Construction	• Emission of dust, generation of noise and vibration, disturbances/blockage of natural drainage paths, public inconvenience	NS
• Disposal of waste	• Pollution of waterways, blockage of drainage, siltation of downstream and damage to habitats	NS
• Wastewater	• The proposed agricultural activities will be undertaken using only organic fertiliser and IPM practices. Therefore, application of chemical fertiliser, pesticides and insecticides will be minimised. Hence the soil and ground/surface water will not be polluted	NS

Key to table

- NS - Effect not significant, or can be rendered insignificant with mitigation
- SP - Significant positive effect
- SN - Significant negative effect
- U - Outcome unknown or cannot be predicted, even with mitigation

10. EMP IMPLEMENTATION RESPONSIBILITIES AND COSTS

The overall responsibility of ensuring compliance with safeguard requirements lie with the ISP team and supervised by the PMU while the contractor will be responsible for implementing the provisions of the EMP. In addition, the ISP will be directly responsible for reviewing the proposed design to ensure that all design related mitigation measures mentioned herein are implemented with the support and supervision of the PMU. The overall supervision will be carried out by the in-house staff of the PMU supported by the Provincial Deputy Project Director who is responsible for the overall supervision of the proposed project. Any consequent design modification will be reflected in the project cost.

Environmental monitoring will be carried out largely through visual observations and compliance monitoring using the checklist provided in the World Bank's Environmental Management Framework (EMF) by the Environmental and Social Safeguards Specialist of ISP and Provincial Deputy Project Director's Office of the PMU and the contractor jointly. The Environmental and Social Safeguards Specialist of ISP will need to visit the site on a monthly or quarterly and report on issues and performance on EMP implementation to the PMU. The Cost of Environmental compliance monitoring would be borne by the ISP project implementation cost.

11. SCREENING DECISION RECOMMENDATION

In general, the proposed initiatives will have a significant positive impact on rural agriculture communities by enhancing their economic conditions and prosperity while it has an influence on national economy at the national level.

Majority of the potential adverse effects can be classified as general agricultural activities and construction related impacts and which can be mitigated on site with proper engineering interventions as all activities proposed are minor scale of infrastructures limited to very small span of area. These potential constructional impacts are temporary in nature. Implementation of the EMPs proposed are sufficient to mitigate the identified impacts. These proposed EMPs for each distinctive activities should be accompanied with civil contracts which enforces contractors to adhere. Proposed Waste minimisation, Income Generation and Empowerment pilot project can be implemented here. However, it should be noted that establishment of Postharvest Processing Centre related activities are excluded from this report and those project activities will be separately investigated and reported (refer Annexure 6). In addition, following recommendations are proposed based on the activities:

Agriculture activities: Proper implementation of Integrated Pest Management practices proposed above should be highly encouraged and use of chemical fertilizers should be avoided. Establishment of any ground water wells (deep wells or agro wells) should have prior consent from Water Resources Board yield test obtained with recommendation for suitable locations by them. Water conservation practices such as proposed micro sprinkling should be encouraged and farmers should be educated on the benefits of the same. Reuse/recycling of fruit bags is recommended up to maximum possible. Failing with, proper segregation, collection and disposal of waste through LA's collectors is recommended. Organic solid waste should be directed to the compost facility as much as possible.

Post harvesting practices at the collection centre: Degradable wastes and non-degradable waste should be segregated properly and degradable can be directed to the compost while non-degradable should be reuse, and recycle as much and if not disposed through LA. Domestic wastewater should be soaked through pits without discharging to adjoining drains.

Improvements of Rural roads: Implementation of the Environmental Management Plan will be sufficient to mitigate the identified impacts and EMP shall be updated with detailed designs of infrastructure improvements. Health and Safety proactive measures should be implemented by the contractors. Siltation of adjoining drains, canals, streams, etc will be significant as roads will be basically earth filling and should implement mitigation measures proposed in the EMP. Avoid construction of lengthy sections at a time to avoid disturbances to the public. Proper traffic arrangements including diversions, signs, etc should be available. Construction activities should be restricted to 0600-1800hours to avoid inconvenience to the general public. Disposal of soil abruptly should be avoided which can leads to many environmental issues. Maximum of 250m stretch should be open at a time for construction to minimise the public convenience.

Construction of Collection Centre and Compost Yard: Implementation of the Environmental Management Plan will be sufficient to mitigate the identified impacts and EMP shall be updated with detailed designs of infrastructure improvements. Health and Safety proactive measures should be implemented by the contractors. Establishment of boundary demarcations. Construction activities should be restricted to 0600-1800hours to avoid inconvenience to the general public. Construction waste should be disposed safely at a recommended location by the LA.

Construction of Elephant Fence: New method introduced by the Department of Wildlife Conservation (DWLC) in erecting elephant fence should be constructed. Elephant fence design should be approved by DWLC. Use biological fences and ditches outside the electrical fence as much as possible to reduce the pressure on the electrical fence.

Table 14: Screening Recommendations for each activity

Key recommendations	Actions / Approvals to be attended	Time period to attend each action	Responsibility / Remarks
Construction of Agro Wells	Obtain WRB Recommendations with yield test reports	Before mobilise contractors to construct wells	ISP PPMU Engineer-PMU
Use of Kala Oya and Yodha Ela	Obtain written consent from the Department of Irrigation – Kala Oya	Urgently	ISP PPMU
Disposal of Waste (covering bags)	Start collection and segregation of waste Reuse and Recycle Dispose through LAs Implement Waste Minimization Programme	During harvesting During harvesting time	FOs ISP PPMU ISP PPMU
Integrated Pest Management Practices	Implement IPM activities proposed above at each stage	From land preparation onwards	National and International Agronomist – ISP Agronomist – PPMU
Construction of rural roads	Construction of silt-traps where drains and canals are adjoining which has the potential for siltation	During construction of rural roads	Civil Engineer – ISP PPMU
Rehabilitation of Elephant fence	Construction or rehabilitation of fence Electrification Maintanance	During construction During Operations	FOs DWLC – Range Office Civil Engineer – ISP PPMU

Construction of Collection centre	Construction of Building Fencing of land Landscaping of area Post-harvest operations	During construction Installation of equipments/ machineries During operations	Civil Engineer – ISP Agronomost - ISP PPMU
Construction of compost yard	Construction of Building Fencing of land Landscaping of area Drying and sorting of waste Leachate collection Odor control Operations of composting	During construction Installation of machineries During operations	Civil Engineer – ISP Agronomost - ISP PPMU

12. DETAILS OF PERSONS RESPONSIBLE FOR THE ENVIRONMENTAL SCREENING

Screening report completed by **J.A.P. Jayaweera** National Safeguards Specialist ISP/ASMP ***Name/Designation/Contact information***	**Date** **June** 2022  ***Signature***
Screening report reviewed by **D.M. Sanjaya Bandara** Environment and Social Safeguard Specialist Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** 20 June 2022  ***Signature***
Screening report Approved by **Dr. Rohan Wijekoon** Project Director Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** 20 June 2022  ***Signature***

ANNEXURE 1: LIST OF REFERENCES

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2) Water quality index for Kalaoya basin (2019)- Muhandiram G.M.H.M.[1], Bandara W.D.C.[1], Perera W.L.G.D.1, Vithanage M.[2], Edirisinghe V.[3], Athapaththu B.C.L.[1]*https://core.ac.uk/download/pdf/33720752.pdf
3) https://www.breezometer.com/air-quality-map/air-quality/sri-lanka/palugaswewa
4) Preram S, Vidanage, S and Kallesoe, M (2005). Multiple Benefits of Small Irrigation Tanks and their Economic Value - A case study in the Kala Oya Basin, Sri Lanka. IUCN – Ecosystems and Livelihoods Groups, Sri Lanka and Asia Region. At URL: https://portals.iucn.org/library/efiles/documents/2005-016.pdf
5) FAO. Fisheries Reservoir Fisheries. At URL: http://www.fao.org/3/T0028E/T0028E05.htm
6) Preram S, Vidanage, S and Kallesoe, M (2005). Multiple Benefits of Small Irrigation Tanks and their Economic Value - A case study in the Kala Oya Basin, Sri Lanka. IUCN – Ecosystems and Livelihoods Groups, Sri Lanka and Asia Region. At URL: https://portals.iucn.org/library/efiles/documents/2005-016.pdf
7) www.anuradhapura.dis.gov.lk/images/PDF/Statistical
8) Resource profile, Ipologama Divisional Secretariat

ANNEXURE 2: BENEFICIARY LIST

№	Name of the farmer	Contact no	Address	Gender	Extent of proposed cropping (Acres)	Presence of land	Land ownership	Available of security fence	Availability of water annually	Water resource
1	TB Mahinda Rathna	077-1557233	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	no	Yes	Canal
2	LKMEWD Ellepola	071-6252488	Ganthiriyagama, Ipalogama	Male	2	Yes	lease	yes	Yes	Tank
3	BM Senevirathna	070-2200183	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed		yes	Canal
4	M Jayarathna Banda	071-2447756	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	No	No	
5	RM Rasika Chandima	078-8290077	Ganthiriyagama, Ipalogama	Male	0.5	Yes		yes	yes	Canal
6	KA Wickramsinghe	078-9905744	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	yes	yes	
7	SKD Hemasiri Samarawickrama	071-4003275	Ganthiriyagama, Ipalogama	Male	1.5	Yes	Deed	yes	yes	Canal
8	R Prema chandra Rajakaruna	071-2350398	Ganthiriyagama, Ipalogama	Male	0.5	Yes	Deed	yes	yes	Rainfed
9	HRF Gunathilaka	025-2265901	Ganthiriyagama, Ipalogama	Male	2	Yes	Deed	yes	yes	Irrigated
10	PB Ekanayaka	025-2055700	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed		No	Canal
11	PB Thilakarathna	071-1308168	Ganthiriyagama, Ipalogama	Male	2	Yes	Deed	No	yes	Irrigated
12	TB Chandrarathna Rajakaruna	025-2263612	Ganthiriyagama, Ipalogama	Male	2	Yes	Deed	yes	yes	Mahaweli
13	TB Anura Bandara	025-2263962	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	yes	yes	Tank
14	RM Tikiri Banda	078-6312796	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	yes	yes	Agrowell
15	RB Somasiri Bandara	071-6200419	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	yes	yes	Tank
16	P.W. Wimalasiri Dharmakirthi	025-2263187	Ganthiriyagama, Ipalogama	Male	4	Yes	Deed	yes	yes	Agrowell
17	ASP Kumara	071-2510644	Ranajayapura, Ipalogama	Male	1	No	Not legally owned	No	No	Tap Line
18	Thushari Damayanthi Rajakaruna	078-6415631	Ganthiriyagama, Ipalogama	Female	1	Yes	Deed	No	yes	Tap Line
19	MK Bandara	078-8605368	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	No	yes	Tap Line
20	TB Rajakaruna	078-6801063	Ganthiriyagama, Ipalogama	Male		Yes		yes	yes	
21	B Tikiri Banda Rajakaruna	078-6801063	Ganthiriyagama, Ipalogama	Male	1	Yes	Deed	yes	yes	
22	HM Prasanna Sugath Herath	071-1987563	Ganthiriyagama, Ipalogama	Male		Yes	Not legally owned	yes	yes	Tank and well
23	BMK Wijebandara	071-3022900	Idhunugala Maradankadawala	Male	1	Yes	Deed	No	yes	Agrowell
24	DMA Gunawardhana	071-4227369	Idhunugala Maradankadawala	Male	1	Yes	Deed	No	yes	
25	HV Senevirathna	078-4381440	Ihalakagama, Maradankadawala	Male	1	Yes	Lease	yes	yes	Agrowell

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26	MMTB Karunarathna	078-3265599	Pallekagama, Maradankadawala	Male	2	Yes	Not legally owned	yes	No	Rainfed
27	AK Jayalath Kodikara	076-0015955	Hiripitiyagama, Ipalogama	Male	1.5	Yes	Deed	No	yes	Agrowell
28	HBR Bandara	076-7370679	Idhunugala Maradankadawala	Male	1.5	Yes	Deed	No	yes	Agrowell
29	Chandana Sugath Dissanayake	075-5675103	Idhunugala Maradankadawala	Male	1	Yes	Deed	No	yes	Agrowell
30	K. Padma Jayarangani Weerasuriya	072-4766086	9, Hapidiyagama, Maradankadawala	Female	3	Yes	Deed	No	yes	Agrowell
31	K Somapala	071-7064239	Hapidiyagama, Maradankadawala	Male	2	Yes	Deed	No	yes	Agrowell
32	DMSC Dissanayaka	071-7520184	Pallekagama, Maradankadawala	Male	1	Yes	Deed	yes	yes	Agrowell
33	DM Sunil Dissanayaka	071-6120768	Pallekagama, Maradankadawala	Male	1.2	Yes	Deed	yes	yes	Agrowell
34	DM Chandrathilaka	071-7739245	Dampelessagama, Maradankadawala	Male	1.5	Yes	Deed	No	yes	Agrowell
35	A Lakshman Jayarathna	071-8033421	Ihalakagama, Maradankadawala	Male	1	Yes	Deed	No	yes	Tube well
36	Mahanama Rajakaruna	077-0497388	Ihalakagama, Maradankadawala	Male	3	Yes	Deed	No	yes	Tube well
37	P Nirmala Priyadarshani Weerasooriya	071-0645915	Hapidiyagama, Maradankadawala	Female	4	Yes	Deed	No	yes	Agrowell
38	RHM Padma Kumara	071-4474820	Jaya Mawatha, Ihalakagama, Maradankadalwala	Male	1	Yes	Deed	No	yes	Agrowell
39	AG Kularathna Banda	078-9063706	Hapithiyagama, Maradankadawala	Male	1	Yes	Deed	No	Yes	Agrowell
40	Lesli Wijayananda	077-5221867	Settikulama, Maradankadawala	Male	1	Yes	Deed	No	Yes	Agrowell
41	LKR Ananda Rajakaruna	071-4743437	Ihala Kagama, Maradankadawala	Male	0.5	Yes	Deed	no	Yes	Agrowell
42	A Najimundin	071-7554142	Aluthdennawa, Kagama	Male	1	Yes	Deed	yes	Yes	Tank
43	SA Fairuk	076-4841862	Aluthdennawa, Kagama	Male	0.5	Yes		no	No	
44	M Jasmine	071-2566724	Aluthdennawa, Kagama	Male	0.5	Yes	Deed	yes	Yes	Irrigated
45	ASM Hilmi	071-2048168	Aluthdennawa, Kagama	Male	0.5	Yes	Deed	yes	Yes	Irrigated
46	IM Uwayis		Aluthdennawa, Kagama	Male	0.5	Yes	Deed	yes	Yes	Irrigated
47	Abdul kapoor Thamsil	071-6315738	Aluthdennawa, Kagama	Male	0.5	Yes	Deed	yes		
48	Chamila Nishanthi Wegolla	077-8412174	Aluth Ganthiriyagama, Kagama	Female	0.75	Yes	Deed	yes	Yes	Agrowell
49	PT Uyanwaththa	071-0109487	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	Yes	Agrowell
50	SM Weerakoon Banda	071-0958425	Galwanguwa, Ipalogama	Male	1	Yes	Deed	yes	Yes	Tank
51	Sagarage Piyasena	071-5822069	Aluth Ganthiriyagama, Kagama	Male	1	Yes	lease	no	Yes	Agrowell
52	P Wasantha Samarathunga	077-5718131	Aluth Ganthiriyagama, Kagama	Male	0.75	Yes	Deed	yes	Yes	Agrowell
53	K Sethunga	071-9305485	Aluth Ganthiriyagama, Kagama	Male	4	Yes	Deed	yes	yes	

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54	S Chaminda Sarath Senevirathna	071-3724157	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
55	P Nishantha Priyadarshana Karunarathna	078-6756517	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
56	GDB Hewage	025-5733505	Mimalgama, Kagama	Male	1.5	Yes	Deed	No	yes	
57	S Musthafa	071-3536376	Aluthdennawa, Kagama	Male		Yes	Deed	yes	yes	Canal
58	S Kamardhin		Aluthdennawa, Kagama	Male	0.5					
59	Sultan Misba Umma	071-5636062	Aluthdennawa, Kagama	Female	0.5	Yes			No	
60	MDB Rajarathna	070-4440829	Aluth Dabewatana, II kotasa, Kagama	Male	0.5	Yes	Deed	No	No	Water Pump
61	GM Senevirathna	078-3452281	06. Aluviharegama, Senapura	Male	0.5	Yes	Deed	No	yes	Agrowell
62	Palitha Bandara Dissanayaka	077-8375337	Narangallegama, Senapura	Male	1.5	Yes	Deed	yes	yes	Agrowell
63	Dayananda Senarath Yapa	071-1951744	Senapuragama, Senapura	Male	1	Yes	Lease	No	yes	
64	AM Bandaranayaka	075-8165077	41, Track 1, Senapura	Male	1	Yes	Deed	No	yes	Irrigated
65	G Sampath Renuka Kariyawasam	078-5487511	Wedinigama, Senapura	Male	2.5	Yes	Deed	yes	yes	Tube well
66	HA Shantha Dayarathna	072-6280000	Narangallegama, Senapura	Male	3.5	Yes	Deed	yes	yes	
67	DM Nilanthi Sheela Dayarathna	076-1879028	9, Aluviharegama, Senapura	Female	1	Yes	Deed	yes	yes	Tank
68	RMD Rajakaruna	071-6733677	20, Aluwiharegama, Senapura	Male	1	Yes	Deed	yes	yes	Water Pump
69	RM Silawathi	076-7399224	11, Aluviharegama, Senapura	Female	0.25	Yes	Deed	No	yes	Agrowell
70	HM Sunil Premalatha Herath	071-6619098	8, Aluviharegama, Senapura	Male	1	Yes	Deed	No	yes	Agrowell
71	CR Karunawathi	076-9158042	Senapuragama, Senapura	Female	1	Yes	Lease	No	yes	Agrowell
72	SM Dayani Rupashika Obewansha	071-4804733	7, Track 01, Senapura	Female	1	Yes	Deed	yes	yes	Agrowell
73	EM Gunathilaka		4, Aluviharegama, Senapura	Male	1	Yes	Deed		yes	Agrowell
74	SM Susila Ranjani	076-9231678	Ganthiriyagama, Ipalogama	Female	1	Yes	Deed	yes	yes	
75	RM Suriyathissa Bandara	071-6809876	34, Senapura	Male	3	Yes	Deed	yes	yes	
76	AM Abeyrathna	071-5966478	71, Track 1, Senapura	Male		Yes	Deed	yes	yes	
77	IM Jayawickrama Banadara	077-1265104	Aluth Dabewatana, II kotasa, Kagama	Male	1.5	Yes	Deed	yes	yes	Water Pump
78	BA Nishshanka Aththanayaka	071-3632138	148, Mahamigassegama, Mahailuppallama	Male	2	Yes			yes	Agrowell
79	H. Geetha sawsiri	072-991799	248, Mahamigassegama, Mahilupplama	Female	1.5	Yes	Deed	No	yes	Agrowell
80	BA Lalan Premasiri	077-6149267	Mahamigassegama, Mahailuppallama	Male		Yes	Deed	No	yes	
81	SW Kanthi Gunathilaka	077-2371298	Mahamigassegama, Mahailuppallama	Female		Yes	Deed	No	yes	
82	HM Nimal Sarath Bandara	071-1488702	Wedinigama, Senapura	Male	1	Yes	Deed		yes	Canal

