Sri Lanka Agriculture Sector Modernisation Project (ASMP)

ENVIRONMENTAL SCREENING REPORT

FOR

CDP № 8 – MULLAITIVU (PUTHUKUDIYIRUPPU) - BANANA (KOLIKUTTU) AND CHILLI

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

Revised: 11 April 2022

FCG

NEW ZEALAND G2G KNOW-HOW

InfotechsIDEAS

TABLE OF CONTENTS

TABLES

FIGURES

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
IPM	Integrated pest management
IPNS	Integrated Plant Nutrition System
ISP	International Service Provider
LA	Local authority
MoD	Ministry of Défense
MOP	Muriate of Potash
O&M	Operation and maintenance
OFC	Other farm crops
PCR	Physical cultural resources
PMC	Project Management Committee
PMP	Pest management plan
PMU	Project Management Unit
RDA	Road Development Authority
SMP	Social Management Plan
WQI	Water Quality Index

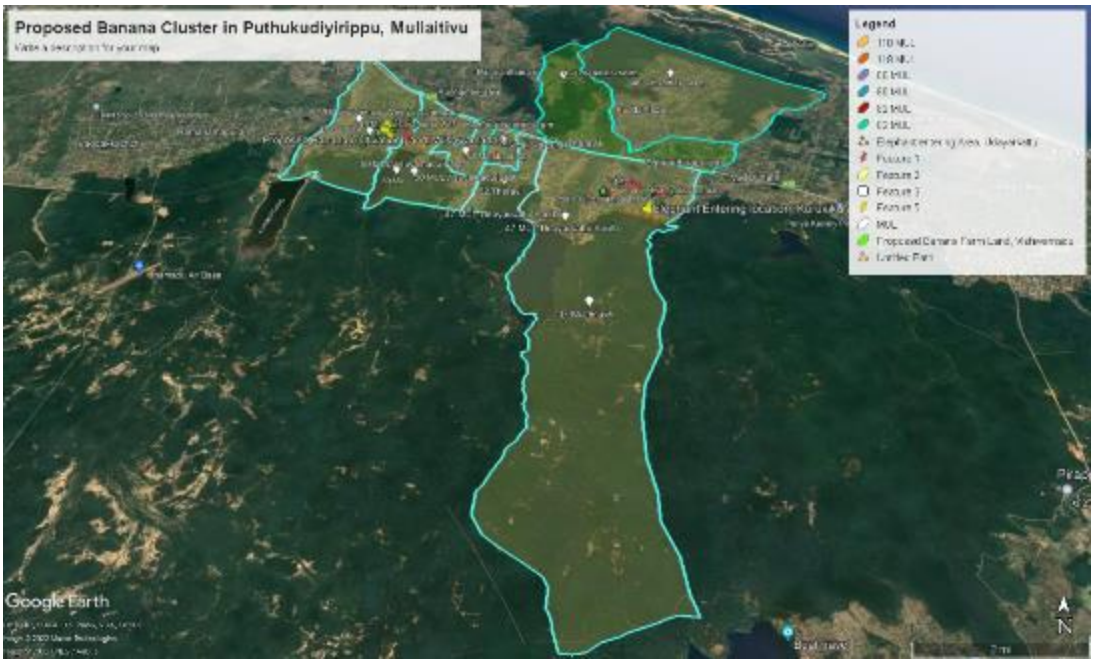
ASMP

ENVIRONMENTAL SCREENING REPORT

1. PROJECT IDENTIFICATION

Project title	Introduction of Improved Technologies to enhance the quality and productivity of banana in Mullaitivu (Puthukudyirippu) District
Project Proponent	Project Management unit, ASMP, Ministry of Agriculture

2. PROJECT LOCATION

Location **(Relative to the nearest town, highway)**	The cluster area is coming under the Puthukudyirippu DS Division is located on the North Eastern side of the Mullaitivu District., covering a land area of 329.0 sq.km which is 12.2 percent of the district's total. It is the smallest DS Division of the district too. Puthukudyirippu Divisional Secretariat Division has 19 Grama Niladari divisions, and population about 41,408[1]. The total land area of the DS division is 366.0 Km^2 and the selected GN divisions accounted for 46.75% of the total area of the division. The Puthukudyirippu Banana Cluster comprises seven GN divisions and namely Udayarkaddu South (MU 47), Suthanthirapuram (MU 48), Vishvamadu West (MU49), Vishvamadu East (MU50), Manikkapuram (MU51), Theravil (MU52) and Valluvarpuram (MU53). There are 37 villages in these 7 GN divisions and people are living only in 32 villages. This year 351 farmers have been selected for cultivating banana from these divisions. All the cluster area included to Udayarkaddu ADC areas. The selected villages are located along A35 Paranthan-Mullaitivu Road. Figure 1 shows the selected areas in the three GNDs.  ***Figure 1**: **Selected farmlands*** These selected GNDs are located about 25km away from Mullaitivu town and about 15km away from A9 – Paranthan Junction.

[1] Resource profile & SHB Puthukkudiyiruppu Divisional Secretariat 2019

About 450 farmers will be selected from seven (7) GNDs in Puthukudyirippu DSD. These farmers are scattered in these GNDs.

Definition of project area

(The geographical extent of the project & areas affected during construction)

Puthukudyirippu DSD is covering a land area of 329.0 sq.km which is 12.2 percent of the district's total. However, implementation of cluster development activities will be limited to the following areas including public infrastructure improvements.

Table 1: Basic information on identified locations for Banana Cluster by PPMU

Agrarian Development Centre	AI range	GN division	Existing Farmer Organisation	Number of identified farmers	Extent (ha)
Udayarkaddu	Vishvamadu	Vishvamadu West, MUL 49	Lift Irrigation Thoddiyadi	95	38
			Gravity Irrigation Wishvamadu		
			Neththaliaru		
		Vishvamadu East, MUL-50	Barathapuram	43	17
			Vishvamadu East		
	Udayarkaddu	Udayarkaddu South, MUL-47	Udayarkaddu South	112	46
	Manikkapuram	Manikkapuram MUL-51	Manikkapuram	100	40
		Valluvapuram MUL-53	Valluvapuram		
		Theravil MUL-52	Illankopuram		
		Udayarkaddu North	Udayarkattu North	100	40
	Total			**450**	**181**

Source: ISP District Coordinator, Mullaitivu

As per the eligibility criteria, minimum of 0.5 Acre should be available with a water sources. However, according to the details above, about 450 Acres (181 Ha) available which denotes about 1 acre each farmer. Impact due to cultivation of Banana will be limited to the cultivated area. However, improvements of rural roads will have a positive impact on the community in general which ease the mobility of the community in the area. Further, proposed collection centre will also benefit farmers in the area even though they are not in the cluster. However, size of the land is not yet finalised. Minimum requirement of the land would be 0.5 acre.

In addition, establishment of new institutional arrangement, farmer training and capacity buildings, value chain development initiatives, post-harvest processing centre, etc will have a greater positive impact on the cluster as well as on the farmer community in the area.

Adjacent land and features

The proposed cluster area belongs to 7 GN divisions in the North Eastern side of the Puthukudiyirippu DS divisions in the Mullaitivu District of Northern Province. Table below compared the Land Use Pattern (LUP) in Mullaitivu district and Puthukudyirippu DS division. This Divisional Secretariat area covers only about 12% of the district area but it appears that more than that of the agricultural lands in the district belongs to this Divisional Secretariat area. As per the Land Use Plan, Mullaitivu, quite significant number of land acreage is underutilized within the selected GNDs.

It is important to note that as in other parts of the district, most of the land area (54%) in this Divisional Secretariat Division is still covered with forest lands. Irrigated paddy fields cover only 25% of the paddy land area and the remaining 75% of paddy cultivations are taken place as rain fed cultivations only during the Maha season. More than 70% of plantation crops are consist with coconut. Mainly, there seven surface waterbodies within this selected area and out of which Kalmadu tank is belongs to Kilinochchi district but partially falling within Wishwamadhu as well. Forest cover in these areas is significant and part of these

selected lands are belonging to Forest Reserves. Within the selected area, vegetable, fruit, paddy, coconut, Arica nut, etc are being cultivated in large scale.

Table 2: Land Use Pattern in Cluster area and Mullaitivu District

Land use category	Land Extent ha		% of Cluster DS
	Mullaitivu District	Puthukudyirippu DSD	
Homesteads	19272	3998	20.7
Paddy	27700	4756	17.2
Plantations	5155	1493	29.0
Other Crops	2548	989	38.8
Non Agri	2718	397	14.6
Forests/Forest Cultivations	148590	17882	12.0
Scrublands	29844	2116	7.1
Grass lands	287	2	0.7
Wet lands - Forest Mangroves	4559	10	0.2
Wetlands - Non-Forest Marshes	1310	15	1.1
Water Bodies - Inland Reservoirs	12348	773	6.3
Water Bodies - Lagoons	6155	0	0.0
Water Bodies - Others	1836	394	21.5
Other Lands	6979	74	1.1
	269301	**32899**	**12.2**

Source: District Statistical Handbook, 2018

The main reason for this increase in crop extents is due to the massive resettlement activities-based livelihood development programs after the end of the civil war in 2009. Accordingly, many devastated reservoirs and infrastructures in the district were rehabilitated. The agricultural lands which had been turned into barren were redeveloped and the farmers were directed for various cultivations giving various subsidies. This process is still in progress.

3. PROJECT JUSTIFICATION

Need for the project **(What problem is the project going to solve)**	Banana is a healthy fruit item of human and it is a good source of Manganese, Potassium and Vitamin C, useful in haemorrhoids, heart health and blood pressure. Conversion paddy cultivation to banana was mainly due to easy management and high return of banana when compared to paddy and other farm crops (OFCs). After establishment of plantations, expenditure on banana cultivation is low and farmers are able to receive continuous income from their plantations. Banana is grown rainfed with supplementary irrigation whenever necessary. In general, farmers use both flood irrigation and canal irrigation methods in banana cultivation. As per the 2014 study carried out by UN-habitat Sri Lanka, it was revealed that four major hazards badly affecting the agriculture production in the district include draught, floods, strong winds and elephant damages. The study suggested to take into consideration these factors while planning agriculture development projects.

There are different types of water sources available in the district such as large reservoirs, minor and medium tanks, large ponds, deep wells and dug wells. Average depth of a dug well is about 4 to 5 meters and water is available throughout the year.

Puthukudyirippu is the DS area with 19 GN divisions which cover 38.6% of the total land area of the district. According to available information from Land Use Policy Planning Department (LUPPD), 27% of the land area have been used for agricultural activities and potential extent could be increased to higher level through effective involvement of government to overcome the prevailing issues hindering the agriculture development in the area.

The following major issues were identified through discussions with farmers, farmer representatives and line agency officers in the area:

- Lack of water sources with reliable and sufficient water supply for irrigation
- Crop damages by wild animals
- Inadequate technical know-how
- Presence of degraded lands
- Poor infrastructure facilities
- Low prices and existing poor marketing system

Most of the farm families were displaced due to war situation that prevailed in the past and majority of them have resettled in their original villages. A programme of resettlement of displaced families due to conflict had taken place up to 2014 and total number of families resettled was about 13,500 in Mullaitivu District.

Paddy is the major crop in the area covering about 1800 ha, which is 6% under major irrigation, 8% under minor irrigation and 86% is under rainfed. As 86% of the paddy lands are cultivated only during *Maha* season and it indicates the unproductive land use pattern in the cluster area and there exists huge potential to develop the area with alternative cropping systems. Some farmers are growing banana as a home garden crop. As there is no considerable quantity of production farmers are selling products to local buyers at lower rates. As per our field observations, it is important to pay special attention on the following issues so as to implement successful programme in the preparation of CDP for Kolikuttu banana and chilli cultivation in the proposed Puthukudyirippu cluster area.

- Lack of coordination among relevant line agencies
- Lack of information and data regarding agriculture production and marketing
- No proper resource sharing mechanism
- Lack of training and expertise to implement activities
- Lack of technical knowledge

The proposed project is designed as a model for primary value addition, collecting centre and productivity enhancement by using new technology with sprinkler irrigation and construction of collecting centre. New cultivation of banana land is going to be selected for micro sprinkler irrigation systems to reduce water issues in some areas and value addition activities will implemented for existing orchard in cluster area. This sprinkler irrigation system will be powered by renewable energy through the solar panel system and it will reduce the energy cost.

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 postharvest, 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 Kolikuttu banana, for export to the Middle East.
Purpose of the project **(What is going to be achieved by carrying out the project)**	A total of 50 technology demonstration plots will be established for bananas in Jaffna. In addition to demonstration plot (new cultivations), majority will be existing Banana cultivated lands. There will be about 450 farmers including new Banana Cultivators in seven GNDs in Puthukudyirippu DSD in Mullaitivu. 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 banana for export market. The main objective of the subproject is to develop Agriculture-related livelihood by achieving below objectives. • To introduce new technologies to increase yield • Land preparation • Water conservation/Management • Disease control • Use of weedicides, pesticides • Enhancement of productivity and Quality of banana • To minimise postharvest losses • To increases sustainable farm income • Create new employment opportunities • Identify international market opportunities • Postharvest 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)**	Following concerns were focused during selection of Kolikuttu Banana Cluster in Puthukuduyirippu. • 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 banana farmers have kept smaller part of their land for paddy crop for domestic consumption. • All the banana farmers are members of farmer organisations or successors • Requirement for disturbing new lands is not triggered as existing cultivation will be sufficient to upgrade • Ability to cater the continuous supply of Banana to export market • Soil characteristics such as pH, water holding capacity, electrical conductivity and organic matter contents favours banana cultivation in Puthukudiyirippu Most of the farmers have large scale, low flat farmer-based lands with water with less drainage concerns. Since it consists with already established farmlands, no clearance of new lands is required and anticipated site specific negative environmental impacts are found. Hence, the selected area is highly supportive to meet the project needs within short period of time without negative environmental impacts. Geographically, the selected area is the highest potential for Kolikuttu Banana cultivation in Puthukudiyirippu. The "no-action" alternative would mean that no Banana Cluster Development undertake by the ASMP and hence no financial, technical and market support for the existing banana Cultivators in seven GNDs in Puthukudyirippu DSD. 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 Mullaitivu.

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)	√			Any conversion of paddy lands permanently or temporarily should be approved by the Commissioner.
3	Local Authorities Acts	√			Improvements of rural roads, waste disposal should be approved by the Porathivu Pattu Pradeshiya Sabha.
4	Water Resources Board Act No. 29 of 1964	√			Extraction of ground water should be concented by the WRB
5	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
6	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
7	Forest Ordinance including Amendments	√			Any activity having potentials of disturbing Oddusudan Forest faling in the close proximity to the project area should be consented by the Forest Department.

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	January 2022
Proposed completion date	August 2023
Estimated total cost	LKR 244 million
Present land ownership	Private Farmlands, Lands with Deed and Leased Lands Rural Roads – Local Authorities
Description of the project **(With supporting material such as maps, drawings etc attached as required)**	It is important to explain that proposed cluster development of Kolikuttu Banana in Puthukudyirippu is upgrading agricultural practices in Banana Cultivations with modernize technology given below. This cluster doesn't involve clearing of any new forest (vegetation areas) areas and will only improve or establish banana cultivation in the existing agriculture lands. This cluster development will not focus on establishing farmlands in new lands which are not used for cultivation. Availability of water sources was an eligibility criterion of selecting farmers and this technology will reduce water usage minimum by 50% or conserve water.

Table 3: Improved technology package

Main Technology	Practice (s)	Comments
Bunch clearing before bagging	Removing leaves that can damage bunch and bending or removal of placenta leaf	Bunch clearing practices protect the Kolikuttu Banana from mechanical damage by removing potential causes of damage
Bagging with plastic bags	Premature bagging when the bunch is just emerging and the flower bud points downward	Bagging protects the banana bunch from physical and pest damage and increases bunch vigoro
Bunch clearing after bagging	De-leafing, de-flowering, de-handing, de-budding	Bunch clearing practices protect the Kolikuttu Banana from mechanical damage by removing potential causes of damage and increase the vigor of the bunch
Tagging of the banana bunch with coloured plastic ribbons	Every week a different coloured ribbon is applied when the lower hands are parallel to the ground. Eight colours are used	Tagging of the banana bunch fixes the age of the fruit. At tagging, the age is 1 week. The count of bunches tagged develops a true fruit inventory that needs to be maintained and managed. The fruit inventory 13 weeks before harvest improves marketing and selling practices

		to maximise pricing for farmers and maintains quality and shelf life
Propping and guying	The banana bunch is propped with wooden poles tied with rope or plastic	Propping protects the banana bunch avoiding field losses of fruit
Harvesting by de-handing at the mat	* Bunches for de-handing in the field are chosen based on age (ribbon colour) and caliper grade to protect quality, prevent ripening during transport and extend shelf life * Hands are removed from the bunch using a fish line (100 test) that cuts and seals the crown properly with no additional trimming required	De-handing at the mat avoids the handling of whole bunches after harvest and brings only good hands to the packing centre for packing. All organic matter waste remains in the field as organic fertilizer. Prolongs life and usefulness of harvested of the mother plant
De-latexing in the field	Removed hands from harvested bunch are placed on banana leaves for de-latexing for at least one hour	Fruit arrives free of latex for packing, avoiding the use of large amounts of water for de-latexing purposes. A dry packing procedure can then be applied that requires less investment in packing infrastructure. Small farmers can easily pack Kolikuttu Banana with minimum infrastructure
Transport to packing centre	Packing the de-latexed hands into 20-kg plastic trays lined with foam. One bunch, one crate. Colour ribbon tied securely to crate to allow for inventory management at packing centre	Protects banana hands from damage during transport to packing centre
Postharvest technology	Field heat removal Line packing Cold chain management	These practices are utilized to preserve optimum quality and shelf life throughout value chain
Quality monitoring and evaluation system	Quality score Tally of defects Value chain feedback loop	The quality monitoring and evaluation system provides data for quality management and creates a feedback mechanism to correct quality problems to ensure and maintain high banana quality throughout the value chain
Value chain protocol	Guidelines to grow, pack and ship Kolikuttu Banana	The protocol ensures Kolikuttu Banana arrive in optimum biological and commercial condition to targeted markets

Table 4: Productivity Enhancing Technology

Main Technology	Practice (s)	Comments
Variety	Kolikuttu banana	Technology is applicable across varieties
Tissue culture planting material	Kolikuttu banana meristems approximately 40 cm in height with 4 to 5 functional green leaves present	Banana seedlings purchased from a tissue culture laboratory

	"Peeper" planting material	Kolikuttu banana seedlings developed from "peepers" taken from the production field and grown for 3 months following nursery practices. "Peepers" should reach approximately 40 cm of height, with 4 to 5 functional green leaves present to be ready for transplanting	"Peeper" planting material is an option for farmers when tissue culture meristems are not readily available. "Peepers" are very small followers without green leaves found in the proximity of the mother plant
	Land Preparation	* Deep ploughing using moldboard plough * Application of compost * Deep ploughing again using moldboard plow (perpendicular to first ploughing) * Disking or harrowing (two perpendicular passes) * Micro levelling to facilitate drainage works	Improved land preparation practices
	Mini-sprinkler irrigation systems	* Computer controlled heads for water application scheduling supported by fertility sensors and soil moisture sensors * Precision fertigation with liquid organic compounds * Precision application of liquid pesticides * Anti-clogging flushing components	Mini-sprinkler systems create a waterhead that allows the wetting front to reach the depth of the feeder roots of fruit trees. Irrigation scheduling-based evapotranspiration measurements
	Flood prevention and drainage field techniques	Site levelling using laser levelling machinery, quick water evacuation ditches, surface drainage techniques (removal of wet spots)	On-farm drainage works avoid water from standing in the field for long periods of time preventing waterlogging
	Precision planting	Construction type twine to demarcate planting rows, planting templates with plant spacing measurements	Practical tools and aids assure accurate precise field layout and measurements of planting distances to assure desired population densities which are the foundation of productivity
	Double row planting system	Kolikuttu Banana are planted in two double rows 1 m apart. The spacing for Kolikuttu Banana within a double row is 1.75 m. An alley, 4 m wide, separates the double rows.	This double row planting pattern accommodates 2,400 banana plants per hectare or 960 per acre and it is suitable for multiple cropping
	Rotation system to manage Panama Disease	When the infection rate of Fusarium Wilt reaches 30% to 40% incidence, the plantation can be moved to the alley space of the double row without loss of production. When the alley way becomes infected, the plantation is moved back to the original	The double row planting system allows for a banana crop rotation system on the same plot of land without loss of production

	planting space. This establishes a rotation system in the same plot of land that allows for Kolikuttu plantations to last for at least 10 years instead of 2 years	
Multiple cropping	Intercropping with short term vegetables	The alley of the Double row planting system can be used for intercropping vegetables with fruit trees. In most cases, 3 beds of vegetables can be planted is this space using the new and improved technology package introduced by the ISP for the particular vegetable
Weeding	Intercropping prevents weed infestation. Otherwise, mechanical weeding is practiced	Mechanical weeding is herbicide free. It is a very environmentally friendly technology
Precision fertilization	Fertigation with organic liquid fertilizers supplemented with fertilization and/or fertigation with chemical fertilizers	Formulation of fertiliser regimes based on complete soil tests and foliar analyses
Integrated Pest Management (IPM)	* Pest population and pest damage assessment surveys to evaluate pest and disease intensity/ quantity factors for damage prevention and to determine pest populations threshold status for rational application of pesticides * Prevention and management of Fusarium wilt (Panama disease) * Control of Sigatoka disease and other pre and postharvest diseases	* IPM practices are combined with modern spray techniques when necessary i.e. ultra-low volume spray using drones * Pesticide application through irrigation system
Labelling for precision agriculture	Production area blocks and tree tagging labelling	Production area blocking and tree tagging labelling develop a tree identification nomenclature to find tress quickly to apply precision agriculture practices on a timely basis

Through this process other farmers gradually adopt new technologies and management practices introduced by ISP. Thereafter, whole farming community of the area will be producers of high- quality banana suitable for export market.

