Sri Lanka Agriculture Sector Modernisation Project (ASMP)

ENVIRONMENTAL SCREENING REPORT

FOR

CDP № 2- ANURADHAPURA (THALAWA AND GALNEWA) - CHILLI

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

Revised: 26 May 2022

FCG

NEW ZEALAND
G2G KNOW-HOW

InfotechsIDEAS

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Abbreviations

AI	Agriculture Instructor
AQI	Air Quality Index
ASC	Agrarian Service Centre
ASMP	Agriculture Sector Modernisation Project
ATDP	Agricultural Technology Demonstration Park
BS	British Standards
CBO	Community Based Organisation
CDP	Cluster Development Plan
CEA	Central Environmental Authority
DDR	Due Diligence Report
DoA	Department of Agriculture
DS	Divisional Secretary
DSD	Divisional Secretary Division
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMS	Environmental Method Statement
EPL	Environmental Protection Licence
ESR	Environmental Screening Report
FO	Farmers' Organisation
FPO	Farmers' Production Organisation
GAP	Good Agricultural Practices
GN	Grama Niladari
GoSL	Government of Sri Lanka
GSMB	Geological Survey and Mines Bureau
IDA	International Development Association
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
IPNS	Integrated Plant Nutrition System
ISP	International Service Provider
LA	Local Authority
LCC	Leaf Curl Complex
LCDC	Leaf Curl Disease Complex
LGA	Local Government Authority
LKR	Sri Lanka Rupees
MEA	Mahaweli Economic Agency
MOA	Ministry of Agriculture
MoD	Ministry of Défense
MOPI	Ministry of Primary Industries
NGO	Non-Governmental Organisation
NIRP	National Involuntary Resettlement Policy
O&M	Operation and maintenance
OFC	Other farm crops
OP	Operational Policy
PAP	Project Affected Persons
PCR	Physical Cultural Resources
PMP	Pest management plan
PMU	Project Management Unit
PPE	Personal protection equipment
RDA	Road Development Authority
RPM	Resident Project Manager
SMP	Social Management Plan
WQI	Water quality index

Environmental Screening Report

CDP № 2- Anuradhapura (Thalawa and Galnewa) - Chilli

1. PROJECT IDENTIFICATION

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

2. PROJECT LOCATION

Location **(Relative to the nearest town, highway)**	The ASMP and DoA have identified the farmers from 13 Grama Niladari (GN) divisions in Thalawa and Galnewa DS Divisions which belongs to Anuradhapura District. Few selected farmlands are shown in figure 1 below. Both Thalawa and Galnewa DS Divisions are in Anuradhapura District. Thalawa DS is one of eight divisional secretariats (Ipalogama, Galnewa, Thirappane, Nachchaduwa, Nuwaragampalatha Central, Nochchiyagama and Thabuththegama) of Anuradhapura District. Galnewa DS bounded to Palagala, Ipologama, Thalawa, and Thabuththegama. Thalawa DS has eight GN Divisions with a total population of 14,014, and Galnewa DS has 11 GN Divisions with a population of 29,800 (Mahaweli Authority). Thalawa villages can be access from two ends and from Thalawa Town at A28 Padeniya-Anuradhapura. About 5 km away from the Thalawa Town and about 2km from B501 Andarawewa-Balaluwewa road. Thalawa and Nochchiyagama are the nearest townships to the selected area. In the meantime, B501 Andarawewa-Balaluwewa road is the main access road to Galnewa selected areas. Galnewa is about 11km from Thambuththegama and Bulnewa, Kalawewa, Maha Iluppallama are some of the adjacent towns.
Definition of project area **(The geographical extent of the project and areas affected during construction**)	The proposed chilli cluster development initiatives will benefit the chilli farmers in selected villages in Thalawa and Galnewa by many ways as proposed and it will ensure the sustainability in the agriculture sector. The beneficiaries have been identified (refer Annexure 2) for the cluster project from two DS divisions namely Thalawa and Galnewa. There are about 590 farmers will be selected with having minimum of 0.5 acre each farmer in which initially about 3100 farmers will be selected. Therefore, in total minimum of 295 Acres will be expected cultivate in batches and first batch 118 Acres will be cultivated. In addition, two canal roads in Thalawa and two canal roads in Galnewa equivalent to about 10km length selected to improve which will benefits people in areas not only selected farmers.

Table 1: Farmer participation in the CDP № 2

Block name	Zone in the block	Names of GN Divisions	No. of farmers	Area for chilli (ha)
Thalawa	Zone 1	Kiralogama, Ketakela	30	6
	Zone 2	Kiralogama, Ihalawewa	48	9.6
	Zone 3	Mudunegama, Nawatheldeniya	42	8.4

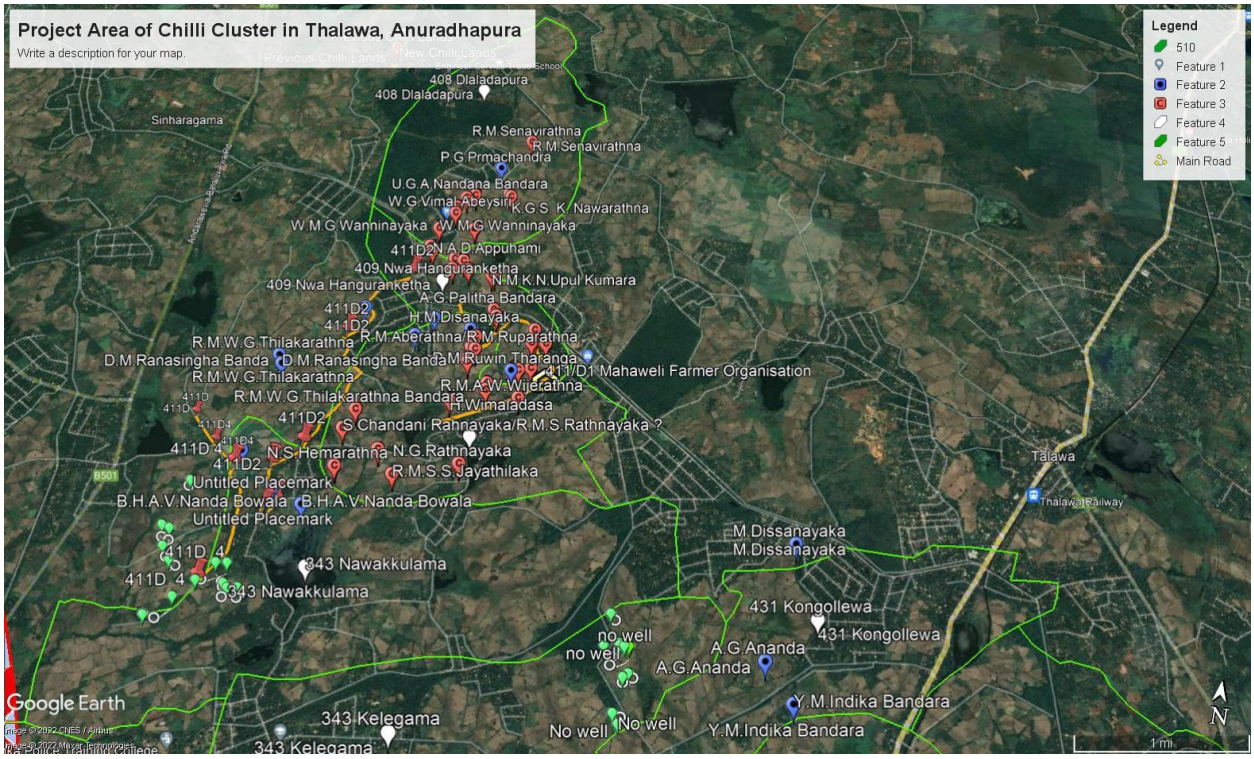
	Zone 4	Nawahanguranketa, Hirigollegama	48	9.6
	Zone 5	Pothiyagama, Nawkkulama	29	5.8
Galnewa	Zone 6	Kalankuttiya, Galkema	28	5.6
	Zone 7	Makulewa	39	7.8
	Zone 8	Hurigaswewa	41	8.2
Total			**300**	**61**

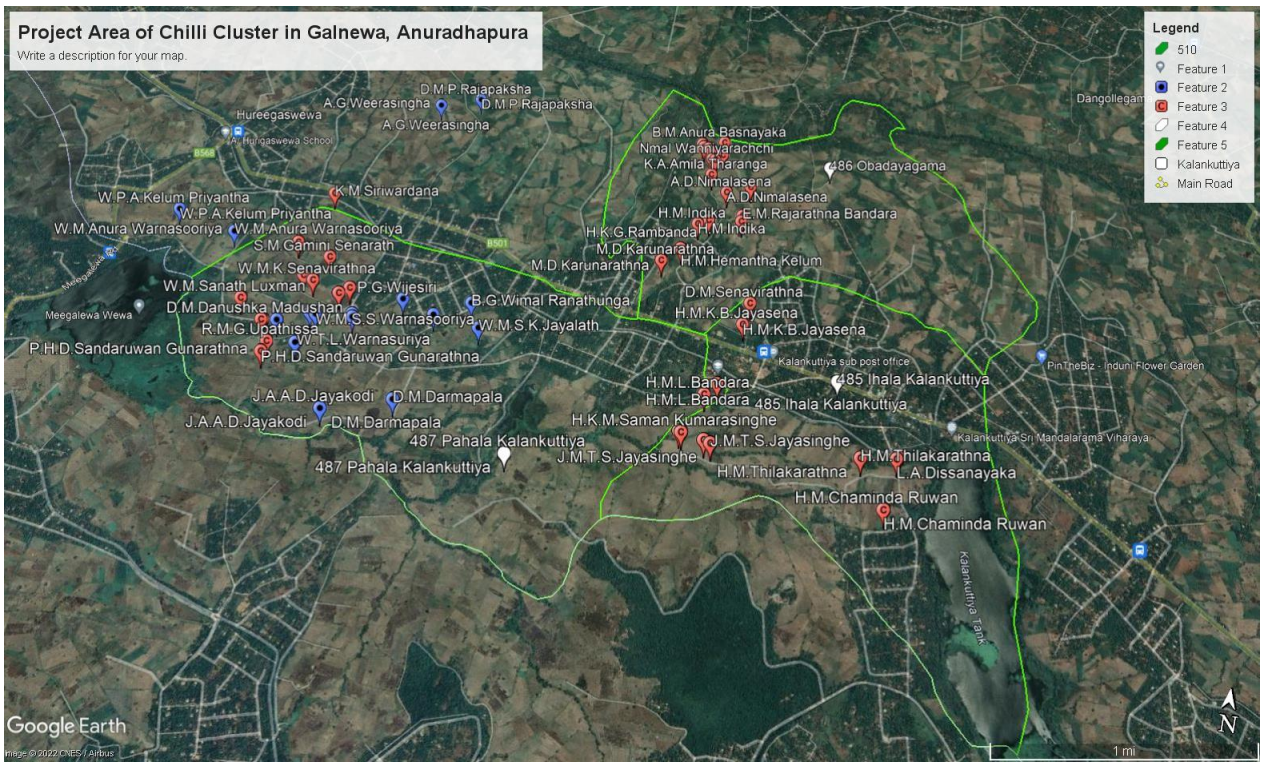
Source of Information- Block Managers offices of Thalawa and Galnewa

Selected farmlands of Thalawa are scattered across the division and 5 water catchments are found which are within 1 km distance at any of one selected farmland. Further, there are two forests areas found in north east and north west and none of them are affected during the cultivation activities. Galnewa cluster contains two water catchments which are closer to any of one selected farmlands and anticipated impacts were not found. Water catchments are shown in figure 2 & 3.

This cluster area is in the Mahaveli H System that can provide irrigation water to downstream settlements with water from Kala Wewa Reservoir. Mahaweli System H is a large settlement project that suffers from water shortages, especially during the Yala (Dry) season. Accordingly, farmers tend to use part of their paddy lands for growing other more drought tolerant crops. According to the Mahaweli Authority of Sri Lanka (MASL) statistics, 29,137 hectares were under paddy and 9,075 hectares were under other food crops in System H in 2018. When System H was first started in the 1970s, chilli cultivation was very popular among most of the farmers as it was an attractive cash crop and required minimal water inputs during Yala season. However, due to pest outbreaks in the area in 1990s, many farmers moved away from growing chillies. According to the statistics of MASL (2012 to 2018), the area under chilli in System H varies from 115 to 683 hectares.

Figure 1: Few selected farmlands in Thalawa and Galnewa





Adjacent land and features	Paddy cultivation could be considered as the main agricultural activity in Thalawa and Galnewa DS Divisions. Both DS divisions fall under the commanding area of Mahaweli System H, and farmers were given 0.8 hectare (2 acre) lowlands and 0.2 hectare (0.5 acre) uplands when established Mahaweli System H. Mahaweli System H which is high potential area when compared to other Mahaweli Systems in the country. In general paddy is grown in both Yala (Dry season) and Maha (Wet season). Irrigation system developed under Mahaweli project issued water for rice cultivation in Maha season. However, farmers were encouraged to cultivate OFC during Yala in paddy lands because they require less water compared to rice and comparatively higher economic advantages of OFC and vegetables. Therefore, part of paddy fields, which is in upper catena of the paddy fields converted by farmers to grow annual crops such as chilli, vegetable and other OFCs mainly in Yala season. It indicates that part of paddy fields converted for cultivation of upland crops is economically viable. Farmers grow upland crops such as OFC and vegetables in Yala season with supplementary irrigation whenever necessary. Farmers obtain water for their cultivations from Mahaweli canals or agro wells constructed in their fields. Most of the selected farmlands are surrounded by the paddy lands and OFCs cultivated lands. Further, vegetable and fruit cultivation are also very prominent in surrounding farmlands. Figure 2&3 shows the tanks/water catchments available in the surrounding area. Most of the farmlands of Thalawa division scattered near to Catchment 1, Catchment 3, and catchment 4. However, all these plots are existing farmlands. There are 2 water catchments found in the Galnewa project area withing 1 km distance to the farm lands and considerable amount of plots are near to the Catchment 1. However, any of these two will not be affected by the proposed cultivational activities. Though there are around 590 farmers in this area, at the initial stage, new and improved technology packages to enhance productivity and quality will only be featured in newly planted plots, strategically located for maximum exposure to large numbers of farmers. These plots will serve as learn-by-doing sites where, at

	the beginning when technology is first introduced, training of trainers will take place to prepare "change agents" to work in the dissemination and expansion of the new technology packages to large numbers of farmers. The identified are consists of large and medium scale commercial cultivation lands observed. It included coconut, green chilli, vegetable, fruit, etc. Further, good dairy/livestock industry observed. Sandy soil type mainly observed.

3. PROJECT JUSTIFICATION

Need for the project **(What problem is the project going to solve)**	Chilli (*Capsicum annuum L*.) is one of the most important cash crops grown in Sri Lanka. It has become an essential ingredient in Sri Lankan foods. Sri Lankans use it as green pods and dried red chilli. Per capita consumption of chilli is estimated 2.84 kg per annum and the national annual requirement of dry chilli is about 62,480 tonnes. At present chilli extent is about 6,611and annual production of green chilli is 33,838 tonnes (Department of Census and Statistics, 2021). Therefore, a large quantity of dry chilli is imported annually. In general, chilli is cultivated in dry zone mainly for dry chilli production. But part of the crop is harvested as green chillies if green chilli prices are high in the market. Chilli was intensively grown by farmers in Mahaweli System H during the decades of 70's and 80's. At that time Sri Lanka was self-sufficient in chilli. However, the chilli production declined during last few decades due to various reasons and imports have increased accordingly. As a result, foreign exchange spent on the importation of chilli increased. Farmers were further discouraged due to low yield due to pest and diseases, moisture stress, shortage of availability of quality seeds, high inputs costs, unstable market situation with the government import policy. As a result, farmers withdrew themselves from the chilli cultivation. Main reasons considered in promoting a chilli cultivation programme in System H • Interest of farmers and farmer organisations • Experience in chilli cultivation • Contribution to national economy by being a crop that substitutes for imports that is urgently needed in times of limited foreign exchange • Higher income as compared to paddy and other food crops • Almost all the farmers have converted part of their paddy land for highland crops • Possibility to cultivate chilli with low volumes of water • Availability of irrigation water from Irrigation canal system, agro wells and water pumps • Active support from officers attached to MEA and RPM Office The CDP is prepared under ASMP Component 2, which is for productivity enhancement, diversification and demonstration to support smallholder farmers to produce competitive and marketable commodities, improve their ability to respond to market requirements and move towards an increase in commercialisation. 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.
Purpose of the project **(What is going to be achieved by carrying out the project)**	New and improved technology packages to enhance productivity and quality will only be featured in newly planted plots, strategically located for maximum exposure to large numbers of farmers. These plots will serve as learn-by-doing sites where, at the beginning when technology is first introduced, training of trainers will take place to prepare "change agents" to work in the dissemination and expansion of the new technology packages to large numbers of farmers. The technology package and other management practices will be introduced to the selected group. The project introduces the proposed technologies and infrastructure to both increase production and process it, but also to deliver a quality product that meets the proposed local chilli market's standards. The main objective of the subproject is to develop Agriculture-related livelihood by achieving below objectives: • Introduce new technologies to increase yield • Land preparation • Water conservation/Management • Disease control • Use of weedicides, pesticides • Enhancement of productivity and Quality of chilli • To minimise postharvest losses • To increases sustainable farm income • Create new employment opportunities • Identify international market opportunities 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. Further, A business plan will be formulated with the members at the incorporation of the public unlisted company. Tentative long-term business objectives will cover the following aspects. • Develop and manage a competitive and sustainable agribusiness enterprise to provide benefits to its members and to the FPO at large. • Develop a dynamic and manage a cluster of farmers to introduce modern technology to chilli cultivation in Sri Lanka for the enhancement of productivity. • Develop and manage a modern value chain and use latest technologies along with it. • Introduce superior quality of the product for local market. • Develop sustainable links with agribusiness partners. The cluster will be developed to cater to an import-substitute value chain with the country presently relying upon 90% of its chilli from imports. The produce of the highest quality will be channelled over to the local market at the beginning, through agribusiness partners who have already expressed interest.
Justification and Alternatives considered **(Different ways to meet the project**	The identified business opportunities with farmers and agribusiness are a stimulus to reviving and increasing the chilli cultivated area in four DS divisions of Thalawa Nochchiyagama Thambuttegama and Galnewa by using modern technology, techniques and process to help meet potential local market demand. The cluster will be developed to cater to an import-substitute value

need and achieve the project purpose)

chain with the country presently relying upon 90% of its chilli from imports. The produce of the highest quality will be channelled over to the local market at the beginning, through agribusiness partners who have already expressed interest.

This cluster area is in the Mahaveli H System that can provide irrigation water to downstream settlements with water from Kala Wewa Reservoir; one of the largest ancient reservoirs. Mahaweli System H is a larger settlement project that suffers from water shortages, especially during the Yala (Dry) season. Accordingly, farmers tend to use part of their paddy lands for growing other more **drought tolerant crops**. According to the Mahaweli Economic Agency (MEA) statistics, 29,137 hectares were under paddy and 9,075 hectares were under other food crops in System H in 2018. When System H was first started in the 1970s, chilli cultivation was very popular among most of the farmers as it was an attractive cash crop and required minimal water inputs during Yala season. However, due to pest outbreaks in the area in 1990s, many farmers moved away from growing chillies. According to the statistics of MEA (2012 to 2018), the area under chilli in System H varies from 115 to 683 ha. MASL is in overall charge and is authorised to oversee all administrative and operational matters connected to its agriculture, irrigation, irrigation water issue, seasonal cropping systems, community development and social welfare. Therefore, administering the project activities will be easy. Thalawa and Galnewa have well-established farmer organisations already and production of chilli available immediately. There are experienced chilli farmers and most of farmers of these area rely on paddy and chilli for livelihood. Most of the farmers have large scale, low flat farmer-based lands with plenty of water with **less drainage concerns**.

The technology package will cover practices from land preparation to postharvest handling. In other words, from A to Z, including **farm level drainage** technology; the use of drones and other machinery and implements for land preparation, levelling and for making raised beds; new planting patterns with high population densities; new **low pressure drip irrigation** systems that **conserve water** and prevent laminar erosion; **precise application of fertilisers** using the low pressure irrigation systems and based on soil and foliar analyses; **new pests and disease control** technology based on integrated pest management (IPM) practices and using drones for the precise and localised application of pesticides; precision agriculture technology to lower the unit cost of production by improving the overall management of the farm and expand the localised application of agricultural amendments.