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83	WMW Aberathna	070-4969086	Wedinigama, Senapura	Male	1	Yes	Deed	yes	yes	Agrowell
84	BAL Premasiri	077-6149267	245, Mahamigassegama, Mahailluppallama	Male		Yes	Deed	No	yes	
85	AMS Adhikari	071-2172016	Wedinigama, Senapura	Female	1	Yes	Deed	yes	yes	Agrowell
86	U Gunapala	071-3200105	Mahamigassegama, Mahailuppallama	Male	1	Yes	Deed	No	yes	Canal
87	L Nishantha	071-3977122	Mahamigassegama, Mahailuppallama	Male	1	Yes	Deed	yes	yes	Water Pump
88	Sugath Kumara	071-4595121	Mahamigassegama, Mahailuppallama	Male	2	Yes	Deed	yes	yes	Water Pump
89	Santha Amarasena		175, Mahamigassegama, Mahailuppallama	Male	0.25	Yes				
90	RM Wijerathna	071-7986658	Wedinigama, Senapura	Male	1	Yes	Deed	No	Yes	Agrowell
91	RM Aberathna	077-5990725	Wedinigama, Senapura	Male	1	Yes	Deed	yes	Yes	Canal
92	L Jayathunga	078-3671248	Mahamigassegama, Mahailuppallama	Male	1.5	Yes	Deed	yes	Yes	Water Pump
93	J Geetha Kanthi	078-3291920	Sirikkulama, Mahailuppalama	Female	0.5	Yes	lease	yes	Yes	Agrowell
94	WP Seelawathi	071-9307418	Mahamigassegama, Mahailuppallama	Female	1	Yes	Deed		Yes	Agrowell
95	H Sunanda	076-2492438	174, Mahamigassegama, Mahailuppallama	Male	0.25	Yes			Yes	Agrowell
96	S Karunathilaka	071-5949013	10, Mahamigassegama, Mahailuppallama	Male	2.5	Yes	Deed	no	Yes	Agrowell
97	P Sudda		Mahamigassegama, Mahailuppallama	Male	0.5	Yes	Deed	yes	Yes	Water Pump
98	LAAS Iddamalgoda	076-0645227	70, Mahamigassegama, Mahaiuppallama	Male	2	Yes	Deed	no	Yes	Agrowell
99	WM Nimali Wijesinghe	078-4509256	Mahamigassegama, Mahailuppallama	Male	0.5	Yes		yes	Yes	
100	Ruchirani Munsinghe	070-2120587	Kalakarbewa, Karabewa	Female	5	Yes	Deed	yes	Yes	Water Pump
101	G Bandara	071-2446257	Samuwa Farm, Kadiyangalla, Ipalogama	Male	2	Yes	Deed	yes	Yes	Water Pump
102	SW Sunitha	070-4190298	Madurugama, Mahailuppallama	Female	1	Yes	Deed		Yes	
103	SW Siripala Wirasuriya	070-4190298	Mahamigassegama, Mahailuppallama	Male	1.5	Yes	Deed	No	yes	
104	K Wasantha Piyathilaka	071-4083403	247, Mahamigassegama, Mahailuppallama	Male						
105	G Pema Siri	071-9849774	112, Mahamigassegama, Mahailuppallama	Male	1	Yes	Deed	No	Yes	Agrowell
106	Susila Sarojani Hemakanchana	071-0492642	Farm Road, Gonapathirawa	Female		Yes				
107	SBM Shelton Senevirathna	072-5348698	187, Kudamigassegama, Ipalogama	Male	1	Yes	Deed	No	Yes	

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108	Subadrage Premarathna	071-1336233	50, Mahamigassegama, Mahailuppallama	Male	1.5	Yes	Deed	No	Yes	Agrowell
109	G Somawathi	070-4558300	68, Mahamigassegama, Mahailuppallama	Female	1	Yes	Deed	No	Yes	Agrowell
110	WMC Keerthi	071-2388105	65, Mahmigassegama, Mahailuppallama	Male	3	Yes	Deed	yes	yes	Water Pump
111	KG Siril Shantha Guruge	072-5028256	20, Mahamigassegama, Mahailuppallama	Male	0.5	Yes	Deed	yes	yes	Agrowell
112	P Ranasinghe	078-6990179	135, Mahamigassegama, Mahailuppallama	Male	0.5	Yes	Lease	No	yes	River
113	HM Gnawathi	071-2915287	42, Mahamigassegama, Mahiluppallama	Female	1	Yes	Deed	No	yes	Canal
114	G Gunadasa	078-1873851	12, Mahamigassegama, Mahailuppallama	Male	1	Yes	Deed	yes	yes	Water Pump
115	RM Wimalasiri	071-5617709	198, Kudamigassegama, Ipalogama	Male	1	Yes	Deed	No	yes	Agrowell
116	AM Tikiribanda	072-5937811	205, Kudamigassegama, Ipalogama	Male	1.5	Yes	Deed	No	yes	Agrowell
117	ADK Sandya Kumari	071-4080646	38, Manewa Road, Ipalogama	Female	1.5	Yes	Deed	No	yes	Water Pump
118	IMCR Karunarathna	077-59732153	Godayaya, Ipalogama	Male	3	Yes	Deed	yes	yes	Canal
119	HM Shantha Samarajiwa Herath	077-5057304	Ipalogama	Male	3	Yes	Deed	No	yes	Agrowell
120	Kalupahanage Kalyanawathi	071-1050748	Godayaya, Ipalogama	Female	0.5	Yes	Deed	No	yes	Canal
121	T Sardawathi Kumarihami	077-4212516	Ipalogama	Female	2	Yes	Deed	No	yes	Canal
122	WS Suraweera	071-7104452	87, Godayaya, Ipalogama	Male	1	Yes	Deed	yes	yes	Tube well
123	AWMCS Malkanthi	076-5581306	Haguranketha House, Manewa, Ipalogama	Female	1	Yes	Deed	No	yes	Agrowell
124	TB Karunarathna	077-9353359	Gonapathirawa, Ipalogama	Male	2	Yes	Deed	No	yes	Water Pump
125	HP Thissa Kumara Kariyawansha	070-2428240	31, Pothana, Ipalogama	Male	1	Yes	Deed	No	yes	
126	Indunil Madhusanka	078-5395665	Gamini Halmillewa, Ipalogama	Male	1.5	Yes	Deed	No	yes	Tank water
127	LA Shantha Liyanage	078-2916577	Gamini Halmillewa, Ipalogama	Male	2.5	Yes	Deed	No	yes	Tank water
128	S Karunapala	077-9798957	Gamini Halmillewa, Ipalogama	Male	3	Yes	Deed		yes	Agrowell
129	S Sameera Sampath	070-1292438	Gamini Halmillewa, Ipalogama	Male	2	Yes		No	yes	Agrowell
130	L Peiris	077-6262237	Gamini Halmillewa, Ipalogama	Male	0.75	Yes	Deed	yes	yes	Agrowell
131	S Nishshanka Wijerathne	078-3930545	Gamini Halmillewa, Ipalogama	Male	2.5	Yes	Deed	No	yes	Agrowell
132	Damith Lakmal	077-4857914	Gamini Halmillewa, Ipalogama	Male	4.5	Yes	Deed	yes	yes	Agrowell
133	KM Ranjan Prasad Kandegedara	076-9231390	Gamini Halmillewa, Ipalogama	Male	2	Yes	Deed	No	yes	Agrowell
134	P Kirthipala	078-4821703	Gamini Halmillewa, Ipalogama	Male	1	Yes	Deed	No	yes	Agrowell
135	KS Praneeth Kumara	078-2949527		Male	2		Deed		yes	Agrowell

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136	Shelton Premasiri	077-0782468	Gamini Halmillewa, Ipalogama	Male	2	Yes	Deed	yes	yes	Agrowell
137	S Saman	072-1645878	Gamini Halmillewa, Ipalogama	Male	1.5	Yes	Deed	No	yes	
138	HM Geeth Prasanga Kumara Herath	070-3594775	No 9, Track 5, Katiyawa	Male	0.5	Yes	lease	No	yes	
139	RJ Nishshanka	071-1800982	Dikwewa, Senapura	Male	1	Yes	Deed	yes	Yes	Mahaweli
140	HG Piyadasa	071-6179904	70, Track 4, Senapura	Male	4.5	Yes	Deed	No	Yes	
141	IKG Chaminda Thilakarathna	072-5514928	25, Track 5, Katiyawa	Male	0.5	Yes	Deed	yes	Yes	Mahaweli
142	DD Kumarasinghe	071-6577753	25, Track 5, Katiyawa	Male	0.5	Yes	Deed	yes	Yes	Mahaweli
143	NGSS Wiliam	071-7619573	17, Track 5, Sri Niwasa, Katiyawa	Male	1.5	Yes	Deed	yes	No	Pumping
144	J Gamini Rajapaksha	071-5778270	30, Track 5, Katiyawa	Male	4	Yes	Deed	no	Yes	Agrowell
145	DM Jayakodi Dissanayaka	071-3610641	57, Track 4, Senapura	Male	1	Yes	Deed	no	Yes	Agrowell
146	WM Dhanushka Pradeep Weerasekara	071-3035752	10, Track 5, Katiyawa	Male	2	Yes	Deed	no	Yes	
147	LKR Lasantha Rajapakshe	025-5788198	8, Track 5, Katiyawa	Male	2.5	Yes	Deed	no	Yes	Canal
148	AR Wimal Jayananda Ramanayaka	070-3739490	23, Track 5, Katiyawa	Male	1	No			Yes	Agrowell
149	TM Upali Thilakarathna	076-4508291	3, Track 5, Katiyawa	Male	0.5	Yes	Deed	yes	Yes	Canal
150	WM Gunasekara Bandara	071-3355106	10, Track 5, Katiyawa	Male	1	Yes	Deed	No	Yes	
151	DM Rathnayaka	071-6080809	5, Track 5, Katiyawa	Male	0.5	Yes	Deed	No	Yes	Canal
152	JA Rohan Sanjaya Jayakodi	071-3250171	4, Track 5, Katiyawa	Male	1	Yes	Deed	yes	No	
153	WM Nalinda Udayakumara	025-5719380	15, Track 5, Katiyawa	Male	1	Yes	Deed	No	yes	Agrowell
154	DS Pathirana	071-9494011	Dikwewa, Senapura	Male	1	Yes	Deed	No	Yes	tank
155	WM Supun Sulochana Weerakoon	078-8474386	13, Track 5, Katiyawa	Male	1	Yes	Deed	No	Yes	Agrowell
156	J Piyatissa	071-3032774	35, Track 5, Katiyawa	Male	1	Yes	Deed	yes	Yes	Agrowell
157	S Dayawathi	025-5789910	33, Track 5, Katiyawa	Female	1	Yes	Deed	yes	Yes	Irrigated
158	RM Rohitha Rajapakshe	071-6912484	58, Track4, Senapura	Male	1	Yes	Deed	yes	Yes	Agrowell
159	IM Illangasinghe		85, Track 4, Senapura	Male	1.5	Yes	Deed		No	
160	PS Udayasiri	071-6782082	77, Track 4, Senapura	Male	1	Yes	Deed	No	yes	Agrowell
161	GP Malani Premalatha	076-6193106	Srikakulam	Female	0.5					
162	JCP Kumari	078-1345192	30, Kirikkulama, Mahailuppallama	Female	0.5	Yes	Deed	yes	yes	
163	RM Jayathilaka Banda	071-0524920	100 Acres, Senapura	Male	0.5	Yes	Deed	yes	yes	Canal
164	WM Chandani Kumari Wijerathna	071-3364490	100 Acres, Senapura	Female	2	Yes	Deed	No	yes	Agrowell
165	HM Maithripala		05, 100 Acres, Senapura	Male		No		yes	No	

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166	NWB Madugalla	071-1503282	100 Acres, Senapura	Male	0.75	Yes	Deed	yes	yes	Tube well
167	Nishantha Rohitha Ranasinghe	071-3086791	18/B, Track 5, Katiyawa	Male	1.5	Yes	Deed	No	yes	
168	WA Ashoka Damayanthi	078-2608049	13, Track 5, Katiyawa	Female	1	Yes	Deed			
169	DA Susantha Vijitha Dissanayaka	077-2211014	100 Acres, Senapura	Male	1.5	Yes	Deed		Yes	Mahaweli
170	HMLDK Herath	071-6845627	100, Manewa Road, Ipalogama	Male	1	Yes	Deed	yes	yes	Tube well
171	D Tharanga Ranjith Nanayakkara	077-1015813	Manewa Road, Ipalogama	Male	2.5	Yes	Deed	No	yes	Pumping
172	HM Anura Susantha Herath	070-4519504	Godayaya, Ipalogama	Male	3	Yes	Deed	yes	yes	Pumping
173	Chamila Shriyani Somawardhana	076-8810874	Manewa, Ipalogama	Female	3	Yes	Deed	yes	yes	Pumping
174	HM Senanayaka	077-5509153	Godayaya, Gonapathirawa, Ipalogama	Male	1	Yes	Deed	No	yes	Canal
175	SM Wijerathna	078-4896375	36, Pothana, Ipalogama	Male	1.5	Yes	Deed	No	yes	
176	Wasantha Nihal Kumarasinghe	071-2748674	25, Track 5, Katiyawa	Male	2	Yes	Deed	yes	yes	Irrigated
177	S Irangani Premalatha		20/B, Track 5, Katiyawa	Female	0.5	Yes	Deed	No	yes	
178	G Jayalath Ranasinghe	070-4550722	track 5, Katiyawa	Male	1	Yes	Deed	No	yes	Agrowell
179	WM Sameera Madhusanka	078-9167931	48, Track 5, Katiyawa	Male	0.5	Yes	Deed	yes	yes	Agrowell
180	L Jayakodi	076-9495124	4, Track 5, Katiyawa	Male	0.5	Yes	Deed	yes	yes	Canal
181	WL Ajith Kumara	070-168016	Manewa, Ipalogama	Male	1	Yes	Deed	yes	yes	Tube well
182	W Sunil Premasiri	077-1091745	Machchagama, Ipalogama	Male	2	Yes	Deed	No	yes	
183	Saman Pradeep Kumara Herath	072-4100744	Machchagama, Ipalogama	Male	4	Yes	Deed	No	yes	Agrowell
184	AMSDL Adhikari	077-5203086	73, Shanthi, Manewa Road, Ipalogama	Male	1	Yes	Deed	No	yes	Pumping
185	AM Lalani Shanthi Adhikari	077-2824460	71, Manewa Road, Ipalogama	Female	1	Yes	Deed	No	yes	Pumping
186	P Priyanthika Herath	077-6083780	Kadiyangalla, Gonapathirawa	Female		Yes	Deed	yes	No	
187	Nalin Prasanna	076-7706363	Gonapathirawa, Ipalogama	Male	2	Yes	Deed	No	yes	
188	K Sarath Kuamara	072-6100002	Gonapathirawa, Ipalogama	Male	2.5	Yes	Deed	No	yes	Canal
189	RW Jayantha Rohana Kumara Rajasinghe	070-2077344	Farm Road, Gonapathirawa	Male	1	Yes		No	Yes	Tube well
190	HM Dhananjaya Kumara Herath	077-4944153	Gonapathirawa, Ipalogama	Male	1.5	Yes	Deed	No	Yes	Tube well
191	AM Prasanna Sugath Adhikari	077-5973487	Gonapathirawa, Ipalogama	Male		Yes				
192	KB Chandralatha	071-1523414	Gonapathirawa, Ipalogama	Female	2	Yes	Deed	no	Yes	Canal
193	PB Weerasinghe	076-7159403	Gonapathirawa, Ipalogama	Male	2.5	Yes	Deed	yes	Yes	Tube well
194	DMK Kalubanda	076-2832248	Gonapathirawa, Ipalogama	Male	2	Yes	Deed	no	Yes	
195	KWD Kadigawa	071-5826776	Gonapathirawa, Ipalogama	Male	1	Yes	Deed	no	Yes	

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196	KB Abeyrathna	077-1843937	Kadiyangalla, Gonapathirawa	Male	2	Yes	Deed	no	Yes	Canal
197	DMK Muthubanda	077-5850238	Gonapathirawa, Ipalogama	Male		Yes	Deed	no	Yes	
198	KW Manoj Dharmapriya Bandara	077-9477596	Gonapathirawa, Ipalogama	Male						
199	DM Janaka Pradeep Dissanayaka	071-6649969	Gonapathirawa, Ipalogama	Male	2	Yes	Deed	No	Yes	Tube well
200	K Rathnayaka	076-8371671	Gonapathirawa, Ipalogama	Male	1	Yes	Deed	yes	Yes	Canal
201	HM Thushantha Bandara	074-6039255	Gonapathirawa, Ipalogama	Male		Yes	Deed	No	Yes	Tube well
202	JM Anushika Priyadarshani Jayasekara	070-2651857	Gonapathirawa, Ipalogama	Female	0.5	Yes	Deed	yes	yes	Canal
203	G Renuka Priyadarshani	076-5851169	Gonapathirawa, Ipalogama	Female		Yes	Deed		yes	
204	SM Nimal Dissanayaka		Gonapathirawa, Ipalogama	Male		Yes	Deed	No	No	
205	S Nishshanka Piyasiri	071-2600473	2, Mimalgama, Kagama	Male	1	Yes	Deed	yes	Yes	Agrowell
206	S Gamini Jayarathna	071-9161474	Mimalgama, Kagama	Male	0.75	Yes	Deed	yes	Yes	
207	G Jayapala	070-1613638	Aluth Ganthiriyagama, Kagama	Male	2	Yes	Deed	No	No	Mahaweli
208	MP Mahindika Kirthisena	071-7310213	Mimalgama, Kagama	Female	0.5	Yes	Deed	yes	Yes	Agrowell
209	R Vidya Ranga	070-2441252	Aluth Ganthiriyagama, Kagama	Male	0.5	Yes	Deed	No	yes	Agrowell
210	K Nimal Jayarathna	071-3786656	Aluth Ganthiriyagama, Kagama	Male	0.5	Yes	Deed	yes	yes	
211	K Wasantha Kumuduni	071-1198366	Aluth Ganthiriyagama, Kagama	Female	0.5	Yes	Deed	yes	yes	Agrowell
212	PA Shiroma Prasadi Panampitiya	070-1140866	Aluth Ganthiriyagama, Kagama	Female	1.5	Yes	Deed	yes	yes	Tube well
213	PK Nihal Jayasinghe	071-5946117	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
214	B Nimal Ranathunga	071-2571851	Aluth Ganthiriyagama, Kagama	Male	1.5	Yes	Deed	yes	yes	Agrowell
215	HG Athulasiri Hemantha	071-6192402	Aluth Ganthiriyagama, Kagama	Male	0.75	Yes		yes	yes	Agrowell
216	NTSH Karunarathna	071-5225186	Mimalgama, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
217	A Upali Samarasinghe	071-5246427	Mimalgama, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
218	G Wimalasena	070-1093531	Mimalgama, Kagama	Male	1	Yes	Deed	yes	Yes	Agrowell
219	S Nimal Wijerathna	070-1611438	Mimalgama, Kagama	Male	1	Yes		yes	Yes	
220	W Renuka Jayasinghe	071-7112483	Aluth Ganthiriyagama, Kagama	Female	0.5	Yes	Deed	yes	yes	Agrowell
221	PJ Nalaka Padmalal	071-8954095	Aluth Ganthiriyagama, Kagama	Male	1	No		yes	yes	Canal
222	PS Siripala	071-6952157	Aluth Ganthiriyagama, Kagama	Male	0.5	Yes	Deed	yes	yes	Canal
223	PS Karunarathna	071-6504044	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	yes	Irrigated
224	K Thilak Karunarathna	072-3042252	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
225	HP Nandasoma	077-6839303	1st Canal, Kagama	Male	0.5	Yes	Deed	yes	yes	Agrowell