Table 5: Access roads identified for repair in Puthukudyirippu, Mullaitivu

NO	LOCATION	UNIT	Length
1	Vishvamadu West Road 1 to be rehabilitated forming a concrete carriage way.	km	0.82

2	Vishvamadu East Road 2 to be rehabilitated forming a concrete carriage way.	km	0.92
3	Udayarkattu South, Ponnambalam Road to be rehabilitated forming a concrete carriage way.	km	0.39
4	Udayarkattu South, Chanthiran Road to be rehabilitated forming a concrete carriage way.	km	0.36
5	Udayarkattu South, Jeevaoli mission Road to be rehabilitated forming a concrete carriage way	km	0.52
	Total length of roads identified for repairs	**km**	**3.01**

The proposed sub project is mainly focused to introduce the new technology for cultivation activities. The civil works of sub project includes:

- Managing land, water and human resources in the cluster area
- Marketing and transportation of agricultural products
- Introduction of Productivity Enhancing Technologies
- Introduction of Quality Enhancing Technologies
- Development of small-scale rural farm access roads about 3km (No widening expected)
- Technology demonstration and training
- Development of Postharvest storage and processing plants

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.

Small civil works to upgrade farm access roads have been identified with stakeholders. Small-scale cluster value chain infrastructure facilities are also proposed including collection centre, organic production unit, waste mitigation, fruit bag manufacture unit.

Project management team

A PMU was established under the Ministry of Agriculture to implement proposed project activities.

Contact Persons

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	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 In preparation of this CDP, the PPMU of ASMP made all the discussions with Chief Secretary of Northern Province, Provincial Director of Agriculture (Northern Province), District Secretary, Mullaitivu, Deputy Commissioner of Agrarian Development, Mullaitivu who are responsible for all the development coordination activities and agriculture extension works in the cluster area. Consultation was also held with the private sector involved in input supplies, marketing and transportation of agricultural products. Most importantly, attention has been paid on the existing situation of Farmer Organisations and their expected roles and functions in organic manure production to meet the demand for cultivation. Most of the identified farmers for Banana (Kolikuttu) and Chilli cultivation cluster are members of existing Farmer Organisations or in certain cases member farmer's sons and daughters have also been identified for the cluster. The PPMU (Northern Province) has played a key role in identification of proposed areas and villages with the support of the ISP District Coordinator (DC) and Cluster Coordinators (CC). Selection of potential cluster villages with interested farmers were carried out by the DC and CCs with the active support of Agriculture Instructors in the selected areas under the direction of PPMU and ISP consultants. The existing Farmer Organisations also have been consulted in this process. However, institutional mechanism for the Banana Cluster Development has been proposed. Institutional roles in this cluster (Cluster Development Plan (CDP) № 8 - Puthukudyirippu - Kolikuttu Banana and Chilli Cultivation) are attached in Annexure 3. Provincial Agriculture Department, consisting of all the line agencies such as irrigation, Agrarian Development, DS and Land), and all the chairmen of farmer organisations have extended cooperation for banana cultivation considering following reasons. • Great potential to increase Farmer income with less labour and inputs. • Effective mechanism to attract young farmers for commercial agriculture. • All the banana farmers are members of farmer organisations or successors.

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 PHYSICAL FEATURES	
Topography and terrain	The proposed cluster area belongs to 3 GN divisions in the North Eastern side of the Puthukudyirippu DS divisions in the Mullaitivu District of Northern Province. The Topography of the project area is flat land, gently sloping to the East and North and in the Western part the directed towards West and South. The elevation varies from 13 to 41 meters. The area is basically undulating and flat terrain. However, there are small rock outcrops can be recognised in the forest area.

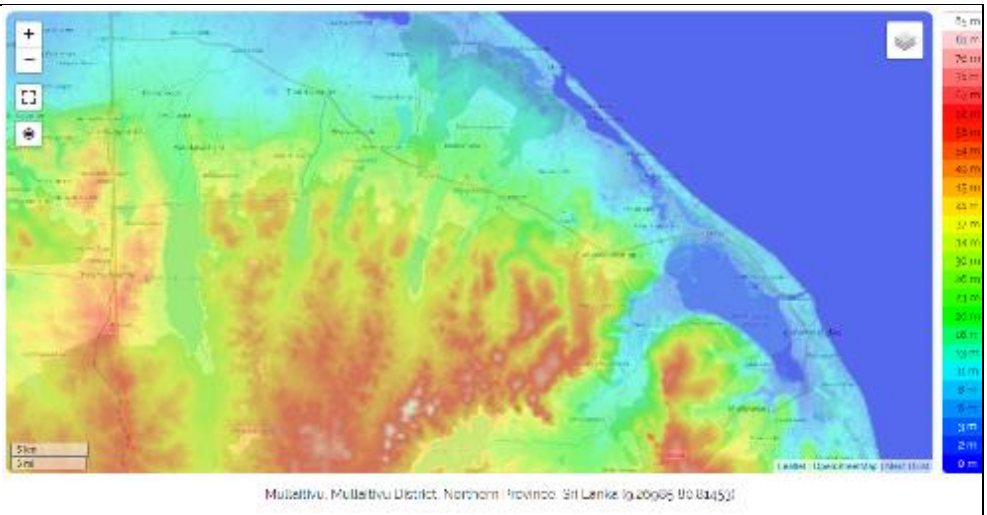


Figure 2: Topography of Puthukudyirippu DSD

Table 6: Terrain Types of the Cluster Area

	AEZ	Land Extent		Terrain Types
		sq.km	% to	
Puthukudyirippu	DL3	247.2	79	Undulating and Flat
	DL1e	64.3	21	Undulating and Flat
Total Area		**311.5**		

Source: Punyawardana, 2003

Soil
(Type and quality)

About 21% of the land area of the Divisional Secretariat Division (Cluster Area) belongs to DL1e Agro-Climate Zone. Although the area receives more than 900 mm of annual rainfall, 65% of it falls during the Maha season (October to February). This area is not included to the proposed project.

The dominant soil group of the DL3 area known as the Red Yellow Latasol (RYL). Soils of the upper part of the soil catena is red in colour and named as Red Latasol and soil in the lower part known as yellow latasol. Due to the relative depth of the soil is high, being the calcareous soils of limestone and there are many cracks in the bedrock, this area contains more groundwater than any other part of the island. As a result, even after a light rainfall, a significant volume of water accumulates in the groundwater. Therefore, a very intensive cultivation system could be observed in DL3 areas that provides pumped water for crop cultivations is found in this region. The proposed Banana Project is being implemented mainly in this agro-climatic zone.

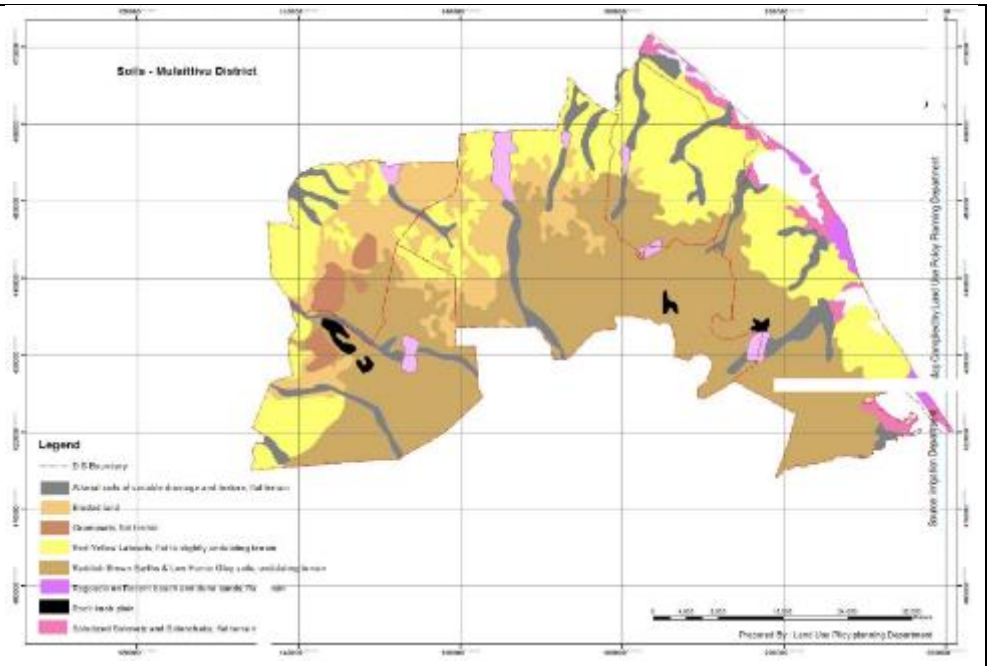


Figure 3: Soils of Mullaitivu District

Data Source: LUPPD, 2016

Another agroecological zone (DL4) makes 13% within the three DSc and has mostly Solanets soladized soils that are not good for crop cultivations. In some places, paddy is being cultivated on Grumusol soils in this agroecological zone. There is very small areas having with RYL soils.

Table 7: Agro Ecological Characteristics of the Cluster Area

	AEZ	Land Extent		Rainfall	Soil Types
		sq.km	% to DS		
Puthukudyirippu	DL3	247.2	79	> 800mm	**RYL, Rego sol**
	DL1e	64.3	21	> 900mm	**RBE, LHG**
Total Area		**311.5**			

RBE-Reddish Brown Earth, LHG-Low Humic Gley, RYL – Red Yellow Latasol
Source: Punyawardana, 2003

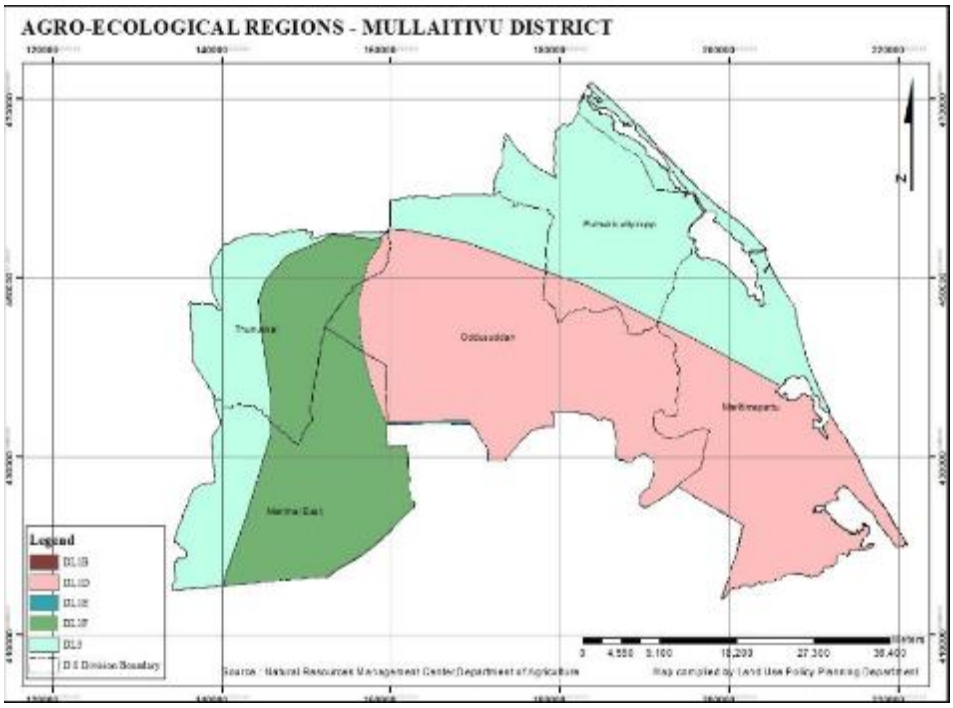


Figure 4: Agro-ecological Areas of Mullaitivu District

Data Source: LUPPD, 2016

Surface water (Sources, distance from the site, local uses and quality)

There are six surface waterbodies in the project area. Out of these six, Vishwamadu Tank, Kalmadu Tank, Udayarkattu Tanka and Kuruvi Kulam are belongs to Major and medium irrigation tanks. However, Kalmadu tank is administratively belongs to Kilinochchi district but falling within Vishwamadu area. Further, Theravi Aru and Theruvil Kulam in Udayarkattu. There are no major perennial rivers that could be tapped to provide irrigation for cultivation. All these waterbodies are irrigation waterbodies and no one using for drinking purposes. There are no scientific records regarding quality of the water. The water bodies of the District is shown in Figure 6.

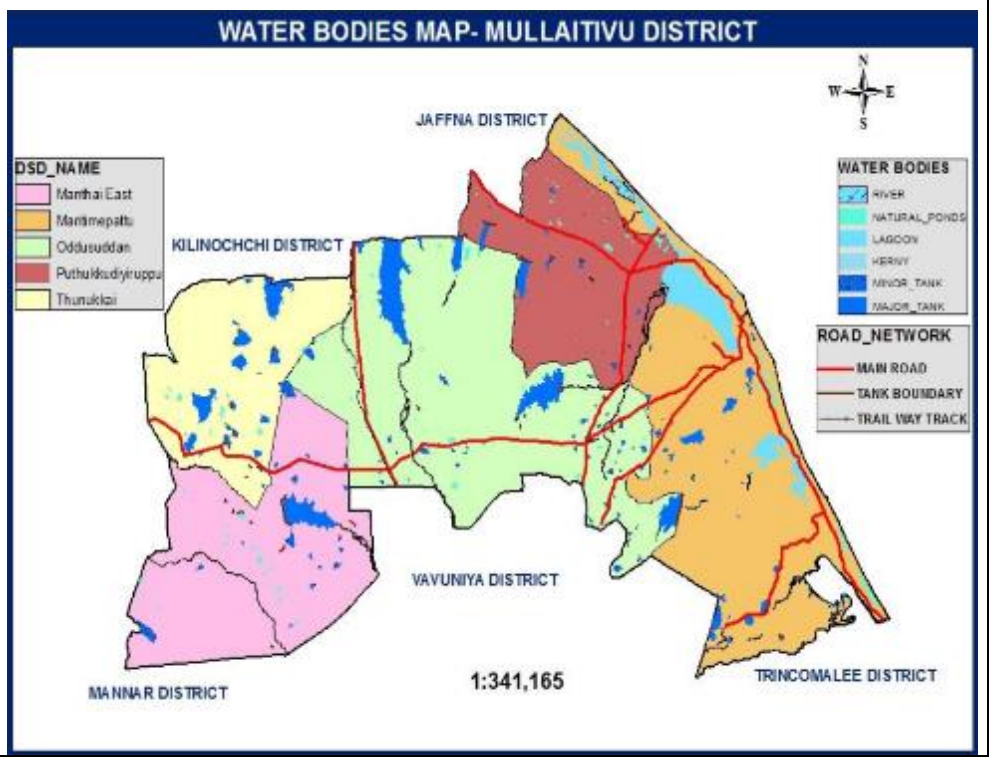


Figure 5: Surface Waterbodies of Mullaitivu District
Data Source: LUPPD, 2016

Ground water
(Sources, distance from the site, local uses and quality)

Ground water is the main source of drinking water in the area. People are using well water for drinking purposes other than community water supply schemes. Water levels in the area lies 15-35 feet and availability of water in the area is reliable even during dry period. However, there are certain areas in Puthukudyirippu is having poor water quality and established RO plants for purification.

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 shows that the Air Quality Index (AQI) of Udayarkattu is 71/500 and $PM_{2.5}$ is the dominant pollutant while O_3, PM_{10} and CO are having lower concentration than $PM_{2.5}$.

5.2 Ecological features – Ecosystem components

Vegetation (Trees, ground cover, aquatic vegetation)

The selected lands for banana cultivations are presently been used for other crop cultivations such as vegetables, cereals, legumes, fruit including Banana. Vishwamadu, and Udayarkattu areas are bordering to the forest area. This forest area extending up to Muthiyankattu Reservoir and Kilinochchi district.

Table 8: Floral Species Recorded in the Cluster Area
H=Habit – T – Tree, S – Shrub, H – Herb, C – Creeper,
TS= Taxonomic Status , N-Native, E-Endemic
NCS = National Conservation Status according to 2012 National Red List.
EN- Endangered, VU- Vulnerable, NT- Near Threatened, LC- Least Concern

Family	Species	Sinhala Name	English name	H	TS	NCS
Palmae	*Areca catechu*	Puwak	Areca Nut	T		
Celastraceae	*Salacia reticulata*	Kotala-himbutu		C	N	EN
Rubiaceae	*Diplospora erythrospora*	Gal seru		T	E	VU
Lauraceae	*Alseodaphne semecarpifolia*	Wewarana		T	N	VU
Loganiaceae	*Strychnos potatorum*	Ingini	Clearing-nut	T	N	VU
Phyllanthaceae	*Margaritaria indicus*	Maha karawu		T	N	VU
Rutaceae	*Chloroxyclon swietenia*	Burutha	Satinwood	T	N	VU

	Sapotaceae	*Manilkara hexandra*	Palu	Obtuse leaved mimusops	T	N	VU
	Asperagaceae	*Sansevieria zeylanica*	Maha niyanda	Snake Plant	H	N	NT
	Combretaceae	*Combretum ovalifolium*	Kaduru-ketiya wel		S	N	NT
	Ulmaceae	*Holoptelea integrifolia*	Goda-Kirilla	Indian elm	T	N	NT
	Fabaceae	*Derris parviflora*	Kala-wel		C	E	LC
	Melastomataceae	*Memecylon capitellatum*	Weli-Kaha		S	E	LC
	Apocynaceae	*Wrightia angustifolia*			T	E	LC
	Ebenaceae	*Diospyros nummulariifolia*			T	E	LC
	Palmae	*Borassus flabellifer*	Thal	Palmyrah	T		
	Meliaceae	*Swietenia macrophylla*	Mahogany	Mahogany	T		
	Caesalpiniaceae	*Tamarindus indica*	Siyambala	Tamarind	T	I	
	Rutaceae	*Limonia acidissima*	Divul	Wood Apple	T		
	Combretaceae	*Terminalia elliptica*	Asana		T	N	
	Putranjivaceae	*Drypetes sepiaria*	Weera		T		LC
	Ebenaceae	*Diospyros ebenum*	Kaluwara	Ebony	T		VU
	Lamiaceae	*Vitex altissima*	Milla		T		NT
	Apocynaceae	*Wrightia angustifolia*			T	E	LC
	Malvaceae	*Sterculia foetida*	Telambu		T		LC
	Malvaceae	*Pterospermum suberifolium*	Welang	Fishing rod tree	T		LC
	Rubiaceae	*Ixora pavetta*	Maha Rathambala	Torch tree	S	I	LC
	Moraceae	*Ficus benghalensis*	Maha Nuga	Krishna-bo	T		LC
	Anacardiaceae	*Lannea coromandelica*	Hik	Indian Ash Tree	T		LC
	Phyllanthaceae	*Flueggea leucopyrus*	Katu Pila		S		LC
	Euphorbiaceae	*Mallotus rhamnifolius*	Molabe		S		LC
	Verbenaceae	*Lantana camara*	Hinguru	Common lantana	S	IN	
	Apocynaceae	*Carissa spinarum*	Heen Karamba		T		LC
	Boraginaceae	*Ehretia microphylla*	Heen Thambala		T		LC
	Melastomataceae	*Memecylon umbellatum*	Kora Kaha	Blue mist	S	E/I	LC

	Rubiaceae	*Tarenna asiatica*	Tharana		S	I	
	Phyllanthaceae	*Phyllanthus polyphyllus*	Kuratiya		S		LC

Presence of wetlands

There are no wetlands in the project area. However, Puthukudiyirippu is consist of abandoned paddy fields. However, proposed cultivation lands are up lands mostly home gardens.

Fish and fish habitats

The project area consists of few surfaces water bodies which are having best possible habitats for fish. Even aqua-culture activities can be seen in the area as domestic fresh water fishing.

Birds (waterfowl, migratory birds, others)

Bird species recorded during field visits are given below:

Table 9: Bird Species recorded in the Cluster Area

TS=Taxonomic Status, E=Endemic, N=Native
NCS=National Conservation Status, LC=Least concern, EN=Endangered, VU=Vulnerable

Family	Species	English Name	TS	NCS
Accipitridae	*Haliastur indus*	Brahminy Kite	N	LC
Accipitridae	*Spilornis cheela*	Crested Serpent-eagle	N	LC
Bucerotidae	*Ocyceros gingalensis*	Sri Lanka Grey Hornbill	**E**	LC
Campephagidae	*Pericrocotus cinnamomeus*	Small Minivet	N	LC
Columbidae	*Chalcophaps indica*	Emerald Dove	N	LC
Columbidae	*Stigmatopelia chinensis*	Spotted Dove	N	LC
Columbidae	*Treron bicinctus*	Orange-breasted Green-pigeon	N	LC
Coraciidae	*Coracias benghalensis*	Indian Roller	N	LC
Dicaeidae	*Dicaeum erythrorhynchos*	Pale Billed Flowerpecker	N	LC
Dicruridae	*Dicrurus caerulescens*	White-bellied Drongo	N	LC
Motacillidae	*Anthus rufulus*	Paddyfield Pipit	N	LC
Phalacrocoracidae	*Phalacrocorax niger*	Little Cormorant	N	LC
Pycnonotidae	*Pycnonotus cafer*	Red-vented Bulbul	N	LC
Pycnonotidae	*Pycnonotus luteolus*	White Browed Bulbul	N	LC
Ramphastidae	*Megalaima haemacephala*	Coppersmith Barbet	N	LC
Ramphastidae	*Megalaima zeylanica*	Brown-headed Barbet	N	LC
Sturnidae	*Acridotheres tristis*	Common Myna	N	LC
Sylviidae	*Orthotomus sutorius*	Common Tailorbird	N	LC
Timaliidae	*Rhopocichla atriceps*	Dark Fronted Babbler	N	LC
Timaliidae	*Turdoides affinis*	Yellow Billed Babbler	N	LC

Presence of special habitat areas (special designations and identified sensitive zones)

Nearly 12% of the DSD is under forest cover. Theravil (380 sq.km), Mankulam (59 sq.km) and Alavedduwan (41 sq.km), are the major forest reserves in the Puthukudiyirippu area. There are five other forest reserves as well, ranging from 8.0 sq. km to 22.0 sq.km. These forests areas encouraging wild elephants roaming in the area. There are 2 medium and several minor irrigation schemes specially to irrigate for paddy cultivation.