The "no-action" alternative would mean that no chilli cluster development undertake by the ASMP and hence no financial, technical and market support for the existing chilli Cultivators in selected DS divisions. Therefore, conventional farm practices, low productivity, low quality and low income will continue to dominate the economy of the farmers and agriculture sector will not develop in Anuradhapura.

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	Mahaweli Authority of Sri Lanka Act (Act No.23 of 1979)	√			Interventions proposed to be carried out in and around Mahaweli Development area should obtain consents from Mahaweli Authority of Sri Lanka as per the Act.
3	The Mines and Mineral Act No.33 of 1992	√			Improvements of rural roads and other proposed infrastructure activities may require extraction of soil and rocks. Soil and rocks should be purchased from GSMB permitted borrow pits and quarries.
4	Local Authorities Acts	√			Improvements of rural roads, waste disposal should be approved by the Rajanganaya Pradeshiya Sabha.
5	Water Resources Board Act No. 29 of 1964	√			Extraction of ground water should be concented by the WRB
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 within forest reserve or buffer zone or removal of trees required to be carried out should follow regulation stipulated under this legal framework.
8	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

World Bank safeguards policies triggered by the project

Safeguard Policies Triggered by the Project	**Yes**	**No**
Environmental Assessment (OP/BP/GP 4.01)	[**x**]	[]
Natural Habitats (OP/BP 4.04)	[]	[**x**]
Pest Management (OP 4.09)	[x]	[]
Physical Cultural Resources(OP 4.11)	[]	[**x**]

Involuntary Resettlement (OP/BP 4.12)	[]	[**x**]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[]	[x]
Forests(OP/BP 4.36)	[]	[x]
Safety of Dams (OP/BP4.37)	[]	[x]
Projects on International Waterways (OP/BP/GP 7.50)	[]	[x]

4. PROJECT DESCRIPTION

Proposed start date	July 2021
Proposed completion date	December 2023
Estimated total cost	LKR 282,005,824
Present land ownership	Private Farmlands, Lands with "Swarnabhoomi", deed and permits given by Divisional Secretariat
Description of the project **(Supporting materials such as maps, drawings, etc. Are attached)**	The proposed sub project is mainly focused to introduce the new technology for cultivation activities. The civil works of sub project include:

Table 2: Improved Technology Package for Chillies

Technology	Description
Hybrid seeds	MICH HY 1 hybrid developed by the DoA in 2015
Cocopel seedling production	"Cocopel Grow Pellet is a compressed coir fibre pith disc. The disc comes with added fertiliser and is covered in a bottom sealed bio-degradable net with EU certification"
Introduction of water conserving and low-pressure drip irrigation systems (300 farmers)	Computer controlled heads for water application scheduling supported by fertility sensors, soil moisture sensors and evapotranspiration measuring devices. Design based on local agri-climatic conditions and soil physical properties
	Precision fertigation with liquid organic compounds based on soil analysis
	Precision application of liquid pesticides in the vicinity of the root zone as required i.e. control of soil borne diseases
	Anti-clogging flushing components
Placement of insect net around crop area	Existing practice that provides a mechanical barrier to prevent insects from infesting crop area. It is placed around the perimeter of the production area
Mechanised and high tech land preparation using advanced implements for tractors	Deep ploughing and shallow disking to improve physical soils characteristics
Incorporation of organic material in land preparation practices	Organic material incorporated in ploughing and disking operations to improve placement and facilitate bulk handling of organic materials such as compost
Micro levelling of cropping area	Levelling with laser device mounted on tractor accessory will accelerate water removal from the crop area to avoid drainage problems and facilitate operations such as bed making

Raised beds 0.5 m high with special bed making tractor pulled accessory	Mechanised bed making using implement pulled by tractor. This innovation will significantly reduce labour requirements and will speed up land preparation tasks considerably. Increased bed height will be improved internal drainage and aeration in the root zone
Plastic mulch	Established technology to control weeds and reduce evapotranspiration
Drainage micro works	In addition to levelling, drainage micro works such as small ditches and quick water evacuation works will prevent water accumulation in the soil profile, improving pest prevention conditions and root aeration and health
Planting tools and aids	Practical tools and aids to secure accurate measurements of planting distances to assure desired population densities such as planting templates

High density planting of chillies	• Bed width: 0.9 m wide
	• № of rows in a bed = 2 rows
	• Plant (intra row) spacing = 0.3 m
	  ○ e.g. 100 m long row has 333 plants
	  ○ e.g. 100 m long bed has 666 plants
	• For 1 ha (100 x 100m), has 112 beds (224 rows)
	• Chilli High Population Density = 74,592 plants per hectare

Sticky insect traps placed systematically inside the crop at a spacing of 5 m	Non toxic insect control that also allows for the determination of insect population dynamics used in IPM practices to schedule spraying operations
IPM pest control practices	Scheduling of pest control operations using pesticides based on pest population dynamics and their risk assessment thresholds
Drones1 for localised ultra-low volume spraying	When spraying is necessary, localise ultra-low volume spray on equipment mounted on drones will minimise negative impact of operation
Organic pesticides	Approved organic pesticides found locally in Sri Lanka preferred to imported agrochemicals
Improved postharvest handling	Practices to protect quality and shelf life such as proper harvest and pre-cooling
High efficiency dryers	Use of continuous dryers instead of batch type dryers

Table 3: Summary of farm access road repair

№	Location	Unit	Length
01	Thalawa		
1.1	Canal road 411- D4	metre	2,100
1.2	Canal road 411- D2	metre	3,700
02	Galnewa		
2.1	Canal road 307-D3	metre	1,900
2.2	Canal road 308-D2	metre	3,000
Total length of roads identified for repairs		**kilometre**	**10.7**

Note: No changes to the alignment and the width of the roads

Table 4: Summary of Project Interventions in the Cluster

[1] Recommended but not employed by ASMP

#	Project component	Key Activities	Approx. extent / quantity	Implementation responsibility
1	Cultivation of Chilli (Refer table 1)	Land Preparation Irrigation pipelaying Installation of mini-sprinklers	61ha	ISP PPMU
2	Improvements of Rural Roads (Rehabilitation) (Refer table 3)	Trimming, levelling and compaction of sub grade Supplying and pilling approved gravel Spreading and compaction garvel	4 road sections Total length 10.7km	Contractor LAs Civil Engineer – ISP PPMU Engineer - PMU
3	Construction of Collection centre and installation of drying facilities	Construction of Building facilities Fencing of area Provision of Utility services Landscaping of area Drainage system Provision of equipments including driers	1 Collection Centre	Contractor FO Civil Engineer – ISP PPMU Engineer - PMU
4	Construction of Compost Production Unit	Fencing Constrution of builing Disposal yards Mixing yards Leachat management	1	Contractor FO Civil Engineer – ISP PPMU Engineer - PMU

Project management team

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

Contact Persons

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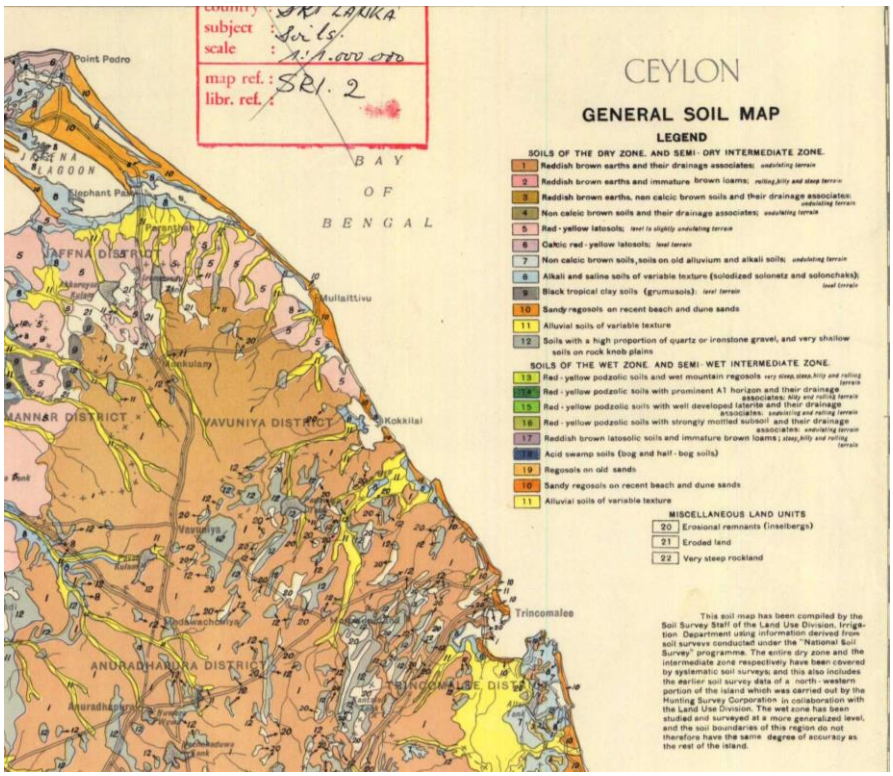
	Battaramulla Tel: +94 112 877 550 Fax: +94 112 877 546 Email: sanjayadms@hotmail.com Web: https://www.asmp.lk/ **Nature of Consultations and Inputs Received** Consultations with Environmental and Social Safeguard Specialist/ PMU However, institutional mechanism for the chilli cluster development has been proposed. The Project Management Committee, chaired by RPM, includes all the line agencies (Agriculture, Irrigation, Agrarian Development and Land) and all the heads of the farmers' organisations. They have accepted the growing of chilli on paddy lands under irrigation for following reasons: • 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 farmers have kept smaller part of their land for paddy crop for domestic consumption • All the farmers are members of farmer organisations or successors

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 PHYSICAL FEATURES

Topography and terrain	Geologically, the project area belongs to the Wanni Complex of Sri Lanka. Generally, the project site is an undulating terrain with a gentle slope (slope <30%) and the relief is <20m. The elevation of the area is around 40 to 125 metres above mean sea level[2]. However, specific to the area Thalawa is lies between 75 – 110m MSL while Galnewa lies 80 -120m MSL.
Soil (*type and quality*)	Thalawa and Galnewa DS Divisions (Mahaweli System H) fall under the agroecological region of Low Country Dry Zone (DL1b) which has bi-modal rainfall patterns as in other areas of the district. Farmers in Thalawa and Galnewa grow mainly paddy where main soil group is Low Humic Gley soils (Eutric Gleysols- GLe). Colour of soil varies from dark brown to dark grey with the increase of soil depth. Texture of the soil is sandy clay loam. Clay content increases with soil depth. Surface soil is sticky and plastic when moist. Soil pH is slightly less than 7.0 (1.2.5, Soil: water) in the surface horizon but become greater than 7.0 below 50 cm depth mainly due to presence of high content of sodium salt. Cation exchange capacity is variable in the profile and shows a fluctuating value of 6.0-20.0 cmolc/kg soil. Organic carbon content is lower than 1% in the surface soil. Available P content in surface soil is below 10 $mgkg^{-1}$. **Figure 2: Soil Map**

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



The dominant factor that governs the expression of these soils is the periodically high groundwater level; this may be true groundwater or a water table that develops on an impermeable stratum during the rainy season. The base saturation in the subsoil is in the range of 90-100% and free carbonates are present at varying depths of the subsoil; soil reaction is thus moderately alkaline. The water holding capacity of the soil is high because of the presence of smectite clay minerals (Panabokke, 1996). The Low Humic Gley soils occupy the lower parts of the slope and valley bottom. Low Humic Gley Soils are characterised by wetness or gleiing throughout the profile or gleiing immediately below the surface horizon. The colour of the surface soil is dark greyish brown to dark brown. Calcium carbonate concretions are found in the lower depths of the profile in the drier environments (Panabokke, 2003).

Chilli growing lands in both DS divisions could be categorised as flat lands with poor drainage. A narrow strip of alluvial soils occurs along the natural drainage stream (Panabokke, 1996). The soils are high in exchangeable bases, neutral or moderately acid in reaction rich in potassium and low in phosphorus and nitrogen and low organic matter due to the high temperature and low rainfall (Panabokke, 1996). In addition, farmers in Thalawa and Galnewa grow OFC and vegetables in upper slopes where main soil group is Reddish-Brown Earths (Chromic Luvisols – LVx) and Alluvial soils – Eutric Fluvisols (FLe) present in valley bottoms (Soil Survey Staff, 1992). The Reddish-Brown Earths occupy the crest and the upper and mid-slopes of the landscape. In Reddish-Brown Earths normal soil profile consists of sandy loam to a sandy clay loam surface horizon underlain by a sandy clay loam to sandy clay subsoil. The surface soil structure is weak to moderate, coarse, subangular blocky. The base saturation in the sub soil is almost 60-80%; and soil reaction slightly acid to neutral.

Surface water **(Sources, distance from the site, local uses and quality)**	Several tanks and streams are scattered within the identified area. The major irrigation scheme of Kalawewa Reservoir made it possible to cultivate successfully. All selected chilli cultivation lands are fed by Yodha Ela of Kalawewa Reservoir. Comparatively Kalawewa irrigation system is considered

	as a water abundant scheme and main source of water is the Kalaoya river and in addition drainage water from Mahaveli System H contributes significantly to maintain the reservoir capacity. Kalawewa Reservoir is feed by Kala Oya basing and the Water Quality Index (WQI) of surface water ranged from 35 to 158. The WQI values of shallow water ranged from 6 to 187. Therefore, drinking water of Kalaoya basin should purify before using. (Muhandiram, Bandara, Perera, Vithanage, Edirisinghe, Athapaththu, 2019). Refer Figure 2&3 to identify the distribution of tanks/water catchments available in the surrounding area. Most of the farmlands in Thalawa division scattered near to Catchment 1, Catchment 3, and catchment 4. However, all these plots are existing farmlands and there won't be potentials to have impacts on the water resources. There are 2 water catchments found in the Galnewa project area within 1 km distance to the farmlands and considerable amount of plots are near to the Catchment 1. However, any of these two will not be affected by the proposed cultivational activities.

Figure 3: Water catchments of selected project area "Galnewa"

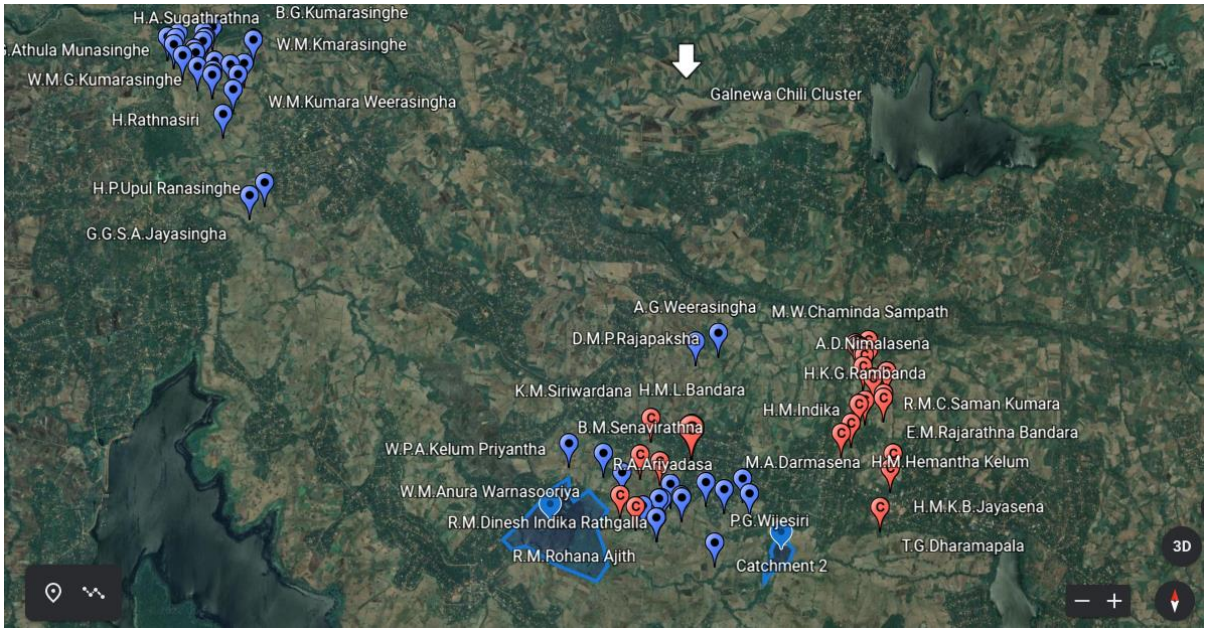
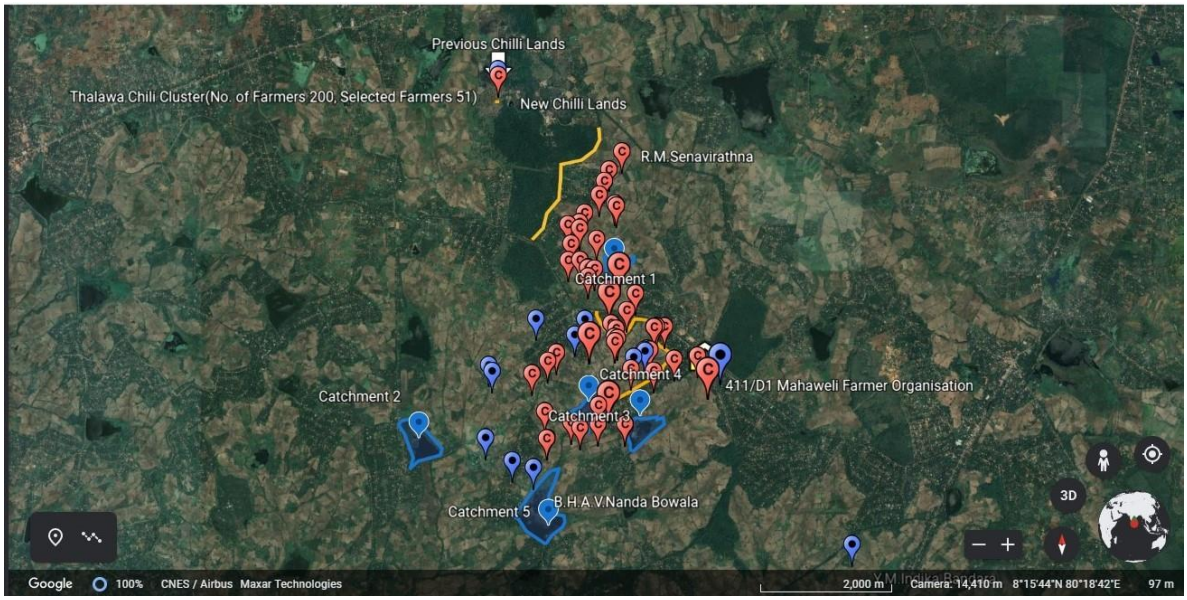


Figure 4: Water catchments of selected area "Thalawa"



Ground water **(Sources, distance from the site, local uses and quality)**	Agro wells are 7-8 metres deep, with an average diameter of 5 m. They are a popular way to obtain water in upland areas to irrigate small areas of high value crops or to provide a supplementary and secure source of water for the paddy crop. There are records to have 482 agro wells within the cluster are of which 36 have been abandoned. Considering the Kala Oya basin is a large area, fluoride levels of groundwater are higher than recommended level. The WQI values of groundwater ranged from 1.1 to 385 and it is not possible to conclude that ground water quality of this area is good[3]. The main options for water supplied through agro wells or existing irrigation canals, accessible by individual farmers with their own (or shared) pumps; or a cluster scale, centrally controlled, automated system with piped water delivery systems based on gravity pressure from a higher level reservoir or other such systems as required. These type of agro wells are scattered across the selected area and it is not practical to quantify the plots and the distances. However, It has been decided to irrigate the lands using the selected existing arrangement of agro wells in the cluster to cover 300 existing farmers.
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/de/air-quality/sri-lanka/palugaswewa shows that the Air Quality Index (AQI) of Galnewa is 34/500 and O_3 is the dominant pollutant found in the area.
5.2 ECOLOGICAL FEATURES – ECOSYSTEM COMPONENTS	
Vegetation **(Trees, ground cover, aquatic vegetation**)	Farmers in the project area tend to use part of their paddy lands for growing other more drought-tolerant crops such as Chili, vegetables and some fruit crops. It was observed that there are home gardens, cultivated lands and fragmented secondary forest patches scattered along the roadsides. A dense groundcover could be observed in many areas. Home gardens are another agroforestry type in this area. In both DS divisions, Agrosilvopastoral practices can be seen very commonly. Different types of species including vegetables, fruits, medicinal plants, ornamental plants, and plantation crops with animal husbandry practices can be seen. The main purpose of home gardens is daily family consumption and the additional crop harvest for income generation. Coconut, jack, papaya, orange, guava, mango and vegetables including chillies, ladies fingers, bitter guards, pumpkins, and cucumber are the most common food crops found within home gardens. Timber species of halmilla, sandalwood, teak, tamarind, and margosa are also can be seen in the home gardens and kumbuk (*Terminalia arjuna*), weera (*Drypetes sepiaria*) and palu (*Manilkara hexandra*) like species can be observed at the embankments of our ancient tank system. Aloe vera and neem are the most common medicinal plants in home gardens. Few commonly Identified varieties are shown in Table 4.