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226	SH Sujith Karunarathna	077-6711575	"Supuni" House, Mihidugama Road, Ipalogama	Male	1	Yes	Deed	yes	yes	Agrowell
227	MMA Dipani Neranjala	077-1617408	Aluthdennawa, II Slot, Kagama	Female	1	Yes	Deed	yes	yes	Agrowell
228	D Deepika Damayanthi	071-2349515	Aluthdennawa, II Slot, Kagama	Female	0.5	Yes	Deed	No	yes	Agrowell
229	HP Indra Kusumlatha	077-1558867	Aluthdennawa, II Slot, Kagama	Female	1	Yes	Deed	yes	yes	Agrowell
230	EM Chaminda Kumara	076-4855491	Aluthdennawa, II Slot, Kagama	Male	1	Yes	Deed	yes	yes	Agrowell
231	LKR Ayomi Udayangani		Aluthdennawa, II Slot, Kagama	Female	1	Yes	Deed	yes	yes	Agrowell
232	DKG Somarathna	078-5246626	Galwanguwa, Ipalogama	Male	0.5	Yes	Deed	yes	yes	Tube well
233	DP Kirthlatha	071-9656572	Galwanguwa, Ipalogama	Female	1	Yes	Deed	yes	yes	Tube well
234	WS Ramani	072-3203449	Galwanguwa, Ipalogama	Female	0.25	Yes	Deed	yes	yes	Agrowell
235	HP Theja Nandasoma	070-4970021	Galwanguwa, Ipalogama	Female	1	Yes	Deed	yes	yes	Agrowell
236	K Karunapala	076-2423741	Galwanguwa, Ipalogama	Male	1	No		yes	yes	Agrowell
237	HP Anoja Kumudini	071-3045591	Galwanguwa, Ipalogama	Female	1	Yes	Deed	yes	yes	Canal
238	K Keerthi Saman Karunarathna	076-7323672	Aluth Ganthiriyagama, Kagama	Male	0.75	Yes	Deed	yes	yes	Mahaweli
239	S Gunapala	078-3641523	Aluth Ganthiriyagama, Kagama	Male	0.5	Yes		yes		
240	T Jayathura	076-9017819	Mimalgama, Kagama	Male	1.5	Yes	Deed	yes	Yes	Agrowell
241	T Pemadasa		Mimalgama, Kagama	Male	1	Yes	Deed	yes	Yes	Agrowell
242	S Upali Somarathna	072-1702549	24, Mimalgama, Kagama	Male	1	Yes	Deed	yes	No	Agrowell
243	S Indica Samarathunga	076-6385050	6, Mimalgama, Kagama	Male	2	Yes	Deed	no	Yes	
244	A Pathmawathi	077-2191421	11, Mimalgama, Kagama	Female	0.75	Yes	Deed	yes	Yes	Agrowell
245	Jayarathna Ganegoda	078-7318338	Aluth Ganthiriyagama, Kagama	Male	1	Yes	Deed	yes	Yes	Agrowell
246	G Charitha Priyadarshani Sewwandi	077-8964906	Aluth Ganthiriyagama, Kagama	Female	0.5	Yes	Deed	yes	Yes	Agrowell
247	WA Sampath Chandana Bandara	078-8199403	18, Mimalgama, Kagama	Male	1	Yes	Deed	no	Yes	Agrowell
248	J Wasantha Jayathilaka	078-8008009	Mimalgama, Kagama	Male	0.5	No			Yes	Agrowell
249	NN Kusumsiri	071-6234976	Aluth Ganthiriyagama, Kagama	Male	1.75	Yes	Deed	yes	Yes	Agrowell
250	S Thissa Jayathilaka	070-3355307	Aluth Ganthiriyagama, Kagama	Male	2	Yes	Deed	yes	Yes	Agrowell
251	PG Gamini Senarath	076-4953257	Mimalgama, Kagama	Male	1	Yes	Deed	yes	Yes	Agrowell
252	LW Thilakarathna	071-5518454	Middle Road, Kagama	Male	2.5	Yes	Deed	yes	yes	Mahaweli
253	TB Ariyarathna	070-3137508	3rd Canal, Middle Slot, Kagama	Male	1	Yes	Deed	yes	yes	Mahaweli
254	TM Wimalarathna Banda	077-4768656	2nd Canal, Kagama	Male	0.5	Yes	Deed	No	Yes	

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255	RMNCK Rathnayaka	070-2048669	Middle Slot, Kagama	Female	2	Yes	Deed	No	Yes	Agrowell
256	HM Malani Herath	078-3641275	2nd Canal, Kagama	Female	0.35	Yes	Deed	No	Yes	
257	DM Heenbanda	071-4057282	2nd Canal, Kagama	Male	1	Yes	Deed	yes	Yes	
258	HM Kumarasinghe	070-3594790	Middle Slot, Kagama	Male	2	Yes	Deed	No	No	
259	KGS Rupasinghe		RB 2, Kagama	Male	0.5	Yes	Deed		yes	
260	EG Kusumalatha	071-2941793	No 6 Canal, Kagame	Female	0.5	Yes	Deed	yes	yes	Agrowell
261	HM Sangeeth Chamila Kumara Herath	072-8080024	RB 2, Walpaluwa, Kagama	Male	2	Yes	lease	No	yes	Agrowell
262	KW Chandrakumari	071-5246870	2nd Canal, Kagama	Female	0.5	Yes	Deed	No	yes	Mahaweli
263	KGM Irangani Padmalatha	071-2391275	2nd Canal, Kagama	Female	0.5	Yes	Deed	yes	yes	
264	Chaminda Nelson Nandasena	071-1954980	No 4 Canal, Middle Slot, Kagama	Male	1	Yes	Deed	No	yes	
265	Semasinghage Lionel	071-3639537	RB 2 canal, Kagama	Male	0.5	Yes	Deed	yes	yes	
266	DG Udeni Jayawardhana	078-2930951	6th Canal, Kagama	Female	1.5	Yes	Deed	yes	yes	Agrowell
267	Uththara Chathurani Senevirathna	078-4663081	6th Canal, Kagama	Female	0.75	Yes	Deed	yes	yes	
268	Chamila Nandearachchi	071-8792312	6th Canal, Kagama	Female	0.5	Yes	Deed	No	Yes	
269	AHG Alahakoon	078-3418513	No 5 Canal, Kagama	Male	0.75	Yes	Deed		Yes	Irrigated
270	RM Wasantha Bandara Rathnayaka	072-5595302	No 5 Canal, Kagama	Male	0.5	Yes	Deed	No	yes	Irrigated
271	EM Karunawathi	071-9726864	No 5 Canal, Kagama	Female	1	Yes	Deed	No	yes	
272	BN Madugalla	072-9841729	RB 2 canal, Kagama	Male	1.05	Yes	Deed	No	yes	Agrowell
273	DM Udaya Samantha Dissanayaka	071-6503823	RB 2 canal, Kagama	Male	0.5	Yes	Deed	No	yes	Agrowell
274	PB Abeyrathna		5th Canal, Kagama	Male	3	Yes			yes	
275	AG Thilak Kumara	076-6266098	5th Canal, Kagama	Male		Yes	Deed	yes	No	Irrigated
276	KB Manel Hami	071-3454648	5th Canal, Kagama	Female	1	Yes	Deed	yes	No	Irrigated
277	RM Ajith Kumara	071-6192391	5th Canal, Kagama	Male	3	Yes	Deed	yes	No	Irrigated
278	DM Chandima Dilrukshi	071-1954251	5th Canal, Kagama	Female	1	Yes	Deed	No	yes	Agrowell
279	DG Vijitha Damayanthi	072-8062139	5th Canal, Kagama	Female	1	Yes	Deed	no	yes	Agrowell
280	AM Nanda Attanayaka	071-8790256	5th Canal, Kagama	Female	1	Yes	Deed	no	yes	Agrowell
281	EM Dilhani Kapilarathna Ekanayaka	071-1534996	5th Canal, Kagama	Female	1	Yes	Deed	no	No	Agrowell
282	LWJK Thilakarathna	071-6417062	Middle Slot, Kagama	Male	0.5	Yes	Deed			Mahaweli
283	RM Pathmawathi	077-1024743	6th Canal, Kagama	Female	1.5	Yes	Deed	no	yes	
284	EM Shanika Kumari	077-5736022	6th Canal, Kagama	Female	1	Yes	Deed		No	

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285	DM Chandrathilaka	071-9183467	4th Canal, Kagama	Male	1	Yes	Deed	no	yes	Agrowell
286	DM Jayathilaka	077-2794129	Nelligaha Niwasa, No 5 Canal, Kagama	Male	1	Yes	Deed		yes	
287	EG Wasantha Gamage	072-3938910	2nd Canal, Kagama	Male	2.5	Yes	Deed	yes	yes	Mahaweli
288	AHM Sumanawathi		3rd canal, Kagama	Female	2				yes	Mahaweli
289	SMK Senewirathna	077-8990767	No 7, 4th Canal, Kagama	Female	0.5	Yes	Deed	yes	Yes	Pumping
290	LWSK Thilakarathna	071-5518454	Middle Slot, Kagama	Male	0.5	Yes	Deed	yes	Yes	Mahaweli
291	RM Rathnayaka	071-5946128	6th Canal, Kagama	Male	0.5	Yes	lease	no	Yes	Agrowell
292	RG Chandana Randeniya	071-2455035	6th Canal, Kagama	Male	0.25	Yes	Deed	no	Yes	Canal
293	Nalani Kusum Senanayaka		Pallekagama, Maradankadawala	Female	1	Yes	Deed	yes	Yes	Tube well
294	AM Chandima Kumari Abeykoon		Pallekagama, Maradankadawala	Female	1	Yes	Deed	no	Yes	Agrowell
295	P Wajira Bandaranayaka	076-2641009	Pallekagama, Maradankadawala	Female	2	Yes		no	Yes	
296	BMH Bandaranayaka	077-9531264	Pallekagama, Maradankadawala	Female	2	Yes		no	Yes	
297	Wijitha Mallika Dissanayaka	071-6312918	Idunugala, Maradankadawala	Female	1	Yes	Deed	yes	Yes	Agrowell
298	Nilmini Dissanayaka	077-0323855	Idunugala, Maradankadawala	Female	1	Yes	Deed	No	Yes	Agrowell
299	KD Somarathna	076-9318104	Idunugala, Maradankadawala	Male	0.5	Yes	Deed	No	Yes	
300	MD Dissanayaka	071-3195952	Dampelessagama, Maradankadawala	Male	0.5	Yes	Deed	No	Yes	Agrowell
301	DM Chandrathilaka	071-9128619	Dampelessagama, Maradankadawala	Male	1	Yes	Deed	No	Yes	Agrowell
302	KDM Herath Bandage	071-1105591, 078-7330030	Idunugala, Maradankadawala	Male	2.5	Yes	Deed	No	yes	Agrowell
303	M Somapala Dassanayaka	071-6962866	Dampelessagama, Maradankadawala	Male	0.5	Yes	Deed	No	yes	Agrowell
304	T Chandani Shyama Rathnasiri	076-1543049	Dampelessagama, Maradankadawala	Female	0.75	Yes	Deed	yes	Yes	Agrowell
305	M Bandaranayaka Dissanayaka	071-1997194	Dampelessagama, Maradankadawala	Male	0.75	Yes	Deed	yes	Yes	Agrowell
306	DM Karunarathna	074-0096369	Idunugala, Maradankadawala	Male	0.5	Yes	Deed	No	Yes	
307	DM Nimal Dassanayaka	071-2865947	Idunugala, Maradankadawala	Male	1	Yes	Deed	No	Yes	Agrowell
308	DJ Rupasinghe	071-6053355	Idunugala, Maradankadawala	Male	1	Yes	Deed	No	yes	
309	R Anulawathi	071-2388681	Idunugala, Maradankadawala	Female	0.5	Yes	Deed	No	yes	
310	UJ Erandi Pradeepika Jayarathna	070-4550616	Idunugala, Maradankadawala	Female	0.5	Yes	Deed	No	yes	Agrowell
311	SM Kumarasinghe		Idunugala, Maradankadawala	Male	0.5	Yes	Deed	No	yes	Agrowell
312	NK Jayawardhana		Idunugala, Maradankadawala	Female	0.5	Yes	Deed	No	yes	Agrowell
313	BM Ajith Banadara	076-1515750	Idunugala, Maradankadawala	Male	0.25	Yes	Deed	yes	yes	Agrowell

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314	DMM Punchibanda		Idunugala, Maradankadawala	Male	0.5	Yes	Deed	yes	yes	Agrowell
315	HMK Kemangani	071-1948098	100 Km post, Maradankadawala	Female	0.5	Yes	Deed	No	yes	Agrowell
316	M Chandrasekara	076-7285016	Dampelessagama, Maradankadawala	Male	0.5	Yes	lease	No	yes	Agrowell
317	OG Manoj Sudarshana	025-7913006	Pallekagama, Maradankadawala	Male	0.5	Yes	Deed	yes	No	Nearby house
318	PA Wickramasinghe	070-1281519	Pallekagama, Maradankadawala	Male	2	Yes	lease	No	Yes	Agrowell
319	WM Jayasinghe	071-4352396	Pallekagama, Maradankadawala	Male	0.5	Yes	Deed	No	Yes	Agrowell
320	Priyanga Hemali Kumarasinghe	071-6199409	Pallekagama, Maradankadawala	Female	1	Yes	Deed	No	No	Tank water
321	TG Ariyawathi	071-8979606	Pallekagama, Maradankadawala	Female	1	Yes	Deed	yes	yes	Agrowell
322	WM Chamila Sanjiwani Wijesinghe	071-6337093	Pallekagama, Maradankadawala	Female	1	Yes	Deed	yes	yes	Agrowell
323	Dinesh Kumara Bandaranayaka	071-9189129	Pallekagama, Maradankadawala	Male	1	Yes	Deed	No	yes	Agrowell
324	DM Sunil Dissanayaka	070-5749054	Pallekagama, Maradankadawala	Male	1	Yes	Deed	No	yes	Agrowell
325	TB Sunanda	072-2934813	Pallekagama, Maradankadawala	Male	2	Yes	Deed	No	yes	Agrowell
326	BM Lalitha Bandaranayaka	071-7320005	Pallekagama, Maradankadawala	Female	2	Yes	Deed	No	yes	Agrowell
327	S Udeni Kumari	078-9251010	Gulupeththewewa, Ranajayapura Junction	Female	2	Yes	Deed	yes	yes	Agrowell
328	LR Chandani	071-2490264	Gulupeththewewa, Ranajayapura Junction	Female	1.5	Yes	Deed	yes	yes	Agrowell
329	Amith Sandaruwan Dissanayaka	077-1653012	Idunugala, Maradankadawala	Male	1	Yes	Deed	no	yes	
330	Dhammika Ruwan Dissanayaka	071-2378865	Dampelessagama, Maradankadawala	Male	2	Yes	Deed	yes	yes	Agrowell
331	DM Wimalarathna	072-4137774	Idunugala, Maradankadawala	Male	1	Yes	Deed	yes	yes	Agrowell
332	RS Dissanayaka	076-5553001	Idunugala, Maradankadawala	Male	0.5	Yes	Deed		No	Agrowell
333	ERM Sarath Dissanayaka	071-4466830	Pallekagama, Maradankadawala	Male	3	Yes	Deed	no	yes	Agrowell
334	EA Jayalal Edirisinghe	072-5268436	16, Track 1, Senapura	Male		Yes	Deed	no	yes	Canal
335	PP Mahinda Premalal	071-5152197	Track 1, Senapura	Male	0.5	Yes	Deed	no	yes	Agrowell
336	TM Nirosha Thennakoon	078-3053524	Kalakarbewa, Karabewa	Male	1.5	Yes	Deed	yes	yes	Tube well
337	WA Hemalatha Wijesekara	070-2145306	Mahayayagama, Kala Karabewa	Female	0.5	Yes	Deed	yes	yes	Agrowell
338	ARMU Rathnayaka	076-4160954	Mahayayagama, Kala Karabewa	Male	2	Yes	Deed		yes	Irrigated
339	RMMSB Rajapaksha	077-5072295	Aswedduma, Kala Karabewa	Male	2.5	Yes	Deed	yes	Yes	
340	KA Winitha Gunathilaka	070-3554436	Pin Para, Kala Karabewa	Female	1	Yes	Deed	no	Yes	Agrowell
341	KA Wasanthi Gunathilaka	077-5215234	Pin Para, Kala Karabewa	Female	0.5	Yes	Deed		No	

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342	TMAK Kularathna	071-6604190	Pin Para, Kala Karabewa	Male	0.5	Yes	Deed		Yes	Agrowell
343	DMK Sanjeewa	070-1963257	Bo gaha Acre, Kala Karabewa	Male	1	Yes	Deed	no	No	Agrowell
344	WA Rohana Lalith	070-1614331	Pugollagama, Kala Karabewa	Male	1	Yes	Deed	no	Yes	Agrowell
345	ED Thilakasiri Perera	077-4212698	52, Shanthagama	Male	0.5	Yes	Deed	yes	Yes	Agrowell
346	DP Chandani Wickramasinghe	025-2265305	Kunchikulama, Ipalogama	Female	2	Yes	Deed	yes	Yes	Agrowell
347	DP Gamini Wickramasinghe	077-7953328	Kunchikulama, Ipalogama	Male	3	Yes	Deed	yes	Yes	Agrowell
348	Ranjani Kalyani Basnayaka	071-9863286	5th Post, Kunchikulama	Female	1	Yes	Deed	yes	Yes	Agrowell
349	UB Illangasinghe	025-2263747	Kunchikulama, Ipalogama	Male	3	Yes	Deed	yes	Yes	Canal
350	PG Wimalawathi	078-3467549	5th Post, Kunchikulama	Female	1.25	Yes	Deed	yes	Yes	Agrowell
351	GG Chandani Malkanthi	078-9791375	Sri Gamunupura, Ipalogama	Female		Yes	Deed	yes	Yes	Tube well
352	HM Manoj Wijerathna	078-5161538	Sri Gamunupura, Ipalogama	Female	1	Yes	Deed	yes	Yes	
353	BM Priyantha Gunarathna	072-4494755	Kunchikulama, Ipalogama	Male		Yes	Deed	yes	Yes	Agrowell
354	WA Weerasekara	077-4909940	Kunchikulama, Ipalogama	Male		Yes	Deed	yes	Yes	
355	TB Rajakaruna	071-7075611	Kunchikulama, Ipalogama	Male	1	Yes	Deed	yes	Yes	Agrowell
356	W Kusumalatha	071-4855876	Kunchikulama, Ipalogama	Female	1.5	Yes	Deed	yes	No	
357	DM Ananda Dissanayaka	071-0164878	Garment Road, Kunchikulama, Ipalogama	Male	2.5	Yes	Deed	yes	Yes	Agrowell
358	Nimal Kumarapeli	071-1497902	Kunchikulama, Ipalogama	Male		Yes	Deed	yes	Yes	Pumping
359	KW Wijayasiri Fernando	071-8171823	"Sasikala", Kunchikulama, Ipalogama	Male	1	Yes	Deed	yes	Yes	Tube well
360	AM Sugath Ashoka	071-8972615	Aswedduma, Kala Karabewa	Male	0.5	Yes	Deed	yes	Yes	
361	RM Mahindarathna	071-2425929	Kunchikulama, Ipalogama	Male	0.25	Yes	Deed	yes	Yes	Agrowell
362	TB Nandasena	071-2282603	Palugaswewa Farm, Wijitha pura	Male	0.5	Yes	Deed	yes	Yes	
363	LKR Rathnayaka	072-7410710	55, In front of Garment, Kunchikulama, Ipalogama	Male	2	Yes	Deed	yes	Yes	Agrowell
364	HM Nishantha Jayawardhana	071-2235037	Sangattawa, Mahailuppallama	Male	1	Yes	Illegal	No	Yes	
365	HM Wimal	071-555166	Kaduruwagama, Kala Karabewa	Male	0.5	Yes	Deed	No	Yes	Tank water
366	AG Ranjith Kumara	078-4502534	Mahayayagama, Kala Karabewa	Male	0.25	Yes	Deed	No	No	
367	PKC Gamage	077-8049157	Kallanchiyagama, Kagama	Male	1	Yes	lease	No	No	
368	DM Sumedha Kumara	071-9704794	Canal, Kagama	Male	1.5	Yes	Deed	yes	Yes	
369	AM Lalantha Sanjeewa Adhikari	071-2519204	2nd Canal, Kagama	Male	2.5	Yes	Deed	yes	Yes	
370	HAM Indrawathi	071-0192309	No 5 Canal, Kagama	Female	4	Yes	Deed	yes	Yes	