5.3 Other features

Residential/sensitive areas (e.g., hospitals, schools)

Considering the location of Puthukudyirippu along A35, there are many sensitive areas are located along the road. Moongilaru Divisional Hospital is the closest hospital to the selected project area which is located within 5-8km. Further, about 20km to Kilinochchi District Hospital and 23-35km to Mullaitivu District General

	Hospital. In the DS division, there is a Base Hospital in Puthukkudiyiruppu town, Divisional hospital at Munkilaru and PMCU at Thevipuram. In addition, there are 8 Gramodaya Health centres and two school dental clinic centres. In these health service centres there are 103 beds. However, inadequate staff both technical and medical doctors are one of the problems faced by the health sector in the DS division. Common diseases in the DS division are Diarrhoea, Typhoid, and Malaria. Vishwamadu Maha Vidyalayam, Udayarkattu Maha Vidyalayam, Kuravi Tamil Vidyalayam, Vallipunam School, etc are observed within the project area. None of these locations get affected due to project activities. According to the published documents, there are 25 schools including 3 1AB, 41C, 10 Type II and 8 Type III schools are available in the DS division. In 2020, the student population in the DS division was 9,624 comprising 4,866 males and 4,758 females and the teacher's strength was 599. The student teacher ratio was 16.1. In the project area except Manikkapuram GN division there are 10 schools in all other GN divisions. There are 3 schools in Udayarkaddu West, 2 schools in Suthanthirapuram, 2 schools in Viswamadu East and one school per GN in other 3 divisions. School leavers belongs to the selected areas of Puthukkudiyiruppu should be encouraged to contribute to the banana cultivation or to get employment opportunities as skilled farmers or opportunities at post harvesting processing activities. Modernisation of agriculture sector increase or stabilize the monthly income and other income generating opportunities in the agriculture sector should attract the school leavers, male and females in the area.
Traditional, economic and cultural activities	Puthukudyirippu Divisional Secretariat Division has 19 Grama Niladari divisions, and population about 41,408[2]. The total land area of the DS division is 366.0 Km^2 and the selected GN divisions accounted for 46.75% of the total area of the division. The Puthukudyirippu Banana Cluster comprises seven GN divisions and namely Udayarkaddu South (MU 47), Suthanthirapuram (MU 48), Visvamadu West (MU49), Visvamadu East (MU50), Manikkapuram (MU51), Theravil (MU52) and Valluvarpuram (MU53). There are 37 villages in these 7 GN divisions and people are living only in 32 villages. This year 351 farmers have been selected for cultivating banana from these divisions. It is likely to increase in terms of GN divisions and number of farmers next year and the targeted farmers will be 500 or more. Many of the selected farmers have experience in cultivating Kolikoodu variety of banana in these GN divisions. Farmers in these selected GN divisions have landholdings of different size.

Table 10: Household and Agricultural population in the selected GN areas

Households	**Number**
Male head	4,495
Female head	813
% female head	15.32%
Total	5,308
Agricultural Population	
Male	1,832
Female	634
Total	2,466

Source: Department of Census and Statistics Sri Lanka, 2019. Note: all the farmers registered under Udayarkaddu ASC was considered as Agricultural population.

[2] Resource profile & SHB Puthukkudiyiruppu Divisional Secretariat 2019

In the discussions with the area farmers, they highlighted the local migration of youths who were looking for different types of employment opportunities with soft skills rather than engage in agriculture. Further, they claimed that the existing agricultural activities do not ensure consistent and stable monthly income for farmers. They claimed that stable monthly income in agriculture sector would be a key point to get the attraction of the youth. As per the information[3], more than 530 government and around 380 private employees are found within the selected area. Further, around 5600 people of the selected area are entitled to self-employment opportunities while around 1,488 were found as an unemployed. Employment categories including few self-employment figures are shown in table 11.

Table 11: Livelihood Status of the Cluster

GN Nos	Government & Private sector		Self-Employment				
	Government	Private	Farm families	skilled	Foreign Emp.	Daily Wage	Unemployment
MU 47	284	275	280	-	-	-	45
MU 48	88	25	217	-	-	-	237
MU 49	84	5	228	-	-	-	82
MU 50	145	31	121	-	-	-	160
MU 51	90	4	103	-	-	-	62
MU 52	65	4	110	-	-	-	119
MU 53	80	6	105	-	-	-	70
DS Div.	1,934	1,625	4,809	1,284	821	4,133	-

Source : Resource profile & SHB of Puthukudyirippu Divisional Secretariat 2021. Note: - Breakdown of skilled, unskilled and daily wage earners at the GN level is not available.

The project creates many opportunities for unemployed people to have employment opportunities on daily basis 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. Hence, development of banana cultivation will be a good prospect for the youths to have stable income and it prevents local employment migrations. Both male and female youths should be encouraged by conducting training and awareness to get active involvement in modern banana cultivation project. In addition, explore new/innovative areas within banana sector would create more employment opportunities or income generating options for youth and women in the area.

As per the Statistical Handbook 2021 published by Puthukkudiyiruppu DS Divisional secretariat 26.5% of the families in these selected GN divisions are getting monthly income less than LKR 5,000. Another 25.2% of the households are drawing an income between LKR 5001-10,000 per month. 22.6% of the families are getting an income of LKR 10,001 t0 15,000 and 25.7% of the families are getting more than LKR 15,000 per month. There is no income or expenditure data

[3] Resource profile & SHB Puthukudyirippu Divisional Secretariat 2019

specific to Banana farmers. In general, the household Income and Expenditure Statistics in Mullaitivu District - 2006/07 – 2016, published by Department of Census & Statistics shows that the mean household mean monthly income in 2016 of Mullaitivu district was about LKR and the median month income was LKR 25,526. Income receivers mean and median incomes were LKR 18,461 and LKR 17,864 respectively. Size of a Household was 3.8 and the number of income receivers in a household was 1.7. Even though there are no specific family income details relevant to the Banana Cluster in Puthukudyirippu, the above data is adequate to visualize the situation about the income and employment situation in the selected GN divisions. More than 70% of annual income was from farming, farm labour and livestock raring in the areas and the balance 30% of annual income is from the jobs. Farmers do not disclose their actual annual or monthly income for various reasons, and it is always a challenging exercise calculating their monthly or annual income because they do not keep records of their income and expenditure.

Table 12: No. of Families and population breakdown with gender

Name of GN Division & No	No of Families	Population	Male	Female
Udayarkaddu South MU47	1,196	3,603	1,744	1,859
Suthanthirapuram Mu48	870	2,595	1,294	1,301
Visvamadu West MU49	1,004	2,820	1,351	1,469
Visvamadu East MU50	565	1,685	825	860
Mannikkapuram MU51	461	1,351	684	667
Theravil MU52	482	1,445	719	726
Valvarpuram MU53	460	1,304	646	658
Total	5,308	14,803	7,263	7,540

Source: Statistical Handbook 2021 Puthukudyirippu Divisional Secretariat

Archaeological resources (Recorded or potential to exist)

Suthanthirapram and Mannakandal are Archaeological places in Puthukudyirippu area. However, there are no locations observed within project area. The protected archaeological locations are given in the below figure:

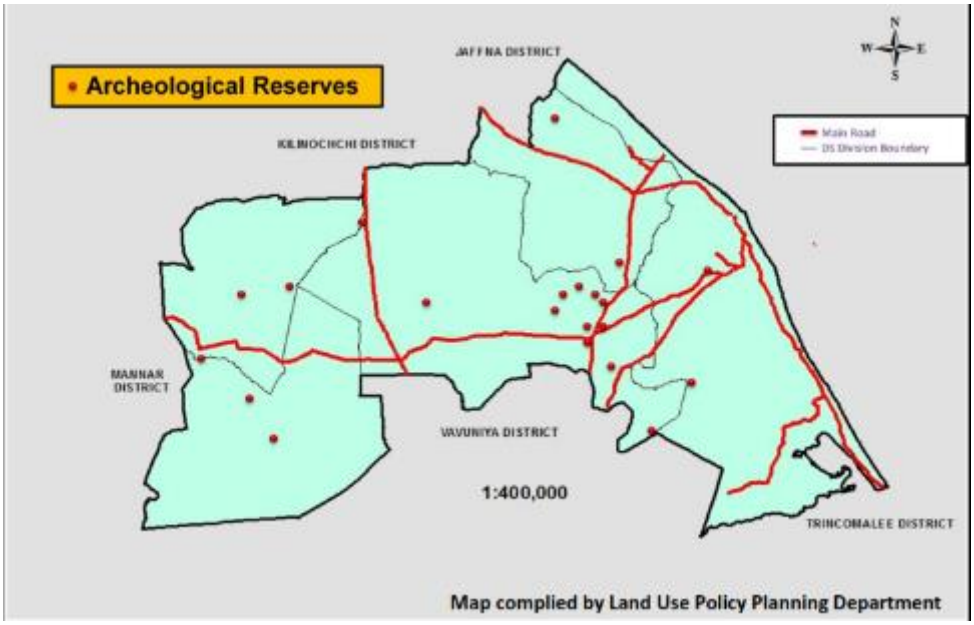


Figure 6: Archaeological Reserves in Puthukudyirippu

	Hence, find chance scenarios can be expected and required guidance are provided in the Environmental Management Plan (EMP).

6. DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES

6.1 CULTIVATION

Existing condition of the crop	Size of banana plots varies between 0.2 ha to 1 ha (0.5-2 acres) per farmer. Banana growers are first deeply ploughed with a moulded board plough attached to a four-wheel tractor and after about 2 weeks, use a tine tiller to get the soil clods in to fine particles. Basin-like beds are arranged for easy irrigation and planting are taken place in fits dug in this basin. Main source of irrigation for the Banana Cluster agro wells, tube wells or lift irrigation water from Vishwamadu reservoir. However, the lands selected for this project will not be irrigated with the lifting irrigation and only lands with an existing cultivation well or tube well will be selected. Most of the farmers prefer to cultivate Kolikuttu variety. Because there is a high price in the market for these products. Kolikuttu or Kapple cultivar planting materials are purchasing from nearby farmer or use their own. Farmers are using organic manure in every 6 months together with chemical fertilizer. Plantations are usually renewed every 5 to 6 years; however, some plantations are kept for 10 years or more. Plant is irrigated in every 6 or 7 days using pumped water to the basin prepared around the banana plant. Common Pests and diseases are banana weevil, mealy bugs as pests and panama disease, Sigatoga and Bunchy top as diseases. Most of farmers are practicing selected vigorous healthy planting materials and neem extract as a natural in pest control. In case of diseases control they practice using diseases free suckers, drainage improvement, application of lime (1-2kg/pit) and keeping field clean approaches. In fact, farmers apply pesticide very rarely. In general, farmers do not apply chemicals to control diseases in banana cultivation. As a result, existing banana plantations in this area surviving long period without serious pests and diseases. Weeds are mostly controlled manually in early stages of the crop. In mature plantations shade as well as use of banana residue as mulch help to keep bananas free of weeds. Harvesting is done every 2 weeks. Harvested bunches are sold at a nearby market by transporting in small trucks or selling to a collector coming from other districts. Farm gate prices of Kolikuttu banana varies from 70 to 90 LKR per kg. However, in peak period farm gate price may go up to 120-150 LKR per kg. The cost of production of banana is about 30 LKR per kg. In general, the average bunches weight is 12-20 kg. However, in young plantations in first and second bunces average weight may go up to 20-25 kg. Generally, farmers aim to harvest for the festival seasons occurring in mid-April and end of December by maintaining suckers in their cultivations. Although presently farmers are getting lower prices, they have a good potential to obtain higher prices for their produce if they had won the brand of “Mullaitivu Kolikuttu” in the local and foreign markets. The proposed project is designed to address many of the above issues. According to the high-density cultivation approach specific to this project, the number of suckers planted per unit area will be nearly double than the recommended and it is expected that the yield will increase at least by about 50 percent. Likewise, it should also be noted that the micro irrigation system, which can provide water to the effective root zone area of the plant, is particularly suitable for soils in the project area where soil infiltration rate is very high. Every grower is advised to take care of crop sanitation in the field at all time of the plant life cycle. The amount of nutrients supplied to the

	plant is determined after analysis of the soil and, if necessary, the leaves, so that the plant does not grow up to unnecessarily succulent. As a result, the risk of disease and pest damage to the plant will be low. From the above details it can be seen that the products produced under this project are being designed and will be maintained to minimize the harmful effects on the environment, human and animal toxins from nursery to harvest market preparation. Accordingly, there is a possibility of obtaining a special price for the products produced under this project by earning a name as the least toxic food foods. Also, every producer is encouraged to obtain the SL Gap Certificate. All banana products grown under the project will be directed to pre identified specific markets. Accordingly, the existing small market in this area will be replaced by a wider high-end market in other areas of the country. In addition to growers, other groups will be involved in a variety of value-added product manufacturing related activities. Therefore, this cluster will play a significant role in changing and upgrading the livelihood of the cluster area. From the above details it can be seen that the products produced under this project are designed and maintained to minimize the harmful effects on the environment, human and animal toxins from nursery to harvest market preparation. Accordingly, there is a possibility of obtaining a special price for the products produced under this project by earning a name as the least toxic banana. In addition to growers, other groups will be involved in a variety of value-added product manufacturing related activities. Therefore, this cluster will play a significant role in changing and upgrading the livelihood of the cluster area.
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	Size of banana plots varies between 0.2 ha to 1 ha (0.5-2 acres) per farmer. Banana growers are first deeply ploughed with a moulded board plough attached to a four-wheel tractor and after about 2 weeks, use a tine tiller to get the soil clods in to fine particles. Basin-like beds are arranged for easy irrigation and planting are taken place in fits dug in this basin. However, the lands selected for this project will not be irrigated with the lifting irrigation and only lands with an existing cultivation well or tube well will be selected. Planting fits are fortified with 5 to 6 kg of cow done. In addition, some farmers are using about 150g of TSP. Size of planting hole is 0.6m*0.6*0.6m. Planting spacing is about 3m by 3m. The proposed project is designed to address many of the above issues. According to the high-density cultivation approach specific to this project, the number of suckers planted per unit area will be nearly double than the recommended and it is expected that the yield will increase at least by about 50 percent. Likewise, it should also be noted that the micro irrigation system, which can provide water to the effective root zone area of the plant, is particularly suitable for soils in the project area where soil infiltration rate is very high. Every grower is advised to take care of crop sanitation in the field at all time of the plant life cycle. The amount of nutrients supplied to the plant is determined after analysis of the soil and, if necessary, the leaves, so that the plant does not grow up to unnecessarily succulent. As a result, the risk of disease and pest damage to the plant will be low. Removal of all shrubs and bushes is the first step. Manual weed control is the best method at preliminary land preparation stage. Then, shading branches of big trees near the field will be taken place to destroy all alternative host for pest and diseases and this will provide required sun light for the plants. First soil preparation step is

<table>
<tr><td></td><td>ploughing with disc or board ploughs and compost will be added. Second deep ploughing is taking place perpendicular to the 1st ploughing. Lastly, the flood prevention and drainage improvements and these steps destroy pest cycles in different stages. Harmful bacteria and microorganisms are destroyed and minimise due to aeration is improved. Also, Harmful pathogens are destroyed also due to exposing soils to sunlight. This will minimise future pest and disease incidences and damages.
They place the sword suckers in planting holes at a depth of 1 or 1.5 ft. Before planting, basal fertiliser is not applied to the hole and after 1.5 to 2 months later with the appearance of a leaf, paddy fertiliser mixture or banana fertiliser mixture is applied. However, some farmers Diazinon insecticide is placed in the planting hole to control the banana weevil attacks in young suckers. Weeds are mostly controlled manually in early stages of the crop. However, some farmers apply weedicides such as glyphosate.</td></tr>
<tr><td>Water requirement</td><td>Main source of irrigation for the Banana Cluster agro wells, tube wells or lift irrigation water from Vishwamadu reservoir. However, the lands selected for this project will not be irrigated with the lifting irrigation and only lands with an existing cultivation well or tube well will be selected. Plants are irrigated in every 6 or 7 days using pumped water to the basin prepared around the banana plant. Main source of irrigation for the Puthukudyirippu Banana Cluster agro wells, or tube wells. Plants are irrigated in every 6 or 7 days through gravity irrigation. They are practicing flood irrigation and certain farmers have common wells and they use the wells in rotation. They can pump water continuously for 2-3 hours and thereafter they must stop pumping till the wells are recharged. Many farmers have inserted tube wells inside the dug wells to continuous water supply. However, they are aware of the danger of change of water quality and quantity in future. All these wells are domestic wells, and no agro wells are in the area. The depth of these wells varies from 20 feet to 40 feet. They experience shortage of water during July to September. The farmers said that they will have pump 4-5 hours continuously to a half an acre plant for flooding. Farmers are using both electric and kerosene water pumps to pump the water and they are expecting electric water pumps from the project to replace kerosene and old electric pumps currently in use.

There are three types of irrigation water supply for crops as given below (Error! Reference source not found.).
Table 13: Three types of irrigation water supply for crops
<table>
<tr><th>GN Divisions</th><th>Source of Irrigation</th><th>Water supply method</th></tr>
<tr><td>Vishvamadu West</td><td>Vishvamadu Reservoir</td><td>Through lift irrigation system. But identified farmers from lift irrigation FO also have wells</td></tr>
<tr><td>Wishvamadu South</td><td>Vishvamadu Reservoir</td><td>Gravity flow through irrigation canals but identified farmers from lift irrigation FO also have wells</td></tr>
<tr><td>Udayarkaddu and Manikkapuram</td><td>Dug wells (Individual or shared)</td><td>Pump irrigation through individual pump</td></tr>
</table></td></tr>
<tr><td>Use of fertiliser and pesticides and weedicides</td><td>Common Pests and diseases are banana weevil, mealy bugs as pests and panama disease, Sigatoga and Bunchy top as diseases. Most of farmers are practicing selected vigorous healthy planting materials and neem extract as a natural in pest control. In case of diseases control they practice using diseases free suckers, drainage improvement, application of lime (1-2kg/pit) and keeping field clean approaches. In fact, farmers apply pesticide very rarely. In general, farmers do not apply chemicals to control diseases in banana cultivation. Weeds are mostly controlled manually in early stages of the crop. In mature plantations shade as well as use of banana residue as mulch help to keep bananas free of weeds.</td></tr>
</table>

	International standard IPM framework of the world bank 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. IPM of the Mullaitivu Banana cluster is shown in table 16 and that should be implemented during the cultivation process. These agrochemicals are recommended by the pesticides register of DOA and PMP as well.
Harvesting	Harvesting will be done once in two weeks. Harvest will be exported and lower grades can be sold at domestic markets. Farm gate prices of Kolikuttu banana varies from 70 to 90 LKR per kg. However, in peak period farm gate price may go up to 120-150 LKR per kg. The cost of production of banana is about 30 LKR per kg. In general, the average bunches weight is 12-20 kg. However, in young plantations in first and second bunces average weight may go up to 20-25 kg. Generally, farmers aim to harvest for the festival seasons occurring in mid-April and end of December by maintaining suckers in their cultivations. However, in young plantations in first and second bunces average weight may go up to 25-30 kg. Farmers aim to harvest for the festival seasons in mid-April and end of December by maintaining suckers in their cultivations. Though, presently farmers are getting low price between LKR 25 to 40 per kg, by exporting banana farmers will certainly get high price for their products. Export of banana has not been done yet due to unavailability of suitable export protocol.
Postharvest storage and transportation	From the above details it can be seen that the products produced under this project are being designed and will be maintained to minimize the harmful effects on the environment, human and animal toxins from nursery to harvest market preparation. Accordingly, there is a possibility of obtaining a special price for the products produced under this project by earning a name as the least toxic food foods. Also, every producer is encouraged to obtain the SL Gap Certificate. All banana products grown under the project will be directed to pre identified specific markets. Accordingly, the existing small market in this area will be replaced by a wider high-end market in other areas of the country. In addition to growers, other groups will be involved in a variety of value-added product manufacturing related activities. Therefore, this cluster will play a significant role in changing and upgrading the livelihood of the cluster area. From the above details it can be seen that the products produced under this project are designed and maintained to minimize the harmful effects on the environment, human and animal toxins from nursery to harvest market preparation. Accordingly, there is a possibility of obtaining a special price for the products produced under this project by earning a name as the least toxic banana. In addition to growers, other groups will be involved in a variety of value-added product manufacturing related activities. Therefore, this cluster will play a significant role in changing and upgrading the livelihood of the cluster area. This banana is mainly used as the fresh fruit and maintain of freshness is important and need to transport immediately to the local market. However, project expectation is to provide fresh banana fruit to the export market. Therefore, the harvesting should be done by maintaining required time gap (at least two weeks) prior to the shipment day. Grading and packing of the fruit are an essential part during the postharvest 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.