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

Table 5: Commonly identified varieties

Common Sinhala Name	Scientific Name	Conservation status according to the National red list 2020
Kohomba	*Azadirachta indica*	-
Pare Mara	*Albizia saman f.muell.*	-
Divul	*Limonia acidissima l.*	*LC*
Kumbuk	*Terminalia arjuna*	*LC*
Maila	*Bauhinia racemosa*	*LC*
Pol	*Cocos nucifera*	-
Albezia	*Gliricidia sepium*	-
Siyambala	*Tamarindus indica*	-
Amba	*Mangifera indica*	-
Del	*Artocarpus nobilis*	*LC*
Kiriwel	*Ichnocarpus frutescens (L.)*	*LC*
Aguna Wel	*Wattakaka volubilis*	*LC*
Thekka	*Tectona grandis*	-
Kon	*Schleichera oleosa*	*LC*
Dodam	*Citrus aurantium l.*	-
Kos	*Artocarpus heterophyllus*	-
Bo	*Ficus religiosa*	-
Kotta	*Ceiba pentandra*	-
Kottamba	*Terminalia catappa*	-
Ketakala	*Bridelia retusa*	*LC*
Weera	*Drypetes sepiaria*	*LC*
Jam	*Muntingia calabura L.*	-

(LC- Least Concern)

According to the literature and field observations, no species were identified within the threatened category of the IUCN redlist. Since the proposed project continues in the existing farmlands, no disturbances will occur to the existing wetlands or forested ecosystems.

Presence of wetlands

There are no designated wetlands observed within the project area. However, tank associated ecosystem and its associated paddy fields are the most common wetland ecosystem types in Thalawa and Galnewa area. Predominently, Thalawa and Galnewa consist of a large number of seasonal and perennial tanks. Perennial tanks hold water throughout the year. However, the seasonal tanks hold water during the rainy seasons.

In the dry seasons, these tanks become the only water source for animals in the forests and will be good habitate for many aquatic bird species (high density), butterflies, dragonflies, mammals and amphibian species associate with tank ecosystems. Invasive species of *Eichhornia crassipes* (“Japan Jabara”) could be observed within these tank ecosystems.

A large number of important wetlands including man-made and natural wetlands are situated in the Kala Oya basin. The International Union for Conservation of Nature Sri Lanka Country Office implemented a project on

	integrating wetland ecosystem values into river basin management in collaboration with the Mahaweli Authority of Sri Lanka[4]. According to the rapid field observations and existing literature, no threaten species or threaten habitats were identified within the wetland ecosystem. Since the proposed project continues in the existing agricultural lands, no negative impact on the wetland ecosystem is expected.
Fish and fish habitats	Tank associated ecosystems are rich in biodiversity and provide numerous environmental and economic benefits. These tanks are rich in many other resources such as fish, sedges, edible flowers and plants. Many aquatic and semi-aquatic plant species are associated with tank ecosystems. Plant species, such as *Cyperus cephalotes,* have made dense mats on thin water layers at tank edges. Many faunal species are habitats within tank ecosystems. Kalawewa Reservoir and associated waterways can be identified as fish habitats. The reservoir provides important habitats for a wide range of species including migratory birds and waterfowl, amphibians and fish. Thilapiya, Banded etroplus, Flying barb, Clinbing perch, Spiny eel, Eel and freshwater catfish are the common fish species found in the tank systems. Hence, it is contributing sustainable fish yield to the market[5]. Freshwater fishing also provides nutrition to children and income for the low-income people in the district. The field studies clearly showed that there are few full-time fishermen and many part-timers who do fishing mainly for their daily consumption[6]. The tanks are located at a higher elevation than the paddy fields and other farmlands. Therefore, fish species and fish habitats will not be impacted by the proposed project activities.
Birds (waterfowl, migratory birds, others)	The reservoir and associated vegetation, natural scrublands and abandoned paddy fields can be identified as potential bird habitats for migratory birds. Many large birds such as owls, eagles and hawks do hunt rodents. Also, aquatic bird species such as cranes, storks, and herons feed on insects and crabs that pose a threat to rice production. Further, it was highlighted that there has been a huge increase in peacock populations over the past years in the area and peacocks feed on the tendril roots, seeds and flowers of the crops, not just severely destroying the main crops, but will affect the future cultivations.
Presence of special habitat areas (special designations and identified sensitive zones)	The area has not been identified as a special habitat area as per the map of the sensitive area (Annexure 4) of the Central Environmental Authority. There are no protected areas, reserves or proposed reserved within the project area. However, the tank system provides important habitats for a wide range of species including migratory birds and waterfowl, amphibians and fish. Many of these species depend on the food sources associated with the aquatic habitats. Moreover, tanks will enhance the aesthetic beauty and will contribute to healing the peoples' stressful minds.

[4] https://portals.iucn.org/library/efiles/documents/2005-016.pdf

[5] http://www.fao.org/3/T0028E/T0028E05.htm

[6] https://portals.iucn.org/library/efiles/documents/2005-016.pdf

	The surrounding tanks also provide a habitat for floral species. The most important floral species from a livelihood perspective is the lotus. Lotus flowers are used for religious purposes, the roots are widely harvested as a food source and the leaves are used for wrapping foods. However, the lotus is being threatened by the water hyacinth which is an invasive alien species. The water hyacinth has a competitive advantage over the lotus, especially in the smaller tanks where nutrient levels are high[7]. Besides competing with the lotus, the water hyacinth also has a negative impact on biodiversity. Its ability to completely cover the water surface is not favoured by many wetland species, especially the aquatic birds and waterfowl.
5.3 OTHER FEATURES	
Residential/sensitive areas **(E.g., hospitals, schools)**	In the cluster area, there are two divisional type B hospitals (Thalawa and Galnewa). According to the information provided by GNs, there are three schools available in the project area in the category of Type 3 and Type AB as per the classification of state schools. Since the selected farmlands are scattered across the both DS divisions, no of Buddhist temples are not counted. There are considerable number of Buddhist temples are scattered across the selected area, but none of them are affected by the project activities.
Traditional, economic and cultural activities	Out of total workforce in Anuradhapura District, 54.0% is employed in agriculture sector activities, 14.7% is employed in government sector and 11.4% is engaged with private sector occupations. With compared to other districts, the considerable percentage of workforce is engaged in labour works and it is 16.5%. Other sectors are minor and low contribution to the economy[8]. The average monthly household's income is LKR 58,326 and the average monthly household's expenditure is LKR 48,299[9]. The community who lives below the poverty line is around 3.8% in the district. The primary income source of the majority households is agriculture. More than 90% of households have both upland and paddy lands. Farmers cultivates their paddy land in both Yala and Maha seasons under irrigation system. The farmers have constructed their residential houses on upland and timber trees and fruit bearing trees are planted in balance part of the land. During the Maha season (September to March), intercropping is done on upland. Thalawa and Galnewa DS Divisions have 39 and 30 GN Divisions respectively, and population about 112,51410. The Thalawa and Galnewa Chilli Cluster contains 13 distributary canal areas in the Thalawa and Galnewa Block Managers' Divisions. The number of identified chilli farmers is 590 having a combined land area of 118 hectares. There are 2,877 families included in these five GN Divisions having a population of about 9,976 persons. Of this population, 4,873 (49%) is male and 5,103 (51%). Is female. Furthermore, 127 and 210 female headed families found to be in

[7] https://portals.iucn.org/library/efiles/documents/2005-016.pdf

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

[9] Household income expenditure survey

[10] Resource profile, Thalawa and Galnewa Divisional Secretariat

	selected two GN Divisions of Thalawa and three GN Divisions of Galnewa respectively. Number if people recorded as being Buddhist was 9,971 (99.9% of total population) and 5 others as being Islamic within the 5 GN Divisions. Almost all are Sinhalese. Average monthly income of a household for Anuradhapura District is estimated to be LKR 50,869 and per capita monthly income is about LKR 15,700[11]. More than 12.9% of annual income was from agricultural activities[12]. Implementation of agricultural projects under Thalawa and Galnewa scheme create causes to increase the annual income of farmers. About 361 out of 2,877 families are receiving "Samurdhi" benefits from Department of Samurdhi Development and it is around 12.55% from the total families of the selected GN Divisions. As per the 'Household Income Expenditure Survey in Sri Lanka' (Department of Census and Statistics - Sri Lanka in 2020), estimated head count index (2016) under Sri Lanka's official poverty line is 3.8% in Thalawa and Galnewa DS. This is the highest head count index reported in 2006/07 and it clearly shows the importance of having economically stable agricultural projects to these selected areas. In the cluster area, there are two divisional type B hospitals (Thalawa and Galnewa). According to the information provided by GNs, there are three schools available in the project area in the category of Type 3 and Type AB as per the classification of state schools. Further, around 337 female headed families were found within the selected area. Since the project is looking for at least 30% representation of female headed households for the development plan, these will be targeted for assistance.
Archaeological resources **(Recorded or potential to exist)**	Archaeological resources in the proposed project site are not recorded. However, both DS divisions are located in Anuradhapura District and it has proud history. Anuradhapura District is having thousands of known and unknown historical places and archaeological resources. Atamasthana or eight sacred places are bound religious history and also Anuradhapura is the first kingdom in Sri Lankan history. Hence, chance find scenarios can be expected and required guidance are provided in the Environmental Management Plan (EMP). Galnewa is the closet selected village to the well-known Kalawewa and Vijithapura, and both are around 7 Km away from the village.

6. DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES

6.1 CULTIVATION	
Existing condition of the crop	This cluster area is in the Mahaveli H System that can provide irrigation water to downstream settlements with water from Kala Wewa Reservoir. When System H was first started in the 1970s, chilli cultivation was very popular among most of the farmers as it was an attractive cash crop and required

[11] Per capita monthly income was calculated using the average monthly monetary income of a household in Anuradhapura district announced by the Department of Census and Statics and the family size of Thalawa and Galnewa DSDs

[12] http://www.statistics.gov.lk/statistical%20Hbook/2020/Anuradhapura/11.2.pdf

	minimal water inputs during Yala season. However, due to pest outbreaks in the area in 1990s, many farmers moved away from growing chillies. Members of this cluster are small and medium scale farmers with one hectares of land of which some lands have fully reserved for paddy and some farmers are keeping 0.2 hectare (half an acre) of land for other food crops. The objective of the chilli hybridisation and selection programme of the DoA targeted to develop new chilli varieties with tolerance/ resistance to LCC, Choanephora blight (*Choanephora spp*.), Anthracnose (*Colletotrichum capsica*), Leaf spot (*Cercospora capsica*) etc. In addition, insect pests are also major constraints to the production of chilli in Sri Lanka. It reduces not only the production but also the quality of pods. Important pests reported in chilli are Trips (Scirtothrips dorsalis), Mites (Hemitarsonemous latus), Aphids (*Aphis gossypii, Myzus persicae*), White fly (*Bemisia tabaci*), Pod borer (*Spodopetera litura / Helicoverpa armigera*) etc. Chilli LCC identified as due to damage by thrips (Scirtothrips dorsalis), mites (*Hemitarsonemous latus*) and aphids (*Aphis gossypii, Myzus persicae*) and viruses transmitted by white fly (*Bemisia tabaci*). Therefore, farmers apply various agrochemicals available in the market. In addition, plant resistance is one of the most economical, compatible and environmentally acceptable method of pest management strategies. The DoA released almost 10 different open pollinated chilli varieties such as MI-1, MI-2, KA-2, Arunalu, MI-Hot, MI green, Galkiriyagama selection, MI Varaniya 1, MIPC1 etc. However, all these varieties did not show resistance to major pests of chilli. In this regard, in 2015 hybrid variety MICH HY1 released by the DoA showed moderate resistant to LCC with high yield as 30 - 32 tonnes per hectare of green chilli. However, average potential green chilli yield recorded in previously released open pollinated varieties are almost 10 - 15 tonnes per hectare while national average showed as low as 5.1 tonnes per hectare. Low yields of farmers are associated with mainly LCC, poor adoption of recommended agronomic practices and use of inferior quality seed material. At present farmers prefer to produce green chilli than dry red chilli due to high price, ready market, high return, lack of availability of drying facilities, high labour input for drying etc. For dry chilli production harvesting should be done at proper stage more than 80% red coloured pods and use of tarpaulins when dryers are not available.
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	Manual weed control is the best method at preliminary land preparation stage. In general, farmers prepare nursery beds width almost 0.9m (3ft) in well-drained virgin soil. Farmers sterilised soils before sowing by burning the nursery bed with rice husk and rice straw. At present some farmers use seed treatment with fungicides recommended by the DoA or chemical companies. Usually, nursery beds are prepared few days before seeding. Application of compost or any other organic manure is a common practice. In addition, the application of recommended fungicide for controlling of damping off and anthracnose is also practice. After seeding seeds are covered with layer of soil and straw. Thereafter, remove the mulch 7-10 days after sowing before the seedlings over grow through the mulch. To avoid from hot sunlight and heavy rain cover the bed with Cajon leaves or transparent polythene. Then almost one week before

	transplanting control water application. When the seedlings are ready for transplanting planting will be done with onset of rain. At the beginning in the farmlands, removal of all shrubs and bushes is taking place. Manual weed control is the best method at preliminary land preparation stage. Then, the shading branches of big trees near the field are removed and it will destroy alternative host plants of pest and diseases. Soil preparation follows, doing first ploughing with disc or mould board ploughs and doing second deep ploughing with disc or mould board ploughs perpendicular to the first ploughing. Then the disking or harrowing is taking place by each pass being perpendicular to the previous one. These activities provide benefits such as improvement of soil aeration, destroy pest cycles in different stages, destroy harmful bacteria and microorganisms due to aeration is improved and destroy harmful pathogens due to exposing silos to sun light. Adding Compost and mixing with soil will increase beneficial macro and microorganism in the soil and decrease pathogenic microorganism. Water by means of irrigation is applied immediately after transplanting. In general, raised beds are prepared width of 0.9 m (3ft) to facilitate proper drainage due to high clay in paddy soils. Some farmers make farrows without making beds. Majority of farmers make planting holes approximately with the spacing of 50x50cm or 60x50cm. In general, compost and chilli chemical fertiliser mixture are applied in the hole. To address these critical concerns, the ISP will introduce a new and/or improved technology package that will cover practices from land preparation for a new plantation and use of drones for land preparation and levelling, new planting patterns and population densities, basic flood prevention and drainage techniques.

Figure 5: Conditions of the existing crop

Water requirement	The main source of irrigation for the proposed cluster is Kala Wewa Reservoir. In general, farmers use both flood irrigation and canal irrigation methods in chilli cultivation. Water is applied immediately after transplanting. After planting, they apply different chemical fertilisers every 3-4 weeks. Though flood irrigation is popular among farmers, it has created many problems due to poor drainage of soils in the area. The excess water used in flood irrigation can be considered as the main reason for the increase of diseases and subsequent low yield. Using the proposed low pressure drip and mini sprinkler irrigation systems better distribute water, reduce laminar erosion and apply precisely fertilisers using the low pressure irrigation systems that are based on soil and foliar analysis. Currently, 0.2 hectare is flooded by Field Canal and it takes 1 hour whereas pumping from an agro well takes 6 hours. About 4,000 litres will be required to flood this area. During the initial stage, irrigate every 8 days and after maturity every 5 days. However, drip irrigation requires much less water – about 1,500 litres every 5 days.
Use of fertiliser and pesticides and weedicides	Farmers use chemical fertiliser for chilli cultivation. Urea is used as the nitrogen source, Rock Phosphate and Triple Super Phosphate are used as the phosphate source and Potash as the potassium source. However, proposed project will not provide chemical fertilisers, and also not encouraged to do so. Further, the chemical fertiliser to cultivate 0.5 acer slot will be low and farmers will be used their own space to store if required. Chilli leaf curl complex is prominent especially in Yala season than in Maha season. Therefore, the objective of the chilli hybridisation and selection

	programme of the DoA targeted to develop new chilli varieties with tolerance/resistance to LCC, Choanephora blight (Choanephora spp.), Anthracnose (Colletotrichum capsica), Leaf spot (Cercospora capsica) etc. In addition, insect pests are also major constraints to the production of chilli in Sri Lanka. It reduces not only the production but also the quality of pods. Therefore, farmers apply various agrochemicals available in the market. Chilli cultivation has always been associated with inappropriate and indiscriminate use of pesticides and high labour input for weed control, both of which have significantly contributed to increasing the cost of cultivation. The continuous and indiscriminate use of pesticides has major drawbacks such as adverse effects on human beings and other non-target organisms, development of pest resistance, the outbreak of secondary pests and environmental pollution. The project proposed by the DoA is a selection of quality seeds, use appropriate nursery management techniques, early planting, use of barrier crops, use of recommended fertiliser, use of sticky traps, use of mulches, spraying of water, control weeds, adequate irrigation and use of insect proof net. IPM is encouraged to control the pest and diseases in the crop management as per the pest management plan (PMP) prepared for ASMP and for both pest and diseases the recommended pesticides and the fungicides are applied by the framers. Proposed IPM technologies are given in table 6 should be implemented during the project. These agrochemicals are recommended by the pesticides register of DoA and PMP as well.
Harvesting	At present farmers prefer to produce green chilli than dry red chilli due to high price, ready market, high return, lack of availability of drying facilities, high labour input for drying etc. For dry chilli, production harvesting should be done at the proper stage of more than 80% red coloured pods and the use of tarpaulins when dryers are not available. Green chilli prices in Dambulla Economic Centre range between LKR 100 – 300 per kg. However, in off seasons it may go up to 400 - 600 per kg. Though flood irrigation is popular among farmers it has created many problems due to poor drainage of soils found in the area. Excess water use due to flood irrigation could be considered as the main reason for increase of diseases and subsequent low yield. At present, almost total production is sold in local market. In terms of agricultural development, the ISP will introduce new and improved technologies required to remove technical constraints or fill technical gaps keeping the chilli farmers from progressing to become commercial farmers.
Postharvest storage and transportation	This chilli is mainly used as dry chilli and a quality drying process is important. Therefore, the harvest should be transported to the processing centre after harvesting. Grading, drying, and packing of the dried chilli is an essential part during the postharvest period as it helps to cut down the losses and increase the high quality and value. Therefore grading, drying, packing, and transporting should be undertaken with improved technology. These technology facilities will be available for farmers. Continuous drying process will be established by the project with solar power.
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 5: 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. Screening report and relevant EMP and Social Management Plan (SMP) reports of post harvesting processing centre will be developed separately.
Wastewater	Surface run off will carry the fertilisers and applicable chemicals (pesticides, weedicides etc.) and impact is higher due to flood irrigation system. This will minimise by introducing water conservation techniques. Further, due to application of IPM mechanism, soil and ground/surface water pollution will be minimalised. ASMP will conduct the awareness creation and training programmes for both farmers as well as the officers regarding the IPM as per the PMP. Proposed application IPM during cluster given in table 6.