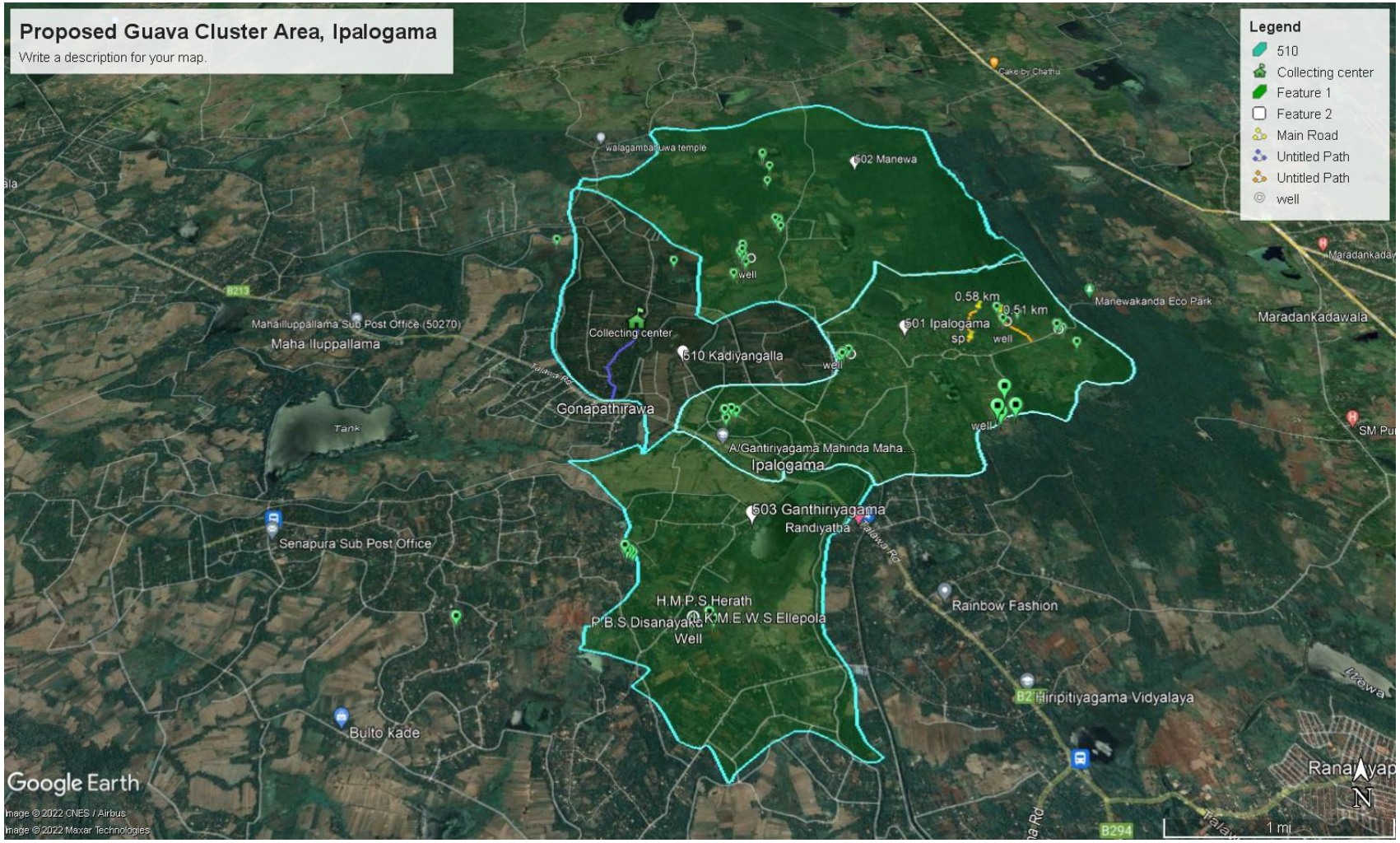
№	Name of the farmer	Contact no	Address	Gender	Extent of proposed cropping (Acres)	Presence of land	Land ownership	Available of security fence	Availability of water annually	Water resource
371	WM Dhammika Pathma Kumari	071-2127408	No 5 Canal, Kagama	Female	0.5	Yes	Deed	No	Yes	Agrowell
372	WM Nishshanka Rathnayaka	077-6401359	No 5 Canal, Kagama	Male	0.75	Yes	Deed	No	Yes	Agrowell
373	SA Jayaseakara	070-3960463	"Ruwan Sewana", Galwanguwa, Ipalogama	Male	1.5	Yes	Deed	No	Yes	Tap Line
374	YMY Tikiri Kumarihami	078-7327749	No 5 Canal, Kagama	Female	1	Yes	Deed	No	Yes	Agrowell
375	HM Bandaranayaka	025-5682271	No 5 Canal, Kagama	Male	2	Yes	Deed	No	Yes	Agrowell
376	HB Upali Anurasiri Herath	078-8275168	Kadiyangalla, Ipalogama	Male	3	Yes	Deed	No	Yes	Agrowell
377	HMDI Kumara Herath	070-2389198	Machchagama, Ipalogama	Male	3	Yes	Deed	No	Yes	Agrowell
378	G Keerthipala	072-3738699	Machchagama, Ipalogama	Male	1.5	Yes	lease	No	Yes	Agrowell
379	P Sugath Priyadarshana	076-1607949	Machchagama, Ipalogama	Male	3	Yes	Illegal	No	Yes	Agrowell
380	HG Ariyadasa	071-2824442	No 70, Track 4, Senapura	Male	1	Yes	Deed	No	Yes	Agrowell
381	HM Priyantha Herath	077-7263862	Kadiyangalla, Ipalogama	Male	2	Yes	Deed	No	Yes	Agrowell
382	SA Nimali Sanjeewani	077-7944153	Gonapathirawa, Ipalogama	Female		Yes	Deed	No	Yes	Tube well
383	HM Piyasena	076-8203603	Gonapathirawa, Ipalogama	Male	1.5	Yes	Deed	No	Yes	Tube well
384	UB Podimanike	076-8203603	Gonapathirawa, Ipalogama	Female	1.5				Yes	Tube well
385	J Sandakelum Wickramasinghe	076-9052723		Male		Yes	Deed	No		
386	J Chamika Madhuranga Wickramasinghe	070-4236024	Gonapathirawa, Ipalogama	Male		Yes	Deed	No	No	
387	DM Priyantha Kumara Dissanayaka	077-9004092	Gonapathirawa, Ipalogama	Male	1.5					
388	DB Upali Dissanayaka		Kadiyangalla, Gonapathirawa	Male	3					
389	G Samantha Herath		Gonapathirawa, Ipalogama	Male	2					

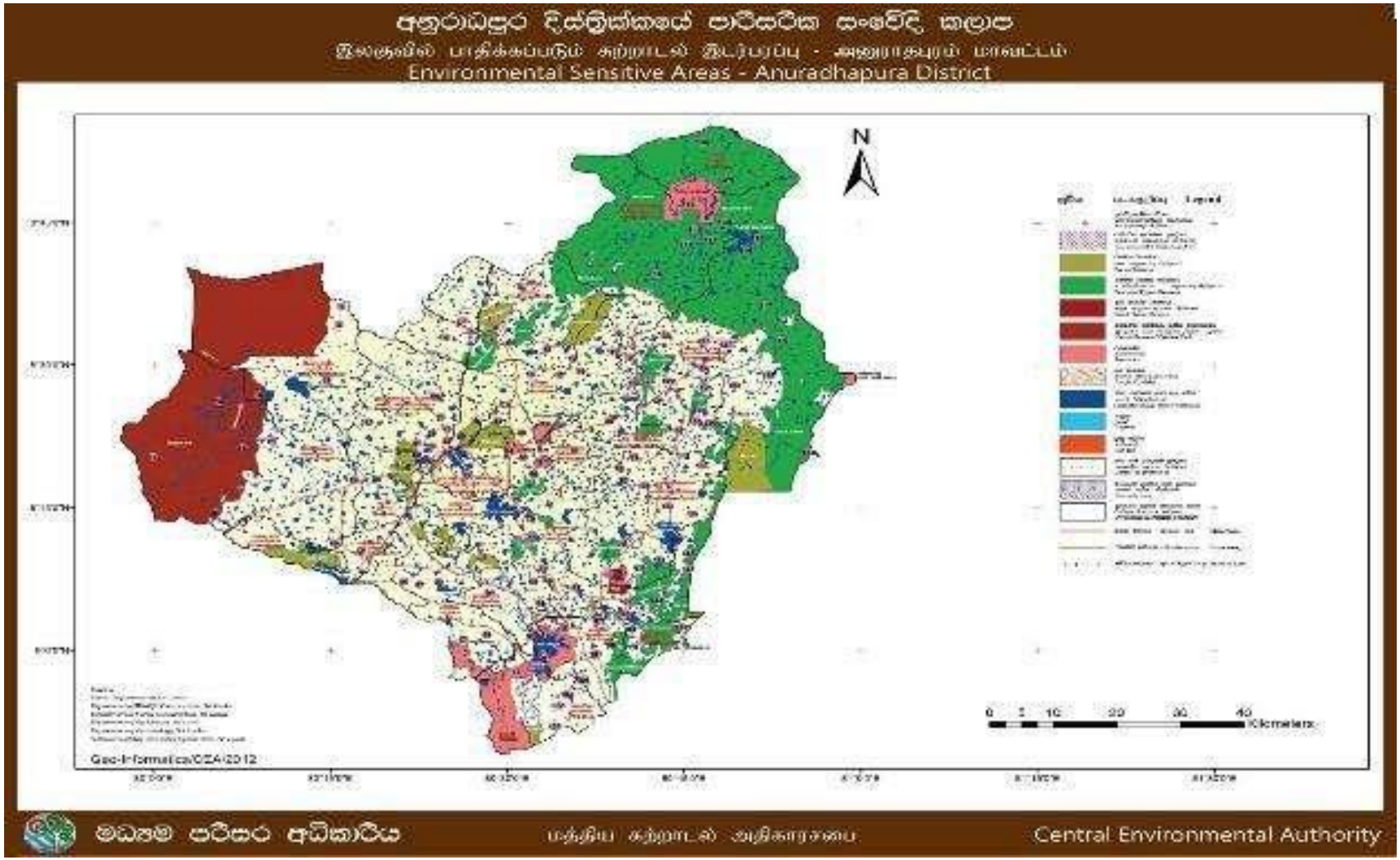
ANNEXURE 3: INSTITUTIONAL ROLES IN IPOLOGAMA GUAVA CLUSTER

Agency/ committee	Officers responsible	Official functions assigned	Expected role in cluster development programme
DOA (Provincial)	• Assistant Director (Ext) • Ipalogama	• Provide extension support through Field Staff and maintain data system	• Coordinate all the extension activities on new technology and crop management
	• Agriculture Instructor • (Ipalogama)	• Carry out extension field programmes with Agrarian Research and Productivity Assistants	• Implement extension activities on new agricultural technology and crop management
Agrarian Development Department	• Agrarian Development Officer Ipalogama	• Administering of Agrarian Research and Productivity Assistants attached to Agrarian Service centre. Agric. Input supplies, manage paddy-land Act and FPO registration under 56A and 56B	• Coordinate activities related to input supplies and make relevant the Agrarian Research and Productivity Assistants involvement more active in the Programme
	• Agrarian Research and Productivity Assistants	• Assist the Agrarian Development Officer and Agriculture Instructors to implement field programmes. Maintain data and information on Agriculture and communicate with FO and farmers on issues	• Communicate with FO members including guava farmers and keep records of updates on each guava farmer • Organise farmer meetings when requested by the Agriculture Instructors, Agriculture Development Officer or Senior Officers
Divisional Secretariat. Ipalogama	• Divisional Secretary/Asst. Divisional Secretary • Ipalogama	• Administrative head of the Secretariat area and Chairman of the Divisional Agriculture Committee holding monthly meetings which all the Divisional Heads, FPO leaders are participating	• Extend cooperation to get the involvement of Grama Niladaris, Development Officers and Samurdhi Niladari in the cluster area. Assist to settle land ownership issues and disputes of guava farmers
	• Grama Niladari (village officer)	• Deal with key functions such as poverty alleviation, conflict resolution at village level and maintain population data of people in his area	• Extend village level cooperation to mobilise guava farmers and assist farmers to select their Representatives with good personnel qualities
	• Land officer	• Land management under Land Development Ordinance in the area	• Assistance to settle land tenure issues and encroachments. Proper information on legal land ownership and nominated successors

Agency/ committee	Officers responsible	Official functions assigned	Expected role in cluster development programme
Divisional Agriculture Committee	• Members of Divisional Agriculture Committee (Divisional Secretary, AD-Agriculture, Agrarian Development Officer, Land Officer, GNs, Provincial irrigation engineer, Representative from Mahaveli Syste m H, Framer Representatives and others)	• Taking up for discussion of all issues related to agriculture, input supplies, seasonal cultivation decisions, pest and diseases and marketing of agriculture produce. Find alternative solutions and assign the responsibilities for remedial actions	• Take this forum to discuss the issues related to guava cultivation and get the active involvement of relevant line agency officers. (Issue on irrigation Water from Mahaveli Feeder canal)
Field Crop Research and Development I nstitute (Maha Illuppall ama)	• Entomologist • Pathologist • Irrigation Agronomist	• Carry out research activities on pest and diseases, new irrigation systems and cropping systems related to Field crops	• Provide required research information on guava cultivation and provide assistance to overcome agronomic issues

ANNEXURE 4: RESIDENTIAL/SENSITIVE LOCATIONS

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Environmental Sensitive Areas - Anuradhapura District
N
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Kilometers
Geo-Informatics/CEA/2012
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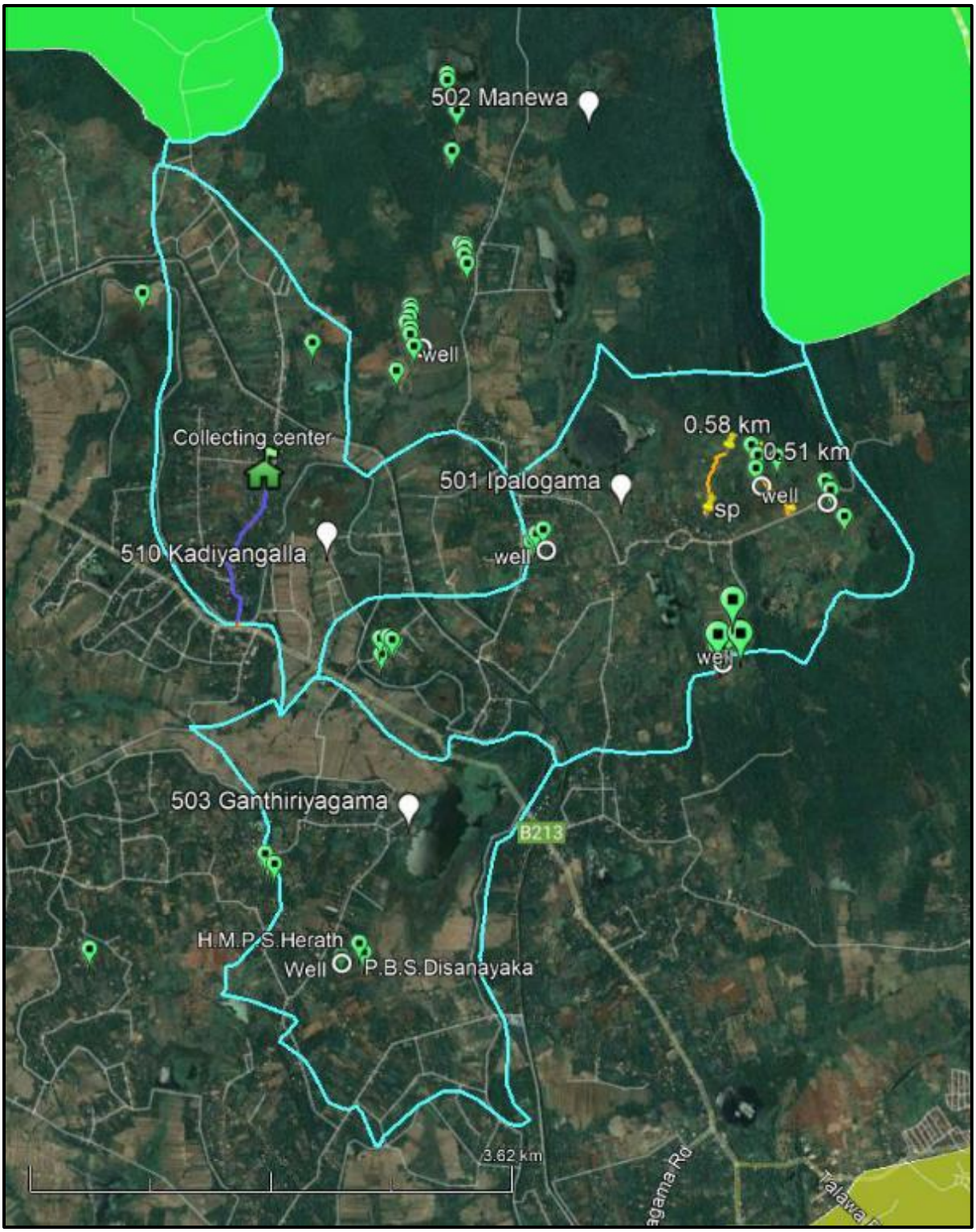
மத்திய சுற்றாடல் அதிகாரசபை
Central Environmental Authority


502 Manewa
well
Collecting center
0.58 km
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501 Ipalogama
sp
well
510 Kadiyangalla
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503 Ganthiriyagama
B213
H.M.P.S.Herath
Well
P.B.S.Disanayaka
3.62 km

ANNEXURE 5: ESTABLISHMENT OF COMPOST PRODUCTION UNIT

1. Rationale

Soil productivity and environmental concerns have revived global interest in organic recycling practices such as composting. Composting considered as an attractive option for turning on-farm organic waste materials into a valuable farm resource. However, at present the quality of organic fertilisers could be considered as one of the most limiting resources in crop production. In this respect compost plays an important role to mitigate and solve the problem of inadequacy of suitable organic fertilisers in crop production.

An overall decline of soil fertility is a major problem associated with crop production in Sri Lanka. Decline of soil fertility is mainly due to depletion of soil organic matter and loss of plant nutrients. Organic matter decline takes place due to soil erosion, decomposition due to high soil temperatures and low attention to organic fertiliser added to soil. Low organic matter content in soil has created several problems such as yield decline and yield stagnation even in all crop sectors. It is a well-known fact that the Cation Exchange Capacity of many Sri Lankan soils is low chiefly due to low organic matter content. Under such conditions, retention of plant nutrients is low and subsequently chemical fertiliser efficiency will decrease. Thus, many agricultural farming systems are becoming non-profitable to farmers even though heavy investments in many other farming activities. Hence, application of organic fertilisers such as compost will be a beneficial effect on crop yield as well as on over all soil fertility. In addition, compost could be considered as the most suitable organic fertiliser for crop production when compared to many other organic fertilisers due to its number of characteristics such as presence of decomposed organic materials, ready availability of plant nutrients, absence of weed seeds and pathogens, high efficiency, low volume etc. One of the important contributions of compost is the high organic matter fraction, which improves the physical conditions of poor soils such as soil structure, texture, tilth, water holding capacity etc. In addition, compost also improves the chemical and biological properties of soils. Compost carries small quantities of growth promoting substances similar in nature to hormones. The application of organic fertilisers such as compost to soil will be useful for reducing the incidence of plant diseases. Addition of organic fertilisers suppressed the numbers of plant parasitic nematodes. However, in the recent past, most people were unaware that using composts is an effective way to increase healthy plant growth; help to save money by reduce the use of chemical fertilisers, and conserve natural resources while helping to recycle wastes.

2. Integrated plant nutrition system

The complementary role which organic and chemical fertilisers play in crop production is a popular fact. To improve soil fertility, it is important to follow environmentally friendly plant nutrition management practices under what has been termed the Integrated Plant Nutrition System (IPNS). This concept advocates the balanced use of both organic and chemical fertilisers for crop production. IPNS is considered as the most suitable plant nutrient management system to increase the crop yield while maintaining the good soil fertility. Since compost is one of the most important components of the IPNS technology production of compost will be an immense benefit for the development of the country. Therefore, ISP will undertake following steps in all clusters:

- Promote manufacturing of compost using available raw materials in cluster areas.
- Promote utilisation of compost and liquid organic fertilisers and reduce the use of chemical fertilisers through IPNS.

Farmers in Sri Lanka are used to apply only chemical fertiliser for their cultivations which has been a contributory factor towards gradual decline of fertility in soil. This situation is adversely affecting crop production in all clusters. Hence, the utilisation of organic fertiliser in addition to the chemical fertiliser is

essential for successful crop production in clusters. In this regard, it is necessary to increase the overall organic fertiliser production in all clusters as well as in throughout the country. The objective of this modernisation investment and activity is to encourage farmers to produce total requirement of compost within the cluster areas because transport of compost from long distance is not economical. Therefore, it is expected to encourage some producers to make large scale productions on commercial basis.