Other factors	
Solid waste	The solid organic waste is generated as crop residuals and at postharvest period and all are biodegradable. However, compost production unit (See Annexure 6: Compost plant proposal) will be implemented to produce compost using solid waste generated from post harvesting processing centre and these organic fertilisers will be used at land preparation stage. Solid waste is a critical consideration during implementation of this cluster. Polythene bags which will be using to cover the Banana bunches will be significant. Hence, site level segregation, collection, reuse, recycling of polythene bags should be implemented properly to avoid solid waste becoming a nuisance to the community. In addition, Polythene/Plastic collectors at the Local Authority can be made use for this as final method of disposal if reuse/recycling is infeasible. However, farmers will be made aware on proper disposal mechanism during implementation.
Wastewater	Surface runoff 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. Proposed application of IPM during implementation of banana cluster is given in table 14.

Table 14: ISP of ASMP - Proposed IPM Technologies for Crop Banana in Mullaitivu (CDP 8)

Stages	**IPM Practices**	**Impacts of Implementation**	**Benefit for farmers**
Pre-Land preparation stage	Removal of all shrubs and bushes. Shading branches of big trees near the field are removed	Destroying of all alternative host for pest and diseases	Future risk of pest damages are minimised
Land preparation stage	Doing 1st ploughing with disk or mould board ploughs	• Different stages of pest cycles are destroyed. • Harmful bacteria and microorganisms are destroyed and minimize due to aeration is improved. • Also, Harmful pathogens are destroyed also due to exposing soils to sunlight.	Future pest and disease incidences and damages are minimized. Cost reduced.
	Adding Compost		
	Doing 2nd deep ploughing with disk or mould board ploughs perpendicular to 1st ploughing		
	Disking or harrowing (two perpendicular passes)		
	Flood prevention and Drainage improvements		
Planting stage	Healthy Planting Materials are selected	strong and vigorous Saplings are ensured for planting	A healthy plantation is assured. Cost reduced
	Plant of nonstandard are removed		
	Tissue cultured saplings will be supplied from recognized nursery men		
	Saplings of same height and growth are planted in separate rows	Easy to manage agronomic practices. Uniform plantation is assured	A healthy plantation is assured. Cost reduced
Sapling stage	Daily attention on each and every saplings are 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	A healthy plantation is assured. Cost reduced
	Care will be assured to have water stress	Vigorous growth and Even plantation is assured	A healthy plantation is assured. Cost reduced
	Only correct dose of nutritionally balanced fertilizers will be applied	No unwanted canopy development and vigorous growth is assured	A healthy plantation is assured. Cost reduced
Juvenile stage	Daily attention on all saplings is assured. This procedure is followed in every growth stage of the crop cycle	A healthy crop field is assured	A healthy plantation is assured. Cost reduced

	weakened plant parts are removed and vacancies will be filled		
	Field sanitation is assured by managing garbage in the field		
	Suspicious plants are marked and will be monitored for pest and diseases. Treatment is followed if identified a pest or a disease incident		
	Attacked plants and parts are uprooted and immediately destroyed		
	Intercropping	• Minimize the weed control. • No need to weedicide application	additional income
	Micro irrigation	• Volume of water need for the effective root zone is assured. • Percolation of irrigated water toward the ground water is minimized	Easy to handle
	Fertigation with organic liquid fertilizers supplemented with fertilization and/ or fertigation with chemical fertilizers. 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 assure	Easy to handle
Flowering stage	Bunch clearing before bagging. Removing leaves that can damage bunch and bending or removal of placenta leaf	Bunch clearing practices protect the bananas from mechanical damage by removing potential causes of damage	A healthy plantation is assured. Cost reduced
	Bagging with plastic bags. Premature bagging when the bunch is just emerging and the flower bud points downward	Bagging protects the banana bunch from physical and pest damage and increases bunch vigour	

	Bunch clearing after bagging. De-leafing, de-flowering, de-handing, de-budding	Bunch clearing practices protect the bananas from mechanical damage by removing potential causes of damage and increase the vigour of the bunch	Healthy crop is assured
Maturity stage	The banana bunch is propped with wooden poles tied with rope or plastic	Propping protects the banana bunch avoiding field losses of fruit or bunches. Risk of pest and disease incidents are minimized.	Expected yield is assured
Harvesting stage	• Bunches for de-handing in the field are chosen based on age (ribbon colour) and calliper grade to protect quality, prevent ripens and turnings during transport and extend shelf life • Hands are removed from the bunch using a fish line (100 test) that cuts and seals the crown properly with no additional trimming required	De-handing at the mat avoids the handling of whole bunches after harvest and brings only good hands to the packing centre for packing. All organic matter waste remains in the field as organic fertilizer.	Expected yield is assured
	Removed hands from harvested bunch are placed on banana leaves for de-latexing for at least one hour	Fruit arrives free of latex for packing, avoiding the use of large amounts of water for de-latexing purposes. A dry packing procedure can then be applied that requires less investment in packing infrastructure. Small farmers can easily pack bananas with minimum infrastructure	
Post Harvesting and storage	Field heat removal Line packing Cold chain management Integration of export protocols into standard SOP	These practices are utilized to preserve optimum quality and shelf life throughout value chain	Banana producers will win a brand of quality product suppliers
Transport stage	Packing the de-latexed hands into 20-kg plastic trays lined with foam. One bunch, one crate. Colour ribbon tied securely to crate to allow for inventory management at packing centre.	Protects banana hands from damage during transport to packing centre. Possible cause of pest and disease incidents are minimized.	Expected quantity of produce is assured. Reasonable price is assured.

Marketing stage	Export protocol, guidelines to grow, pack and ship bananas for export	The export protocol ensures bananas arrive in optimum biological and commercial condition to international markets	Banana producers will win a brand of quality product suppliers

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 situation of farmer organisations 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.

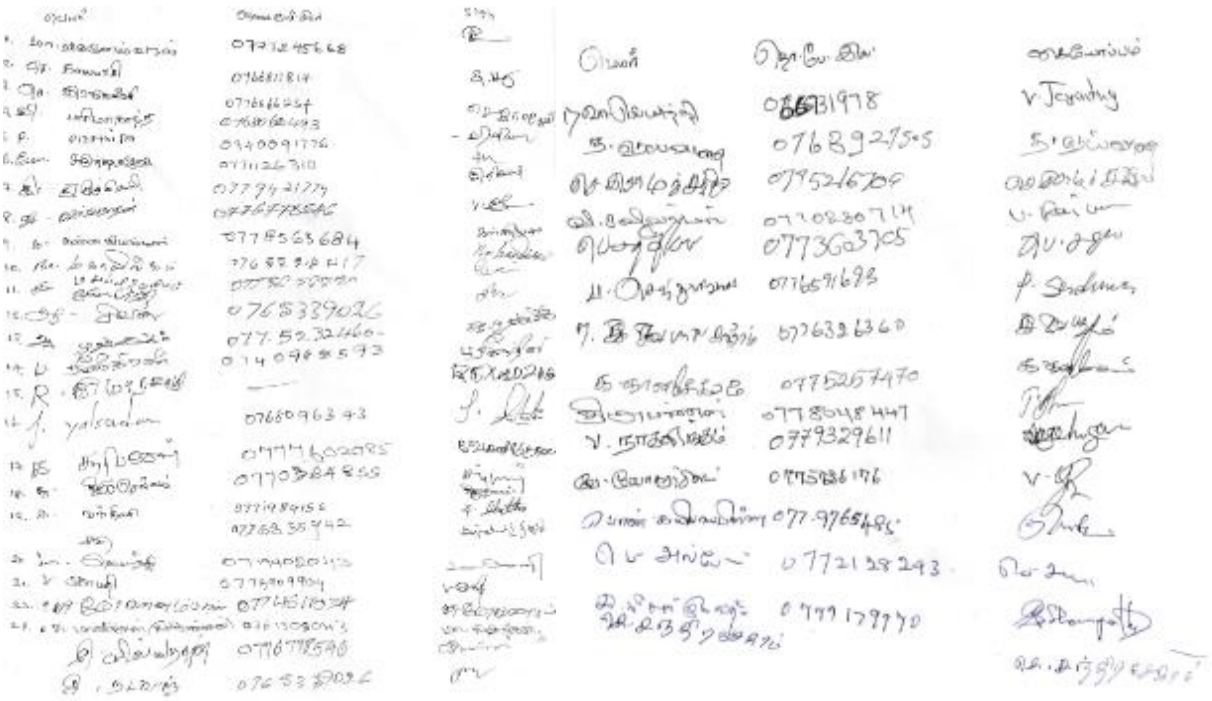


Figure 7: Attendance Sheets of Public Consultations

Table 15: Outcomes of the Public Consultations

#	Farmer's Representation	Summary of Public Consultations
1	Vishwamadu East and West	Farmers mentioned that they ready to alienate even more than 1 acres and that they are having ownership or lease rights for the lands they are cultivating. Further they said that they can easily obtain the legally valid lease document from the landowners. In Vishwamadu lands were alienated for educated youth scheme to cultivate onion and chili in 1970's under the import substitution policy of then Sri Lankan Government. The selected youths were mostly from Jaffna district. Some lands are still owned by them, and others have been transferred to the present cultivators of the land. Water source is dug well and if it rains adequately in the rainy season of September-January water will be available throughout the next cultivation season. There is a lift irrigation system in the GN division and water from the nearby tank is lifted by diesel pumps into the concrete channel network. Registered members of the system will be eligible for water, and they irrigate their field crops. Otherwise, water shortage will be encountered during July-September. They mentioned with the introduction of drip irrigation in the project this issue could be resolved in future. Participants were asked to divide into two groups to represent Vishwamadu East and Vishwamadu West GN divisions and draw their GN divisions Community map indicating all the social, cultural, and environmental resources. Two community maps were

		drawn, and they indicated the schools, major and minor roads, tanks, rivers, and places of worships. They pointed out shortage of surface and ground water during dry season, cleaning and constructing drainage channel, intrusion of wild animals such as monkey and elephants, and poor condition of internal roads as their immediate problems.
2	**Udayarkaddu South Kuravil**	They are keen to adopt modern technology in plantain cultivation. They were also interested in intercropping the banana plantation with some short-term crops such as chili and ground nut and long-term perineal crops like coconut and areca palm to maximize their annual income. The purpose of the visit was explained to the farmers and asked to draw their community map indicating their social, cultural environmental resources and the problems they faced in their cultivation. They pointed out all their social and cultural infrastructures such as schools, tuition centre, cooperative, GN office, temples, common hall, playground, in the map. The road network is also shown in the map. Majority of the participants were women in this discussion Their major problem was shortage of ground water during months of July to October. The wind during the months of April, May, causes damage to banana cultivators and they do not get any compensation from the government. Hence, they asked for a cheap method of protecting their plants from wind. Further, they said monkey's and wild elephants are also causing damage to banana and other crops.

- **Existing issues**

Although presently farmers are getting lower prices, they have a good potential to obtain higher prices for their produce if they had won the brand of "Mullaitivu Kolikuttu" in the local and foreign markets. Technological problems and gaps in present banana cultivation practices of farmers that affect crop productivity and quality in the cluster are as follows:

1. Low yield of banana and decline of yield over the years due to poor agronomic practices adopted by farmers
2. Low quality of product and major portions are not suitable for high end markets due to small finger size, shape etc.
3. Low productivity of lands, labour and other inputs.
4. Low adoptability of new technologies.
5. Excessive flood irrigation creates many problems such as waterlogged conditions, poor crop performances, high disease incidence and waste of water.
6. High risk of soil erosion due to prolonged flood irrigation.
7. Poor crop management practices and poor sanitation.
8. Bagging of banana bunches is not a common practice.
9. Some farmers reuse bags that may contaminate fruit bunches.
10. Poor primary post- harvest handling and high wastage.
11. Difficulties in finding labour.
12. Most of the youth in the labour force have left the district or gone abroad for employments.
13. Even the youth living in the district are reluctant to choose agriculture as their main livelihood.

Figure 8: Public Consultations with Banana Cluster Farmers

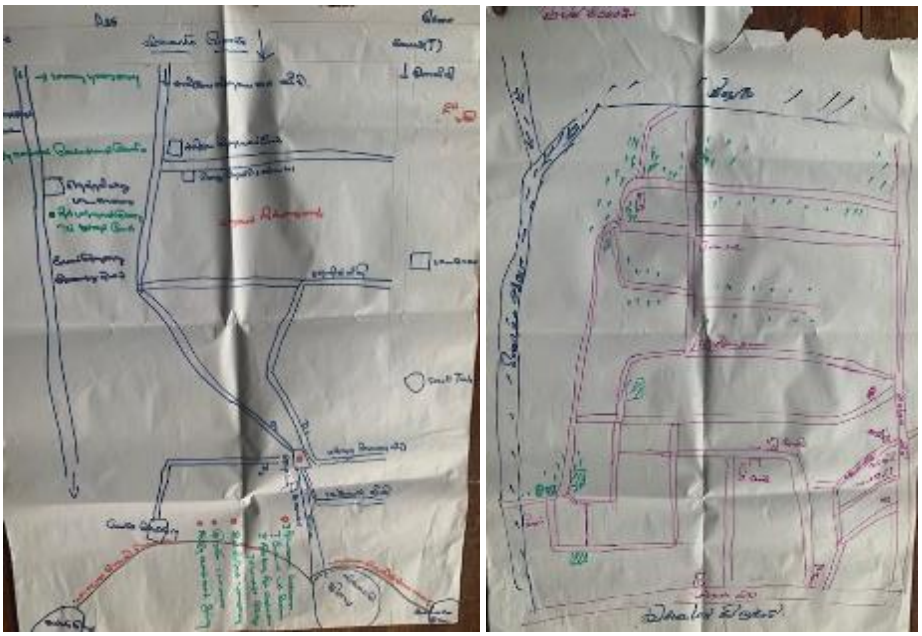


Figure 9: Community Mapping Outcomes

Figure 10: Existing Conditions of Proposed Lands

Figure 11: Current irrigating practices

Figure 12: Forest Reserve Boarder and Elephant Entering Location

Figure 13: Existing Cultivation Practices

8. ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

Table 16: 8a. Screening for Potential Environmental Impacts

№	Screening question	Yes	No	Significance: (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	• Due to proposed agricultural activities, the changes to the topography will be minimal. However, there will be a change due to proposed infrastructure improvements such as rural roads, collection centres, compost yard, etc
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?	√		Low	• Improvements of rural roads, construction of collection centre and compost yard may use construction materials which are harmful to human health but the volume will be less • Use of pesticides, weedicides, and chemical fertilizers will be discouraged. However, certain minimal quantities may be used by the farmers
3	Will the Project produce solid wastes during construction or operation?	√		Moderate - High	• Use of polythene bags for covering of Banana bunches will be significant during implementation • Other organic solid waste which will be generated during cluster implementation will be directed to the compost yard • Construction related wastes should be disposed at an approved disposal site
4	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	√		Low	• Proposed agricultural activities have proposed IPM practices which discourage potential use of hazardous substances • However, during infrastructure improvements, there will be minor level of fumes, dust, cement dust, emissions due to machineries, etc will have a low impact
5	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	√		Low	• Due to proposed infrastructure developments, there are potential vibration and noise generating activities • However, there is no possibility of generating noise, vibration, heat energy and electromagnetic radiation due to proposed agricultural activities

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
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?	√		Low	• Use of chemical fertilizers will have an impact on land and water contamination. However, project will be highly discouraging chemical fertilizer use and promote IPM practices as proposed above • Construction related wastewater discharges may have an slight impact on water and land
7	Will the project cause localised flooding and poor drainage during construction? Is the project area located in a flooding location?	√		Low	• There won't be any possibility of localised flooding due to proposed agricultural activities and it will enhance the existing drainage system • However, due to improper practices by the civil contractors during construction activities may have a possibility of creating drainages disturbances and blockage of natural drainages which leads to localise flooding
8	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?	√		Low	• Due to agricultural activities proposed, there are no public safety hazards as the project encourages IPM practices which will reduce the risks due to chemical fertilisers • There will be minor level of public safety hazards due to proposed construction activities such as movements of machineries, excavation, filling, etc
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	• There are no potentials for creating traffic congestions due to cultivation activities • Due to construction activities including improvements to selected rural roads will have a possibility of creating traffic congestion as roads are narrow rural roads
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?		√		• There are no such places located within the project area
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?		√		• Even though a forest reserve is located within few GNDs. There are NO activities proposed closer to those areas which has the possibility of creating disturbances
12	Are there any other areas on or around the location which are important or sensitive for reasons of their		√		• As mentioned above, the Theruvil forest reserve fallen within few GNDs. However, there no lands proposed closer to those

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
	ecology e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests which could be affected by the project?				lands which will have a possibility to create an impact on the forest
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?		√		• There are no records of being recorded a such important aspects
14	Is the project located in a previously undeveloped area where there will be loss of green field land		√		• All agricultural activities proposed are within farmers lands which they are being cultivated at present and no new land will be converted to agriculture • The proposed collection centre and compost yard will be constructed on a government land which are not categorized as undeveloped green fields
15	Will the project cause the removal of trees in the locality?		√		• No tree removal foreseen due to agricultural activities • Removal of trees during proposed construction activities is discouraged
16	Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?		√		There is no culturally important location which will be affected due to agricultural or construction activities. However, Hindu kovils are located at many places in the 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, tourism, mining or quarrying which could be affected by the project?		√		• As mentioned above all proposed cultivation areas are cultivating lands at present and no new lands will be converted to agricultural purposes • Proposed construction activities are also taking place on government lands which are designated for development but no conflict of interest due to any other proposed activities
18	Are there any areas on or around the location which are densely populated or built up, which could be affected by the project?		√		• There are no densely populated areas in the area as the areas selected are purely rural
19	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals,	√		Low	• As mentioned, due to proposed agricultural activities no negative impact on such sensitive locations in the area

№	Screening question	Yes	No	Significance: (low, moderate, high)	Remarks
	schools, places of worship, community facilities, which could be affected by the project				• Due to proposed rural road improvements, there will be minor level of impact on accessing of schools, kovils and community facilities but NO hospitals will be disturbed
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?		√		• No such important locations observed in and around the area
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?		√		• Within proposed cultivation areas, no such already polluted or environmentally damaged areas recognized.

8B. Environmental Management Plan

Table 17: Environmental Management Plan for Proposed Agricultural Activities which ISP/ASMP should implement

№	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/PUCs	• Establish project name boards with all basic details of the project • Distribute project leaflets among the community for awareness before staring beneficiary selection and other activities including details of grievance redress mechanism • Establish/Strengthen institutional development component and proper awareness and community leadership via Public Unlisted company (PUC) • 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 • Display selected beneficiary lists in all selected GNDs for community awareness

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• 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 • A copy of the EMP should be available at all times at the project supervision office on site
2	Activities related to installation of irrigation systems	Installation of micro 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 • Use of solar powered pumps should be encouraged for irrigation purposes
3	Spreading of Invasive Alien Species	Manual control of weeds Establishment of new cultivation	• Provide DOA certified banana variety only to farmers • Manual and integrated weed control • Prevent weed spreading via organic manure (Compost) by periodic inspection and manual removal after application
4	Public Nuisance due to Noise Pollution	Use of tractors and agricultural equipment/ machineries Use of water motors	• Working time for noise/vibration generation activities should be restricted and carried out only from 6 am to 6 pm. • Noise related to all agricultural improvement activities should not exceed 55 dB (daytime) and 45dB (night time) as practicable as possible • Equipment and machinery should be maintained in good condition
5	Contamination of water, land and air during usage of chemicals (pesticides, weedicides.)	Land preparation Control weedicides, insecticides, fungicides, etc Use of fertilisers	• Adherence to IPM practices proposed above which are complying WB's Pest Management Framework, IPM action plan of ASMP and international 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
6	Impaired water quality and volume for paddy cultivation	Cultivation of banana	• Excess water extraction is to be cut down to preserve ground water table • Proper introduction of micro sprinkling practices instead of flood irrigation to preserve water and use of modern techniques as discussed in the CDP for reduce water consumption

№	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 Agrowells/deep wells as much as possible to prevent conflicts with other farmers
7	Improper disposal of Solid Waste during cultivation period	Discarding poor quality fruits Organic materials in the field (Bunch clearing, de-flowering, de-handing, de-leafing, debudding, bagging, propping and guying) Waste from weed control activities Polythene bags use to cover Banana bunches Ribbons	• Make farmer awareness from the beginning on waste management practices • Burnt to maintain the farmlands' hygienic condition • Organic waste should be directed to composting • Implement waste minimisation as proposed in pilot activity of minimisation of waste generation, income generation and empowerment • Reuse/Recycling of polythene bags and ribbons as much as possible • Proper segregation, collection and safe disposal of polythene through approved collectors (LAs) at approved disposal locations
8	Lack of knowledge on basic cultivation practices, harvest and postharvest practices lead to low quality of product and high amount of waste due to perishability nature	Maintain good sanitize practices 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 postharvest 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
9	Spread of crop related diseases among other flora species	Throughout the cultivation period including land preparation	• 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

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• Pest and disease control based on IPM practices and modern spray techniques and land preparation techniques to allow maximum aeration and sunlight penetration • 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.)	• Carry out proper hazardous identification and risk assessment of all proposed activities • 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, googles, masks and protective clothing) • Training and awareness on safe chemical handling • Use drone technology to spray chemicals • 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 18: EMP for Improvements of Rural Farm Access Roads (This should be part and partial of the bidding document during bidding)

№	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 project affected persons. • Project Name board should be established and community awareness should be carried out using leaflets containing project details including grievance redress mechanism • 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. • Sufficient sign boards, movement controllers, etc should be mobilized as proactive measures
2	Exposing and damaging of physical cultural resources	Site preparatory works including clearing and grubbing, excavation, extraction of borrow materials, etc	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