Figure 6: Existing storing and drying practices

Table 6: Application of IPM for the protection chilli in Mahaweli System H

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 plants of pest and diseases	• Future risk of pest damages is minimised
Land preparation stage	• Doing first ploughing with disc or mould board ploughs	• Soil aeration improved • Different stages of pest cycles are destroyed • Harmful bacteria and microorganisms are destroyed and minimise due to aeration is improved • Also, Harmful pathogens are destroyed also due to exposing soils to sunlight	• Future pest and disease incidences and damages are minimised. Cost pest control reduced. Environmental pollution will be minimised
	• Doing second deep ploughing with disc or mould board ploughs perpendicular to first ploughing		
	• Disking or harrowing (two perpendicular passes)		
	• Adding Compost and mixing with soil	• Increase beneficial macro and microorganism in the soil and decrease pathogenic microorganism. Development of soil structure	
	• Flood prevention and Drainage improvements. Raised beds are 0.5m in height and 0.9 m wide.	• Less risk of disease spread	
	• Beds will be aligned, where possible, to make best use of sunlight	• Sunlight will not be a limitation to the plant to produce maximum yield	• Higher yield and income
Nursery and Planting stage	• MICH HY variety will be selected	• Moderately resistant for Leaf Curl Disease Complex (LCDC). It gives a higher yield	• Less risk of (LCDC) and higher income
	• Seedlings will be produced on "Cocopel" pellets. Cocopel Grow Pellet is a compressed coir fibre pith disc. The disc comes with added fertiliser and is covered in a bottom sealed biodegradable net with EU certification"	• No of labourers need for nursery management will be reduced • Yield will be about 20% higher than conventional nursery bed method (Sri Lanka research) where uprooted seedlings are planted • Only vigorous seedlings could be selected	• Less labour requirement • Vigorous healthy cultivation is assured • Less risk of pest and diseases
	• Seedlings of same height and growth are planted in separate rows	• Easy to manage agronomic practices. Uniform plantation is assured	• A healthy plantation is assured
	• Placement of silver and black plastic mulch over the beds. Planting points will be made by punching the polythene in recommended distances	• Established technology to control weeds and reduce evapotranspiration which lowers irrigation water needs. In addition, reflecting sunlight will improve the solar radiation reception to the chilli plants. No chemical weed control	• Less labour needed • Reduce irrigation volume • Optimised photosynthesis
	• Erecting a ultraviolet (UV) resistant insect proof net around the crop field	• Existing practice that provides a mechanical barrier to prevent insects from infesting crop area. It is placed around the perimeter of the production area.	• Reduced cost of pest and diseases control • Less hazards to the environment

Stages	IPM practices	Impacts of implementation	Benefit for farmers
		It will highly reduce the need of pesticide applications, In most cases by 90 percent	
Sapling stage	• Daily attention on all saplings is assured	• Early identification of pest and diseases incidents	• A healthy plantation is assured. Cost reduced
	• weakened plants are replaced by new saplings	• Even plantation is assured	
	• No water stress is allowed	• Vigorous growth and Even plantation is assured	
	• Only correct dose of nutritionally balanced fertilisers will be applied	• No unwanted canopy development and vigorous growth is assured	
Juvenile, Flowering and Maturity stages	• Daily attention on all seedlings is assured. This procedure is followed at all stages of growth of the crop cycle	• A healthy crop field is assured	• A healthy plantation is assured. Cost reduced
	• Field sanitation is assured by managing garbage in the field		
	• Suspicious plants are marked and will be monitored for pest and diseases. Treatment will be followed if only identified as economically harmful pest or a disease		
	• Diseases attacked plants are uprooted and immediately destroyed		
	• Automated Micro irrigation by using drip tapes	• Volume of water need for the effective root zone is assured • Percolation of irrigated water towards the ground water is minimised • Helps for a vigorous plant growth	• Easy to handle, cost reduced. Less harm to the environment
	• *Fertigation with organic or chemical fertilisers. *Formulation of fertiliser regimes based on complete soil tests and foliar analyses. *It will be continued flowering and maturity stages too	• Correct dose of nutrient to the plant is assured • It minimised adding of excess fertilises to the environment • Vigorous plant growth is assured • Less risk of pest and disease infestation	• Easy to handle
	• Required dose of fertiliser will be supplied though fertigation, by soil and leaf analysis	• Balanced plant nutrient requirement for the plant is assured • Plant vigour will be increased • Optimum fruit setting will be occurred	• A healthy plantation is assured. Maximum yield will be assured
	• Automated Micro irrigation by using drip tapes	• Volume of water need for the effective root zone is assured • Loss of irrigated water into the ground water is minimised	• Easy to handle, cost reduced. Less harm to the environment

Stages	IPM practices	Impacts of implementation	Benefit for farmers
		• Helps for a vigorous plant growth	
	• Sticky insect traps placed systematically inside the crop, along the planting beds, at a spacing of 10 m	• Pesticide free, non-toxic insect control that also allows for the determination of insect population dynamics used in IPM practices to schedule spraying operations	• Healthy crop is assured
	• Pest population and pest damage assessment surveys to evaluate pest and disease intensity/quantity factors for damage prevention and to determine pest population threshold status for rational application of pesticides	• IPM practices are combined with modern spray techniques when necessary i.e. ultra-low volume spray using drones if needed • Pesticide application through irrigation system if needed	• Healthy crop is assured
Harvesting stage	• harvesting following market quality specifications on size (girth and length) and colour (maturity stage)	• Precision harvesting is a key practice to create and preserve quality and extend shelf life with minimum risk of diseases infestation	• Expected quality production is assured
	• Harvest will be collected to plastic creates	• Minimum risk of diseases infestation	
Transport stage	• Harvest will be transported to the markets by using creates. Care will be taken to minimum damages to the produce	• Losses in transportation will be minimum • Disease infestations will be minimum	• Expected quantity of produce is assured. Reasonable price is assured

7. PUBLIC CONSULTATION

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

- **Existing crop related issues**

Farmers were moved away from the chilli cultivation due to varies issue raised and main problem was the LCC which identified in 1980s considered as a major threat for chilli cultivation particularly in dry zone of Sri Lanka. Technological problems and gaps in present chilli cultivation practices of farmers that affect crop productivity and quality in Thalawa and Galnewa are as follows:

1. Low yield of chilli and decline of yield over the years due to poor agronomic practices adopted by farmers
2. Low quality of products due to small 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 soil erosion due to prolonged flood irrigation
7. Poor crop management practices and poor sanitation
8. Poor and inefficient land utilisation pattern
9. Fertiliser application is not practised by based on soil and foliar analyses
10. No attention for micronutrient fertilisers
11. Poor primary post- harvest handling and high wastage
12. Low quality standards for marketing

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

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

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

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

- **Issues bound with flood irrigation system**

Excessive flood irrigation creates many problems such as waterlogged conditions, poor crop performances, high disease incidence and waste of water, high soil erosion due to prolonged flood irrigation were identified under water conservation and management discussions. Bringing water to inaccessible lands was a prioritised question raised from farmers and introduction of water conserving

and low pressure drip and mini sprinkler system was highlighted during the discussion. However, technical knowledge on implementation and continuity of mini sprinkler system needed to be given.

- **Infrastructure development**

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

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

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

Figure 7: Community mapping activities

- **Existing environmental issues**

Some farmers were raised their existing issues related to the agricultural activities during the public consultation such as crop losses due to wild animals and onsite waste management issues. It was highlighted that most of the damages are caused by monkeys and wild elephants. Use of chemicals including fertilisers is highly applicable during the chilli cultivations and leftovers are dumped on the same land and it causes environmental contamination. Water contamination of leftovers (empty chemical bottles, polyethene, pipes) considered as the main issue and some of onsite observations are shown in figure 9. Further, existing crops have an unknown disease and it was confirmed during the onsite visit conducted at the farmlands. This was highlighted as discouraging point of the existing farmers.

Figure 8: Attendance sheet of community mapping

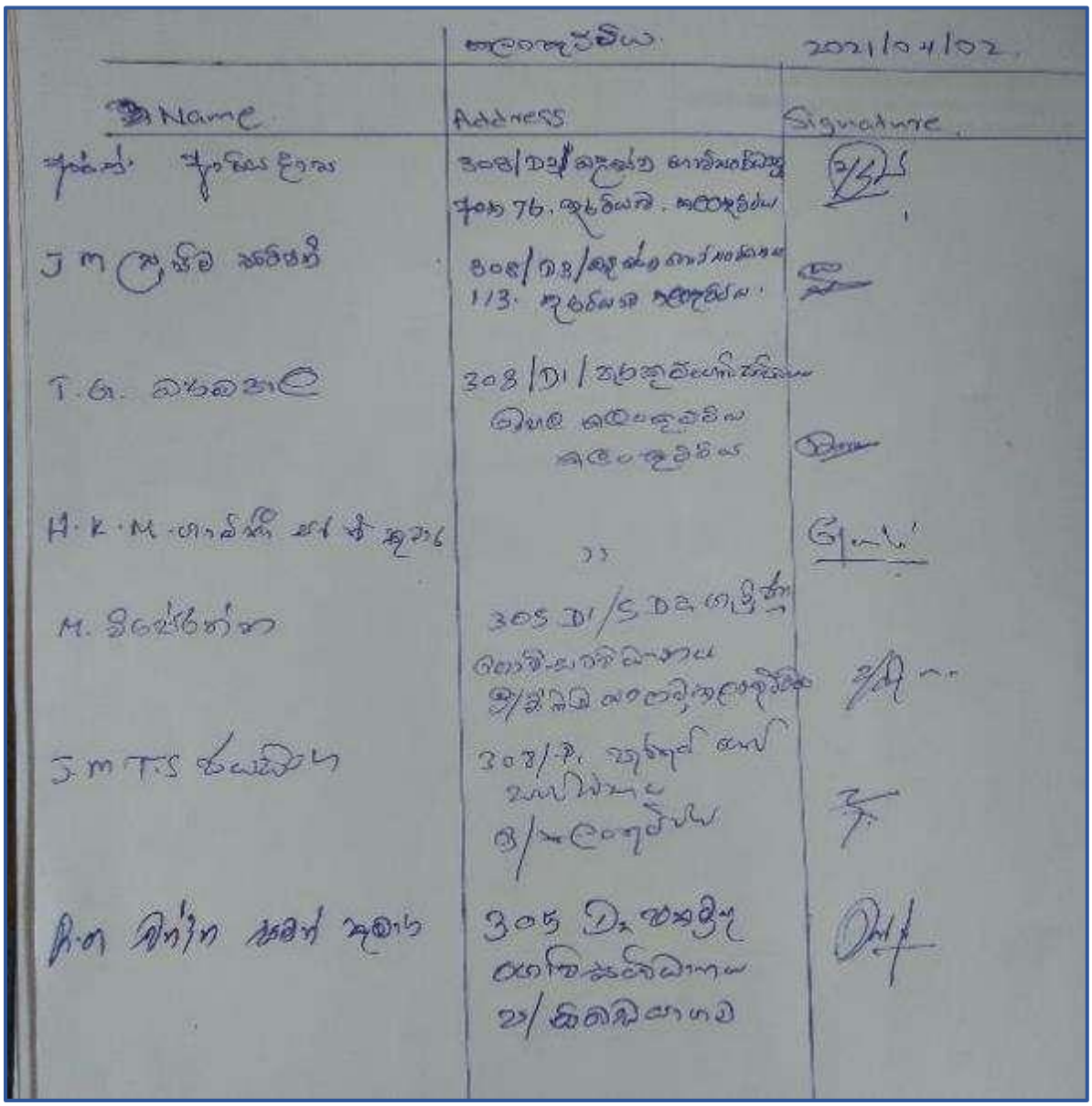


Figure 9: Existing environmental issues

8. ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

8A. Screening for Potential Environmental Impacts

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
1	Will construction and operation of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.?)	√		Low-moderate	Existing land preparation and flood irrigation system will be changed. Land preparation techniques will focus on reducing the effects of flood irrigation. Land clearance will be there for the renovation of access roads and separate EMP is attached to minimise the impact. No significant disturbances for any existing land use, or water bodies and no negative impact causes are anticipated
2	Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	√		Moderate	Pesticides, weedicides, fertilisers and some additional chemicals will be used and there is a possibility to have chronic impacts due to the long-term usage. However, proposed techniques will reduce the amount of chemicals and fertilisers use and modern techniques/methods will be introduced to increase the productivity by other means. In terms of public infrastructure development, handling, storage, transportation and use of substances which will be harmful for human health such as cement
3	Will the Project produce solid wastes during construction or operation?	√		Moderate	During the operation solid organic waste will be produced as crop residuals. Crop residual will be used for the compost production unit. However, development of infrastructure will create solid waste during clearing and grubbing, construction, etc which need to handle with care, but quantum would be small
4	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	√		Moderate	Pesticides, weedicides will be used and released to the air. Possibility to have significant impacts to other flora and fauna. Further, infrastructure development activities will also create emission of dust during clearing and grubbing, construction, etc which need to be mitigated by good engineering practices. However, since small scale infrastructure development, no significant pollution is expected during construction
5	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	√		Low	Land preparation, transportation and Construction of collecting centre may create noise and vibration impacts and it can be mitigated through proper implementation of EMP. Similar noise and vibration will create during proposed infrastructure development which will also be mitigated by adhering to EMP
6	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater or coastal wasters?	√		Moderate	All chemicals used to include pesticides and weedicides during cultivation may contaminate land or water. In addition, pollutants during infrastructure development will have an impact on surface and ground water in surrounding areas if not properly managed

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
7	Will the project cause localised flooding and poor drainage during construction? Is the project area located in a flooding location?		√		Flooding locations were not identified during the visit and the project will not cause localised flooding
8	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction or operation of the Project?	√		Low	No medium and large scale infrastructure development envisaged and hence, no severe health and safety hazard identified. Better hazard identification and prevention and corrective measures during construction will eliminate the risk associate. Snake bike bites and exposure to chemicals are possible hazards during agriculture activities.
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	Chilli transportation from cultivated lands to post harvesting storages and transportation from post harvesting storages to shipments/or any other location will be taken place. No creation of significant environmental problems. However, improvements to existing road network will create some form of traffic during construction which can be reduced or prevented by adhering to proper traffic management plan during construction
10	Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?		√		No recreational or other facilities will be disturbed
11	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?		√		There are no areas or features with high landscape or scenic value on or around the location
12	Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests which could be affected by the project?		√		Important or sensitive areas were not found except reservoir canals and will not be affected
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?		√		
14	Is the project located in a previously undeveloped area where there will be loss of green field land		√		No new lands will be used for cultivation and only existing chilli farmers will be engaged. Infrastructure development will not be undertaken newly and only improvements to the existing structures will be undertaken
15	Will the project cause the removal of trees in the locality?	√		Low	There will be very few number of trees to be removed during clearing lands. However, removal of trees will not be much due to existing cultivation lands and

№	Screening question	Yes	No	Significance of effect (Low, moderate, high)	Remarks
					removal of trees is highly discouraged. Unforeseen removal of trees should follow the procedures of tree removal given in the EMP.
16	Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?		√		No features of historic importance have been identified within the study area
17	Are there existing land uses on or around the location e.g. home gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?	√		Low	Individual drip systems will be installed on private lands
18	Are there any areas on or around the location which are densely populated or built up, which could be affected by the project?		√		Densely populated or built up areas will not be affected by the project
19	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project	√		low	Sensitive land uses in or around the project site will not be negatively affected by the project. There will be improvements on Road network and canals which positively affected to the livelihood of selected areas. However, during rehabilitation of roads, there will be disturbances to the local communities.
20	Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?		√		Existing agricultural practices will be improved by the sub project activities and no negative impacts are anticipated
21	Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?		√		There are no areas around the location where legal environmental standards have been exceeded or has been environmentally polluted

Table 7: Contractor's responsibility for mitigating adverse environmental issues raised during agricultural activities

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
1	Public complaints and lack of community support for the project implementation	Information Disclosure among Stakeholders Community Outreach activities including training Institutional development based on farmer organisations	• Strengthen institutional development component and proper awareness and community leadership • Discussions should be conducted with the beneficiary farmers including women, and youth • The beneficiary farmers selection based on the criteria which were developed at stakeholders meeting and identifying of beneficiary farmers were undertaken transparently • Residents in the area will be briefed of the project, purpose and design and outcomes with comprehensive discussion • Communication and training activities focusing women, youth and farmers who are poor in communication • The 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/complains and actions taken to resolve them • A copy of the EMP should be available at all times at the project supervision office on site
2	Lack of knowledge on basic harvest and postharvest practices lead to low quality of product and high amount of waste	Use of harvesting crates Mechanical scarring and bruising quality defects Drying of chillies using driers Sorting and packaging of chillies Storing the harvested product before delivery to the packing facility	• 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 • Use of Discarded poor quality ones 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
3	Removal of trees	Clearing of lands	1. The farmer shall make every effort to avoid removal and/or destruction of trees, including those of religious, cultural and aesthetic significance. 2. If such action is unavoidable, the Engineer shall be informed in advance to verify and report on the technical justification for the trees that will be required to be removed. • The following steps are to be followed if trees are identified for removal during the renovation • Identify and document the number of trees that will be affected with girth size & species type • Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department (LA) • Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area • The contractor shall adhere to the guidelines and recommendations made by the CEA, if any with regard to felling of trees and removal of vegetation

№	Potential environmental impacts and risk level	Key project activities causing the impact	Mitigation measures proposed and action to be implemented by the contractor
			• Removed trees of economic value must be handed over to the State Timber Corporation
4	Activities related to installation of drip irrigation systems	Installation of drip irrigation 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

5	Exposing and damaging of physical cultural resources (PCR)	Site preparatory work	• Upon discovery of physical cultural material during project implementation work, the following should be carried out:
			  • Immediately stop construction activities
			  • With the approval of the resident engineer delineate the discovered site area
			  • Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over
			  • Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours
			  • Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented
			  • Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out
			  • An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve onsite, 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

6	Spreading of Invasive Alien Species	Vegetation clearing Planting of chilli	• Provide DoA certified chilli seed variety only to farmers for nurseries • Good housekeeping • Manual and integrated weed control • Prevent weed spreading via organic manure (Compost) by periodic inspection and manual removal after application
7	Contamination of water, land and air during usage of chemicals (pesticides, weedicides.)	Land preparation Vegetation clearing Use of fertilisers	• Adherence to IPM standards of the WB, IPM action plan of ASMP and standards • Introduce technological methods to reduce dosage amounts • Awareness on usage time, handling and storage • Guidance on suitable time for the usage of chemicals

№	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 chemicals for specific requirements Soil erosion	• Promote organic fertilisers • Formulation of fertiliser regimes based on complete soil tests and foliar analysis • Introduction of proper drainage system including catch-pits and silt-traps to avoid silt and other particles been carried by the drainage water out of the site
8	Impaired water quality	Cultivation of chilli	• Excess water extraction is to be cut down to preserve ground water table • Proper introduction of drip irrigation practices instead of flood irrigation to preserve water and use of modern techniques as discussed in the CDP for reduce water consumption
9	Solid Waste Disposal	Discarding poor quality organic materials in the field Waste from weed control activities Polythene from Poly mulches Plastics from Drip irrigation left-overs	• Burnt to maintain the farmlands' hygienic condition • Use postharvest waste for compost production • Implement waste minimisation as proposed in pilot activity for reducing waste generation, and providing income generation and empowerment • Plastic and Polythene should be collected, segregated and disposed via approved agents at approved locations preferably thorugh LAs
10	Spread of crop related diseases among other flora species	Throughout the cultivation period	• Use of drone technology to conduct disease surveys using infra-red photography • Provide technical guidance on application of chemicals including dosage, suitable time and frequency • Use of chemicals using drone technology • Pest and disease control based on IPM practices and modern spray techniques • Pest population and pest damage surveys to assess pest threshold status for application of pesticides
11	Spreading COVID 19 virus	All activities	• The Farmers must ensure that all workers are well trained on COVID 19 safety precautions published by health ministry • Make required precautionary measures at the site level to take care of Covid-19 infected person
12	Health hazard	Use of agrochemicals (fertilisers, pesticides, weedicides etc.) Snake Bite Exposure to Chemicals	• Carry out proper hazardous identification and risk assessment of all proposed activities • Training and awareness on safe chemical handling • Use drone technology to spray chemicals • Availability of First-aid kits • Training on first-aid and carry out mocks • Implement proper health and safety protocols by elimination, substitution, engineering controls, administrative control and provide Personal Protective Equipment (PPE). Provide necessary PPE (*basics should include gloves, googles, masks and protective clothing*) • 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 8: Environmental Management Plan for Rural Road Improvements

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
1	Public complaints and lack of community support for the project implementation	Information Disclosure among Stakeholders	1. Discussions should be conducted with the project affected persons. 2. Residents in the area have to be briefed of the project, purpose and design and outcomes via a documented community consultation session ***-This should be done immediately once the contractor is mobilized.*** 3. The contractor should take note of all impacts, especially access issues and safety hazards that will be of concern to the residents and take necessary measures as stipulated in the EMP to mitigate them. 4. The contractor will maintain a log of any grievances/complains and actions taken to resolve them. 5. A copy of the EMP should be available at all times at the project supervision office on site.
2	Exposing and damaging of physical cultural resources	▪ Site preparatory work	Upon discovery of physical cultural material during project implementation work, the following should be carried out; 1. Immediately stop construction activities. 2. With the approval of the resident engineer delineate the discovered site area. 3. Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over. 4. Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours. 5. Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented. 6. Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. 7. An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days. 8. Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
3	Over extraction of natural resources	▪ Material Sourcing	1. The contractor is required to ensure that sand, aggregates and other quarry material is sourced from licensed sources. The contractor is required to maintain the necessary licenses and environmental clearances for all burrow and quarry material they are sourcing including soil, fine aggregate and coarse aggregate. 2. Sourcing of any material from protected areas and/or designated natural areas, including tank beds, are strictly prohibited. 3. If the contractor uses a non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed. 4. The contractor should submit in writing all the relevant numbers and relevant details of all pre-requisite licenses etc. and report of their status accordingly.
4	Impact on habitats of fauna and flora	▪ Vehicle and machinery movements ▪ Site preparation including tree removal (if any)	3. The contractor shall make every effort to avoid removal and/or destruction of trees, including those of religious, cultural and aesthetic significance. 4. If such action is unavoidable, the Engineer shall be informed in advance to verify and report on the technical justification for the trees that will be required to be removed. • The following steps are to be followed if trees are identified for removal during the renovation. • Identify and document the number of trees that will be affected with girth size and species type. • Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department (LA). • Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area. • The contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority (CEA), if any with regard to felling of trees and removal of vegetation. • Removed trees of economic value must be handed over to the State Timber Corporation.
5	Air Pollution including dust generation that can affect nearby vegetation	▪ Site Preparation activities, setting up of material storage yards and removal of vegetation ▪ Transport of construction material and storage on site	1. In the construction method statement, the contractor should clearly designate areas for maintaining material stock piles, waste stock piles, labour camps and vehicle maintenance yards. These dust emitting sources should be located away from human activity and natural drainage paths as much as possible. 2. Stock piles should be suitably covered to minimise washing off. 3. The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. 4. Transporting out debris to be carried out with minimal use of heavy transport vehicles and taking due care to avoid unwanted damages to existing structures.