3. Objectives of the compost production programme

- Utilise freely available organic materials for crop production
- Creation of a favourable environment through recycling of organic waste materials
- Reduce chemical fertiliser use through compost production and use
- Popularise use organic fertiliser in addition to chemical fertilisers for crop production
- Increase chemical Fertiliser Use Efficiency
- Improve soil fertility and maintain sustainability
- Popularise quality compost production
- Minimise environmental pollution
- Economical crop production
- Minimise chemical fertiliser use
- Popularise proper waste management system
- Introduce compost production on commercial scale
- Emergence of a market for compost
- Initiate a compost sale as a viable business

At present the amount of waste materials which are freely available in clusters could be considered as important resources for successful compost production. They are rich in plant nutrients. In general, banana waste materials available in Rajanganaya and Jaffna are high in potassium. Waste minimisation is a very important aspect in banana crop production to minimise pest and diseases. Therefore, ISP will establish compost production in all clusters as an important intervention. This action will ensure increase the soil fertility in clusters as well as increase crop production and subsequent sustainability of agricultural crop production.

4. Site selection

Generally, well-chosen site can speed up the composting process. In this regard, well-drained area of the location is suitable for compost production. Similarly, shadier spot is more suitable so it does not dry out too quickly. Preparation of compost over soil or grasses is better than concrete floor, to take advantage of microbes and other decomposers. Site should be selected from reasonable distance of houses. The selected location should have access roads, electricity, water sources (well), area for unloading raw materials and loading final product, parking access, production area, processing area, storage facilities, small management room, changing room, lunch room, bathroom etc.

5. Steps of compost production process

1. Collection of raw materials
2. Production of compost
3. Drying
4. Crushing
5. Sieving
6. Packaging
7. Distribution
8. Marketing

6. Main activities under the compost production programme in clusters:

- Selection of farmers or FPOs those who can do compost production
- Registration of compost production in relevant authorities
- Collection of information on raw- materials availability in each cluster areas
- Selection of suitable sites in each cluster
- Establishment of compost production units in each cluster
- Training of farmers in groups through field demonstrations on complete package of the compost production
- Educate farmers on quick compost production technologies, maintenance of the quality, storage, stocks, run as a business etc.
- Arrange compost production with individuals or FPOs
- Laboratory testing of produced compost samples for quality testing
- Design bags with brand names and other relevant details
- Guide for marketing of compost

7. Buildings, Tools and Equipment Required for Compost Production Unit (100 t/month)

No.	Item	Number
1.	Shovel	5
2.	Pitch fork	5
3.	Wheel barrow	5
4.	2-wheel tractor	1
5.	Boots	10 pairs
6.	Water pump 1”	1
7.	1” hose pipes	200m
8.	Chipper/ Shredder	1
9.	Black polythene (Gauge 750, 3ft width and double)	500kg
10.	Compost turner	1
11.	Rotary Sieve	1
12.	Weighing machine up to 100kg	1
13.	Manual Bag closer/ stitcher machine	2
14.	Small truck (Optional)	1
15.	Printed bags 25kg and 50kg	10,000 each
16.	Compost Aerator (Optional)	1
17.	Compost thermometer (Optional)	1
18.	Drying, processing and sieving hut 15m x 20m	1
19.	Storage building with basic office room, changing room and toilet 20m x40m	1
20.	Miscellaneous items	

8. Heap method of compost production

Heap method is more advantageous than any other methods for commercial compost productions. Under heap method aerobic composting takes place in the presence of Oxygen. In this process, aerobic microorganisms break down organic matter and produce carbon dioxide, ammonia, water, heat and humus, producing the relatively stable organic end product. The heat generated accelerates the breakdown complex compounds such as proteins, fats, cellulose and hemi-cellulose in raw materials. In heap method the processing time is shorter. In addition, this process destroys harmful pathogens; as well

as weed seeds due to undergo sufficiently high temperature. Therefore, aerobic composting is considered more efficient and effective than anaerobic composting for agricultural production.

The aerobic composting process starts with the formation of the pile. First, mesophilic organisms multiply rapidly with the temperature of 20 - 450C on the readily available sugars and amino acids. Under such conditions, they generate heat by their own metabolism and raise the temperature to a point where their own activities become suppressed. Then some thermophilic fungi and several thermophilic bacteria under the temperature range 50 - 700C or more continue the process, raising the temperature up to 650C or higher. In many cases, the temperature goes up to 70 - 800C and this peak heating phase is important for the quality of the compost as the heat kills pathogens and weed seeds.

The general process of producing compost involves piling the organic waste in long rows. The heap is usually started with 20-30 cm layer of different raw materials. Alternate layers should be placed with different raw materials available in the area in the heap. The manure, dung and animal urine are excellent for composting due to high nitrogen content and less C/N ratio. The application of Eppawala rock phosphate is also an important step in compost production. It is well-known fact that quality of compost could be improved when rock phosphate is added. Different raw materials are placed until the pile is 1.5 - 2.0m high. It is advisable to maintain the width about 2 - 2.5m at the base for successful aeration. The sides are tapered so that the top is about 0.5m narrower in width than the base. The substrates should be piled loosely in a compost heap to provide better aeration within the heap. After 3-4 layers of raw materials normally apply sufficient water and compost activator/inoculant. After formation, the pile is covered with black polythene to retain heat and moisture but leave a sufficient space at the bottom for ventilation.

The active composting stage is followed by turning stage, and the pile temperature decreases gradually with the time. Therefore, turning/mixing should be done every 3 - 4 weeks interval to activate the decomposition of raw materials. However, maximum three turning/mixing steps are recommended during the whole period of the composting process due to high labour involvement for this process. At each turning, the material is mixed thoroughly and moistened with water and apply compost activator/inoculant such as Trichoderma fungus. In general, the C/N ratio should be maintained with carbonaceous and nitrogenous materials for successful decomposition. Under such conditions, compost can be typically produced within 8-12 weeks depend on raw materials used. In reasonably mature compost contains a wide range of particle sizes from fine grains to partly decomposed twigs and un-compostable fragments from refuse. Therefore, compost may need sieving by 4mm sieve before sending to the market. Mature compost should have a crumbly texture, an earthy smell and be dark brown or black in colour.

Compost has high market share in a growing market. Produced compost in the cluster has the option to sell directly to the end users such as cluster farmers and other farmers in the area. The government's stance on promoting local, organic fertiliser is a favourable signal for businesses venturing into the industry. Since, organic fertiliser is a major requirement for high productivity of crops and can be considered an essential product. Disposal of banana waste is a major challenge for many banana farmers, due to the costs and logistics involved; with almost all farmers just dumping it inside their farms. Inefficient disposal of crop waste and other waste materials has a severe impact on the crop and the environment. Hence, production of compost using waste materials can mitigate the disposal problem as well to obtain useful organic fertilisers for crop production. In addition, this will be an additional venture for FPOs and cluster farmers.

9. Management of compost production unit

a. Approvals

Before initiating the compost facility, the person or FPO shall obtain the approval from relevant authorities of the area. Several regulatory regimes come into play prior to initiate compost production.

b. Management

Managing the composting process involves the balancing of several different variables, all impacting on the others. These interactions therefore need to be managed. Operators need to encourage the right conditions to aid microbial growth and activity. A careful balance of these variables results in a quality product, in minimum time, and considerably reduces the potential environmental impacts from the composting activity.

c. Compost quality

Quality Management systems play a fundamental part in good processing and product. Hence, person or FPO responsible for compost production in clusters shall produce compost that meets the standards established by Sri Lanka Standards Institution in 2019. In this regard, regular testing of compost samples should be undertaken.

d. Record keeping

The person or FPO will be responsible to establish and maintain an operating record for the compost facility. Records are needed in relation to: waste acceptance and disposal, validation and on-going assessment of process monitoring and sample testing, traceability, environmental monitoring and dispatched material.

10. Marketing

The marketing strategy needs to be prepared to market the compost in various market segments such as farmers, nurseries, institutions, home garden etc. The strategy includes product design, pricing, distribution and promotional strategies. The strategy will be used to market compost to ensure that activity is sustainable.

Overall, this activity has the success in demonstrating the application of composting technology to process the market waste. Both technical and financial feasibility of the application of this technology on a large scale will be demonstrated. Since, compost has high demand in many crop sectors it indicates that the production can be done in a sustainable manner which has additional advantages for the community.

The compost marketing and distribution system in Sri Lanka is a free enterprise mainly in the hands of the private sector. The present marketing channels through, which compost flow from the producer to the farmers and end users throughout the country consist of three main levels of handlers namely: Producers, Distributors and Dealers/ Retailers.

Establishing a price for a product is one of the most important marketing decisions. In a developing market or in a competitive market pricing is an important element in a marketing strategy. The pricing system should cover the cost of the product and the cost of marketing the product. However, it should be noted that price and quality of compost in local market is vary drastically. The sales promotion and market development activities should be done to stimulate demand, thus increase sales of the product. In marketing terms, compost must compete with the chemical fertilisers to be able to take a share of the latter's market. Therefore, promotional activities should be done to show the importance of usage of organic fertiliser in combination with chemical fertilisers as basal dose for annual crops and for perennial crops basal as well as for top dressings.

The means of promoting the sales of organic fertilisers include the following:

- Training farmers, extension officers, traders and other relevant target groups
- Field demonstrations, field days, field tours etc.

- Outdoor advertising / Billboards
- Use mass media for various promotional activities
- Poster displays in strategic places
- Distribution of samples for trial use
- Granting of promotional discounts on purchases
- Arrange credit facilities

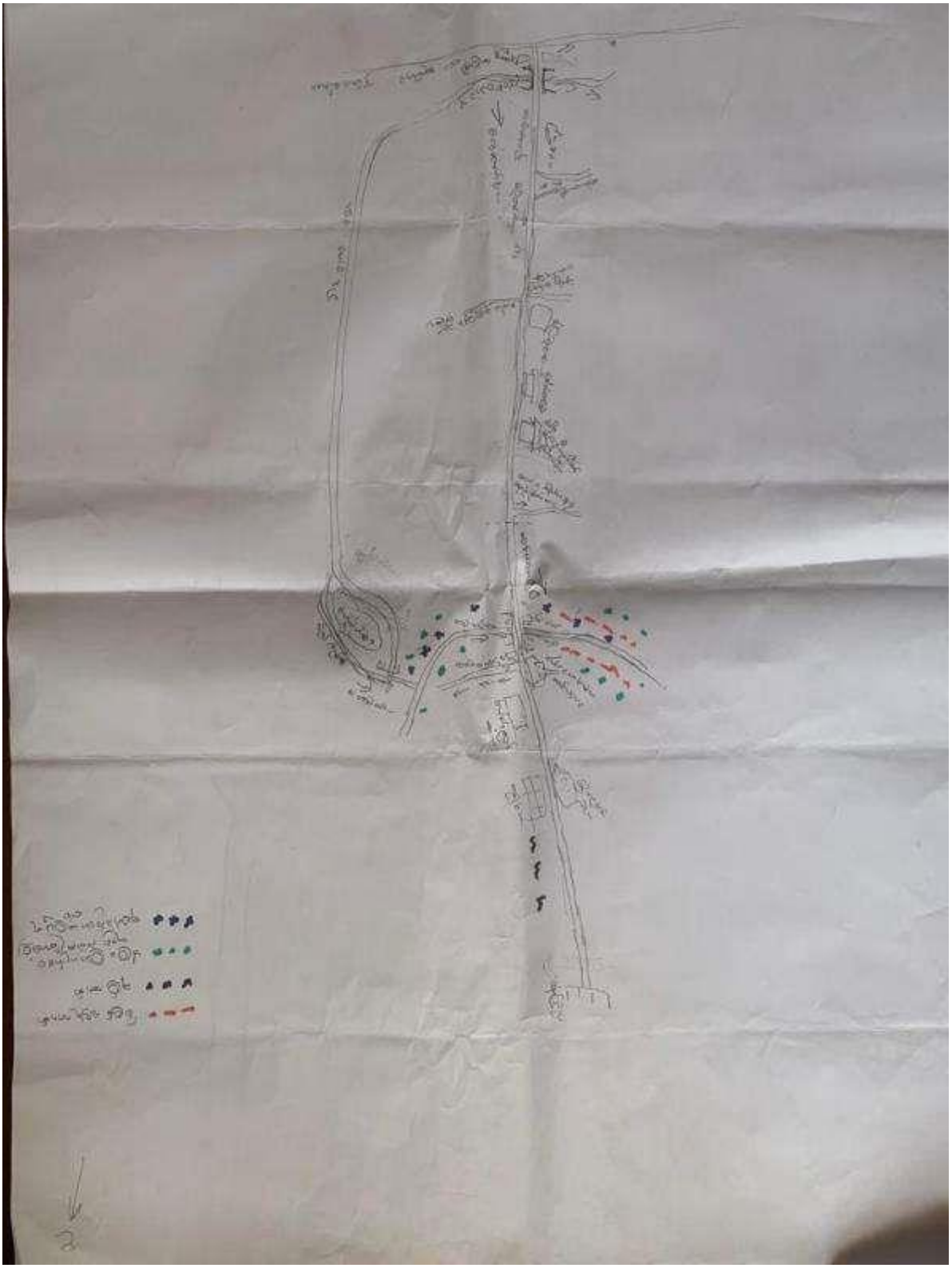
11. Environmental impact

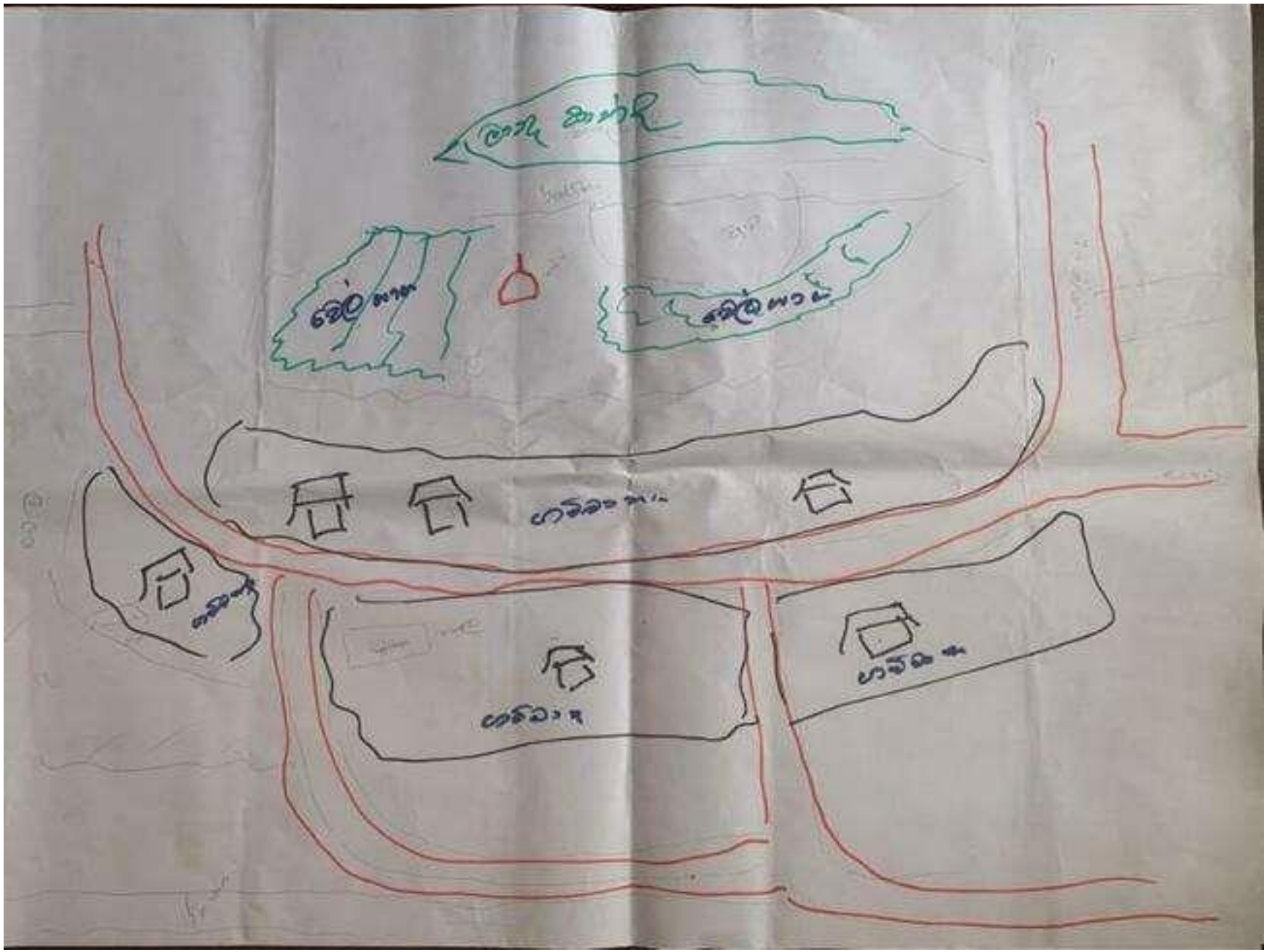
The unit will be established to minimise the environmental impact including measures to minimise odour, dust, leachate, etc. Breakdown of organic matter by aerobic oxidation produces no odours. It is important therefore, to supply sufficient air during the composting process. Another important aspect of some of the materials that can be used in composting is their attractiveness of flies. To avoid the problem, the suggestion is maintaining high temperature. Fly larvae are unlikely to survive if temperature is above 550C.

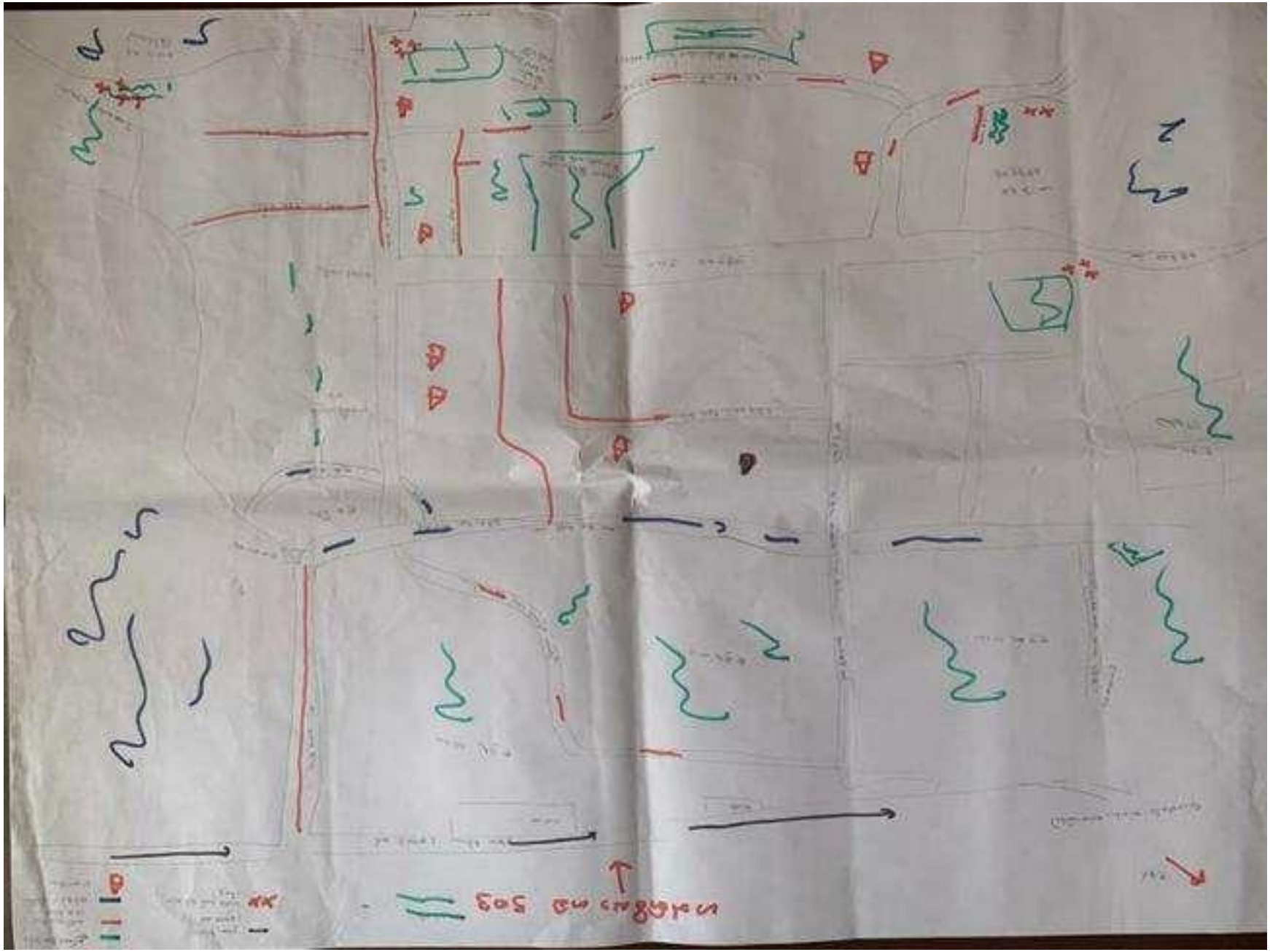
In addition, by turning the heap and placing the outer material in the hot central region many of the larvae will be destroyed; satisfactory fly control is possible by proper turning. Similarly, maintain the high temperature is the most significant factor in causing the death of pathogens too. In addition, steps should be taken to avoid release of leachate to the environment by avoiding excess water use, construction a place to collect leachate and reuse for compost production etc.