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			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	Over extraction of natural resources	Material Sourcing such as soil, aggregates, sand, etc	• The contractor is required to ensure that soil, 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. • Sourcing of any material from protected areas and/or designated natural areas, including tank beds, are strictly prohibited. • If the contractor uses a non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed. • 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.
4	Soil Erosion	Land preparation including clearing and grubbing and embankment construction	1. Shoes drains should be proposed as side drains to avoid water flow on the road surface which will enable to use as carriageway as the road width is low in rural roads 2. Erosion potentials should be assessed before rains and take measures such as catch pits to avoid silt being carried to the adjoining drains and streams 3. Proper culvert arrangement should be there places where potential water draining over the road 4. Land clearing/preparation should be avoided during the rainy season and at a time maximum of 250m stretch should be worked and no more than that
5	Spreading of Invasive Alien Species	Vegetation clearing Borrow material transportation	1. Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done. 2. Invasive plants species removed should be destructed onsite without transporting to another place. 3. Vehicles should be covered during transportation of cleared vegetation to and from the construction site. 4. 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.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			5. Washing the vehicles should be conducted periodically to prevent carrying any invasive species 6. The construction site should be inspected periodically to ensure that no invasive species are establishing
6	Air Pollution including dust generation that can affect nearby plantation and households	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 stockpiles, waste stockpiles, and vehicle maintenance yards. These dust-emitting sources should be located away from human activity and natural drainage paths as much as possible. 2. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. 3. Stockpiled soil and sand shall be covered with tarpaulin during rain and wind. 4. The site should be water sprinkled at least 2-3 times a day during dry weather to suppress dust emission. 5. 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. 6. Regular and proper maintenance of construction vehicles and machinery to avoid air emissions.
7	High Noise & Vibration levels that can affect nearby structures and wildlife	Operation of 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). If the construction activities happen during the nighttime, it is necessary to maintain the noise level at below 50 dB. 3. The use of mechanically driven saw blades for tree felling will make the noise levels restricted to only a short period of time. 4. 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.
8	Improper Solid Waste Disposal	▪ Unsuitable soil ▪ Site clearing	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

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
		▪ Concrete waste	type. 2. Any hazardous type of waste shall be dealt with special care and instructions from the LA. 3. Waste Asphalt should be reused as much as possible. Any leftovers should be taken back by the Contractor to the batching plant. Asphalt waste should not be disposed of on-site 4. The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations. 5. The contractor shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
9	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 Prevention of COVID-19 Pandemic spread	**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 helmets, protective footwear, and high visibility jackets). 3. Gloves, ear muffs, goggles, dust masks, safety harnesses, and any other equipment considered necessary should be maintained in stock at the site office. 4. A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wearing and monitored 5. Necessary COVID-19 safety measures and protocols will be implemented as per Government, WHO, and WB guidelines by all construction workers. 6. Proactive measures should be taken to mitigate fall from height, edge collapse, excavation and machinery related hazards during construction **Construction camps** 7. Construction camps should have adequate sanitation facilities for construction workers to control the transmission of infectious diseases. 8. 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,

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			and health facilities according to labour laws. Clear work campsites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS.
10	Mosquito breeding places and spreading vector borne diseases	Temporary water ponding due to construction	1. Water pocketing should be avoided especially during the rainy season 2. The temporary pond should be filled as soon as possible 3. Construction equipment and tanks should be emptied immediately after the construction concluded for the day
	Post construction phase		
12	Clearing/Closure of Construction Site/Labour Camps		• 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.
13	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 19: EMP for Construction of Collection Centre and Compost Yard (This should be part and partial of the bidding document during bidding)

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 are 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	• The contractor must ensure that all workers, including managers are well trained on COVID 19 safety precautions published by health ministry. • All construction activities should follow the '**INTERIM GUIDANCE ON COVID-19 (VERSION 1: APRIL 7, 2020)'** recommended by World Bank's Operations Environmental and Social Review Committee
3	Exposing and damaging of physical cultural resources (PCR)	• Site preparatory work Vehicle	• 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 to find the report, within a specified time period, with the 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

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			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.
4	Spreading of Invasive Alien Species	• Clearing and Grubbing • Material sourcing • Desilting of earth drains	• 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 • Use of hammer type pile driving will generate high noise and vibration.	• 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 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 restrict 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, 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. • 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.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
		•	• 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. • The contractor shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
8	Blocking of surface drainage paths leading to localized flooding and ponding of water	• Site Preparation including clearing and grubbing	• 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. • The stockpiles should be suitably covered to minimize wash-offs to nearby waterways. • If impacts to surface drainage cannot be avoided leading to ponding of rainwater and inconvenience to people, the contractor must provide an adequate surface drainage system to safely remove water from the site to the canal to avoid on-site ponding or flooding. • Proper planning to avoid construction during the rainy season. • Preventing total blockage of streams / providing alternative drainage paths during construction.
9	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 monitored.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			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 nighttime. 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 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 at 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

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			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.
10	Damage to Flora and Fauna	• Vegetation clearing • Encroaching forest lands	• Speed limits and operating times for the construction vehicles should be imposed. • Due consideration should be given to carefully clearing of vegetation avoiding the destruction of habitats of fauna. • The de-silted matter shall immediately be disposed of off to pre-decided disposal sites. • The contractor will take reasonable precautions 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.
11	Soil erosion, sedimentation of nearby waterbodies and farmlands	• Construction work • Removal of topsoil • Vegetation clearance	• Soil stockpiles and other construction material should not be placed within the bed or banks of the tanks or canal. • Installing and maintaining permanent erosion and sediment control measures such as silt traps to avoid sediment runoff into the tank and nearby waterways.
Post construction phase			
14	Clearing/Closure of Construction Site/Labour Accommodations		• 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 burrowing 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.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
15	Solid waste	• Operational stage organic 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. • Organic waste during operations shall be directed to the compost yard • The farmer societies shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
16	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

9. COST OF MITIGATION

Table 20: Environmental mitigation measures and estimated cost

No.	Environmental mitigation measure	Cost (LKR)	Remarks
1	Information Boards, leaflets	60,000	Awareness leaflets for organic cultivation practices and IPM
2	On-site first aid facilities	50,000	
3	Safety equipment	150,000	Personal protection equipment should be provided for road and canal renovation activities
4	Dust suppression	50,000	Need to be done during road and canal renovation activities
5	Waste removal from site	75,000	Waste from vegetation clearing, site preparation, labour camps
6	Training of farmers and village level stakeholders on IPM and new technological applications	200,000	Should be scheduled to a few sessions
7	Trainings and awareness including progress review meetings	10,000	Progress Reviews and technical reviews
		10,000	Training/motivation programmes for female farmers to enhance active participation
		10,000	Trainings on postharvest processing activities (Collection, Selection, storage and transportation etc.)
	Total	**615,000**	

10. CONCLUSION AND SCREENING DECISION

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

Table 21: Summary of environmental effects

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place[4]
During Agricultural activities		
• Land preparation • Preparation of pits & planting • Planting materials • Fertiliser in the planting pit	No significant negative impacts since new lands are not used for the cultivation activities. Water accessibility will be improved and use of water will be reduced more than 60%	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 Less potentials of generating micro-bacterial issues Increase sanitization of banana trees and lands	SP
• Use of fertilisers and chemicals • Mechanical Weeding • Insect Control • Sigatoka Fungus Control • Nematode Control • Other Spray	No Land, water an air contamination as No Pesticides, weedicides and fertilizers will be used	SP
Product transportation and storage		
• Introduction of drone technology • Geo-positioning • Land surveys for site selection • Levelling for land preparation and drainage • Disease surveys using infra-red photography	Less agro-chemical contamination on Land, water, and air	SP

[4] 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

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place[4]
• Application of pesticides		
• 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, delatexing 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 including ribbons, polythene bags for covering of bunches Organic solid waste will be used for composting	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
Infrastructure Activities (Improvements of rural roads, construction of collection centre and compost yard)		
• Clearing and Grubbing	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
• Construction activities including embankment and building structures	Traffic congestion, 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	Construction related wastewater discharges to adjoining lands and water sources	NS

11. EMP IMPLEMENTATION RESPONSIBILITIES AND COSTS

The overall responsibility of ensuring compliance with safeguard requirements lie with both ISP team and PMU/PPMU supported by Provincial Agriculture Department, Northern Province. However, construction related activities are of both ISP and PMU/PPMU 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 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 National 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.

12. 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 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. Waste minimisation, Income Generation and Empowerment pilot project proposed in Anuradhapura can be make use 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 polythene bags is recommended up to maximum possible. Failing with, proper segregation, collection and disposal of polythene 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.

Table 22: Screening Recommendations for each activity

Key recommendations	Actions / Approvals to be attended	Time period to attend each action	Responsibility / Remarks
Construction of Agro Wells	Excavation should be strictly adhered to the recommended locations by the WRB	During excavation	ISP PPMU Engineer-PMU WRB
Use of Nawagiriya Water	Obtain written consent from the Department of Irrigation - Nawagiriya	In case of use of Nawagiriya water	ISP FO PPMU
Disposal of Waste (Plastics and polythene)	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
Construction of Collection Centres and Compost yard	Lands should be properly obtained from the DS	Before start construction	ISP PPMU PMU DS
Removal of Trees	Local Authority approval should be obtained	Before removal of trees	ISP PPMU
Erection of Elephant fence	Obtain concent from DWLC Arrange proper maintenance of fence and corridor	Before construction During Operations	Engineer – ISP PPMU Engineer – PMU

13. 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** April 2022  ***Signature***
Screening report reviewed by **D.M. Sanjaya Bandara** Environment and Social Safeguard Specialist Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** August 2022 
Screening report Approved by **Dr. Rohan Wijekoon** Project Director Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** August 2022 

ANNEXURE 1: LIST OF REFERENCES

1) Resource profile & SHB Puthukkudiyiruppu Divisional Secretariat 2019

2) ISP District Coordinator, Mullaitivu

3) District Statistical Handbook, 2018

4) Land Use Policy Planning Department (LUPPD), 2016

5) Punyawardana, B.V.R., Bandara, T.M.J., Munasinghe, M.A.K., Banda N.J. and Pushpakumara, S.M.V. (2003). Agro-ecological regions of Sri Lanka. Natural Resources Management Centre, Department of Agriculture, Peradeniya, Sri Lanka

6) Draft Cluster Development Plan – CDP 8 – Kolikuttu Banana Cluster in Puthukudyirippu

7) https://www.breezometer.com/air-quality-map/air-quality

8) Statistical Handbook 2021 Puthukudyirippu Divisional Secretariat

ANNEXURE 2: BENEFICIARY LIST

#	Name of the Farmer	Gender (M/F)	NIC	GN Division	Address	Mobile TP	Land Extent Ac	Type of Irrigation Available	GPS E	GPS N
1	Pathmanathan Yoshika	F	995150590X	MUL 49	D3, Thoddiyadi, Visuvamadu	779230321	1.00	Lift/tube well	449534.00	1034907.00
2	Navaratnam Shanmuganathan	M	473562243V	MUL 49	No 182/2, Visuvamadu	773001675	1.00	Lift/tube well	449073.00	1034383.00
3	Shanmugam Srikantharajah	M	480943473V	MUL 49	No 65/1, Visuvamadu	776605619	0.00	Lift/well		
4	Chelliah Ramachandran	M	543353051V	MUL 49	Thoddiyadi, Visuvamadu West	775216709	1.00	Lift/well	448998.00	1034819.00
5	Selvarasa Rajendran	M	783095599V	MUL 49	Thoddiyadi	774103192	0.00	Lift/well		
6	Ramachandran Thevarasa	M	870344031V	MUL 49	Thoddiyadi, Visuvamadu West	775216709	1.00	Lift/well	448960.00	1034782.00
7	Thambimuththu Nirmalan	M	772084650V	MUL 49	Thoddiyadi, Visuvamadu	773531833	1.00	Lift/well	449209.00	1035357.00
8	Thambimuththu Mohanathas	M	820144872V	MUL 49	No 117/2, Thoddiyadi, Visuvamadu	775122807	1.00	Lift/well	449138.00	1035113.00
9	Ponnambalam Sritharan	M	710434859V	MUL 49	No 122/2, Thoddiyadi, Visuvamadu West	770592174	0.50	Lift/Tube well	449239.00	1035366.00
10	Vairamuthtu Naguleswaran	M	680515620V	MUL 49	No 11 D2, Thoddiyadi, Visuvamadu	770759779	0.50	Lift/well	449287.00	1034908.00
11	Naguleswaran Nishanth	M	911142449V	MUL 49	No 119 D2, Thoddiyadi, Visuvamadu West	770759779	0.50	Lift/well	449287.00	1034908.00
12	Arulvasagam Kilamentan	M	200113102751	MUL 49	1/2 Ekkar Thiddam, Thoddiyadi	769838267	0.50	Lift/Well	449411.00	1034588.00
13	Anthonipillai Rajini	F		MUL 49	Thoddiyadi	764022579	0.50	Lift/Well	449480.00	1034811.00
14	Raththinasingam Uthayananthan	M	801793169V	MUL 49	No 47/2 Visuvamadu West, Visuvamadu	779998275	1.00	Lift/tube well	449895.00	1035375.00
15	Kugan Pathmajini	F	877344274V	MUL 49	Visuvamadu West, Thoddiyadi	762209432	0.00	Lift		
16	Palanivel Marimuththu	M	573143990V	MUL 49	Visuvamadu West, Thoddiyadi	770558231	0.00	Lift		
17	Thangamayil Selvachenthan	M	197131903747	MUL 49	No 202/2, Thoddiyadi, Visuvamadu	767729803	1.00	Tube Well	448250.00	1035004.00
18	Kaalimuthu Rajeswaran	M	740805016V	MUL 49	Indian Scheme, Thoddiyadi, Visuvamadu	778631408	0.00	Lift		
19	Vinayagamoorthy Vijayatheepan	M	800404169V	MUL 49	Kulaveethy, Thoddiyadi, Visuvamadu	778280459	1.00	Lift/Tube well	449831.00	1034673.00

20	Natsingam Kunaseelan	M		MUL 49	No 179/2, Visuvamadu West, Thoddiyadi		0.50	Lift		
21	Punjipanda Sellamma	F	476753082V	MUL 49	No 178/2, Thoddiyadi, Visuvamadu	770789617	0.50	Lift/TUbe well	448987.00	1034528.00
22	Velu Rajagopal	M	723394708V	MUL 49	Thodiyadi, Visuvamadu	778588801	0.50	Lift/Tube well	449123.00	1034676.00
23	Jesuthasan Ilankumaran	M	973470949V	MUL 49	No 68/2, Thoddiyadi, Visuvamadu	760573887	1.00	Lift/tube well	449937.00	1035697.00
24	Jesuthasan Manoranjitham	F	548323606V	MUL 49	No 68/2, Thoddiyadi, Visuvamadu	773486008	1.00	Lift/tube well	449937.00	1035697.00
25	K Jesuthasan	M	513663692V	MUL 49	No 68/2,Thoddiyadi, Visuvamadu	770255934	1.00	Lift/Tube well	449820.00	1035852.00
26	Tharmabalasingam Jisintha	F	816723809V	MUL 49	No 60/02, Visuvamadu West, Thodiyadi	772881058	0.50	Lift/well	450098.00	1036084.00
27	Senathirasa Kalathevan	M	673090168V	MUL 49	No 258, Punnaineeravi, Visuvamadu	778836804	1.00	Lift		
28	Yogeswaran Parameswary	F	655114033V	MUL 49	D3, ThoDdiyadi, Visuvamadu West	770094970	1.00	Lift/tube well	448104.00	1034394.00
29	Jesurathinam Kuganeswary	F	706744398V	MUL 49	Diii, 146/2, Thoddiyadi, Visuvamadu	778167108	1.00	Lift/Well	448562.00	1035348.00
30	S Sivapalan	M	196803203275	MUL 49	Visuvamadu West, Thoddiyadi	765469870	1.00	Lift	449237.00	1035224.00
31	Kanagasabai Kulasingam	M	473223830V	MUL 49	No 205/2, D3, Thoddiyadi, Visuvamadu	770591962	1.00	Lift/Well	448163.00	1034868.00
32	Tharmapalan Theivanai	F	718214440V	MUL 49	Thoddiyadi, D3	768927505	1.00	Lift/Well	447903.00	1034723.00
33	Kanagalingam Karthik	M	971214210V	MUL 49	No 130/2, Thoddiyadi, Visuvamadu	775545535	1.00	Lift/Well	447714.00	1034373.00
34	Yogeswaran Neminathan	M	962903940V	MUL 49	D3, Thoddiyadi,Visuvamadu West	773699267	1.00	Lift/tube well	448149.00	1034394.00
35	Kaneshan Kayatheepan	M	198419510030	MUL 49	Visuvamadu West, Thoddiyadi	778085044	0.50	Lift/Well	448879.00	1035265.00
36	Thillaisivam Abarnan	M	851432825V	MUL 49	No 125/1, Visuvamadu West, Visuvamadu	778048447	1.00	Lift/Agrowell	449380.00	1035614.00
37	Kanthaiya Thillaisivam	M	571893193V	MUL 49	No 39/2, Visuvamadu West	777549119	1.00	Lift		
38	Sambasivam Sasikaran	M	197823501192	MUL 50	Visuvamadu East, Puththadi	770361265	1.00	Lift/Tube well	450109.00	1035101.00
39	Punjipanda Pavalachelvan	M		MUL 49	No 109/1, Visuvamadu West	775823809	1.00	Lift	448837.00	1035427.00
40	Subramaniyam Tharmarathinam	M	531201965V	MUL 49	No 132/02, Visuvamadu West	772123902	1.00	Lift/tube well	449002.00	1034781.00
41	Tharmarathinam Sajikaran	M	801055842V	MUL 49	No 173/02, Visuvamadu West	772938944	1.00	Lift/tube well	449012.00	1034815.00

42	Arumugam Vasantharathevi	F	507491855V	MUL 49	No 38/2, Visuvamadu West	778380195	1.00	Lift/tube well	450279.00	1036132.00
43	Sachithanantham Thamilselvan	M	199203202581	MUL 49	No 21/2, Thoddiyadi, Visuvamadu	773761752	1.00	Lift/Well	447732.00	1034394.00
44	Shanmuganathan Ranganathan	M	772774672V	MUL 49	No 21/2, Thoddiyadi, Visuvamadu	772032732	1.00	Lift/well	447753.00	1034407.00
45	Parameswaran Yogeswary	F	727563890V	MUL 49	No 179/2, Visuvamadu West, Thoddiyadi	765276209	1.00	Lift/well	449083.00	1034564.00
46	Velupillai Yogaratnam	M	603600410V	MUL 49	No 30/2, Thoddiyadi, Visuvamadu	775726176	1.00	Lift/agrowell	450280.00	1035906.00
47	Kanaganayagam Thulakshan	M	200025900072	MUL 49	No 121/2, Thoddiyadi, Visuvamadu	773645418	1.00	Lift	449148.00	1035354.00
48	Vaheeshan Jeyanthi	F	777003160V	MUL 49	No 105/2, Thoddiyadi, Visuvamadu	764792983	1.00	Lift/tube well	449581.00	1035218.00
49	Thiyagarasa Vaheeshan	M	197829004183	MUL 49	No 107/2, Thoddiyadi, Visuvamadu	766731978	1.00	Lift/Tube well	449460.00	1035095.00
50	Subramaniyam Thayalan	M	911824582V	MUL 50	Barthipuram Visuvamadu East	766665081	1	Well	450585.00	1034568.00
51	Mugunthan Sajitha	F	2.00073E+11	MUL 49	Visuvamadu West	772384031	1	Lift		
52	Vinayagamoorthy Ravivarman	M	803655111V	MUL 49	26/11, Thoddiyadi, Visuvamadu West	770230714	1	Lift/tube well	450209.00	1035614.00
53	Santhira Vinayakamoorthi	M	555563256V	MUL 49	117/1, Visuvamadu West	774397045	1	Lift		
54	Mugunthan Sathees	M	797273996V	MUL 49	76/1, Visuvamadu West	772384031	1	Lift	449806.00	1034828.00
55	Thambiiya Kathirkamanathan	M	1.97907E+11	MUL 49	23, Visuvamadu West, Thoddiyadi	775882403	1	Lift/Tube well	450269.00	1035498.00
56	Kathirkamanathan Vijitha	F	1.98182E+11	MUL 49	33, Visuvamadu West, Thoddiyadi	776673124	0	Lift		
57	Mohanamangalakumar Piriyankan	M	2.00011E+11	MUL 49	171/1, Visuvamadu West	762478692	0.5			
58	Kumaravel Mohanamangalakumar	M	753294236V	MUL 49	171, D1, Visuvamadu West	762478692	1			
59	Ponnaiya Kailayapillai	M	440642411V	MUL 49	77, D2, Visuvamadu West	779765485	0.5	Lift/Well	449993.00	1035605.00
60	Kunabalasingam Kirusnakumar	M	682343737V	MUL 49	D2, Visuvamadu West	775094702	1	Well	449750.00	1034730.00
61	Ponnuchchami Kengeswaran	M	720290685V	MUL 49	77/1, Visuvamadu West	773879391	0			
62	Aravinthan Srithevi	F	748581960V	MUL 49	118/1, Visuvamadu West	776934846	1	Lift/well	449875.00	1034808.00
63	Kanagarasa Aravinthan	M	731523975V	MUL 49	118/1, Visuvamadu West	774467577	1	Lift/well	449913.00	1034822.00