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

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			on site ponding or flooding. 4. Preventive measures such as sil-traps for siltation of adjoining canal should be taken 5. Regular cleaning of canals and drains should be done
9	Solid Waste Disposal	▪ Site clearing ▪ Waste generated for labour camps ▪ Construction debris	1. The contractor shall make a list of all types of waste resulting from the construction activity, and obtain direction from the LA on possible disposal sites for each waste type. 2. Any hazardous type of waste shall be dealt with special care and instructions from the LA. 3. The contractor shall document all types and quantities of waste generated and removed from the site and the disposal locations. 4. The contractor shall remove waste from the site each day and dispose of the waste in the LA approved site/s.
10	Public/occupational safety hazard	▪ Site clearing, storage of equipment, material etc ▪ Increased traffic of heavy vehicles for material transportation ▪ Noise and vibration of construction machinery	**Training** 1. The contractor must ensure that all workers, including managers are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets). 3. In addition, the contractor shall maintained in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary. 4. A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored. **Site Delineation and Warning Signs** 5. The entire construction site should be delineated using devices such as cones, lights, tubular markers, orange and white strips and barricades to inform oncoming vehicular traffic and pedestrians in the area about work zones. 6. Dangerous warning signs should be raised to inform public of particular dangers and to keep the public away from such hazards. 7. Overloading of vehicles with materials should be controlled 8. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety.

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			9. The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned, if they are easily identifiable and whether they are reflective. **Equipment safety** **10.** Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems. **Emergency Procedures** 11. An emergency aid service must be in place in the work site. 12. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site. **Construction camps** 13. Construction camps should have adequate sanitation facilities for construction workers to control transmission of infectious diseases. 14. Avoid housing workers in camps and provide socio-economic benefits locally by employing local people. If there is no alternative to employing workers from elsewhere, locate accommodation camps away from communities on land acquired from willing sellers. Provide labour camps with adequate sanitation, waste disposal and health facilities according to labour laws. Clear work camp sites after use and reinstate vegetation. Conduct programs to raise worker awareness of HIV/AIDS. **Information management** 15. Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities. 16. Provide advance notice to local communities by way of information boards or leaflet about the schedule of construction activities, interruption to services and access etc.
11	Access restrictions and public inconvenience	▪ Site Preparation activities ▪ Vehicle and machinery movements	1. Prior consultation and consent should be taken from relevant authorities and should conduct work with a minimum disturbance to public.

	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			2. Provision of access during designated times of day or where possible provides temporary access paths for users/ staff within the premises. 3. Make alternative routes for users and made them aware
12	Spreading COVID 19 virus	▪ All activities	• take all necessary precautions to maintain the health and safety of all Staffs including labourers • The contractor must ensure that all workers, including managers, are well trained on COVID 19 safety precautions published by the health ministry. • appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents • ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics • Follow all necessary guidance stipulated under Interim Guidance on COVID-19 Version 1- April 2020 (see Annex 6)
	Post construction phase		
13	Clearing/closure of construction site/labour camps		1. Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. This includes burrow sites and storage yards as well. 2. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.
14	Environmental enhancement/ landscaping		1. Landscape plantation, including turfing shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. 2. The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP.

Table 9: Environmental management plan for establishment of elephant fence which should be included in the tender documents

№	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/occupational safety hazard	▪ Installation of elephant fence	**Training**

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			1. The contractor must ensure that all workers, including managers are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include safety helmet, protective footwear and high visibility jackets). 3. In addition, the contractor shall maintained in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary. 4. A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored. **Site Delineation and Warning Signs** 5. Precautions for electrocution 6. Dangerous warning signs should be raised to inform public of particular dangers and to keep the public away from such hazards. 7. Overloading of vehicles with materials should be controlled 8. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety. 9. The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned, if they are easily identifiable and whether they are reflective. **Equipment safety** 10. Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems. **Emergency Procedures** 11. An emergency aid service must be in place in the work site. 12. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site.

№	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			Information management 13. Develop and establish contractor's own procedure for receiving, documenting and addressing complaints from the affected public and nearby communities. 14. Provide advance notice to local communities by way of information boards or leaflet about the schedule of construction activities, interruption to services and access etc.
2	Access restrictions and public inconvenience	▪ Site Preparation activities ▪ Vehicle and machinery movements ▪ Noise, vibration, dust and waste piling	Prior consultation and consent should be taken from relevant authorities and should conduct work with a minimum disturbance to public.
	Post construction phase		
3	Routine Maintanance		• Routine clearance/maintenance of electrical fence corridor • Maintanance of energizing system (solar system)
4	Environmental Enhancement/ Landscaping		• Landscape plantation, including turfing shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. • The contactor also shall remove all debris, piles of unwanted earth, spoil material, away from the site and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP

Table 10: Environmental management plan for Construction of collection centre (with drying facilities)

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 • MASL Consent for the proposed construction should be obtained • Residents in the area will be briefed on the project, purpose and design, and outcomes with a comprehensive discussion • Communication and training activities focusing on women, youth, and farmers who are poor in communication • The contractor should take note of all impacts, especially temporary issues and safety hazards that will be of concern to the cropping pattern of the farmers. All possible impacts will be mitigated as stipulated in the EMP to mitigate them • The contractor will maintain a log of any grievances/complaints and actions taken to resolve them

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• A copy of the EMP should be available at all times at the project supervision office on site
2	Spreading COVID 19 virus	• All activities	• take all necessary precautions to maintain the health and safety of all Staffs including labourers • The contractor must ensure that all workers, including managers, are well trained on COVID 19 safety precautions published by the health ministry. • appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents • ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics • Follow all necessary guidance stipulated under Interim Guidance on COVID-19 Version 1- April 2020 (see Annex 6)
3	Exposing and damaging of physical cultural resources	• Site preparation work	Upon discovery of physical cultural material during project implementation work, the following should be carried out; 1. Immediately stop construction activities. 2. With the approval of the resident engineer delineate the discovered site area. 3. Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over. 4. Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours. 5. Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented. 6. Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. 7. An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on-site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days. • 8. Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.
4	Impact on Vegetation Cover (Tree Cover)	▪ Site preparation including tree removal	1. The contractor shall make every effort to avoid removal and/or destruction of trees, including those of religious, cultural and aesthetic significance.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
		▪ Working Space	2. If such action is unavoidable, the Engineer shall be informed in advance to verify and report on the technical justification for the trees that will be required to be removed. • The following steps are to be followed if trees are identified for removal during the renovation. • Identify and document the number of trees that will be affected with girth size & species type • Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department (LA). • Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area. • The contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority (CEA), if any with regard to felling of trees and removal of vegetation. • Removed trees of economic value must be handed over to the State Timber Corporation.
5	Water Quality of adjoining canals, streams and drains	• Spill out of fuels and lubricants from machinery	• Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets • Prioritize re-use of excess spoils and materials in the construction works. • Install temporary silt traps or sedimentation basins along the drainage leading to adjoining drains; • Place storage areas for fuels and lubricants away from any drainage leading to water bodies; • Dispose of any wastes generated by construction activities in designated sites.
6	Spreading of Invasive Alien Species	• Vegetation clearing • Material transportation	• Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done. • 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
7	Noise Pollution & Vibration that can affect nearby structures	• Operation of equipment and machinery. • Material storage and transport	• Working time for noise/vibration generation activities should be restricted and carried out only from 6.00 am to 6.00 pm. • All equipment and machinery should be operated of noise not to exceed 75 dB (during construction) as practical as possible. Regularly maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12). If the construction activities happen during the night-time, it is necessary to maintain the noise level at below 50 db. • Use of mechanically driven saw blades for tree felling will make the noise levels restricted to only a short period of time.

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• 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	Air Pollution including dust generation that can affect nearby vegetation and households	• Site Preparation activities setting up of material storage yards, and removal of vegetation • Transport of construction material and storage on site	• In the construction method statement, the contractor should clearly designate areas for maintaining material stockpiles, waste stockpiles, labor camps, and vehicle maintenance yards. These dust-emitting sources should be located away from human activity and natural drainage paths as much as possible. • All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. • Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. • The site should be wetted at least 2/3 times a day during dry weather to keep dust levels low. • Vehicles transporting soil, sand, and other construction materials shall be covered. Limitations to the speeds of such vehicles are necessary. Transport through densely populated areas should be avoided. • Regular and proper maintenance of construction vehicles and machinery to avoid air emissions. • There should be no burning of wastes on-site. • Until removal to arranged disposal sites, waste from demolition shall be held stockpiled in a place with minimal interference with local drainage paths and obstruction to traffic, local residents.
9	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.
10	Public/occupational safety hazard	• Site clearing, storage of equipment, material etc. • Increased traffic of heavy vehicles for material transportation • Noise and vibration of construction machinery	**Training** 1. The contractor must ensure that all workers, including managers, are trained on occupational health and public safety risks and mitigation measures for the site, prior to commencement of construction. **Personal Protective Equipment** 2. All workers will be provided with necessary PPEs (basic should include a safety helmet, protective footwear, and high visibility jackets). 3. In addition, the contractor shall maintain in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness, and any other equipment considered necessary. 4. A safety inspection checklist should be prepared to take into consideration what the workers are supposed to be wearing and monitoring.

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 night-time. 7. Dangerous warning signs should be raised to inform the public of particular dangers and to keep the public away from such hazards. 8. Trenches should be progressively rehabilitated once work is completed. 9. Overloading of vehicles with materials should be controlled 10. Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety. 11. The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned if they are easily identifiable, and whether they are reflective. **Equipment safety** 12. Work zone workers use tools, equipment, and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts, and mechanical or electrical problems. **Emergency Procedures** 13. An emergency aid service must be in place on the worksite. 14. During health and safety training, site staff should be properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble in an emergency. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site. **Information management** 15. Develop and establish the contractor's own procedure for receiving, documenting, and addressing complaints from the affected public and nearby communities. 16. 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.
11	Mosquito breeding places and spreading vector borne diseases	• Temporary water ponding due to construction	• Water pocketing should be avoided specially during rainy season • Temporary pond should be filled as soon as possible

SN	Potential Environmental Impacts and Risk Level	Key project activities causing the impact	Mitigation Measures proposed and action to be implemented by the Contractor
			• Construction equipment and tanks should be emptied immediate after the construction concluded for the day
Post construction phase			
12	Solid waste	• Operational stage crops related waste, general household waste & machinery parts.	• Any hazardous type of waste shall be dealt with special care and instructions from the LA. • The farmer societies shall document all types and quantities of waste generated and removed from the site and the disposal locations. • Degradable waste shoube 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.
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
14	Greenhouse gas emission	• Use of electricity during processing activities (Electricity usage for machineries)	• The farmer society shall use eco-friendly practices • The farmer society shall get recommendation for the efficient machineries by experts • Conservation practices for electricity should be followed options such as use of Solar power instead of Kerosine
15	Contamination of Soil and Water Resources due to discharge of wastewater	• Discharges of wastewater	• Wastewater generate should not be discharged to outside site • Primary trapping and treatment methods can be followed

9. COST OF MITIGATION

№	Environmental mitigation measure	Cost (LKR)	Remarks
1	Information Boards, leaflets	250,000.00	Awareness leaflets for organic cultivation practices and IPM
2	Onsite first aid facilities	75,000.00	
3	Safety equipment including COVID-19 precautions	250,000.00	PPEs should be provided
4	Dust suppression	50,000.00	Need to be done during road and canal renovation activities
5	Waste removal from site	50,000.00	Waste from vegetation clearing, site preparation, labour camps
6	Training of Farmers and Village level stakeholders on IPM and new technological applications	250,000.00	Should be scheduled to a few sessions

10. CONCLUSION AND SCREENING DECISION

10A SUMMARY OF ENVIRONMENTAL EFFECTS:

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

Key project activities	Potential environmental effects	Significance of environmental effect with mitigation in place
During Agricultural activities		
Land preparation	Solid waste generation Removal of Trees	SN
Introduction of basic flood prevention and drainage field techniques	Less water consumption, less soil erosion	SP
Use of fertilisers and chemicals	Land, water an air contamination	NS
Manual weed control	Solid waste generation	NS
New and improved quality enhancing technologies	No such harm, less use of water and Less contamination of agrochemicals on Land, air and water Less insect impact	SP
Operational activities		
Operations such as collection, drying, sorting, etc	Disposal of Waste in a haphazard manner Energy Consumption and Greenhouse gas emission	NS SN
Infrastructure Activities (Renovation of roads, Drainages, collection centres and elephant fence)		
Vegetation clearing	Clearing of vegetation will collect significant amount of waste which will lead to several environmental issues such as blockage of drainage, siltation of downstream, damage to habitats, spreading of invasive species etc	NS

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

Note: 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

10B. EMP Implementation Responsibilities and Costs

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

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

11. SCREENING DECISION RECOMMENDATION

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

Majority of the potential adverse effects can be classified as general agricultural activities and construction related impacts and which can be mitigated on site with proper engineering interventions as all activities proposed are minor scale of infrastructures limited to very small span of area. These potential constructional impacts are temporary in nature. Implementation of the EMPs proposed are sufficient to mitigate the identified impacts. These proposed EMPs for each distinctive activities should be

accompanied with civil contracts which enforces contractors to adhere. 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. If any establishment of 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 drip irrigation should be encouraged and farmers should be educated on the benefits of the same. 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. If any grinding activities other than collection and drying of chilli are envisaged, it is recommended to obtain an EPL or depending on the number of employees. Personal protective mesures for workers should be arranged during post-harvest practices including drying. Use of Solar power as energy source for drier is highly recommended and use of Kerosine is discouraged.

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.

Table 11: Screening Recommendations for each activity

Key recommendations	Actions / Approvals to be attended	Time period to attend each action	Responsibility / Remarks
Construction of Agro Wells (Collection centre and Compost yard)	Obtain WRB Recommendations with yield test reports	Before mobilise contractors to construct wells	ISP PPMU Engineer-PMU
Any use of Kalawewa Water	Obtain written consent from the Department of Irrigation - Kalawewa	Urgently	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 centre with drying facilities	Construction of Building Fencing of land Landscaping of area	During construction Installation of drier During operations	Civil Engineer – ISP Agronomist - ISP PPMU

	Installation of Drier Chilli drying activities		
Construction of compost yard	Construction of Building Fencing of land Landscaping of area Drying and sorting of waste Leachate collection Odor control Operations of composting	During construction Installation of machineries During operations	Civil Engineer – ISP Agronomist - ISP PPMU

12. DETAILS OF PERSONS RESPONSIBLE FOR THE ENVIRONMENTAL SCREENING

Screening report completed by **J.A.P. Jayaweera** National Safeguards Specialist ISP/ASMP ***Name/Designation/Contact information***	**Date** 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** 20 June 2022  ***Signature***
Screening report Approved by **Dr. Rohan Wijekoon** Project Director Agriculture Sector Modernization Project ***Name/Designation/Contact information***	**Date** 20 June 2022  ***Signature***

ANNEXURE 1: LIST OF REFERENCES

1) https://en-in.topographic-map.com/maps/gmcr/Sri-Lanka
2) Water quality index for Kalaoya basin (2019)- Muhandiram G.M.H.M.1, Bandara W.D.C.1, Perera W.L.G.D.1, Vithanage M.2, Edirisinghe V.3, Athapaththu B.C.L.1*https://core.ac.uk/download/pdf/33720752.pdf
3) Check the Air Quality in palugaswewa, Sri Lanka - BreezoMeter
4) https://portals.iucn.org/library/efiles/documents/2005-016.pdf
5) http://www.fao.org/3/T0028E/T0028E05.htm
6) https://portals.iucn.org/library/efiles/documents/2005-016.pdf
7) https://portals.iucn.org/library/efiles/documents/2005-016.pdf
8) https://portals.iucn.org/library/efiles/documents/2005-016.pdf
9) anuradhapura.dis.gov.lk/images/PDF/Statistical
10) Resource profiles, Thalawa and Galnewa Divisional Secretariat