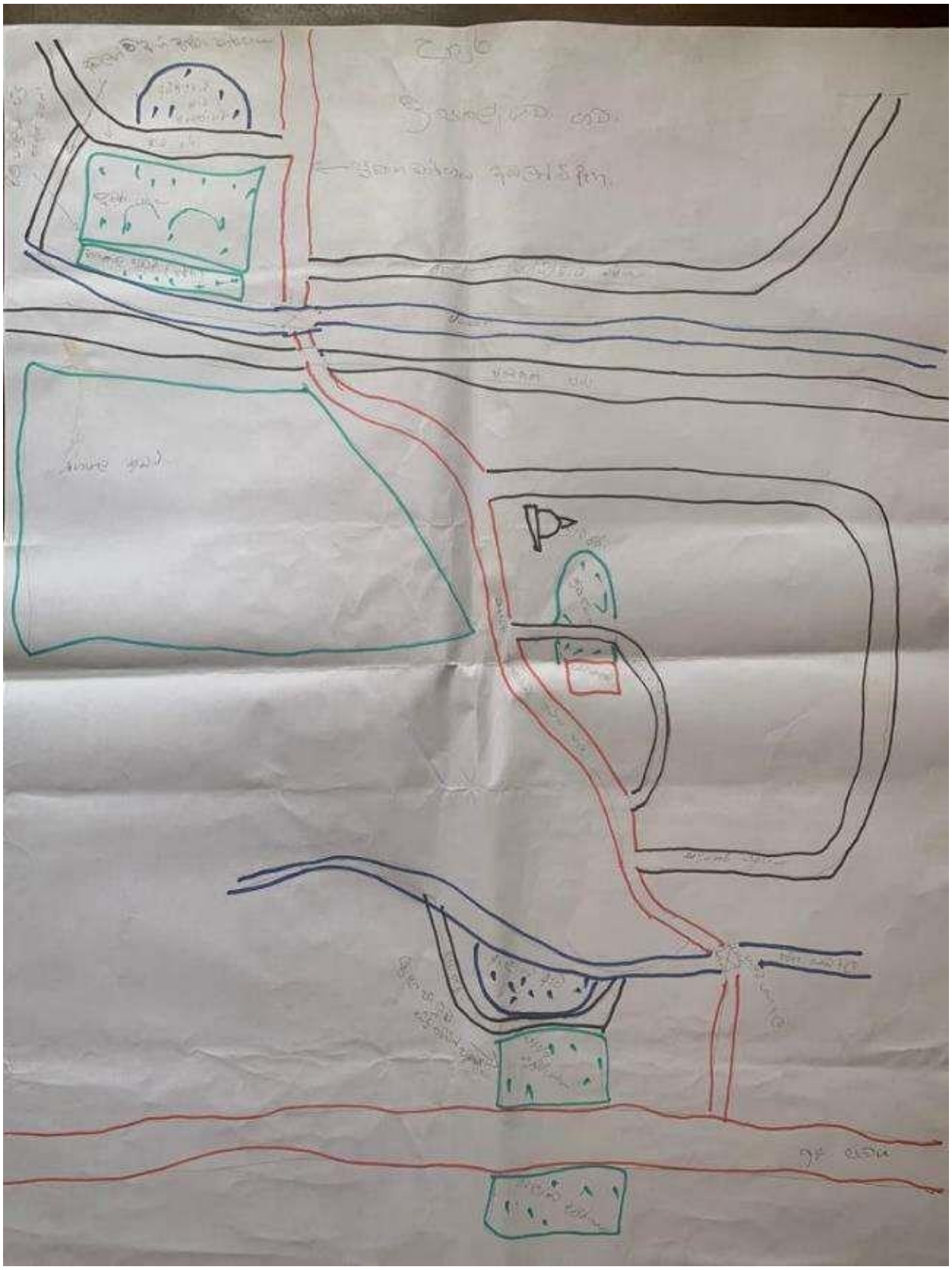
As a further safety measures, it is recommended that no compost unit be set up close to drinking water source. This should prevent any liquid percolating from the compost heap into the water supply, particularly during the rainy season.

ANNEXURE 6: OUTCOMES OF COMMUNITY MAPPING









ANNEXURE 7: WORLD BANK ENVIRONMENTAL SOCIAL FRAMEWORK (ESF) AND SAFEGUARDS INTERIM NOTE:

COVID-19 CONSIDERATIONS IN CONSTRUCTION/CIVIL WORKS PROJECTS

This note was issued on April 7, 2020 and includes links to the latest guidance as of this date (e.g. from WHO). Given the COVID-19 situation is rapidly evolving, when using this note it is important to check whether any updates to these external resources have been issued.

1. INTRODUCTION

The COVID-19 pandemic presents Governments with unprecedented challenges. Addressing COVID-19 related issues in both existing and new operations starts with recognizing that this is not business as usual and that circumstances require a highly adaptive responsive management design to avoid, minimize and manage what may be a rapidly evolving situation. In many cases, we will ask Borrowers to use reasonable efforts in the circumstances, recognizing that what may be possible today may be different next week (both positively, because more supplies and guidance may be available, and negatively, because the spread of the virus may have accelerated).

This interim note is intended to provide guidance to teams on how to support Borrowers in addressing key issues associated with COVID-19, and consolidates the advice that has already been provided over the past month. As such, it should be used in place of other guidance that has been provided to date. This note will be developed as the global situation and the Bank's learning (and that of others) develops. This is not a time when 'one size fits all'. More than ever, teams will need to work with Borrowers and projects to understand the activities being carried out and the risks that these activities may entail. Support will be needed in designing mitigation measures that are implementable in the context of the project. These measures will need to take into account capacity of the Government agencies, availability of supplies and the practical challenges of operations on-the-ground, including stakeholder engagement, supervision and monitoring. In many circumstances, communication itself may be challenging, where face-to-face meetings are restricted or prohibited, and where IT solutions are limited or unreliable.

This note emphasizes the importance of careful scenario planning, clear procedures and protocols, management systems, effective communication and coordination, and the need for high levels of responsiveness in a changing environment. It recommends assessing the current situation of the project, putting in place mitigation measures to avoid or minimize the chance of infection, and planning what to do if either project workers become infected or the work force includes workers from proximate communities affected by COVID-19. In many projects, measures to avoid or minimize will need to be implemented at the same time as dealing with sick workers and relations with the community, some of whom may also be ill or concerned about infection. Borrowers should understand the obligations that contractors have under their existing contracts (see Section 3), require contractors to put in place appropriate organizational structures (see Section 4) and develop procedures to address different aspects of COVID-19 (see Section 5).

2. CHALLENGES WITH CONSTRUCTION/CIVIL WORKS

Projects involving construction/civil works frequently involve a large work force, together with suppliers and supporting functions and services. The work force may comprise workers from international, national, regional, and local labor markets. They may need to live in on-site accommodation, lodge within communities close to work sites or return to their homes after work. There may be different contractors

permanently present on site, carrying out different activities, each with their own dedicated workers. Supply chains may involve international, regional and national suppliers facilitating the regular flow of goods and services to the project (including supplies essential to the project such as fuel, food, and water). As such there will also be regular flow of parties entering and exiting the site; support services, such as catering, cleaning services, equipment, material and supply deliveries, and specialist sub-contractors, brought in to deliver specific elements of the works.

Given the complexity and the concentrated number of workers, the potential for the spread of infectious disease in projects involving construction is extremely serious, as are the implications of such a spread. Projects may experience large numbers of the work force becoming ill, which will strain the project's health facilities, have implications for local emergency and health services and may jeopardize the progress of the construction work and the schedule of the project. Such impacts will be exacerbated where a work force is large and/or the project is in remote or under-serviced areas. In such circumstances, relationships with the community can be strained or difficult and conflict can arise, particularly if people feel they are being exposed to disease by the project or are having to compete for scarce resources. The project must also exercise appropriate precautions against introducing the infection to local communities.

3. DOES THE CONSTRUCTION CONTRACT COVER THIS SITUATION?

Given the unprecedented nature of the COVID-19 pandemic, it is unlikely that the existing construction/civil works contracts will cover all the things that a prudent contractor will need to do. Nevertheless, the first place for a Borrower to start is with the contract, determining what a contractor's existing obligations are, and how these relate to the current situation.

The obligations on health and safety will depend on what kind of contract exists (between the Borrower and the main contractor; between the main contractors and the sub-contractors). It will differ if the Borrower used the World Bank's standard procurement documents (SPDs) or used national bidding documents. If a FIDIC document has been used, there will be general provisions relating to health and safety. For example, the standard FIDIC, Conditions of Contract for Construction (Second Edition 2017), which contains no 'ESF enhancements', states (in the General Conditions, clause 6.7) that the Contractor will be required:

- to take all necessary precautions to maintain the health and safety of the Contractor's Personnel
- to appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents
- to ensure, in collaboration with local health authorities, that medical staff, first aid facilities, sick bay, ambulance services and any other medical services specified are available at all times at the site and at any accommodation
- to ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics

These requirements have been enhanced through the introduction of the ESF into the SPDs (edition dated July 2019). The general FIDIC clause referred to above has been strengthened to reflect the requirements of the ESF. Beyond FIDIC's general requirements discussed above, the Bank's Particular Conditions include a number of relevant requirements on the Contractor, including:

- to provide health and safety training for Contractor's Personnel (which include project workers and all personnel that the Contractor uses on site, including staff and other employees of the Contractor and Subcontractors and any other personnel assisting the Contractor in carrying out project activities)
- to put in place workplace processes for Contractor's Personnel to report work situations that are not safe or healthy
- gives Contractor's Personnel the right to report work situations which they believe are not safe or healthy, and to remove themselves from a work situation which they have a reasonable justification to believe presents an imminent and serious danger to their life or health (with no reprisal for reporting or removing themselves)
- requires measures to be in place to avoid or minimize the spread of diseases including measures to avoid or minimize the transmission of communicable diseases that may be associated with the influx of temporary or permanent contract-related labor
- to provide an easily accessible grievance mechanism to raise workplace concerns

Where the contract form used is FIDIC, the Borrower (as the Employer) will be represented by the Engineer (also referred to in this note as the Supervising Engineer). The Engineer will be authorized to exercise authority specified in or necessarily implied from the construction contract. In such cases, the Engineer (through its staff on site) will be the interface between the PIU and the Contractor. It is important therefore to understand the scope of the Engineer's responsibilities. It is also important to recognize that in the case of infectious diseases such as COVID-19, project management – through the Contractor/subcontractor hierarchy – is only as effective as the weakest link. A thorough review of management procedures/plans as they will be implemented through the entire contractor hierarchy is important. Existing contracts provide the outline of this structure; they form the basis for the Borrower to understand how proposed mitigation measures will be designed and how adaptive management will be implemented, and to start a conversation with the Contractor on measures to address COVID-19 in the project.

4. WHAT PLANNING SHOULD THE BORROWER BE DOING?

Task teams should work with Borrowers (PIUs) to confirm that projects (i) are taking adequate precautions to prevent or minimize an outbreak of COVID-19, and (ii) have identified what to do in the event of an outbreak. Suggestions on how to do this are set out below:

- The PIU, either directly or through the Supervising Engineer, should request details in writing from the main Contractor of the measures being taken to address the risks. As stated in Section 3, the construction contract should include health and safety requirements, and these can be used as the basis for identification of, and requirements to implement, COVID-19 specific measures. The measures may be presented as a contingency plan, as an extension of the existing project emergency and preparedness plan or as standalone procedures. The measures may be reflected in revisions to the project's health and safety manual. This request should be made in writing (following any relevant procedure set out in the contract between the Borrower and the contractor).

- In making the request, it may be helpful for the PIU to specify the areas that should be covered. This should include the items set out in Section 5 below and take into account current and relevant

guidance provided by national authorities, WHO and other organizations. See the list of references in the Annex to this note.

- The PIU should require the Contractor to convene regular meetings with the project health and safety specialists and medical staff (and where appropriate the local health authorities), and to take their advice in designing and implementing the agreed measures.

- Where possible, a senior person should be identified as a focal point to deal with COVID-19 issues. This can be a work supervisor or a health and safety specialist. This person can be responsible for coordinating preparation of the site and making sure that the measures taken are communicated to the workers, those entering the site and the local community. It is also advisable to designate at least one back-up person, in case the focal point becomes ill; that person should be aware of the arrangements that are in place.

- On sites where there are a number of contractors and therefore (in effect) different work forces, the request should emphasize the importance of coordination and communication between the different parties. Where necessary, the PIU should request the main contractor to put in place a protocol for regular meetings of the different contractors, requiring each to appoint a designated staff member (with back up) to attend such meetings. If meetings cannot be held in person, they should be conducted using whatever IT is available. The effectiveness of mitigation measures will depend on the weakest implementation, and therefore it is important that all contractors and sub-contractors understand the risks and the procedure to be followed.

- The PIU, either directly or through the Supervising Engineer, may provide support to projects in identifying appropriate mitigation measures, particularly where these will involve interface with local services, in particular health and emergency services. In many cases, the PIU can play a valuable role in connecting project representatives with local Government agencies, and helping coordinate a strategic response, which takes into account the availability of resources. To be most effective, projects should consult and coordinate with relevant Government agencies and other projects in the vicinity.

- Workers should be encouraged to use the existing project grievance mechanism to report concerns relating to COVID-19, preparations being made by the project to address COVID-19 related issues, how procedures are being implemented, and concerns about the health of their co-workers and other staff.

5. WHAT SHOULD THE CONTRACTOR COVER?

The Contractor should identify measures to address the COVID-19 situation. What will be possible will depend on the context of the project: the location, existing project resources, availability of supplies, capacity of local emergency/health services, the extent to which the virus already exist in the area. A systematic approach to planning, recognizing the challenges associated with rapidly changing circumstances, will help the project put in place the best measures possible to address the situation. As discussed above, measures to address COVID-19 may be presented in different ways (as a contingency plan, as an extension of the existing project emergency and preparedness plan or as standalone procedures). PIUs and contractors should refer to guidance issued by relevant authorities, both national

and international (e.g. WHO), which is regularly updated (see sample References and links provided in the Annex).

Addressing COVID-19 at a project site goes beyond occupational health and safety, and is a broader project issue which will require the involvement of different members of a project management team. In many cases, the most effective approach will be to establish procedures to address the issues, and then to ensure that these procedures are implemented systematically. Where appropriate given the project context, a designated team should be established to address COVID-19 issues, including PIU representatives, the Supervising Engineer, management (e.g. the project manager) of the contractor and sub-contractors, security, and medical and OHS professionals. Procedures should be clear and straightforward, improved as necessary, and supervised and monitored by the COVID-19 focal point(s). Procedures should be documented, distributed to all contractors, and discussed at regular meetings to facilitate adaptive management. The issues set out below include a number that represent expected good workplace management but are especially pertinent in preparing the project response to COVID-19.

(a) ASSESSING WORKFORCE CHARACTERISTICS

Many construction sites will have a mix of workers e.g. workers from the local communities; workers from a different part of the country; workers from another country. Workers will be employed under different terms and conditions and be accommodated in different ways. Assessing these different aspects of the workforce will help in identifying appropriate mitigation measures:

- The Contractor should prepare a detailed profile of the project work force, key work activities, schedule for carrying out such activities, different durations of contract and rotations (e.g. 4 weeks on, 4 weeks off).
- This should include a breakdown of workers who reside at home (i.e. workers from the community), workers who lodge within the local community and workers in on-site accommodation. Where possible, it should also identify workers that may be more at risk from COVID-19, those with underlying health issues or who may be otherwise at risk.
- Consideration should be given to ways in which to minimize movement in and out of site. This could include lengthening the term of existing contracts, to avoid workers returning home to affected areas, or returning to site from affected areas.
- Workers accommodated on site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided.
- Consideration should be given to requiring workers lodging in the local community to move to site accommodation (subject to availability) where they would be subject to the same restrictions.
- Workers from local communities, who return home daily, weekly or monthly, will be more difficult to manage. They should be subject to health checks at entry to the site (as set out above) and at some point, circumstances may make it necessary to require them to either use accommodation on site or not to come to work.

(b) ENTRY/EXIT TO THE WORK SITE AND CHECKS ON COMMENCEMENT OF WORK

Entry/exit to the work site should be controlled and documented for both workers and other parties, including support staff and suppliers. Possible measures may include:

- Establishing a system for controlling entry/exit to the site, securing the boundaries of the site, and establishing designating entry/exit points (if they do not already exist). Entry/exit to the site should be documented.
- Training security staff on the (enhanced) system that has been put in place for securing the site and controlling entry and exit, the behaviors required of them in enforcing such system and any COVID - 19 specific considerations.
- Training staff who will be monitoring entry to the site, providing them with the resources they need to document entry of workers, conducting temperature checks and recording details of any worker that is denied entry.
- Confirming that workers are fit for work before they enter the site or start work. While procedures should already be in place for this, special attention should be paid to workers with underlying health issues or who may be otherwise at risk. Consideration should be given to demobilization of staff with underlying health issues.
- Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site.
- Providing daily briefings to workers prior to commencing work, focusing on COVID-19 specific considerations including cough etiquette, hand hygiene and distancing measures, using demonstrations and participatory methods.
- During the daily briefings, reminding workers to self-monitor for possible symptoms (fever, cough) and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell.
- Preventing a worker from an affected area or who has been in contact with an infected person from returning to the site for 14 days or (if that is not possible) isolating such worker for 14 days.
- Preventing a sick worker from entering the site, referring them to local health facilities if necessary or requiring them to isolate at home for 14 days.

(c) GENERAL HYGIENE

Requirements on general hygiene should be communicated and monitored, to include:

- Training workers and staff on site on the signs and symptoms of COVID-19, how it is spread, how to protect themselves (including regular handwashing and social distancing) and what to do if they or other people have symptoms (for further information see WHO COVID-19 advice for the public).
- Placing posters and signs around the site, with images and text in local languages.
- Ensuring handwashing facilities supplied with soap, disposable paper towels and closed waste bins exist at key places throughout site, including at entrances/exits to work areas; where there is a toilet, canteen or food distribution, or provision of drinking water; in worker accommodation; at waste stations; at stores; and in common spaces. Where handwashing facilities do not exist or are not adequate, arrangements should be made to set them up. Alcohol based sanitizer (if available, 60-95% alcohol) can also be used.
- Review worker accommodations, and assess them in light of the requirements set out in IFC/EBRD guidance on Workers' Accommodation: processes and standards, which provides valuable guidance as to good practice for accommodation.
- Setting aside part of worker accommodation for precautionary self-quarantine as well as more formal isolation of staff who may be infected (see paragraph (f)).

(d) CLEANING AND WASTE DISPOSAL

Conduct regular and thorough cleaning of all site facilities, including offices, accommodation, canteens, common spaces. Review cleaning protocols for key construction equipment (particularly if it is being operated by different workers). This should include:

- Providing cleaning staff with adequate cleaning equipment, materials and disinfectant.
- Review general cleaning systems, training cleaning staff on appropriate cleaning procedures and appropriate frequency in high use or high-risk areas.
- Where it is anticipated that cleaners will be required to clean areas that have been or are suspected to have been contaminated with COVID-19, providing them with appropriate PPE: gowns or aprons, gloves, eye protection (masks, goggles or face screens) and boots or closed work shoes. If appropriate PPE is not available, cleaners should be provided with best available alternatives.
- Training cleaners in proper hygiene (including handwashing) prior to, during and after conducting cleaning activities; how to safely use PPE (where required); in waste control (including for used PPE and cleaning materials).
- Any medical waste produced during the care of ill workers should be collected safely in designated containers or bags and treated and disposed of following relevant requirements (e.g., national, WHO). If open burning and incineration of medical wastes is necessary, this should be for as limited a duration as possible. Waste should be reduced and segregated, so that only the smallest amount of waste is incinerated (for further information see WHO interim guidance on water, sanitation and waste management for COVID-19).