64	Aravinthan Saranja	M	200276700348V	MUL 49	118/1, Visuvamadu West	776934846	1	Lift/well	449916.00	1034815.00
65	Subiramaniyam Mowlitharan	M	720701553V	MUL 50	228/1, Visuvamadu East	0773302095	0.5			
66	Ponnambalam Jagatheesan	M	792181392V	MUL 49	33, Visuvamadu West, Puththadi	0770226388	1	Lift		
67	Arulambalam Jenosan	M	1.99935E+11	MUL 49	87/1, Visuvamadu West	719722076	0.5	Lift/tube well	450489.00	1035693.00
68	Sambasivamoorthi Pirakalathan	M	870473508V	MUL 49	152/1, Visuvamadu West	773302074	0			
69	Rasaiya Srisanmugavarathan	M	1.94711E+11	MUL 49	96/2, Thoddiyadi, Visuvamadu West	777179970	1	Lift/Agrowell	449394.00	1035790.00
70	Mahenthiram Gowshika	F	19885470312	MUL 50	Kulaththadi, Visuvamadu East	772376036	0	Lift/Agrowell	449241.00	1035647.00
71	Suriyasekaram Ganasekaram	M	712151293V	MUL 50	Barthipuram Visuvamadu East	775257470	1		451953	1035088
72	Murugaiya Kishanthan	M	2.00229E+11	MUL 50	Barthipuram Visuvamadu East	773412928	0.5	Well	450965	1034531
73	Kanesh Kodeeswaran	M	662832529V	MUL 50	Barthipuram Visuvamadu East	765347378	0			
74	Muniyandi Selvarani	M	1.97551E+11	MUL 50	Barthipuram Visuvamadu East	765909836	0.5	well	450913	1034432
75	Vijerathinam Baskaran	M	902712399V	MUL 50	Visuvamadu East	774126838	0			
76	Irasaiya Subiramanium	M	780505001V	MUL 50	Barthipuram Visuvamadu East	768010444	0.5	well	450977	1034893
77	Kajan Thilakarani	F	947823094V	MUL 50	Barthipuram Visuvamadu East	762962234	0.5			
78	Murugupillai Kanthar	M	522650382V	MUL 50	Barthipuram Visuvamadu East	771854162	0.5			
79	Marimuththu Kovinthasami	M	490232281V	MUL 50	Barthipuram Visuvamadu East	775290578	0.5	well	451510	1035328
80	T.Selvarasa	M	552342550V	MUL 50	Barthipuram Visuvamadu East	774151272	0			
81	Kanthasami Soshilatsumi	F	7252555098V	MUL 50	Barthipuram Visuvamadu East	764083601	0.5	Well	451040	1034462
82	Ravishankar Ranjithakumari	F	19895413054	MUL 50	Baththitakali road, 12th Mile post, Visuvamadu East	770261107	0	Well		
83	Palanichchami Arasakumar	M	690561298V	MUL 50	Barthipuram Visuvamadu East	772006297	0.5	Dam	450818	1034279
84	Sellakathiramalai Santhirasekaram	M	430772643V	MUL 50	Barthipuram Visuvamadu East	740804563	1	Well	451818	1034895
85	Santhirasekaram Mangalakumar	M	721973611V	MUL 50	Barthipuram Visuvamadu East	773943353	0.5	Well	452054	1034851
86	Thangavel Nishanthan	M	2.00013E+11	MUL 50	Barthipuram Visuvamadu East	779195340	0			
87	Nesaraja Vijeyalatsumi	F	1.9828E+11	MUL 50	Barthipuram Visuvamadu East	774138996	0.5	Tube Well	451123	1034458

88	Vijeyakumar Vijeyabaskaran	M	803394064V	MUL 50	Barthipuram Visuvamadu East	766492173	0.5			
89	P.Kengaimathi	F	955561767V	MUL 50	Barthipuram Visuvamadu East	771308326	0.5	well	451024	1034721
90	Periyasami Balakirusnan	M	581284110V	MUL 50	Barthipuram Visuvamadu East	776489632	0.5	well	450990	1034776
91	N.jeyanthi	F	815765818V	MUL 50	Barthipuram Visuvamadu East	763949309	0.5	well	451064	1034351
92	Kanthasami Kanistakumar	M	902420738V	MUL 50	Barthipuram Visuvamadu East	769194824	1	Well	450694	1034487
93	S.Kalaaselvi	F	638564670V	MUL 50	Barthipuram Visuvamadu East	772695510	1	well	450714	1034552
94	Thirunavukkarasu Kokilan	M	871141886V	MUL 50	66/1, Visuvamadu East	779597768	1			
95	Vijinthiran Rajani	F	786072638V	MUL 50	72/1, Visuvamadu East	770746434	0.5			
96	Sasikaran Nanthini	F	916052464V	MUL 50	Barthipuram Visuvamadu East	775254932	0.5			
97	Azalaku Kaneshan	M	662683868V	MUL 50	Barthipuram Visuvamadu East	772689560	0.5			
98	Kanthasami Pavalavani	F	616474677V	MUL 50	Barthipuram Visuvamadu East	775219280	0.5	well	450788	1034912
99	Perumal Arumugam	M	582112916V	MUL 50	Barthipuram Visuvamadu East	764749114	0.5	Well	450701	1034397
100	Vinayakamurthi Iynkaran	M	1.99632E+11	MUL 50	Barthipuram Visuvamadu East	771435397	0.5	well	451024	1034691
101	P.Senthoorvasan	M	711590838V	MUL 49	Thoddiyadi, Visuvamadu West	776591693	0.5	Tube Well	450138	1035159
102	S.Suriyakumar	M	2.00403E+11	MUL 49	Thoddiyadi, Visuvamadu West	776591693	0.5	Tube Well	450165	1035178
103	Visuvalingam Vickneswaran	M	692823397V	MUL 47	Kuravil, Udayarkaddu South	770545039	1.00	Tube well	456675.00	1032736.00
104	Velusamy Yogeswary	F	197570603107	MUL 47	Kuravil, Udayarkaddu South	773857462	0.50	Well	457390.00	1032179.00
105	Suren Nanthini	F	938204080V	MUL 47	Kuravil, Udayarkaddu South	771984156	1.00	Agro well	457589.00	1031655.00
106	Adaikan Murugesu	M	620794872V	MUL 47	Kuravil, Udayarkaddu South	778412293	1.00	Well	457295.00	1032338.00
107	Kathiramalai Mathanathaas	M	850933286V	MUL 47	Kuravil South, Udayarkaddu	778012040	1.00	Agro well	457430.00	1031957.00
108	Ponnaiah Ammasi	M	602012107V	MUL 47	Udayarkaddu South	761882185	1.00	Agro well	456227.00	1032155.00
109	K Manikam	M	441233046V	MUL 47	Kuravil, Udayarkaddu	762306594	1.00			
110	Anthonythas Thevarasa	M	783344149V	MUL 47	Kuravil, Udayarkaddu South	771129263	1.00	Well	457661.00	1032219.00
111	Sellathurai Rajeswary	F	747734410V	MUL 47	Kuravil, Udayarkaddu South	766566254	0.50	2 Well	457524.00	1031794.00
112	Karuppaiah Kopalamoorthy	M	660184864V	MUL 47	Kuravil, Udayarkaddu South	773639312	0.50	Agro well	457741.00	1031526.00
113	Kumarasamy Tharmenthiran	M	901025134V	MUL 47	Kuravil, Udayarkaddu South	778172471	0.50	Well	456789.00	1032074.00

114	Sellaiah Subramaniyam	M	196307610081	MUL 47	Kuravil, Udayarkaddu South	779395898	0.50	Well	457615.00	1032348.00
115	Karnan Ketheeswaran	M	942062923V	MUL 47	Kuravil, Udayarkaddu South	769443389	0.50	well	457610.00	1032345.00
116	Ramasamy Visvanathan	M	196703002660	MUL 47	Udayarkaddu South, Udayarkaddu	776778546	1.00	Agro well	456163.00	1032195.00
117	Selvanayagam Kalaiyarasi	F	866603820V	MUL 47	Kuravil, Udayarkaddu South	766811817	1.00	well	457571.00	1031721.00
118	Karuppaiah Chanthirasekaran	M	6330621172V	MUL 47	Kuravil, Udayarkaddu South	777602085	1.00	well	457383.00	1031963.00
119	Palanimuththu Thileeban	M	850663408V	MUL 47	Kuravil, Udayarkaddu South	777550773	0.00			
120	Justin Vasantharani	F	805384158V	MUL 47	Kuravil, Udayarkaddu South	768102345	0.00			
121	Karuppaiah Gnanasekaran	M	763614760V	MUL 47	Kuravil, Udayarkaddu South	772545724	0.00			
122	Lorenceroy Maheswary	F	876413094V	MUL 47	Kuravil, Udayarkaddu South	761298274	0.50	well	457689.00	1031640.00
123	Jeyaram Yasotha	F	805144734V	MUL 47	Kuravil, Udayarkaddu South	771418496	1.00	Agro Well	456968.00	1032548.00
124	Ponnan Yogathas	M	700454177V	MUL 47	Kuravil, Udayarkaddu South	779893484	0.50	well	457060.00	1032409.00
125	Chanthirasekaran Nitharshan	M	972160296V	MUL 47	Kuravil, Udayarkaddu South	762013966	1.00	Agro well	457416.00	1032067.00
126	Aarumugam Pathmeswaran	M	198030805781	MUL 47	Kuravil, Udayarkaddu South	760253964	0.50	Agro well	457678.00	1031643.00
127	Aarumugam Chanthirasekar	M	842404126V	MUL 47	Kuravil, Udayarkaddu South	767883583	0.50	Agro well	457744.00	1031630.00
128	Balan Krishnakumary	F	785114701V	MUL 47	Kuravil, Udayarkaddu South	774416348	0.50	Agro well	458055.00	1032193.00
129	Thavasekaran Pathmaloginy	F	826054700V	MUL 47	Kuravil, Udayarkaddu South	774912095	0.50	well	456953.00	1032508.00
130	Visvanathan Arulneshan	M	991372440V	MUL 47	Kuravil, Udayarkaddu South	776778546	0.50	Agro well	456163.00	1032195.00
131	Kumarasamy Tharmakulan	M	961024560V	MUL 47	Kuravil, Udayarkaddu South		0.50	Agro well/tube well	456529.00	1032512.00
132	Ramar Dilakshan	M	962762930V	MUL 47		775612649	0.50	Tube well	457540.00	1032266.00
133	Ramar Thiruchelvi	F	706234764V	MUL 47	Kuravil, Udayarkaddu South	779421774	0.50	Tube well	457540.00	1032266.00
134	Balaiya Sahunthala	F	698521902V	MUL 47	Kuravil, Udayarkaddu South	761496005	0.50		457585.00	1032260.00
135	Kapilaraj Krishnaveny	F	946513890V	MUL 47	Udayarkaddu South	770072848	0.50	Well	456153.00	1032163.00
136	Visvanathan Krishaminy	F	200160803122V	MUL 47	Udayarkaddu South	776778546	0.50	Agro well	456178.00	1032259.00
137	S Mahalingam	M		MUL 47	Kuravil, Udayarkaddu South	779902043	0.50	well	457542.00	1031765.00
138	A Sivanu	M	194923304960	MUL 47	Kuravil, Udayarkaddu South	765339026	0.50	well	457036.00	1031631.00

139	Subramaniyam Thayaparan	M	941414141V	MUL 47	Kuravil, Udayarkaddu South	767620594	0.50	well	457057.00	1032224.00
140	Jeyaram Sutharshiny	F	198652203137	MUL 47	Kuravil, Udayarkaddu South	767161184	0.50	well	457353.00	1031476.00
141	Yogarasa Mohanaraj	M	833064762V	MUL 47	Udayarkaddu South	772850740	0.5	well	456102.00	1032379.00
142	Sivapirakasam Kavithaas	M	771664121V	MUL 47	Kulakaddu road, Udayarkaddu South	773488212	0			
143	Rajeswaran Thiruganasampanthan	M	800405564V	MUL 47	Kuravil, Udayarkaddu South	766122545	1	well	456645.00	1031971.00
144	Sanmuganathan Kamalathevi	F	775034670V	MUL 47	Kuravil, Udayarkaddu South	779154128	0.5	Agro well	457662.00	1031714.00
145	P.Mayilvakanam	M	1.97308E+11	MUL 50	Parathipuram East, Visuvamadu	773980246	0			
146	Sathirathileepan Sriranjini	F	1.97465E+11	MUL 50	70/1, Visuvamadu East	771159971	1			
147	Kirusnapillai Sivakumar	M	743304969V	MUL 50	Barthipuram Visuvamadu East	779153989	0.75	well	451930	1035341
148	Johnsaon Jeyaraj Pathmarani	F	885874401V	MUL 49	6, Idian housing scheme, Thoddiyadi	770457034	0.5	Tube Well	449626	1034451
149	Nanthakumaran Senthilmathi	F	745844456V	MUL 49	Kulaththadi, Thoddiyadi, Visuvamadu West	777579541	0.5	Well	449795	1034707
150	Thusiyanthan Premananthi	F	836839570V	MUL 49	Thoddiyadi, half acre scheme Visuvamadu West	765468660	0.5	Tube Well	449308	1034568
151	Ialamparathi Sarojathevi	F	837293944V	MUL 49	Thoddiyadi, half acre scheme Visuvamadu West	760478003	0.5	Well	449351	1034463
152	Sivaselvan Pakeerathi	F	798005863V	MUL 49	Thoddiyadi, Visuvamadu	766064779	0.5	well	448921	1034204
153	Sanmugasuntharam Piratheepan	M		MUL 49	Thoddiyadi, half acre scheme Visuvamadu West	760177343	0.5	Well	449521	1034601
154	Vijitharan Tharsini	F	827935298V	MUL 49	Thoddiyadi, Visuvamadu	766064779	0.5	Well	449548	1034899
155	Sathiyasivan Ramenthiran	M	1.97605E+11	MUL 49	Thoddiyadi, Visuvamadu	761203532	0.5	Well	449452	1034800
156	Sivakumar Mangaleswari	F	875654926V	MUL 50	Barthipuram Visuvamadu East	779490740	0.5	Well	451056	1034234
157	Patmanathan Thajiparan	M	802863055V	MUL 49	88/1, Visuvamadu West	772225748	0			
158	Kaneshathasan Malini	F	796784920V	MUL 49	Thoddiyadi, half acre scheme Visuvamadu West	761025698	0.5	Tube Well	449534	1034538
159	Paramanantham Partheepan	M	762964511V	MUL 49	11/2, Thoddiyadi, Visuvamadu West	773303138	0.5	well	450260	1035072
160	K.Sivajogalatsumi	F	835544192V	MUL 47	Udayarkaddu South	0777540013	0			
161	Sellaiya Kamalam	F	478103166V	MUL 47	Udayarkaddu South	0777540013	0			

162	Sellaiya Jeyasakunthan	M	790800630V	MUL 47	Udayarkaddu South	0706540013	0			
163	Sinnaiya Sithamparan	F	573252861V	MUL 47	Kuravil, Udayarkaddu South	773235700	1			
164	Pirapakaran Thevaranji	F	1.97554E+11	MUL 47	Udayarkaddu South	778726634	0	well	456537	1032667
165	Kanagasabi Saithiyananthan	M		MUL 47	Kuravil, Udayarkaddu South	776603468	0			
166	Rengasami Thiva	M	1.97017E+11	MUL 47	Kuravil, Udayarkaddu South	741497961	0			
167	Vasanthan Banuja	F	945593660V	MUL 47	Udayarkaddu South	768044894	0.5	well	456248	1033210
168	Muththiya Azakurasa	M	622182343V	MUL 47	Udayarkaddu South	779683189	0.5	well	456318	1032700
169	Sinnakanthan Yogarasa	M	712895250V	MUL 47	Udayarkaddu South	776501929	1	Agro well	455919	1031394
170	Azakarathinam Kirusnamurthi	M	722303873V	MUL 47	Udayarkaddu South	777640290	1	well	456772	1031319
171	Thambimuththu Sivamayajeyam	M	613204458V	MUL 47	Udayarkaddu South	771565711	0.5			
172	Raththinam Suthakaran	M	810405414V	MUL 47	Udayarkaddu South	770372568	1	well	456396	1032737
173	Satkunasingam Santhakumar	M	640450320V	MUL 47	Udayarkaddu South	776573336	0			
174	Mahalingam Saththiyaruban	M	871044090V	MUL 47	Udayarkaddu South	779671888	0.5	well	456504	1031947
175	Sinnappan Ganapirakasam	M	490852875V	MUL 47	Udayarkaddu South		0			
176	Muththukkaruppan Kanakavalli	F	63842703V	MUL 47	Kuravil, Udayarkaddu South	771671009	0.5	well	456997	1032014
177	Aruchchunan Kannan	M	8016256222V	MUL 47	Kuravil, Udayarkaddu South	777575894	0.5	well	457187	1031879
178	Muththuvel Uthayakumar	M	1.98113E+12	MUL 47	Kuravil, Udayarkaddu South	770325917	0.5	well	456779	1031651
179	Kaneasan Yokanaathan	M	841895100V	MUL 47	Kuravil, Udayarkaddu South	775843259	0.5			
180	Panchavarnam Sivachchelvam	M	920144349V	MUL 47	Kuravil, Udayarkaddu South	765766437	0.5	well	457160	1031979
181	Velayutham Seethaiyamma	F	4.49101E+12	MUL 47	Kuravil, Udayarkaddu South	762567621	0.5	well		
182	Krishnaraja Moorinesanusa	F	836985109V	MUL 47	Kuravil, Udayarkaddu South	765830224	0.5			
183	Velu Raamalingam	M	770734916V	MUL 47	Kuravil, Udayarkaddu South	766522486	0	well		
184	Pirasanthan Sukirtha	F	978454100V	MUL 47	Kuravil, Udayarkaddu South	774699271	0.5	well	456894	1031735
185	Muththuchchaami Lokeswaran	M	710065241V	MUL 47	Kuravil, Udayarkaddu South	779378249	0.5	well	456982	1031740

186	Mookulaathevi Suthanraaj	M	1.99786E+11	MUL 47	Kuravil, Udayarkaddu South	769848486	0			
187	Sankarkanesh Selvakumaari	F	858334497	MUL 47	Kuravil, Udayarkaddu South	775497361	0.5			
188	Murukaiya Mokanaammaal	F	788035420V	MUL 47	Kuravil, Udayarkaddu South	774611034	0.5	well		
189	Seapaththiyaan Parameswari	F	716838790V	MUL 47	Kuravil, Udayarkaddu South	778783466	0.5			
190	Supramaniyam Surenthirakumar	M	911601818V	MUL 47	Kuravil, Udayarkaddu South	766536675	0.5	well	457350	1031470
191	Archchunan Saththiyanaathan	M	862813634	MUL 47	Kuravil, Udayarkaddu South	770317046	0.5	well	456917	1031555
192	Ponnusaami Thavaseelan	M	823045190V	MUL 47	Kuravil, Udayarkaddu South	774912095	0			
193	Kitnasaami Vijiyenthiran	M	912533190V	MUL 47	Kuravil, Udayarkaddu South	775497361	0			
194	Ponnusaami Archchunan	M	532312230X	MUL 47	Kuravil, Udayarkaddu South		0.5	well	456926	1032170
195	Selvenththiran Karthika	F	958592299V	MUL 47	Kuravil, Udayarkaddu South	779378249	0.5	well	456968	1031693
196	Melyappan Paakkiyanathan	M	912094642V	MUL 47	Kuravil, Udayarkaddu South	766151060	0.5	well		
197	Sollamaadan Kuleanthiran	M	722192346V	MUL 47	Kuravil, Udayarkaddu South	776913743	0.5	well	456774	1032847
198	Santhiraseakaran Nitharsan	M		MUL 47	Kuravil, Udayarkaddu South	762013966	0			
199	Sivalingam karunaakirinaathan	M	721973743V	MUL 47	Moongilaru South	776323418	0.5			
200	Kanthaiyya Santhanamma	F	625016673V	MUL 47	Moongilaru South	765751473	0			
201	Karunakaralingam Sivakalai	F	657984264V	MUL 47	Moongilaru South	772477810	0.5			
202	Nallaiya Baskaran	M	763434931V	MUL 47	Moongilaru South	778357221	0.5	well	455179	1033531
203	Kalaiselvi Srisusantha	F	1.97976E+11	MUL 47	Moongilaru South	774052867	0.5			
204	Ilangeethan Kalpana	F	876474611V	MUL 47	Moongilaru South	774898249	0.5	well	454909	1033604
205	Rajakopaal Rakunaathan	M	7109847510	MUL 47	Moongilaru South	761124465	0			
206	Karunakaralingam Nirusanth	M	912334791V	MUL 47	Moongilaru South	773983198	0.5			
207	Rajaratnam Saththiyavaani	F	925290700V	MUL 47	Moongilaru South	773382863	0			
208	Santhiraseakaran Nirmalathevi	F	855734508V	MUL 47	Moongilaru South	779198538	0.5	well	454435	1033300