ANNEXURE 2: BENEFICIARY LIST

No	Name of Farmer	Farmer Address	NIC Number	Contact Number	Gender	GN Division
1	H.M.N.G. Muthubanda	411/04, 140, Nawa Haguranketha	19570762087	077-4950253	Male	409 - Nawahaguranketha
5	H.M. Dissanayaka	411/1/111, Hirigollegama, Thalawa	541376055V	076-8755060	Male	411-Hirigollegama
6	R.M.R.T.Rathnayaka	411/1/111, Hirigollegama, Thalawa	197915002268	0768 955060	Male	411-Hirigollegama
7	W.V.Saman Samarasiri	411/1, Anurapura, Talawa	832031478V	0768 943512	Male	411-Hirigollegama
8	P Shantha Ratnayaka	411/1/80 Hirigollegama, Thalawa	197624105313	076-4701679	Male	411-Hirigollegama
9	A.M.Kusum Thilaka	411/2, 56, Anurapura, Talawa	820130640V	0787 052010	Female	411-Hirigollegama
10	M.Dissanayaka	409/2, Mudurangama, Talawa	NA	0779 251863	Male	NA
11	G.A.Ananda	409/1, 217, Koongollewa, Talawa	791392802V	0771 760122	Male	NA
14	T.L.S. Randunu	411/1 Hirigollegama, Thalwa	197333003557	076-6872109	Male	343- Nawakkulama
15	W.G.O.C.K. Ratnayaka	411/3, 17, Nawatheldeniya, Galadiulwewa	197829202440	076-7821100	Male	343- Nawakkulama
16	D.M. Ranasingha Banda Dissanayake	411/1 Hirigollegama, Thalwa	721188276V	077-2877031	Male	409 - Nawahaguranketha
17	K.M. Ratnayaka	411/4, 91A, Nawahaguranketha, Talawa	700593215V	0769 427775	Male	409 - Nawahaguranketha
18	W.G.R.M. Thilakarathna Banda	411/03/41 Newtheldeniya, Galadiwul wewa	701691893V	077-1651491	Male	409 - Nawahaguranketha
19	S. Asanka	411/3, 48, Nawadeldeniya, Galadiulwewa	850393044V	0717 878950	Male	343- Nawakkulama
20	K.G.Kapila Priyantha Bandara	411/2, 42, Anura Pura, Talawa	197926001871	0788 679773	Male	409 - Nawahaguranketha
22	K.M.G.Sarath Bandara	411/4, 1, Nawa Haguranketha	680260923V	0771 453575	Male	409 - Nawahaguranketha
23	W.M.G.N.K.Nawarathna	411/4, 83, Nawa Haruranketha	NA	0765 763716	Male	409 - Nawahaguranketha
24	S.M.A.G.Wijwsiri Bandara	411/3. 43, Nawatheldemiya, Galadiulwewa	700292568V	0769 316109	Male	343- Nawakkulama
25	H.M.Sujith Manjula Kumara Hearth	411/3, 72, Nawatheldeniya, Galadiulwewa	197432201362	0763 238491	Male	343- Nawakkulama
26	W.G. Dulanjaya Supun Harsha Rathnayaka	411/3, 88, Nawatheldeniya, Galadiulwewa	982792819V	0717 656055	Male	343- Nawakkulama
28	K.M.Seela Kumari	411/3, Nawatheldeniya, Galadiulwewa	605020747V	NA	Female	343- Nawakkulama
29	W.M.A.G. Nawarathne	411/3, 40, Nawathldeniya, Galadiulwewa	196905402510	0713 577850	Male	343- Nawakkulama
30	W.G. Tilakarathna	411/3, 45, Nawatheldeniya, Galadiulwewa	761836652V	0701 490073	Male	343- Nawakkulama
31	D.W. Bandula Kumara	411/4, 20, Nawahaguranketha, Talawa	800980364V	0775 484822	Male	409 - Nawahaguranketha
32	R.M.Kalubanda Rathnayake	411/3, 33, Nawatheldeniya, Galadiulwewa	197419503439	0762 737100	Male	343- Nawakkulama
34	D.M.P.G.Somarathna	411/2, 125, Arunapura, Talawa	197506104175	0774 203265	Male	409 - Nawahaguranketha
35	W.G.Wasanthi Premadasa	411/2, Anurapura, Talawa	198577604447	0768 754724	Female	409 - Nawahaguranketha
36	B.M.A.V. Bowala Bandara	411/4, 97,Nawahaguranketha, Talawa	703343970V	0773 093434	Male	409 - Nawahaguranketha
37	H.Bandaranayaka	Nawakkulama, Galadiulwewa	611243332V	0767 480741	Male	343- Nawakkulama
38	K.N.L.Jayarathna	Nawakkulama, Galadiulwewa	801883958V	0769 100851	Male	343- Nawakkulama
39	D.P.Abeygunawardena	411/3, 214, Nawatheldeniya, Galadiulwewa	851932909V	0768 740642	Male	343- Nawakkulama
40	A.G.Bandula Kumara	411/3, 100, Nawatheldeniya, Galadiulwewa	882754359V	0711 325658	Male	343- Nawakkulama
41	R.P.Senavirathna	411/3, Nawatheldeniya, Galadiulwewa	531754131V	NA	Male	343- Nawakkulama
42	R.P.C.S.Randunu	411/3, 134, Nawatheldeniya, Galadiulwewa	753372935V	0775 124193	Male	343- Nawakkulama
43	P.B.J.R.Tilakarathna	Nelumthottama, Karagahawewa, Talawa	773094470V	0763 270020	Male	343- Nawakkulama

No	Name of Farmer	Farmer Address	NIC Number	Contact Number	Gender	GN Division
44	A.W.A. Sunil Abesekara	31, Nawamakulewa, Hurigaswewa	671402910V	0717 027318	Male	415- Makulewa
45	W.M.Wasantha Malani	31, Nawamakulewa, Hurigaswewa	197154101202	0703 553966	Female	415- Makulewa
46	R.A.Aruna Sampath Ranasinghe	68, Nawamakulewa, Hurigaswewa	198533400913	0715 349470	Male	415- Makulewa
47	W.M.Kumara Wijesinghe	58, Nawamakulewa, Hurigaswewa	820443950V	0712 424140	Male	415- Makulewa
48	W.M.Mahinda Kulasooriya	37, Nawamakulewa, Hurigaswewa	762633809V	0703 553947	Male	415- Makulewa
49	N.M.Wijerathna	Nawamakulewa, Hurigaswewa	852494638V	0776 218973	Male	415- Makulewa
50	K.W.S.K.Ketakumbura	Nawamakulewa, Hurigaswewa	858341805V	0776 218973	Female	415- Makulewa
51	W.M.Senavirathna	37, Nawamakulewa, Hurigaswewa	611600123V	0712 934055	Male	415- Makulewa
52	R.A.Kumarasinghe	09, Nawamakulewa, Hurigaswewa	701572203V	0705 031678	Male	415- Makulewa
53	R.M.Danawansa	01, Nawamakulewa, Hurigaswewa	822464335V	0767 362534	Male	415- Makulewa
54	H.A.Laxman Jayantha	42, Nawamakulewa, Hurigaswewa	750574211V	0712 824762	Male	415- Makulewa
55	R.A.K.Nimal Ranasinghe	09, Nawamakulewa, Hurigaswewa	840903273V	0767 070442	Male	415- Makulewa
56	H.M.Jayathilaka	135, Makulewa, Hurigaswewa	NA	NA	Male	415- Makulewa
57	I.M.Rathnasiri	12/A, Botekanda, Nawamakulewa	673653472V	NA	Male	415- Makulewa
58	B.G.Athula Wijesinghe	30, Nawamakulewa, Hurigaswewa	812724380V	0774 984058	Male	415- Makulewa
59	B.G. Kumarasinghe	30, Nawamakulewa, Hurigaswewa	641214620V	0788 054205	Male	415- Makulewa
60	B.G.Munasinghe	30, Nawamakulewa, Hurigaswewa	773364397V	0785 959843	Male	415- Makulewa
61	H.A.Sugatharathna	09, Nawamakulewa, Hurigaswewa	197711901304	0755 516435	Male	415- Makulewa
62	W. Chathuranga Lakmal	41, Nawamakulewa, Hurigaswewa	972162469V	0715 418770	Male	415- Makulewa
63	A.W.A.Sudath Abekekara	22, Makulewa, Hurigaswewa	722043197V	0778 549105	Male	415- Makulewa
64	W.M.Kuumarasinghe	41, Nawamakulewa, Hurigaswewa	743003292V	0774 629616	Male	415- Makulewa
65	W.A.A. Nissanka Abesekara	07, Nawamakulewa, Hurigaswewa	197909605091	0713 366281	Male	415- Makulewa
66	H.P.Upul Ranasinghe	116, Makulewa, Hurigaswewa	720522632V	0712 197629	Male	415- Makulewa
67	R.A.Nihal Ranaweera	01, Commercial Land, Nawamakulewa	742902471V	0715 125234	Male	415- Makulewa
68	D. Lalith Kumara	23, Nawamakulewa, Hurigaswewa	813223716V	0774 905029	Male	415- Makulewa
69	T.M.Kumara	Nawamakulewa, Hurigaswewa	197313110044	NA	Male	415- Makulewa
70	G.G.S.A. Jayasinghe	111, Makulewa, Hurigaswewa	762740885V	0772 577130	Male	415- Makulewa
71	M.M.B.Dayarathna	14, Makulewa, Hurigaswewa	633494088V	NA	Male	415- Makulewa
72	J.M.Sujeewa Kumara	Kuratiyawa, Kalankuttiya	197600703946	NA	Male	487- Pahala Kalankuttiya
73	E.K.M.Dharmasooriya	Kuratiyawa, Kalankuttiya	631064256V	0784 208180	Male	487- Pahala Kalankuttiya
74	E.K.M.Sugath Dammika	Kuratiyawa, Kalankuttiya	NA	0701 609317	Male	487- Pahala Kalankuttiya
75	R.A.Ariyadasa	76, Kuratiyawa, Kalankuttiya	NA	0716 428110	Male	487- Pahala Kalankuttiya
76	B.M.Sidath Hemantha	105, Kuratiyawa, Kalankuttiya	830590455V	NA	Male	487- Pahala Kalankuttiya
77	R.M.Dinesh Indika Ranagalla	01, Old Rd, Kuratiyawa, Kalankuttiya	640911691V	0719 622996	Male	487- Pahala Kalankuttiya
78	D.M.Samarakoon Banda	411/3, Nawatheldeniya, Galadiulwewa	682072271V	0775 226363	Male	343- Nawakkulama
79	W.M.Dingiri Banda	411/4, 68, Nawahagurankethа, Talawa	733624035V	0763 931819	Male	409 - Nawahagurankethа
80	P.V.Lakshika Priyadarshani	411/3, 58, Nawatheldeniya, Galadiulwewa	927761874V	0713 831414	Female	343- Nawakkulama

No	Name of Farmer	Farmer Address	NIC Number	Contact Number	Gender	GN Division
81	W.G.Amila Udayangani	411/3, Nawatheldeniya, Galadiulwewa	807584960V	0761 943999	Female	343- Nawakkulama
82	W.G.Manoj Dilshan	411/3, 45, Nawatheldeniya, Galadiulwewa	950592893V	0716 973433	Male	343- Nawakkulama
83	P.G. Premachandra	419/1/80, Jayasiripura, Talawa	195927007861	0773 520810	Male	408- Daladapura
84	Y.G.Darmadasa	419/1/25, Jayasiripura, Talawa	593101177V	0766 225260	Male	408- Daladapura
85	K.G.Saman Kumara	419/1, 194, Jayasiripura, Talawa	743072537V	0770 535036	Male	408- Daladapura
86	W.G.Ranbanda	419/1, 105, Daladapura, Talawa	593042522V	0715 919267	Male	408- Daladapura
87	H.M.Rathnayake	419/1, 93, Jayasiripura, Talawa	743072537V	0770 183081	Male	408- Daladapura
88	S.Chandani Rathnayake	411/ --, Hirigollegama, Talawa	716072088V	0788 431448	Female	411-Hirigollegama
89	R.M.S.Rathnayake	411/ --, Hirigollegama, Talawa	942872330V	0703 527948	Male	411-Hirigollegama
90	P.S.Rathnayake	411/ --, Hirigollegama, Talawa	662261220V	0771 760998	Male	411-Hirigollegama
91	R.M.T.S.Rathnayake	411/ --, Hirigollegama, Talawa	953542595V	0712 275222	Male	411-Hirigollegama
92	R.M.Sadun Sandaruwan	411/ --, Hirigollegama, Talawa	199420200236	0715 825607	Male	411-Hirigollegama
93	R.M.J.S.Priyadarshani	Nawatheldeniya, Galadiulwwa	727382011V	0713 659981	Female	343- Nawakkulama
94	R.P.P.A.K.Senavirathna	411/3, Nawatheldeniya, Galadiulwewa	NA	0771 042421	Male	343- Nawakkulama
95	W.M.Sagara Upul Sanjeewa	411/3, 109, Nawatheldeniya, Galadiulwewa	780743360V	0705 500661	Male	343- Nawakkulama
96	R.M.G.Anura Gunathilaka	Pothiyagama, Pahalagama, Thambuththegama	732231692V	0776 633975	Male	433- Kelegama
97	W.M.Sagara Sudath Warnasuriya	Kuratiyawa,Kalankuttiya		0716 428718	Male	487 pahala kalankuttiya
98	D.M.Darmapala	Kuratiyawa,Kalankuttiya		0714 004196	Male	488 pahala kalankuttiya
99	J.A.A.Dharmapriya Jayakody	Kuratiyawa,Kalankuttiya		0718 893205	Male	489 pahala kalankuttiya
100	R.M.Rohana Ajith	Kuratiyawa,Kalankuttiya		0722 629418	Male	490 pahala kalankuttiya

Tentatively selected farmers for the second phase-chilli cluster, Anuradhapura District

No	Farmer Name	Address	ID Number	T.P Number	Group Name
1	Chinthaka Sanjeewa	Galkema,Kalankuttiya	901660832v	716554758	Galkema,Kalankuttiya
2	Chandani Rajika	Galkema,Kalankuttiya	197162601824	719934068	Galkema,Kalankuttiya
3	Krishan Kumarasinghe	Galkema,Kalankuttiya	960610725v		Galkema,Kalankuttiya
4	Udara Sandaruwan	Galkema,Kalankuttiya	873084634v	716079635	Galkema,Kalankuttiya
5	E.M.Udeni Chandimal	Galkema,Kalankuttiya	980254446v	719447801	Galkema,Kalankuttiya
6	A.M.Dinesh Prasanga	Galkema,Kalankuttiya	861580520v	712667702	Galkema,Kalankuttiya
7	K.A.A.Karunarathne	Galkema,Kalankuttiya	872742549v	714086506	Galkema,Kalankuttiya
8	J.A.Samantha Kumara	Galkema,Kalankuttiya	811972657v	712229139	Galkema,Kalankuttiya
9	Nandana Senarath	Galkema,Kalankuttiya	741280841v		Galkema,Kalankuttiya
10	T.S.Bandara	Galkema,Kalankuttiya	200220602633	701939996	Galkema,Kalankuttiya
11	V.G.V.C.Sandaruwan	Galkema,Kalankuttiya	199135502431	719879505	Galkema,Kalankuttiya

No	Farmer Name	Address	ID Number	T.P Number	Group Name
12	Daglas Ranasinghe	Galkema,Kalankuttiya	731274274v	704810090	Galkema,Kalankuttiya
13	Priyantha Bandara	Galkema,Kalankuttiya	840073998v	712988470	Galkema,Kalankuttiya
14	I.M.Nalinda Ruwan	Galkema,Kalankuttiya	198118600069	718249485	Galkema,Kalankuttiya
15	Kasun Prabhath	Galkema,Kalankuttiya	822510485v	713555335	Galkema,Kalankuttiya
16	H.M.Priyantha	Galkema,Kalankuttiya	923082670v	713406603	Galkema,Kalankuttiya
17	Nalaka Upul Kumara	Galkema,Kalankuttiya	841673085v	718784348	Galkema,Kalankuttiya
18	D.M.Senavirathne	Galkema,Kalankuttiya	590433187v	776215053	Galkema,Kalankuttiya
19	D.M.Dhamith Kumara	Galkema,Kalankuttiya	980431770v	711921079	Galkema,Kalankuttiya
20	D.M.Indika Wijeesinghe	Galkema,Kalankuttiya	830022023v	729052034	Galkema,Kalankuttiya
21	H.K.Nihal Athula	Galkema,Kalankuttiya	802954786v	712893064	Galkema,Kalankuttiya
22	J.K.Asanka Priyadarshana	Galkema,Kalankuttiya		716558236	Galkema,Kalankuttiya
23	Dharmasena Irugal	No.101,Thambuttegama road Eppawala	196236303918	720188044	Eppawala Team 1
24	K.P.P.Neel Kularathne	Thambuttegama road Eppawala	852860456v	719212353	Eppawala Team 1
25	K.P.L.Nimal Jayarathne	No.55/C,Pahalasiyambalewa,Eppawala	893613536v	786362407	Eppawala Team 1
26	R.K.Ashoka Jayaweera	No.155,Pahalasiyambalewa,Eppawala	590824828v	721360636	Eppawala Team 1
27	K.Samantha	Pahalasiyamabalewa,Eppawala	197928502726		Eppawala Team 1
28	P.Deepasika Priyadarshani	Pahalasiyamabalewa,Eppawala	776981150v	713354553	Eppawala Team 1
29	M.R.S.I.K.Dissanayake	No.27/A,Thambuttegama road Eppawala	861990826v	713491950	Eppawala Team 1
30	M.A.Chandrarathne	No.37,Pahalasiyambalewa,Eppawala	533324657v	710609077	Eppawala Team 1
31	H.V.Rathnaweera	Thambuttegama road Eppawala	600303260v	715530012	Eppawala Team 1
32	H.V.Dayarathne	Thambuttegama road Eppawala		252249555	Eppawala Team 1
33	E.M.Senadeera	Pahalasiyamabalewa,Eppawala	197234002026	718455610	Eppawala Team 1
34	R.M.U.B.Rathnamala	Ihalasiyambalewa,Eppawala	811660230v	761176325	Eppawala Team 1
35	R.A.Rathnayake	16,Mail post,Ihalasiyambalewa,Eppawala	643663376v	716965312	Eppawala Team 1
36	R.B.M.S.Upul Kumara Rathnamalala	16,Mail post,Eppawala	770623170v	705315369	Eppawala Team 1
37	K.G.Sunil Premathilaka	No.118,Trak 2,Eppawala	782703340v	772219616	Eppawala Team 2
38	K.G.Jayantha Senarathne	No.188/A,Trak2,Eppawala	701781945v	712610036	Eppawala Team 2
39	M.G.Bandula Senawirathne	No.164,Trak2,Eppawala	197829401593	786484873	Eppawala Team 2
40	R.P.Parinda Ranasinghe	No.132,Trac2,Eppawala	751680813v	776291889	Eppawala Team 2
41	S.Chandana Thilakasiri	No.137,Trak2,Eppawala	761282794v	716404050	Eppawala Team 2
42	R.Sunil Premachandra	Trak2,Eppawala	710653364v	702661950	Eppawala Team 2
43	R.D.Nimal Jayarathne	No.165,Trak2,Eppawala	652963870v	779798686	Eppawala Team 2

No	Farmer Name	Address	ID Number	T.P Number	Group Name
44	J.Chaminda Jayasooriya	No.201,Trak2,Eppawala	811851884v	773105343	Eppawala Team 2
45	K.Samantha Padmakumara	No.98,Trak1,Eppawala	197706903020	701933564	Eppawala Team 2
46	D.M.N.Mihira Bandara	No.196,Trak2,Eppawala	751573618v	71463798	Eppawala Team 2
47	D.A.A.N.Kumara Delathala	No.194,Trak2,Eppawala	800803691v		Eppawala Team 2
48	W.M.Thilakarathne Banda	407 D 01 Canal,Kiralogama,Thalawa	631444776v	775567573	407 D 1
49	W.M.Sachintha Srimal Bandara	407 D 01 Canal,Kiralogama,Thalawa	943330476v	702519933	407 D 1
50	Harispriya Ranjith Dissanayake	407 D 01 Canal,Kiralogama,Thalawa	721314308v	717105041	407 D 1
51	K.R.M.Prasanna Malinda Kulathunga	407 D 01 Canal,Kiralogama,Thalawa	822584867v	701400265	407 D 1
52	K.R.M.Lasantha Kumari Kulathunga	407 D 01 Canal,Kiralogama,Thalawa	856854361v	719633538	407 D 1
53	G.M.Nalinda Dhanushka Ranasinghe	407 D 01 Canal,Kiralogama,Thalawa	951640166v	767340334	407 D 1
54	B.M.Subash Pushpakumara	407 D 01 Canal,Kiralogama,Thalawa	943512132v	715628125	407 D 1
55	M.Chaminda Herath	407 D 01 Canal,Kiralogama,Thalawa	197825302944	713072707	407 D 1
56	J.Nishantha Jayaweera	407 D 01 Canal,Kiralogama,Thalawa	831271094v	712750396	407 D 1
57	H.M.Athula Bandara	407 D 01 Canal,Kiralogama,Thalawa	197910102112	762712586	407 D 1
58	Wasantha Upul Diwakara	407 D 01 Canal,Kiralogama,Thalawa	751063482v		407 D 1
59	D.B.Kapurubanda	407 D 01 Canal,Kiralogama,Thalawa	480450493v		407 D 1
60	R.M.Palitha Bandara	407 D 01 Canal,Kiralogama,Thalawa	197929010014		407 D 1
61	I.M.Dingiribanda	407 D 01 Canal,Kiralogama,Thalawa	196114201036		407 D 1
62	G.L.W.Jayalal de Silava	407 D 01 Canal,Kiralogama,Thalawa	197705202129		407 D 1
63	R.M.Karunathilaka	407 D 01 Canal,Kiralogama,Thalawa	652270155v		407 D 1
64	Sunil Basnayake	407 D 01 Canal,Kiralogama,Thalawa	583391452v		407 D 1
65	D.M.Rasika Prabath Diwakara	407 D 01 Canal,Ketakala,Kiralogama	790941438v	702871510	407 D 1
66	Wijitha Basnayake	Wanewathta,Kiralogama	781992933v		407 D 1
67	Jayantha Herath	Wanewathta,Kiralogama	742301988v		407 D 1
68	D.K.B.Jayantha Sisira Dissanayake	407 D 01 Canal,Kiralogama,Thalawa	780692502v		407 D 1
69	Aruna Sanjeewa	Ketakala,Kiralogama		778272601	407 D 1
70	Palitha Jayasundara	Ketakala,Kiralogama		761895704	407 D 1
71	Ananda Dissanayaka	Ketakala,Kiralogama		715521255	407 D 1
72	P.Wijethunga	Ketakala,Kiralogama		778038839	407 D 1
73	R.M.Thilanga Dinesh Kumara	407,Bandaragama,Kiralogama	951934062v	713599172	407 D 2
74	S.L.C.Dissanayake	159,Sandaresgama,Kiralogama	882721566v	715455559	407 D 2
75	R.M.Sumudu Sanjeewa Rathnayake	407,Bandaragama,Kiralogama	822094716v	768530869	407 D 2