(e) ADJUSTING WORK PRACTICES

Consider changes to work processes and timings to reduce or minimize contact between workers, recognizing that this is likely to impact the project schedule. Such measures could include:

- Decreasing the size of work teams.
- Limiting the number of workers on site at any one time.
- Changing to a 24-hour work rotation.
- Adapting or redesigning work processes for specific work activities and tasks to enable social distancing, and training workers on these processes.
- Continuing with the usual safety trainings, adding COVID-19 specific considerations. Training should include proper use of normal PPE. While as of the date of this note, general advice is that construction workers do not require COVID-19 specific PPE, this should be kept under review (for further information see WHO interim guidance on rational use of personal protective equipment (PPE) for COVID-19).
- Reviewing work methods to reduce use of construction PPE, in case supplies become scarce or the PPE is needed for medical workers or cleaners. This could include, e.g. trying to reduce the need for dust masks by checking that water sprinkling systems are in good working order and are maintained or reducing the speed limit for haul trucks.
- Arranging (where possible) for work breaks to be taken in outdoor areas within the site.
- Consider changing canteen layouts and phasing meal times to allow for social distancing and phasing access to and/or temporarily restricting access to leisure facilities that may exist on site, including gyms.

- At some point, it may be necessary to review the overall project schedule, to assess the extent to which it needs to be adjusted (or work stopped completely) to reflect prudent work practices, potential exposure of both workers and the community and availability of supplies, taking into account Government advice and instructions.

(f) PROJECT MEDICAL SERVICES

Consider whether existing project medical services are adequate, taking into account existing infrastructure (size of clinic/medical post, number of beds, isolation facilities), medical staff, equipment and supplies, procedures and training. Where these are not adequate, consider upgrading services where possible, including:

- Expanding medical infrastructure and preparing areas where patients can be isolated. Guidance on setting up isolation facilities is set out in WHO interim guidance on considerations for quarantine of individuals in the context of containment for COVID-19). Isolation facilities should be located away from worker accommodation and ongoing work activities. Where possible, workers should be provided with a single well-ventilated room (open windows and door). Where this is not possible, isolation facilities should allow at least 1 meter between workers in the same room, separating workers with curtains, if possible. Sick workers should limit their movements, avoiding common areas and facilities and not be allowed visitors until they have been clear of symptoms for 14 days. If they need to use common areas and facilities (e.g. kitchens or canteens), they should only do so when unaffected workers are not present and the area/facilities should be cleaned prior to and after such use.
- Training medical staff, which should include current WHO advice on COVID-19 and recommendations on the specifics of COVID-19. Where COVID-19 infection is suspected, medical providers on site should follow WHO interim guidance on infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected.
- Training medical staff in testing, if testing is available.
- Assessing the current stock of equipment, supplies and medicines on site, and obtaining additional stock, where required and possible. This could include medical PPE, such as gowns, aprons, medical masks, gloves, and eye protection. Refer to WHO guidance as to what is advised (for further information see WHO interim guidance on rational use of personal protective equipment (PPE) for COVID-19).
- If PPE items are unavailable due to world-wide shortages, medical staff on the project should agree on alternatives and try to procure them. Alternatives that may commonly be found on constructions sites include dust masks, construction gloves and eye goggles. While these items are not recommended, they should be used as a last resort if no medical PPE is available.
- Ventilators will not normally be available on work sites, and in any event, intubation should only be conducted by experienced medical staff. If a worker is extremely ill and unable to breathe properly on his or her own, they should be referred immediately to the local hospital (see (g) below).
- Review existing methods for dealing with medical waste, including systems for storage and disposal (for further information see WHO interim guidance on water, sanitation and waste management for COVID-19, and WHO guidance on safe management of wastes from health-care activities).

(g) LOCAL MEDICAL AND OTHER SERVICES

Given the limited scope of project medical services, the project may need to refer sick workers to local medical services. Preparation for this includes:

- Obtaining information as to the resources and capacity of local medical services (e.g. number of beds, availability of trained staff and essential supplies).
- Conducting preliminary discussions with specific medical facilities, to agree what should be done in the event of ill workers needing to be referred.
- Considering ways in which the project may be able to support local medical services in preparing for members of the community becoming ill, recognizing that the elderly or those with pre-existing medical conditions require additional support to access appropriate treatment if they become ill.
- Clarifying the way in which an ill worker will be transported to the medical facility, and checking availability of such transportation.
- Establishing an agreed protocol for communications with local emergency/medical services.
- Agreeing with the local medical services/specific medical facilities the scope of services to be provided, the procedure for in-take of patients and (where relevant) any costs or payments that may be involved.
- A procedure should also be prepared so that project management knows what to do in the unfortunate event that a worker ill with COVID-19 dies. While normal project procedures will continue to apply, COVID-19 may raise other issues because of the infectious nature of the disease. The project should liaise with the relevant local authorities to coordinate what should be done, including any reporting or other requirements under national law.

(h) INSTANCES OR SPREAD OF THE VIRUS

WHO provides detailed advice on what should be done to treat a person who becomes sick or displays symptoms that could be associated with the COVID-19 virus (for further information see WHO interim guidance on infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected). The project should set out risk-based procedures to be followed, with differentiated approaches based on case severity (mild, moderate, severe, critical) and risk factors (such as age, hypertension, diabetes) (for further information see WHO interim guidance on operational considerations for case management of COVID-19 in health facility and community). These may include the following:

- If a worker has symptoms of COVID-19 (e.g. fever, dry cough, fatigue) the worker should be removed immediately from work activities and isolated on site.
- If testing is available on site, the worker should be tested on site. If a test is not available at site, the worker should be transported to the local health facilities to be tested (if testing is available).
- If the test is positive for COVID-19 or no testing is available, the worker should continue to be isolated. This will either be at the work site or at home. If at home, the worker should be transported to their home in transportation provided by the project.
- Extensive cleaning procedures with high-alcohol content disinfectant should be undertaken in the area where the worker was present, prior to any further work being undertaken in that area. Tools used by the worker should be cleaned using disinfectant and PPE disposed of.
- Co-workers (i.e. workers with whom the sick worker was in close contact) should be required to stop work, and be required to quarantine themselves for 14 days, even if they have no symptoms.

- Family and other close contacts of the worker should be required to quarantine themselves for 14 days, even if they have no symptoms.
- If a case of COVID-19 is confirmed in a worker on the site, visitors should be restricted from entering the site and worker groups should be isolated from each other as much as possible.
- If workers live at home and has a family member who has a confirmed or suspected case of COVID-19, the worker should quarantine themselves and not be allowed on the project site for 14 days, even if they have no symptoms.
- Workers should continue to be paid throughout periods of illness, isolation or quarantine, or if they are required to stop work, in accordance with national law.
- Medical care (whether on site or in a local hospital or clinic) required by a worker should be paid for by the employer.

(i) CONTINUITY OF SUPPLIES AND PROJECT ACTIVITIES

Where COVID-19 occurs, either in the project site or the community, access to the project site may be restricted, and movement of supplies may be affected.

- Identify back-up individuals, in case key people within the project management team (PIU, Supervising Engineer, Contractor, sub-contractors) become ill, and communicate who these are so that people are aware of the arrangements that have been put in place.
- Document procedures, so that people know what they are, and are not reliant on one person's knowledge.
- Understand the supply chain for necessary supplies of energy, water, food, medical supplies and cleaning equipment, consider how it could be impacted, and what alternatives are available. Early pro-active review of international, regional and national supply chains, especially for those supplies that are critical for the project, is important (e.g. fuel, food, medical, cleaning and other essential supplies). Planning for a 1-2 month interruption of critical goods may be appropriate for projects in more remote areas.
- Place orders for/procure critical supplies. If not available, consider alternatives (where feasible).
- Consider existing security arrangements, and whether these will be adequate in the event of interruption to normal project operations.
- Consider at what point it may become necessary for the project to significantly reduce activities or to stop work completely, and what should be done to prepare for this, and to re-start work when it becomes possible or feasible.

(j) TRAINING AND COMMUNICATION WITH WORKERS

Workers need to be provided with regular opportunities to understand their situation, and how they can best protect themselves, their families and the community. They should be made aware of the procedures that have been put in place by the project, and their own responsibilities in implementing them.

- It is important to be aware that in communities close to the site and amongst workers without access to project management, social media is likely to be a major source of information. This raises the importance of regular information and engagement with workers (e.g. through training, town halls, tool boxes) that emphasizes what management is doing to deal with the risks of COVID-19. Allaying fear is an important aspect of work force peace of mind and business continuity. Workers should be given an opportunity to ask questions, express their concerns, and make suggestions.

- Training of workers should be conducted regularly, as discussed in the sections above, providing workers with a clear understanding of how they are expected to behave and carry out their work duties.
- Training should address issues of discrimination or prejudice if a worker becomes ill and provide an understanding of the trajectory of the virus, where workers return to work.
- Training should cover all issues that would normally be required on the work site, including use of safety procedures, use of construction PPE, occupational health and safety issues, and code of conduct, taking into account that work practices may have been adjusted.
- Communications should be clear, based on fact and designed to be easily understood by workers, for example by displaying posters on handwashing and social distancing, and what to do if a worker displays symptoms.

(k) COMMUNICATION AND CONTACT WITH THE COMMUNITY

Relations with the community should be carefully managed, with a focus on measures that are being implemented to safeguard both workers and the community. The community may be concerned about the presence of non-local workers, or the risks posed to the community by local workers presence on the project site. The project should set out risk-based procedures to be followed , which may reflect WHO guidance (for further information see WHO Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response). The following good practice should be considered:

- Communications should be clear, regular, based on fact and designed to be easily understood by community members.
- Communications should utilize available means. In most cases, face-to-face meetings with the community or community representatives will not be possible. Other forms of communication should be used; posters, pamphlets, radio, text message, electronic meetings. The means used should take into account the ability of different members of the community to access them, to make sure that communication reaches these groups.
- The community should be made aware of procedures put in place at site to address issues related to COVID-19. This should include all measures being implemented to limit or prohibit contact between workers and the community. These need to be communicated clearly, as some measures will have financial implications for the community (e.g. if workers are paying for lodging or using local facilities). The community should be made aware of the procedure for entry/exit to the site, the training being given to workers and the procedure that will be followed by the project if a worker becomes sick.
- If project representatives, contractors or workers are interacting with the community, they should practice social distancing and follow other COVID-19 guidance issued by relevant authorities, both national and international (e.g. WHO).

6. EMERGENCY POWERS AND LEGISLATION

Many Borrowers are enacting emergency legislation. The scope of such legislation, and the way it interacts with other legal requirements, will vary from country to country. Such legislation can cover a range of issues, for example:

- Declaring a public health emergency

- Authorizing the use of police or military in certain activities (e.g. enforcing curfews or restrictions on movement)
- Ordering certain categories of employees to work longer hours, not to take holiday or not to leave their job (e.g. health workers)
- Ordering non-essential workers to stay at home, for reduced pay or compulsory holiday

Except in exceptional circumstances (after referral to the World Bank's Operations Environmental and Social Review Committee (OESRC)), projects will need to follow emergency legislation to the extent that these are mandatory or advisable. It is important that the Borrower understands how mandatory requirements of the legislation will impact the project. Teams should require Borrowers (and in turn, Borrowers should request Contractors) to consider how the emergency legislation will impact the obligations of the Borrower set out in the legal agreement and the obligations set out in the construction contracts. Where the legislation requires a material departure from existing contractual obligations, this should be documented, setting out the relevant provisions.

ANNEX

WHO Guidance

Advice for the public

WHO advice for the public, including on social distancing, respiratory hygiene, self-quarantine, and seeking medical advice, can be consulted on this WHO website:
https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public

Technical guidance

Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected, issued on 19 March 2020

Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health, issued on 18 March 2020

Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response, issued on 16 March 2020

Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19), issued on 19 March 2020

Operational considerations for case management of COVID-19 in health facility and community, issued on 19 March 2020

Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19), issued on 27 February 2020

Getting your workplace ready for COVID-19, issued on 19 March 2020

Water, sanitation, hygiene and waste management for COVID-19, issued on 19 March 2020

Safe management of wastes from health-care activities issued in 2014

Advice on the use of masks in the community, during home care and in healthcare settings in the context of the novel coronavirus (COVID-19) outbreak, issued on March 19, 2020

ILO GUIDANCE

ILO Standards and COVID-19 FAQ, issued on March 23, 2020 (provides a compilation of answers to most frequently asked questions related to international labor standards and COVID-19)

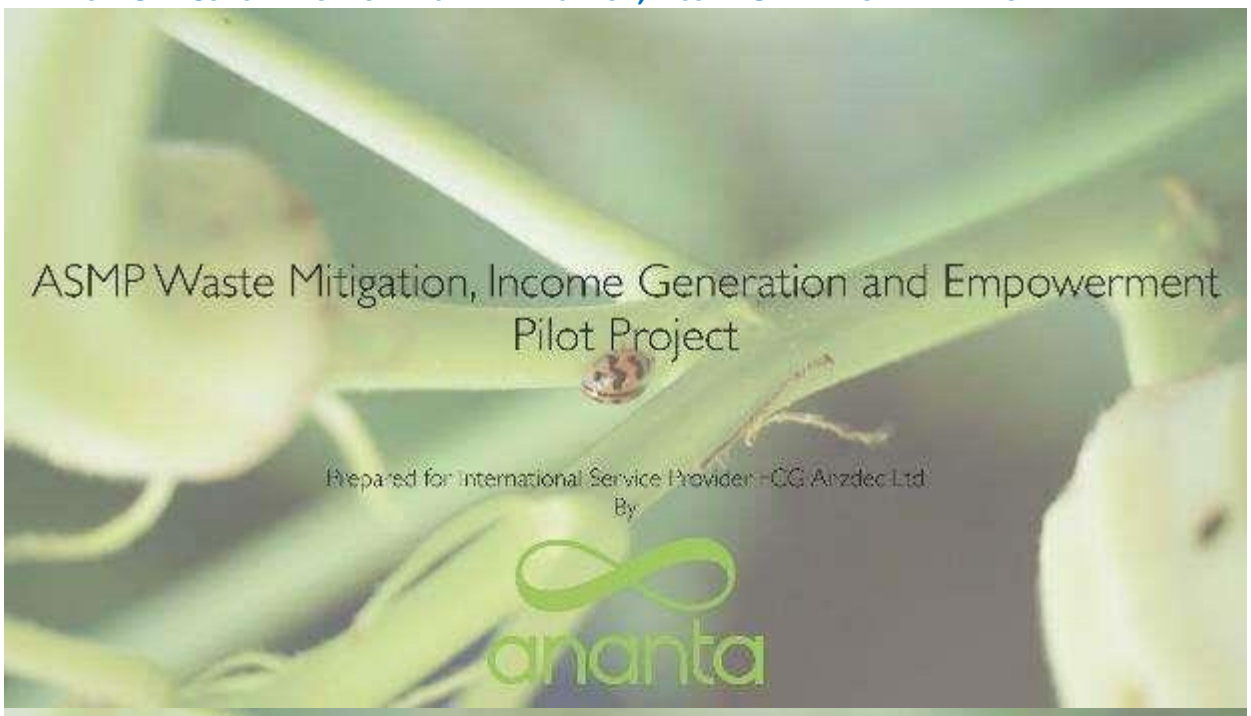
MFI GUIDANCE

IDB Invest Guidance for Infrastructure Projects on COVID-19: A Rapid Risk Profile and Decision Framework

KfW DEG COVID-19 Guidance for employers, issued on 31 March 2020

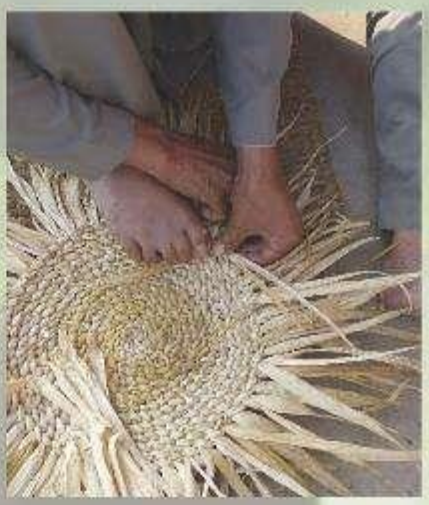
CDC Group COVID-19 Guidance for Employers, issued on 23 March 2020

ANNEXURE 8: A CONCEPT NOTE OF WASTE MINIMISATION, INCOME GENERATION AND EMPOWERMENT



INTRODUCTION

The purpose of this Pilot Project is two-fold: to mitigate waste generated from new and improved farming practices introduced by the Agriculture Sector Modernization Project (ASMP), and to utilize farm by-products in income generating activities. Fulfilling this purpose will allow the ASMP to create a positive social and environmental impact locally, not only for the farmers in the ASMP clusters, but also for their communities. At the same time, the Project will serve to widely use environmental and social responsibilities to the Country and society in general. Furthermore, the inclusion of socio-ecological values into ASMP farmer organizations ("CIGs") to be created for commercial purposes goals them to participate in the international market as mindful citizens of the world. In fact, it will allow them to meet the growing demand for impact certification and for responsible and accountable food systems and value chains.



The Pilot Project seeks to protect the environment by using waste and by-products from the farm to create additional sources of income for rural, marginalized members of the community, with a focus on women and youth. Through community awareness, education and financial incentives the negative effects of waste on their homes and the financial opportunity farm by-products present will be demonstrated.

The scope of the Pilot Project is to divert the waste generated from the ASMP introduced technology and farm by-products into existing supply chains that, currently and profitably utilize these environmentally friendly raw materials. By targeting women and youth within the farming clusters, the Pilot Project hopes to empower leadership and financial independence carried out in gender inclusive collectives formed within the ASMP farming clusters. By identifying alternative raw materials for production from practices that utilize environmentally polluting materials (i.e. single use plastics) and locally sourced by-products (as well as identifying a supply base that utilizes the existing waste and farm by-products generated), the Pilot Project will sustain waste mitigation and will leverage by-products from the farm by harnessing existing market forces and creating additional sources of income by introducing these eco-friendly raw material streams.