209	Sasikumar Anoma	F	835195015V	MUL 47	Moongilaru South	774225221	1	well	454508	1032430
210	Makenthiran Suvagini	F	766493769V	MUL 47	Moongilaru South	766088983	0			
211	Krishnapillai Ravichchanthiran	M	781155322V	MUL 47	Moongilaru South	779051789	0.5	well	455037	1033428
212	Selvaranjan Inthumathi	F	1.98071E+11	MUL 47	Moongilaru South	764245303	0.5			
213	Nishanthan Thayaalini	F	828575392V	MUL 47	Moongilaru South	760375728	0.5	well	454700	1033258
214	Kanmani Umakaran	M	803283575V	MUL 47	Thearavil East	772852815	0.5	Agro well	454383	1032598
215	Pirancis Subagini	F	787465188V	MUL 47	Thearavil East	774015981	1	Agro well	454626	1032579
216	Veerasingam Vanotheepan	M	772920652V	MUL 47	Thearavil East	777968747	0.5	well	454681	1032604
217	Vinothika Pushparaja	F	815914945V	MUL 47	Thearavil East	779842194	0.5	well	454701	1032645
218	Veerasingam Vinotharsan	M	843082327V	MUL 47	Thearavil East	771600438	0.5	well	454643	1032623
219	Rajappu Annamma	F		MUL 47	Thearavil East	778875621	1	well	454455	1032520
220	Sarkunam Lokeswaran	M	832705080V	MUL 47	Thearavil East	778010109	1			
221	Jeyaseelan Srijayan	M	952653741V	MUL 47	Udayarkaddu South	776540781	0			
222	Kumanan Srivaani	F	948161559V	MUL 47	Udayarkaddu South	766629446	0			
223	Suthakaran Dileshkumaari	F	807615262V	MUL 47	Udayarkaddu South	770372568	1	well	456405	1032775
224	Kathirvel Palaniyandi	M	1.96058E+11	MUL 47	Udayarkaddu South		0			
225	Karuppaiya Kirushnakumar	M	1.96619E+11	MUL 47	Kuravil, Udayarkaddu South	779375615	1	well	457573	1032025
226	Pirapakaran Thamilrathi	F	747453708V	MUL 47	Kuravil, Udayarkaddu South	771338358	0			
227	Mallikainaaya Merishalini	F	937094043V	MUL 47	Kuravil, Udayarkaddu South	770867989	0			
228	Sevamalai Sewwaananthi	F	708414867V	MUL 47	Kuravil, Udayarkaddu South	773269652	0.5	well	457338	1032584
229	Sellaiya Kamalathevi	F	585924326V	MUL 47	Udayarkaddu South	768692309	1	well	456359	1032785
230	Kanthaiya Yogarasa	M	661284048V	MUL 49	Aranmpa sukathaaraveethi, Visuvamadu west	776172435	0			
231	Thusiyanthan Tharmini	F	787305270V	MUL 50	62/1, Visuvamadu East, Visuvamadu	773243661	0.5			
232	Makeswaran Yokeswari	F	647702538V	MUL 50	52/01, Visuvamadu East	772623179	0.5			
233	Vickneswaran Piriyatharsini	F	818495021V	MUL 49	No 25, Thoddiyadi, Visuvamadu	740667654	0.5			
234	Vijayaanantharasa Vinojan	M	963451601V	MUL 50	Kulaththadi veethi, Visuvamadu East	778654492	0.5			

235	Thangavel Ganapathi	M	641837822V	MUL 50	Barthipuram Visuvamadu East	767632971	0.5	Well	451198	1034636
236	Ganapathi Vimalan	M	932874415V	MUL 50	Barthipuram Visuvamadu East	766958400	0.5	Well	451208	1034619
237	Chinnasaami Kalithaas	M	820585372V	MUL 50	Barthipuram Visuvamadu East	767259670	0.5	Well	451053	1034383
238	Venkadasalam Selvarasa	M	552342550V	MUL 50	Barthipuram Visuvamadu East	774451272	0.5	Well	450956	1034377
239	Anthoni Irajeswari	F	626973689V	MUL 50	Barthipuram Visuvamadu East	769957017	0.5	Well	451288	1034683
240	Marimuththu Periyasami	M	651624444V	MUL 50	Barthipuram Visuvamadu East	761840192	0.5	Aqueduct	451434	1035114
241	Periyasami Mayilvakanam	M	1.97308E+11	MUL 50	Barthipuram Visuvamadu East	773980246	0.5	Aqueduct	450623	1035187
242	Piremkumar Nakuleshwaran	M	1.99203E+11	MUL 50	Kulaththadi Veethi, Barthipuram Visuvamadu East	764006810	0.5		450865	1034369
243	Krishnapillai Sivapaalasuntharam	M	1.95216E+11	MUL 49	Visuvamadu West	776326360	0.5			
244	Sellaththurai Manimaaran	M	731714223V	MUL 49	Visuvamadu West	775508389	0.5			
245	Thuraisingam Thanujan	M	2E+11	MUL 49	Visuvamadu West	778473509	1			
246	Sajeesh Raathika	F	1.98877E+11	MUL 49	Kulaththadi, Visuvamadu West	772254311	0.5			
247	Sakthivel Isaimoli	F	977242398V	MUL 49	NO 221/1, Visuvamadu West, Visuvamadu	771761817	0.5			
248	Vellasaami Naagalingam	M	431712105X	MUL 49	Visuvamadu West	779329611	0.5			
249	Arumukam Sivanjanam	M	671343468V	MUL 49	Visuvamadu West	779672313	0.5			
250	Muththaiyya Santhiran	M	841143736V	MUL 49	Visuvamadu West	778558744	0.5			
251	Kanesanathan Lavan	M	881632233V	MUL 49	Sundikkulam Santhi, Visuvamadu West	775848420	0.5			
252	Naiththan Pathmapriya	F	1.99478E+11	MUL 49	Neththaliyaru, Visuvamadu West	779880620	0.5			
253	Ramachandran Ragunathan	M	831902221V	MUL 49	Neththaliyaru, Visuvamadu West	771750404	0			
254	Karunakaran Jeyaraani	F	796802707V	MUL 49	Neththaliyaru, Visuvamadu West	770597340	0			
255	Gowrithaas Kirisaanthi	F	1.98968E+11	MUL 49	Neththaliyaru, Visuvamadu West	769998500	0.5			
256	Rakavan kukanoot	M	900834985V	MUL 52	Theravil, maanikkapuram	773578236	0.5	Well		
257	Thiyakarasa Yokanathan	M	851283951V	MUL 52	Mu/52, Theravil, maanikkapuram	775048017	0.5			

258	Sanmukam Mahalingam	M	570093045V	MUL 52	Mu/52, Theravil, maanikkapuram	766741665	0.5			
259	Thangavel Mohanathaas	M	683205184V	MUL 51	Mu/52, Theravil, maanikkapuram	774182054	0.5	Well		
260	Thangaiya Selvakumar	M	722933710V	MUL 52	No-100, Ilankopuram	77320614	0.5	Well		
261	Kanthasaami Pancharaththinam	M	560060254V	MUL 52	No-86, Ilankopuram	767800971	0.5	Well		
262	Kanthaiya Sures	M	852494468V	MUL 52	Theravil, maanikkapuram	778402160	0.5	Tube Well		
263	Siththiran Iramalingam	M	530724700V	MUL 52	No-06, Ilankopuram	763030568	0.5			
264	Nijenthiran Kulamathi	F	200078803574	MUL 53	No-155, Valluvarpuram, redbana	765752409	0.5	Well		
265	Puvaneswaran Selvanayaki	F	768394911V	MUL 53	No-154, Valluvarpuram, redbana	778686187	0.5	Well		
266	Kanthasaami Selvakumari	F	725402422V	MUL 50	Kulaththadi, Visuvamadu East	770575134	0.50	River	450525.00	1035108.00
267	Nanthakumar Parivathani	F	826943386V	MUL 49	No 82/01, Visuvamadu West	768405157	1.00	Well	449979.00	1037027.00
268	Ratnarasa Kuhasayanthan	M	1.99603E+11	MUL 50	Barthipuram Visuvamadu East	760328393	1.00	Well	451073.00	1034793.00
269	Narayanan Arichchanthiran	M	720758407V	MUL 49	Visuvamadu West	771776323	0.50	Well	449747.00	1034359.00
270	Sokkalingam Saseenthiran	M	1.98126E+11	MUL 49	Mu-49, Visuvamadu West	778035350	1.00	Well	450397.00	1035345.00
271	Sivasupramaniyam Kobinaath	M	790504615V	MUL 49	Visuvamadu West	741070966	0.50	Well	449762.00	1034381.00
272	Ranjith Preamavathi	F	876184842V	MUL 49	Neththaliyaru, Visuvamadu West	760715578	0.50	Well	448586.00	1037385.00
273	Ankappan Villarasan	M	951541036V	MUL 49	Neththaliyaru, Visuvamadu West	765165297	1.00	Well	448595.00	1035905.00
274	Tharmasrirasa Kalainesan	M	810906030V	MUL 49	No 79/02, Visuvamadu West, Thoddiyaddi	772591548	1.00	Well	449638.00	1035363.00
275	Mahenthiran Njaneswari	F	765054893V	MUL 49	Thoddiyadi, Visuvamadu West	773548096	0.50	Tube Well	449260.00	1034327.00
276	Kumar Thayalini	F	837044782V	MUL 47	Kuravil, Udayarkaddu South	771169925	0.50	Well		
277	Ponnambalam Koneswaran	M	753284567	MUL 48	Kuravil, Udayarkaddu South	779152882	0.50			
278	Muththulingam Manjula	F	917804125V	MUL 49	Kuravil, Udayarkaddu South	767885136	0.50			
279	Anantharasa Nanthini	F	1.98574E+11	MUL 48	Udayarkaddu, Iruttumadu	778089583	0.50	Well		
280	Pakkiyarasa Nallalingam	M	810035676V	MUL 46	Udayarkaddu North, Vellappakkam	779187847	0.50	Agro Well		

281	Vadivel Krishnakumar	M	863453682V	MUL 46	Udayarkaddu North, Vellappakkam	770373470	0.50	Agro Well		
282	Kugan Sumathi	F	825194355V	MUL 46	Udayarkaddu North, Vellappakkam	769827548	0.50	Agro Well		
283	Sakthivel Irasakumar	M	1.97515E+11	MUL 46	Udayarkaddu North, Vellappakkam	772144162	0.50	Agro Well		
284	Yokeswaran Tamilselvi	F	827964867V	MUL 46	Udayarkaddu North, Vellappakkam	776721863	0.50	Agro Well		
285	Saparaththinam Manivannan	M	783585286V	MUL 46	Udayarkaddu North, Vellappakkam	773323478	0.50	Agro Well		
286	Sellaiya Eakampu	M	793255545V	MUL 46	Udayarkaddu North, Vellappakkam	773510332	0.50	Agro Well		
287	Karnakaran Kaloyan	M	2.00104E+11	MUL 46	Udayarkaddu North, Vellappakkam	767308887	0.50	Agro Well		
288	Arumainayakam Sasikala	F	767584423V	MUL 46	Moongilaru North, Udayarkaddu	763703342	0.50			
289	Kangatharam Sivarajini	F	827024813V	MUL 46	Moongilaru North, Udayarkaddu	776006091	0.50			
290	Kanthaiyya Jayaseelan	M	903270284V	MUL 46	Moongilaru North, Udayarkaddu	767885103	0.50			
291	Sasikumar Sivagowri	F	908094735	MUL 46	Moongilaru North, Udayarkaddu	779374382	0.50			
292	Sivalingam Kalaiselvi	F	535747410V	MUL 46	Moongilaru North, Udayarkaddu	779374382	0.50			
293	Thillairasa Nakeswaran	M	670844790V	MUL 46	Moongilaru North, Udayarkaddu	773648235	0.50			
294	N.Nisakaran	M	910383809V	MUL 46	Moongilaru North, Udayarkaddu	779070255	0.50			
295	Kanthan Kowsalyathini	F	825825126V	MUL 46	Moongilaru North, Udayarkaddu	775935063	0.50	Well		
296	Kanthasami Lokathaas	M	630343933V	MUL 46	Moongilaru North, Udayarkaddu	771545801	1.00	Well		
297	Velayuthampillai Balakumar	M	760384526V	MUL 46	Moongilaru North, Udayarkaddu	773531255	1.00	Well		
298	Selvarasa Nirmalathevi	F	715434032	MUL 46	Moongilaru North, Udayarkaddu	774372036	0.50			
299	Kamalathasan Adaikkalam	M	678503410V	MUL 46	Moongilaru North, Udayarkaddu	774640577	0.50			
300	Saththiyamurththi Santhirakumari	F	755444820V	MUL 46	Moongilaru North, Udayarkaddu	764201802	0.50			

301	Pushparasa Ilangathir	M	200010402390V	MUL 46	Moongilaru North, Udayarkaddu	774602372	0.50			
302	Amirthalingam Vasantharathevi	F	1.98162E+11	MUL 46	Moongilaru North, Udayarkaddu	778873805	0.50			
303	Kanthasaami Pushparaani	F	617014300V	MUL 46	Moongilaru North, Udayarkaddu	776028795	0.50			
304	Sivalingam Gowrimanokari	F	815175107V	MUL 46	Moongilaru North, Udayarkaddu	776668514	0.50			
305	Kirushnaraja Vishnalatha	F	766604285V	MUL 46	Moongilaru North, Udayarkaddu	764131998	0.50			
306	Santhiran Irasamma	F	1.96266E+11	MUL 46	Moongilaru North, Udayarkaddu	773489521	0.50			
307	Veluppillai Kukathasan	M	621490699V	MUL 53	Valluvarpuram	779356891	1.00	Well		
308	Velan Maarimuththu	M		MUL 53	No-267, Valluvarpuram	775244947	0.50			
309	Nallaiya Kathireasan	M	462361688V	MUL 53	No-212, Valluvarpuram	766797271	0.50			
310	Murukaiya Preamachanthiran	M	640071621V	MUL 53	No-553, Valluvarpuram	775956769	0.50	Well		
311	Maruthaveeran Irajaratnam	M	643214342V	MUL 53	No-473, Valluvarpuram	771583578	0.50			
312	Sinnaiya Maruthaveeran	M	412481569V	MUL 53	No-555, Valluvarpuram	779923305	0.50			
313	Irayaratnam Lokes	M	922054312V	MUL 53	No-473, Valluvarpuram	773429875	0.50			
314	Selvarasa Jestinpolraj	M	812805479V	MUL 53	No-389/1, Valluvarpuram	779054198	1.00	Well		
315	Kumaravelu Sarmilan	M	850491380V	MUL 51	Maanikkapuram	776108027	0.50			
316	Kirushnamoorththi Menakan	M	861652491V	MUL 51	Maanikkapuram	774910982	0.50			
317	Eakamparam Kirushnakumar	M	832093378V	MUL 51	No- 307, Maanikkapuram	777382807	0.50			
318	Nitharsan Nithusa	F	946433365V	MUL 49	D3, Vairavar Kovilady	761813293	1	Well	448045.00	1034369.00
319	K. Selvakumari	F	725402422V	MUL 50	Kuththady Road, Visuvamadu East	770575134	0.5	River	450525.00	1035108.00
320	Sinnan Sawntharajan	M	603072227V	MUL 49	No-212, Neththaliyaru, Visuvamadu West	775631806	0.5	Well	448675.00	1036675.00
321	Arunthavam Kayenthiraprasannath	M	1.98315E+11	MUL 49	No-134/2, Thoddiyadi, Visuvamadu West	767633308	1	Well	448924.00	1035700.00
322	Veerakulasingam Raveenthirakumar	M	802745770V	MUL 49	Thoddiyadi, Visuvamadu West	778998829	1	Tube Well	449229.00	1034771.00

323	Palasingam Karshan	M	940313201V	MUL 48	Iruttu Madu, Udaiyarkaddu	772428270	0.50	Well		
324	Kayenthiran Yasinthan	M	2.00119E+11	MUL 48	Iruttu Madu, Udaiyarkaddu	764664382	0.50	Well		
325	Karuppan Mahalingam	M	530161994X	MUL 48	Iruttu Madu, Suthanthirapuram	768677354	0.50	Well		
326	Mahalingam sasikkumar	M	793225016V	MUL 48	Iruttu Madu, Suthanthirapuram	770420051	0.50	Well		
327	Lachchumanan Makenthiran	M	710724881V	MUL 48	Iruttu Madu, Suthanthirapuram	779329172	0.50	Well		
328	Malaiyaan Raamaayi	F	4.4906E+12	MUL 48	Iruttu Madu, Suthanthirapuram	776180283	0.50	Well		
329	Kanapathi Supramaniyam	M	570092634X	MUL 48	Iruttu Madu, Suthanthirapuram	776210633	0.50	Well		
330	Satheeswaran Sumiththra	F	896838202	MUL 48	Iruttu Madu,Udaiyarkaddu	773028978	1.00	Well		
331	Sakthivel Vasanthan	M	952323423V	MUL 48	Iruttu Madu,Udaiyarkaddu	777730668	0.50	Agro Well		
332	Muththu Kalaimani	M	571552540V	MUL 48	Iruttu Madu, Suthanthirapuram	774375111	0.50	Well		
333	Mokanraj Thavamalar	F	917554986V	MUL 48	Iruttu Madu, Suthanthirapuram	776166081	0.50	Well		
334	Kayenthiran Tharusan	M	940134153V	MUL 48	Iruttu Madu,Udaiyarkaddu	771263232	0.50	Well		
335	Ilavarasan Bhamini	F	937064071V	MUL 48	Iruttu Madu, Suthanthirapuram	779124624	0.50	Well		
336	Muththukkumar Jayalaksmi	F	677732857V	MUL 48	Iruttu Madu,Udaiyarkaddu	769454482	0.50	Well		
337	Thavarasa Sritharan	M	900664672V	MUL 48	Iruttu Madu,Udaiyarkaddu	775658478	1.00	Well		
338	Thangavel Navaraththinarasa	M	811384887V	MUL 48	Iruttu Madu,Udaiyarkaddu	766746075	1.00	Well		
339	Theivanthiran Poovaji	F	735595229V	MUL 48	Iruttu Madu,Udaiyarkaddu	760009692	0.50			
340	Anantharasa lakshumi	F	585957801V	MUL 48	Iruttu Madu, Suthanthirapuram	768718843	0.50	Well		
341	Supramaniyam Vasanthakumari	F	816839386V	MUL 48	Iruttu Madu, Suthanthirapuram	767027053	0.50	Well		
342	Iraman Irasaiyya	M	610045081V	MUL 48	Iruttu Madu, Suthanthirapuram	778160059	0.50	Well		
343	Arumaiseelan Thevakumari	F	908344464V	MUL 48	Iruttu Madu,Udaiyarkaddu	767414963	0.50	Well		
344	Nesakumar Santhiravathani	F	796644389V	MUL 48	Iruttu Madu, Suthanthirapuram	764242668	0.50	Well		

345	Iraamu Srikantharaj	M	773494657V	MUL 48	Iruttu Madu, Suthanthirapuram	771842846	0.50	Well		
346	Ponnu Selvarasa	M	691554392V	MUL 48	Iruttu Madu, Suthanthirapuram	766581929	0.50	Well		
347	Selvarasa Saroyathevi	F	658065114V	MUL 48	Iruttu Madu,Udaiyarkaddu		0.50	Well		
348	Krishnamoorththi Sajinthini	F	1.98262E+11	MUL 48	Iruttu Madu,Udaiyarkaddu	771361500	0.50	Well		
349	Vinotharan Vinothini	F	966414014V	MUL 48	Iruttu Madu,Udaiyarkaddu	778478911	0.50	Well		
350	Satheeskumar Thanusika	F	2.00376E+11	MUL 48	Iruttu Madu,Udaiyarkaddu	766684184	1.00	Well		
351	Vijayarasa Selvarani	F	686983722V	MUL 48	Iruttu Madu,Udaiyarkaddu	778158197	0.50	Well		
352	Shanmukanathan Eeswari	F	1.97879E+11	MUL 48	Iruttu Madu,Udaiyarkaddu	763318467	0.50	Well		
353	Kirupakaran Maithili	F	905174703V	MUL 48	Iruttu Madu,Udaiyarkaddu	772703241	0.50	Well		
354	Nitharsan Kanimathi	F	2.00085E+11	MUL 48	Iruttu Madu,Udaiyarkaddu	763371091	0.50	Well		
355	Ponnampalam Nakuleswaran	M	842614007V	MUL 47	Kuravil, Udayarkaddu South	773575837	1.00	Well		
356	Velan Yokanathan	M	551210898V	MUL 47	Mongilaru South, Theravil	779137662	0.50	Well		
357	Palanimuththu Raveenthiran	M	802164807V	MUL 47	Kuravil, Udayarkaddu South	740968593	1.00	Well		
358	Thevarasa ketheeskumar	M	870033990V	MUL 48	Suthanthirapuram, Udayarkaddu	773286608	0.50	Well		
359	Pavithan Sutha	F	1.9847E+11	MUL 47	Moongilaru South, Udayarkaddu	773773970	1.00	Well		
360	Kathirvelu Poopathi	M	472872680V	MUL 48	No-128, Suthanthirapuram, Udayarkaddu	773878113	0.50	Well/Tube well		
361	Sinnaththurai Sivakumar	M	693591422V	MUL 48	No-91, Suthanthirapuram Kolani	766554370	0.50	Well		
362	Sivapaalasuntharam Vinthuyan	M	943520054V	MUL 48	No-14, Suthanthirapuram Kolani	766854598	0.50	Well		
363	Irajeswaran Thamilmainthan	M	2.00338E+11	MUL 46	Udayarkaddu North, Vellappakkam	775780297	0.50	Agro Well		
364	Anthonisaami Anthonipiraans	M	802855761V	MUL 46	Moongilaru North, Udayarkaddu	771505584	0.50			
365	Thavarasa Bhakerathi	F	715254646V	MUL 46	Moongilaru North, Udayarkaddu	774458391	0.50			
366	Selventhiran Siththira	F		MUL 46	Moongilaru North, Udayarkaddu	740581536	0.50			