No	Farmer Name	Address	ID Number	T.P Number	Group Name
76	R.Somapala	407,Ketakala,Kiralogama	481151600v	785290579	407 D 2
77	Geetha Kumari Jayathilaka	Ketakala,Kiralogama	785161112v	779064676	407 D 2
78	Kudarala Gunarathnage Jayathilaka	Ketakala,Kiralogama	730211180v	712905651	407 D 2
79	K.G.Premarathne	Ketakala,Kiralogama	672892430v	713762013	407 D 2
80	J.Priyantha Upul Kumara Jayathilaka	Ketakala,Kiralogama	198434801817	719066016	407 D 2
81	R.Nandana Kumara	102,Sandaresgama,Eppawala	822505660v	719870419	407 D 2
82	D.K.T.Damayanthi Dissanayake	407,Paindikulama,Malwanegama	198164210035	702200050	407 D 2
83	B.G.Kusum Malkanthi	Pahalagama,Thambuttegama	197457201320	719652863	Pothiyagama,Thambuutegama
84	M.G.S.Kumara	Pahalagama,Thambuttegama	8209821770v	711420507	Pothiyagama,Thambuutegama
85	R.Nimal Rathnayake	Pothiyagama,Thambuttegama		712636393	Pothiyagama,Thambuutegama
86	D.B.Jayantha Bandara Dissanayake	403 D 03 Canal Ketakala,Kiralogama	843541151v	716015046	403 D 03
87	U.J.K.Herath	403 D 03 Canel Ketakala,Kiralogama	830142800v	716015046	403 D 3
88	U.B.Dayananda	403 D 03 Ketakala,Kiralogama	561511284v	715674915	403 D 3
89	D.M.W.Athtanayake	403 D 03 Ihalaketakala,Kiralogama	580641385v	718961013	403 D 3
90	A.M.Dissanayake	403 D 02 Ketakala,Kiralogama	743333403v	714548273	403 D 2
91	D.M.Jayawikrama Dissanayake	403 D 02 Ketakala,Kiralogama	690984474v	705035979	403 D 2
92	D.M.Rohana Dissanayake	403 D 02 Ketakala,Kiralogama	721202062v	715507612	403 D 2
93	Sarath Dissanayake	403 D 02 Ketakala,Kiralogama	593421473v	712303280	403 D 2
94	S.B.A.M.Susira Kumara	403 D 02 Ketakala,Kiralogama	692743636v	768560145	403 D 2
95	H.T.Wanninayake	Ihalawewa,Kiralogama	670262766v	714885982	403 D 2
96	H.M.A.Kumarasinghe	Ihalawewa,Kiralogama	662310689v	718185964	403 D 2
97	H.M.C.Kumarasinghe	Ihalawewa,Kiralogama	770662206v	718034439	403 D 2
98	H.M.Roshan Madusanka Herath	Ihalawewa,Kiralogama	922154031v	703645700	403 D 2
99	H.M.Rasikasiri Herath	Ihalawewa,Kiralogama	783012189v	716255430	403 D 2
100	B.Weerasinghe	Ihalawewa,Kiralogama	611411871v	712991637	403 D 2
101	P.K.M.Dissanayake	No.62,Kelediwlwewa,Mahailukpallama	656154659v	765745500	Kelediwlwewa,Mahailukpallama
102	W.M.B.W.Thilakarathne	No.59,Kelediwlwewa,Mahailukpallama	660123529v	711420860	Kelediwlwewa,Mahailukpallama
103	S.T.Dissanayake	No.70,Kelediwlwewa,Mahailukpallama	921962363v	715210149	Kelediwlwewa,Mahailukpallama
104	D.T.Rathnayake	No.191,Kelediwlwewa,Mahailukpallama	521995017v	714296452	Kelediwlwewa,Mahailukpallama
105	H.G.A.Indrani Ramyalatha	No.37,Kelediwlwewa,Mahailukpallama	618532798v	712494175	Kelediwlwewa,Mahailukpallama
106	D.K.P.Dissanayake	No.56,Kumbukanda,Mahailukpallama	660123529v	711420860	Kelediwlwewa,Mahailukpallama
107	D.R.B.S.B.Dissanayake	No.187,Kelediwlwewa,Mahailukpallama	770474205v	712121903	Kelediwlwewa,Mahailukpallama

No	Farmer Name	Address	ID Number	T.P Number	Group Name
108	Jayarathne Illangasinghe	No.64,Kelediwlwewa,Mahailukpallama	653652658v	775177936	Kelediwlwewa,Mahailukpallama
109	D.K.Piyarathne	No.189,Samanalapura road,Kelediwlwewa	600531034v	718165992	Kelediwlwewa,Mahailukpallama
110	D.R.Somawathi	No.60,Kelediwlwewa,Mahailukpallama	488430483v	252249570	Kelediwlwewa,Mahailukpallama
111	Soma Kumari	Godayaya,Ipalogama	786331943v	763416157	Kelediwlwewa,Mahailukpallama
112	N.D.R.Nanayakkara	Godayaya,Ipalogama	661510382v	727719719	Kelediwlwewa,Mahailukpallama
113	A.D.K.S.Kumari	Godayaya,Ipalogama	1965000423	717057093	Kelediwlwewa,Mahailukpallama
114	A.M.I.E.Adhikari	Godayaya,Ipalogama	952120174v	703090388	Kelediwlwewa,Mahailukpallama
115	L.P.Sarath Kumara	No.35,Puliyankulama,Mahailukpallama	663232494v	716173338	Kelediwlwewa,Mahailukpallama
116	K.B.Dissanayake	No.49,Kelediwlwewa,Mahailukpallama	850570990v	718423777	Kelediwlwewa,Mahailukpallama
117	D.M.S.G.Dissanayake	No.34,Kelediwlwewa,Mahailukpallama	613523835v	701616130	Kelediwlwewa,Mahailukpallama
118	H.M.P.Herath	Mudunegama,Thalawa	600513745v	713120112	Mudunegama
119	N.G.Nissanka Sisira Kumara	409/3/280, Nawa Gagasiripura,Thalawa	198813510010		Mudunegama
120	G.A.Udulawathi	409/2,Mudunegama	197759101239	779251863	Mudunegama
121	K.G.Thilakarathne Banda	409/1/241,Thalawa	633163375v	710510446	Mudunegama
122	B.M.Thilakarathne	409/1/239, Thalawa	197308502568	716899536	Mudunegama
123	K.M. Senawirathne	409/2/134, Thalawa		713802040	Mudunegama
124	E.R.Priyantha Ekanayake	409/3/39,Thalawa	940951119v	772704115	Mudunegama
125	E.M.Priyantha Ekanayake	409/2/150, Mudunegama,Thalawa	713653640v	716835806	Mudunegama
126	G.A.Dayananda	409/2/99, Canal road,Thalawa		769399671	Mudunegama
127	B.B.H.Senawirathne Banda	410/3/108, Kumaraeliya,Thalawa		76416932	Mudunegama
128	K.G.Tikiribanda	409/1/240, Thalawa	196928601442	783559123	Mudunegama
129	K.Jayarathne	Nawakkulama,Galadiwlwewa	581223560v	715168223	Nawakkulama,Galadiwlwewa
130	A.Somapala	Nwakkulama,Gaaladiwlwewa	513010265v	719496376	Nawakkulama,Galadiwlwewa
131	R.P.Sunil	Nwakkulama,Gaaladiwlwewa	853245194v	775553223	Nawakkulama,Galadiwlwewa
132	R.P.Nimal Samarathunga	Nwakkulama,Gaaladiwlwewa	197824002257	782584687	Nawakkulama,Galadiwlwewa
133	Samantha Bandara	Nwakkulama,Gaaladiwlwewa	742942740v	779994907	Nawakkulama,Galadiwlwewa
134	Amila Senadeera	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa
135	K.G.Upali Weerawardhane	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa
136	Prasanna Kumara	Nwakkulama,Gaaladiwlwewa	800562740v	702414829	Nawakkulama,Galadiwlwewa
137	A.Gunawardhane	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa
138	W.G.Nilupa Sanjeewani	Nwakkulama,Gaaladiwlwewa		776121670	Nawakkulama,Galadiwlwewa
139	K.G.Chinthaka Rohan	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa

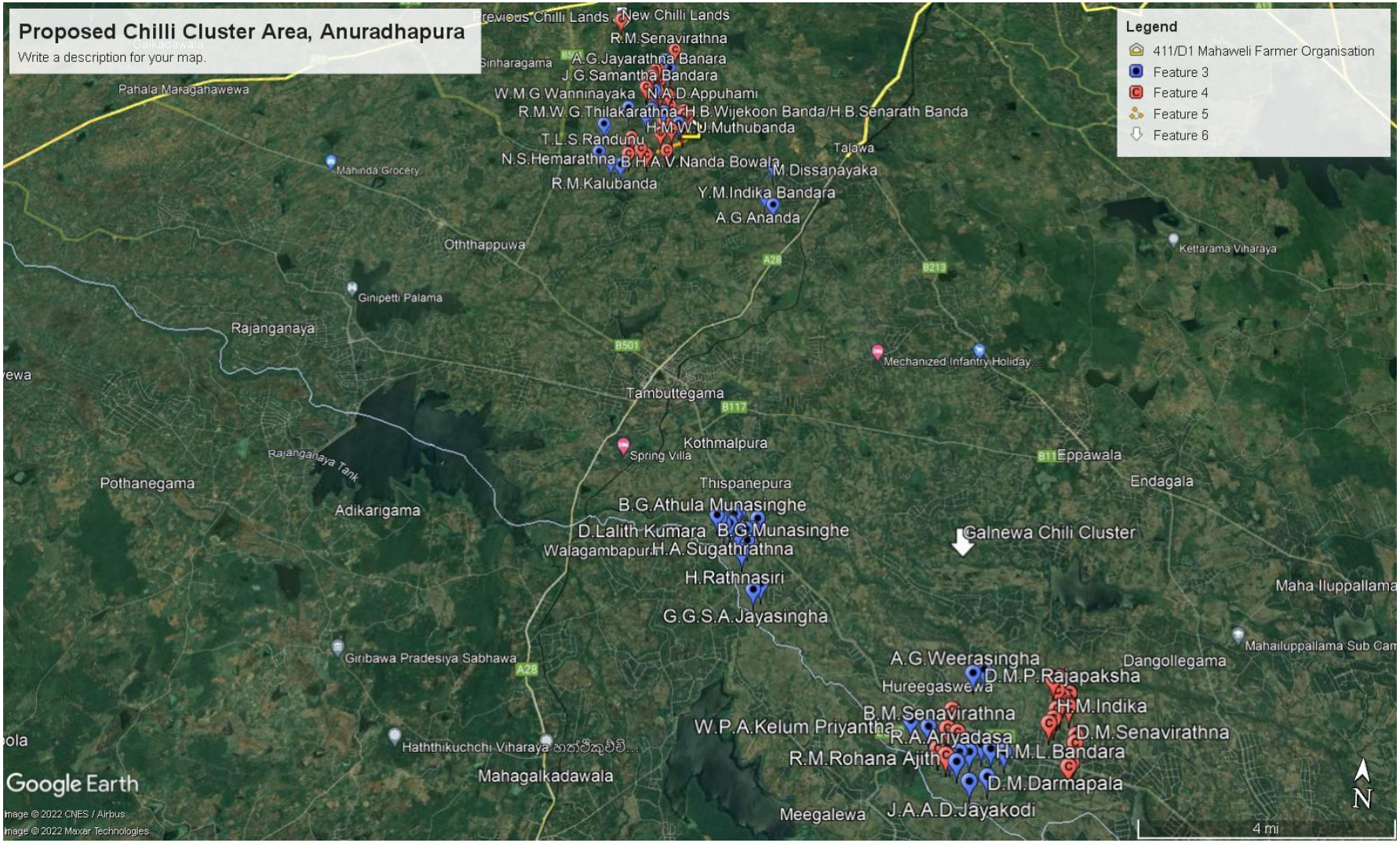
No	Farmer Name	Address	ID Number	T.P Number	Group Name
140	Chathuranga Lakmal	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa
141	W.M.Rathnayeka	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa
142	K.W.Anura Wrawita	Nwakkulama,Gaaladiwlwewa	650913205v	702414829	Nawakkulama,Galadiwlwewa
143	D.M.Anula Kumari	Nwakkulama,Gaaladiwlwewa			Nawakkulama,Galadiwlwewa
144	D.M.Nawarathne	Nwakkulama,Gaaladiwlwewa	662931632v	772644987	Nawakkulama,Galadiwlwewa
145	D.M.Kamal Priyantha Dissanayake	Nwakkulama,Gaaladiwlwewa	720271818v	729022610	Nawakkulama,Galadiwlwewa
146	A.G.Rawindra Kumara	Nwakkulama,Gaaladiwlwewa	721312842v	773130267	Nawakkulama,Galadiwlwewa
147	G.M.Rukman Dissanayake	Nawa Haguranketha	790842812v	775124778	Nawa Haguranketha
148	E.G.Ariyasiri	Nawa Haguranketha	463480088v		Nawa Haguranketha
149	A.R.M.Wasantha Rathnayake	Nawa Haguranketha			Nawa Haguranketha
150	A.H.R.M. Samarakoon Banda	Nawa Haguranketha			Nawa Haguranketha
151	Sunil Jayaweera	Nawa Haguranketha	197401204129	766240432	Nawa Haguranketha
152	D.M.P.G.Dissanayake	Nawa Haguranketha	751160110v	770603527	Nawa Haguranketha
153	W.M. Senawirathne Banda	Nawa Haguranketha	620731889v	776951956	Nawa Haguranketha
154	P.K.G.Upul Priyanka	Nawa Haguranketha	753553193v	776070093	Nawa Haguranketha
155	K.M.Jayantha Kekulandara	Nawa Haguranketha	773503737v	713703630	Nawa Haguranketha
156	S.K.Rajanayake	Nawa Haguranketha		702046296	Nawa Haguranketha
157	H.G.Sumanathissa	Nawa Haguranketha		773093434	Nawa Haguranketha
158	K.M.Aberathne	Nawa Haguranketha			Nawa Haguranketha
159	D.G.Sarath Kumara	Nawa Haguranketha	732123890v	761778863	Nawa Haguranketha
160	Lakshman Kumara Wijeekoon	Nawa Haguranketha	791421900v	775002785	Nawa Haguranketha
161	A.G.Mahinda Abesinghe	Nawa Haguranketha			Nawa Haguranketha
162	R.M.Karunarathne	Nawa Haguranketha	691050998v	772892761	Nawa Haguranketha
163	M.G.Aberathne	Nawa Haguranketha		770533185	Nawa Haguranketha
164	S.M.Wijeerathne	Nawa Haguranketha			Nawa Haguranketha
165	Gamini Rathnayake	Nawa Haguranketha	742713164v	771130802	Nawa Haguranketha
166	D.M.Samantha Dissanayake	Nawa Haguranketha			Nawa Haguranketha
167	Wasantha Udayanga Silva	Nawa Haguranketha		713216862	Nawa Haguranketha
168	D.M.Sunil Dissanayake	Nawa Haguranketha		773057659	Nawa Haguranketha
169	Y.M.Keerthirathne	411/1,Hirigollegama,Thalawa		778158595	Hirigollegama
170	K.M.Kumarasinghe	411/1,Hirigollegama,Thalawa		779303083	Hirigollegama
171	B.M.Dingiribanda	411/1,Hirigollegama,Thalawa		767825668	Hirigollegama

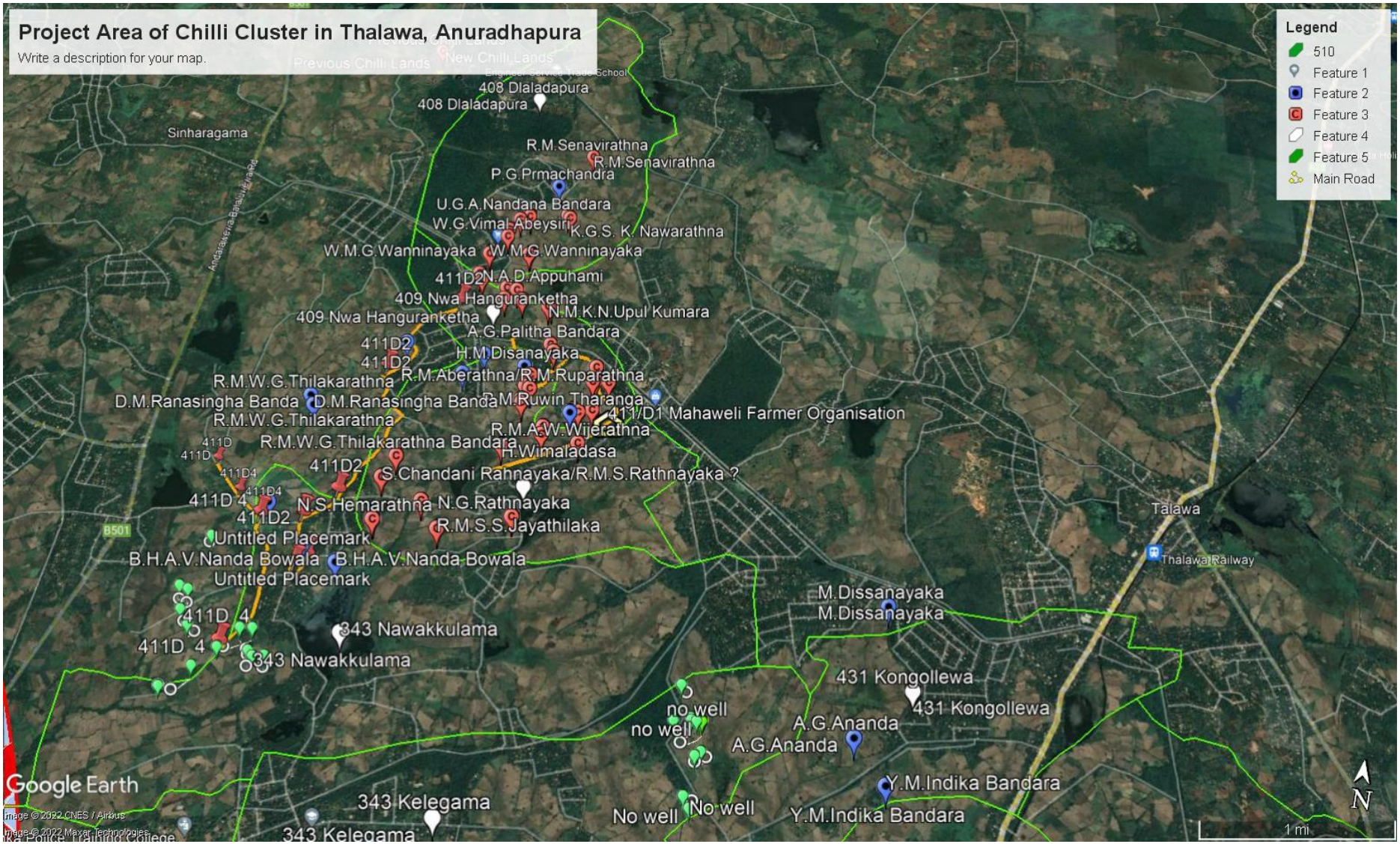
No	Farmer Name	Address	ID Number	T.P Number	Group Name
172	P.Wasantha Kumara	411/1,Hirigollegama,Thalawa		761513451	Hirigollegama
173	S.Sidath Kumara	411/1,Hirigollegama,Thalawa		767693969	Hirigollegama
174	W.Palitha Dissanayake	411/1,Hirigollegama,Thalawa		774730110	Hirigollegama
175	R.M.S.Rathnayake	411/1,Hirigollegama,Thalawa		776247350	Hirigollegama
176	R.Rathnayake	411/1,Hirigollegama,Thalawa		771697914	Hirigollegama
177	U.B.Sujith Gunawardhana	411/1,Hirigollegama,Thalawa		772747941	Hirigollegama
178	R.M.Aberathne	411/1,Hirigollegama,Thalawa		776434698	Hirigollegama
179	R.M.Ruparathne	411/1,Hirigollegama,Thalawa		712565486	Hirigollegama
180	C.K.Dissanayake	411/1,Hirigollegama,Thalawa		779705974	Hirigollegama
181	D.G.Jayathissa	411/1,Hirigollegama,Thalawa		776685213	Hirigollegama
182	W.W.Kumara	411/1,Hirigollegama,Thalawa		705812485	Hirigollegama
183	Chandana Ariyarathne	411/1,Hirigollegama,Thalawa		774730110	Hirigollegama
184	W.V.Nimal Shantha	411/1,Hirigollegama,Thalawa		768843512	Hirigollegama
185	K.M.Nawarathnebanda	411/1,Hirigollegama,Thalawa		705500661	Hirigollegama
186	W.M.Sagara Upul Sanjeewa	411/1,Hirigollegama,Thalawa		781258666	Hirigollegama
187	W.Amararathne	411/1,Hirigollegama,Thalawa		740868975	Hirigollegama
188	G.G.Anura Bandara	408 D3 Canal,Thalawa	830154760v	772456844	408 D 3
189	L.G.Thushara	408 D3 Canal,Thalawa	866128171v	714545744	408 D 3
190	D.G.Muthubanda	408 D3 Canal,Thalawa	785265233v	772525254	408 D 3
191	K.G.Ranjith Bandara	408 D3 Canal,Thalawa	861513831v	774123544	408 D 3
192	H.M.P.G.Saman Priyantha	408 D3 Canal,Thalawa	842669372v	768955527	408 D 3
193	G.Ajith Samantha	408 D3 Canal,Thalawa	842524733v	784512855	408 D 3
194	K.G.Janaka Ranjith	408 D3 Canal,Thalawa	880413201v	714578897	408 D 3
195	K.Piyadasa	408 D3 Canal,Thalawa	711972343v	777564112	408 D 3
196	A.G.Jayawardana	408 D3 Canal,Thalawa	862334280v	779635795	408 D 3
197	R.M.Chandika Prasanna	408 D3 Canal,Thalawa	822595049v		408 D 3
198	A.G.Jayarathne	408 D3 Canal,Thalawa	782752928v	782548566	408 D 3
199	T.G.Kiribanda	408 D3 Canal,Thalawa	680624470v	702528998	408 D 3
200	T.G.Ranjith Dissanayake	408 D3 Canal,Thalawa	197938033188	715823199	408 D 3