The Pilot project will address the following for introduced ASMP techniques in **Guava** and **Banana** Clusters in **Anuradhapura** North Central Province

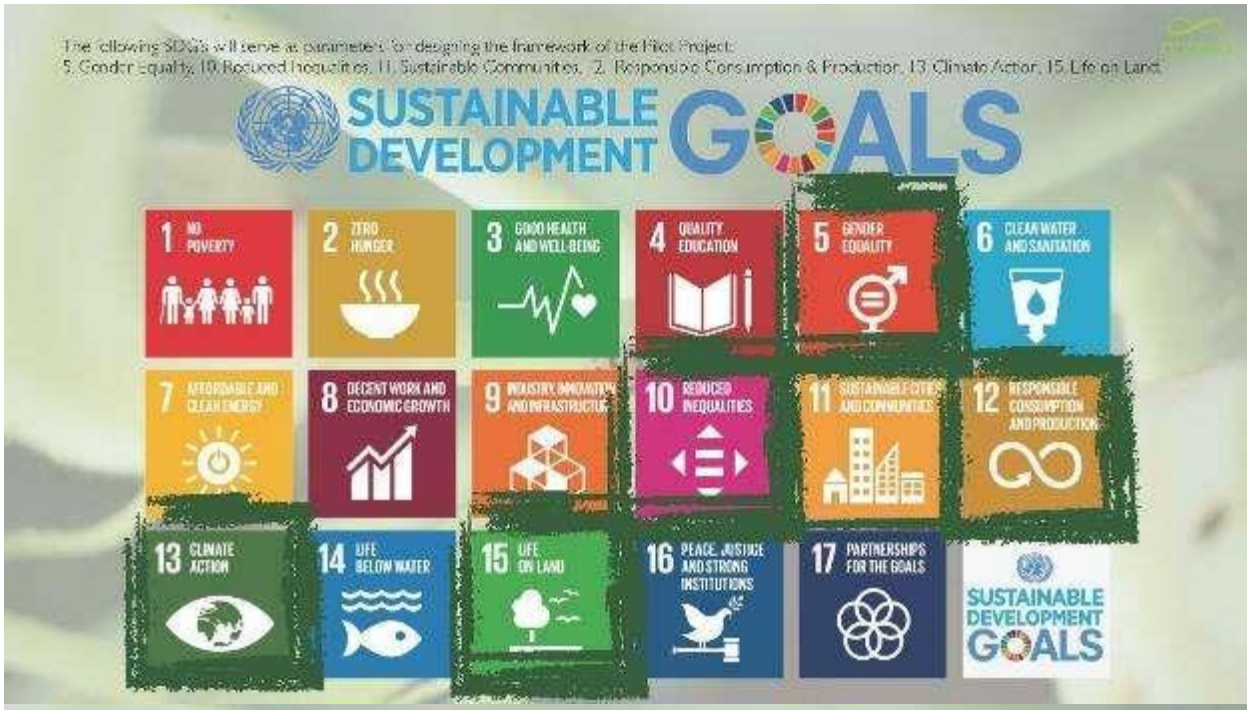
OBJECTIVES

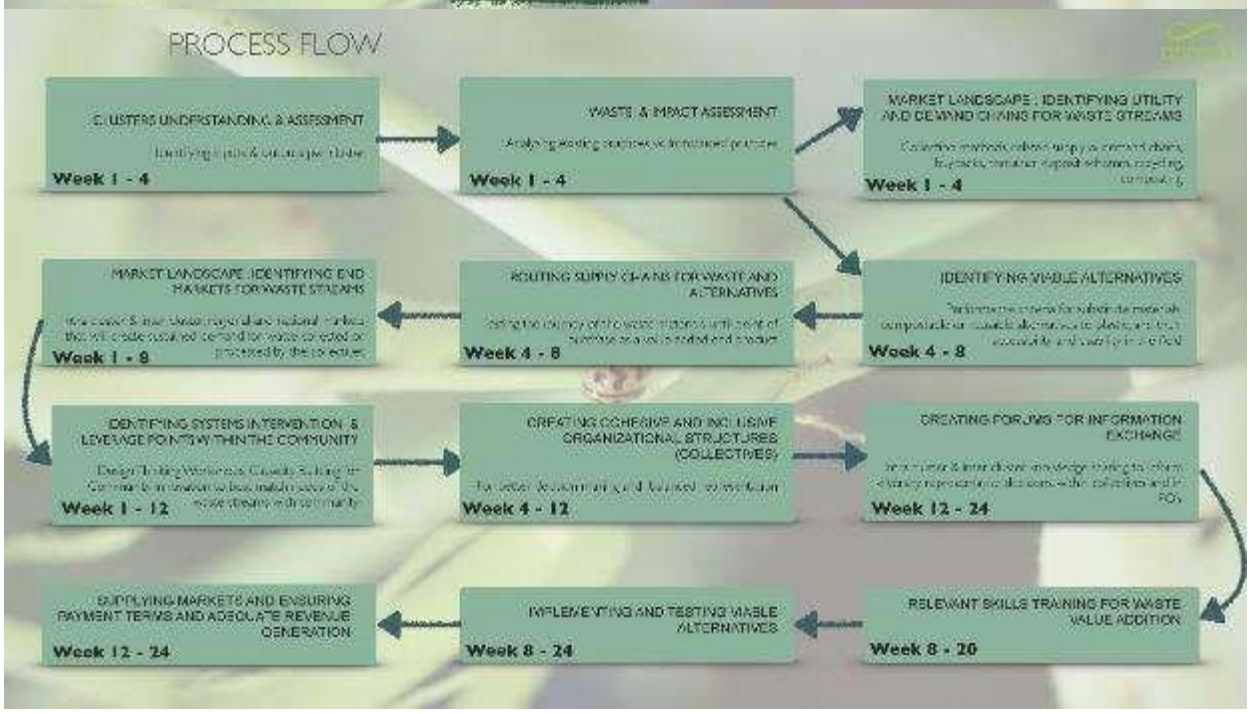
1. Reduce Plastic and Hazardous Waste Generated
&
2. Value Addition for Farm By-products

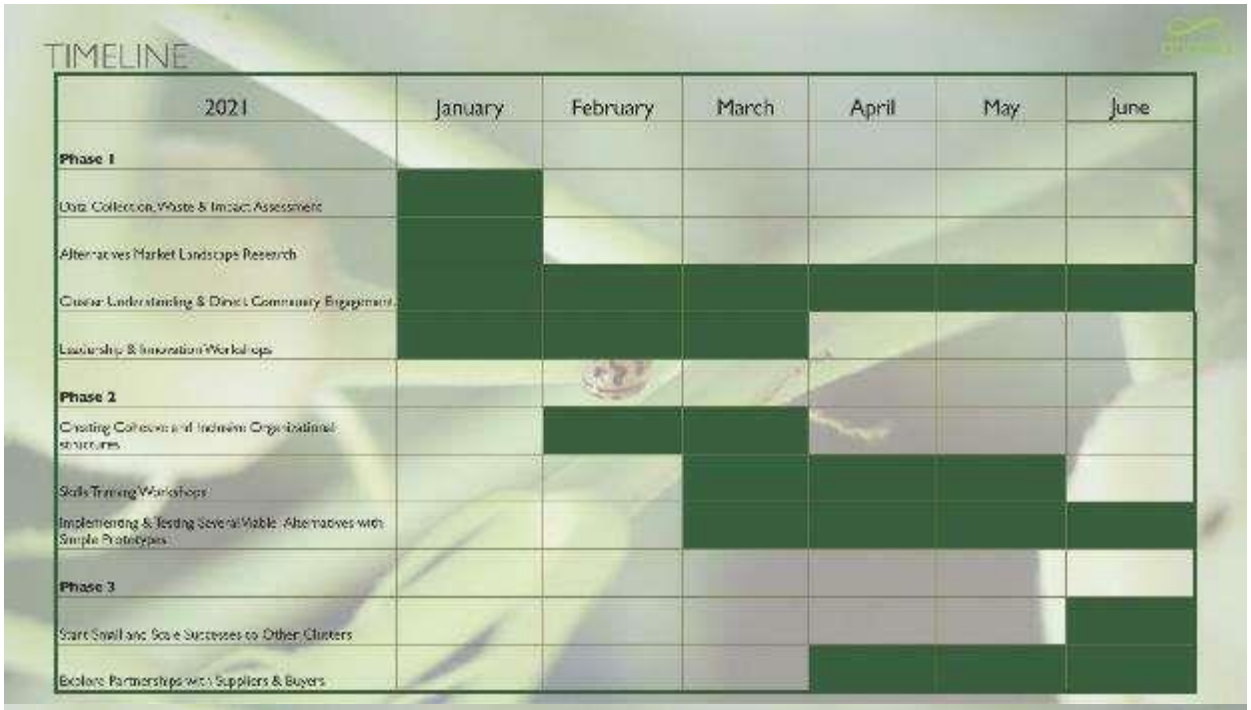
- Sourcing Alternative Materials
- Income Generation through Circular Supply Chains
- Women & Youth Empowerment


OUTPUTS
The Pilot Project will produce the following outputs focusing on the interplay between three verticals: Cluster, Community and Market
CLUSTER
Waste generated per introduced modernisation method reduced
Tracking journey of waste per practice
Quantity of waste generated per farm replaced/reduced/diverted
Quantity of waste generated per cluster replaced/reduced/diverted
Additional income generated from crop per farm
Additional income generated from crop per cluster
Alternatives meet competitive costing of current methods introduced by ASMP restrictions
Connecting to existing value chains (surplus & shortages) and filling need gaps in the waste ecosystem
COMMUNITY
Increased participation by indirect beneficiaries in additional income generating activities
Clear understanding on waste and environmental issues
Increased participation in inclusive collectives
Additional income covers cost of caring for dependents of participating members
Efficient utilisations of resources otherwise seen as unavailable or inaccessible (i.e transport, stay-at-home mothers, unemployed youth)
Increased willingness of farmers to include other modes of income related to their farming activities
Greater understanding of the cultural and systemic barriers for women to participate in FO's and the necessary systems interventions to address them
Community benefits from income generated and activities by formed inclusive collectives
MARKET
Route to market of value added waste products mapped and implemented
Market landscape and key customer segments analysis and sufficient market demands for suggested products created
ASMP Waste Pilot Project able to meet competitive landscape of suppliers of raw materials
Competitive logistics costs met
New products and material feature requirement met
INPUTS
The Pilot Project will demonstrate income generating opportunities from waste and farm by-products generated by the ASMP and develop an implementation plan to create circular supply chains and increase self-employment of women and youth within the clusters.
ALTERNATIVE MATERIALS
Introduce low-cost, local, scalable alternative materials to replace proposed single use plastic technologies
Implementing circular supply chains to reduce waste streams
Reversing degradation and depletion of natural environment (i.e soil and water) by transitioning to materials that are regenerative i.e compostability
Providing skills training to women to produce alternative products from within clusters (intra cluster) and regionally (inter cluster)
Raising awareness among farmers and community about plastic pollution and the benefits of environmental stewardship
INCOME GENERATION THROUGH EXISTING SUPPLY CHAINS FOR EMPOWERED COMMUNITY ECONOMIES
Introducing additional revenue streams through existing supply chains i.e collection for recycling or compostability, buyback schemes, deposit schemes, banana fiber end products etc.
Increasing women's participation, representation, decision making in FO's to tap into unutilised potential of community members by introducing additional revenue
Addressing underrepresentation of demographics involved in FO's (i.e women and youth) in Collectives with inverse demographic ratios
Defining highly productive, functional management structures within collectives for shared ownership (horizontal ownership and management structures)
Improving critical thinking skills and design capabilities through Workshops equipping them to discern inadequate methods, conceptualize and implement solution-oriented ideas

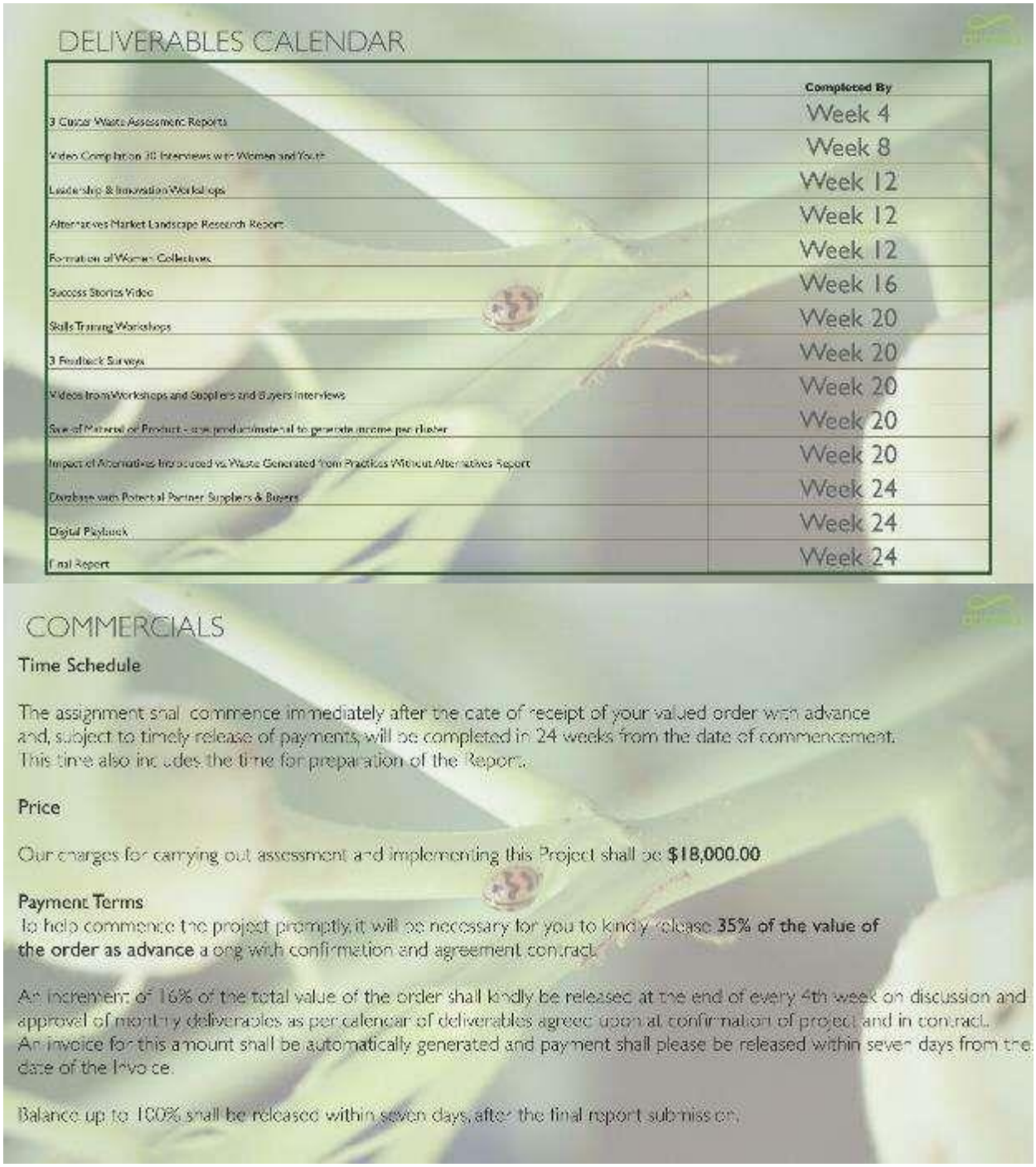

APPROACH
SYSTEMS APPROACH | Making supply chains more responsible, efficient and sustainable, by analysing social and environmental relationships and interactions to enable effective overall outcomes for the system as a whole.
Traditional approaches focus on outcomes of a supply chain in isolated parts. This can lead to outcomes that deplete the value and integrity of the whole supply network. Our approach aims to break down supply chains and their waste streams in order to holistically design, manage and integrate effective parts in a whole functioning system which will protect the natural environment and enhance the social bonds within a community.
HARNESSING EXISTING SUPPLY CHAINS | To establish income generation projects for women and youth, we will connect them to existing supply chains and create a more resource efficient economy
The development of new products and entry into new markets can be resource intensive. Alternatively, we will explore potential partnerships with existing SME's to promote and develop products based on their extensive market experience and data.
DESIGN THINKING | To empower the local community to understand their wants, needs and constraints, we will provide them with frameworks for creative problem solving with design thinking methodologies.
Local community members often best understand the situation on the ground. Providing frameworks for analyzing the root causes of the problems, rather than the symptoms, enables members of the collective to understand for themselves how best to address the problems and embed the solutions.
APPROACH
LEADERSHIP FOR INNOVATION | To create a sense of agency that enables creative problem seeking and solving, we will organize leadership workshops and trainings targeted at women and youth that will drive innovation with available resources, consensus building and crowdsourcing solutions.
This will include creative visual techniques such as storytelling, theatre and video. This will facilitate innovating with the community, not for the community.
COMMUNITY BUILDING | To build more knowledgeable, skilled and connected communities, we will work with stakeholders to design and implement centrally guided, locally led organizational structures.
The collectives aim to facilitate communication, build trust, enhance transparency in decision making, and promote collaboration across supply networks both inter and intra-clusters. Community participation methods empower people to creatively develop skills and strengthen ties through collective activities for public works.


The following SDGs will serve as parameters for designing the framework of the Pilot Project:
5. Gender Equality, 10. Reduced Inequalities, 11. Sustainable Communities, 12. Responsible Consumption & Production, 13. Climate Action, 15. Life on Land
SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS


PROCESS FLOW
CLUSTERS UNDERSTANDING & ASSESSMENT
Week 1 - 4
WASTE & IMPACT ASSESSMENT
Week 1 - 4
MARKET LANDSCAPE : IDENTIFYING UTILITY AND DEMAND CHAINS FOR WASTE STREAMS
Week 1 - 4
IDENTIFYING VIABLE ALTERNATIVES
Week 4 - 8
ROUTING SUPPLY CHAINS FOR WASTE AND ALTERNATIVES
Week 4 - 8
MARKET LANDSCAPE: IDENTIFYING END MARKETS FOR WASTE STREAMS
Week 1 - 8
IDENTIFYING SYSTEMS INTERVENTION & LEVERAGE POINTS WITHIN THE COMMUNITY
Week 1 - 12
CREATING COHESIVE AND INCLUSIVE ORGANIZATIONAL STRUCTURES (COLLECTIVES)
Week 4 - 12
CREATING FORUMS FOR INFORMATION EXCHANGE
Week 12 - 24
RELEVANT SKILLS TRAINING FOR WASTE VALUE ADDITION
Week 8 - 20
IMPLEMENTING AND TESTING VIABLE ALTERNATIVES
Week 8 - 24
SUPPLYING MARKETS AND ENSURING PAYMENT TERMS AND ADEQUATE REVENUE GENERATION
Week 12 - 24


TIMELINE
2021
January
February
March
April
May
June
Phase 1
Data Collection Waste & Impact Assessment
Alternatives Market Landscape Research
Cluster Understanding & Direct Community Engagement
Leadership & Innovation Workshops
Phase 2
Creating Cohesive and Inclusive Organizational structures
Skills Training Workshops
Implementing & Testing Several Viable Alternatives with Simple Prototypes
Phase 3
Start Small and Scale Successes to Other Clusters
Explore Partnerships with Suppliers & Buyers


DELIVERABLES
ALTERNATIVES
Report: 3 Cluster Waste Assessment Reports
Report: Proposed alternative materials/waste solution per modernization method including life cycle and supply chain
Video: Success stories in the region for implementation of alternatives
Database: End markets and potential partners
Sourcing: Connecting farmers with sufficient supply of alternative materials
Report: Impact of alternatives introduced vs. waste generated from practices without alternatives
EMPOWERMENT
Workshops: Leadership and Innovation 6x3 hr
Workshops: Skills training workshops 6 per cluster by SME partners/specialists according to market needs
Videos: 3 (one per cluster) on Innovation and Leadership made with workshop participants
Organization: Formation of collectives per cluster with inclusive ownership models
Video: 30 interviews conducted with women and youth
Feedback Surveys: 3 conducted to assess community engagement
Digital Playbook: Guidelines on workshops and qualitative and quantitative results to be replicated in other clusters
INCOME
Report: Market landscape
Report: Buyers per cluster to purchase waste collected including price and KG's
Proof of Market Entry: one product/material to generate income per cluster
Payment Confirmation: for KG's collected and bought
Video: supplier and buyers interviews on implemented supply chain
Final Report



DELIVERABLES CALENDAR

	Completed By
3 Cocoa Waste Assessment Reports	Week 4
Video Compilation 30 Interviews with Women and Youth	Week 8
Leadership & Innovation Workshops	Week 12
Alternatives Market Landscape Research Report	Week 12
Formation of Women Collectives	Week 12
Success Stories Video	Week 16
Skills Training Workshops	Week 20
3 Feedback Surveys	Week 20
Videos from Workshops and Suppliers and Buyers Interviews	Week 20
Sale of Material or Product - use product/material to generate income per cluster	Week 20
Impact of Alternatives Introduced vs. Waste Generated from Practices Without Alternatives Report	Week 20
Database with Potential Partner Suppliers & Buyers	Week 24
Digital Playbook	Week 24
Final Report	Week 24

COMMERCIALS

Time Schedule

The assignment shall commence immediately after the date of receipt of your valued order with advance and, subject to timely release of payments, will be completed in 24 weeks from the date of commencement. This time also includes the time for preparation of the Report.

Price

Our charges for carrying out assessment and implementing this Project shall be **$18,000.00**

Payment Terms

To help commence the project promptly, it will be necessary for you to kindly release **35% of the value of the order as advance** along with confirmation and agreement contract.

An increment of 16% of the total value of the order shall kindly be released at the end of every 4th week on discussion and approval of monthly deliverables as per calendar of deliverables agreed upon at confirmation of project and in contract. An invoice for this amount shall be automatically generated and payment shall please be released within seven days from the date of the Invoice.

Balance up to 100% shall be released within seven days, after the final report submission.


BUDGET
Personnel (6 months)
Salary (USD)
2 x Ananta Consultants
13,500
On the Ground Project Manager
2,500
Skills Trainers
Subtotal personnel
16,000
Project participation
Workshops and Video Production
1,000
1,000
Total Cost
USD 18,000


Savera Weerasinghe &Taylor Smythe