367	Niththiyanantham Bhakerathi	F	1.98279E+11	MUL 46	Moongilaru North, Udayarkaddu	775792240	0.50			
368	Kayanthan Vasanthi	F	85552922V	MUL 46	Moongilaru North, Udayarkaddu	767722285	0.50			
369	Maruthu Raveenthiran	M	870974000V	MUL 46	Moongilaru North, Udayarkaddu		0.50			
370	Jayapras Sasi	M	905344560V	MUL 46	Moongilaru North, Udayarkaddu	779051857	0.50			
371	Nanthakumar Tharani	F	1.98462E+11	MUL 46	Moongilaru North, Udayarkaddu	761149347	0.50			
372	Antrani Kalaimathi	F	818394993V	MUL 46	Moongilaru North, Udayarkaddu	770166113	0.50			
373	Sivalaikuntharasa Kooma	F	1.9896E+11	MUL 46	Moongilaru North, Udayarkaddu	770487760	0.50			
374	Suveetsan Yamuna	F	956780799V	MUL 46	Moongilaru North, Udayarkaddu	762799346	0.50			
375	Kalaikumar Thevakumari	F	836775023V	MUL 46	Moongilaru North, Udayarkaddu	766496791	0.50			
376	Villtan Raveenthiran	M	802716125V	MUL 46	Moongilaru North, Udayarkaddu	762254389	0.50			
377	Piratheepan Vijenthini	F	1.98364E+11	MUL 46	Moongilaru North, Udayarkaddu	772255066	0.50			
378	Kumarakurunathan Gowri	F	855212467V	MUL 46	Moongilaru North, Udayarkaddu	763078312	0.50			
379	Thavaratnam Pushparaani	F	19781110019	MUL 46	Moongilaru North, Udayarkaddu	779236171	0.50			
380	Viyasan Sivasankari	F	2.00161E+11	MUL 46	Moongilaru North, Udayarkaddu	774372036	0.50			
381	Santhiran Gowrithaasa	M	871904596V	MUL 46	Moongilaru North, Udayarkaddu	740123985	0.50			
382	Puvalogarasa Parameswari	F	747734330V	MUL 46	Moongilaru North, Udayarkaddu	763895564	0.50			
383	Mahenthiran Ilankomathi	F	1.9817E+11	MUL 47	Kuravil, Udayarkaddu South	764987886	1.00	Well		
384	Ponnuthurai Thavarooban	M	903261447V	MUL 47	Kuravil, Udayarkaddu South	779300469	0.50			
385	Nadarasa Yokeswaran	M	802232195V	MUL 48	No-159, Suthanthirapuram Kolani	776779689	0.50	Well		
386	Puvanakrishnan Jeyarames	M	911902761V	MUL 48	No-49, Suthanthirapuram Kolani	776399340	0.50	Well		

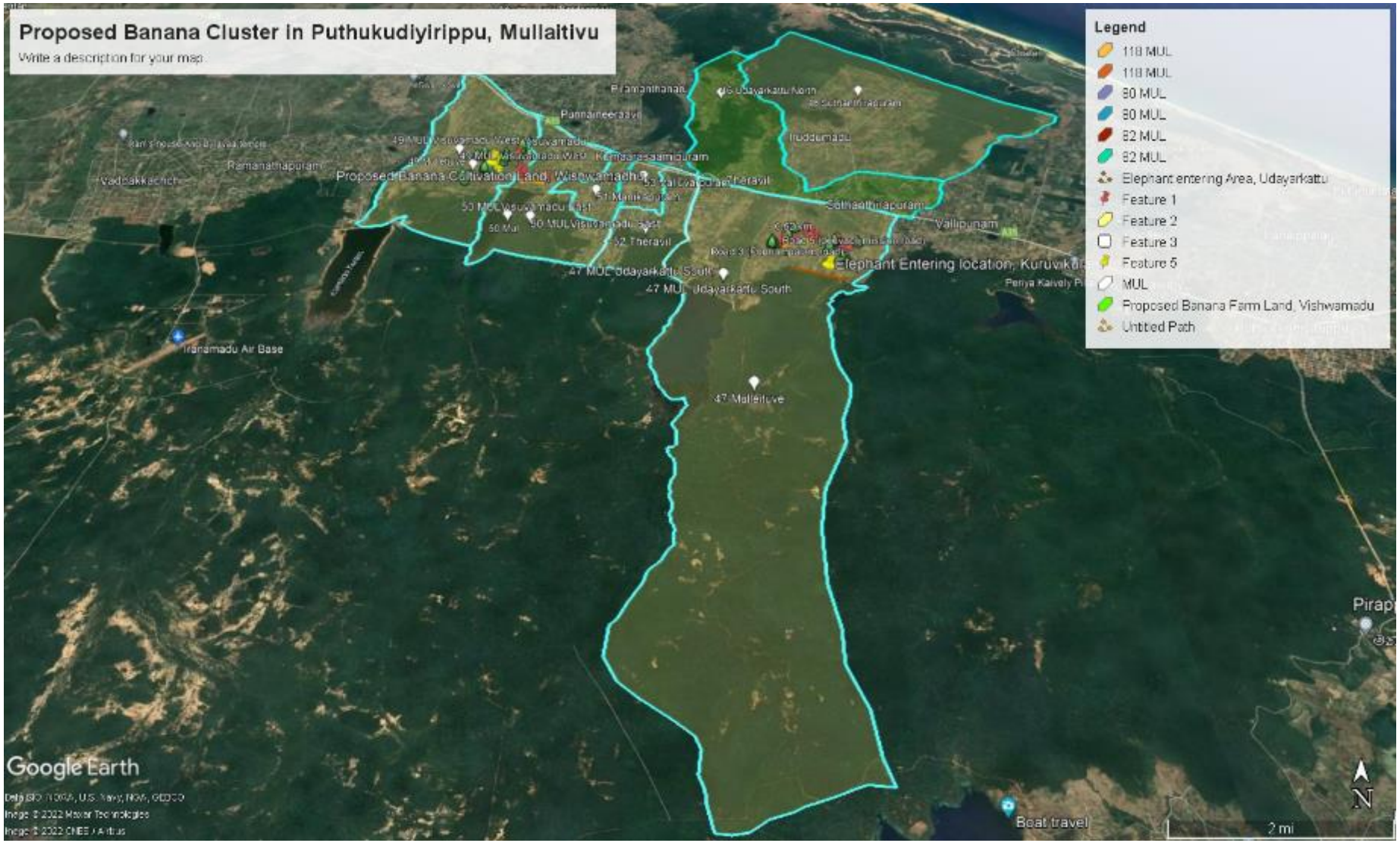
387	Supramaniyam Puvanakrishnan	M	702755220V	MUL 48	No-49, Suthanthirapuram Kolani	772617262	0.50	Well		
388	Kathirvelu Naagathevan	M	681836268V	MUL 48	Suthanthirapuram Kolani	740715573	0.50			
389	Donposhko Donishsilash	M	763055086V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	741341799	0.50			
390	Thangarasa Vimalraj	M	853451649V	MUL 48	Suthanthirapuram, Udayarkaddu	775793798	0.50	Well		
391	Vijayaraani Uththarakumar	M	685423006V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	776799362	0.50			
392	Kanesalingam Bharathithass	M	801745016V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	779430086	0.50			
393	Sangarapillai Kajaananthan	M	901032920V	MUL 48	Suthanthirapuram Maththi	771745202	0.50			
394	Pattricjamesthilac Elilan	M	2.00036E+11	MUL 48	Suthanthirapuram Kolani	767094025	0.50	Well		
395	Pattricjamesthilac Kalairoobi	F	815016816V	MUL 48	Suthanthirapuram Kolani	776718371	0.50	Well		
396	T. Lokanaathan	M	902002294V	MUL 48	Suthanthirapuram Kolani	716210032	0.50			
397	Balasingam Atputharaani	F	546150607V	MUL 48	Suthanthirapuram, Udayarkaddu	760816773	0.50			
398	Selvarasa Sivapalasupramanyam	M	690033470V	MUL 48	No-78, Suthanthirapuram, Udayarkaddu	775309234	0.50			
399	Kajenthiran Lukshiya	F	976502523V	MUL 48	No-61, Suthanthirapuram, Udayarkaddu	760816773	0.50			
400	Siththirakumar Nirmalathevi	F	747381720V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	773128925	0.50			
401	Baskaran Piratheepa	F	846323813V	MUL 48	No-106, Suthanthirapuram Kolani	779671284	0.50			
402	Maruthappu Iramalingam	M	553191181V	MUL 48	Suthanthirapuram Kolani	769456732	0.50			
403	Jeyarasa Majura	F	926324519V	MUL 48	Suthanthirapuram Kolani	774119290	0.50			
404	Puvaneanthirarasa Rajkumar	M	702930065V	MUL 48	No-165, Suthanthirapuram Kolani	764841624	0.50	Tube Well		
405	Narayanasami Sivalingam	M	550953935V	MUL 48	Suthanthirapuram Maththi, Udayarkaddu	777783396	0.50	Well		
406	Krishnan Iraveenthirarasa	M	783435063V	MUL 48	Suthanthirapuram Maththi, Udayarkaddu	770745216	0.50	Well		
407	Muththusaami Arumugam	M	510754603V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	768986430	0.50			

408	Sinnaiya Vijayakumara	M	1.96306E+11	MUL 48	Suthanthirapuram Maththi, Udayarkaddu	773498489	0.50			
409	Piratheepan Kowsala	F	876302004V	MUL 48	No-106, Suthanthirapuram	766183095	0.50			
410	Uthayarasa Kirupakaran	M	823605803V	MUL 48	No-106, Suthanthirapuram	772219325	0.50			
411	Nadeasar Tharumalingam	M	570040057X	MUL 48	Suthanthirapuram Maththi, Udayarkaddu	779185044	0.50			
412	Sasikumar Sureswari	F	1.97956E+11	MUL 48	No-158, Suthanthirapuram Kolani	776224753	0.50	Well		
413	Irasaraththinam Kelan	F		MUL 48	Suthanthirapuram Maththi, Udayarkaddu	764380385	0.50	Well		
414	Piratheep Jekayini	F	997752708V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	774631597	0.50	Well		
415	Jeyarasa Jenoth	M	930494429V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	768644711	0.50	Well		
416	Viththiyananthan Vinoseran	M	921365047V	MUL 48	Suthanthirapuram Kolani, Udayarkaddu	773615622	1.00	Well		
417	Narayanasami Velayutham	M	651702631X	MUL 48	Suthanthirapuram Maththi, Udayarkaddu	771601610	0.50	Well		
418	Irajenthiran Yokavaani	F	1.97557E+11	MUL 46	200 nd House project, Moongilaru North	763472010	0.50			
419	Thiyakarasa Lalithkumari	F	776242837V	MUL 48	Udayarkaddu South, Moongilaru	770392003	0.50			
420	Theepan Anashriya	F	956482445V	MUL 51	2nd Thittam, Ilankopuram, Theravil	760581552	0.50	Well		
421	Maari Irasu	M	442461686V	MUL 52	Theravil, Ilankopuram	778950138	0.50	Well		
422	Kaandeepan gowtheeswari	F	836304357V	MUL 52	No- 96, Ilankopuram	763437026	0.50	Well		
423	Karuppannasaami Ravichchanthiran	M		MUL 52	No- 22, Ilankopuram	763140614	0.50			
424	Bala Kajenthiran	M	883054768V	MUL 52	No- 44, Ilankopuram	773323877	0.50			
							239.3			

ANNEXURE 3: INSTITUTIONAL ROLES IN THE BANANA CLUSTER

Agency/ Private sector	Officer responsible	Expected role in ASMP cluster development
Provincial Department of Agriculture (North)	Provincial Director (Agriculture)	Lead and provide guidance to relevant officers and FPO Coordinate with all line agencies at District level
	Deputy Director (Agriculture)	Provide guidance to relevant officers and FPO. Provide extension services and inputs. Solve farmer problems. Coordinate with all line agencies at cluster level
	3 Agriculture Instructors	Maintain close link with farmers in the cluster area. Training of farmers. Involve in farmer selection process Play the role of farmer facilitator
Divisional Secretariat Puthukudyirippu	1 Divisional Secretary	Make representation to review committees to assist DD (Agriculture) Settlement of land issues and issue land permits, if necessary. Make required services available to FPO from other agencies
	1 Land Officers	Settlement of land disputes. Clearing boundary demarcations
	6 Grama Niladharis	Assist to identify eligible legal farmers. Organise farmer meetings
Divisional Irrigation Engineers Office	Divisional Engineer	Make decisions on water issues for seasonal cultivation. Water allocation and head work management
	Engineering Assistant	Provide technical support to FO. Settle water related issues
Agrarian Development Department, Agrarian Development Centre, Udayarkaddu	1 Agrarian Development Officer	Get involvement for input supplies such as seeds, organic and chemical fertilisers, machineries For effective cooperation from existing Farmer Organisations Gather Agrarian related farmer information
RARDC (Regional Agriculture Research and Development Centre, Kilinochchi)	Deputy Director, Pathologist, Entomologist and Soil scientist, Irrigation Agronomist	Provide research support to farmers whenever a crop problem emerges.
Agriculture Insurance Board-Mullaitivu	Assistant Director/Mullaitivu District	Introduction of agriculture insurance policies and take necessary steps for assessment of damages and payment settlement against damages.
Divisional Agriculture Committee/Puthukudyirippu (Chaired by DS)	Divisional Secretary, All divisional level officers attached to Agriculture, Irrigation and Development sectors. Selected Farmer Representatives	Make decisions on agriculture related issues emerged at the Meeting. Introduce problem solving mechanism to overcome issues related to Marketing, input supplies, draught and flood relief, irrigation, damages by wild elephant, crop insurance etc.

ANNEXURE 4: PROJECT AREA MAPS



ANNEXURE 5: COMPOST PLANT PROPOSAL

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 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.

Over- all 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, loss of plant nutrients, etc. 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. In order 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:

1. Promote manufacturing of compost using available raw materials in cluster areas.
2. 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 programme 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 undertake 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)

Table 23: List of structures, implements and equipment Required for the Compost Production Unit

No.	Item	Number	Estimated Cost (LKR)
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. Method of compost production by the heap method

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, 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 - 45^{0}C 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 - 70^{0}C or more continue the process, raising the temperature up to 65^{0}C or higher. In many cases, the temperature goes up to 70 - 80^{0}C 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 quantity of 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 the Trichoderma spp. of 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. A number of regulatory regimes come into play prior to initiate compost production.

b. Manage composting

Managing the composting process involves the balancing of a number of different variables, all of which impact 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 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 has 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 in order 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 and thus increase sales of the product. In marketing terms, compost has to compete with the chemical fertilisers in an effort to grab a part 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 followings:

- 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. In order to reduce the environmental impact, measures will be taken 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 to maintain higher temperature. Fly larvae are unlikely to survive if temperature is above 55^0C. 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: CONCEPT NOTE OF WASTE MINIMISATION, INCOME GENERATION AND EMPOWERMENT


INTRODUCTION


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
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.

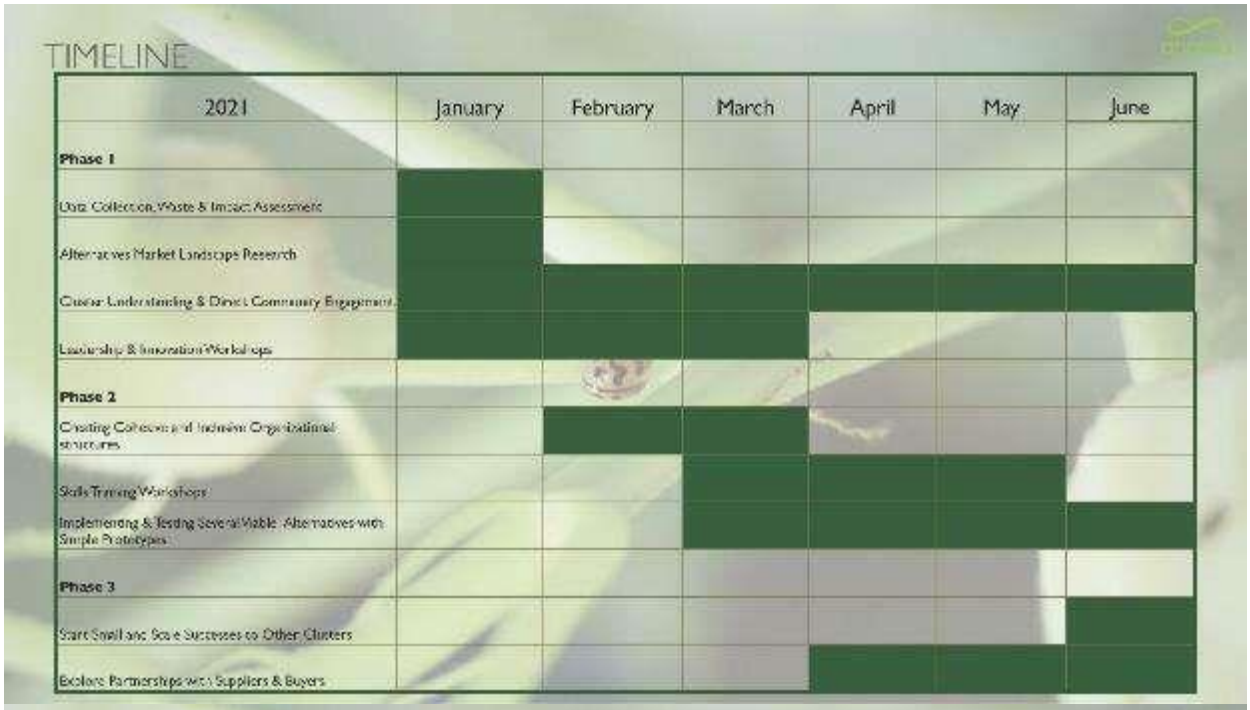
COMMUNITY BUILDING | To build more knowledgeable, skilled and connected communities, we will work with stakeholders to design and implement centrally guided, locally led organizational structures.

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.

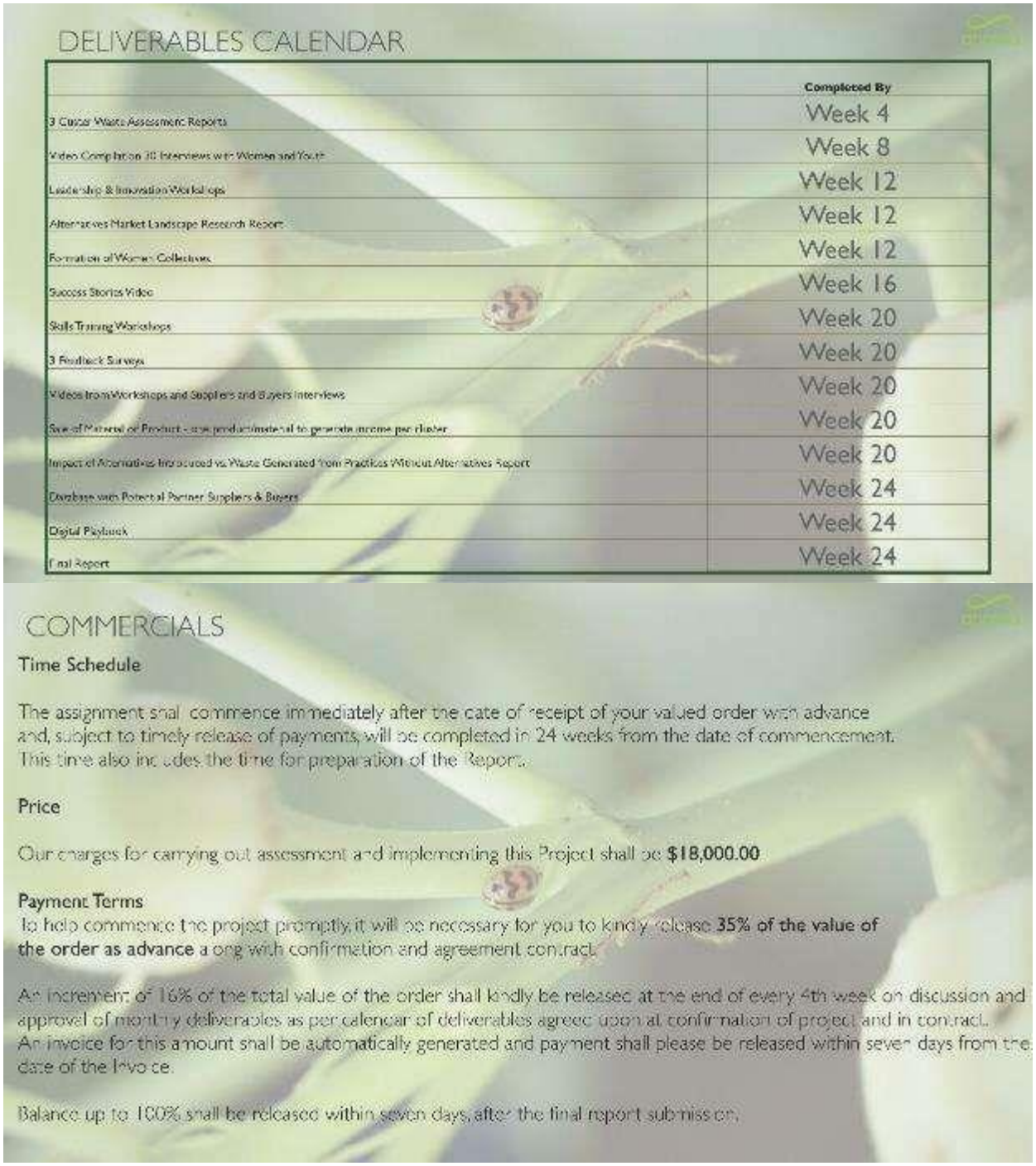



The following SDGs will serve as parameters for designing the framework of the Pilot Project:
5. Gender Equality, 10. Reduced Inequalities, 11. Sustainable Communities, 12. Responsible Consumption & Production, 13. Climate Action, 15. Life on Land
SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
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 implementation 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 Cacao Waste Assessment Reports	Week 4
Video Compilation 10 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 - new 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.

ANNEXURE 7: INTERIM GUIDELINES ON COVID-19 OF WORLD BANK

ESF/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.

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

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

INTERIM GUIDANCE ON COVID-19 **VERSION 1: APRIL 7, 2020**

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