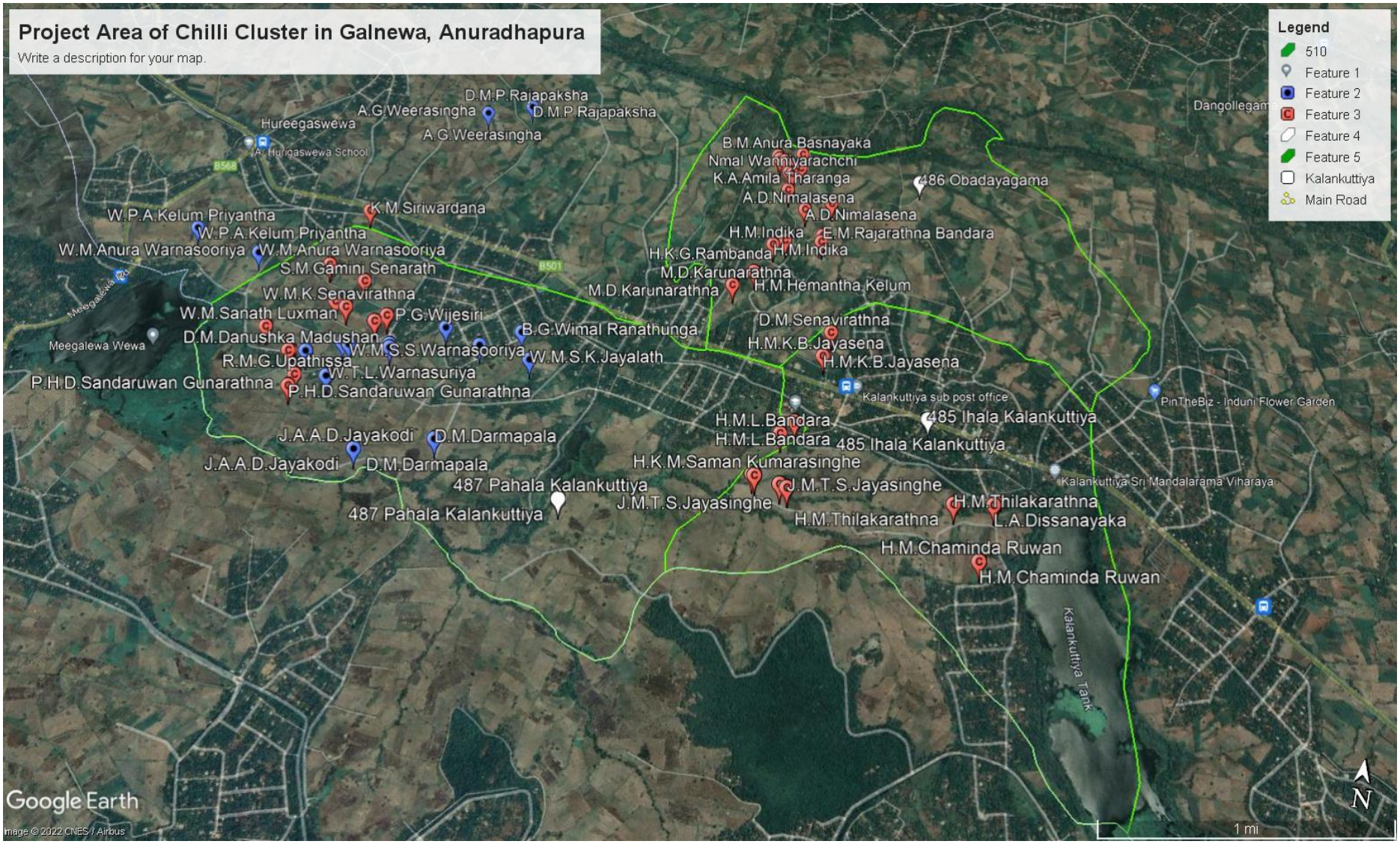
ANNEXURE 3: INSTITUTIONAL ROLES IN MAHAVELI SYSTEM H (THALAWA AND GALNEWA BLOCKS)

Agency/ committee	Officers responsible	Official functions assigned	Expected role in cluster development programme
RPM's Office	RPM	Management of all the sectors in the System H and leading the team to achieve development targets	Plan, guide, review and monitor all development, Administration and management functions. Keep coordination with the Mahaveli Authority of Sri Lanka (MASL) HQ
	DRPM(Agriculture)	Provide extension support through Field Staff and maintain data system	Coordinate all the extension activities on new technology and crop management
	DRPM (Engineering)	All the irrigation matters, water management, water allocation and O&M of canal systems	Provide guidance to Block Managers staff relevant to irrigation. Involve for water issue problems
	DRPM (Institutional Development)	Coordinate all Institutional development activities in the system	Provide guidance to Block Managers to promote participation for proposed FPO programme in the system
	DRPM (Lands)	Coordinate and settlement of land issues in the system	Assist farmers' organisations (FOs) to settle land disputes and advise Block Manager accordingly
Agrarian Development Department	Agrarian Development Officers, Galnewa and Thalawa	Administering of Agrarian Research and Productivity Assistants attached to Agrarian Service centre. FPO registration under 56A and 56B as per request of Mahaveli Officials	Coordinate activities related to input supplies and make relevant the Agrarian Research and Productivity Assistants to work with MEA Officials
	Agrarian Research and Production Assistants	Assist the Agrarian Development Officer to implement field programmes with Mahaveli Officials	Communicate with FO members. Organise farmer meetings when requested by the Mahaveli Officials (Agriculture Development Officer or Senior Officers)
Project Agriculture committee at system level	Members of Project Agriculture Committee (RPM, DS Development Officer, All heads of Mahaveli System H. Block Managers and staff officers)	Taking up for discussion of all issues related to agriculture, input supplies, seasonal cultivation decisions and marketing of agriculture produce. Find alternative solutions and assign the responsibilities for remedial actions	Take this forum to discuss the issues related to chilli cultivation and get the active involvement of relevant line agency officers
Field Crop Research and Development Institute (Maha Illuppallama)	Entomologist, Pathologist and Irrigation Agronomist	Carry out research activities on pest and diseases, new irrigation systems and cropping systems related to Field crops	Provide required research information on chilli cultivation and provide assistance to overcome agronomic issues

ANNEXURE 4: RESIDENTIAL/SENSITIVE LOCATIONS




Project Area of Chilli Cluster in Thalawa, Anuradhapura
Write a description for your map.
Legend
510
Feature 1
Feature 2
Feature 3
Feature 4
Feature 5
Main Road
Previous Chilli Lands
New Chilli Lands
408 Dlaladapura
Sinharagama
R.M.Senavirathna
P.G.Prmachandra
U.G.A.Nandana Bandara
W.G.Vimal Abeysiri
K.G.S. K. Nawarathna
W.M.G.Wanninayaka
411D2
N.A.D.Appuhami
409 Nwa Hanguranketha
N.M.K.N.Upul Kumara
A.G.Palitha Bandara
H.M.Disanayaka
R.M.Aberathna/R.M.Ruparathna
R.M.W.G.Thilakarathna
D.M.Ranasingha Banda
P.M.Ruwin Tharanga
411/D1 Mahaweli Farmer Organisation
R.M.A.W.Wijerathna
R.M.W.G.Thilakarathna Bandara
H.Wimaladasa
411D
411D4
S.Chandani Rahnayaka/R.M.S.Rathnayaka ?
411D 4
N.S.Hemarathna
N.G.Rathnayaka
R.M.S.S.Jayathilaka
B501
Untitled Placemark
B.H.A.V.Nanda Bowala
Talawa
Thalawa Railway
M.Dissanayaka
343 Nawakkulama
431 Kongollewa
no well
A.G.Ananda
Y.M.Indika Bandara
343 Kelegama
No well
Google Earth
1 mi
N


Project Area of Chilli Cluster in Galnewa, Anuradhapura
Write a description for your map.
Legend
510
Feature 1
Feature 2
Feature 3
Feature 4
Feature 5
Kalankuttiya
Main Road
D.M.P.Rajapaksha
A.G.Weerasingha
D.M.P.Rajapaksha
A.G.Weerasingha
Hureegaswewa
A/ Hurigaswewa School
B568
B.M.Anura Basnayaka
Nmal Wanniyarachchi
K.A.Amila Tharanga
486 Obadayagama
A.D.Nimalasena
A.D.Nimalasena
K.M.Siriwardana
W.P.A.Kelum Priyantha
W.P.A.Kelum Priyantha
H.M.Indika
E.M.Rajarathna Bandara
W.M.Anura Warnasooriya
W.M.Anura Warnasooriya
H.M.Indika
H.K.G.Rambanda
S.M.Gamini Senarath
M.D.Karunarathna
B501
M.D.Karunarathna
H.M.Hemantha Kelum
W.M.K.Senavirathna
W.M.Sanath Luxman
P.G.Wijesiri
D.M.Senavirathna
B.G.Wimal Ranathunga
D.M.Danushka Madushan
H.M.K.B.Jayasena
Meegalewa Wewa
W.M.S.S.Warnasooriya
W.M.S.K.Jayalath
H.M.K.B.Jayasena
R.M.G.Upathissa
W.T.L.Warnasuriya
P.H.D.Sandaruwan Gunarathna
P.H.D.Sandaruwan Gunarathna
Kalankuttiya sub post office
PinTheBiz - Induni Flower Garden
H.M.L.Bandara
485 Ihala Kalankuttiya
J.A.A.D.Jayakodi
D.M.Darmapala
H.M.L.Bandara
485 Ihala Kalankuttiya
J.A.A.D.Jayakodi
D.M.Darmapala
H.K.M.Saman Kumarasinghe
Kalankuttiya Sri Mandalarama Viharaya
487 Pahala Kalankuttiya
J.M.T.S.Jayasinghe
J.M.T.S.Jayasinghe
H.M.Thilakarathna
487 Pahala Kalankuttiya
H.M.Thilakarathna
L.A.Dissanayaka
H.M.Chaminda Ruwan
H.M.Chaminda Ruwan
Kalankuttiya Tank
Google Earth
Image © 2022 CNES / Airbus
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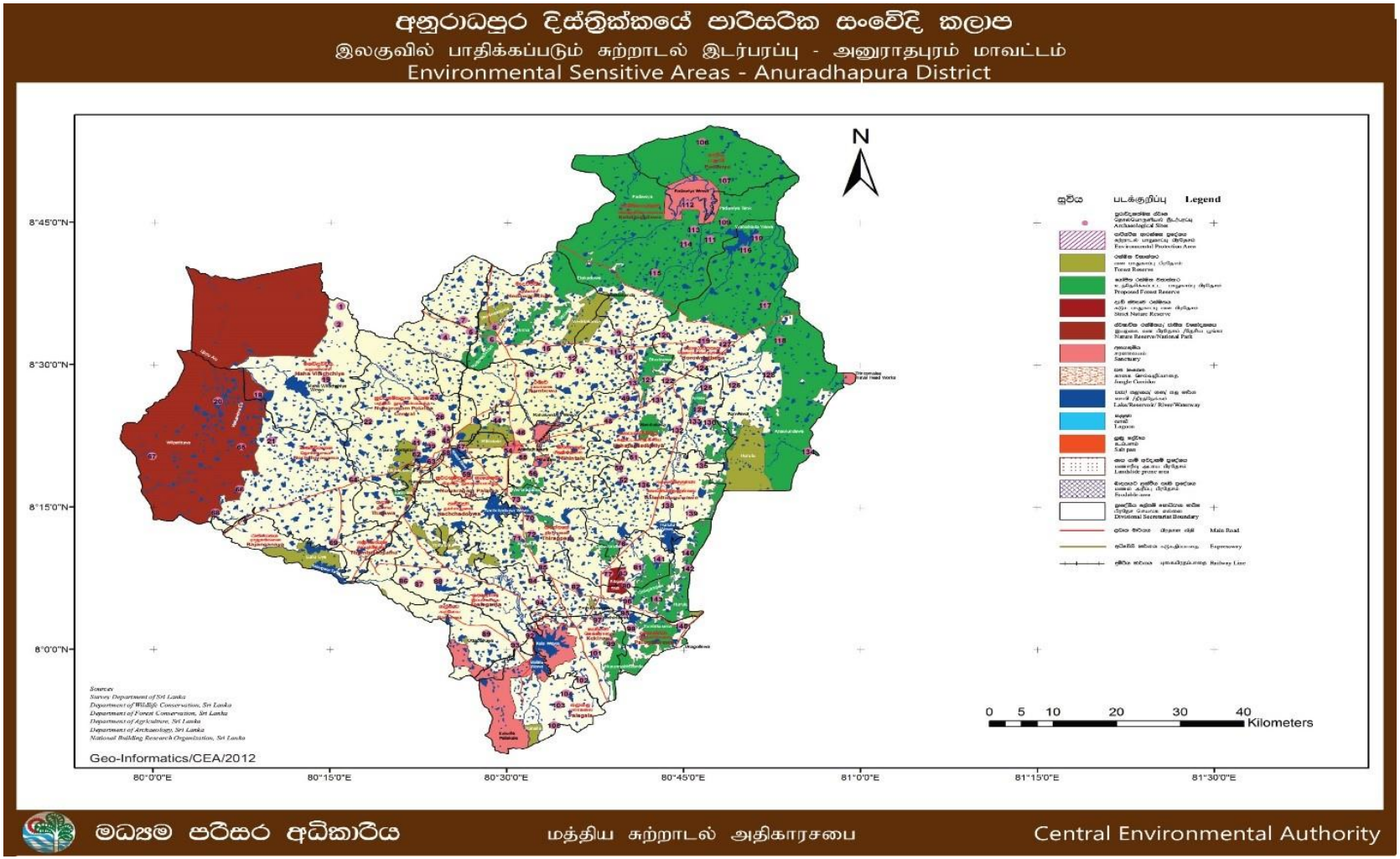

The area has not been identified as a special habitat area as per the sensitive areas map of CEA. However, this reservoir provides important habitats for a wide range of species including migratory birds and waterfowl, amphibians and fish.

ANNEXURE 5: ESTABLISHMENT OF COMPOST PRODUCTION UNIT

1. Rationale

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

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

2. Integrated plant nutrition system

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

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 modernisation investment and activity is to encourage farmers to produce total requirement of compost within the cluster areas because transport of compost from long distance is not economical. Therefore, it is expected to encourage some producers to make large scale productions on commercial basis.

3.Objectives of the compost production programme

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

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

4. Site selection

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

5. Steps of compost production process

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

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

- Selection of farmers or FPOs those who can do compost production
- Registration of compost production in relevant authorities
- Collection of information on raw- materials availability in each cluster areas
- Selection of suitable sites in each cluster
- Establishment of compost production units in each cluster
- Training of farmers in groups through field demonstrations on complete package of the compost production

- Educate farmers on quick compost production technologies, maintenance of the quality, storage, stocks, run as a business etc.
- Arrange compost production with individuals or FPOs
- Laboratory testing of produced compost samples for quality testing
- Design bags with brand names and other relevant details
- Guide for marketing of compost
- Tools (see following table)

Table 12: Buildings, tools and equipment required for compost production unit (100 tonnes/month)

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

8. Heap method of compost production

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

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

The general process of producing compost involves piling the organic waste in long rows. The heap is usually started with 20-30 cm layer of different raw materials. Alternate layers should be placed with different raw materials available in the area in the heap. The manure, dung and animal urine are excellent for composting due to high nitrogen content and less C/N ratio. The application of Eppawala rock phosphate is also an important step in compost production. It is well-known fact that quality of compost could be improved when rock phosphate is added. Different raw materials are placed until the pile is 1.5

- 2.0m high. It is advisable to maintain the width about 2 - 2.5m at the base for successful aeration. The sides are tapered so that the top is about 0.5m narrower in width than the base. The substrates should be piled loosely in a compost heap to provide better aeration within the heap. After 3-4 layers of raw materials normally apply sufficient water and compost activator/inoculant. After formation, the pile is covered with black polythene to retain heat and moisture but leave a sufficient space at the bottom for ventilation. The active composting stage is followed by turning stage, and the pile temperature decreases gradually with the time. Therefore, turning/mixing should be done every 3 - 4 weeks interval to activate the decomposition of raw materials. However, maximum three turning/mixing steps are recommended during the whole period of the composting process due to high labour involvement for this process. At each turning, the material is mixed thoroughly and moistened with water and apply compost activator/inoculant such as Trichoderma fungus. In general, the C/N ratio should be maintained with carbonaceous and nitrogenous materials for successful decomposition. Under such conditions, compost can be typically produced within 8-12 weeks depend on raw materials used. In reasonably mature compost contains a wide range of particle sizes from fine grains to partly decomposed twigs and un-compostable fragments from refuse. Therefore, compost may need sieving by 4mm sieve before sending to the market. Mature compost should have a crumbly texture, an earthy smell and be dark brown or black in colour.

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

9. Management of compost production unit

a. Approvals

   Before initiating the compost facility, the person or FPO shall obtain the approval from relevant authorities of the area. 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 needs to be prepared to market the compost in various market segments such as farmers, nurseries, institutions, home garden etc. The strategy includes product design, pricing, distribution and promotional strategies. The strategy will be used to market compost to ensure that activity is sustainable.

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

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

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

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

- Training farmers, extension officers, traders and other relevant target groups
- Field demonstrations, field days, field tours etc.
- Outdoor advertising / Billboards
- Use mass media for various promotional activities
- Poster displays in strategic places
- Distribution of samples for trial use
- Granting of promotional discounts on purchases
- Arrange credit facilities

11. Environmental impact

The unit will be established to minimise the environmental impact including measures to minimise odour, dust, leachate, etc. Breakdown of organic matter by aerobic oxidation produces no odours. It is important therefore, to supply sufficient air during the composting process. Another important aspect of some of the materials that can be used in composting is their attractiveness of flies. To avoid the problem, the suggestion is maintaining high temperature. Fly larvae are unlikely to survive if temperature is above 550C. In addition, by turning the heap and placing the outer material in the hot central region many of the larvae will be destroyed; satisfactory fly control is possible by proper turning. Similarly, maintain the high temperature is the most significant factor in causing the death of pathogens too. In addition, steps should be taken to avoid release of leachate to the environment by avoiding excess water use, construction a place to collect leachate and reuse for compost production etc. As a further safety measures, it is recommended that no compost unit be set up close to drinking water source. This should prevent any liquid percolating from the compost heap into the water supply, particularly during the rainy season.

ANNEXURE 6: 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.

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- 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 , 2020

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

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